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MASSACHUSETTS
Department of Environmental Protection

Water Quality Certificate

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Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection
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August 5, 2025

Massachusetts Department of Transportation
Highway Division
10 Park Plaza, Room 7360
Boston, MA 02116
ATTN: Erica Larner

RE: 401 WATER QUALITY CERTIFICATION
BRP WW 10, Major Fill Project
BRP WW 08, Minor Dredge Project
Reconstruction of Route 38 (Main Street) from Route 62 to the Woburn City Line
Wilmington, MA

401 WQC Filing Number: 25-WW26-0013-APP
USACE Application No. NAE-2025-00171
MassDOT File Number: 608051

Dear Ms. Larner:

The Massachusetts Department of Environmental Protection (MassDEP) has reviewed your application for a Water Quality Certification (WQC), as referenced above. This application was deemed complete on August 1, 2025. In accordance with the provisions of MGL Ch. 21, §§26-53 and Section 401 of the Federal Clean Water Act as amended (33 U.S.C. §1251 et seq.), it has been determined there is reasonable assurance the proposed project will be conducted in a manner which will not violate applicable water quality standards (314 CMR 4.00) and other applicable requirements of state law.

The proposed project consists of corridor improvements along an approximately 2.1-mile stretch of Route 38 (Main Street) from Route 62 (Church Street/Burlington Avenue) to the Woburn city line in Wilmington (the Project). The Project includes roadway reconstruction and repaving, widening less than a lane, adding shoulders, intersection improvements, installation of sidewalks, bridge and culvert replacement, Bordering Vegetated Wetland (BVW) and Land Under Water (LUW) replication and restoration, and stormwater infrastructure improvements. The Project purpose is to improve the roadway infrastructure, reduce traffic back-ups on entering side streets, improve the existing drainage system, and provide increased safety for drivers, bicyclists, and pedestrians. The bridge over Maple Meadow Brook to be replaced (Bridge No. W-38-011) is stated as being structurally deficient.

This information is available in alternate format. Please contact MassDEP at 617-292-5500.
TTY# MassRelay Service 1-800-439-2370
MassDEP Website: www.mass.gov/dep

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Existing Conditions

Route 38 is classified as an Urban Principal Arterial and extends in a primarily north/south alignment from the Woburn city line to Route 62. Pavement widths generally vary from approximately 30 to 34 feet. Travel lanes are 12 to 14 feet wide with two- to five-foot-wide shoulders. Approximately 5.5-foot-wide sidewalks are present at various locations along Route 38 and its intersections along the Project corridor. There are no other pedestrian or bicycle accommodations along the roadway. Several underground and overhead utilities are present along the corridor including gas, water, sewer, stormwater, and electric.

Maple Meadow Brook is a perennial stream that flows northeast under Route 38 at approximate Station 253+75. The bridge over Maple Meadow Brook is a single span with a clear span width of 11.7 feet and a length of 43 feet. An unnamed intermittent stream flows northeast under Route 38 at approximate Station 218+00 through a 3.5-foot-wide, 1.5-foot-tall, 46-foot-long box culvert. As distinct bankfull width indicators are not present immediately upstream or downstream of the crossings, StreamStats was used to estimate a bankfull width of approximately 25 feet for Maple Meadow Brook and approximately 3.14 feet for the intermittent stream. BVWs are present at various locations along both sides of the Route 38 corridor.

A portion of the Project will occur within a Federal Emergency Management Agency (FEMA) 1% annual chance of flooding zone (Zone AE) and regulatory floodway associated with Maple Meadow Brook. The FEMA Flood Insurance Study identified a Base Flood Elevation (BFE) of 82.9 feet (NAVD88) upstream of the bridge and 81.5 feet downstream; however, a hydraulic study determined the BFE to be 84.09 feet. Nearly the entire Project is located within a Zone II Wellhead Protection Area. Stormwater currently flows untreated to adjacent areas through a combination of country drainage and closed drainage systems.

Project Description

Full depth reconstruction of Route 38 will occur from Route 62 to Eames Street, along with micromilling and resurfacing from Eames Street to the Woburn city line. The Project also includes intersection improvements including realignments to improve sight distances and geometry. Two 11-foot-wide travel lanes will be provided along Route 38, one in each direction, with five-foot-wide bicycle lanes on each side. The roadway will be widened by a maximum of 7.5 feet for approximately 900 feet south of the Route 62 intersection. A 5.5-foot-wide sidewalk will be installed along one or both sides of the roadway depending on location.

The existing bridge over Maple Meadow Brook will be replaced with a prefabricated open bottom three-sided structure supported by cast-in-place footings on micropiles. Due to potential downstream flooding concerns with a wider structure as demonstrated by a hydraulic study, the width of the new structure will maintain approximately the same clear span width as the existing structure. As such, the new bridge will not result in an increase in flood elevations. Natural streambed material will be placed to a depth of 18 inches to match the existing streambed elevation, over 2.5 feet of riprap scour protection. A temporary four-foot-wide pedestrian bridge will be installed west of the existing bridge to provide safe pedestrian access while the bridge is being replaced.

The existing culvert at Station 218+00 will be replaced with a four-foot-wide, three-foot-tall, 55.3-foot-long precast concrete box culvert. The box culvert will be embedded with 12 inches of natural streambed material; in addition, 12 inches of riprap scour protection will be installed at the ends topped with 12 inches of natural streambed material to meet grade.

A compensatory flood storage area will also be constructed on the west side of Route 38 from approximate Stations 257+50 to 260+00. Invasive species will be managed prior to any clearing or soil disturbance in accordance with an Invasive Plant Management Strategy to be approved by MassDEP. Several stormwater infrastructure improvements will be implemented as described below.

BVW and LUW Impacts

The Project will result in 2,630 square feet (sf) of permanent and 2,834 sf of temporary impacts to BVWs, and 2,195 sf of permanent and 601 sf of temporary impacts to LUW. Permanent BVW and LUW impacts are required for installation of the new stream crossing structures and riprap scour protection, and grading associated with roadway side slopes. Temporary BVW and LUW impacts are required for installation of erosion and sediment controls, construction period access to work areas, and for the temporary pedestrian bridge. A total of 715 cubic yards (cy) of dredging will be required; 650 cy in Maple Meadow Brook, and 65 cy in the unnamed intermittent stream. Dredging is required to install new stream crossing structures and riprap scour protection. In an email dated February 3, 2025, the Massachusetts Division of Fisheries and Wildlife stated no in-water work time of year restrictions are required for the Project.

Alternatives Analysis

Constraints adjacent to Route 38, including but not limited to commercial and residential properties, BVWs and LUW, and numerous utilities make realigning Route 38 to further avoid BVW and LUW impacts not practicable. Lane widths have been reduced from 12 feet to the minimum practicable width of 11 feet to minimize the roadway width and impervious surface. Permanent impacts from riprap scour protection have been avoided in BVWs on the downstream side of the Maple Meadow Brook crossing. Permanent BVW impacts associated with grading were also avoided on the downstream side of the intermittent stream crossing. A retaining wall was determined to be impractical to avoid or minimize BVW and LUW impacts along the west side of the roadway from Stations 238+50 to 241+00, and instead a 2:1 side slope is proposed to avoid and minimize BVW and LUW impacts to the extent practicable.

BVW and LUW Replication and Restoration

Permanent BVW impacts will be mitigated through construction of a 3,510 sf BVW replication area east of approximate Station 256+50 adjacent to BVW E under the supervision of a qualified Wetland Scientist. The area will be excavated to 12 to 18 inches below the adjacent BVW elevation, backfilled with wetland soil to the existing adjacent BVW elevation, planted with native trees and shrubs, and a native wetland seed mix will be applied. Temporary BVW impacts will be restored in place by grading to pre-construction contours as needed and applying a native wetland seed mix.

As previously discussed, Maple Meadow Brook and the unnamed intermittent stream will be restored by placement of 18 inches and 12 inches of natural streambed material, respectively, to match the existing

streambed elevations. Suitable native streambed material dredged during the Project will be stockpiled and reused as available.

Stormwater Management Standards

The Project will increase impervious surface by 1.4 acres (60,722 sf) and qualifies as a redevelopment project as defined at 314 CMR 9.02 as widening will be limited to less than the width of a single lane. Through construction of an infiltration basin and sediment forebay and two subsurface infiltration systems with isolator rows, and installation of deep sump catch basins throughout the corridor, Stormwater Management Standard 3 is exceeded using the macro approach. Stormwater Management Standard 2 is met to the maximum extent practicable, and Stormwater Management Standard 4 is met for all new impervious surfaces and met to the maximum extent practicable for existing impervious surfaces. A complete evaluation concluded additional locations for Stormwater Control Measures (SCMs) are not practicable within the Project area. Stormwater runoff will remain as country drainage where SCMs are not practicable.

Stormwater Management Standard 6 will be met to the maximum extent practicable by construction of an infiltration basin with a sediment forebay and deep sump catch basins for pretreatment within the Zone II Wellhead Protection Area. Infiltration basins are highly recommended within Zone II Wellhead Protection Areas per the Stormwater Handbook.

Stream Crossing Standards

The bridge over Maple Meadow Brook will meet all Stream Crossing Standards except Standard 3 which will be met to the maximum extent practicable in accordance with 314 CMR 9.06(2)(b)4. As demonstrated in the hydraulic study, a wider opening would cause downstream flooding; therefore, a crossing that meets 1.2 times the bankfull width is not practicable.

The box culvert at Station 218+00 will fully meet Stream Crossing Standards 3, 4, and 5, and will meet Standards 1, 2, and 6 to the maximum extent practicable in accordance with 314 CMR 9.06(2)(b)4. An open bottom or larger opening culvert is not practicable due to the presence of underground utilities immediately above and below the structure. The box culvert will be embedded with 12 inches of natural streambed material, which is the maximum depth practicable to maintain the hydraulic opening.

Sediment Chemistry

Sediment sample analytical results were compared to the Reportable Concentration (RC) S-1 criteria of the Massachusetts Contingency Plan. Results of the sediment samples analyzed indicated the presence of several Volatile and Semi-Volatile Organic Compounds, Extractable Petroleum Hydrocarbons, Polychlorinated Biphenyls, and metals in concentrations below the RC S-1 criteria. As previously discussed, suitable native streambed material dredged during the Project will be stockpiled and reused as available. Dredged materials determined to meet specifications for structural fill will be reused to the extent possible as backfill. All dredge and disposal activities shall occur in accordance with Special Conditions 37 through 44.

Based on a review of information provided by the applicant, MassDEP finds that this project complies with the standards described under 314 CMR 9.06 and 9.07. Public notice was provided in the Town Crier on April 17, 2025, and in the MEPA Environmental Monitor on May 7, 2025.

The Ipswich River Watershed Association (IRWA) submitted comments to MassDEP dated May 28, 2025, requesting additional information regarding the hydraulic study that was completed for the Maple Meadow Brook crossing. Specifically, the IRWA requested an illustration or discussion of the specific impacts of a wider hydraulic opening relative to downstream flooding. MassDOT provided the hydraulic study, which indicates there would be an increase in peak discharge rates and the downstream BFE if the hydraulic opening was 30 feet wide, the width required to meet 1.2 times the bankfull width of 25 feet.

Therefore, based on information currently in the record, MassDEP grants a WQC for this project subject to the following conditions to maintain water quality, to minimize impact on waters and wetlands, and to ensure compliance with appropriate state law. The Department further certifies in accordance with 314 CMR 9.00 that there is reasonable assurance the project or activity will be conducted in a manner which will not violate applicable water quality standards (314 CMR 4.00) and other applicable requirements of state law. Finally, the Department has determined that upon satisfying the conditions and mitigation requirements of this approval, the project provides a level of water quality necessary to protect existing uses and accordingly finds that the project to be implemented satisfies the Surface Water Quality Standards at 314 CMR 4.00.

Pursuant to 314 CMR 9.09(1)(d); 314 CMR 9.06(6)(a); 310 CMR 9.06(2); 314 CMR 9.07; 314 CMR 9.07(1); 314 CMR 9.09(7)(5)(c); 314 CMR 9.11; and 314 CMR 9.09(1)(e), the following Special Conditions are necessary to ensure that construction practices and stormwater controls are implemented in such a manner as to prevent degradation to wetlands and waters; ensure that practicable steps have been taken which will avoid and minimize impacts to wetlands and waters; minimize turbidity and sediment caused by construction activities; ensure that water quality is not degraded, and that biology of the waters are not negatively impacted by potential discharges; and/or maintain a record of the dredged material for reference and to ensure accountability in its transportation.

Those Special Conditions that require direct submittals to MassDEP for either review, or review and approval, are denoted by the following notation (Submittal) at the end of the condition and are summarized in Attachment A. In addition, those conditions with the (Submittal) designation shall be included in the Special Provisions and, as applicable, reviewed at the Pre-Construction Meeting.

1. All work shall be performed in accordance with the following documents and plans:

    - Application for Water Quality Certification, with cover letter and attachments. Prepared by Green International Affiliates, Inc. on behalf of MassDOT. “Reconstruction of Route 38 (Main Street) from Route 62 to the Woburn City Line Including Replacement of Bridge No. W-38-011, Route 38 over Maple Meadow Brook, Wilmington, Massachusetts”. MassDOT Contract No. 608051. Dated April 10, 2025. 401 WQC Filing Number: 25-WW26-0013-APP.
    - Plans entitled: “Massachusetts Department of Transportation Highway Division Plan and Profile of Route 38 (Main Street), W-38-003 (C99), W-38-011 (802), W-38-002 (2NQ) in

the Town of Wilmington, Middlesex County, 100% Submittal". Sheets 1 through 4; 15-19, 94 through 114; 136 through 143; 212 through 224; 228 through 231; and Impact Plans 1 through 6. Prepared by Green International Affiliates, Inc. Last revised May 2024.

- MassDEP Administrative Completeness and Technical Deficiency Review. 401 WQC Transmittal No. 25-WW26-0013-APP. Reconstruction of Route 38 (Main Street), Route 62 to the Woburn City Line, Wilmington, MA. Dated May 1, 2025.
- MassDOT Response to MassDEP Administrative Completeness and Technical Deficiency Review, with attachments. 401 WQC Transmittal No. 25-WW26-0013-APP. Prepared by Green International Affiliates, Inc. Dated May 22, 2025.
- MassDEP Supplemental Administrative Completeness and Technical Deficiency Review via email. Subject: Re: Wilmington Rt. 38 Outstanding Items. Dated June 4, 2025.
- MassDOT Response to Supplemental Administrative Completeness and Technical Deficiency Review via email. Subject: Re: Wilmington Rt. 38 Outstanding Items. Prepared by Oxana Fartushnaya, Green International Affiliates, Inc. Dated June 18, 2025.
- Certificate of the Secretary of Energy and Environmental Affairs on the Final Environmental Impact Report Rollover, Reconstruction of Route 38 (Main Street), from Route 62 to the Woburn C.L., Wilmington. EOEEA Number 16942, dated August 1, 2025.
- Order of Conditions issued by the Wilmington Conservation Commission. DEP File No.: 344-1566. Issued July 17, 2025.
- Massachusetts Division of Fish and Wildlife comments via email. Subject: Re: 608051 Wilmington Maple Meadow Brook. Prepared by Adam Kautza, Coldwater Fisheries Project Leader. Dated February 3, 2025.
- Hydraulic Report. Reconstruction on Route 38 (Main Street), Wilmington, Massachusetts. MassDOT Contract No. 608051. Prepared by Green International Affiliates, Inc. Dated June 26, 2025.
- Comments from Ipswich River Watershed Association. Prepared by Neil Shea, Restoration Program Director. Dated May 28, 2025.

Pre-Construction

2. The permittee shall employ an **Environmental Monitor** (EM) to oversee all project activities with the potential to have an adverse impact on BVWs and LUW and to ensure compliance with this WQC and the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan (CP/PP) as required herein. The EM shall have a minimum of five years of professional experience with construction site CP/PP compliance. The EM shall complete the U.S. Environmental Protection Agency (EPA) Construction General Permit (CGP) Inspector Training, or other training that meets the CGP requirements, and provide proof of completion prior to the start of work. The name, contact information, and qualifications of the proposed EM shall be provided to MassDEP for approval prior to the Pre-Construction Meeting required in Condition 5. The name and contact information of the approved EM shall be provided to the Wilmington Conservation Commission prior to the start of work. **(Submittal)**

3. A qualified **Wetland Scientist** (WS) with a minimum of five years of relevant professional experience with wetland and stream replacement and restoration projects shall be employed to oversee all BVW and LUW replacement and restoration activities as proposed in the application, including but not limited to grading, placement of substrate, seeding, vegetation plantings, and placement of wildlife habitat features. The name, contact information, and qualifications of the WS shall be provided to MassDEP for approval prior to the Pre-Construction Meeting required in Condition 5. The name and contact information of the approved WS shall be provided to the Wilmington Conservation Commission prior to the start of work. The EM may also be the WS if the qualifications are met. **(Submittal)**

4. Prior to the Pre-Construction Meeting required in Condition 5, the applicant shall provide MassDEP with the name and contact information of the Resident Engineer (RE) responsible for ensuring that all work complies with the conditions of this WQC. **(Submittal)**

5. A minimum of 21 days prior to the start of ground disturbance or vegetation clearing, MassDOT shall contact MassDEP to schedule an onsite Pre-Construction Meeting to review the approved plans and terms and conditions of this WQC. The RE, the construction contractor, the EM, the WS, a representative from the MassDOT Environmental Section and/or the District Environmental Engineer shall attend the Pre-Construction Meeting. **No work shall commence prior to the Pre-Construction Meeting.**

6. MassDEP shall be copied on applicable submittals to the U.S. Army Corps of Engineers (USACE). These include but are not limited to: Self-Verification Notification Form (SVNF); Pre-Construction Notification (PCN); Work-Start Notification Form; Mitigation Work-Start Notification Form; and Compliance Certification Form. The Work-Start Notification Form shall be submitted at least 14 days before the anticipated start of work and the Compliance Certification Form shall be submitted within 30 days following the completion of the authorized work. **(Submittal)**

7. A CP/PP shall be developed and implemented as required by 314 CMR 9.06(6)(a)8. A minimum of 14 days prior to the start of work, MassDOT shall submit the CP/PP for review and approval. If the EPA CGP applies, the Stormwater Pollution Prevention Plan (SWPPP) may serve as the CP/PP, providing it includes the measures required to be in the CP/PP per these Special Conditions, in addition to the measures specifically required by the CGP. Any subsequent changes to the Final CP/PP (defined herein as including the construction period SWPPP if applicable) must be approved by MassDEP. **(Submittal)**

8. Training regarding erosion and sedimentation controls is required. The CP/PP Inspector, and any other relevant personnel responsible for erosion and sedimentation controls shall complete the EPA CGP Inspector Training, or other training that meets the CGP requirements, as well as complete a comprehensive review of the Final CP/PP. Proof of completion of the training shall be submitted to MassDEP prior to the start of work. **(Submittal)**

9. The CP/PP shall identify, but shall not be limited to, staging and laydown areas in relation to BVWs and LUW, proposed dewatering methods and locations, proposed stockpile locations and their proximity to catch basins or other drainage conveyances that discharge to wetland resource areas, and the location of construction-period erosion and sedimentation controls.

Stockpiles shall be located no less than 50 feet from BVWs, LUW, catch basins, or other drainage conveyances that discharge to BVWs or LUW.

10. A minimum of 14 days prior to the start of work, MassDOT shall submit a Control of Water Plan for review and approval. The Plan shall include a description of proposed methods to isolate and dewater work areas within streams while maintaining stream flow, including but not limited to the method of isolation (e.g., steel sheeting or sandbag cofferdam), dewatering methods and locations and specifications for stream bypass systems as applicable. The Control of Water Plan shall include a plan depicting BVW and LUW boundaries, and the location of all relevant methods and materials which shall be located within the BVW and LUW impact areas approved herein. The plan shall meet the requirements of the CP/PP and be specific to the Project. Dewatering and stream bypasses shall be conducted under the supervision of the RE or other project staff with knowledge of these practices and comply with the applicable conditions identified herein. **(Submittal)**

11. Prior to the start of work, approved erosion and sedimentation control measures shall be installed per the approved CP/PP and as applicable, the manufacturer specifications. Erosion and sedimentation control measures may consist of, but are not limited to, silt fence, staked straw bales, silt/turbidity curtains, compost filter tubes, etc.

12. Prior to the Pre-Construction Meeting, the boundaries of BVWs and LUW shall be re-flagged where they are within 50 feet of the limits of work. In the event BVW and LUW boundaries overlap, the outermost boundary (i.e., closest to the proposed work) shall be flagged. All boundary markers, once in place, shall remain in place throughout construction until all disturbed surfaces have been permanently stabilized. Boundary markers shall be fully evaluated annually and refreshed where needed. Implementation of and compliance with this requirement shall be documented by the EM or WS. All construction personnel shall be made aware of these markers.

13. Soil evaluations confirming at least two feet of separation between the infiltration SCMs and estimated seasonal high groundwater shall be provided prior to the Pre-Construction Meeting. If at least two feet of separation cannot be confirmed, an alternatives analysis shall be submitted to MassDEP demonstrating whether a redesigned infiltration SCM or alternative SCMs are practicable in that location. **(Submittal)**

14. The SCM inspection and maintenance frequencies in the Operations and Maintenance Plan shall be revised to be in accordance with Volume 2, Chapter 2 of the Stormwater Handbook. The revised Operations and Maintenance Plan shall be submitted to MassDEP for review and approval prior to the Pre-Construction Meeting. **(Submittal)**

15. Prior to any work within the 1% annual chance of flooding zone within Project limits, including mobilization or storage of equipment and materials, a Flood Contingency Plan shall be submitted to MassDEP for review and approval that includes at a minimum the following information and provisions: **(Submittal)**

a. The RE and/or Contractor shall monitor the National Weather Service forecast daily, and upon issuance of a flood watch or flood warning for the Project area, the Flood Contingency Plan shall be implemented.

b. Upon implementation of the Flood Contingency Plan, all construction equipment and materials located below the Base Flood Elevation (BFE) shall be removed and placed in an upland location above the BFE and outside of BVW and/or LUW.

c. Anchored stationary equipment may remain below the BFE if demonstrated to be required and upon written approval from MassDEP. In the event semi-stationary equipment cannot be feasibly removed before the arrival of the storm, they shall be adequately secured and MassDEP shall be notified prior to the storm.

d. A requirement to inspect and maintain all erosion and sedimentation controls, and stabilize all exposed soils as needed below the BFE prior to the storm shall be included.

e. A plan depicting at a minimum, but not limited to, BVW and/or LUW boundaries, the Project limits, and the BFE boundary based on ground elevations shall be included.

f. Staff and materials must be available 24 hours per day, seven days per week to implement the Flood Contingency Plan. The name, affiliation, title, email address, and phone number of each person responsible for implementing the Flood Contingency Plan shall be included.

g. No work shall commence until the flood watch or flood warning has ended, all areas below the BFE have been inspected, and erosion and sedimentation controls are maintained as needed.

16. The Contractor shall develop an Invasive Plant Management Strategy (IPMS) to be submitted to MassDEP for review and approval prior to the Pre-Construction Meeting. The IPMS shall be implemented as approved. **(Submittal)**

17. If needed, use of herbicides to control invasive species shall be implemented in accordance with the approved IPMS and with the following requirements:

a. Herbicides shall only be applied by a Licensed Applicator;

b. Only herbicides registered with the Massachusetts Pesticide Board Subcommittee shall be applied to the targeted area/species;

c. The manufacturer's label directions must be followed, in addition to any conditions imposed by other state or local authorities;

d. Herbicide application shall use no more than the minimum application rate to accomplish removal of the target species; and

e. Applicants must obtain a BRP WM04 Herbicide Permit from the MassDEP Wetlands Program, Dredge Unit before performing herbicide application in waterbodies (traditionally lakes and ponds).

18. Final Construction Plans (the plans provided to the contractor) shall be submitted for review at least 30 days prior to the Pre-Construction Meeting. Once MassDEP provides written approval, the updated set of plans shall become the "Final Plan of Record." The Plan shall be prepared and signed by a Professional Engineer in the Commonwealth of Massachusetts and shall incorporate all revisions and additions to the original plans that have been approved as discussed herein. **(Submittal)**

Construction Period

19. No more than **2,630 sf** of permanent and **2,834 sf** of temporary impacts to BVWs shall occur. No more than **2,195 sf** of permanent and **601 sf** of temporary impacts to LUW shall occur. No more than **715 cy** of dredging in LUW shall occur. All work shall avoid unapproved impacts to BVW and LUW.

20. EM inspections shall occur at least once every seven calendar days and within 24 hours of a storm event that produces 0.5 inches or more of rain within a 24-hour period. The EM duties shall include, but are not limited to, oversight of installation and maintenance of erosion and sedimentation controls and Stormwater Control Measures (SCMs), dewatering activities, cofferdam installation and removal, concrete washout containment, dust control, and hazardous or toxic material containment, as applicable. The EM shall only be responsible for the oversight of hazardous and toxic materials to the extent that the CP/PP requires. All erosion and sedimentation controls shall be inspected by the EM prior to the start of work in each area, and all dewatering methods and locations shall be inspected by the EM prior to use. The EM shall have the authority to require modifications to or additional erosion and sedimentation controls or dewatering controls as they deem necessary to comply with this WQC and the CP/PP.

21. The EM shall submit to MassDEP and the Wilmington Conservation Commission at least one report every two calendar weeks during active construction and once every month while work is shut down until the site achieves final stabilization. The permittee shall not participate in the preparation of any EM report. The report shall include:

    a. Relevant weather information including storm event amounts and durations since the last inspection;

    b. A general description of current and foreseeable construction activities;

    c. The status and effectiveness of erosion and sedimentation controls, stormwater control measures, and dewatering methods;

    d. Evidence of erosion, sedimentation, or improper material containment or spills;

    e. A description of any unauthorized discharges to BVWs or LUW, and actions taken to immediately stop the discharge;

    f. Recommendations to correct any deficiencies identified during the inspection;

g. Due dates to resolve corrective actions as specified in the CP/PP and WQC, and dates and descriptions of the resolutions as they are completed;

h. Representative photos of current site conditions, erosion and sedimentation controls, stormwater control measures, and dewatering methods;

i. Specific photos of any unauthorized discharges to BVWs or LUW, deficiencies or non-compliance requiring corrective actions, and corrective actions that have been undertaken; and

j. Any other recommendations for site management to promote compliance with this WQC and the CP/PP.

22. The EM shall immediately report any unauthorized discharges to BVWs or LUW, or any other significant non-compliance with this WQC or the CP/PP to MassDEP, MassDOT, the RE, and the Wilmington Conservation Commission. The EM shall have stop-work authority in the event of significant non-compliance with this WQC and/or the CP/PP. The EM shall be authorized to respond to and communicate directly with MassDEP on all matters related to compliance with this WQC. MassDEP may make any requests directly to the EM and copy MassDOT, and MassDOT shall authorize the EM to fulfill such request in direct coordination with MassDEP.

23. The Project shall identify one individual with at least three years of experience with construction period erosion and sedimentation control to be responsible for erosion and sedimentation control inspections (CP/PP Inspector). Under the direction of the CP/PP Inspector, inspection and maintenance of erosion and sediment controls in active work areas may be performed by both the Contractor and RE or other MassDOT project staff. Maintenance is the responsibility of the Contractor; however, the permittee shall be ultimately responsible for erosion and sedimentation control failure. The EM, RE, and/or contractor shall immediately notify MassDEP and the Wilmington Conservation Commission if any unauthorized discharges to BVWs or LUW occur.

24. CP/PP inspections shall occur at least once every seven calendar days and within 24 hours of a storm event that produces 0.5 inches or more of rain within a 24-hour period, or at a more stringent frequency if the CP/PP requires.

25. Copies of CP/PP Inspection and Maintenance Log Forms shall be submitted to MassDEP within 14 days upon request.

26. Disturbed areas shall be stabilized immediately after activities have permanently ceased or will be temporarily inactive for 14 or more calendar days. The installation of stabilization measures shall be implemented as soon as practicable, but no later than 14 calendar days after stabilization has been initiated.

27. Work within LUW shall be conducted in low or no-flow conditions to the extent practicable. Notice shall be provided to MassDEP and the Wilmington Conservation Commission within 24 hours prior to the commencement of dewatering. Dewatering methods and location(s) shall be approved by the RE or other project staff with knowledge of these practices prior to use to

ensure consistency with the approved Control of Water Plan, and shall be documented in the CP/PP. There shall be no discharge of untreated dewatered stormwater or groundwater to BVWs or LUW. Any discharges shall be visibly free of sediment.

28. Additional erosion and sedimentation control materials shall be stored on-site at all times for emergency and routine replacement. Materials shall be kept covered, dry, and accessible at all times. The CP/PP Inspector and EM shall be responsible for anticipating the need for and installation of additional erosion and sedimentation controls and shall have the authority to require additional erosion control measures to protect wetland resource areas beyond what is shown on the plans if field conditions or professional judgment dictate that additional protection is necessary.

29. The Contractor shall monitor the National Weather Service forecast for updates, and upon issuance of a flood watch for the 1% annual chance of flooding zone, shall implement the flood contingency plan referenced in Condition 15.

30. Any storm drains with potential to receive discharge from stockpiled materials or construction operations shall be managed to inhibit the inflow of sediment while not increasing the likelihood of roadway flooding during periods of precipitation. The CP/PP shall specify measures to implement this. Filter fabric stretched under storm drain inlet grates are not acceptable for this purpose.

31. Stockpiles shall be located no less than 50 feet from BVWs, LUW, catch basins, or other drainage conveyances that discharge to BVWs or LUW.

32. The contractor shall have designated washout areas for concrete equipment that will be comprised of impermeable material and sized to contain project concrete wastes and wash water. Concrete wash out areas shall be located no less than 50 feet from BVWs, LUW, and catch basins or other drainage conveyances that discharge directly or indirectly to BVWs or LUW.

33. Refueling, washing, and cleaning of vehicles and other construction equipment shall not take place within 50 feet of BVWs or LUW and any wash water shall be contained such that it does not drain toward BVWs or LUW. MassDEP shall explicitly approve in writing any deviation to this condition for oversized stationary vehicles.

34. The contractor shall have spill containment kits on site. In the event of a release of fuels and/or oils, the local fire department, MassDEP Emergency Response and MassDEP Wetlands Program Highway Unit shall be contacted, and in addition, the MassDEP Bureau of Waste Site Cleanup shall be notified per the requirements of the Massachusetts Contingency Plan, 310 CMR 40.0000.

35. Construction vehicles or other vehicles or heavy equipment are prohibited from traversing over the proposed infiltration SCMs to avoid compaction of soils during construction. These areas shall be demarcated by silt fence with signage, or high visibility fencing. If access through the

location of an infiltration SCM is unavoidable, MassDOT shall request written approval from MassDEP.

36. Construction vehicles and equipment shall not enter the BVW or LUW unless authorization is provided by way of this permit or amendment. The Contractor shall use equipment with boom reach capabilities and other measures to avoid inadvertent impacts to jurisdictional resource areas as a result of excavation, riprap placement, and/or bridge/pier demolition materials.

Dredging

37. MassDEP shall be notified one week prior to the start of dredging so that staff may inspect the work for compliance throughout the project.

38. No later than 21 days prior to commencement of dredging activity, a Dredged Material Dewatering Plan shall be submitted to MassDEP for review and approval. At a minimum, the Plan shall include but not be limited to the type of containment, method of dewatering (i.e. mechanical or by gravity), method of collecting the dewatered effluent and method of disposal. **(Submittal)**

39. Best Management Practices (BMPs) shall be employed by the contractor to protect resource areas located adjacent to the proposed staging/temporary dredged material stockpiling and dewatering areas. Sediment stockpiles shall be constructed in accordance with the MassDEP approved project plans, stabilized, bottom-lined if not placed on paved surfaces and securely covered with wind tear resistance tarpaulin, polyethylene sheeting or similar impermeable material at all times, and properly labeled. Stockpile covers shall be securely weighed down. Stockpiles shall also be secured to restrict access by the public and shall be set back at least 10 feet from temporary construction access roads or other areas and activities which could disturb the stockpiles and associated erosion controls; if the 10-foot setback cannot be met, then a MassDEP-approved barrier shall be provided. Inspection of the sediment containment and dewatering location and associated erosion controls shall be conducted daily and within 24 hours of a storm that produces 0.5 inches or more of rain. Any observed deficiency shall be corrected or repaired in a timely manner.

40. In the event of a precipitation or storm event, the site shall be secured beforehand in such a way as to protect resource areas and waters on site and downstream of the site, including covering of stockpiles of dredged material. Sediment stockpile areas shall be inspected in line with the frequency of the CP/PP required in Condition 7. Any observed deficiency shall be corrected or repaired in a timely manner to prevent discharge from the stockpiled material. If stormwater runoff and erosion is observed from stockpiled dredged material, additional erosion and/or damage prevention controls measures shall be implemented.

41. Measures shall be in place to prevent turbid waters, due to dredging, demolition, or debris removal activities, from extending past the limits of work into Maple Meadow Brook and the intermittent stream. These measures can be items such as turbidity curtains and/or sheet piles.

42. If visual turbidity escapes the controls in place, as described in Condition 41, work shall stop immediately and MassDEP shall be notified within 24 hours. Work shall not resume until the issue is corrected and to the satisfaction of MassDEP.

43. All turbidity controls shall be inspected daily by the EM or RE or a designated MassDOT Project Staff. If any damage is observed the controls in place will be replaced or repaired immediately.

44. If dredged sediment is disposed of off-site, MassDEP shall be notified in writing of the name and location of the upland licensed facilities accepting the dredged material for disposal or reuse for review and approval. If the licensed facility is located out of state, documentation shall be provided to MassDEP that the dredged material disposal/reuse has been approved and will be accepted by the receiving State. The dredged material shall not be transported to the facility without concurrence of MassDEP.

Wetland Mitigation

45. A minimum of 3,510 sf of wetland replication shall be completed in coordination with an approved WS. The WS shall oversee all BVW replication and restoration, including final grading, seeding, and planting. The WS shall confirm that constructed BVW replication and restoration areas have adequate soils and hydrology to promote wetland plant species prior to seeding and installation of plantings and shall recommend measures to amend soils and promote wetland hydrology as needed.

46. Planting and seeding shall not take place between November 15th and April 15th, except as allowed by MassDEP in writing. The WS shall inspect trees and shrubs to ensure they are healthy prior to planting. Trees and shrubs deemed unhealthy in the professional judgment of the WS shall be replaced. Plantings and seed mixes shall consist of native and non-invasive species. Species may be substituted at the recommendation of the WS, and review and approval by MassDEP.

47. At least 75% of the surface area of the BVW replication and restoration areas shall be vegetated with indigenous wetland plant species within two growing seasons, or the period required by the Section 404 permit, whichever is longer. Additionally, evidence of hydrology, including hydric soil formation shall be submitted at the same time. Annual monitoring reports shall be submitted by the WS no later than January 15th each year. Monitoring reports shall include an assessment based on the approved success criteria, representative photos, and recommended corrective actions as needed. **(Submittal)**

48. MassDEP reserves the right to determine the success or failure of the BVW replication and restoration areas, and reserves the right to require additional plantings, regrading, invasives removal or other measures deemed necessary to promote success.

Stream Mitigation

49. The WS shall oversee all LUW restoration. Placement of streambed materials shall take place in no- or low-flow conditions. The Control of Water Plan required in Condition 10 shall include measures to create no-flow conditions for this work such as a pump bypass system or other

dewatering method, if needed. Placement of streambed materials during greater than low-flow conditions shall require a placement plan, with a narrative describing turbidity control measures, submitted to MassDEP for review and approval.

50. Upon completion of the LUW restoration, the WS shall provide photographs and a summary of the completed work to MassDEP and the Wilmington Conservation Commission. **(Submittal)**

51. Water shall be slowly introduced back into the restored and dewatered LUW work areas as to not cause erosion and sedimentation. This work shall be overseen by the WS.

52. MassDEP reserves the right to determine the success or failure of the LUW restoration areas and reserves the right to require additional measures deemed necessary to promote success.

Post-Construction

53. All temporary erosion controls shall be removed at the conclusion of work once the surrounding area has achieved final stabilization.

General Conditions

54. Any proposed alterations, minor plan changes, or amendment requests, as well as any required submittals shall be sent by email for review and approval to heidi.davis@mass.gov and ryan.hale@mass.gov. **(Submittal)**

55. This WQC remains in effect for the same duration as the Section 404 permit that requires it.

56. No Special Condition set forth herein shall be construed or operate to prohibit MassDEP from taking enforcement against MassDOT or its contractors for any failure to comply with the terms and requirements of this WQC.

57. No activity authorized by this WQC may begin prior to expiration of the 21-day appeal period, or until a final decision is issued by MassDEP in the event of an appeal.

Failure to comply with this Certification is grounds for enforcement, including civil and criminal penalties, under MGL Ch. 21 §42, MGL Ch. 21A §16, or other possible actions/penalties as authorized by the General Laws of the Commonwealth.

This Certification does not relieve the applicant of the obligation to comply with other appropriate state or federal statutes or regulations.

NOTICE OF APPEAL RIGHTS

a.) Appeal Rights and Time Limits

Certain persons shall have a right to request an adjudicatory hearing concerning certifications by MassDEP when an application is required: (a) the applicant or property owner; (b) any person aggrieved by the decision who has submitted written comments during the public comment period; (c) any ten

(10) persons of the Commonwealth pursuant to M.G.L. c.30A where a group member has submitted written comments during the public comment period; or (d) any governmental body or private organization with a mandate to protect the environment which has submitted written comments during the public comment period. Any person aggrieved, any ten (10) persons of the Commonwealth, or a governmental body or private organization with a mandate to protect the environment may appeal without having submitted written comments during the public comment period only when the claim is based on new substantive issues arising from material changes to the scope or impact of the activity and not apparent at the time of public notice. To request an adjudicatory hearing pursuant to M.G.L. c.30A, § 10, a Notice of Claim must be made in writing, provided that the request is made by certified mail or hand delivery to MassDEP, with the appropriate filing fee specified within 310 CMR 4.10 along with a DEP Fee Transmittal Form within twenty-one (21) days from the date of issuance of this Certificate, and addressed to:

Case Administrator
Department of Environmental Protection
100 Cambridge Street, 9th Floor
Boston, MA 02114

A copy of the request shall at the same time be sent by certified mail or hand delivery to the Department of Environmental Protection at:

Department of Environmental Protection
Wetlands Program, Highway Unit
100 Cambridge Street, 8th floor
Boston, MA 02114

b.) Contents of Hearing Request

A Notice of Claim for Adjudicatory Hearing shall comply with MassDEP's Rules for Adjudicatory Proceedings, 310 CMR 1.01(6), and shall contain the following information pursuant to 314 CMR 9.10(3):

1. the 401 Certification Transmittal Number;
2. the complete name of the applicant and address of the project;
3. the complete name, address, and fax and telephone numbers of the party filing the request, and, if represented by counsel or other representative, the name, fax and telephone numbers, and address of the attorney;
4. if claiming to be a party aggrieved, the specific facts that demonstrate that the party satisfies the definition of "aggrieved person" found at 314 CMR 9.02;
5. a clear and concise statement that an adjudicatory hearing is being requested;
6. a clear and concise statement of (1) the facts which are grounds for the proceedings, (2) the objections to this Certificate, including specifically the manner in which it is alleged to be inconsistent with the MassDEP's Water Quality Regulations, 314 CMR 9.00, and (3) the relief sought through the adjudicatory hearing, including specifically the changes desired in the final written Certification; and
7. a statement that a copy of the request has been sent by certified mail or hand delivery to the applicant, the owner (if different from the applicant), the conservation commission of the city or town where the activity will occur, the Department of Conservation and Recreation (when the certificate concerns projects in Areas of Critical Environmental Concern), the public or private

water supplier where the project is located (when the certificate concerns projects in Outstanding Resource Waters), and any other entity with responsibility for the resource where the project is located.

c.) Filing Fee and Address

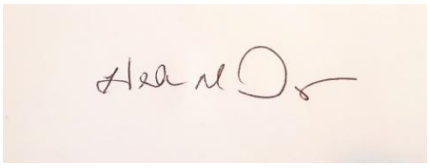
The hearing request along with a DEP Fee Transmittal Form and a valid check or money order payable to the Commonwealth of Massachusetts in the amount of one hundred dollars ($100) must be mailed to:

Commonwealth of Massachusetts
Department of Environmental Protection
Commonwealth Master Lockbox
PO Box 4062
Boston, MA 02211

The request will be dismissed if the filing fee is not paid, unless the appellant is exempt or granted a waiver. The filing fee is not required if the appellant is a city or town (or municipal agency), county, or district of the Commonwealth of Massachusetts, or a municipal housing authority. MassDEP may waive the adjudicatory hearing filing fee pursuant to 310 CMR 4.06(2) for a person who shows that paying the fee will create an undue financial hardship. A person seeking a waiver must file an affidavit setting forth the facts believed to support the claim of undue financial hardship together with the hearing request as provided above.

Should you have any questions relative to this permit, please contact myself or Ryan Hale at heidi.davis@mass.gov and ryan.hale@mass.gov.

Very truly yours,



Heidi M. Davis
Highway Unit Supervisor

Ecc: DEP NERO – Jill Provencal
USACE – Dan Vasconcelos
USACE – Kevin Newton
MassDOT – Melissa Lenker
MassDOT – Kevin Thompson
MassDOT – Eamon Kernan
Green International Affiliates – Oxana Fartushnaya
Ipswich River Watershed Association - Neil Shea
Wilmington Conservation Commission – Cameron Lynch, Conservation Agent

ATTACHMENT A
PRE-CONSTRUCTION SUBMITTAL CHECKLIST

Reconstruction of Route 38 (Main Street) from Route 62 to the Woburn City Line
Wilmington, MA

THIS CHECKLIST MUST BE COMPLETED PRIOR TO THE START OF WORK. NOTE THAT SOME CONDITIONS REQUIRE THAT INFORMATION BE SUBMITTED A SPECIFIC NUMBER OF DAYS PRIOR TO THE START OF WORK OR THE PRE-CONSTRUCTION MEETING.

Pre-Construction Meeting Date: _____

Condition	Required Submittal	Due Date	Date Submitted	Date Approved
PRE-CONSTRUCTION SUBMITTAL REQUIREMENTS				
2 and 3	Name, contact information, and qualifications of the EM and WS, including specific experience and years to meet requirement	Prior to Pre-Construction Meeting		
4	Name and contact information of the RE	Prior to Pre-Construction Meeting		
6	USACE Work-Start Notification Form	14 days prior to work start		
7	CP/PP	14 days prior to work start		
8	EM Verification of SWPPP Training	Prior to work start		
10	Control of Water Plan	14 days prior to work start		
13	Soil Evaluations	Prior to Pre-Construction Meeting		
14	Revised Operations and Maintenance Plan	Prior to Pre-Construction Meeting		
15	Flood Contingency Plan	Prior to any work within 1% annual chance of flooding zone		

16	Invasive Plant Management Strategy	Prior to Pre-Construction Meeting		
18	Final Construction Plans	30 days prior to Pre-Construction Meeting		

重要 महत्वपूर्ण σημαντικός Important կարեւոր quan trọng مهم

Communication for Non-English-Speaking Parties

This document is important and should be translated immediately.

If you need this document translated, please contact MassDEP's Director of Environmental Justice at the telephone number listed below.

Español Spanish

Este documento es importante y debe ser traducido inmediatamente. Si necesita traducir este documento, póngase en contacto con el Director de Justicia Ambiental de MassDEP (*MassDEP's Director of Environmental Justice*) en el número de teléfono que figura más abajo.

Português Portuguese

Este documento é importante e deve ser traduzido imediatamente. Se você precisar traduzir este documento, entre em contato com o Diretor de Justiça Ambiental do MassDEP no número de telefone listado abaixo.

繁體中文 Chinese Traditional

本文檔很重要，需要即刻進行翻譯。
如需對本文檔進行翻譯，請透過如下列示電話號碼與 MassDEP 的環境司法總監聯絡。

简体中文 Chinese Simplified

这份文件非常重要，需要立即翻译。
如果您需要翻译这份文件，请通过下方电话与 MassDEP 环境司法主任联系。

Ayisyen Kreyòl Haitian Creole

Dokiman sa a enpòtan epi yo ta dwe tradui l imedyatman. Si w bezwen tradui dokiman sa a, tanpri kontakte Direktè. Jistis Anviwònmantal MassDEP a nan nimewo telefòn ki endike anba a.

Việt Vietnamese

Tài liệu này và quan trọng và phải được dịch ngay. Nếu quý vị cần bản dịch của tài liệu này, vui lòng liên hệ với Giám Đốc Phòng Công Lý Môi Trường của MassDEP theo số điện thoại được liệt kê bên dưới.

ប្រទេសកម្ពុជា Khmer/Cambodian

ឯកសារនេះមានសារៈសំខាន់
ហើយគប្បីត្រូវត្រូវបានបកប្រែភ្លាមៗ។.
ប្រសិនបើអ្នកត្រូវការអោយឯកសារនេះបកប្រែ
សូមទាក់ទងនាយកផ្នែកយុត្តិធម៌បរិស្ថានរបស់
MassDEPតាមរយៈលេខទូរស័ព្ទដែលបានរាយដូចខាងក្រោម។

Kriolu Kabuverdianu Cape Verdean

Es dokumentu sta important i tenki ser tradusidu immediatamenti. Se nho ta presisa ke es dokumentu sta tradisidu, por favor kontata O Diretor di Justisia di Environman di DEP ku es numero di telifoni menxionadu di baixo.

Contact Deneen Simpson 857-406-0738
Massachusetts Department of Environmental Protection
100 Cambridge Street 9th Floor Boston, MA 02114
TTY# MassRelay Service 1-800-439-2370 • https://www.mass.gov/environmental-justice
(Version revised 8.2.2023) 310 CMR 1.03(5)(a)

Русский Russian

Это чрезвычайно важный документ, и он должен быть немедленно переведен. Если вам нужен перевод этого документа, обратитесь к директору Департамента экологического правосудия MassDEP (MassDEP's Director of Environmental Justice) по телефону, указанному ниже.

العربية Arabic

هذه الوثيقة مهمة وتجب ترجمتها على الفور.

إذا كنت بحاجة إلى ترجمة هذه الوثيقة، فيرجى الاتصال بمدير العدالة البيئية في MassDEP على رقم الهاتف المذكور أدناه.

한국어 Korean

이 문서는 중대하므로 즉시 번역되어야 합니다.
본 문서 번역이 필요하신 경우, 매사추세츠 환경보호부의 "환경정의" 담당자 분께 문의하십시오. 전화번호는 아래와 같습니다.

հայերեն Armenian

Այս փաստաթուղթը կարևոր է, և պետք է անհապաղ թարգմանել այն:
Եթե Ձեզ անհրաժեշտ է թարգմանել այս փաստաթուղթը, դիմեք Մասաչուսեթսի շրջակա միջավայրի պահպանության նախարարության (MassDEP) Բնապահպանական հարցերով արդարադատության ղեկավարին (Director of Environmental Justice)՝ ստորև նշված հեռախոսահամարով

فارسی Farsi Persian

این نوشتار بسیار مهمی است و باید فوراً ترجمه شود.
اگر نیاز به ترجمه این نوشتار دارید لطفاً با مدیر عدالت محیط زیستی MassDEP در شماره تلفن ذکر شده زیر تماس بگیرید.

Français French

Ce document est important et doit être traduit immédiatement. Si vous avez besoin d'une traduction de ce document, veuillez contacter le directeur de la justice environnementale du MassDEP au numéro de téléphone indiqué ci-dessous.

Deutsch German

Dieses Dokument ist wichtig und muss sofort übersetzt werden. Wenn Sie eine Übersetzung dieses Dokuments benötigen, wenden Sie sich bitte an MassDEP's Director of Environmental Justice *(Direktor für Umweltgerechtigkeit in Massachusetts)* unter der unten angegebenen Telefonnummer.

Ελληνική Greek

Το έγγραφο αυτό είναι πολύ σημαντικό και πρέπει να μεταφραστεί αμέσως. Αν χρειάζεστε μετάφραση του εγγράφου αυτού, παρακαλώ επικοινωνήστε με τον Διευθυντή του Τμήματος Περιβαλλοντικής Δικαιοσύνης της Μασαχουσέτης στον αριθμό τηλεφώνου που αναγράφεται παρακάτω

Italiano Italian

Questo documento è importante e deve essere tradotto immediatamente. Se hai bisogno di tradurre questo documento, contatta il Direttore della Giustizia Ambientale di MassDEP al numero di telefono sotto indicato.

Język Polski Polish

Ten dokument jest ważny i powinien zostać niezwłocznie przetłumaczony. Jeśli potrzebne jest tłumaczenie tego dokumentu, należy skontaktować się z dyrektorem ds. sprawiedliwości środowiskowej MassDEP pod numerem telefonu podanym poniżej.

हिन्दी Hindi

यह दस्तावेज महत्वपूर्ण है और इसका अनुवाद तुरंत किया जाना चाहिए। यदि आपको इस दस्तावेज का अनुवाद कराने की जरूरत है, तो कृपया नीचे दिए गए टेलीफोन नंबर पर MassDEP के पर्यावरणीय न्याय निदेशक से संपर्क करें।

Contact Deneen Simpson 857-406-0738
Massachusetts Department of Environmental Protection
100 Cambridge Street 9th Floor Boston, MA 02114
TTY# MassRelay Service 1-800-439-2370 • https://www.mass.gov/environmental-justice
(Version revised 8.2.2023) 310 CMR 1.03(5)(a)

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection
100 Cambridge Street Suite 900 Boston, MA 02114 • 617-292-5500

Maura T. Healey
Governor

Kimberley Driscoll
Lieutenant Governor

Rebecca L. Tepper
Secretary

Bonnie Heiple
Commissioner

May 1, 2025

Massachusetts Department of Transportation Highway Division
Ten Park Plaza, Room 7360
Boston, MA 02116
ATTN: Erica Larner

RE: 401 WATER QUALITY CERTIFICATION
Administrative Completeness and Technical Deficiency Review
401 WQC Transmittal No: 25-WW26-0013-APP

AT: Reconstruction of Route 38 (Main Street)
Route 62 to the Woburn City Line
Wilmington, MA

Dear Ms. Larner:

The Massachusetts Department of Environmental Protection (MassDEP) Wetlands Program Highway Unit has completed its Administrative Completeness Review of the application for the above-referenced Water Quality Certification (WQC) application. The application requires proof of public notice in the Environmental Monitor per Section 24 of Chapter 79 of the Acts of 2014 to be administratively complete Please also note MassDEP cannot complete technical review of the WQC application until the Massachusetts Environmental Policy Act (MEPA) process has concluded.

MassDEP has completed a preliminary Technical Review of the above-referenced application pending conclusion of the MEPA process, and requests that you submit the following additional information:

1. Comments 2 through 7 in the email from the U.S. Army Corps of Engineers (USACE) to MassDOT dated April 17, 2025, are hereby incorporated by reference.

This information is available in alternate format. Please contact MassDEP at 617-292-5500.
TTY# MassRelay Service 1-800-439-2370
MassDEP Website: www.mass.gov/dep

Printed on Recycled Paper

2. Relative to USACE Comment 5, it is not clear why the permanent Bordering Vegetated Wetland (BVW) impacts at the intermittent stream culvert replacement (approximate Station 218+00) could not be temporary and the BVW restored. Please clarify the proposed final condition of this area and demonstrate the permanent BVW impacts are required, if applicable.

3. Please evaluate installation of a retaining wall along the west side of Route 38 from approximate Stations 138+50 to 241+00 to avoid or minimize permanent BVW impacts. If a retaining wall is not practicable, please evaluate a steeper slope (i.e., 1.5:1 as opposed to 2:1).

4. The application states that the culvert at the intermittent stream at STA 218+00 is 3.5 feet wide and the proposed culvert is 3.0 feet wide. Please provide the measured bankfull width and evaluation of how the proposed 3-foot-wide culvert meets the MA Stream Crossing Standards to the Maximum Extent Practicable. In addition, please provide an evaluation of whether the culvert may be further widened to better meet Stream Crossing Standard 3. Note the width of the culvert beneath the railroad tracks upstream of this crossing does not preclude and has no bearing on the potential widening of this structure.

5. The amount of proposed riprap within and adjacent to the Maple Meadow Brook crossing appears excessive for this type of headwater low energy system. Potential solutions that have been incorporated into previous projects include reshaping the riprap fill areas to follow more natural drainage patterns and removing riprap from adjacent BVWs to the extent practicable. Please evaluate these measures, and any other practicable measures, to reduce the footprint of riprap within and adjacent to Maple Meadow Brook. A reduction in BVW alteration may result in a commensurate reduction in the required BVW replication.

6. Please evaluate installing a Stormwater Control Measure (SCM) within the proposed compensatory flood storage area to better meet the Stormwater Management Standards to the maximum extent practicable.

7. It appears Stormwater Management Standard 3 has been met using the macro approach, rather than met to the maximum extent practicable. Standard 3 requires the annual recharge from the post-development site to approximate the annual recharge from pre-development conditions. MassDEP notes that providing the required recharge for the net increase in impervious surface meets Standard 3.

8. The narrative states there will be two 11-foot-wide southbound travel lanes for 900 feet south of the intersection of Route 62 and Route 38. Please clarify whether the roadway will be widened a lane width or more in this area, and if so, full compliance with the Stormwater Management Standards is required for that portion of the project.

9. MassDEP requests a meeting to discuss how the Estimated Seasonal High Groundwater (ESHGW) was determined for the infiltration SCMs, as well as to discuss the conclusions

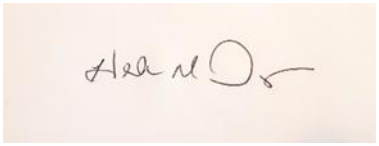
regarding ESHGW for SCM-2. Redoximorphic features used to identify ESHGW were not identified in the test pits or boring logs. Additional investigation may be needed to establish ESHGW at the infiltration SCMs.

10. SCM inspection and maintenance frequencies need to be in accordance with Volume 2, Chapter 2 of the Massachusetts Stormwater Handbook.
11. Please sign and date the Illicit Discharge Compliance Statement at the end of the Stormwater Management Report.

Please note that MassDEP may have further comments upon review of the plan revisions delivered to MassDEP NERO on May 1, 2025. Upon receipt of all requested supplemental information, MassDEP has 30 calendar days in which to issue or deny a certification.

Should you have any questions relative to this letter, please contact me at heidi.davis@mass.gov or Ryan Hale at ryan.hale@mass.gov.

Sincerely,



Heidi M. Davis
Highway Unit Supervisor

Ecc: DEP NERO – Jill Provencal
USACE – Dan Vasconcelos
USACE – Kevin Newton
MassDOT – Kevin Thompson
Green International – Oxana Fartushnaya
Wilmington Conservation Commission – Cameron Lynch, Conservation Agent

DOCUMENT A00860

MASSACHUSETTS

DEPARTMENT OF ENVIRONMENTAL PROTECTION

NOTICE OF INTENT

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DRAFT NOTICE OF INTENT

Reconstruction of Route 38 (Main Street)
From Route 62 to the Woburn City Line
Wilmington, Massachusetts

MassDOT Contract No. 608051



Prepared for

Massachusetts Department of Transportation

March 13, 2025

Prepared by

GREEN
A Lochner Company

Building Strong Client Relationships Through Engineering Excellence

March 13, 2025

Cameron Lynch, Conservation Agent
Wilmington Conservation Commission
Wilmington Town Hall
121 Glen Road
Wilmington, MA 01877
(978)-658-8238

Subject: **Reconstruction of Route 38 (Main Street), From Route 62 to the Woburn City Line**
Wilmington, MA
MassDOT File No. 608051
Notice of Intent Submittal

Dear Mr. Lynch:

On behalf of the Massachusetts Department of Transportation (MassDOT) Highway Division, Green International Affiliates, Inc. is pleased to submit the enclosed Notice of Intent (NOI) to the Wilmington Conservation Commission pursuant to the Massachusetts Wetlands Protection Act (WPA) and 310 CMR 10.00 which is administered by the Wilmington Conservation Commission. This NOI Application has been prepared for the Reconstruction of Route 38 (Main Street) project in Wilmington, Massachusetts.

This Notice of Intent (NOI) is being submitted to the Wilmington Conservation Commission pursuant to the Massachusetts Wetlands Protection Act (WPA) Regulations and its implementing regulations 310 CMR 10.00 for work within the Bordering Vegetated Wetland (BVW), Land Under Water and Waterways (LUW), Bank, Riverfront Area (RFA), 100-foot Buffer Zone, and Bordering Land Subject to Flooding (BLSF). As stated in 310 CMR 10.05(4)(b), projects proposed by the MassDOT Highway Division are not subject to local wetlands bylaws or regulations, and the provision of 310 CMR 10.05(4)(a) provides relief from individual abutter notification. As a state agency, MassDOT must provide notice of the time and place of the Notice of Intent hearing in a newspaper of general circulation in the Town.

The purpose of the project is to improve the roadway infrastructure, reduce traffic back-ups on entering side streets, improve the existing drainage system and provide increased safety for roadway users. A new water system is proposed along a portion of the project corridor. The Town of Wilmington will fund water system improvements, while the rest of the project is being funded by MassDOT.

The project results in 2,806 square feet (SF) of permanent and 2,329 SF of temporary impacts to Bordering Vegetated Wetlands (BVWs); 262 SF permanent and 195 SF temporary impacts within Land Under Water (LUW); 64 linear feet (LF) of permanent and 15 LF of temporary impact to Inland Bank; and occurs within 6,815 SF of Bordering Land Subject to Blooding (BLSF). BVW replication and Compensatory Flood Storage is provided as part of this project.

A portion of the project includes the replacement of Bridge No. W-38-011, which carries Route 38 over Maple Meadow Brook. In accordance with the Massachusetts Transportation Bond Bill of 2014, the proposed work described herein that is associated with bridge repair and replacement is exempt from review under the Massachusetts Wetlands Protection Act (M.G.L. c.131 §40) and its implementing

regulations (310 CMR 10.00). However, this portion will be permitted with the Department of Environmental Protection (DEP) pursuant to Section 401 of the Clean Water Act (CWA) and in accordance with Section 404 with the U.S. Army Corps of Engineers. The copy of the filing is typically shared with the Conservation Commission.

The NOI is being submitted for the purpose of receiving an Order of Conditions under the Massachusetts WPA for the proposed work within these resource areas. The project can be categorized as a "Redevelopment" project under the Massachusetts Stormwater Management Standards and meets the Stormwater Standards to the maximum extent practicable.

This Project meets the criteria of the Limited Project provisions of the WPA listed in the 310 CMR 10.53(3)(f): *Maintenance and improvement of existing public roadways, but limited to widening less than a single lane, adding shoulders, correcting substandard intersections, and improving inadequate drainage systems*.

As an agency of the Commonwealth providing essential government functions, MassDOT is exempt from certain municipal requirements including but not limited to wetland bylaws, ordinances and policies, and for paying peer review fees. Additionally, MassDOT is not required to notify abutters per the WPA Regulations at 310 CMR 10.05(4).

Enclosed are the following items included with this submission:

10 hard copies of the NOI Report (includes Stormwater Report)
5 full size (24x36) NOI plan set
5 reduced size (11x17) NOI plan set

An electronic copy of this submittal is also being sent to clynch@wilmingtonma.gov.

As required by regulation, one (1) copy of the above submittal is being provided concurrently to the MassDEP Northeast Office.

We respectfully request that this project be placed on the Conservation Commission agenda for the hearing scheduled on April 2, 2025. Should you have any questions regarding this submittal, please do not hesitate to contact me.

Sincerely,
Green International Affiliates, Inc.

Oxana Fartushnaya
Client Manager II / Water Resources Group

cc: DEP – Northeast Region
Eamon Kernan, P.E. – MassDOT PM
Erica Larner – MassDOT
Melissa Lenker – MassDOT
Project File: 21058.16XX

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APPENDIX D – Wildlife Habitat Evaluation
APPENDIX E – NOI Plan Set (bound separately)
APPENDIX F – Stormwater Management Report (bound separately)

NOTICE OF INTENT FORMS

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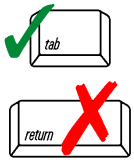
Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
MassDEP File Number
Document Transaction Number
Wilmington
City/Town

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



Note: Before completing this form consult your local Conservation Commission regarding any municipal bylaw or ordinance.

A. General Information

1. Project Location (**Note:** electronic filers will click on button to locate project site):

Routh 38 (Main Street) from Route 62 (Church Street / Burlington Avenue) to Woburn City Line
a. Street Address

Wilmington
b. City/Town

01887
c. Zip Code

Latitude and Longitude:
42°32'47"N-42°31'16"N
71°10'25"W-71°9'30"W

N/A
f. Assessors Map/Plat Number

N/A
g. Parcel /Lot Number

2. Applicant:

Erica
a. First Name

Larner
b. Last Name

Massachusetts Department of Transportation Highway Division
c. Organization

10 Park Plaza, Room 7360
d. Street Address

Boston
e. City/Town

MA
f. State

02116
g. Zip Code

857-268-1729
h. Phone Number

i. Fax Number

erica.n.larner@dot.state.ma.us
j. Email Address

3. Property owner (required if different from applicant): ☐ Check if more than one owner

a. First Name

b. Last Name

Massachusetts Department of Transportation - Highway Division
c. Organization

10 Park Plaza
d. Street Address

Boston
e. City/Town

MA
f. State

02116
g. Zip Code

h. Phone Number

i. Fax Number

j. Email address

4. Representative (if any):

Oxana
a. First Name

Fartushnaya
b. Last Name

Green International Affiliates, Inc
c. Company

100 Ames Pond Drive, Suite 200
d. Street Address

Tewksbury
e. City/Town

MA
f. State

01876
g. Zip Code

978-923-0400
h. Phone Number

978-399-0033
i. Fax Number

ofartushnaya@greenintl.com
j. Email address

5. Total WPA Fee Paid (from NOI Wetland Fee Transmittal Form):

$750
a. Total Fee Paid

$362.50
b. State Fee Paid

$376.50
c. City/Town Fee Paid

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Provided by MassDEP:

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A. General Information (continued)

6. General Project Description:

(see Narrative for more information)

7a. Project Type Checklist: (Limited Project Types see Section A. 7b.)

1. ☐ Single Family Home
2. ☐ Residential Subdivision
3. ☐ Commercial/Industrial
4. ☐ Dock/Pier
5. ☐ Utilities
6. ☐ Coastal engineering Structure
7. ☐ Agriculture (e.g., cranberries, forestry)
8. ☒ Transportation
9. ☐ Other

7b. Is any portion of the proposed activity eligible to be treated as a limited project (including Ecological Restoration Limited Project) subject to 310 CMR 10.24 (coastal) or 310 CMR 10.53 (inland)?

1. ☒ Yes ☐ No

If yes, describe which limited project applies to this project. (See 310 CMR 10.24 and 10.53 for a complete list and description of limited project types)

310 CMR 10.53(3)(f) - See Narrative for full description.

2. Limited Project Type

If the proposed activity is eligible to be treated as an Ecological Restoration Limited Project (310 CMR10.24(8), 310 CMR 10.53(4)), complete and attach Appendix A: Ecological Restoration Limited Project Checklist and Signed Certification.

8. Property recorded at the Registry of Deeds for:

Middlesex North	
a. County	b. Certificate # (if registered land)
N/A - roadway	N/A - roadway
c. Book	d. Page Number

B. Buffer Zone & Resource Area Impacts (temporary & permanent)

1. ☐ Buffer Zone Only – Check if the project is located only in the Buffer Zone of a Bordering Vegetated Wetland, Inland Bank, or Coastal Resource Area.
2. ☒ Inland Resource Areas (see 310 CMR 10.54-10.58; if not applicable, go to Section B.3, Coastal Resource Areas).

Check all that apply below. Attach narrative and any supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

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B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

For all projects affecting other Resource Areas, please attach a narrative explaining how the resource area was delineated.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☒ Bank	64 (perm); 15 (temp) (1. linear feet)	to be restored (2. linear feet)
b. ☒ Bordering Vegetated Wetland	2,806 (perm); 2,329 (temp) (1. square feet)	3,510 (2. square feet)
c. ☒ Land Under Waterbodies and Waterways	262 (perm); 195 (temp) (1. square feet)	to be restored (2. square feet)
	(3. cubic yards dredged)	

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
d. ☒ Bordering Land Subject to Flooding	6,815 (1. square feet)	4,261 (2. square feet)
	2,155 (3. cubic feet of flood storage lost)	4,161 (4. cubic feet replaced)
e. ☐ Isolated Land Subject to Flooding	(1. square feet)	
	(2. cubic feet of flood storage lost)	(3. cubic feet replaced)
f. ☒ Riverfront Area	Maple Meadow Brook (inland) (1. Name of Waterway (if available) - **specify coastal or inland**)	

2. Width of Riverfront Area (check one):

☐ 25 ft. - Designated Densely Developed Areas only

☐ 100 ft. - New agricultural projects only

☒ 200 ft. - All other projects

3. Total area of Riverfront Area on the site of the proposed project: 86,013 square feet

4. Proposed alteration of the Riverfront Area:

a. total square feet	b. square feet within 100 ft.	c. square feet between 100 ft. and 200 ft.
71,960	50,357	21,603

5. Has an alternatives analysis been done and is it attached to this NOI? ☐ Yes ☒ No

6. Was the lot where the activity is proposed created prior to August 1, 1996? ☒ Yes ☐ No

3. ☐ Coastal Resource Areas: (See 310 CMR 10.25-10.35)

Note: for coastal riverfront areas, please complete **Section B.2.f**. above.

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B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

Check all that apply below. Attach narrative and supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

Online Users: Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☐ Designated Port Areas	Indicate size under Land Under the Ocean, below	
b. ☐ Land Under the Ocean	1. square feet 2. cubic yards dredged	
c. ☐ Barrier Beach	Indicate size under Coastal Beaches and/or Coastal Dunes below	
d. ☐ Coastal Beaches	1. square feet	2. cubic yards beach nourishment
e. ☐ Coastal Dunes	1. square feet	2. cubic yards dune nourishment

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
f. ☐ Coastal Banks	1. linear feet	
g. ☐ Rocky Intertidal Shores	1. square feet	
h. ☐ Salt Marshes	1. square feet	2. sq ft restoration, rehab., creation
i. ☐ Land Under Salt Ponds	1. square feet 2. cubic yards dredged	
j. ☐ Land Containing Shellfish	1. square feet	
k. ☐ Fish Runs	Indicate size under Coastal Banks, inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above 1. cubic yards dredged	
l. ☐ Land Subject to Coastal Storm Flowage	1. square feet	

4. ☐ Restoration/Enhancement

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.2.b or B.3.h above, please enter the additional amount here.

a. square feet of BVW

b. square feet of Salt Marsh

5. ☒ Project Involves Stream Crossings

0
a. number of new stream crossings

1
b. number of replacement stream crossings

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C. Other Applicable Standards and Requirements

☐ This is a proposal for an Ecological Restoration Limited Project. Skip Section C and complete Appendix A: Ecological Restoration Limited Project Checklists – Required Actions (310 CMR 10.11).

Streamlined Massachusetts Endangered Species Act/Wetlands Protection Act Review

1. Is any portion of the proposed project located in **Estimated Habitat of Rare Wildlife** as indicated on the most recent Estimated Habitat Map of State-Listed Rare Wetland Wildlife published by the Natural Heritage and Endangered Species Program (NHESP)? To view habitat maps, see the *Massachusetts Natural Heritage Atlas* or go to http://maps.massgis.state.ma.us/PRI_EST_HAB/viewer.htm.

   a. ☐ Yes ☒ No

   If yes, include proof of mailing or hand delivery of NOI to:

   Natural Heritage and Endangered Species Program
   Division of Fisheries and Wildlife
   1 Rabbit Hill Road
   Westborough, MA 01581

   2021
   b. Date of map

   If *yes*, the project is also subject to Massachusetts Endangered Species Act (MESA) review (321 CMR 10.18). To qualify for a streamlined, 30-day, MESA/Wetlands Protection Act review, please complete Section C.1.c, and include requested materials with this Notice of Intent (NOI); *OR* complete Section C.2.f, if applicable. *If MESA supplemental information is not included with the NOI, by completing Section 1 of this form, the NHESP will require a separate MESA filing which may take up to 90 days to review (unless noted exceptions in Section 2 apply, see below).*

   c. Submit Supplemental Information for Endangered Species Review*

      1. ☐ Percentage/acreage of property to be altered:

         (a) within wetland Resource Area _____ percentage/acreage

         (b) outside Resource Area _____ percentage/acreage

      2. ☐ Assessor's Map or right-of-way plan of site

2. ☐ Project plans for entire project site, including wetland resource areas and areas outside of wetlands jurisdiction, showing existing and proposed conditions, existing and proposed tree/vegetation clearing line, and clearly demarcated limits of work **

   (a) ☐ Project description (including description of impacts outside of wetland resource area & buffer zone)

   (b) ☐ Photographs representative of the site

* Some projects **not** in Estimated Habitat may be located in Priority Habitat, and require NHESP review (see https://www.mass.gov/ma-endangered-species-act-mesa-regulatory-review).
Priority Habitat includes habitat for state-listed plants and strictly upland species not protected by the Wetlands Protection Act.

** MESA projects may not be segmented (321 CMR 10.16). The applicant must disclose full development plans even if such plans are not required as part of the Notice of Intent process.

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C. Other Applicable Standards and Requirements (cont'd)

(c) ☐ MESA filing fee (fee information available at https://www.mass.gov/how-to/how-to-file-for-a-mesa-project-review).
Make check payable to "Commonwealth of Massachusetts - NHESP" and ***mail to NHESP*** at above address

*Projects altering **10 or more acres** of land, also submit:*

(d) ☐ Vegetation cover type map of site

(e) ☐ Project plans showing Priority & Estimated Habitat boundaries

(f) OR Check One of the Following

1. ☐ Project is exempt from MESA review.
Attach applicant letter indicating which MESA exemption applies. (See 321 CMR 10.14, https://www.mass.gov/service-details/exemptions-from-review-for-projectsactivities-in-priority-habitat; the NOI must still be sent to NHESP if the project is within estimated habitat pursuant to 310 CMR 10.37 and 10.59.)

2. ☐ Separate MESA review ongoing. a. NHESP Tracking # b. Date submitted to NHESP

3. ☐ Separate MESA review completed.
Include copy of NHESP "no Take" determination or valid Conservation & Management Permit with approved plan.

3. For coastal projects only, is any portion of the proposed project located below the mean high water line or in a fish run?

a. ☒ Not applicable – project is in inland resource area only b. ☐ Yes ☐ No

If yes, include proof of mailing, hand delivery, or electronic delivery of NOI to either:

South Shore - Cohasset to Rhode Island border, and the Cape & Islands:

Division of Marine Fisheries -
Southeast Marine Fisheries Station
Attn: Environmental Reviewer
836 South Rodney French Blvd.
New Bedford, MA 02744
Email: dmf.envreview-south@mass.gov

North Shore - Hull to New Hampshire border:

Division of Marine Fisheries -
North Shore Office
Attn: Environmental Reviewer
30 Emerson Avenue
Gloucester, MA 01930
Email: dmf.envreview-north@mass.gov

Also if yes, the project may require a Chapter 91 license. For coastal towns in the Northeast Region, please contact MassDEP's Boston Office. For coastal towns in the Southeast Region, please contact MassDEP's Southeast Regional Office.

c. ☐ Is this an aquaculture project? d. ☐ Yes ☐ No

If yes, include a copy of the Division of Marine Fisheries Certification Letter (M.G.L. c. 130, § 57).

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Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
MassDEP File Number
Document Transaction Number
Wilmington
City/Town

C. Other Applicable Standards and Requirements (cont'd)

Online Users: Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

4. Is any portion of the proposed project within an Area of Critical Environmental Concern (ACEC)?

   a. ☐ Yes ☒ No If yes, provide name of ACEC (see instructions to WPA Form 3 or MassDEP Website for ACEC locations). **Note:** electronic filers click on Website.

   b. ACEC

5. Is any portion of the proposed project within an area designated as an Outstanding Resource Water (ORW) as designated in the Massachusetts Surface Water Quality Standards, 314 CMR 4.00?

   a. ☐ Yes ☒ No

6. Is any portion of the site subject to a Wetlands Restriction Order under the Inland Wetlands Restriction Act (M.G.L. c. 131, § 40A) or the Coastal Wetlands Restriction Act (M.G.L. c. 130, § 105)?

   a. ☐ Yes ☒ No

7. Is this project subject to provisions of the MassDEP Stormwater Management Standards?

   a. ☒ Yes. Attach a copy of the Stormwater Report as required by the Stormwater Management Standards per 310 CMR 10.05(6)(k)-(q) and check if:
      1. ☐ Applying for Low Impact Development (LID) site design credits (as described in Stormwater Management Handbook Vol. 2, Chapter 3)
      2. ☒ A portion of the site constitutes redevelopment
      3. ☒ Proprietary BMPs are included in the Stormwater Management System.

   b. ☐ No. Check why the project is exempt:
      1. ☐ Single-family house
      2. ☐ Emergency road repair
      3. ☐ Small Residential Subdivision (less than or equal to 4 single-family houses or less than or equal to 4 units in multi-family housing project) with no discharge to Critical Areas.

D. Additional Information

☐ This is a proposal for an Ecological Restoration Limited Project. Skip Section D and complete Appendix A: Ecological Restoration Notice of Intent – Minimum Required Documents (310 CMR 10.12).

Applicants must include the following with this Notice of Intent (NOI). See instructions for details.

Online Users: Attach the document transaction number (provided on your receipt page) for any of the following information you submit to the Department.

1. ☒ USGS or other map of the area (along with a narrative description, if necessary) containing sufficient information for the Conservation Commission and the Department to locate the site. (Electronic filers may omit this item.)

2. ☒ Plans identifying the location of proposed activities (including activities proposed to serve as a Bordering Vegetated Wetland [BVW] replication area or other mitigating measure) relative to the boundaries of each affected resource area.

Massachusetts Department of Environmental Protection
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Provided by MassDEP:

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Wilmington
City/Town

D. Additional Information (cont'd)

3. ☒ Identify the method for BVW and other resource area boundary delineations (MassDEP BVW Field Data Form(s), Determination of Applicability, Order of Resource Area Delineation, etc.), and attach documentation of the methodology.

4. ☒ List the titles and dates for all plans and other materials submitted with this NOI.

See Attached Plan List in NOI Report
a. Plan Title

Green International Affiliates, Inc.
b. Prepared By

c. Signed and Stamped by

3/13/2025
d. Final Revision Date

As shown on each plan
e. Scale

f. Additional Plan or Document Title

g. Date

5. ☐ If there is more than one property owner, please attach a list of these property owners not listed on this form.

6. ☐ Attach proof of mailing for Natural Heritage and Endangered Species Program, if needed.

7. ☐ Attach proof of mailing for Massachusetts Division of Marine Fisheries, if needed.

8. ☒ Attach NOI Wetland Fee Transmittal Form

9. ☒ Attach Stormwater Report, if needed.

E. Fees

1. ☐ Fee Exempt: No filing fee shall be assessed for projects of any city, town, county, or district of the Commonwealth, federally recognized Indian tribe housing authority, municipal housing authority, or the Massachusetts Bay Transportation Authority.

Applicants must submit the following information (in addition to pages 1 and 2 of the NOI Wetland Fee Transmittal Form) to confirm fee payment:

16964
2. Municipal Check Number

3/12/2025
3. Check date

16966
4. State Check Number

3/12/2025
5. Check date

Green International Affiliates, Inc.
6. Payor name on check: First Name

7. Payor name on check: Last Name

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

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Provided by MassDEP:

MassDEP File Number

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Wilmington
City/Town

F. Signatures and Submittal Requirements

I hereby certify under the penalties of perjury that the foregoing Notice of Intent and accompanying plans, documents, and supporting data are true and complete to the best of my knowledge. I understand that the Conservation Commission will place notification of this Notice in a local newspaper at the expense of the applicant in accordance with the wetlands regulations, 310 CMR 10.05(5)(a).

I further certify under penalties of perjury that all abutters were notified of this application, pursuant to the requirements of M.G.L. c. 131, § 40. Notice must be made by Certificate of Mailing or in writing by hand delivery or certified mail (return receipt requested) to all abutters within 100 feet of the property line of the project location.

1. Signature of Applicant	2. Date: 03/04/2025
3. Signature of Property Owner (if different)	4. Date
5. Signature of Representative (if any) (Oxana Fartushnaya)	6. Date: 3/10/2025

For Conservation Commission:
Two copies of the completed Notice of Intent (Form 3), including supporting plans and documents, two copies of the NOI Wetland Fee Transmittal Form, and the city/town fee payment, to the Conservation Commission by certified mail or hand delivery.

For MassDEP:
One copy of the completed Notice of Intent (Form 3), including supporting plans and documents, one copy of the NOI Wetland Fee Transmittal Form, and a **copy** of the state fee payment to the MassDEP Regional Office (see Instructions) by certified mail or hand delivery.

Other:
If the applicant has checked the “yes” box in any part of Section C, Item 3, above, refer to that section and the Instructions for additional submittal requirements.

The original and copies must be sent simultaneously. Failure by the applicant to send copies in a timely manner may result in dismissal of the Notice of Intent.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

NOI Wetland Fee Transmittal Form

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

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





A. Applicant Information

1. Location of Project:

Routh 38 (Main Street) from Route 62 (Church Street / Burlington Avenue) to Woburn City Line	Wilmington
a.	b. City/Town
16966 and 16964	$750
c. Check number	d. Fee amount

2. Applicant Mailing Address:

Erica	Larner	
a. First Name	b. Last Name	
Massachusetts Department of Transportation Highway Division		
c. Organization		
10 Park Plaza, Room 7360		
d. Mailing Address		
Boston	MA	02116
e. City/Town	f. State	g. Zip Code
857-268-1729		erica.n.larner@dot.state.ma.us
h. Phone Number	i. Fax Number	j. Email Address

3. Property Owner (if different):

a. First Name	b. Last Name	
Massachusetts Department of Transportation - Highway Division		
c. Organization		
10 Park Plaza		
d. Mailing Address		
Boston	MA	02116
e. City/Town	f. State	g. Zip Code
h. Phone Number	i. Fax Number	j. Email Address

B. Fees

To calculate filing fees, refer to the category fee list and examples in the instructions for filling out WPA Form 3 (Notice of Intent).

Fee should be calculated using the following process & worksheet. ***Please see Instructions before filling out worksheet.***

Step 1/Type of Activity: Describe each type of activity that will occur in wetland resource area and buffer zone.

Step 2/Number of Activities: Identify the number of each type of activity.

Step 3/Individual Activity Fee: Identify each activity fee from the six project categories listed in the instructions.

Step 4/Subtotal Activity Fee: Multiply the number of activities (identified in Step 2) times the fee per category (identified in Step 3) to reach a subtotal fee amount. Note: If any of these activities are in a Riverfront Area in addition to another Resource Area or the Buffer Zone, the fee per activity should be multiplied by 1.5 and then added to the subtotal amount.

Step 5/Total Project Fee: Determine the total project fee by adding the subtotal amounts from Step 4.

Step 6/Fee Payments: To calculate the state share of the fee, divide the total fee in half and subtract $12.50. To calculate the city/town share of the fee, divide the total fee in half and add $12.50.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

NOI Wetland Fee Transmittal Form

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

B. Fees (continued)

Step 1/Type of Activity	Step 2/Number of Activities	Step 3/Individual Activity Fee	Step 4/Subtotal Activity Fee
Category 2(e) Inland Limited Projects (with Riverfront Area)	1.5	$500	$750

Step 5/Total Project Fee: $750

Step 6/Fee Payments:

Total Project Fee:	$750 (a. Total Fee from Step 5)
State share of filing Fee:	$362.50 (b. 1/2 Total Fee **less $**12.50)
City/Town share of filling Fee:	376.50 (c. 1/2 Total Fee **plus** $12.50)

C. Submittal Requirements

a.) Complete pages 1 and 2 and send with a check or money order for the state share of the fee, payable to the Commonwealth of Massachusetts.

Department of Environmental Protection
Box 4062
Boston, MA 02211

b.) **To the Conservation Commission:** Send the Notice of Intent or Abbreviated Notice of Intent; a **copy** of this form; and the city/town fee payment.

To MassDEP Regional Office (see Instructions): Send a copy of the Notice of Intent or Abbreviated Notice of Intent; a **copy** of this form; and a **copy** of the state fee payment. (E-filers of Notices of Intent may submit these electronically.)

1.0 PROJECT DESCRIPTION

The Massachusetts Department of Transportation, Highway Division (MassDOT), in conjunction with the Town of Wilmington, propose to reconstruct the existing Route 38 (Main Street) roadway between the intersection of Route 38 and Route 62 to the Woburn city line for a total project length of approximately 2.1 miles (MassDOT Project No. 608051).

The purpose of the project is to improve the roadway infrastructure, reduce traffic back-ups on entering side streets, improve the existing drainage system and provide increased safety for roadway users. A new water system is proposed along a portion of the project corridor. The Town of Wilmington will fund water system improvements, while the rest of the project is being funded by MassDOT.

The overall project will also include the replacement of Bridge No. W-38-011, which carries Route 38 between approximately Sta. 252+50 to Sta. 255+00 over Maple Meadow Brook, because the existing bridge is structurally deficient. In accordance with the Massachusetts Transportation Bond Bill of 2014, the proposed work described herein that is associated with bridge repair and replacement is exempt from review under the Massachusetts Wetlands Protection Act (M.G.L. c.131 §40) and its implementing regulations (310 CMR 10.00).

This project consists of maintenance and improvement of an existing roadway (including widening of less than a single lane, improvements to existing drainage systems and repaving). As the proposed project is a roadway project, which is increasing impervious area by less than one lane, it is therefore categorized as a "*Redevelopment Project*" under the Massachusetts Stormwater Management Standards. The project is therefore designed to meet the Standards to the maximum extent practicable. A Stormwater Management Report demonstrating the compliance of the project with the ten state stormwater standards is attached as Appendix F to this NOI.

The proposed work within Waters of the United States requires a Clean Water Act Section 401 Water Quality Certification pursuant to 314 CMR 9.04(1) since the combined projects will result in cumulative permanent and temporary impacts to Bordering Vegetated Wetlands (BVW) and Waterways/Land Under Water (LUW) in excess of 5,000 square feet as well as dredging in waterways in excess of 100 cubic yards. Therefore, a Joint Application for 401 Water Quality Certification for Minor Dredging and Major Fill/Excavation and Section 404 Pre-Construction Notification (PCN) will be submitted to the Department of Environmental Protection (DEP) and the United States Army Corps of engineers in association with this project.

In addition, the proposed work exceeds the activity thresholds described in *301 CMR 11.03(3)(b)1(d): alteration of 5,000 or more sf of bordering or isolated vegetated wetlands* and *301 CMR 11.03(3)(b)1(f): 301 CMR 11.03(3)(b)1(f): alteration of ½ or more acres of any other wetlands*. Consequently, an Environmental Notification Form is being filed to initiate project review under MEPA by the Executive Office of Energy and Environmental Affairs (EEA). Since the project is also located within a one-mile radius of an Environmental Justice (EJ) population, the project also requires an Environmental Impact Report (EIR) based on the updated MEPA requirements issued in January 2022.

This Notice of Intent (NOI) is being submitted to the Wilmington Conservation Commission pursuant to the Massachusetts Wetlands Protection Act (WPA) Regulations and its implementing regulations 310 CMR

10.00 for work within the Bordering Vegetated Wetland (BVW), Land Under Water and Waterways (LUW), Bank, Riverfront Area (RFA), 100-foot Buffer Zone, and Bordering Land Subject to Flooding (BLSF).

As stated in 310 CMR 10.05(4)(b), projects proposed by the MassDOT Highway Division are not subject to local wetlands bylaws or regulations and do not require individual abutter notification. As a state agency, MassDOT must provide notice of the time and place of the Notice of Intent hearing in a newspaper of general circulation in the Town.

Limited Project Provisions

The entire project meets the criteria of the Limited Project provisions of the WPA listed in the 310 CMR 10.53(3)(f): *Maintenance and improvement of existing public roadways, but limited to widening less than a single lane, adding shoulders, correcting substandard intersections, and improving inadequate drainage systems*.

1.1 EXISTING CONDITIONS

Route 38 (Main Street) is an Urban Principal Arterial, located west of Interstate 93 and east of Route 3A, generally providing northwest and southeast movement between the towns of Tewksbury, Wilmington, Woburn, Winchester, and Medford. The proposed part of Route 38 to be reconstructed and improved runs from Route 62 (Burlington Avenue/Church Street) in Wilmington, MA to the Woburn city line for an approximate project length of 2.1 miles. Main Street is located within a public right-of-way which is generally around 46 feet wide but widens around curves at the intersections. Pavement widths generally vary from approximately 30 to 34 feet. There is a sidewalk present on each corner of the Route 38/Route 62 intersection, along the eastern side of Route 38 between the intersections with Route 62 and Route 129, and on the western side of Route 38 near the Route 129 intersection. The sidewalks at the signalized intersections are approximately 5.5 feet wide, in fair condition, and in some cases do not comply with ADA/AAB requirements. The sidewalks are typically not ADA/AAB-compliant elsewhere, and there are no pedestrian accommodations along the majority of the corridor. The pedestrian signal phase clearance time at the Route 38 and Route 62 intersection is shorter than Manual on Uniform Traffic Control Devices (MUTCD) compliance. The travel lanes are generally 12-14 feet wide with shoulders between 2 and 5 feet. The pavement is in fair condition, and there is moderate pavement cracking throughout the project length. There are no bicycle accommodations on the roadway other than bicycle detection at signalized intersections, and limited pedestrian accommodations. Bicyclists currently must ride within the vehicle lanes or on the sidewalks, resulting in safety concerns.

There are several existing underground utilities at the project site, including gas, water, sewer, and drainage. In addition, there are a number of above ground utilities present at the project site which include many overhead wires and utilities poles throughout the project.

The existing site can be analyzed as twenty-seven (27) watershed areas that contribute runoff to twenty-one (21) discharge points. The existing drainage system on the roadways within the project limits includes “country drainage” (i.e. no curb), where the runoff sheet flows off the pavement into the pervious shoulder, roadside ditches, or private front yards. There are lengths of bituminous berm gutter, where the road runoff flows as concentrated flow to catch basins, or to a point where the berm discontinues, and the runoff flows onto adjacent wetland or wooded areas as shallow concentrated flow.

There are protected wetland resource areas that exist directly adjacent to Route 38 (Main Street) along the project corridor. Most vegetated wetlands and streams on site belong to the Ipswich River headwaters, a subwatershed of the Ipswich River watershed. Approximately 200 feet of the southernmost limit of the project is located within the Aberjona River subwatershed, a subwatershed of the Mystic River watershed. The wetland resources identified as Wetlands "A" through "J" and can be seen on Figure 3, Protected Resource Areas Map in Appendix C. Some portions of the project are located within BLSF. Please refer to Appendix A, Wetland Summary Report, for more details about each resource area within the project's area of interest. Please refer to section 2 of this report for description of each resource area, impacts and regulatory compliance.

The project site is not located within an area designated as a Priority Habitat of Rare Species or Estimated Habitat of Rare Wildlife or NHESP Priority Habitat of Rare Specie by the Natural Heritage & Endangered Species Program (NHESP) 2021 Maps. Therefore, the project activities are not expected to affect these habitats. A potential Vernal Pool (PVP #29119) is located approximately 75 feet southwest of Route 38 and 550 feet south of Burlington Avenue, on the southwest side of the MBTA tracks. The Certified Vernal Pool (CVP# 2795) is located in close proximity to and south of the PVP described above, approximately 150 feet southwest of Route 38 and 550 feet south of Burlington Avenue. Another PVP #29103 is located northwest of the intersection of Route 38 and Cook Avenue, approximately 100 feet west of Route 38 and is within Wetland H; however, project activities are not expected to negatively affect these vernal pools or their designated buffer zones.

Per MassGIS online data mapping, there are no Outstanding Resource Waters (ORW) that exist within or adjacent to the project limits. There are no cold-water fisheries crossing or located adjacent to the project area. The project site is not located within an Area of Critical Environmental Concern (ACEC). The majority of the project is located within a Zone II Wellhead Protection Area; there are no Zone I or IWPS within the project limits. The project is not location within Surface Water Protection Areas (Zones A,B,C)(See Figure 3 in Appendix C).

1.2 PROPOSED CONDITIONS

The project proposes to reconstruct the existing two-lane two-way road to achieve generally two 11-foot lanes and two 5-foot bike lanes along the project corridor. The 5'-6" sidewalk will be added on one, or both sides of the roadway depending on location. There will be two 11-foot southbound travel lanes and a 2-foot shoulder for 900 feet south of the Route 62 and Route 38 intersection. The project will also incorporate improvements to the existing closed drainage system, including headwall and culvert replacement, a new water system along Route 38 from Route 62 to Eames Street. The project also proposes to add bicycle accommodations, improve pedestrian accommodations, and install traffic signal improvements along the Route 38 (Main Street) corridor. The project will upgrade the signage and pavement markings to improve driver safety along the project corridor. New signage and pavement markings also will be provided to enhance safety for bicyclists on the widened roadway. Bicycle access and pedestrian access will be improved along the entire project corridor to and from the MBTA Wilmington commuter rail station and the recently constructed Yentile Farm recreational facility. This roadway upgrade will require full-depth reconstruction of the existing Route 38 pavement from Route 62 to Eames Street. Micromilling and resurfacing will be proposed along Route 38 from Eames Street to the Woburn City Line.

Improvements at the intersection of Route 38 and Route 62 (Burlington Avenue and Church Street) will include re-striping to provide additional turning lanes for the northern, southern, and western legs of the intersection, adding bicycle detection, tree removal and the pruning and trimming of trees and reconstructing the traffic signal, as well as a new retaining wall along the MBTA tracks south of this intersection. These improvements will result in less congestion along the corridor, and significantly lower delays and queues at the intersection. The project will only include pavement resurfacing and minor pavement widening and drainage improvements at the intersection of Route 129 (Lowell Street) because this section of Route 38 was reconstructed approximately 15 years ago. The project will also include a traffic signal at the intersection of Route 38 with Cross Street and Butters Row. This signalization will provide more orderly traffic control for vehicles, pedestrians, and bicyclists. The side street approaches at this intersection are proposed to be realigned to provide improved sight distances and geometry. The improvements will add a left turn lane from northbound Route 38 to Butters Row. Realignments of Eames Street and Old Main Street are also proposed to improve safety. In all, these improvements will result in enhanced safety of roadway for all roadway users including bicyclists, pedestrians, and vehicles.

The portion of the project between approximately Sta. 252+50 to Sta. 255+00 on Route 38 is associated with the replacement of the existing Bridge No. W-38-011 carrying Route 38 over Maple Meadow Brook. As mentioned earlier, this portion is exempt from review under the Wetlands Protection Act (WPA) and will be permitted under the Section 401 Water Quality Certification (WQC). A courtesy copy of the WQC filed with MassDEP will be sent to the Wilmington Conservation Commission.

The project will not result in any impacts to the sewer or water utilities present throughout the site; however, the project will include a variety of drainage improvements. In order to install the proposed sidewalk and other ADA compliant pedestrian improvements throughout the project, several utility poles and overhead wires will be relocated.

The proposed stormwater management analysis can be analyzed as twenty-seven (27) watershed areas contributing runoff to twenty-one (21) discharge points, which are the same under existing conditions. The limits of the overall watershed and discharge points of analysis are the same in proposed and existing conditions. The proposed drainage improvements include installation of new deep sump catch basins with hoods, new drain manholes, replacement of existing drainage outfalls, as well as three proposed infiltration Stormwater Control Measures (SCMs) to mitigate the increase in peak rates of runoff. While curbing will be added in sections of the roadway that used to sheet flow away from the project, the new drainage systems will maintain the historic drainage patterns, distributing runoff to the existing discharge points. The project also provides a modified drainage collection system to address the changes caused by the proposed road improvements as well as protecting the nearby downstream watershed and the environment.

Clearing and grabbing will be required for this project. The overall Route 38 project area of clearing and grubbing is approximately 66,500 SF±. As part of the subject project's tree restoration efforts, several locations within the project limits have been designated for replanting to mitigate the removal of trees affected by construction. All proposed trees and plantings will be within the public right of way, with the most notable areas being from STA. 233+00 – STA. 235+00 RT, STA. 248+00 STA. 249+00 RT, and at the proposed MBTA bus stop on Old Main Street. Additionally, trees and shrubs will be planted at the wetland replication site at 201 Lowell Street and the drainage basin on Old Main Street to help restore green spaces impacted by the project.

Control of invasive plants is proposed to begin immediately with the initiation of construction activities and prior to any anticipated clearing or site disturbance. This work will be performed in accordance with MassDOT specifications for Invasive Plants Management.

1.3 ANTICIPATED CONSTRUCTION PHASING

Construction phasing for the Route 38 (Main Street) project will ultimately be determined by the project contractor. The construction phasing is assumed to generally include the following items:

1. Coordination with private utility companies for utility relocations.
2. Installation of sediment and erosion control measures.
3. Tree removal and the pruning and trimming of trees in sections along Route 38.
4. Construction of new catch basins, drainage improvements and culvert replacements/extensions in sections along Route 38.
5. Construction of improvements to the existing water system
6. Traffic Management throughout construction.
7. Clearing and rough grading along Route 38 including areas for wetland replication and flood storage compensation areas.
8. Construction of the stormwater SCMs
9. Construction of Bridge No. W-38-011 over Maple Meadow Brook (exempt from review under the WPA)
10. Construction of the retaining wall south of the Route 38 and Route 62 Intersection.
11. Construction and installation of the sidewalk, curb ramps, and curbing in sections along Route 38.
12. Construction and installation of the proposed traffic signals equipment.
13. Demolition of pavement in sections along Route 38.
14. Milling of pavement where needed.
15. Roadway full depth construction, upgrading signage and pavement markings.
16. Construction of wetland replication area, installation of wetland replication area plantings and maintenance of plantings.
17. Construction of flood storage compensation area.
18. Installation of landscaping and grassed areas.
19. Maintaining wetland replication area: checking for plantings that are damaged or failing to thrive and adjusting/replacing plantings as recommended by Wetland Specialist.
20. Removal of sediment and erosion control measures and dispose of same.

Equipment that is likely to be utilized for this project includes dump trucks, flatbed trucks, front-end loader(s), backhoe(s), skid steer(s), excavator, hoe rams, drilling rigs, concrete pumpers, boom trucks, air hammers, air compressor(s), and a crane. Equipment can be parked on roadway pavements off-limits for construction staging purposes. Staging equipment in Vegetated Wetland or Waterway resource areas shall be prohibited.

1.4 PROJECT PLAN LIST

The following plan sheets are included with this Notice of Intent in Appendix E:

Sheet	Title	Prepared by	Date
1	Title Sheet & Index	Green International Affiliates, Inc	3/12/2025
2	Legend & Abbreviations	Green International Affiliates, Inc	3/12/2025
3	General Notes	Green International Affiliates, Inc	3/12/2025
4	Key Plan	Green International Affiliates, Inc	3/12/2025
15-19	Typical Sections	Green International Affiliates, Inc	3/12/2025
N/A	Resource Area Impacts Plans 1-6	Green International Affiliates, Inc	3/12/2025
94-114	Drainage Plans	Green International Affiliates, Inc	3/12/2025
136-143	Drainage and Utility Details	Green International Affiliates, Inc	3/12/2025
218	Wetland Replication Plan	Green International Affiliates, Inc	3/12/2025
219	Compensatory Flood Storage Plan	Green International Affiliates, Inc	3/12/2025
220	Infiltration Basin Plan	Green International Affiliates, Inc	3/12/2025
221-224	Construction & Landscape Details	Green International Affiliates, Inc	3/12/2025
228-231	Culvert Plans	Green International Affiliates, Inc	3/12/2025

2.0 PROJECT IMPACTS

2.1 WETLAND RESOURCE AREAS

The wetland resource areas on the Project Site are regulated under Federal, State and Local regulatory programs including:

- Section 404 of the Clean Water Act (CWA) which is administered by the U.S. Army Corps of Engineers (ACOE)
- Section 401 of the CWA which is overseen by the Massachusetts Department of Environmental Protection (DEP)
- Massachusetts Environmental Policy Act (MEPA) and 301 CMR 11.00 which is administered by the Executive Office of Energy and Environmental Affairs (EEA)
- Massachusetts Wetlands Protection Act (WPA) and 310 CMR 10.00 which is administered by the Wilmington Conservation Commission or (upon appeal) by DEP

There are several wetland resource areas adjacent to the roadway within a project corridor. These areas are identified on the attached Figure 3, Protected Resource Area Map, attached to this application.

The Wetlands Protection Act (Massachusetts General Laws (MGL) Chapter 131, Section 40 protects wetlands and the public interests they serve, including protection of public and private water supply and ground water supply, flood control, prevention of storm damage and pollution, land containing shellfish, fisheries, and wildlife habitat.

The following sections describe jurisdictional areas associated with the project:

2.1.1 Bordering Vegetated Wetlands (BVW)

Per *310 CMR 10.55(1)*, Bordering Vegetated Wetlands (BVWs) are likely to be significant to public or private water supply, to ground water supply, to flood control, to storm damage prevention, to prevention of pollution, to the protection of fisheries and to wildlife habitat.

A delineation of the wetland boundaries in the vicinity of the Route 38 project site was completed by Lucas Environmental on May 21 and 22, December 3, 2020. The site was revisited on June 6, 2023, to review and update the wetland delineation based on current site conditions at that time. The wetland resource area boundary delineations were conducted in accordance with the methodology outlined in the Regulations 310 CMR 10.55 and the DEP handbook *Delineating Bordering Vegetated Wetlands Under Massachusetts Wetlands Protection Act*. Hydrophytic vegetation was based upon the *US Fish and Wildlife Service National List of Plant Species That Occur in Wetlands*, as well as all plant species listed in the Act. Wetland hydrology includes hydric soils, which were determined based upon the interagency document *Field Indicators for Identifying Hydric Soils in New England*. This methodology is consistent with the three-parameter approach required for the delineation of federal wetlands as outlined in the Corps of Engineers *Wetland Delineation Manual*. These wetlands are identified as Wetlands "A" through "J" and are depicted on Figure 3, Protected Resource Areas Map, and are described in further detail in Appendix A.

2.1.2 Land Under Water Bodies and Waterways (LUW)

Land under Water Bodies and Waterways (under any Creek, River, Stream, Pond or Lake), established through *310 CMR 10.56(2)*, is likely to be significant to public and private water supply, to ground water supply, to flood control, to storm damage prevention, to prevention of pollution and to protection of fisheries and wildlife habitat.

Maple Meadow Brook is a perennial stream crossing the project at approximate Sta. 253+70. Additionally, an Unnamed Intermittent Stream crosses the project limits at approximate Sta. 218+00. Both streams have LUW associated with them. There are no other streams or waterbodies within or adjacent to the project area. As noted, earlier, Maple Meadow Brook crossing is exempt from review under the WPA.

2.1.3 Inland Bank

Per *310 CMR 10.54(1)*, Banks are likely to be significant to public or private water supply, to ground water supply, to flood control, to storm damage prevention, to the prevention of pollution and to the protection of fisheries and wildlife habitat.

There is one intermittent stream and one perennial stream crossing the Route 38 project area, which have an associated Bank, established though 310 CMR 10.54(2):

- Unnamed Intermittent Stream at Sta. 218+00
- Maple Meadow Brook at Sta. 253+70 (exempt from review under the WPA)

2.1.4 Bordering Land Subject to Flooding (BLSF)

Per *310 CMR 10.57(1)*, Bordering Lands Subject to Flooding (BLSF) are likely to be significant to flood control and storm damage prevention, by providing a temporary storage area for flood water which has overtopped the bank of the main channel of a creek, river or stream or the basin of a pond or lake. Certain portions of Bordering Land Subject to Flooding, including those located within 100 feet of the bank or bordering vegetated wetland, are also likely to be significant to the protection of wildlife habitat.

Over time, incremental filling of these areas causes increases in the extent and level of flooding by eliminating flood storage volume or by restricting flows, thereby causing increases in damage to public and private properties.

Per the Flood Insurance Rate Maps (FIRM) for the Town of Wilmington, Massachusetts, Middlesex County, Panels 25017C0291E, 25017C0292E, 25017C0293E, and 25017C0294E, dated 06/04/2010, a portion of the project that includes the Route 38 crossing over Maple Meadow Brook, is located within the 100-year flood plain. The flood plain areas are shown on Figure 4 – FEMA Map. The Flood Insurance Study, by the Federal Management Agency and last revised on July 6, 2016, includes a detailed study of the project area, showing the 100-year floodplain elevations in the project vicinity. Maple Meadow Brook has a 100-year flood elevation of 82.9 feet upstream and 81.5 feet downstream of Route 38 (NAVD 88).

2.1.5 Riverfront Area

Per *310 CMR 10.58(1)*, Riverfront areas are likely to be significant to protect the private or public water supply, to protect groundwater, to provide flood control, to prevent storm damage, to prevent pollution, to protect land containing shellfish, and to protect wildlife habitat and fisheries.

There is a 200-foot Riverfront Area associated with Maple Meadow Brook within the Route 38 project limits (established though 310 CMR 10.58(2)(a)3). The work proposed in the Riverfront Area meets the definition of work within a previously developed Riverfront Area and is regulated by *310 CMR 10.58(5)*, which may allow work within Previously Developed Riverfront Areas, provided the proposed work improves existing conditions and meets the performance standards listed in 10.58(5).

2.1.6 Buffer Zone

The 100-foot Buffer Zone (established through 310 CMR 10.02) is a 100-foot offset from the BVW line, the inland bank of intermittent streams, lakes, and ponds. The Buffer Zones within the project area consist of existing paved roadways as well as some wooded and landscaped areas. Portions of the project are located within the Buffer Zones associated with BVWs and the Bank of an Unnamed Intermittent Stream at Sta. 218+00.

2.2 REGULATORY COMPLIANCE

Pursuant to 310 CMR 10.53(3), the project has been designed to avoid wetland resource area impacts to the maximum extent practicable and will mitigate unavoidable resource area impacts in accordance with state regulations. Since the proposed project qualifies as a limited project, it will meet the performance standards for each resource area to the maximum extent practicable.

Replication and restoration of the impacted resource areas are provided to contribute to the protection of the interests identified in M.G.L. c. 131, § 40. The proposed mitigation areas will be constructed to meet the requirements of permits and certifications including relevant performance standards of the Massachusetts Wetlands Protection Act (MGL C. 131, s40) and U.S. Army Corps of Engineers.

Regulatory compliance for this project includes the entire project excluding the exempt bridge work (Bridge No. W-38-011) between approximate Sta. 252+50 and 255+00, which will be permitted under the Section 401 Water Quality Certification (WQC) and Section 404 Army Corps of Engineers GP via a PCN filing.

2.2.1 Resource Areas Impacts

There are direct impacts to wetland resource areas associated with the project. These impacts resulting from the project are associated with the full depth pavement reconstruction and minor widening of the roadway, the construction of new sidewalks in select areas, raising the profile of Route 38 to tie into the realigned Butters Row, culvert replacement/extension work, replacement of the existing highway guardrails, as well as various drainage improvements and construction of new drainage outfalls at multiple discharge points, discharging into resource areas, as shown on the Resource Area Impact Plans included in Attachment E. The impacts associated with the replacement of the Maple Meadow Brook bridge (Bridge No. W-38-011), which is exempt from WPA review, are not being permitted under this NOI. In order to determine the boundaries of the WQC jurisdiction, the roadway cross-sections were carefully evaluated to determine the extent of the bridge replacement work and determine the limits of the bridge replacement under the bridge exemption.

To protect the resource areas and the interests of the WPA during construction, proper erosion and sediment controls will be installed during construction. Replication of the impacted wetland resource areas is discussed in detail below. In addition to the minimum control measures included in the plan set,

a Stormwater Pollution Prevention Plan (SWPPP) for construction activities will be prepared by the Contractor for the site in compliance with the EPA's Construction General Permit. It will include measures to minimize exposed soil areas through sequencing and temporary stabilization and establish a permanent vegetative cover or other forms of stabilization as soon as practicable.

Bordering Vegetated Wetlands (BVWs)

There are BVW areas adjacent to Route 38 along the project corridor. The full-depth roadway reconstruction, minor roadway widening in select areas to accommodate consistent shoulder/bike lanes and construction of new sidewalks, new drainage outfalls in select locations as well as raising the profile of Route 38 to tie into the realigned Butters Row, will result in permanent and temporary impacts to wetland areas along the project corridor, as described in Table 1 below. As noted earlier, the impacts associated with the replacement of Bridge No. W-38-011 carrying Route 38 over Maple Meadow Brook are exempt from WPA regulations and are not included in Table 1 below:

Table 1: BVW Impacts

Resource Area	Permanent Impacts (SF)	Temporary Impacts (SF)
BVW A (STA 218+00 East) Flags WFA-series	192	142
BVW C (STA 237+40 - 241+00 West) Flags WFC-series	2,315	1,443
BVW D (STA 236+00 - 240+00 East) Flags WFD-series	270	655
BVW E (STA 248+00 – 256+50 east) Flags WFE- series	29	89
Total	**2,806**	**2,329**

**See Resource Area Impact Plans in Appendix E*

The direct impacts to 2,806 square feet of BVWs cannot be avoided due to the roadway widening in select areas to accommodate consistent shoulder/bike lanes and construction of new sidewalks, replacement of the culvert at Sta. 218+00 and extension of the culvert at Sta. 238+50, new drainage outfalls in select locations, raising the profile of Route 38 to tie into the realigned Butters Row, and associated regrading in the vicinity of the wetland areas.

The proposed improvements to the drainage system will result in enhanced quality of the runoff that will, in turn, result in improved water quality (surface and ground), prevention of pollution and storm damage. There are no fisheries, land containing shellfish or wildlife habitat located within or in close proximity to the project area, therefore the project will not negatively impact these interests of the WPA.

Temporary disturbance to BVW (2,329 square feet) will be required for installation of Erosion & Sediment Control BMPs as well as for installation of utility pole guy wire anchors at select locations. After the erosion controls have been removed, the BVWs will be restored to preexisting conditions in accordance with MassDOT Wetland Restoration specifications.

The following section describes how the proposed work within BVW meets the performance standards:

The proposed work will comply with General Performance Standards in accordance with 310 CMR 10.55 (4)(b),(d) and (e). The 310 CMR 10.55 (4)(c) Standard does not apply to this project as the impacts are more than 500 square feet.

In compliance with 310 CMR 10.55 (4)(d), the proposed project will not have any "*… adverse effect on specified habitat sites of rare vertebrate or invertebrate species, as identified by procedures established under 310 CMR 10.59*." The project site is not located within an area designated as Priority or Estimated Habitat of Rare Species by the Natural Heritage & Endangered Species Program (NHESP) 2021 Maps. There is one Certified Vernal Pool and two Potential Vernal Pools located adjacent to the Route 38 project corridor, however the project activities do not extend into these vernal pools (see Figure 3).

In compliance with 310 CMR 10.55 (4)(e), the proposed project is not located within an Area of Critical Environmental Concern (ACEC), therefore, proposed work will "*not destroy or otherwise impair any portion of a Bordering Vegetated Wetland that is within an Area of Critical Environmental Concern designated by the Secretary of Energy and Environmental Affairs under M.G.L. c. 21A, § 2(7) and 301 CMR 12.00: Areas of Critical Environmental Concern*."

A wetland replication area totaling approximately 3,510 square feet is proposed and designed in accordance with *310 CMR 10.55 (4)(b)* provisions, as summarized below:

1. *Replacement areas (replication areas) must be equal in total size to lost BVW area;*

As shown on the plans accompanying this Notice of Intent, the proposed wetland replication area north of the intersection of Route 38 and the Textron Systems driveway has an area of approximately 3,510 square feet, which is greater than the 2,806 square feet wetland area that will be permanently impacted by the project activities.

2. *The surface/ground water elevations of the replacement must approximate those that characterized the lost BVW areas;*

The replication area proposed north of the intersection of Route 38 and the Textron Systems driveway will be connected to Wetland E and will be at the same elevation as Wetland E.

3. *Replication areas are to be configured and located, with respect to inland bank, in a similar manner as was the case for lost BVW areas;*

The overall horizontal configuration and location of the replacement area with respect to the bank are similar to the lost areas.

4. *Replication areas must have an unrestricted hydraulic connection to the same waterways and/or waterbodies as the lost areas;*

The replication area proposed north of the intersection of Route 38 and the Textron Systems driveway is adjacent to Wetland E and hydrologically connected to all wetlands being impacted by the proposed project.

5. *Replication areas are to be located within the same reach of waterway or general areas of waterbody, as lost BVW areas;*

The replication area is generally located within the same reach of waterway as the lost BVW areas.

6. *In the replication areas, indigenous plant species shall be used to reestablish the vegetation cover of the new BVW areas such that a 75% cover of these areas is attained within two (2) growing seasons. During the period of reestablishment, any exposed soil must be stabilized in accordance with U.S. Soil Conservation Service methods;*

Indigenous plant species are proposed to reestablish vegetation, as shown on the plans. Any exposed soil will be stabilized in accordance with U.S. Soil Conservation Service methods.

7. *General Performance Standards for BVW areas must be addressed in a manner consistent with those of other resource areas described in 310 CMR 10.*

The proposed work will comply with General Performance Standards to BVW areas.

Land Under Water Bodies and Waterways (LUW)

There is one perennial stream within or adjacent to the project area, Maple Meadow Brook. There is also an Unnamed Intermittent Stream crossing the project limits at approximate Sta. 218+00 near Dublin Avenue. One (1) culvert at Sta 218+00 within WPA jurisdiction is being replaced as part of this project.

General Performance Standards for Land Under Water Bodies and Waterways (LUW), as presented in 310 CMR 10.56(4), allow work in LUW that will not impair the water carrying capacity of the existing channel, nor ground water and surface water quality, nor the capacity of the LUW to provide breeding habitat, escape cover, or food for fisheries. The work also may not impair the capacity of the LUW to provide important wildlife functions. The regulations provide that the capacity of LUW to provide important wildlife functions is deemed to be unimpaired so long as less than ten (10) percent of the area of LUW significant to protection of wildlife habitat, or 5,000 square feet of LUW (whichever is less) is cumulatively altered.

The impacts to LUW associated with the replacement of the Bridge No. W-38-011 conveying Maple Meadow Brook beneath Route 38, between approximate Sta. 252+50 and 255+00 and are not included in this NOI and will be permitted under the Section 401 Water Quality Certification (WQC). A copy of the WQC filed with MassDEP will be sent to the Wilmington Conservation Commission.

The proposed project activities will permanently impact 262 square feet of LUW and temporarily impact 164 square feet of LUW associated with the Unnamed Intermittent Stream crossing the project limits at approximate Sta. 218+00. Dewatering and temporary bypass is associated with the culvert replacement. These impacts are due to the replacement of the culvert at Sta. 218+00 (Culvert No. 1) which includes the installation of natural streambed material as well as rip rap at the culvert inlet and outlet for scour protection. Additionally, the placement of rip rap at a new drainage outfall will result in minor temporary impacts (31 square feet) to LUW near Maple Meadow Brook at approximate Sta. 252+40.

The permanent and temporary impacts to LUW are summarized in Table 2 below:

Table 2: LUW Impacts

Resource Area	Permanent Impacts (SF)	Temporary Impacts (SF)
Unnamed Intermittent Stream #1 Flags BF1-100 series (STA. 218+00 East) Flags BF1-200 series (STA. 218+00 West)	262	164
Maple Meadow Brook Flags BF #2-200 series (STA 252+40 Northeast)	0	31
Total	**262**	**195**

**See Resource Area Impact Plans in Appendix E*

Inland Bank

The proposed project activities will permanently impact 64 linear feet of bank associated with the Unnamed Intermittent Stream crossing the project limits at approximate Sta. 218+00. These activities consist of the replacement of the culvert at Sta. 218+00 which includes construction of the concrete headwalls, as well as the placement of rip rap at the culvert inlet and outlet for scour protection. Additionally, permanent impacts to the bank of Maple Meadow Brook are associated with the replacement of Bridge No. W-38-011, however these impacts are exempt from WPA regulations and impact calculations for these areas are not included in this NOI. Temporary disturbance to Bank (15 linear feet) will be required for installation of Erosion & Sediment Control BMPs.

The permanent and temporary impacts to the Bank are summarized in Table 3 below:

Table 3: Impacts to Bank

Resource Area	Permanent Impacts (SF)	Temporary Impacts (SF)
Unnamed Intermittent Stream #1 Flags BF1-100 series (STA. 218+00 East)	37	0
Unnamed Intermittent Stream #1 Flags BF1-200 series (STA. 218+00 West)	27	0
Maple Meadow Brook BF #2-200 series (STA 252+40 Northeast)	0	15
Total	**64**	**15**

**See Resource Area Impact Plans in Appendix E*

General Performance Standards for Inland Bank, as presented in *310 CMR 10.54(4)*, allow work on a Bank that will not impair its physical stability, nor the water carrying capacity of the existing channel within the Bank, nor ground water and surface water quality. Such work also must not impair the capacity of the Bank to provide breeding habitat, escape cover, or food for fisheries; neither may the work impair the capacity of the Bank to provide important wildlife functions. A Bank's capacity to provide important wildlife functions is deemed to be unimpaired so long as less than ten (10) percent of the length of the Bank, or 50 feet of the Bank (whichever is less) is cumulatively altered.

Additional alterations beyond the above threshold may be permitted if they will have no adverse effects on wildlife habitat, as determined by procedures contained in 310 CMR 10.60.

The WPA regulations require, in part, that wildlife habitat evaluations be conducted when a proposed project will alter Inland Bank, Land Under Water ("LUW"), Riverfront Area ("RFA"), or Land Subject to Flooding ("BLSF" or "ILSF") beyond the thresholds permitted under 310 CMR 10.54(4)(a)5., 10.56(4)(a)4., 10.57(4)(a)3., and 10.58(4)(d)1. The proposed work under this project will alter combined 67 linear feet of Bank at the inlet and outlet of the culvert at Sta 218+00, which is above the threshold referenced in the Regulations thus requiring an Evaluation. Wildlife Habitat Evaluation was performed on March 12, 2025 by the Certified Wildlife Biologist, at the locations where Bank was impacted due to project improvements in order to assess how project activities may impact the Banks' capacities to provide breeding habitat, escape cover and food for wildlife. The Wildlife Habitat Evaluation conducted at this location concluded that although minor disturbance to the Inland Bank of the Unnamed Intermittent Stream #1 is proposed in order to replace this obstructed culvert at Sta 218+00, the existing condition in the study area being heavily disturbed with the existing and surrounding development, Route 38 and the adjacent MBTA tracks, therefore, are expected to not cause any adverse impacts to wildlife habitat. The disturbance to wildlife habitat required to replace the stream crossing is temporary; the natural streambed will be reestablished and the LUW area will be restored upon completion of construction. Notwithstanding the requirements of 310 CMR 10.56(4)(a)4., the impact on Land under Water Bodies and Waterways caused by the installation of a stream crossing is exempt from the requirement to perform a habitat evaluation in accordance with the procedures established under 310 CMR 10.60 (see Wildlife Habitat Evaluation in Appendix D to this NOI). The "no substantial reduction" standard is met when "important wildlife habitat functions are substantially restored" during project construction, or it is otherwise demonstrated that "the proposed alterations will have no adverse effects on wildlife habitat" because the important features identified in a particular study area are common to the overall area, and potential habitat features lost are minimal and any adverse impacts are avoided or minimized and mitigated. Therefore, the project should not result in a significant adverse effect or impair or reduce the capacity of Bank to provide important wildlife habitat functions. The impacted bank on the intermittent stream and the surrounding area will be restored upon completion of the culvert replacement work.

The following section describes how the proposed work within the Bank meets the performance standards in accordance with *310 CMR 10.54 (4)(a)*:

310 CMR 10.54(4)(a)(1) Physical Stability of the Bank:

The proposed work will not impair the physical stability of the Bank. The minor impacts associated with construction activities will be mitigated by the implementation of E&S controls to minimize impacts on Bank. After completion of work the total area of bank disturbed under proposed conditions will be replaced in accordance with the performance standards listed in 310 CMR 10.54(4).

310 CMR 10.54(4)(a)(2) Water Carrying Capacity of the Existing Channel within the Bank:

The proposed work will not impair the water carrying capacity of the existing channel within the bank. The permanent impacts to the inland bank of the intermittent stream within the project area result from the proposed roadway widening and replacement of the cross culvert at Sta. 218. The bank will be stabilized with rip rap at the headwalls of the proposed culvert at Sta. 218, therefore, the water carrying capacity of the existing channel within the bank will not be affected.

310 CMR 10.54(4)(a)(3) Ground Water and Surface Water Quality:

The work within the Bank will not have a negative impact on the ground water and surface water quality due to the nature of disturbance associated with roadway widening and replacement of the cross culvert. In addition, implementation of the proposed erosion and sediment control measures will help maintain water quality (ground and surface) throughout construction.

310 CMR 10.54(4)(a)(4) Capacity of the Bank to provide Breeding Habitat, Escape Cover and Food for Fisheries:

The proposed work will not have an adverse effect on the capacity of the Bank to provide breeding habitat, cover and food for fisheries.

310 CMR 10.54(4)(a)(5) Capacity of the Bank to provide Important Wildlife Habitat Functions:

The project is not expected to have a negative impact on the capacity of Bank to provide important wildlife functions, since the existing characteristics of the Bank and landscape context within and adjacent to the previously developed paved project area will not be negatively affected. Impacts to wildlife are expected to be negligible and are expected to be offset by the proposed mitigation measures.

Bordering Land Subject to Flooding (BLSF)

A portion of the project that includes the Route 38 crossing over Maple Meadow Brook is located within a 100-year floodplain with an established elevation of 82.9 feet upstream and 81.5 feet downstream of the Bridge No. W-38-011. Even though the replacement of Bridge No. W-38-011 itself is being permitted under the 2014 Transportation Bond Bill bridge exemption through the 401 WQC filing, compensatory flood storage area discussed below includes the area within the WQC jurisdiction that is not being permitted outside the WPA jurisdiction.

The proposed project activities will occur within approximately 6,815 square feet of BLSF area, due to the proposed full-depth roadway reconstruction, minor roadway widening in select areas to accommodate consistent shoulder/bike lanes and construction of new sidewalks, and new drainage outfalls in select locations (See plans included in Attachment E for details).

The following section describes how the proposed work within BLSF meets the performance standards in accordance with *310 CMR 10.57 (4)(a)*:

10.57(4)(a)(1) Compensatory Storage:

The fill within the floodplain is proposed from approximately Sta. 262+50 to Sta. 263+00 and from Sta. 251+50 to Sta. 256+50, however, those parts of the floodplain between Sta. 252+50 and 255+00 are not under WPA jurisdiction. Fill within this portion of the project is predominantly associated with the addition of a sidewalk on the west side of the roadway. There is also some negligible fill on the east side of the roadway below the elevation of 81.5 feet (18 cubic feet/47 square feet of BLSF). The rest of the proposed work within BLSF will not involve fill and will be limited to reconstruction of the roadway; existing grades will be reestablished at the end of construction within BLSF in this area, therefore, there will be no change in grades in compliance with the BLSF Performance Standards.

The project is not changing the FEMA delineated 100-year floodplain. The proposed flood storage compensation area will be located between Sta. 258+00 and Sta. 260+00 on the west side of Route 38 and

must comply with the General Performance Standards presented in 310 CMR 10.57 (4)(a). These call for the provision of compensatory flood storage volume for existing flood storage that will be made unavailable by the proposed work. These storage areas must be incrementally equal per foot of elevation to storage volume lost. They also must have an unrestricted hydraulic connection to the same waterway segment is the lost storage volumes. Work within BLSF cannot restrict flows in any manner that would increase flood stages or flow velocities.

The proposed flood storage area is hydrologically connected to the affected floodplain and will provide flood storage compensation on a foot-by-foot basis. In order to protect the large trees on the site, the cut will be predominantly excavated at the 82-foot contour, which results in an overall incremental net cut. The project is able to compensate the entire project's flood storage loss between elevations 80-92.9 feet. The lost flood storage volume of 2,155 cubic feet is more than balanced by the creation of 4,161 cubic feet of storage as demonstrated in the table below. Table 4 below provides a summary of cut, fill and flood storage compensation provided:

Table 4: Compensatory Flood Storage

Elevation (FT)	Volume of Cut (CF)	Volume of Fill (CF)	Incremental Net Cut/Fill Volume (CF)
79.0			
	0	0	0
80.0			
	147	7	-140
81.0			
	1,804	925	-879
82.0			
	2,210	1,222	-988
82.9			
TOTAL	**4,161**	**2,155**	**-2,007**

**See Resource Area Impact Plans in Appendix E*

10.57(4)(a)(2) Restriction of Flows:

The proposed work within the BLSF is a result of the redevelopment of the existing paved area currently located within BLSF and activities associated with construction of the sidewalk on the west side of the roadway. Therefore, the proposed improvements will not restrict flows so as to cause an increase in flood stages or flow velocities, in compliance with this standard.

10.57(4)(a)(3) Shall Not Impair Wildlife Habitat:

The proposed site alterations within BLSF will not adversely impact portions of the BLSF found to be significant to the protection of wildlife habitat nor its capacity to provide wildlife habitat functions. The proposed alterations are located outside areas depicted as "priority habitat of rare species" and "estimated habitat of rare wildlife" as depicted on the 2021 Massachusetts Natural Heritage Atlas. The project area within BLSF is comprised of paved roadways, landscaped areas, and includes a bridge crossing over Maple Meadow Brook with adjacent wetlands. Those project activities subject to WPA review will not impair wildlife habitat associated with the Brook and adjacent wetlands.

Riverfront Area

Riverfront Area associated with Maple Meadow Brook extends over 86,013 square feet of the project area; however, significant portions of the work occurring within the Riverfront Area is exempt under the provisions set forth under 310 CMR 10.02(2)(b)1 and, therefore, is not being permitted under this NOI. The non-exempt work takes place within approximately 71,960 square feet of the Riverfront Area. This non-exempt work proposed in the Riverfront Area includes full-depth roadway reconstruction, minor roadway widening in select areas to accommodate consistent shoulder/bike lanes and construction of new sidewalks, and drainage improvements including new drainage outfalls in select locations. This work will take place in existing developed areas, and therefore should be considered as redevelopment.

General Performance Standards for Riverfront Area, as set forth in *310 CMR 10.58(4)*, are addressed as described below:

10.58(4)(a) Protection of other Resource Areas:

The affected Riverfront Area includes BVWs, LUW, Inland Bank, BLSF and Buffer Zones. The project will comply with the performance standards as described above in previous sections of this narrative.

10.58(4)(b) Protection of Rare Species:

As indicated previously in this Narrative, there are no threatened or endangered species, or species of concern, in the project area.

10.58(4)(c) Practicable and Substantially Equivalent Economic Alternative:

Since this project will occur within the previously developed Riverfront Area created prior to August 7, 1996, it does not need to document equivalent economic alternatives.

10.58(4)(d) No Significant Adverse Impact:

The full depth pavement reconstruction and minor widening required for construction of new sidewalks within the 2.1-mile project corridor will result in an increase in impervious area. All permanent work will occur within a Riverfront Area that is currently degraded by pavement, shoulders or adjacent landscaped areas.

When work that redevelops previously developed Riverfront Areas is proposed, the following criteria from *310 CMR 10.58(5)* need to be complied with:

10.58(5)(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.

This roadway reconstruction project is intended to improve existing substandard conditions to promote safety for various roadway users and provide drainage improvements. The project alters previously disturbed and degraded Riverfront Area, and within the limits of the project area, minimal space is present where improvements to the Riverfront Area could be realized. Where possible, disturbed areas will be loamed and seeded. The Riverfront Area within parcels containing the project is degraded with pavement, shoulders and landscaped areas, and as such there is no need to meet requirements of 310 CMR 10.58(4). The work within the Riverfront Area is unavoidable due the proposed full-depth roadway reconstruction,

minor roadway widening in select areas to accommodate consistent shoulder/bike lanes and construction of new sidewalks, and new drainage outfalls in select locations as well as placement of the erosion and sediments controls to protect nearby resource areas.

10.58(5)(b) Stormwater management is provided according to Massachusetts Stormwater Management Standards, as can be seen in the Appendix F to this Application.

The project will provide improvements to the existing drainage system and improve the quality of stormwater runoff discharged to adjacent wetlands. Retrofitting of outfall locations with stone for pipe ends to provide splash pads for stormwater discharges will reduce erosion and movement of sediment into the waterbodies. Construction of subsurface drainage improvements will extend pavement life spans and will result in improved safety by reducing stormwater ponding on reconstructed roadway pavements. Three infiltration SCMs are proposed to improve the quality of stormwater runoff discharged to adjacent protected resource areas. The proposed stormwater improvements will improve public safety on the roadway, help control the flow of stormwater discharged to the adjacent wetlands, and improve the quality of discharged stormwater, to the maximum extent that it is practical. In addition, catch basins will be added to improve runoff. These improvements will result in improved water quality and drainage characteristics; therefore, contributing to the interests of the WPA (public or private water supply, to ground water supply, to flood control, to storm damage prevention, to the prevention of pollution and to the protection of fisheries and wildlife habitat).

10.58(5)(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).

The majority of the proposed work will occur as close to the river as the present limits of areas degraded by pavement, shoulders and landscaped areas. However, due to the project's purpose to provide additional sidewalk within the project corridor, a small portion of this work may be located closer to the brook than existing conditions. The limit of work has been minimized to the maximum extent practicable, and the area will be stabilized and restored to the maximum extent feasible upon completion of work.

10.58(5)(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).

Most of the permanent work will be located within the area previously disturbed, due to existing roadway shoulder embankment and landscaped areas. Areas disturbed by the proposed roadway reconstruction and minor widening to accommodate additional sidewalk within the Riverfront Area will be stabilized upon completion of construction to the maximum extent practicable.

10.58(5)(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 amount of work in the Riverfront Area is 71,960 square feet of the 86,013 square feet of the total Riverfront Area within the project area. Approximately 83% percent of the Riverfront Area will be affected by the proposed work. Of the 71,960 square feet of Riverfront Area within the project area, almost all of the resource area is already degraded with pavement, shoulders, landscape areas or embankments. Disturbances within the Riverfront Area associated with this work and regrading have been minimized to the maximum extent practicable and the area will be stabilized upon completion of construction.

10.58(5)(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:

a. *removal of all debris, but retaining any trees or other mature vegetation;*
b. *grading to a topography which reduces runoff and increases infiltration;*
c. *coverage by topsoil at a depth consistent with natural conditions at the site; and*
d. *seeding and planting with an erosion control seed mixture followed by plantings of herbaceous and woody species appropriate to the site;*

The project is comprised of the reconstruction of a road and structure owned by state highway agencies prior to August 7, 1996, and as such activities to maintain these facilities are grandfathered from Requirements for the Riverfront Area. However, the disturbed area will be restored upon completion of construction activities. Tree restoration/replanting is proposed within the 200-ft Riverfront Area of Maple Meadow Brook (approx. from Sta 248+50 to 261+50) (270 SF± and 11,000 SF± at the wetland replication site).

10.58(5)(g) When an applicant proposes mitigation either on-site or in the riverfront area within the same general area of the river basin, alteration may be allowed notwithstanding the criteria of 310 CMR 10.58(5)(c), (d), or (e) at a ratio in square feet of at least 2:1 of mitigation area to area of alteration not conforming to the criteria or an equivalent level of environmental protection where square footage is not a relevant measure. Alteration not conforming to the criteria shall begin at the riverfront area boundary. Mitigation may include off-site restoration of riverfront areas, conservation restrictions under M.G.L. c. 184, §§ 31 to 33 to preserve undisturbed riverfront areas that could be otherwise altered under 310 CMR 10.00, the purchase of development rights within the riverfront area, the restoration of bordering vegetated wetland, projects to remedy an existing adverse impact on the interests identified in M.G.L. c. 131, § 40 for which the applicant is not legally responsible, or similar activities undertaken voluntarily by the applicant which will support a determination by the issuing authority of no significant adverse impact. Preference shall be given to potential mitigation projects, if any, identified in a River Basin Plan approved by the Secretary of the Executive Office of Environmental Affairs.

No mitigation is needed or proposed. The project is comprised of the reconstruction of a road and structure owned by state highway agencies prior to August 7, 1996, and as such activities to maintain these facilities are grandfathered from Requirements for the Riverfront Area.

10.58(5)(h) The issuing authority shall include a continuing condition in the Certificate of Compliance for projects under 310 CMR 10.58(5)(f) or (g) prohibiting further alteration within the restoration or mitigation area, except as may be required to maintain the area in its restored or mitigated condition. Prior to requesting the issuance of the Certificate of Compliance, the applicant shall demonstrate the restoration or mitigation has been successfully completed for at least two growing seasons.

No mitigation is needed or proposed. The project is comprised of the reconstruction of a road and structure owned by state highway agencies prior to August 7, 1996, and as such activities to maintain these facilities are grandfathered from Requirements for the Riverfront Area.

Buffer Zone

The existing roadway currently encroaches within the 100-foot Buffer Zones to the BVWs and Bank of the Unnamed Intermittent Stream at Sta. 218+00 (Route 38). No buildings are proposed as part of this project, but the proposed minor widening of the roadway to achieve typically two 11-foot travel lanes, a sidewalk and 5.5-foot-wide shoulders/bicycle lanes along the project corridor will result in the limit of the pavement being closer to the wetland under proposed conditions. The proposed work will result in approximately 189,596 square feet of impacts to the 100-foot Buffer Zones. The limited space within the roadway Right-of-Way (ROW) and existing pavement width of approximately 30-34 feet does not allow the proposed 11-foot-wide travel lanes, 5.5-foot shoulders/bike lanes and an additional 5.5-foot sidewalk(s) at selected locations along the project corridor and to be located within the existing limits of pavement. Treatment of stormwater runoff from the proposed roadway will be improved over existing conditions.

Erosion and sediment control Best Management Practices (BMPs) will be installed during construction to protect adjacent resource areas, which will temporarily impact the buffer zones. These BMPs ensure the land disturbance within the Buffer Zone does not negatively impact resource areas and will secure the protection of the interests of the WPA.

2.2.2 Compliance with Massachusetts River and Stream Crossing Standards

The proposed culvert replacement at Sta. 218+00, conveying the Unnamed Intermittent Stream under Route 38, will achieve partial compliance with the Massachusetts River and Stream Crossing Standards (revised March 2011) by conforming with Stream Crossing General Standards (SCGS) #4, #5. SCGS #2, #3 and #6 cannot be complied with, and #1 does not apply. The existing 3.5'x1.5' box culvert at approximate Sta. 218+00, conveying the Unnamed Intermittent Stream under Route 38, is proposed to be replaced with a 3'x3' precast concrete box culvert with a natural streambed material proposed in the bottom of the proposed culvert at the same elevation as the existing surface. Therefore, the proposed design results in an improvement upon the existing conditions at this stream crossing by replacing the existing box culvert, which increases the width of the crossing at this location.

The reconstruction of Bridge No. W-38-011, carrying Route 38 over Maple Meadow Brook, is exempt from review under the Wetlands Protection Act (WPA), and as such, its compliance with Massachusetts River and Stream Crossing Standards will be discussed in the 401 WQC/401 ACOE filing, copy of which will be shared with the Conservation Commission.

The compliance of each stream crossing with the Massachusetts River and Stream Crossing Standards are summarized in Table 5 below.

Table 5: Compliance with Massachusetts River and Stream Crossing Standards

Stream Crossing (STA. #)	SCGS #1	SCGS #2	SCGS #3	SCGS #4	SCGS #5	SCGS #6
Culvert Replacement at STA. 218+00	Not met	Not met	Not met	Met	Met	Not met

SCGS #1 posits that "*Spans (bridges, 3-sided box culverts, open-bottom culverts or arches) that preserve the natural stream channel are strongly preferred*." The existing 3.5'x1.5' obstructed culvert at Sta. 218+00

is not an open bottom structure and will be replaced with the proposed 3'x3' precast concrete box culvert. This culvert conveys an intermittent stream that does not have a year-round flow and it outfalls into a BVW A-series. In addition, there is another culvert west of the culvert inlet conveying this intermittent stream beneath the MBTA railroad tracks, which is not being replaced as part of this project. Both of the existing culverts beneath the MBTA railroad tracks and Route 38 are not an open bottom structure, and replacement of the culverts with open bottom structures is not feasible due to constructability constraints which will potentially cause more impacts to the surrounding BVWs and utilities, therefore, **this standard is met to the maximum extent practicable.**

SCGS #2 provides recommendations for a culverted crossing to be embedded a minimum of 2 feet. The existing culvert is not embedded 2 feet or more; and in order to limit the disturbance to resource areas and the depth of excavation within resource areas (BVW A-series), the proposed replacement culvert will be embedded less than 2 feet as well. Natural streambed material proposed in the bottom of the proposed culvert will be at the same elevation as the existing surface. **This standard is met to the maximum extent practicable.**

SCGS #3 calls for a new span to incorporate a width that, at a minimum, equals 1.2 times bankfull width of the stream. As discussed above under the SCGS #1, there is another culvert west of the culvert inlet of Route 38 conveying this intermittent stream beneath the MBTA railroad tracks, which is not being replaced as part of this project. Both of the existing structures do not comply with the SCGS. Since the existing culvert beneath the MBTA railroad tracks upstream of the Route 38 crossing is not being replaced, widening of the proposed continuation of this stream crossing beneath Route 38 is precluded; in addition, widening of this crossing would cause more impact to the BVW A-series at the outlet of this crossing on the east side of Route 38. **This standard is met to the maximum extent practicable.**

SCGS #4 calls for placement of natural substrate within the structure. As shown in the Plans, the proposed replacement culvert will utilize concrete box culvert span-type structure and will accommodate 6 inches of natural streambed material over 6 inches of crushed stone in the bottom. **This standard is fully met.**

SCGS #5 calls for "*… bed forms and streambed characteristics so that water depths and velocities are comparable to those found in the natural channel at a variety of flows.*" The proposed culvert will maintain bed forms and streambed characteristics comparable to those found in the natural channel at a variety of flow. The proposed layer of natural streambed placed at the same elevation to match the existing streambed will allow for a smooth transition from upstream to downstream of the crossing upon completion of construction. **This standard is fully met.**

SCGS #6 provides a desired level of "*openness*" for stream crossings so that wildlife will utilize the crossing for passage beneath a roadway. The desired ratio of cross-sectional area of opening to passage length is a minimum value of 0.82 feet. The project proposes the replacement of the existing 3.5'x1.5' obstructed culvert with a 3'x3' precast concrete box culvert with 6" of natural streambed material over 6" of crushed stone. The existing cross-sectional area is 5.25 square feet divided by the existing passage length of 47.65 feet, yields a value of 0.11 feet. Although the size of the opening will be slightly increased, there will be a 6" layer of crushed stone topped with natural stream bottom. The proposed cross-sectional area of 6 square feet divided by a proposed passage length of 55.32 feet, both as shown in the Plans, yields a value of 0.11 feet. Therefore, both the existing and the proposed culvert do not meet Standard #6 by providing a minimum level of openness of 0.82 feet. Substantial enlargement of the structure is not feasible due to constructability constraints discussed above and additional impacts to adjacent protected resource areas (BVW A-series). **This standard is met to the maximum extent practicable.**

2.2.3 Stormwater Management

Stormwater management for this project has been designed in compliance with the Stormwater Management Standards as outlined in 310 CMR 10.05(6)(k) through (q) and defined in detail in the DEP's Stormwater Management Handbook. The project has been designed to improve upon existing stormwater conditions while minimizing impacts to nearby resource areas from both the construction and operation of the proposed project. The majority of the project is located within a Zone II Wellhead Protection Area, which is considered a "stormwater critical area" as defined in the Massachusetts Stormwater Handbook. The project proposes three infiltrating Stormwater Control Measures (SCMs), as described in Section 2.3 below, that will improve water quality by providing groundwater recharge and help with peak rate attenuation. The project also provides a modified drainage collection system to address the changes caused by the proposed road improvements as well as protecting the nearby downstream watershed and the environment. Also, throughout the project catch basins with deep sumps and hoods will be installed to provide additional TSS removal. It is anticipated that there will be no adverse effects to the Zone II. A full Stormwater Report documenting compliance with the DEP's Stormwater Management Standards, including required calculations and description of methodology, is attached as Appendix F to this report.

2.3 AVOIDANCE, MINIMIZATION AND MITIGATION MEASURES

The project has been designed to avoid and minimize wetland resource area impacts to the maximum extent practicable and will mitigate unavoidable resource area impacts in accordance with state regulations. In addition to the above-described avoidance, minimization and mitigation measures, some project activities will contribute to the interests of the WPA by improving the quality of stormwater runoff discharged to adjacent wetlands.

The proposed stormwater enhancements are summarized below:

- Route 38 will be reconstructed to provide a typical pavement width of thirty-two feet to forty-four feet using a normal crown section for the majority of the project. Where the road is crowned, curbs will be installed, utilizing gutter flow along the outside lane of each direction of travel. Where the road is superelevated, curb will be installed, utilizing gutter flow along the outside lane of the down-slope side of the road. The new closed drainage system will be redirecting flows that used to sheet flow off Route 38 towards adjacent wetlands and residential areas and will now be conveyed into catch basins prior to discharge.
- The reconstructed drainage system will utilize existing outfall locations and invert elevations where feasible. In areas where the current pipe configuration connects multiple inlets in series (basin to basin), the reconstructed system will use manholes to connect the catch basins to the outfall line. This configuration will place all inlets "off-line" so the failure of an inlet will not adversely impact the overall performance of the entire line.
- The reconfigured system will be in accordance with the MassDEP Stormwater Handbook, which does not give credit for any reduction in total suspended solids (TSS) for catch basins connected on-line (in series). Whereas the existing catch basins do not have deep sumps or hooded outlets, sumps with a minimum depth of 4-feet will be specified, and all outlets will be equipped with hoods/traps to aid in the capture of floatable materials.
- A Low Impact Development (LID) site planning and design strategy has been incorporated into the design by installing three infiltrating SCMs as part of this project. The proposed drainage system

has been designed to convey runoff to these SCMs for water quality treatment, and attenuation prior to discharge to the surrounding environment.

- The proposed drainage improvements will contribute to enhanced flood control and storm damage prevention.
- This project provides an opportunity to improve the existing drainage system and improve the quality of stormwater runoff discharged to adjacent wetlands.

As a result of the project's activities, some drainage structures will be replaced, and the drainage system will be improved. The proposed SCMs will aid in treating runoff and mitigating impacts from the increase in impervious area.

This project results in an increase in impervious area of approximately 60,722 square feet due to the realignment and minor widening of the roadway in select areas, and construction of approximately 14,500 linear feet of new sidewalks. These additions will improve the safety of drivers, bicyclists, and pedestrians on Route 38 (Main Street).

The combined project provides an opportunity to improve the existing drainage system and improve the quality of stormwater runoff discharged to adjacent wetlands. The goals of the proposed stormwater improvements are to improve public safety on the roadway, to control the flow of stormwater discharged to the wetlands, and to improve the quality of discharged stormwater, to the maximum extent that it is practical.

This project will incorporate the installation of three infiltration Stormwater Control Measures (SCMs) located at various locations over the project area:

- SCM-1: Subsurface Infiltration Chamber System, located 375 feet south of the bridge carrying Main Street (Route 38) over the MBTA Railroad.

- SCM-2: Infiltration Basin, situated on the western side of Route 38, between Cook Avenue and Old Main Street,

- SCM-3: Subsurface Infiltration Chamber System, located on the southern end of Old Main Street.

Given the limited space within the ROW, underground utilities, high groundwater elevations, and proximity to wetlands, it was not feasible to propose SCMs in all the drainage areas in the project. A detailed description of the project's SCMs can be found in the Stormwater Report, attached as Appendix F to this Application.

In addition, new catch basins will improve the quality of the runoff by trapping debris, sediments, and floating contaminants. The proposed improvements to the existing drainage system will result in improved water quality (surface and ground) and drainage characteristics; therefore, contributing to the interests of the WPA (public or private water supply, to ground water supply, to flood control, to storm damage prevention, to the prevention of pollution and to the protection of fisheries and wildlife habitat).

Control of invasive plants is proposed as part of this project in accordance with MassDOT specifications.

There are no fisheries, land containing shellfish or significant wildlife habitat located within or in close proximity to the project area, therefore the project will not negatively impact these interests of the WPA.

2.3.1 Construction Mitigation Measures

Erosion and Sediment Control

To protect the resource areas and interests of the WPA during construction, a combination of erosion and sediment control BMPs will be installed as shown on the attached plan set. Primary erosion control techniques proposed include compost filter tubes, sedimentation fence barriers and floating silt fence. The Contractor will have a stockpile of materials required to control erosion on-site to be used to supplement or repair erosion control devices. These materials will include, but are not limited to, compost filter tubes, sedimentation fence, site bags for catch basins, erosion control matting and crushed stone. The erosion controls will be maintained in good condition until on-site soils are stabilized. All areas will be permanently stabilized following the completion of construction work. For additional information on erosion and sediment controls, please see the attached Stormwater Management Report in Appendix F of this report.

Trench Dewatering

It is anticipated that a NPDES Construction General Permit (CGP) will be required for the project; therefore, if trench dewatering is needed, all pumped effluent will be done in compliance with the dewatering requirements within the CGP. There will be no direct discharge of pumped water into any wetland, resource area, or closed drainage system.

2.3.2 Wetland Mitigation

Wetland mitigation is required, and the wetland impact mitigation measures are discussed in detail above under item 2.2.1 Resource Areas Impacts/Bordering Vegetated Wetland (see Sheet 197 - Wetland Replication Plan for details).

2.3.3 Flood Storage Compensation

Flood storage compensation is required, and the required measures are discussed in detail above under item 2.2.1 Resource Areas Impacts/Bordering Land Subject to Flooding (see Sheet 198 – Compensatory Flood Storage Plan for details).

3.0 CONCLUSION

Overall, the project's purpose is to improve the roadway infrastructure, reduce traffic back-ups on entering side streets, improve the existing drainage system and provide increased safety for roadway users. Through the consideration and evaluation of different design alternatives, the project has been designed to avoid wetland resource area impacts to the maximum extent practicable. All unavoidable impacts will be mitigated in accordance with the regulatory requirements.

APPENDICES

APPENDIX A – Wetlands Delineation Memo with Data Forms
APPENDIX B – Photos
APPENDIX C – Figures
- Figure 1 – USGS Topographic Map
- Figure 2 – Aerial Map
- Figure 3 – Protected Resource Area Map
- Figure 4 – FEMA Map

APPENDIX D – Wildlife Habitat Evaluation
APPENDIX E – NOI Plans (bound separately)
APPENDIX F – Stormwater Management Report (bound separately)

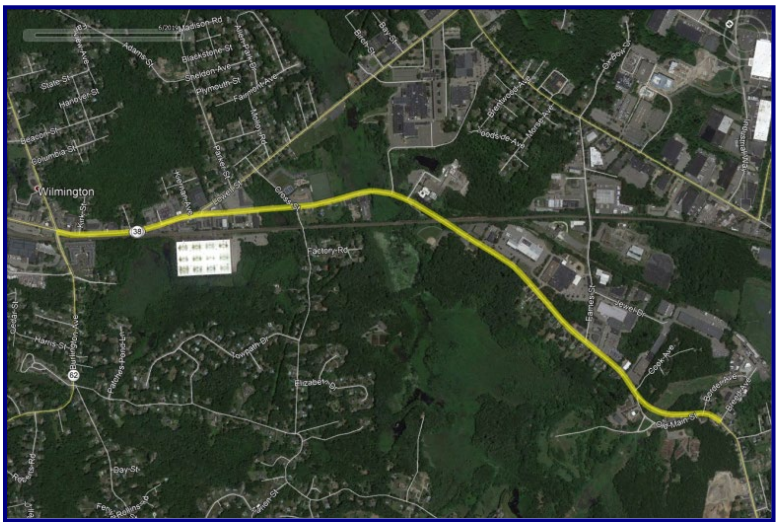
Appendix A – Wetland Summary Report with Data Forms

WETLAND SUMMARY REPORT

Route 38 Project

Route 62 to Woburn Town Line

Wilmington, Massachusetts



PREPARED FOR:
Green International Affiliates, Inc.
239 Littleton Road, Suite 3
Westford, Massachusetts 01886

PREPARED BY:
Lucas Environmental, LLC
500A Washington Street
Quincy, Massachusetts 02169

REPORT DATE: December 18, 2024

LUCAS ENVIRONMENTAL, LLC

LUCAS ENVIRONMENTAL, LLC

500A Washington Street, Quincy, MA 02169

December 18, 2024

Green International Affiliates, Inc.
Attn: Oxana Fartushnaya
239 Littleton Road, Suite 3
Westford, MA 01886

Re: Wetland Summary Report
Route 38 Project
Route 62 to Woburn Town Line
Wilmington, MA

Dear Ms. Fartushnaya,

Professional Wetland Scientists (PWS) from Lucas Environmental, LLC (LE) conducted site investigations along Main Street (Route 38) in Wilmington, Massachusetts on May 21 and 22, and December 3, 2020. A site investigation was also completed on June 6, 2023 to confirm the accuracy of the previous wetland delineation. The purpose of the site investigation was to investigate and delineate wetland resources along the portion of Route 38 located between Burlington Avenue/Church Street (Route 62) and the Wilmington/Woburn Town/City line. The site investigation was limited to wetland areas within 100 feet of and perennial streams within 200 feet of Route 38. This investigation included both a field and office-based component.

Please note that this due diligence effort is specific to environmental resources; it does not evaluate constraints related to local planning or zoning requirements.

MassDEP Bordering Vegetated Wetland Determination Forms were completed as described herein and are included with this report.

If you have any questions, please do not hesitate to contact me at 617.405.4140 or cml@lucasenviro.com. Thank you for your consideration in this matter.

Sincerely,
LUCAS ENVIRONMENTAL, LLC

Christopher M. Lucas, PWS, CWS, RPSS
Environmental Consultant/Wetland & Soil Scientist

Enclosures: Photographic Documentation
BVW Determination Forms

LUCAS ENVIRONMENTAL, LLC

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LUCAS ENVIRONMENTAL, LLC

SECTION I – NARRATIVE

LUCAS ENVIRONMENTAL, LLC

EXISTING CONDITIONS NARRATIVE

1.0 INTRODUCTION

Professional Wetland Scientists (PWS) from Lucas Environmental, LLC (LE) conducted site investigations along Main Street (Route 38) in Wilmington, Massachusetts on May 21 and 22, and December 3, 2020. The site was revisited on June 6, 2023, to review and update the wetland delineation, if needed, based on current site conditions at that time. The wetland investigation was performed in accordance with the Massachusetts Wetlands Protection Act (M.G.L. Ch. 131, § 40) and regulations (310 CMR 10.00 *et seq*.); Section 404 of the Clean Water Act (33 U.S.C. 1344); Massachusetts Department of Environmental Protection (MassDEP) publication "Massachusetts Handbook for Delineation of Bordering Vegetated Wetlands (2022); and the U.S. Army Corp of Engineers (USACE) Wetland Delineation Manual (1987); the Northcentral and Northeast Regional Supplement (2012); and the Town of Wilmington Wetlands Enforcement Bylaw (the "Bylaw").

The following data sources were examined in addition to the site investigation:

- Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map;
- United States Geological Survey Topographic Quadrangle (Wilmington, 2018);
- MassGIS MassDEP Wetland and Hydrography Datalayers;
- National Wetland Inventory (NWI) Maps;
- MassGIS Natural Heritage Atlas Datalayers; and
- United States Department of Agriculture, Natural Resources Conservation Service (USDA-NRCS) Soil Survey.

2.0 EXISTING CONDITIONS

The area under investigation includes wetland areas within 100 feet and perennial streams within 200 feet of the portion of Route 38 between Burlington Avenue/Church Street (Route 62) and the Wilmington/Woburn Town/City line in Wilmington, Massachusetts (the Study Area). Within the Study Area, both sides of Route 38 are generally bounded by commercial and residential properties with the exception of the area in relatively close proximity to Maple Meadow Brook. Maple Meadow Brook is a perennial stream in the Ipswich River Basin that flows from southwest to northeast through the Study Area and is crossed by Route 38. An MBTA railroad track runs roughly parallel to and in close proximity to Route 38 within the northern portion of the Study Area.

A review of the current MassGIS data layer for the Massachusetts Natural Heritage Atlas (effective August 1, 2021) under the Natural Heritage and Endangered Species Program (NHESP) indicates that no portion of the site is located within Estimated Habitat of Rare Wildlife or Priority Habitat of Rare Species under the Massachusetts Endangered Species Act (321 CMR 10.00 et seq.). A Certified Vernal Pool under the jurisdiction of the Wetlands Protection Act Regulations (310 CMR 10.00 et seq.) is present near the Study Area, as are two mapped Potential Vernal Pools. The Mass CAPS Important Wildlife Habitat Map for Wilmington indicates a potential area of important habitat wildlife within approximately 150 feet west of Route 38, south of the Maple Meadow Brook crossing.

The Study Area is not located within an Area of Critical Environmental Concern (ACEC), Outstanding Resource Water (ORW), or Watershed Protection Area. Several MassDEP Zone I Wellhead Protection Areas are mapped near the Study Area, the closest being within approximately 90 feet of Route 38 near Maple Meadow Brook. In addition, most of the Study Area is located within a Zone II Wellhead Protection Area (Zone II #152, Wilmington Water Department).

Maple Meadow Brook (Segment ID MA92-04) is identified as a Category 5 water requiring a Total Maximum Daily Load (TMDL) per the Final MassDEP 2022 Integrated List of Waters (305(b)/303(d)). Waters are listed in Category 5 if they were identified as impaired (i.e., not supporting one or more intended uses), the impairment was related to the presence of one or more "pollutants", and the source of those pollutants was not considered to be natural. The causes of impairment in Maple Meadow Brook have been identified as dewatering* (*TMDL not required), and dissolved oxygen (no EPA TMDL Number).

3.0 ENVIRONMENTAL RESOURCE AREAS

Wetland resource areas identified within the Study Area include Inland Bank, Bordering Vegetated Wetland (BVW), Land Under Waterbodies and Waterways (LUWW), Bordering Land Subject to Flooding (BLSF), and Riverfront Area. Under the Massachusetts Wetlands Protection Act (WPA) and Wilmington Wetlands Enforcement Bylaw the wetlands in the Study Area are defined as follows. Note that the Bylaw does not define any resource areas differently than defined under the WPA.

3.1 Inland Bank – 310 CMR 10.54

Section 310 CMR 10.54 of the WPA defines a Bank *as the portion of the land surface which normally abuts and confines a water body. It occurs between a water body and a vegetated bordering wetland and adjacent flood plain, or, in the absence of these, it occurs between a water body and an upland. The upper boundary of a Bank is the first observable break in the slope or the mean annual flood level, whichever is lower. The lower boundary of a Bank is the mean annual low flow level*. The delineated Banks are described below.

3.2 Bordering Vegetated Wetlands – 310 CMR 10.55

Section 310 CMR 10.55 of the WPA defines BVW *as freshwater wetlands which border on creeks, rivers, streams, ponds and lakes. The types of freshwater wetlands are wet meadows, marshes, swamps and bogs. Bordering Vegetated Wetlands are areas where the soils are saturated and/or inundated such that they support a predominance of wetland indicator plants. The boundary of Bordering Vegetated Wetlands is the line within which 50% or more of the vegetational community consists of wetland indicator plants and saturated or inundated conditions exist. Wetland indicator plants are also those classified in the indicator categories of Facultative, Facultative+, Facultative Wetland-, Facultative Wetland, Facultative Wetland+, or Obligate Wetland in the National List of Plant Species That Occur in Wetlands: Massachusetts (Fish & Wildlife Service, U.S. Department of the Interior, 1988) or plants exhibiting physiological or morphological adaptations to life in saturated or inundated conditions.* The delineated BVWs are described below.

3.3 Land Under Water Bodies and Waterways – 310 CMR 10.56

Section 310 CMR 10.56(2) of the WPA defines Land Under Water Bodies and Waterways *as the land beneath any creek, river, stream, pond or lake. Said land may be composed of organic muck or peat, fine sediments, rocks or bedrock. The boundary of Land under Water Bodies and Waterways is the mean annual low water level.* LUWW is present within Maple Meadow Brook within the Study Area. This resource area is located below the edge of Bank or the Mean Annual High Water (MAHW) mark of perennial streams, therefore it is not field delineated.

3.4 Bordering Land Subject to Flooding – 310 CMR 10.57

Section 310 CMR 10.57(2)(a) of the WPA defines BLSF as *an area with low, flat topography adjacent to and inundated by flood waters rising from creeks, rivers, streams, ponds or lakes. It extends from the banks of these waterways and water bodies; where a bordering vegetated wetland occurs, it extends from said wetland. The boundary of Bordering Land Subject to Flooding is the estimated maximum lateral extent of flood water which will theoretically result from the statistical 100-year frequency storm.*

Flood zones are present within the Study Area. According to the FEMA Flood Insurance Rate Maps (FIRM) for Middlesex County, Massachusetts, Maps Number 25017C0291E and 25017C0293E, effective June 4, 2010, areas designated as Zone AE are present within and along Maple Meadow Brook. Zone AE is classified as an area subject to the 1% annual chance flood (100-year flood), where base flood elevations have been determined. The flood elevations at Maple Meadow Brook are 82.9 feet (NAVD 88) upstream (west) of Main Street and 81.5 feet downstream (east) of Main Street, as provided by Green International Affiliates, Inc. based upon the flood profiles in the Flood Insurance Study. An AE Zone (elevation 95 feet), located within the flood plain of Mill Brook, is also mapped near the Study Area just north of Burlington Avenue.

Areas identified as Zone X are also present near the Study Area west of the MBTA tracks, between the MBTA tracks and Route 38 just north of Butters Row, and near Maple Meadow Brook. Zone X is defined as the 0.2% Annual Chance Flood Hazard (i.e., 500-year flood). The remainder of the Study Area is designated as a Zone X which is classified as an Area of Minimal Flood Hazard. The boundary of BLSF was not delineated in the field and should be identified on the plans.

3.5 Riverfront Area – 310 CMR 10.58

Section 310 CMR 10.58(2)(a)(3) of the WPA defines Riverfront Area *as the area of land between a river's mean annual high water line measured horizontally outward from the river and a parallel line located 200 feet away.* Maple Meadow Brook is mapped as perennial on the current USGS topographic map (Wilmington, Massachusetts Quadrangle, 2024) and is therefore presumed to be perennial. No other perennial streams are mapped within 200 feet of Route 38 within the Study Area. The MAHW line was delineated in the field as described for Stream 2 in the following section.

3.6 Wetland Descriptions

The following describes each of the wetlands identified in the Study Area. This description includes BVW only as no isolated wetlands were identified within the Study Area.

LUCAS ENVIRONMENTAL, LLC

EXISTING CONDITIONS NARRATIVE

Wetland A

Wetland A is a BVW bordering on an intermittent stream (Stream 1) and is located on the north side of Route 38 just east of Dublin Avenue. The BVW boundary was delineated with pink survey tape numbered sequentially with flag series WFA-1 to WFA-20. Common vegetation observed within this palustrine forested (PFO) wetland includes red maple (*Acer rubrum*), green ash (*Fraxinus pennsylvanica*), American elm (*Ulmus americana*), common greenbrier (*Smilax rotundifolia*), northern arrowwood (*Viburnum recognitum*), common reed (*Phragmites australis*), and skunk cabbage (*Symplocarpus foetidus*). Upland vegetation includes black cherry (*Prunus serotina*), red oak (*Quercus rubra*), Oriental bittersweet (*Celastrus orbiculatus*), annual ragweed (*Ambrosia artemisiifolia*), and goldenrods (*Solidago sp.*). Soil within the wetland is a mucky histosol. Upland soils are loamy fine sand and indicative of historic fill and disturbance. Indicators of wetland hydrology included saturation at the soil surface. State and federal boundaries are coincident.

Wetland B

Wetland B is a small narrow BVW within a swale located between a stormwater basin and the MBTA tracks, where the swale enters a culvert under the tracks. The BVW boundary was delineated with pink survey tape numbered sequentially with flag series WFB-1 to WFB-8. Little vegetation is present within the swale but consists primarily of broad-leaf cattail (*Typha latifolia*). Upland vegetation consists of Oriental bittersweet, evening primrose (*Oenothera biennis*), common mullein (*Verbascum thapsus*), goldenrods, and grass. The swale substrate is primarily crushed stone. State and federal boundaries are coincident.

Wetland C & D

Wetland C is located on the south side of Route 38 in the general area northwest of the intersection of Route 38 with Butters Row. The BVW boundary was delineated with pink survey tape numbered sequentially with flag series WFC-1 to WFC-4 and WFC-10 to WFC-26. The area from flags WFC-1 to WFC-10 was re-delineated in 2023 due to the redevelopment of the site at 635 Main Street. No stream channel was observed here, although there may be a blocked culvert. Wetlands D is located on the north side of Route 38 in the general area northwest of the intersection of Route 38 with Cross Street. The BVW boundary was delineated with pink survey tape numbered sequentially with flag series WFD-1 to WFD-31. Wetland C consists of a central area of palustrine emergent (PEM) broad-leaf cattail marsh and open water bounded by red maple swamp (PFO) to the east and west. Wetland D consists of a western area of PEM *Phragmites* marsh and eastern area of a red maple swamp (PFO).

Common vegetation in the forested wetlands includes red maple, green ash, American elm, glossy buckthorn (*Frangula alnus*), white pine, cinnamon fern (*Osmunda cinnamomea*), sensitive fern (*Onoclea sensibilis*), and Canada mayflower (*Maianthemum canadense*). Common upland vegetation includes red oak, white oak (*Quercus alba*), white pine (*Pinus strobus*), Virginia creeper (*Parthenocissus quinquefolia*), Oriental bittersweet, Tatarian honeysuckle (*Lonicera tatarica*), poison ivy (*Toxicodendron radicans*), and goldenrods.

Soils within the wetlands consist of silty loam with a shallow depleted matrix. Upland soils were fine sandy loam to loamy fine sand and indicative of historic fill and disturbance. Indicators of wetland hydrology included surface water, water stained leaves, and saturation at the soil surface. State and federal boundaries are coincident. The west end of the Wetland D (*Phragmites* marsh) adjacent to a parking lot was particularly filled with trash and debris, much of which appeared recent.

Wetlands E & G

Wetlands E and G are located along Maple Meadow Brook on the north and south sides of Route 38, respectively. The BVW boundary was delineated with pink survey tape numbered sequentially with flag series WFE-1 to WFE-78 and WFG-1 to WFG-43. Wetland E is primarily a *Phragmites* marsh (PEM) with areas of open water, palustrine scrub/shrub (PSS) and PFO. Wetland G is primarily a PEM with areas of open water and PFO. Within the emergent marsh common vegetation includes water lily, arrowhead, broad-leaf cattail, sedges (*Carex sp.*) and common reed. Common vegetation in the forested and shrub wetland areas includes red maple, green ash, glossy buckthorn, northern arrowwood, pussy willow (*Salix discolor*), speckled alder (*Alnus incana*), meadowsweet (*Spiraea alba*), elderberry (*Sambucus nigra ssp. canadensis*), common reed, and skunk cabbage. Common upland vegetation includes black cherry, red oak, black locust (*Robinia pseudoacacia*), white pine, Oriental bittersweet, poison ivy, wild sarsaparilla (*Aralia nudicaulis*), goldenrods, and grasses. Soil within the wetland consists of histosols in the wetter areas and deep, dark fine sandy loam with shallow redoximorphic features in the forested areas. Upland soils were generally loamy sand and indicative of historic fill and disturbance, such as containing buried A-horizons. Indicators of wetland hydrology included surface water, water stained leaves, and saturation at or near the soil surface. State and federal boundaries are coincident.

Wetland F

Wetland F is a red maple swamp (PFO) located behind a small house and an automobile repair business on the south side of Route 38, approximately 350 feet west of Maple Meadow Brook. The north edge of the wetland is a shrub dominated PSS. The BVW boundary was delineated with pink survey tape numbered sequentially with flag series WFF-1 to WFF-7. Common vegetation in the wetland includes red maple, glossy buckthorn, silky dogwood (*Cornus amomum*), sensitive fern, jewelweed (*Impatiens capensis*), and goldenrods. The upland includes lawn grass and a gravel parking area. The wetland was generally saturated to the surface and appeared to have recently ponded surface water approximately six to eight inches deep. State and federal boundaries are coincident.

Wetland H

Wetland H is a red maple swamp (PFO) located west of Route 38 and northwest of the intersection of Route 38 and Cook Avenue. The BVW boundary was delineated with pink survey tape numbered sequentially with flag series WFH-1 to WFH-14. Common vegetation in the wetland includes red maple, occasional red oak, glossy buckthorn, highbush blueberry (*Vaccinium corymbosum*), skunk cabbage, cinnamon fern, royal fern (*Osmunda regalis*), and New York fern (*Thelypteris noveboracensis*). Common upland vegetation includes red oak, white pine, black cherry, Virginia creeper, Oriental bittersweet, Canada mayflower, and garlic mustard (*Alliaria petiolata*). Potential Vernal Pool #29103 is located within this wetland (see MAHW3 description below). State and federal boundaries are coincident.

Wetland I

Wetland I is located approximately 350 feet south of Maple Meadow Brook on the east side of Route 38, between the driveways for Textron, Inc. and DSM, Inc. Because this wetland is surrounded by a security fence, it was not delineated in the field. Close to Route 38 the wetland is a red maple swamp (PFO) and further east the wetland becomes a *Phragmites* dominated PEM. Common vegetation in the forested wetland includes red maple, dead and dying red oak trees, glossy buckthorn, northern arrowwood, highbush blueberry, and sensitive fern. Common vegetation in the upland includes red and white oak, gray birch (*Betula populifolia*), American witch-hazel (*Hamamelis virginiana*), glossy buckthorn, Virginia creeper, Oriental bittersweet and goldenrod.

Wetland J

Wetland J is located immediately south of Wetland I along the eastern side or Route 38, on the property of DSM, Inc. Because this wetland is surrounded by a security fence, it was not delineated in the field. Due to the security fencing and topography, visibility of this wetland was limited; however, it appears to have been recently delineated with stakes along the wetland/upland boundary. The wetland edge is lawn and either consists of a large ponded area, or flooded wetland.

3.7 Watercourse Descriptions

The following describes each of the watercourses identified in the Study Area. This description includes both perennial and intermittent streams.

Stream 1 – Unnamed Intermittent Stream

The Banks of a small, unnamed intermittent stream, located just south and east of Dublin Avenue were delineated with blue survey flagging numbered sequentially from BF1-100 to BF1-104 and BF1-200 to BF1-204. Flags BF1-100 through BF1-102 and BF1-200 to BF1-202 are located north of Route 38 on the west and east banks respectively. Flags BF1-103 through BF1-104 and BF1-203 to BF1-204 are located south of Route 38, between the road and MBTA tracks, on the west and east banks respectively. North of Route 38 the stream channel is approximately three to four feet wide with a gravelly substrate and four to six inches of water present at the time of the site visit. Bank vegetation includes American elm (*Ulmus americana*), Oriental bittersweet, common reed, and skunk cabbage. South of Route 38 the open stream channel is approximately two feet wide and located between two culverts. The banks consist of crushed stone with sparse vegetation, including Oriental bittersweet, black cherry, and winterberry holly (*Ilex verticillata*). Erosion from street runoff was apparent.

Stream 2 – Maple Meadow Brook

The MAHW of Maple Meadow Brook upstream and downstream of the culvert crossing under Route 38 was delineated with blue survey flagging numbered sequentially from BF2-100 to BF2-159 and BF2-200 to BF2-229. In some locations MAHW is coincident with the top of Bank; however, in many locations the delineated MAHW line is upgradient of the first break in slope; therefore, the delineation was based on apparent evidence of recent or current high water, such as standing water or water staining of soil, leaves or vegetation.

Flags BF2-100 through BF2-120 and BF2-200 to BF2-208 are located south of Route 38 on the northeast and southwest banks respectively. South of Route 38 the primary stream channel is completely inundated and contains aquatic vegetation such as arrowhead (*Sagittaria latifolia*) and water lily (*Nymphaea odorata* and/or *Nuphar lutea ssp*.) and broad-leaf cattail. The slopes are generally well defined with the MAHW line occurring near the toe of slope. Upgradient vegetation is described under Wetland G above.

Flags BF2-121 through BF2-140 and BF2-209 to BF2-229 are located north of Route 38 on the southeast and northwest banks respectively. North of Route 38 the primary stream channel is completely inundated and vaguely apparent along a shrub line. Vegetation along the delineated MAHW line is dominated by common reed. Upgradient vegetation is described under Wetland E above.

The Riverfront Area extends 200 feet horizontally from the delineated Inland Bank/MAHW line along Maple Meadow Brook. The Riverfront Area includes portions of Wetlands E, G and I described above as well as adjacent upland areas. The adjacent upland Riverfront Area includes a relatively narrow fringe of upland along Route 38 consisting of a mix of grassy roadside areas, wooded areas and developed/commercial property. Common vegetation within the areas of wooded upland Riverfront Area includes red oak, white pine, black cherry, red maple, glossy buckthorn, multiflora rose (*Rosa multiflora*), Oriental bittersweet, Virginia creeper, poison ivy, and garlic mustard.

3.8 Vernal Pool Descriptions

Potential Vernal Pool (PVP#29119)

The MAHW line closest to Route 38 was delineated with blue survey flagging numbered sequentially from MAHW1-1 to MAHW1-15. This PVP (#29119) is located approximately 75 feet southwest of Route 38 and 550 feet south of Burlington Avenue, on the southwest side of the MBTA tracks. The delineation was based on observable evidence of the high water line, such as water stained leaves and water staining on trees or shrubs. Common wetland vegetation included red maple, glossy buckthorn, poison ivy, sensitive fern, and skunk cabbage. Common upland vegetation included white pine, red oak, multiflora rose, Virginia creeper, Oriental bittersweet, and garlic mustard. Surface water remained present within the pool at the time of the delineation and an adult green frog (*Lithobates clamitans*) was observed in the pool.

Certified Vernal Pool (CVP #2795)

The MAHW line closest to Route 38 was delineated with blue survey flagging numbered sequentially from MAHW2-1 to MAHW2-11. This Certified Vernal Pool (CVP # 2795) is located in close proximity to and south of the PVP described above (MAHW1), approximately 150 feet southwest of Route 38 and 550 feet south of Burlington Avenue. The delineation was based on observable evidence of the high water line, such as water stained leaves and water staining on trees or shrubs. Common vegetation is as described under MAHW1 with highbush blueberry and witch-hazel also observed along the pool/upland boundary. Surface water remained present within the pool at the time of the delineation. It appears that there is a potential surface water connection with MAHW1 during very high water conditions via a topographical low point between the two pools.

LUCAS ENVIRONMENTAL, LLC

EXISTING CONDITIONS NARRATIVE

Potential Vernal Pool (PVP #29103)

The MAHW line closest to Route 38 was delineated with blue survey flagging numbered sequentially from MAHW3-1 to MAHW3-26. This PVP (#29103) is located northwest of the intersection of Route 38 and Cook Avenue, approximately 100 feet west of Route 38 and is within Wetland H (see above). The delineation was based on observable evidence of the high water line, such as water stained leaves and water staining on trees or shrubs. Common vegetation is described under Wetland H. At the time of the delineation, surface water remained present within a large deeper portion of the pool located west of the delineation line. Based on the size and apparent depth of this pool it may be semi-permanent. Gray tree frogs (*Hyla versicolor*) and green frogs were heard calling from the pool.

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SECTION II – APPENDICES

LUCAS ENVIRONMENTAL, LLC

APPENDIX A

PHOTOGRAPHIC DOCUMENTATION

LUCAS ENVIRONMENTAL, LLC

PHOTOGRAPHIC DOCUMENTATION

DATE: May 2020



Photograph 1: View of unnamed intermittent stream (Stream 1) and culvert under MBTA tracks, along the west side of Route 138.



Photograph 2: View of Wetland A along the east side of Route 138.

LUCAS ENVIRONMENTAL, LLC

PHOTOGRAPHIC DOCUMENTATION

DATE: May 2020



Photograph 3: View of Wetland B along the MBTA tracks along the west side of Route 138.



Photograph 4: View of Wetland C near flag WFC-18, along the west side of Route 138, opposite Wetland D.

LUCAS ENVIRONMENTAL, LLC

PHOTOGRAPHIC DOCUMENTATION

DATE: May 2020



Photograph 5: View of northwest end of Wetland D marsh, along the east side of Route 138 (note amount of trash).



Photograph 6: View of Wetland E transition from marsh to shrub swamp, along the east side of Route 138.

LUCAS ENVIRONMENTAL, LLC

PHOTOGRAPHIC DOCUMENTATION

DATE: May 2020



Photograph 7: View of MAHW line of Maple Meadow Brook along marsh edge of Wetland E near flag BF2-225, along the east side of Route 138.



Photograph 8: View of Wetland F along the west side of Route 138.

LUCAS ENVIRONMENTAL, LLC

PHOTOGRAPHIC DOCUMENTATION

DATE: May 2020



Photograph 9: View of Maple Meadow Brook (Stream 2) along edge of Wetland G near flag BF2-208, along the west side of Route 138.



Photograph 10: View of Wetland H near flag WHF-10, west of Route 138.

LUCAS ENVIRONMENTAL, LLC

PHOTOGRAPHIC DOCUMENTATION

DATE: May 2020



Photograph 11: View of Wetland I, not delineated, along the east side of Route 138.



Photograph 12: View of Wetland J, not delineated by LE, along the east side of Route 138.

LUCAS ENVIRONMENTAL, LLC

PHOTOGRAPHIC DOCUMENTATION

DATE: May 2020



Photograph 13: View of Potential Vernal Pool along MBTA tracks (MAHW1), along the west side of Route 138.



Photograph 14: View of Certified Vernal Pool along MBTA tracks (MAHW2), along the western side of Route 138.

LUCAS ENVIRONMENTAL, LLC

PHOTOGRAPHIC DOCUMENTATION

DATE: May 2020



Photograph 15: View of Potential Vernal Pool (MAHW3) near flag MAHW3-17, within Wetland H, west of Route 138.

LUCAS ENVIRONMENTAL, LLC

APPENDIX B

BVW DETERMINATION FORMS

BORDERING VEGETATED WETLAND DETERMINATION FORM

Project/Site: Route 38 City/Town: Wilmington Sampling Date: 06/06/23

Applicant/Owner: MassDOT Sampling Point or Zone: WFA-10/11 WET

Investigator(s): Lucas Enviroinmental, LLC Latitude / Longitude: 42.544003° / -71.170559°

Soil Map Unit Name: Freetown muck (52A) NWI or DEP Classification: Wooded Swamp Deciduous

Are climatic/hydrologic conditions on the site typical for this time of year? Yes [✓] No [ ] (If no, explain in Remarks)

Are Vegetation [ ], Soil [ ], or Hydrology [ ] significantly disturbed? (If yes, explain in Remarks)

Are Vegetation [ ], Soil [ ], or Hydrology [ ] naturally problematic? (If yes, explain in Remarks)

SUMMARY OF FINDINGS – Attach site map and photograph log showing sampling locations, transects, etc.

Wetland vegetation criterion met?	Yes [✓] No [ ]	**Is the Sampled Area within a Wetland?** Yes [✓] No [ ]
Hydric Soils criterion met?	Yes [✓] No [ ]	
Wetlands hydrology present?	Yes [✓] No [ ]	

Remarks, Photo Details, Flagging, etc.:

HYDROLOGY

Field Observations:			
Surface Water Present?	Yes [ ]	No [✓]	Depth (inches)
Water Table Present?	Yes [✓]	No [ ]	Depth (inches) 4.00
Saturation Present (including capillary fringe)?	Yes [✓]	No [ ]	Depth (inches) 0.00

Wetland Hydrology Indicators

Reliable Indicators of Wetlands Hydrology	Indicators that can be Reliable with Proper Interpretation	Indicators of the Influence of Water
[✓] Water-stained leaves	[ ] Hydrological records	[ ] Direct observation of inundation
[ ] Evidence of aquatic fauna	[✓] Free water in a soil test hole	[✓] Drainage patterns
[ ] Iron deposits	[✓] Saturated soil	[ ] Drift lines
[ ] Algal mats or crusts	[ ] Water marks	[ ] Scoured areas
[ ] Oxidized rhizospheres/pore linings	[ ] Moss trim lines	[ ] Sediment deposits
[ ] Thin muck surfaces	[ ] Presence of reduced iron	[ ] Surface soil cracks
[ ] Plants with air-filled tissue (aerenchyma)	[ ] Woody plants with adventitious roots	[ ] Sparsely vegetated concave surface
[ ] Plants with polymorphic leaves	[ ] Trees with shallow root systems	[ ] Microtopographic relief
[ ] Plants with floating leaves	[ ] Woody plants with enlarged lenticels	[ ] Geographic position (depression, toe of slope, fringing lowland
[ ] Hydrogen sulfide odor		

Remarks (describe recorded data from stream gauge, monitoring well, aerial photos, previous inspections, if available):

This form is only for BVW delineations. Other wetland resource areas may be present and should be delineated according to the applicable regulatory provisions.

Sampling Point WFA-10/11 WET

VEGETATION – Use both common and scientific names of plants.

Tree Stratum Plot size 30'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Red maple	Acer rubrum	FAC	20.5	Yes	Yes
2. American elm	Ulmus americana	FACW	10.5	Yes	Yes
3.					
4.					
5.					
6.					
7.					
8.					
9.					

31.0 = Total Cover

Shrub/Sapling Stratum Plot size 15'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Glossy buckthorn	Frangula alnus	FAC	20.5	Yes	Yes
2. Northern arrowwood	Viburnum recognitum	FAC	20.5	Yes	Yes
3. Red maple	Acer rubrum	FAC	10.5	No	Yes
4. Green ash	Fraxinus pennsylvanica	FACW	10.5	No	Yes
5. American elm	Ulmus americana	FACW	10.5	No	Yes
6. Crabapple	Malus sp.	UPL	3.0	No	No
7. Black cherry	Prunus serotina	FACU	1.0	No	No
8.					
9.					

76.5 = Total Cover

Herb Stratum Plot size 5'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Skunk cabbage	Symplocarpus foetidus	OBL	38.0	Yes	Yes
2. Common reed	Phragmites australis	FACW	20.5	Yes	Yes
3. Wrinkleleaf goldenrod	Solidago rugosa	FAC	10.5	No	Yes
4. Tall goldenrod	Solidago altissima	FACU	3.0	No	No
5. Purple loosestrife	Lythrum salicaria	OBL	1.0	No	Yes
6. Virginia creeper	Parthenocissus quinquefolia	FACU	1.0	No	No
7.					
8.					
9.					
10.					
11.					
12.					

74.0 = Total Cover

Sampling Point WFA-10/11 WET

VEGETATION – continued.

Woody Vine Stratum	Plot size 30'				
Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Poison ivy	Toxicodendron radicans	FAC	3.0	Yes	Yes
2.					
3.					
4.					
			3.0 = Total Cover		

Rapid Test: Do all dominant species have an indicator status of OBL or FACW?				Yes ☐ No ☑
Dominance Test:	Number of dominant species	Number of dominant species that are wetland indicator plants		Do wetland indicator plants make up ≥ 50% of dominant plant species?
	7	7		Yes ☑ No ☐
Prevalence Index:		Total % Cover (all strata)	Multiply by:	Result
	OBL species		X 1	= 0.00
	FACW species		X 2	= 0.00
	FAC species		X 3	= 0.00
	FACU species		X 4	= 0.00
	UPL species		X 5	= 0.00
	Column Totals	(A) 0		(B) 0
Prevalence Index		B/A = 0.00		Is the Prevalence Index ≤ 3.0? Yes ☐ No ☐
Wetland vegetation criterion met?		**Yes** ☑	**No** ☐	

Definitions of Vegetation Strata

Tree - Woody plants 3 in. (7.62 cm) or more in diameter at breast height (DBH), regardless of height

Shrub / Sapling - Woody plants less than 3 in. (7.62 cm) DBH and greater than or equal to 3.3 ft. (1 m) tall

Herb - All herbaceous (non-woody plants, regardless of size, and woody plants less than 3.3 ft. (1 m) tall

Woody vines - All woody vines greater than 3.3 ft. (1 m) in height

Cover Ranges	
Range	Midpoint
1-5 %	3.0 %
6-15 %	10.5 %
15-25 %	20.5 %
26-50 %	38.0 %
51-75 %	63.0 %
76-95 %	85.5 %
96-100 %	98.0 %

Sampling Point WFA-10/11 WET

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Location[2]		
0-18	10YR 2/1	100.00					sapric	Oa horizon

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators (Check all that apply)		**Indicators for Problematic Hydric Soils**
☑ Histosol (A1)	☐ Polyvalue Below Surface (S8)	☐ 2 cm Muck (A10)
☐ Histic Epipedon (A2)	☐ Thin Dark Surface (S9)	☐ 5 cm Mucky Peat or Peat (S3)
☐ Black Histic (A3)	☐ Loamy Gleyed Matrix (F2)	☐ Iron-Manganese Masses (F12)
☐ Hydrogen Sulfide (A4)	☐ Depleted Matrix (F3)	☐ Mesic Spodic (A17)
☐ Stratified Layers (A5)	☐ Redox Dark Surface (F6)	☐ Red Parent Material (F21)
☐ Depleted Below Dark Surface (A11)	☐ Depleted Dark Surface (F7)	☐ Very Shallow Dark Surface (F22)
☐ Thick Dark Surface (A12)	☐ Redox Depressions (F8)	
☐ Sandy Mucky Mineral (S1)		
☐ Sandy Gleyed Matrix (S4)		
☐ Sandy Redox (S5)		☐ Other (Include Explanation in Remarks)
☐ Stripped Matrix (S6)		
☐ Dark Surface (S7)		

Restrictive Layer (if observed) Type: _____ Depth (inches): _____

Remarks: Historic disturbance/fill

Hydric Soils criterion met? **Yes** ☑ **No** ☐

BORDERING VEGETATED WETLAND DETERMINATION FORM

Project/Site: Route 38 City/Town: Wilmington Sampling Date: 06/06/23

Applicant/Owner: MassDOT Sampling Point or Zone: WFA-10/11 UPL

Investigator(s): Lucas Enviroinmental, LLC Latitude / Longitude: 42.544003° / -71.170559°

Soil Map Unit Name: Urban Land (602) NWI or DEP Classification: Wooded Swamp Deciduous

Are climatic/hydrologic conditions on the site typical for this time of year? Yes [✓] No [ ] (If no, explain in Remarks)

Are Vegetation [ ], Soil [ ], or Hydrology [ ] significantly disturbed? (If yes, explain in Remarks)

Are Vegetation [ ], Soil [ ], or Hydrology [ ] naturally problematic? (If yes, explain in Remarks)

SUMMARY OF FINDINGS – Attach site map and photograph log showing sampling locations, transects, etc.

Wetland vegetation criterion met?	Yes [✓] No [ ]	**Is the Sampled Area within a Wetland?** Yes [ ] No [✓]
Hydric Soils criterion met?	Yes [ ] No [✓]	
Wetlands hydrology present?	Yes [ ] No [✓]	

Remarks, Photo Details, Flagging, etc.:

HYDROLOGY

Field Observations:			
Surface Water Present?	Yes [ ]	No [✓]	Depth (inches)_____
Water Table Present?	Yes [ ]	No [✓]	Depth (inches)_____
Saturation Present (including capillary fringe)?	Yes [ ]	No [✓]	Depth (inches)_____

Wetland Hydrology Indicators

Reliable Indicators of Wetlands Hydrology	Indicators that can be Reliable with Proper Interpretation	Indicators of the Influence of Water
[ ] Water-stained leaves	[ ] Hydrological records	[ ] Direct observation of inundation
[ ] Evidence of aquatic fauna	[ ] Free water in a soil test hole	[ ] Drainage patterns
[ ] Iron deposits	[ ] Saturated soil	[ ] Drift lines
[ ] Algal mats or crusts	[ ] Water marks	[ ] Scoured areas
[ ] Oxidized rhizospheres/pore linings	[ ] Moss trim lines	[ ] Sediment deposits
[ ] Thin muck surfaces	[ ] Presence of reduced iron	[ ] Surface soil cracks
[ ] Plants with air-filled tissue (aerenchyma)	[ ] Woody plants with adventitious roots	[ ] Sparsely vegetated concave surface
[ ] Plants with polymorphic leaves	[ ] Trees with shallow root systems	[ ] Microtopographic relief
[ ] Plants with floating leaves	[ ] Woody plants with enlarged lenticels	[ ] Geographic position (depression, toe of slope, fringing lowland
[ ] Hydrogen sulfide odor		

Remarks (describe recorded data from stream gauge, monitoring well, aerial photos, previous inspections, if available):

This form is only for BVW delineations. Other wetland resource areas may be present and should be delineated according to the applicable regulatory provisions.

Sampling Point WFA-10/11 UPL

VEGETATION – Use both common and scientific names of plants.

Tree Stratum Plot size 30'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Red maple	Acer rubrum	FAC	20.5	Yes	Yes
2. American elm	Ulmus americana	FACW	20.5	Yes	Yes
3.					
4.					
5.					
6.					
7.					
8.					
9.					

41.0 = Total Cover

Shrub/Sapling Stratum Plot size 15'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Red oak	Quercus rubra	FACU	10.5	Yes	No
2. Black cherry	Prunus serotina	FACU	3.0	No	No
3. Green ash	Fraxinus pennsylvanica	FACW	3.0	No	Yes
4.					
5.					
6.					
7.					
8.					
9.					

16.5 = Total Cover

Herb Stratum Plot size 5'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Wrinkleleaf goldenrod	Solidago rugosa	FAC	10.5	Yes	Yes
2. Tall goldenrod	Solidago altissima	FACU	10.5	Yes	No
3. Creeping bellflower	Campanula rapunculoides	UPL	10.5	Yes	No
4. Poison ivy	Toxicodendron radicans	FAC	10.5	Yes	Yes
5. Virginia creeper	Parthenocissus quinquefolia	FACU	3.0	No	No
6. Northern dewberry	Rubus flagellaris	FACU	3.0	No	No
7.					
8.					
9.					
10.					
11.					
12.					

48.0 = Total Cover

Sampling Point WFA-10/11 UPL

VEGETATION – continued.

Woody Vine Stratum	Plot size 30'				
Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Poison ivy	Toxicodendron radicans	FAC	10.5	Yes	Yes
2. Oriental bittersweet	Celastrus orbiculatus	FACU	3.0	Yes	No
3.					
4.					
			13.5 = Total Cover		

Rapid Test: Do all dominant species have an indicator status of OBL or FACW?				Yes ☐ No ☑
Dominance Test:	Number of dominant species	Number of dominant species that are wetland indicator plants		Do wetland indicator plants make up ≥ 50% of dominant plant species? Yes ☑ No ☐
	9	5		
Prevalence Index:		Total % Cover (all strata)	Multiply by:	Result
	OBL species		X 1	= 0.00
	FACW species		X 2	= 0.00
	FAC species		X 3	= 0.00
	FACU species		X 4	= 0.00
	UPL species		X 5	= 0.00
	Column Totals	(A) 0		(B) 0
	Prevalence Index	B/A = 0.00		Is the Prevalence Index ≤ 3.0? Yes ☐ No ☐
Wetland vegetation criterion met?		**Yes** ☑ **No** ☐		

Definitions of Vegetation Strata

Tree - Woody plants 3 in. (7.62 cm) or more in diameter at breast height (DBH), regardless of height

Shrub / Sapling - Woody plants less than 3 in. (7.62 cm) DBH and greater than or equal to 3.3 ft. (1 m) tall

Herb - All herbaceous (non-woody plants, regardless of size, and woody plants less than 3.3 ft. (1 m) tall

Woody vines - All woody vines greater than 3.3 ft. (1 m) in height

Cover Ranges	
Range	Midpoint
1-5 %	3.0 %
6-15 %	10.5 %
15-25 %	20.5 %
26-50 %	38.0 %
51-75 %	63.0 %
76-95 %	85.5 %
96-100 %	98.0 %

Sampling Point WFA-10/11 UPL

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Location[2]		
0-1	10YR 2/1	100.00					loamy fine sand	A horizon
1-4	10YR 4/4 & 2/2 mixed	100.00					loamy fine sand	A/B horizon (mixed)
4-20	10YR 4/4	100.00					loamy fine sand	B horizon

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators (Check all that apply)		**Indicators for Problematic Hydric Soils**
☐ Histosol (A1)	☐ Polyvalue Below Surface (S8)	☐ 2 cm Muck (A10)
☐ Histic Epipedon (A2)	☐ Thin Dark Surface (S9)	☐ 5 cm Mucky Peat or Peat (S3)
☐ Black Histic (A3)	☐ Loamy Gleyed Matrix (F2)	☐ Iron-Manganese Masses (F12)
☐ Hydrogen Sulfide (A4)	☐ Depleted Matrix (F3)	☐ Mesic Spodic (A17)
☐ Stratified Layers (A5)	☐ Redox Dark Surface (F6)	☐ Red Parent Material (F21)
☐ Depleted Below Dark Surface (A11)	☐ Depleted Dark Surface (F7)	☐ Very Shallow Dark Surface (F22)
☐ Thick Dark Surface (A12)	☐ Redox Depressions (F8)	
☐ Sandy Mucky Mineral (S1)		
☐ Sandy Gleyed Matrix (S4)		
☐ Sandy Redox (S5)		☐ Other (Include Explanation in Remarks)
☐ Stripped Matrix (S6)		
☐ Dark Surface (S7)		

Restrictive Layer (if observed) Type: _____ Depth (inches): _____

Remarks: Disturbed/fill soils adjacent to the parking lot.

Hydric Soils criterion met? **Yes** ☐ **No** ☑

BORDERING VEGETATED WETLAND DETERMINATION FORM

Project/Site: Route 38 City/Town: Wilmington Sampling Date: 06/06/23

Applicant/Owner: MassDOT Sampling Point or Zone: WFC-12 WET

Investigator(s): Lucas Enviroinmental, LLC Latitude / Longitude: 42.540176° / -71.165126°

Soil Map Unit Name: Udorthents (655) NWI or DEP Classification: Wooded Swamp Deciduous

Are climatic/hydrologic conditions on the site typical for this time of year? Yes [✓] No [ ] (If no, explain in Remarks)

Are Vegetation [ ], Soil [ ], or Hydrology [ ] significantly disturbed? (If yes, explain in Remarks)

Are Vegetation [ ], Soil [ ], or Hydrology [ ] naturally problematic? (If yes, explain in Remarks)

SUMMARY OF FINDINGS – Attach site map and photograph log showing sampling locations, transects, etc.

Wetland vegetation criterion met?	Yes [✓] No [ ]	**Is the Sampled Area within a Wetland?** Yes [✓] No [ ]
Hydric Soils criterion met?	Yes [✓] No [ ]	
Wetlands hydrology present?	Yes [✓] No [ ]	

Remarks, Photo Details, Flagging, etc.:

HYDROLOGY

Field Observations:			
Surface Water Present?	Yes [✓]	No [ ]	Depth (inches)
Water Table Present?	Yes [✓]	No [ ]	Depth (inches) 7.00
Saturation Present (including capillary fringe)?	Yes [✓]	No [ ]	Depth (inches) 0.00

Wetland Hydrology Indicators

Reliable Indicators of Wetlands Hydrology	Indicators that can be Reliable with Proper Interpretation	Indicators of the Influence of Water
[✓] Water-stained leaves	[ ] Hydrological records	[ ] Direct observation of inundation
[ ] Evidence of aquatic fauna	[✓] Free water in a soil test hole	[ ] Drainage patterns
[ ] Iron deposits	[✓] Saturated soil	[ ] Drift lines
[ ] Algal mats or crusts	[ ] Water marks	[ ] Scoured areas
[ ] Oxidized rhizospheres/pore linings	[ ] Moss trim lines	[ ] Sediment deposits
[ ] Thin muck surfaces	[ ] Presence of reduced iron	[ ] Surface soil cracks
[ ] Plants with air-filled tissue (aerenchyma)	[ ] Woody plants with adventitious roots	[ ] Sparsely vegetated concave surface
[ ] Plants with polymorphic leaves	[ ] Trees with shallow root systems	[ ] Microtopographic relief
[ ] Plants with floating leaves	[ ] Woody plants with enlarged lenticels	[ ] Geographic position (depression, toe of slope, fringing lowland
[ ] Hydrogen sulfide odor		

Remarks (describe recorded data from stream gauge, monitoring well, aerial photos, previous inspections, if available):

This form is only for BVW delineations. Other wetland resource areas may be present and should be delineated according to the applicable regulatory provisions.

Sampling Point WFC-12 WET

VEGETATION – Use both common and scientific names of plants.

Tree Stratum Plot size 30'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Red maple	Acer rubrum	FAC	85.5	Yes	Yes
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					

85.5 = Total Cover

Shrub/Sapling Stratum Plot size 15'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. White pine	Pinus strobus	FACU	20.5	Yes	No
2. Red maple	Acer rubrum	FAC	10.5	Yes	Yes
3. Glossy buckthorn	Frangula alnus	FAC	10.5	Yes	Yes
4.					
5.					
6.					
7.					
8.					
9.					

41.5 = Total Cover

Herb Stratum Plot size 5'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Canada mayflower	Maianthemum canadense	FACU	10.5	Yes	No
2. Cinnamon fern	Osmunda cinnamomea	FACW	1.0	No	Yes
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					

11.5 = Total Cover

Sampling Point WFC-12 WET

VEGETATION – continued.

Woody Vine Stratum	Plot size				
Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1.					
2.					
3.					
4.					
			0.0 = Total Cover		

Rapid Test: Do all dominant species have an indicator status of OBL or FACW?				Yes ☐ No ☑
Dominance Test:	Number of dominant species	Number of dominant species that are wetland indicator plants		Do wetland indicator plants make up ≥ 50% of dominant plant species? Yes ☑ No ☐
	5	3		
Prevalence Index:		Total % Cover (all strata)	Multiply by:	Result
	OBL species		X 1	= 0.00
	FACW species		X 2	= 0.00
	FAC species		X 3	= 0.00
	FACU species		X 4	= 0.00
	UPL species		X 5	= 0.00
	Column Totals	(A) 0		(B) 0
Prevalence Index		B/A = 0.00		Is the Prevalence Index ≤ 3.0? Yes ☐ No ☐
Wetland vegetation criterion met?		**Yes** ☑	**No** ☐	

Definitions of Vegetation Strata

Tree - Woody plants 3 in. (7.62 cm) or more in diameter at breast height (DBH), regardless of height

Shrub / Sapling - Woody plants less than 3 in. (7.62 cm) DBH and greater than or equal to 3.3 ft. (1 m) tall

Herb - All herbaceous (non-woody plants, regardless of size, and woody plants less than 3.3 ft. (1 m) tall

Woody vines - All woody vines greater than 3.3 ft. (1 m) in height

Cover Ranges	
Range	Midpoint
1-5 %	3.0 %
6-15 %	10.5 %
15-25 %	20.5 %
26-50 %	38.0 %
51-75 %	63.0 %
76-95 %	85.5 %
96-100 %	98.0 %

Sampling Point WFC-12 WET

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Location[2]		
4-0	7.5YR 2.5/1	100.00					hemic	Oe horizon
0-2	10YR 3/1	100.00					silt loam	A horizon
2-8	10YR 5/1	78.00	10YR 3/4	2.00	C	M	silt loam	B horizon
			7.5YR _/1	20.00	D	M		
8-14	10YR 2/1	100.00					mucky loam	A2
14-20	7.5YR 3/1 & 3/3	100.00					loamy fine sand	B2 mixed

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators (Check all that apply)		**Indicators for Problematic Hydric Soils**
☐ Histosol (A1)	☐ Polyvalue Below Surface (S8)	☐ 2 cm Muck (A10)
☐ Histic Epipedon (A2)	☐ Thin Dark Surface (S9)	☐ 5 cm Mucky Peat or Peat (S3)
☐ Black Histic (A3)	☐ Loamy Gleyed Matrix (F2)	☐ Iron-Manganese Masses (F12)
☐ Hydrogen Sulfide (A4)	☑ Depleted Matrix (F3)	☐ Mesic Spodic (A17)
☐ Stratified Layers (A5)	☐ Redox Dark Surface (F6)	☐ Red Parent Material (F21)
☑ Depleted Below Dark Surface (A11)	☐ Depleted Dark Surface (F7)	☐ Very Shallow Dark Surface (F22)
☐ Thick Dark Surface (A12)	☐ Redox Depressions (F8)	
☐ Sandy Mucky Mineral (S1)		
☐ Sandy Gleyed Matrix (S4)		
☐ Sandy Redox (S5)		☐ Other (Include Explanation in Remarks)
☐ Stripped Matrix (S6)		
☐ Dark Surface (S7)		

Restrictive Layer (if observed) Type: _____ Depth (inches): _____

Remarks: Historic disturbance/fill

Hydric Soils criterion met? **Yes** ☑ **No** ☐

BORDERING VEGETATED WETLAND DETERMINATION FORM

Project/Site: Route 38 City/Town: Wilmington Sampling Date: 06/06/23

Applicant/Owner: MassDOT Sampling Point or Zone: WFC-12 UPL

Investigator(s): Lucas Enviroinmental, LLC Latitude / Longitude: 42.540176° / -71.165126°

Soil Map Unit Name: Urban Land (602) NWI or DEP Classification: Wooded Swamp Deciduous

Are climatic/hydrologic conditions on the site typical for this time of year? Yes [✓] No [ ] (If no, explain in Remarks)

Are Vegetation [ ], Soil [ ], or Hydrology [ ] significantly disturbed? (If yes, explain in Remarks)

Are Vegetation [ ], Soil [ ], or Hydrology [ ] naturally problematic? (If yes, explain in Remarks)

SUMMARY OF FINDINGS – Attach site map and photograph log showing sampling locations, transects, etc.

Wetland vegetation criterion met?	Yes [✓] No [ ]	**Is the Sampled Area within a Wetland?** **Yes** [ ] **No** [✓]
Hydric Soils criterion met?	Yes [ ] No [✓]	
Wetlands hydrology present?	Yes [ ] No [✓]	

Remarks, Photo Details, Flagging, etc.:

HYDROLOGY

Field Observations:			
Surface Water Present?	Yes [ ]	No [✓]	Depth (inches)_____
Water Table Present?	Yes [ ]	No [✓]	Depth (inches)_____
Saturation Present (including capillary fringe)?	Yes [ ]	No [✓]	Depth (inches)_____

Wetland Hydrology Indicators

Reliable Indicators of Wetlands Hydrology	Indicators that can be Reliable with Proper Interpretation	Indicators of the Influence of Water
[ ] Water-stained leaves	[ ] Hydrological records	[ ] Direct observation of inundation
[ ] Evidence of aquatic fauna	[ ] Free water in a soil test hole	[ ] Drainage patterns
[ ] Iron deposits	[ ] Saturated soil	[ ] Drift lines
[ ] Algal mats or crusts	[ ] Water marks	[ ] Scoured areas
[ ] Oxidized rhizospheres/pore linings	[ ] Moss trim lines	[ ] Sediment deposits
[ ] Thin muck surfaces	[ ] Presence of reduced iron	[ ] Surface soil cracks
[ ] Plants with air-filled tissue (aerenchyma)	[ ] Woody plants with adventitious roots	[ ] Sparsely vegetated concave surface
[ ] Plants with polymorphic leaves	[ ] Trees with shallow root systems	[ ] Microtopographic relief
[ ] Plants with floating leaves	[ ] Woody plants with enlarged lenticels	[ ] Geographic position (depression, toe of slope, fringing lowland
[ ] Hydrogen sulfide odor		

Remarks (describe recorded data from stream gauge, monitoring well, aerial photos, previous inspections, if available):

This form is only for BVW delineations. Other wetland resource areas may be present and should be delineated according to the applicable regulatory provisions.

Sampling Point WFC-12 UPL

VEGETATION – Use both common and scientific names of plants.

Tree Stratum Plot size 30'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Red maple	Acer rubrum	FAC	20.5	Yes	Yes
2. American elm	Ulmus americana	FACW	10.5	Yes	Yes
3.					
4.					
5.					
6.					
7.					
8.					
9.					

31.0 = Total Cover

Shrub/Sapling Stratum Plot size 15'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Glossy buckthorn	Frangula alnus	FAC	38.0	Yes	Yes
2. White pine	Pinus strobus	FACU	10.5	No	No
3. American elm	Ulmus americana	FACW	10.5	No	Yes
4.					
5.					
6.					
7.					
8.					
9.					

59.0 = Total Cover

Herb Stratum Plot size 5'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Canada mayflower	Maianthemum canadense	FACU	10.5	Yes	No
2. Field horsetail	Equisetum arvense	FAC	1.0	No	Yes
3. Wrinkleleaf goldenrod	Solidago rugosa	FAC	1.0	No	Yes
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					

12.5 = Total Cover

Sampling Point WFC-12 UPL

VEGETATION – continued.

Woody Vine Stratum	Plot size 30'				
Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Oriental bittersweet	Celastrus orbiculatus	FACU	3.0	Yes	Yes
2.					
3.					
4.					
			3.0 = Total Cover		

Rapid Test: Do all dominant species have an indicator status of OBL or FACW?				Yes ☐ No ☑
Dominance Test:	Number of dominant species	Number of dominant species that are wetland indicator plants		Do wetland indicator plants make up ≥ 50% of dominant plant species? Yes ☑ No ☐
	5	4		
Prevalence Index:		Total % Cover (all strata)	Multiply by:	Result
	OBL species		X 1	= 0.00
	FACW species		X 2	= 0.00
	FAC species		X 3	= 0.00
	FACU species		X 4	= 0.00
	UPL species		X 5	= 0.00
	Column Totals	(A) 0		(B) 0
Prevalence Index		B/A = 0.00		Is the Prevalence Index ≤ 3.0? Yes ☐ No ☐
Wetland vegetation criterion met?		**Yes** ☑ **No** ☐		

Definitions of Vegetation Strata

Tree - Woody plants 3 in. (7.62 cm) or more in diameter at breast height (DBH), regardless of height

Shrub / Sapling - Woody plants less than 3 in. (7.62 cm) DBH and greater than or equal to 3.3 ft. (1 m) tall

Herb - All herbaceous (non-woody plants, regardless of size, and woody plants less than 3.3 ft. (1 m) tall

Woody vines - All woody vines greater than 3.3 ft. (1 m) in height

Cover Ranges	
Range	Midpoint
1-5 %	3.0 %
6-15 %	10.5 %
15-25 %	20.5 %
26-50 %	38.0 %
51-75 %	63.0 %
76-95 %	85.5 %
96-100 %	98.0 %

Sampling Point WFC-12 UPL

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Location[2]		
2-0	10YR 2/2	100.00					hemic	Oe horizon
0-4	10YR 2/2	100.00					fine sandy loam	A horizon
4-10	10YR 3/2	100.00					loamy fine sand	A/B horizon
10-20	10YR 5/3 & 3/3	100.00					fine sand	small redox present below 18"

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators (Check all that apply)		**Indicators for Problematic Hydric Soils**
☐ Histosol (A1)	☐ Polyvalue Below Surface (S8)	☐ 2 cm Muck (A10)
☐ Histic Epipedon (A2)	☐ Thin Dark Surface (S9)	☐ 5 cm Mucky Peat or Peat (S3)
☐ Black Histic (A3)	☐ Loamy Gleyed Matrix (F2)	☐ Iron-Manganese Masses (F12)
☐ Hydrogen Sulfide (A4)	☐ Depleted Matrix (F3)	☐ Mesic Spodic (A17)
☐ Stratified Layers (A5)	☐ Redox Dark Surface (F6)	☐ Red Parent Material (F21)
☐ Depleted Below Dark Surface (A11)	☐ Depleted Dark Surface (F7)	☐ Very Shallow Dark Surface (F22)
☐ Thick Dark Surface (A12)	☐ Redox Depressions (F8)	
☐ Sandy Mucky Mineral (S1)		
☐ Sandy Gleyed Matrix (S4)		
☐ Sandy Redox (S5)		☐ Other (Include Explanation in Remarks)
☐ Stripped Matrix (S6)		
☐ Dark Surface (S7)		

Restrictive Layer (if observed) Type: _____ Depth (inches): _____

Remarks: Historic fill slope for roadway.

Hydric Soils criterion met? **Yes** ☐ **No** ☑

BORDERING VEGETATED WETLAND DETERMINATION FORM

Project/Site: Route 38 City/Town: Wilmington Sampling Date: 06/06/23

Applicant/Owner: MassDOT Sampling Point or Zone: WFE-32/33 WET

Investigator(s): Lucas Enviroinmental, LLC Latitude / Longitude: 42.537835° / -71.160888°

Soil Map Unit Name: Scarboro mucky fine sandy loam (6A) NWI or DEP Classification: Wooded Swamp Deciduous

Are climatic/hydrologic conditions on the site typical for this time of year? Yes [✓] No [ ] (If no, explain in Remarks)

Are Vegetation [ ], Soil [ ], or Hydrology [ ] significantly disturbed? (If yes, explain in Remarks)

Are Vegetation [ ], Soil [ ], or Hydrology [ ] naturally problematic? (If yes, explain in Remarks)

SUMMARY OF FINDINGS – Attach site map and photograph log showing sampling locations, transects, etc.

Wetland vegetation criterion met?	Yes [✓] No [ ]	**Is the Sampled Area within a Wetland?** Yes [✓] No [ ]
Hydric Soils criterion met?	Yes [✓] No [ ]	
Wetlands hydrology present?	Yes [✓] No [ ]	

Remarks, Photo Details, Flagging, etc.:

HYDROLOGY

Field Observations:			
Surface Water Present?	Yes [ ]	No [✓]	Depth (inches)
Water Table Present?	Yes [ ]	No [✓]	Depth (inches)
Saturation Present (including capillary fringe)?	Yes [✓]	No [ ]	Depth (inches) 8.00

Wetland Hydrology Indicators

Reliable Indicators of Wetlands Hydrology	Indicators that can be Reliable with Proper Interpretation	Indicators of the Influence of Water
[✓] Water-stained leaves	[ ] Hydrological records	[ ] Direct observation of inundation
[ ] Evidence of aquatic fauna	[ ] Free water in a soil test hole	[ ] Drainage patterns
[ ] Iron deposits	[ ] Saturated soil	[ ] Drift lines
[ ] Algal mats or crusts	[ ] Water marks	[ ] Scoured areas
[ ] Oxidized rhizospheres/pore linings	[ ] Moss trim lines	[ ] Sediment deposits
[ ] Thin muck surfaces	[ ] Presence of reduced iron	[ ] Surface soil cracks
[ ] Plants with air-filled tissue (aerenchyma)	[ ] Woody plants with adventitious roots	[ ] Sparsely vegetated concave surface
[ ] Plants with polymorphic leaves	[ ] Trees with shallow root systems	[ ] Microtopographic relief
[ ] Plants with floating leaves	[ ] Woody plants with enlarged lenticels	[✓] Geographic position (depression, toe of slope, fringing lowland
[ ] Hydrogen sulfide odor		

Remarks (describe recorded data from stream gauge, monitoring well, aerial photos, previous inspections, if available):

This form is only for BVW delineations. Other wetland resource areas may be present and should be delineated according to the applicable regulatory provisions.

Sampling Point WFE-32/33 WET

VEGETATION – Use both common and scientific names of plants.

Tree Stratum Plot size 30'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Red maple	Acer rubrum	FAC	38.0	Yes	Yes
2. Canadian serviceberry	Amelanchier canadensis	FAC	10.5	Yes	Yes
3.					
4.					
5.					
6.					
7.					
8.					
9.					

48.5 = Total Cover

Shrub/Sapling Stratum Plot size 15'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Highbush blueberry	Vaccinium corymbosum	FACW	63.0	Yes	Yes
2. Northern arrowwood	Viburnum recognitum	FAC	38.0	Yes	Yes
3. Glossy buckthorn	Frangula alnus	FAC	20.5	No	Yes
4. Canadian serviceberry	Amelanchier canadensis	FAC	10.5	No	Yes
5. Meadowsweet	Spiraea alba	FACW	3.0	No	Yes
6.					
7.					
8.					
9.					

135.0 = Total Cover

Herb Stratum Plot size 5'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Unidentified grass	NA		38.0	Yes	
2. Tussock sedge	Carex stricta	OBL	38.0	Yes	Yes
3. Poison ivy	Toxicodendron radicans	FAC	10.5	No	Yes
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					

86.5 = Total Cover

Sampling Point WFE-32/33 WET

VEGETATION – continued.

Woody Vine Stratum	Plot size 30'				
Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1.					
2.					
3.					
4.					
			0.0 = Total Cover		

Rapid Test: Do all dominant species have an indicator status of OBL or FACW?				Yes ☐ No ☑
Dominance Test:	Number of dominant species	Number of dominant species that are wetland indicator plants		Do wetland indicator plants make up ≥ 50% of dominant plant species? Yes ☑ No ☐
	6	5		
Prevalence Index:		Total % Cover (all strata)	Multiply by:	Result
	OBL species		X 1	= 0.00
	FACW species		X 2	= 0.00
	FAC species		X 3	= 0.00
	FACU species		X 4	= 0.00
	UPL species		X 5	= 0.00
	Column Totals	(A) 0		(B) 0
Prevalence Index		B/A = 0.00		Is the Prevalence Index ≤ 3.0? Yes ☐ No ☐
Wetland vegetation criterion met?		**Yes** ☑ **No** ☐		

Definitions of Vegetation Strata

Tree - Woody plants 3 in. (7.62 cm) or more in diameter at breast height (DBH), regardless of height

Shrub / Sapling - Woody plants less than 3 in. (7.62 cm) DBH and greater than or equal to 3.3 ft. (1 m) tall

Herb - All herbaceous (non-woody plants, regardless of size, and woody plants less than 3.3 ft. (1 m) tall

Woody vines - All woody vines greater than 3.3 ft. (1 m) in height

Cover Ranges	
Range	Midpoint
1-5 %	3.0 %
6-15 %	10.5 %
15-25 %	20.5 %
26-50 %	38.0 %
51-75 %	63.0 %
76-95 %	85.5 %
96-100 %	98.0 %

Sampling Point WFE-32/33 WET

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Location[2]		
2-0	7.5YR 2.5/1	100.00					hemic	Oe horizon
0-4	10YR 2/1	100.00					fine sandy loam	A horizon
4-14	10YR 4/1	90.00	7.5 YR 4/4	10.00	C	M	loamy fine sand	B-horizon
								Refusal

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators (Check all that apply)		**Indicators for Problematic Hydric Soils**
☐ Histosol (A1)	☐ Polyvalue Below Surface (S8)	☐ 2 cm Muck (A10)
☐ Histic Epipedon (A2)	☐ Thin Dark Surface (S9)	☐ 5 cm Mucky Peat or Peat (S3)
☐ Black Histic (A3)	☐ Loamy Gleyed Matrix (F2)	☐ Iron-Manganese Masses (F12)
☐ Hydrogen Sulfide (A4)	☐ Depleted Matrix (F3)	☐ Mesic Spodic (A17)
☐ Stratified Layers (A5)	☐ Redox Dark Surface (F6)	☐ Red Parent Material (F21)
☑ Depleted Below Dark Surface (A11)	☐ Depleted Dark Surface (F7)	☐ Very Shallow Dark Surface (F22)
☐ Thick Dark Surface (A12)	☐ Redox Depressions (F8)	
☐ Sandy Mucky Mineral (S1)		
☐ Sandy Gleyed Matrix (S4)		
☑ Sandy Redox (S5)		☐ Other (Include Explanation in Remarks)
☐ Stripped Matrix (S6)		
☐ Dark Surface (S7)		

Restrictive Layer (if observed) Type: rocks/stones Depth (inches): 14.00

Remarks:

Hydric Soils criterion met? **Yes** ☑ **No** ☐

BORDERING VEGETATED WETLAND DETERMINATION FORM

Project/Site: Route 38 City/Town: Wilmington Sampling Date: 06/06/23

Applicant/Owner: MassDOT Sampling Point or Zone: WFE-32/33 UPL

Investigator(s): Lucas Enviroinmental, LLC Latitude / Longitude: 42.537835° / -71.160888°

Soil Map Unit Name: Udorthents (655) NWI or DEP Classification: Wooded Swamp Deciduous

Are climatic/hydrologic conditions on the site typical for this time of year? Yes [✓] No [ ] (If no, explain in Remarks)

Are Vegetation [ ], Soil [ ] , or Hydrology [ ] significantly disturbed? (If yes, explain in Remarks)

Are Vegetation [ ], Soil [ ] , or Hydrology [ ] naturally problematic? (If yes, explain in Remarks)

SUMMARY OF FINDINGS – Attach site map and photograph log showing sampling locations, transects, etc.

Wetland vegetation criterion met?	Yes [ ]	No [✓]	**Is the Sampled Area within a Wetland?** Yes [ ] No [✓]
Hydric Soils criterion met?	Yes [ ]	No [✓]	
Wetlands hydrology present?	Yes [ ]	No [✓]	

Remarks, Photo Details, Flagging, etc.:

HYDROLOGY

Field Observations:			
Surface Water Present?	Yes [ ]	No [✓]	Depth (inches)_____
Water Table Present?	Yes [ ]	No [✓]	Depth (inches)_____
Saturation Present (including capillary fringe)?	Yes [ ]	No [✓]	Depth (inches)_____

Wetland Hydrology Indicators

Reliable Indicators of Wetlands Hydrology	Indicators that can be Reliable with Proper Interpretation	Indicators of the Influence of Water
[ ] Water-stained leaves	[ ] Hydrological records	[ ] Direct observation of inundation
[ ] Evidence of aquatic fauna	[ ] Free water in a soil test hole	[ ] Drainage patterns
[ ] Iron deposits	[ ] Saturated soil	[ ] Drift lines
[ ] Algal mats or crusts	[ ] Water marks	[ ] Scoured areas
[ ] Oxidized rhizospheres/pore linings	[ ] Moss trim lines	[ ] Sediment deposits
[ ] Thin muck surfaces	[ ] Presence of reduced iron	[ ] Surface soil cracks
[ ] Plants with air-filled tissue (aerenchyma)	[ ] Woody plants with adventitious roots	[ ] Sparsely vegetated concave surface
[ ] Plants with polymorphic leaves	[ ] Trees with shallow root systems	[ ] Microtopographic relief
[ ] Plants with floating leaves	[ ] Woody plants with enlarged lenticels	[ ] Geographic position (depression, toe of slope, fringing lowland
[ ] Hydrogen sulfide odor		

Remarks (describe recorded data from stream gauge, monitoring well, aerial photos, previous inspections, if available):

This form is only for BVW delineations. Other wetland resource areas may be present and should be delineated according to the applicable regulatory provisions.

Sampling Point WFE-32/33 UPL

VEGETATION – Use both common and scientific names of plants.

Tree Stratum Plot size 30'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Red maple	Acer rubrum	FAC	10.5	Yes	Yes
2. Red oak	Quercus rubra	FACU	10.5	Yes	No
3.					
4.					
5.					
6.					
7.					
8.					
9.					

21.0 = Total Cover

Shrub/Sapling Stratum Plot size 15'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Red oak	Quercus rubra	FACU	63.0	Yes	No
2. Glossy buckthorn	Frangula alnus	FAC	38.0	Yes	Yes
3.					
4.					
5.					
6.					
7.					
8.					
9.					

101.0 = Total Cover

Herb Stratum Plot size 5'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Unidentified grass 1	NA		38.0	Yes	
2. Poison ivy	Toxicodendron radicans	FAC	38.0	Yes	Yes
3. Unidentified grass 2	NA		10.5	No	
4. Common yarrow	Achillea millefolium	FACU	3.0	No	No
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					

89.5 = Total Cover

Sampling Point WFE-32/33 UPL

VEGETATION – continued.

Woody Vine Stratum	Plot size 30'				
Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Oriental bittersweet	Celastrus orbiculatus	FACU	3.0	Yes	No
2.					
3.					
4.					
			3.0 = Total Cover		

Rapid Test: Do all dominant species have an indicator status of OBL or FACW?				Yes ☐ No ☑
Dominance Test:	Number of dominant species	Number of dominant species that are wetland indicator plants		Do wetland indicator plants make up ≥ 50% of dominant plant species?
	7	3		Yes ☐ No ☑
Prevalence Index:		Total % Cover (all strata)	Multiply by:	Result
	OBL species		X 1	= 0.00
	FACW species		X 2	= 0.00
	FAC species		X 3	= 0.00
	FACU species		X 4	= 0.00
	UPL species		X 5	= 0.00
	Column Totals	(A) 0		(B) 0
Prevalence Index		B/A = 0.00		Is the Prevalence Index ≤ 3.0? Yes ☐ No ☐
Wetland vegetation criterion met?		**Yes** ☐ **No** ☑		

Definitions of Vegetation Strata

Tree - Woody plants 3 in. (7.62 cm) or more in diameter at breast height (DBH), regardless of height

Shrub / Sapling - Woody plants less than 3 in. (7.62 cm) DBH and greater than or equal to 3.3 ft. (1 m) tall

Herb - All herbaceous (non-woody plants, regardless of size, and woody plants less than 3.3 ft. (1 m) tall

Woody vines - All woody vines greater than 3.3 ft. (1 m) in height

Cover Ranges	
Range	Midpoint
1-5 %	3.0 %
6-15 %	10.5 %
15-25 %	20.5 %
26-50 %	38.0 %
51-75 %	63.0 %
76-95 %	85.5 %
96-100 %	98.0 %

Sampling Point WFE-32/33 UPL

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Location[2]		
0-4	10YR 3/2	100.00					loamy fine sand	A horizon
4-10	10YR 4/4	100.00					loamy sand	B horizon
10-14	10YR 2/1	100.00					loamy fine sand	A2 horizon
14-16	10YR 3/1	90.00	10YR 4/3	10.00	C	M	loamy fine sand	A3 horizon
								Refusal

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators (Check all that apply)		**Indicators for Problematic Hydric Soils**
☐ Histosol (A1)	☐ Polyvalue Below Surface (S8)	☐ 2 cm Muck (A10)
☐ Histic Epipedon (A2)	☐ Thin Dark Surface (S9)	☐ 5 cm Mucky Peat or Peat (S3)
☐ Black Histic (A3)	☐ Loamy Gleyed Matrix (F2)	☐ Iron-Manganese Masses (F12)
☐ Hydrogen Sulfide (A4)	☐ Depleted Matrix (F3)	☐ Mesic Spodic (A17)
☐ Stratified Layers (A5)	☐ Redox Dark Surface (F6)	☐ Red Parent Material (F21)
☐ Depleted Below Dark Surface (A11)	☐ Depleted Dark Surface (F7)	☐ Very Shallow Dark Surface (F22)
☐ Thick Dark Surface (A12)	☐ Redox Depressions (F8)	
☐ Sandy Mucky Mineral (S1)		
☐ Sandy Gleyed Matrix (S4)		
☐ Sandy Redox (S5)		☐ Other (Include Explanation in Remarks)
☐ Stripped Matrix (S6)		
☐ Dark Surface (S7)		

Restrictive Layer (if observed) Type: rocks/stones Depth (inches): 16.00

Remarks: Historic fill slope.

Hydric Soils criterion met? **Yes** ☐ **No** ☑

BORDERING VEGETATED WETLAND DETERMINATION FORM

Project/Site: Route 38 City/Town: Wilmington Sampling Date: 06/06/23

Applicant/Owner: MassDOT Sampling Point or Zone: WFH-7 WET

Investigator(s): Lucas Enviroinmental, LLC Latitude / Longitude: 42.524470° / -71.159787°

Soil Map Unit Name: Freetown muck (52A) NWI or DEP Classification: Wooded Swamp Deciduous

Are climatic/hydrologic conditions on the site typical for this time of year? Yes [✓] No [ ] (If no, explain in Remarks)

Are Vegetation [ ], Soil [ ], or Hydrology [ ] significantly disturbed? (If yes, explain in Remarks)

Are Vegetation [ ], Soil [ ], or Hydrology [ ] naturally problematic? (If yes, explain in Remarks)

SUMMARY OF FINDINGS – Attach site map and photograph log showing sampling locations, transects, etc.

Wetland vegetation criterion met?	Yes [✓] No [ ]	**Is the Sampled Area within a Wetland?** Yes [✓] No [ ]
Hydric Soils criterion met?	Yes [✓] No [ ]	
Wetlands hydrology present?	Yes [✓] No [ ]	

Remarks, Photo Details, Flagging, etc.:

HYDROLOGY

Field Observations:			
Surface Water Present?	Yes [ ]	No [✓]	Depth (inches)
Water Table Present?	Yes [✓]	No [ ]	Depth (inches) 18.00
Saturation Present (including capillary fringe)?	Yes [✓]	No [ ]	Depth (inches) 8.00

Wetland Hydrology Indicators

Reliable Indicators of Wetlands Hydrology	Indicators that can be Reliable with Proper Interpretation	Indicators of the Influence of Water
[ ] Water-stained leaves	[ ] Hydrological records	[ ] Direct observation of inundation
[ ] Evidence of aquatic fauna	[ ] Free water in a soil test hole	[ ] Drainage patterns
[ ] Iron deposits	[ ] Saturated soil	[ ] Drift lines
[ ] Algal mats or crusts	[ ] Water marks	[ ] Scoured areas
[ ] Oxidized rhizospheres/pore linings	[ ] Moss trim lines	[ ] Sediment deposits
[ ] Thin muck surfaces	[ ] Presence of reduced iron	[ ] Surface soil cracks
[ ] Plants with air-filled tissue (aerenchyma)	[ ] Woody plants with adventitious roots	[ ] Sparsely vegetated concave surface
[ ] Plants with polymorphic leaves	[ ] Trees with shallow root systems	[ ] Microtopographic relief
[ ] Plants with floating leaves	[ ] Woody plants with enlarged lenticels	[ ] Geographic position (depression, toe of slope, fringing lowland
[ ] Hydrogen sulfide odor		

Remarks (describe recorded data from stream gauge, monitoring well, aerial photos, previous inspections, if available):

This form is only for BVW delineations. Other wetland resource areas may be present and should be delineated according to the applicable regulatory provisions.

Sampling Point WFH-7 WET

VEGETATION – Use both common and scientific names of plants.

Tree Stratum Plot size 30'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Red maple	Acer rubrum	FAC	85.5	Yes	Yes
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					

85.5 = Total Cover

Shrub/Sapling Stratum Plot size 15'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Glossy buckthorn	Frangula alnus	FAC	63.0	Yes	Yes
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					

63.0 = Total Cover

Herb Stratum Plot size 5'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Canada mayflower	Maianthemum canadense	FACU	85.5	Yes	No
2. Feathery false Solomon's-seal	Maianthemum racemosum	FACU	3.0	No	No
3. Skunk cabbage	Symplocarpus foetidus	OBL	1.0	No	Yes
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					

89.5 = Total Cover

Sampling Point WFH-7 WET

VEGETATION – continued.

Woody Vine Stratum	Plot size 30'				
Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1.					
2.					
3.					
4.					
			0.0 = Total Cover		

Rapid Test: Do all dominant species have an indicator status of OBL or FACW?				Yes ☐ No ☑
Dominance Test:	Number of dominant species	Number of dominant species that are wetland indicator plants		Do wetland indicator plants make up ≥ 50% of dominant plant species? Yes ☑ No ☐
	3	2		
Prevalence Index:		Total % Cover (all strata)	Multiply by:	Result
	OBL species		X 1	= 0.00
	FACW species		X 2	= 0.00
	FAC species		X 3	= 0.00
	FACU species		X 4	= 0.00
	UPL species		X 5	= 0.00
	Column Totals	(A) 0		(B) 0
Prevalence Index		B/A = 0.00		Is the Prevalence Index ≤ 3.0? Yes ☐ No ☐
Wetland vegetation criterion met?		**Yes** ☑	**No** ☐	

Definitions of Vegetation Strata

Tree - Woody plants 3 in. (7.62 cm) or more in diameter at breast height (DBH), regardless of height

Shrub / Sapling - Woody plants less than 3 in. (7.62 cm) DBH and greater than or equal to 3.3 ft. (1 m) tall

Herb - All herbaceous (non-woody plants, regardless of size, and woody plants less than 3.3 ft. (1 m) tall

Woody vines - All woody vines greater than 3.3 ft. (1 m) in height

Cover Ranges	
Range	Midpoint
1-5 %	3.0 %
6-15 %	10.5 %
15-25 %	20.5 %
26-50 %	38.0 %
51-75 %	63.0 %
76-95 %	85.5 %
96-100 %	98.0 %

Sampling Point WFH-7 WET

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Location[2]		
3-0	10YR 2/1	100.00					hemic	Oe horizon
0-8	10YR 2/1	100.00					fine sandy loam	A horizon
8-12	10YR 2/1	90.00	5YR 3/3	10.00	C	M	v.fine sandy loam	A2 horizon
12-20	10YR 2/1	50.00	5YR 3/3	50.00	C	M	v.fine sandy loam	A3 horizon

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators (Check all that apply)		**Indicators for Problematic Hydric Soils**
☐ Histosol (A1)	☐ Polyvalue Below Surface (S8)	☐ 2 cm Muck (A10)
☐ Histic Epipedon (A2)	☐ Thin Dark Surface (S9)	☐ 5 cm Mucky Peat or Peat (S3)
☐ Black Histic (A3)	☐ Loamy Gleyed Matrix (F2)	☐ Iron-Manganese Masses (F12)
☐ Hydrogen Sulfide (A4)	☐ Depleted Matrix (F3)	☐ Mesic Spodic (A17)
☐ Stratified Layers (A5)	☑ Redox Dark Surface (F6)	☐ Red Parent Material (F21)
☐ Depleted Below Dark Surface (A11)	☐ Depleted Dark Surface (F7)	☐ Very Shallow Dark Surface (F22)
☐ Thick Dark Surface (A12)	☐ Redox Depressions (F8)	
☐ Sandy Mucky Mineral (S1)		
☐ Sandy Gleyed Matrix (S4)		
☐ Sandy Redox (S5)		☐ Other (Include Explanation in Remarks)
☐ Stripped Matrix (S6)		
☐ Dark Surface (S7)		

Restrictive Layer (if observed) Type: _____ Depth (inches): _____

Remarks:

Hydric Soils criterion met? **Yes** ☑ **No** ☐

BORDERING VEGETATED WETLAND DETERMINATION FORM

Project/Site: Route 38 City/Town: Wilmington Sampling Date: 06/06/23

Applicant/Owner: MassDOT Sampling Point or Zone: WFH-7 UPL

Investigator(s): Lucas Enviroinmental, LLC Latitude / Longitude: 42.524470° / -71.159787°

Soil Map Unit Name: Deerfield loamy fine sand (256A) NWI or DEP Classification: Wooded Swamp Deciduous

Are climatic/hydrologic conditions on the site typical for this time of year? Yes [✓] No [ ] (If no, explain in Remarks)

Are Vegetation [ ], Soil [ ] , or Hydrology [ ] significantly disturbed? (If yes, explain in Remarks)

Are Vegetation [ ], Soil [ ] , or Hydrology [ ] naturally problematic? (If yes, explain in Remarks)

SUMMARY OF FINDINGS – Attach site map and photograph log showing sampling locations, transects, etc.

Wetland vegetation criterion met?	Yes [ ] No [✓]	**Is the Sampled Area within a Wetland?** Yes [ ] No [✓]
Hydric Soils criterion met?	Yes [ ] No [✓]	
Wetlands hydrology present?	Yes [ ] No [✓]	

Remarks, Photo Details, Flagging, etc.:

HYDROLOGY

Field Observations:			
Surface Water Present?	Yes [ ]	No [✓]	Depth (inches)_____
Water Table Present?	Yes [ ]	No [✓]	Depth (inches)_____
Saturation Present (including capillary fringe)?	Yes [ ]	No [✓]	Depth (inches)_____

Wetland Hydrology Indicators

Reliable Indicators of Wetlands Hydrology	Indicators that can be Reliable with Proper Interpretation	Indicators of the Influence of Water
[ ] Water-stained leaves	[ ] Hydrological records	[ ] Direct observation of inundation
[ ] Evidence of aquatic fauna	[ ] Free water in a soil test hole	[ ] Drainage patterns
[ ] Iron deposits	[ ] Saturated soil	[ ] Drift lines
[ ] Algal mats or crusts	[ ] Water marks	[ ] Scoured areas
[ ] Oxidized rhizospheres/pore linings	[ ] Moss trim lines	[ ] Sediment deposits
[ ] Thin muck surfaces	[ ] Presence of reduced iron	[ ] Surface soil cracks
[ ] Plants with air-filled tissue (aerenchyma)	[ ] Woody plants with adventitious roots	[ ] Sparsely vegetated concave surface
[ ] Plants with polymorphic leaves	[ ] Trees with shallow root systems	[ ] Microtopographic relief
[ ] Plants with floating leaves	[ ] Woody plants with enlarged lenticels	[ ] Geographic position (depression, toe of slope, fringing lowland
[ ] Hydrogen sulfide odor		

Remarks (describe recorded data from stream gauge, monitoring well, aerial photos, previous inspections, if available):

This form is only for BVW delineations. Other wetland resource areas may be present and should be delineated according to the applicable regulatory provisions.

Sampling Point WFH-7 UPL

VEGETATION – Use both common and scientific names of plants.

Tree Stratum Plot size 30'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Red maple	Acer rubrum	FAC	38.0	Yes	Yes
2. Black cherry	Prunus serotina	FACU	38.0	Yes	No
3.					
4.					
5.					
6.					
7.					
8.					
9.					

76.0 = Total Cover

Shrub/Sapling Stratum Plot size 15'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Glossy buckthorn	Frangula alnus	FAC	20.5	Yes	Yes
2. Green ash	Fraxinus pennsylvanica	FACW	1.0	No	Yes
3.					
4.					
5.					
6.					
7.					
8.					
9.					

21.5 = Total Cover

Herb Stratum Plot size 5'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Virginia creeper	Parthenocissus quinquefolia	FACU	38.0	Yes	No
2. Unidentified grass sp.			10.5	No	
3. Unidentified goldenrod sp.			10.5	No	
4. Canada mayflower	Maianthemum canadense	FACU	3.0	No	No
5. Feathery false Solomon's-seal	Maianthemum racemosum	FACU	3.0	No	No
6. Sensitive fern	Onoclea sensibilis	FACW	1.0	No	Yes
7.					
8.					
9.					
10.					
11.					
12.					

66.0 = Total Cover

Sampling Point WFH-7 UPL

VEGETATION – continued.

Woody Vine Stratum Plot size 30'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Virginia creeper	Parthenocissus quinquefolia	FACU	3.0	Yes	No
2. Oriental bittersweet	Celastrus orbiculatus	FACU	3.0	Yes	No
3.					
4.					
			6.0 = Total Cover		

Rapid Test: Do all dominant species have an indicator status of OBL or FACW? Yes ☐ No ☑

Dominance Test:	Number of dominant species	Number of dominant species that are wetland indicator plants	Do wetland indicator plants make up ≥ 50% of dominant plant species?
	6	2	Yes ☐ No ☑

Prevalence Index:	Total % Cover (all strata)	Multiply by:	Result
OBL species	0	X 1	= 0.00
FACW species	2	X 2	= 4.00
FAC species	59	X 3	= 175.50
FACU species	88	X 4	= 352.00
UPL species	0	X 5	= 0.00
Column Totals	(A) 148.5		(B) 531.5
Prevalence Index	B/A = 3.58		Is the Prevalence Index ≤ 3.0? Yes ☐ No ☑

Wetland vegetation criterion met? Yes ☐ No ☑

Definitions of Vegetation Strata

Tree - Woody plants 3 in. (7.62 cm) or more in diameter at breast height (DBH), regardless of height

Shrub / Sapling - Woody plants less than 3 in. (7.62 cm) DBH and greater than or equal to 3.3 ft. (1 m) tall

Herb - All herbaceous (non-woody plants, regardless of size, and woody plants less than 3.3 ft. (1 m) tall

Woody vines - All woody vines greater than 3.3 ft. (1 m) in height

Cover Ranges	
Range	Midpoint
1-5 %	3.0 %
6-15 %	10.5 %
15-25 %	20.5 %
26-50 %	38.0 %
51-75 %	63.0 %
76-95 %	85.5 %
96-100 %	98.0 %

Sampling Point WFH-7 UPL

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Location[2]		
1-0								leaf litter
0-16	10YR 3/2	100.00					loamy fine sand	A horizon
								Refusal

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators (Check all that apply)		**Indicators for Problematic Hydric Soils**
☐ Histosol (A1)	☐ Polyvalue Below Surface (S8)	☐ 2 cm Muck (A10)
☐ Histic Epipedon (A2)	☐ Thin Dark Surface (S9)	☐ 5 cm Mucky Peat or Peat (S3)
☐ Black Histic (A3)	☐ Loamy Gleyed Matrix (F2)	☐ Iron-Manganese Masses (F12)
☐ Hydrogen Sulfide (A4)	☐ Depleted Matrix (F3)	☐ Mesic Spodic (A17)
☐ Stratified Layers (A5)	☐ Redox Dark Surface (F6)	☐ Red Parent Material (F21)
☐ Depleted Below Dark Surface (A11)	☐ Depleted Dark Surface (F7)	☐ Very Shallow Dark Surface (F22)
☐ Thick Dark Surface (A12)	☐ Redox Depressions (F8)	
☐ Sandy Mucky Mineral (S1)		
☐ Sandy Gleyed Matrix (S4)		
☐ Sandy Redox (S5)		☐ Other (Include Explanation in Remarks)
☐ Stripped Matrix (S6)		
☐ Dark Surface (S7)		

Restrictive Layer (if observed) Type: Stones Depth (inches): 16.00

Remarks: Years of accumulated road sand on slope. Buried plastic bag/debris at 12 inches below surface.

Hydric Soils criterion met? **Yes** ☐ **No** ☑

Appendix B – Photos

Reconstruction on Route 38 (Main Street)
Between Route 62 and the Woburn City Line, Wilmington, MA
Green Project No. 13033.19XX

GREEN INTERNATIONAL AFFILIATES, INC.

Photo Log – November 2016, April 2017, September 2018 & October 2020

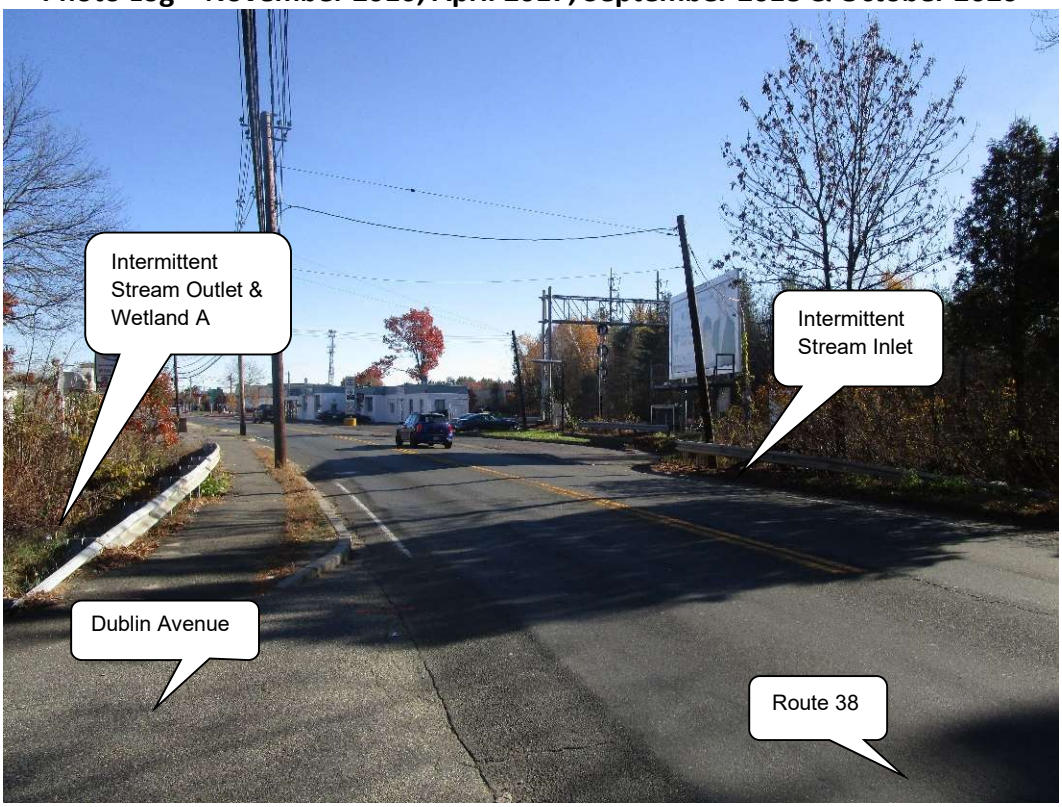


Photo 01 – View southeast on Route 38 from Dublin Avenue intersection (approx. Sta. 217)

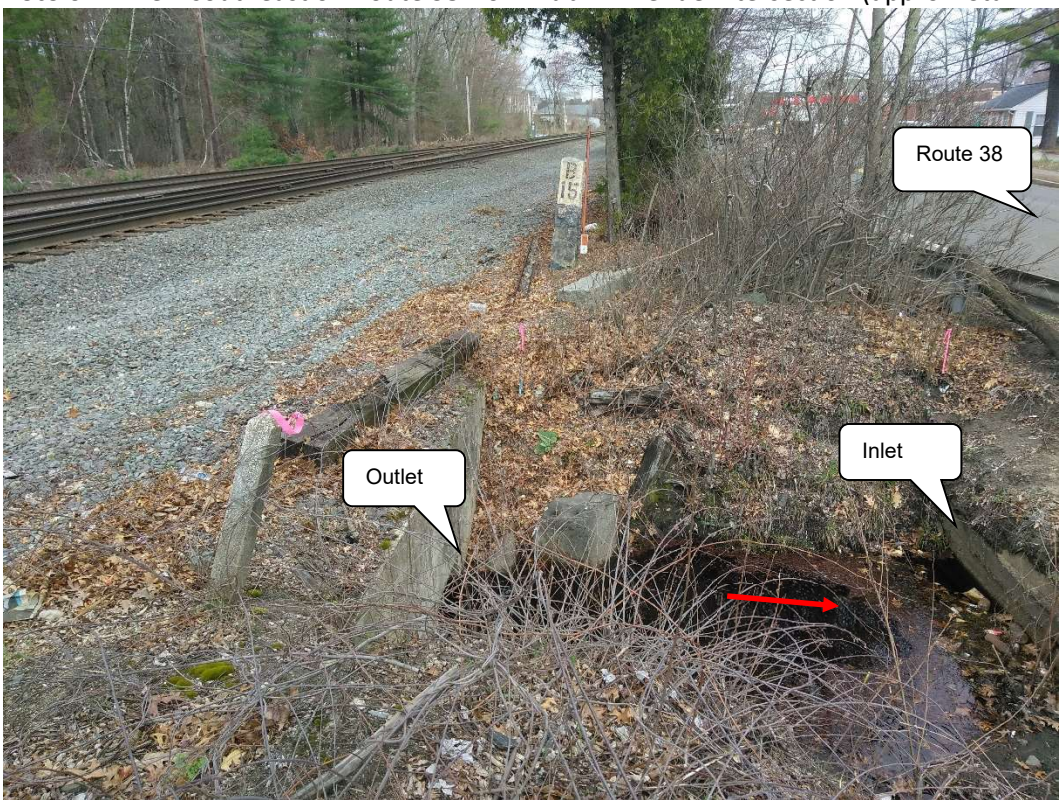


Photo 02 – View northwest at the Intermittent Stream culverts outlet and inlet between Route and railroad tracks (approx. Sta. 218+50)

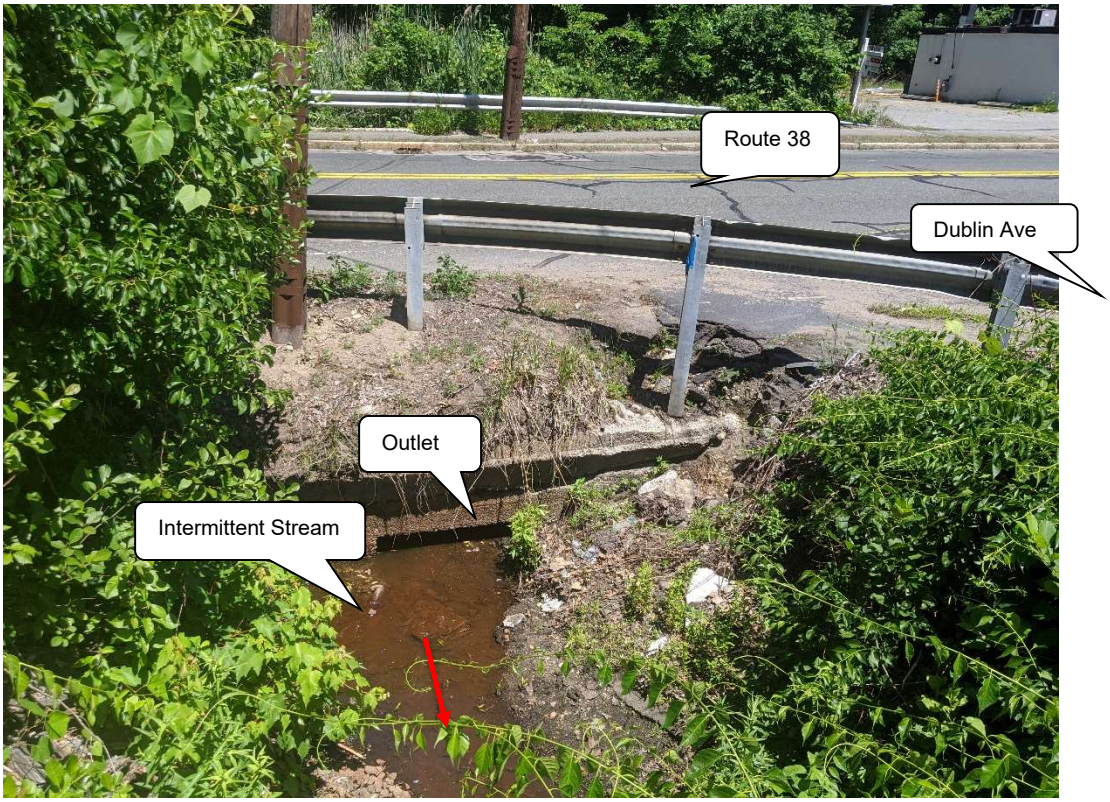


Photo 03 – Box culvert inlet on the western side of Route 38 (approx. Sta. 218)



Photo 04 – Box culvert inlet under railroad tracks west of Route 38 (outside of project limits) (southwest of approx. Sta. 218)

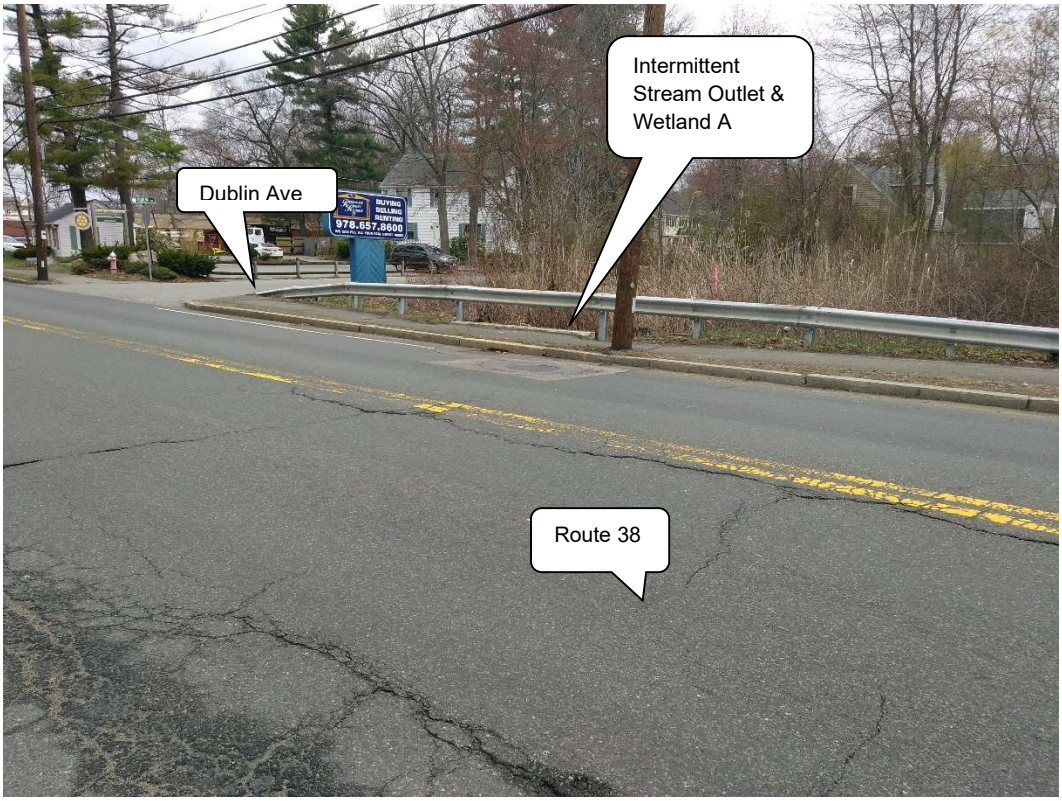


Photo 05 – View north on Route 38 at the Box culvert outlet (approx. Sta. 218+50)



Photo 06 – Box culvert outlet on the eastern side of Route 38 (approx. Sta. 218)



Photo 07 – View northwest north of Butters Row/Cross Street intersection at Wetland C and Wetland D (Sta. 239)



Photo 08 – View west at Wetland C from Route 38 (between Sta. 238 and 239)



Photo 09 – View of the stone headwall and Wetland D (between Sta. 238 and 239)



Photo 10 – View northwest at Wetland G, Wetland E and Maple Meadow Brook (approx. Sta. 257)



Photo 15 – View north on Route 38/Old Main Street intersection towards Wetland H (approx. Sta. 305)



Photo 16 – View northwest at Wetland H from Route 38 (approx. Sta. 305)



Photo 17 – View northwest at Wetland E and Proposed Wetland Replication Area from Textron Driveway (near approx. Sta. 257)

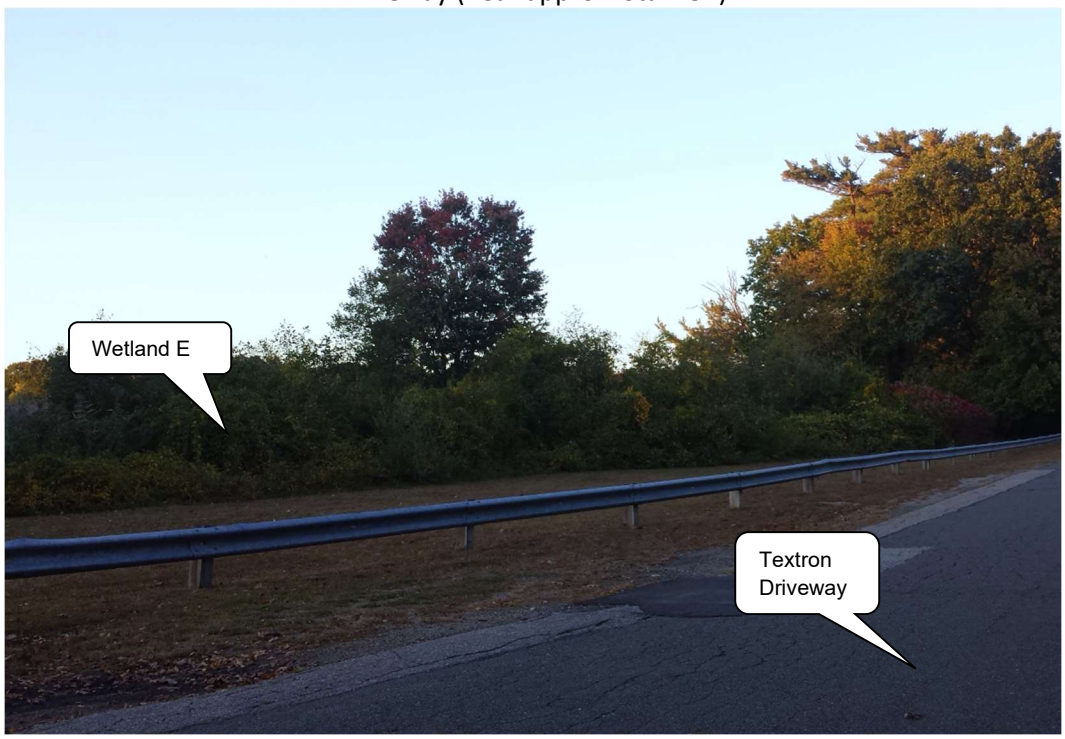
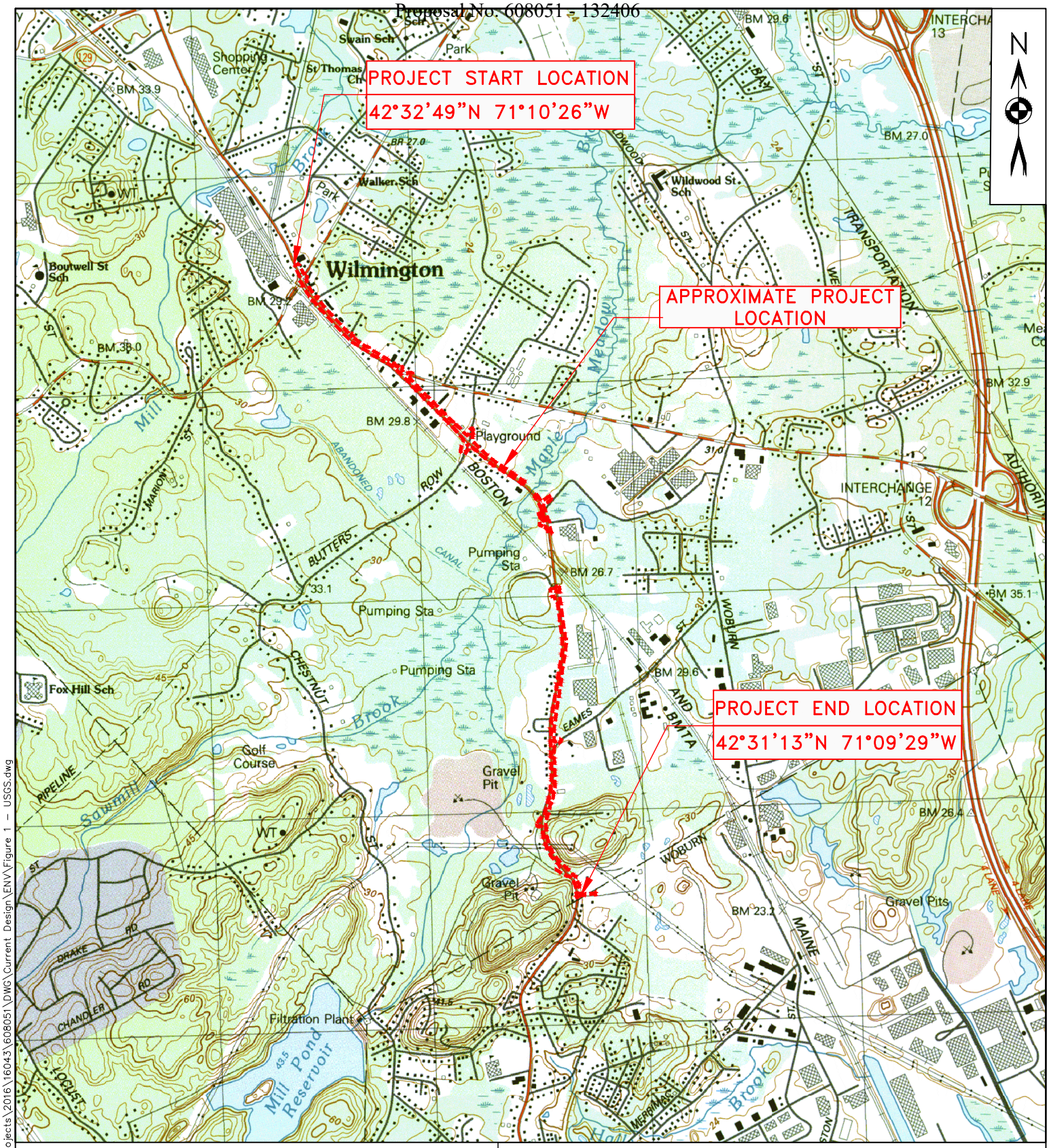


Photo 18 – View northeast at Wetland E and Proposed Wetland Replication Area from Textron Driveway (near approx. Sta. 257)

Appendix C – Figures



LEGEND:

APPROXIMATE PROJECT AREA

SCALE IN FEET

1000 0 1000 2000

1" = 2000'

ELEVATIONS IN METERS

NOTE: DATA TAKEN FROM MASSGIS

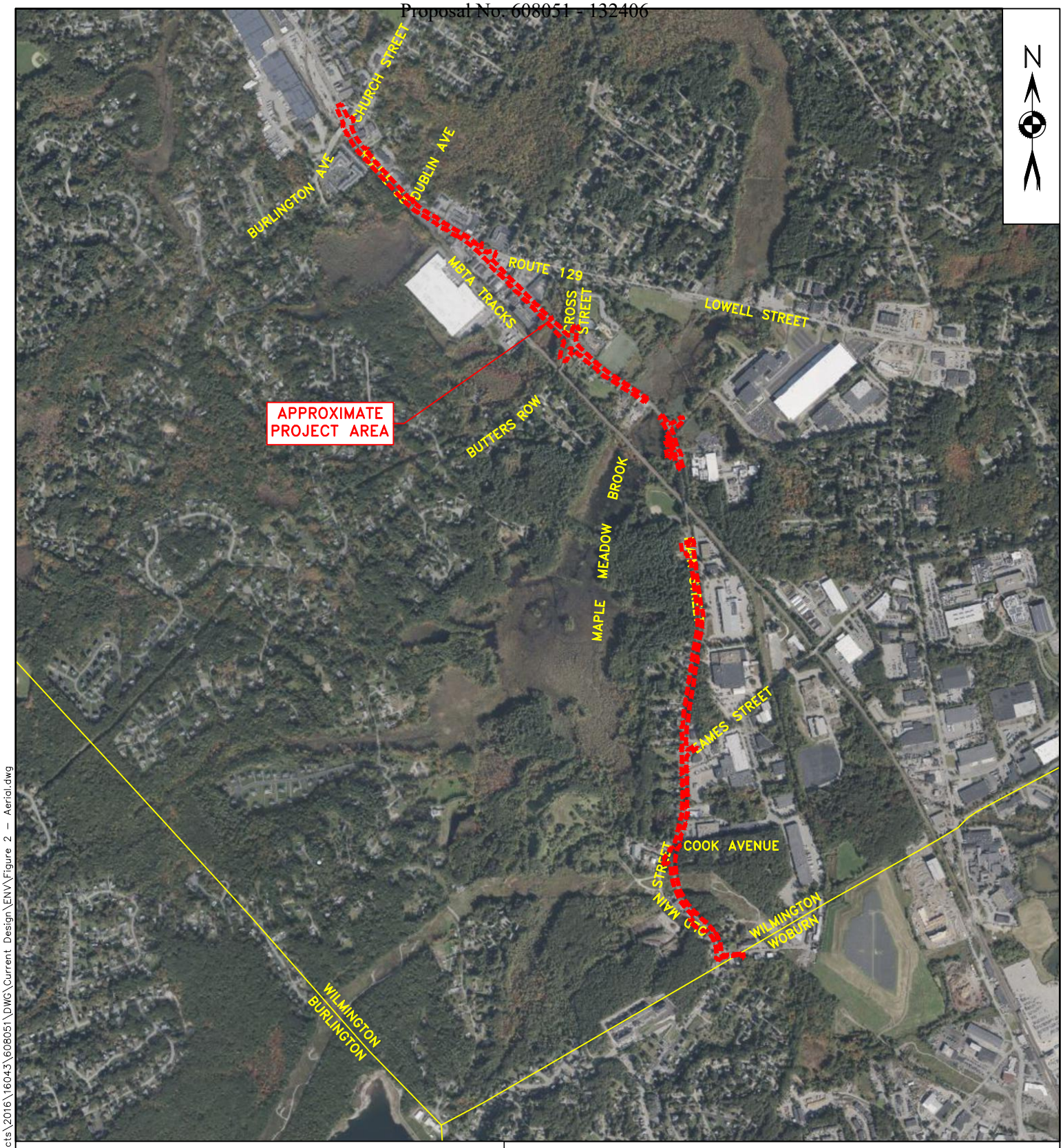
USGS LOCUS MAP

WILMINGTON – RECONSTRUCTION ON ROUTE 38 (MAIN STREET)
FROM ROUTE 62 TO THE WOBURN CITY LINE, PROJECT #608051

PREPARED BY:	PREPARED FOR:
GREEN A Lochner Company	massDOT Massachusetts Department of Transportation Highway Division

SCALE: AS NOTED	PROJECT NO. 21058.16XX	FIGURE 1
DATE: 03/11/2025 REVISED:	DRAWN BY: VR/EL CHECKED BY: OF	

\\EgnyteDrive\greenintl\Shared\Engineering\Projects\2016\16043\608051\DWG\Current Design\ENV\Figure 1 – USGS.dwg



LEGEND:

APPROXIMATE PROJECT AREA (#608051)

SCALE IN FEET

750 0 750 1500

1" = 1500'

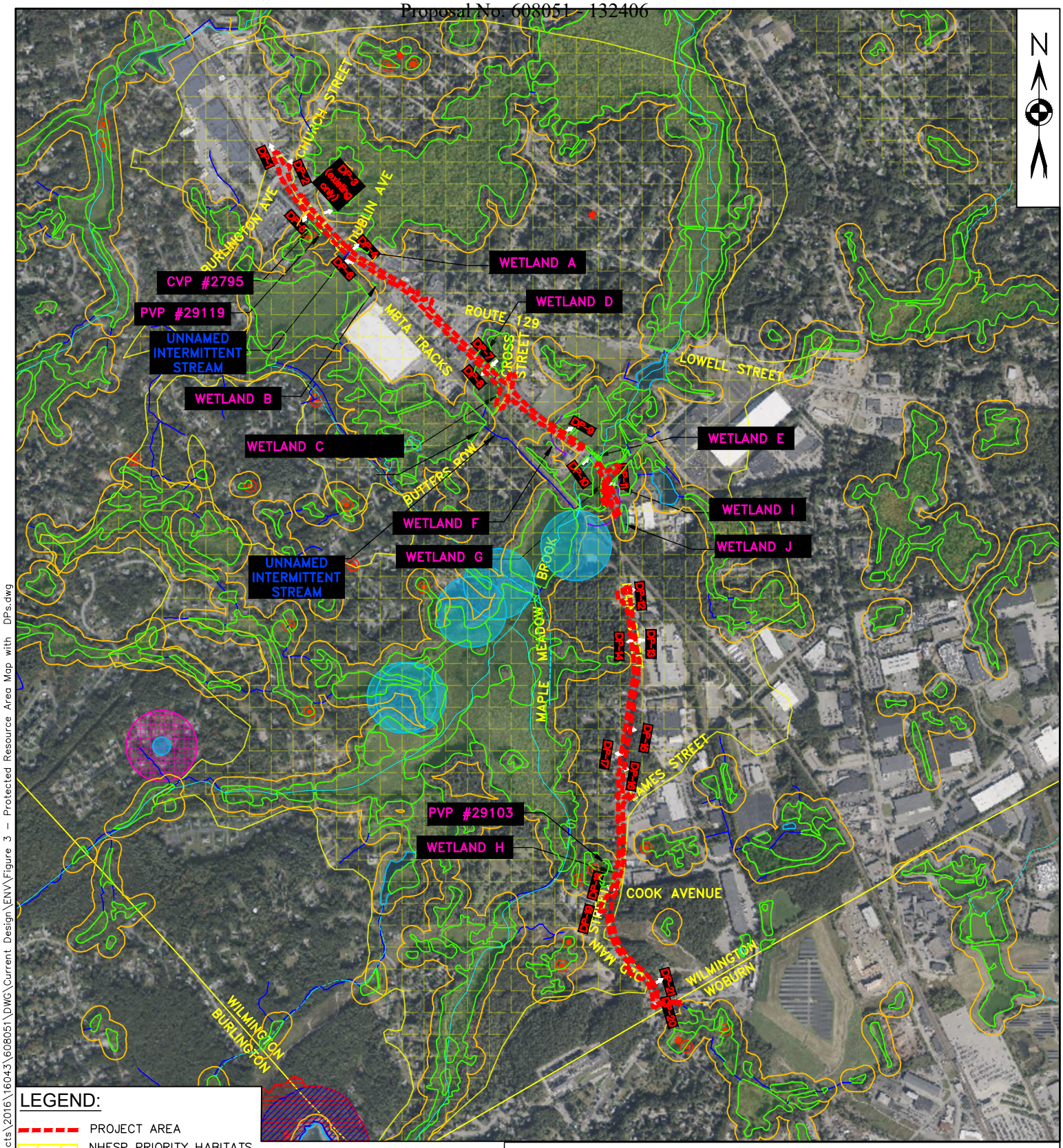
NOTE: DATA TAKEN FROM MASSGIS

AERIAL LOCUS MAP

WILMINGTON – RECONSTRUCTION ON ROUTE 38 (MAIN STREET) FROM ROUTE 62 TO THE WOBURN CITY LINE, PROJECT #608051

PREPARED BY: GREEN A Lochner Company	PREPARED FOR: massDOT Massachusetts Department of Transportation Highway Division	
SCALE: AS NOTED	PROJECT NO. 21058.16XX	FIGURE 2
DATE: 03/11/2025 REVISED:	DRAWN BY: EA/EL CHECKED BY: OF	

\\EgnyteDrive\greenintl\Shared\Engineering\Projects\2016\16043\608051\DWG\Current Design\ENV\Figure 2 – Aerial.dwg



LEGEND:

- PROJECT AREA
- NHESP PRIORITY HABITATS OF RARE SPECIES
- NHESP ESTIMATED HABITATS OF RARE WILDLIFE
- OUTSTANDING RESOURCE WATER (ORW)
- AREAS OF CRITICAL ENVIRONMENTAL CONCERN (ACEC)
- INTERIM WELLHEAD RPROTECTION AREAS (IWPAs)
- DEP APPROVED WELLHEAD PROTECTION AREAS (ZONE I)
- APPROVED WELLHEAD PROTECTION AREAS (ZONE II)
- SURFACE WATER PROTECTION AREAS (ZONE A)
- SURFACE WATER PROTECTION AREAS (ZONE B)
- DEP/SURVEYED WETLANDS
- DEP HYDROLOGIC CONNECTIONS
- 100 FT WETLAND BUFFER
- MAHW/BANK/PERENNIAL
- INTERMITTENT STREAM
- 200 FT RIVERFRONT AREA
- CERTIFIED VERNAL POOLS
- POTENTIAL VERNAL POOLS

SCALE IN FEET

750 0 750 1500

1" = 1500'

NOTE: DATA TAKEN FROM MASSGIS

PROTECTED RESOURCE AREA MAP

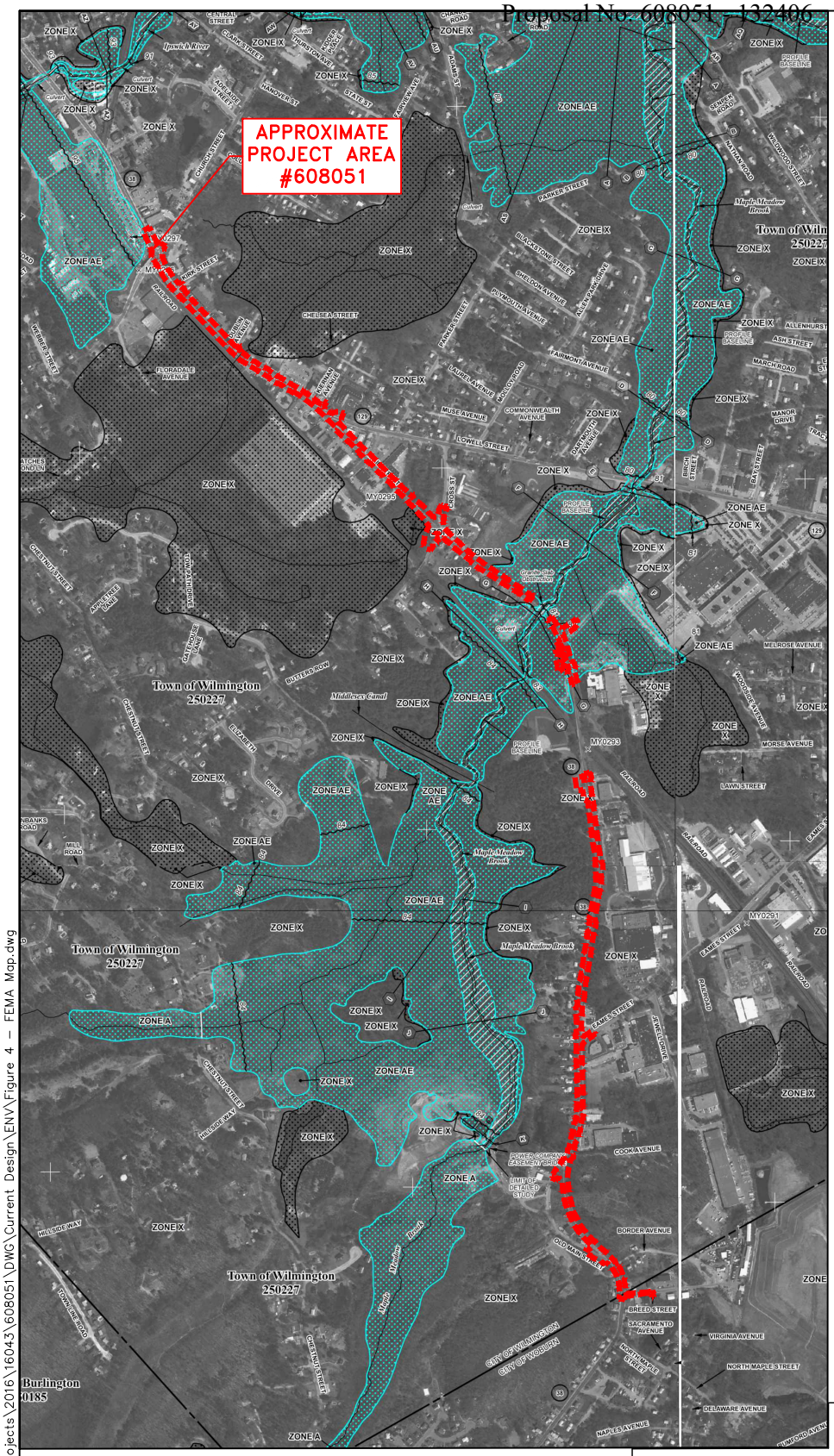
WILMINGTON – RECONSTRUCTION ON ROUTE 38 (MAIN STREET)
FROM ROUTE 62 TO THE WOBURN CITY LINE, PROJECT #608051

PREPARED BY: GREEN A Lochner Company

PREPARED FOR: massDOT Massachusetts Department of Transportation Highway Division

SCALE: AS NOTED	PROJECT NO. 21058.16XX	FIGURE 3
DATE: 03/11/2025	DRAWN BY: VR	
REVISED:	CHECKED BY: OF	

\\EgnyteDrive\greenintl\Shared\Engineering\Projects\2016\16043\608051\DWG\Current Design\ENV\Figure 3 – Protected Resource Area Map with DPs.dwg



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 — 23	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
4276000mN	1000-meter Universal Transverse Mercator grid values, zone 19
600000 FT	5000-foot grid values: Massachusetts State Plane coordinate system, Mainland zone (FIPSZONE 2001), Lambert Conformal Conic projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
● M1.5	River Mile

FEMA MAP

LEGEND:

APPROXIMATE PROJECT AREA (#608051)

NOTE:
THE FLOOD ZONE DATA SHOWN IS TAKEN FROM THE FEDERAL INSURANCE RATE MAPS (FIRM) FOR THE TOWN OF WILMINGTON, MA. (FIRM COMMUNITY PANELS 25017C0291E, 25017C0292E, 25017C0293E, AND 25017C0294E, DATED 06/04/2010.)

SCALE IN FEET
750 0 750 1500
1" = 1500'

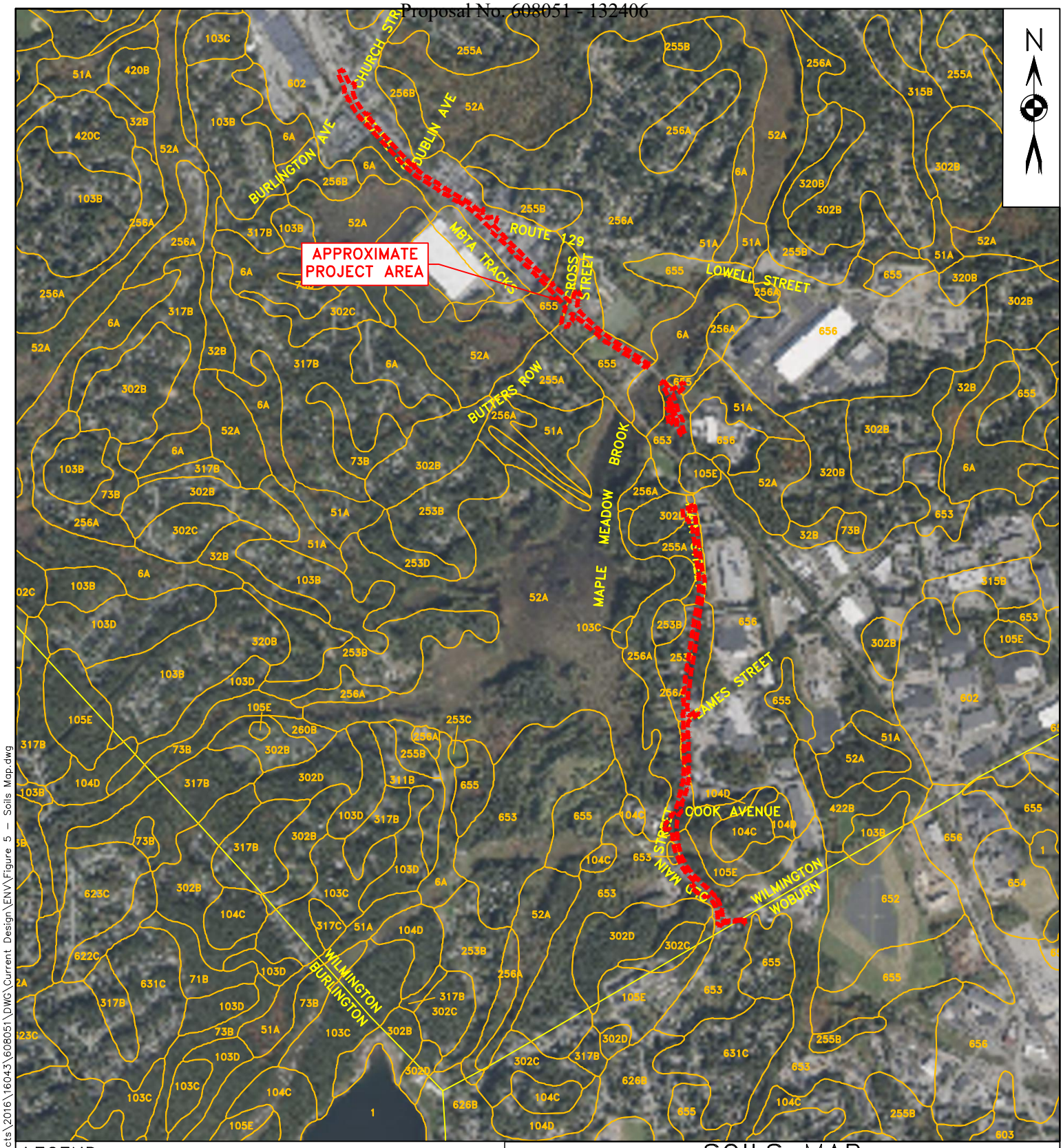
WILMINGTON – RECONSTRUCTION ON ROUTE 38 (MAIN STREET) FROM ROUTE 62 TO THE WOBURN CITY LINE, PROJECT #608051

PREPARED BY: GREEN A Lochner Company

PREPARED FOR: massDOT Massachusetts Department of Transportation Highway Division

SCALE: AS NOTED	PROJECT NO. 21058.16XX	FIGURE 4
DATE: 03/11/2025	DRAWN BY: EA/EL	
REVISED:	CHECKED BY: OF	

\\EgnyteDrive\greenintl\Shared\Engineering\Projects\2016\16043\608051\DWG\Current Design\ENV\Figure 4 – FEMA Map.dwg



LEGEND:

APPROXIMATE PROJECT AREA (#608051)

NRCS SOIL SURVEY BOUNDARY

103C NRCS SOIL SURVEY SYMBOL

NOTE: MAP INFORMATION TAKEN FROM MASSGIS AND SOILS INFORMATION TAKEN FROM NRCS WEB SOIL SURVEY FOR MIDDLESEX COUNTY, MA.

SCALE IN FEET

750 0 750 1500

1" = 1500'

SOILS MAP

WILMINGTON – RECONSTRUCTION ON ROUTE 38 (MAIN STREET) FROM ROUTE 62 TO THE WOBURN CITY LINE, PROJECT #608051

PREPARED BY: GREEN A Lochner Company

PREPARED FOR: massDOT Massachusetts Department of Transportation Highway Division

SCALE: AS NOTED	PROJECT NO. 21058.16XX	FIGURE 5
DATE: 03/11/2025 REVISED:	DRAWN BY: VR/EL CHECKED BY: OF	

\\EgnyteDrive\greenintl\Shared\Engineering\Projects\2016\16043\608051\DWG\Current Design\ENV\Figure 5 – Soils Map.dwg

Appendix D – Wildlife Habitat Evaluation

GREEN
A Lochner Company

MEMORANDUM

To:	Oxana Fartushnaya, Client Manager II, Green International Affiliates, Inc.
Cc:	Joshua Ward, Scientist II, Green International Affiliates, Inc.
From:	Brandon Faneuf, PWS, Green International Affiliates, Inc.
Date:	March 12, 2025
Project Name:	Reconstruction of Route 38 (Main Street), Wilmington, MA (MassDOT No. 608051)
Project Number:	21058.16XX
Subject:	Wildlife Habitat Evaluation – Appendix A

Introduction

This memo is associated with an Appendix A wildlife habitat evaluation associated with areas where bank, BVW, or land under waterbodies & waterways have proposed impacts. This work was completed in conformance with the Massachusetts Wetlands Protection Act (MGL c. 131, §40)(WPA) and its Regulations (310 CMR 10.00).

Area of Interest (AOI)

The area assessed for this Wildlife Habitat Evaluation consists of the proposed culvert replacement location south of Route 38/Dublin Avenue intersection; this culvert conveys unnamed intermittent stream beneath Route 38 in Wilmington.

Route 38 in Wilmington generally provides northwest and southeast movement between the towns of Tewksbury, Wilmington, Woburn, Winchester, and Medford. The land use surrounding the project site consists of a combination of commercial, impervious, developed open space, deciduous forest, evergreen forest, palustrine forested wetland and some bare land.

The following stream crossings were assessed for wildlife habitat values within the project limits:

Unnamed Intermittent Stream 1 (south of Route 38/Doublin Ave intersection)

The Banks of a small, unnamed intermittent stream, located south and east of Dublin Avenue are outlined with blue survey flagging numbered sequentially from BF1-100 to BF1-104 and BF1-200 to BF1-204. Flags BF1-100 through BF1-102 and BF1-200 to BF1-202 are located north of Route 38 on the west and east banks respectively. Flags BF1-103 through BF1-104 and BF1-203 to BF1-204 are located south of Route 38, between the road and MBTA tracks, on the west and east banks respectively.

The analysis for Important Habitat Features took place 50’ upstream and 50’ downstream of the culvert at this location, with emphasis at the culvert itself and surrounding areas.

Table 1. Impacts to Wetland Resource Areas at Sta 218 (Unnamed Intermittent Stream 1)

Resource Area	Cumulative Impact	Regulatory Threshold to require WHE	Regulatory Citation (310 CMR 10.00)
Bordering Vegetated Wetland (BVW) (all BVW is presumed significant for wildlife habitat)	192 SF (perm) 142 SF (temp)	No threshold	10.55(4)(b) (preface to Wetlands Regulations relative to protection of wildlife habitat- 1987 Regulatory Revisions- Section IV)
Land Under Waterbodies and Waterways (LUW) (all land under water is presumed significant for wildlife habitat)	262 SF (perm) 164 SF (temp)	10% of the land in this resource area on a single lot or 5,000sf (whichever is less)[1]	10.57(4)(a)(4)
Bank (all banks are presumed significant for wildlife habitat) Flag Series BF1-100 to BF1-104 and BF1-200 to BF1-204	64 LF (perm)	10% of the length of bank on a single lot or **50 linear feet (whichever is less)**[1]	10.54(4)(a)(5)

[1] **Bold** wording indicates the applicable standard for this project/AOI.

Other Resources

A search of other critical resources in the vicinity of the culvert replacement area was conducted using GIS software and data available through MASSGIS. The results of our search are listed in Table 2 below.

Table 2. Selected MASSGIS Environmental Data Layers

Mapped Resource On or Within Proximity to Site	Yes	No
Area of Critical Environmental Concern		✓
NHESP Certified Vernal Pool	✓[1]	
NHESP Potential Vernal Pool	✓[1]	
NHESP Estimated Habitat of Rare Wildlife		✓
NHESP Priority Habitat of Rare species		✓
Outstanding Resource Waters		✓
FEMA Flood Zones (BLSF)		✓
Surface Water Protection Area		✓
Interim Wellhead Protection Area		✓
Zone II Wellhead Protection Area	✓	
Mass DCR Designated Coldwater Fisheries		✓
Habitats of Regional or Statewide Importance		✓

[1] CVP #2795 and PVP#29119 are located near the culvert site, but outside of their buffer zones.

Conclusion:

The impacts to Inland Bank at the assessed culvert replacement site is associated with the activities required to replace the existing stream crossing beneath Route 38. The disturbance to wildlife habitat required to replace the stream crossing is temporary; the natural streambed will be reestablished and the area will be restored upon completion of construction.

No significant wildlife habitat features found in Appendix A were observed at the Dublin Avenue culvert location.

Therefore, in compliance with 310 CMR 10.60(1), as designed, we do not anticipate long term adverse effects on wildlife habitat following two growing seasons of project completion and thereafter. Even though the habitat may be temporarily affected by the proposed construction activities, after the completion of construction, the Bank will be stabilized and restored.

Based on the parameters used in Appendix A, field observations of potential wildlife habitat offered at the assessed location and the scope of work as designed, there will be no significant, adverse impacts to wildlife habitat.

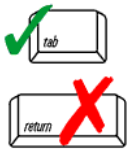
Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wetlands program

Wildlife Habitat Protection Guidance

Appendix A: Simplified Wildlife Habitat Evaluation

Project Information

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



Route 38 over Unnnamed Intermittent Stream (approx. Sta. 218) and Route 38 over Maple Meadow Brook (approx Sta. 253+75)

Brandon B. Faneuf, CWB
Name of Person Completing Form

3/12/2025
Date

Important Habitat Features

Direct alterations to the following important habitat features in resource areas may be permitted only if they will have no adverse effect (refer to Section V).

☐ Habitat for state-listed animal species (receipt of a positive opinion or permit from MNHESP shall be presumed to be correct. Do not refer to Section V).

☐ Sphagnum hummocks and pools suitable to serve as nesting habitat for four-toed salamanders

☐ Trees with large cavities (≥18" tree diameter at cavity entrance)

☐ Existing beaver, mink or otter dens

☐ Areas within 100 feet of existing beaver, mink or otter dens (if significant disturbance)

☐ Existing nest trees for birds that traditionally reuse nests (bald eagle, osprey, great blue heron)

☐ Land containing freshwater mussel beds

☐ Wetlands and waterbodies known to contain open water in winter with the capacity to serve as waterfowl winter habitat

☐ Turtle nesting areas

☐ Vertical sandy banks (bank swallows, rough-winged swallows or kingfishers)

The following habitat characteristics when not commonly encountered in the surrounding area:

☐ Stream bed riffle zones (e.g. in eastern MA)

☐ Springs

☐ Gravel stream bottoms (trout and salmon nesting substrate)

☐ Plunge pools (deep holes) in rivers or streams

☐ Medium to large, flat rock substrates in streams

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wetlands program

Wildlife Habitat Protection Guidance

Appendix A: Simplified Wildlife Habitat Evaluation

Activities

When any one of the following activities is proposed within resource areas, applicants should complete a Detailed Wildlife Habitat Evaluation (refer to Appendix B).

- ☐ Activities located in mapped "Habitat of Potential Regional or Statewide Importance"
- ☐ Activities affecting certified or documented vernal pool habitat, including habitat within 100' of a certified or documented vernal pool when within a resource area
- ☐ Activities in bank, land under water, bordering land subject to flooding (presumed significant) where alterations are more than twice the size of thresholds
- ☐ Activities affecting vegetated wetlands >5000 sq. ft. occurring in resource areas other than Bordering Vegetated Wetland
- ☐ Activities affecting the sole connector between habitats >50 acres in size
- ☐ Installation of structures that prevent animal movement
- ☐ Activities for the purpose of bank stabilization using hard structure solutions that significantly affect ability of stream channel to shift and meander, or disrupt continuity in cover that would inhibit animal passage
- ☐ Dredging (greater than 5,000 sf)

Appendix E – NOI Plans
(bound separately)

Appendix F – Stormwater Management Report
(bound separately)

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	1	391
PROJECT FILE NO.	608051		

TITLE SHEET & INDEX

PLAN AND PROFILE OF

ROUTE 38 (MAIN STREET)

W-38-003 (C99), W-38-011 (802), W-38-002 (2NQ)

IN THE TOWN OF

WILMINGTON

MIDDLESEX COUNTY

FEDERAL AID PROJECT NO. -

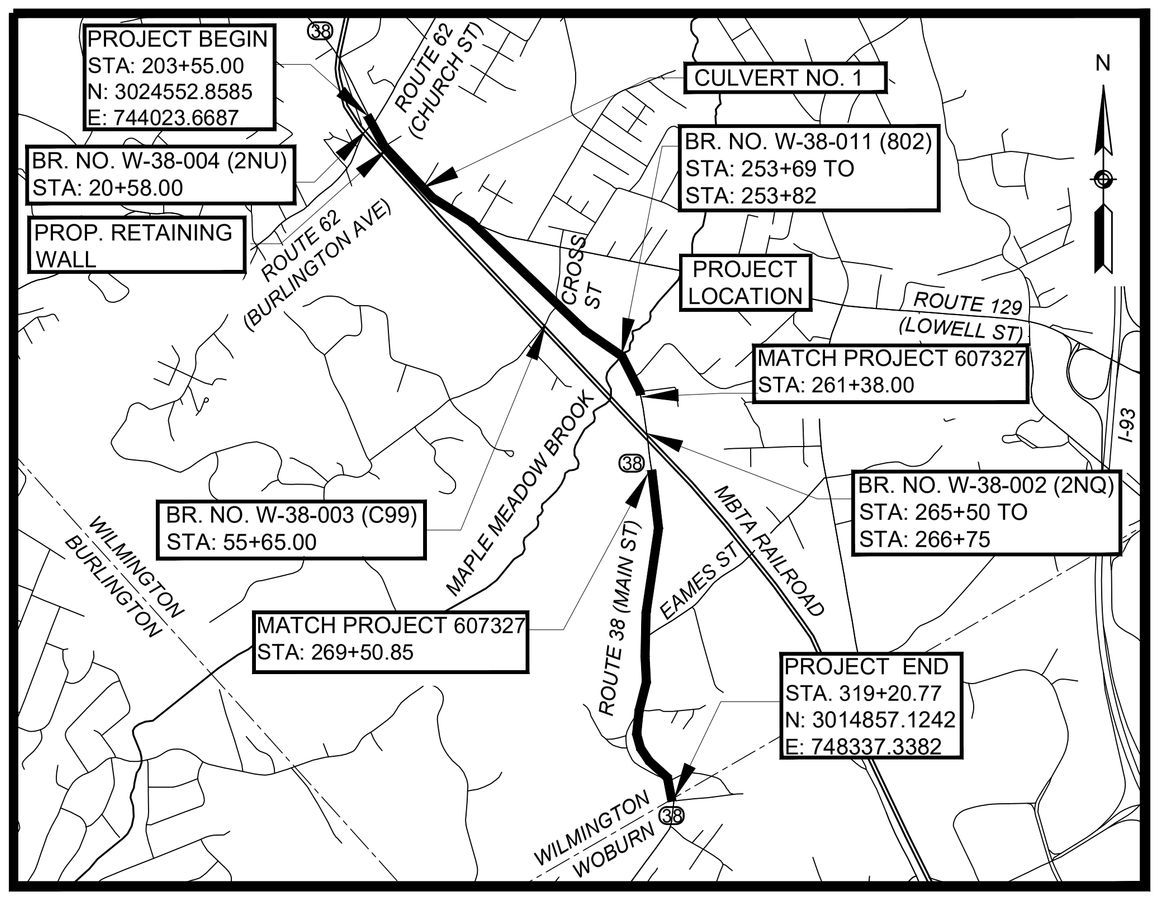
THESE PLANS ARE SUPPLEMENTED BY THE 2024 STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES, THE OCTOBER 2017 CONSTRUCTION STANDARD DETAILS, THE 2015 OVERHEAD SIGNAL STRUCTURE AND FOUNDATION STANDARD DRAWINGS, MASSDOT TRAFFIC MANAGEMENT PLANS AND DETAIL DRAWINGS, THE 1990 STANDARD DRAWINGS FOR SIGNS AND SUPPORTS, THE 1968 STANDARD DRAWINGS FOR TRAFFIC SIGNALS AND HIGHWAY LIGHTING, AND THE LATEST EDITION OF THE AMERICAN STANDARD FOR NURSERY STOCK.

NOI PLAN SET
SUBMISSION DATE: 3/12/2025

100% SUBMITTAL

INDEX

SHEET NO.	DESCRIPTION
1	TITLE SHEET & INDEX
2	LEGEND & ABBREVIATIONS
3	GENERAL NOTES
4	KEY PLAN
~~5~~	~~BORING LOCATION PLAN~~
~~6 - 8~~	~~BORING LOGS~~
15 - 19	TYPICAL SECTIONS
N/A	RESOURCE AREA IMPACT PLANS 1-6
~~20 - 40~~	~~CONSTRUCTION PLANS~~
~~41 - 64~~	~~CONSTRUCTION PROFILES~~
~~65 - 85~~	~~CURB TIE & GRADING PLANS~~
~~86 - 93~~	~~BASELINE TIES & SKETCHES PLANS~~
94 - 114	DRAINAGE PLANS
~~115 - 135~~	~~UTILITY PLANS~~
136 - 143	DRAINAGE & UTILITY DETAILS
~~144 - 165~~	~~PAVEMENT MARKING AND SIGNS PLANS~~
~~166 - 170~~	~~SIGN SUMMARY~~
~~171~~	~~PAVEMENT MARKING DETAILS~~
~~172 - 181~~	~~TRAFFIC SIGNAL PLANS~~
~~182 - 206~~	~~TEMPORARY TRAFFIC CONTROL PLANS~~
~~207 - 211~~	~~PEDESTRIAN CURB RAMP & DRIVEWAY DETAILS~~
212 - 217	LANDSCAPING PLANS 2-6
218	WETLAND REPLICATION PLAN
219	COMPENSATORY FLOOD STORAGE PLAN
220	INFILTRATION BASIN PLAN
221 - 224	CONSTRUCTION & LANDSCAPE DETAILS
~~225 - 227~~	~~RETAINING WALL PLANS~~
228 - 231	CULVERT PLANS
~~232 - 385~~	~~CROSS SECTIONS~~



LENGTH OF PROJECT = 10850.00 FEET = 2.055 MILES

DESIGN DESIGNATION - (ROUTE 38/MAIN STREET)

DESIGN SPEED
40 MPH - PROJECT BEGIN TO STA. 236+60
45 MPH - STA. 236+60 TO 300+00
30 MPH - STA. 300+00 TO PROJECT END

	800 FEET NORTH OF LOWELL STREET	700 FEET SOUTH OF CROSS STREET	450 FEET SOUTH OF EAMES STREET
ADT (2016)	21,383	12,490	14,954
ADT (2036)	26091	15240	18247
K	7.5	9.1	9.0
D	72.9%	78	67.9%
T (PEAK HOUR)	6.0%	9.2%	4.1%
T (AVERAGE DAY)	6.2	10.1%	8.0%
DHV	1957	1387	1642
DDHV	1427	1090	1115
FUNCTIONAL CLASSIFICATION	URBAN PRINCIPAL ARTERIAL	URBAN PRINCIPAL ARTERIAL	URBAN PRINCIPAL ARTERIAL

DATE: MAY XX, 2024

PLANS ARE FOR PERMIT SUBMISSION ONLY AND NOT FOR CONSTRUCTION

COMMONWEALTH OF MASSACHUSETTS
DENNIS A. VERTIYEV
CIVIL
No. 56113
REGISTERED PROFESSIONAL ENGINEER
3/13/25

DATE	DESCRIPTION	REV #
5/XX/2024	PS&E SUBMISSION	0
1/19/2024	100% SUBMISSION	0
1/15/2021	75% SUBMISSION	0
10/25/2017	25% SUBMISSION	0

MassDOT
Massachusetts Department of Transportation
Highway Division

APPROVED

CHIEF ENGINEER **DATE**

PREPARED BY:

Green International Affiliates, Inc.
Civil and Structural Engineers

608051_HD01(TITLE).DWG Plotted on 12-Mar-2025 2:26 PM

GENERAL SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
JB	JB	JERSEY BARRIER
CB	CB	CATCH BASIN
		CATCH BASIN CURB INLET
FP	FP	FLAG POLE
GP	GP	GAS PUMP
MB	MB	MAIL BOX
		POST SQUARE
		POST CIRCULAR
WELL	WELL	WELL
EHH	EHH	ELECTRIC HANDHOLE
		FENCE GATE POST
GG	GG	GAS GATE
BHL #	BHL #	BORING HOLE
MW #	MW #	MONITORING WELL
TP #	TP #	TEST PIT
		HYDRANT
		LIGHT POLE
CO.BD.		COUNTY BOUND
		GPS POINT
		CABLE MANHOLE
		DRAINAGE MANHOLE
		ELECTRIC MANHOLE
		GAS MANHOLE
		MISC MANHOLE
		SEWER MANHOLE
		TELEPHONE MANHOLE
		WATER MANHOLE
MHB	MHB	MASSACHUSETTS HIGHWAY BOUND
MON		MONUMENT
SB		STONE BOUND
TB		TOWN OR CITY BOUND
		TRAVERSE OR TRIANGULATION STATION
TPL or GUY	TPL or GUY	TROLLEY POLE OR GUY POLE
HTP		TRANSMISSION POLE
UFB	UFB	UTILITY POLE W/ FIREBOX
UPDL	UPDL	UTILITY POLE WITH DOUBLE LIGHT
ULT	ULT	UTILITY POLE W / 1 LIGHT
UPL	UPL	UTILITY POLE
		BUSH
SIZE & TYPE		TREE
		STUMP
		SWAMP / MARSH
WG	WG	WATER GATE
PM	PM	PARKING METER
		OVERHEAD CABLE/WIRE
		CURBING
100 99		CONTOURS (ON-THE-GROUND SURVEY DATA)
100 99		CONTOURS (PHOTOGRAMMETRIC DATA)
		UNDERGROUND DRAIN PIPE (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND ELECTRIC DUCT (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND GAS MAIN (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND SEWER MAIN (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND TELEPHONE DUCT (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND WATER MAIN (DOUBLE LINE 24 INCH AND OVER)
		BALANCED STONE WALL
		GUARD RAIL - STEEL POSTS
		GUARD RAIL - WOOD POSTS
x	x	CHAIN LINK OR METAL FENCE
		WOOD FENCE
		TREE LINE
		SAWCUT LINE
		TOP OR BOTTOM OF SLOPE
		LIMIT OF EDGE OF PAVEMENT OR COLD PLANE AND OVERLAY
		BANK OF RIVER OR STREAM
		BORDER OF WETLAND
		100 YEAR FLOOD PLAIN
		100 FT WETLAND BUFFER
		200 FT RIVERFRONT BUFFER
		50 FT NO BUILD
		15 FT NO DISTURB
		STATE HIGHWAY LAYOUT
		TOWN OR CITY LAYOUT
		COUNTY LAYOUT
		RAILROAD SIDELINE
		TOWN OR CITY BOUNDARY LINE
		PROPERTY LINE OR APPROXIMATE PROPERTY LINE
		EASEMENT
		CONC RETAINING WALL
		SEDIMENT CONTROL BARRIER
		COIR LOG
	x	FLOATING SILT FENCE
		STONE FOR PIPE ENDS
		MODIFIED ROCK FILL

TRAFFIC SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
1	1	CONTROLLER PHASE ACTUATED
		TRAFFIC SIGNAL HEAD (SIZE AS NOTED)
		VIDEO DETECTION CAMERA
		MICROWAVE DETECTOR
		PEDESTRIAN PUSH BUTTON, SIGN (DIRECTIONAL ARROW AS SHOWN) AND SADDLE
	*	EMERGENCY PREEMPTION CONFIRMATION STROBE LIGHT
		VEHICULAR SIGNAL HEAD
		VEHICULAR SIGNAL HEAD, OPTICALLY PROGRAMMED
		FLASHING BEACON
		PEDESTRIAN SIGNAL HEAD, (TYPE AS NOTED OR AS SPECIFIED)
RRSG	RRSG	RAILROAD SIGNAL
OR		SIGNAL POST AND BASE (ALPHA-NUMERIC DESIGNATION NOTED)
	20'	MAST ARM, SHAFT AND BASE (ARM LENGTH AS NOTED)
		HIGH MAST POLE OR TOWER
		SIGN AND POST
		SIGN AND POST (2 POSTS)
	20'	MAST ARM WITH LUMINAIRE
		OPTICAL PRE-EMPTION DETECTOR
		CONTROL CABINET, GROUND MOUNTED
		CONTROL CABINET, POLE MOUNTED
		FLASHING BEACON CONTROL AND METER PEDESTAL
		LOAD CENTER ASSEMBLY
		PULL BOX 12"x12" (OR AS NOTED)
		ELECTRIC HANDHOLE 12"x24" (OR AS NOTED)
		TRAFFIC SIGNAL CONDUIT
		VIDEO VEHICLE DETECTION ZONE
		VIDEO BICYCLE DETECTION ZONE
		WIRE LOOP DETECTOR WITH BICYCLE DETECTION (6' x 23' TYP UNLESS OTHERWISE SPECIFIED)

PAVEMENT MARKINGS SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
		PAVEMENT ARROW - WHITE
ONLY	ONLY	LEGEND "ONLY" - WHITE
	SL	STOP LINE
	CW	CROSSWALK
	SWL	6" SOLID WHITE LINE
	SYL	6" SOLID YELLOW LINE
	BWL	6" BROKEN WHITE LINE (10' LINE SEGMENT, 30' GAP)
	BYL	6" BROKEN YELLOW LINE (10' LINE SEGMENT, 30' GAP)
	DWL	6" DOTTED WHITE LINE (3' LINE SEGMENT, 9' GAP)
	DYL	6" DOTTED YELLOW LINE (3' LINE SEGMENT, 9' GAP)
	DWLEx	6" DOTTED WHITE LINE EXTENSION (2' LINE SEGMENT, 6' GAP)
	DYLEx	6" DOTTED YELLOW LINE EXTENSION (2' LINE SEGMENT, 6' GAP)
	DBWL	6" DOUBLE WHITE LINE
	DBYL	6" DOUBLE YELLOW LINE
	RWT	RECESSED ALL-WEATHER THERMOPLASTIC

ABBREVIATIONS

GENERAL

AADT	ANNUAL AVERAGE DAILY TRAFFIC
ABAN	ABANDON
ADJ	ADJUST
APPROX.	APPROXIMATE
A.C.	ASPHALT CONCRETE
ACCM PIPE	ASPHALT COATED CORRUGATED METAL PIPE
BIT.	BITUMINOUS
BC	BOTTOM OF CURB
BD.	BOUND
BL	BASELINE
BLDG	BUILDING
BM	BENCHMARK
BO	BY OTHERS
BOS	BOTTOM OF SLOPE
BR.	BRIDGE
CB	CATCH BASIN
CB W/F&C	CATCH BASIN WITH FRAME AND COVER
CBCI	CATCH BASIN WITH CURB INLET
CC	CEMENT CONCRETE
CCM	CEMENT CONCRETE MASONRY
CEM	CEMENT
CI	CURB INLET
CIP	CAST IRON PIPE
CLF	CHAIN LINK FENCE
CL	CENTERLINE
CMP	CORRUGATED METAL PIPE
CSP	CORRUGATED STEEL PIPE
CO.	COUNTY
CONC	CONCRETE
CONT	CONTINUOUS
CONST	CONSTRUCTION
CR GR	CROWN GRADE
CTE	CONNECT TO EXISTING
DHV	DESIGN HOURLY VOLUME
DI	DROP INLET
DIA	DIAMETER
DIP	DUCTILE IRON PIPE
DW	STEADY DON'T WALK - PORTLAND ORANGE
DWY	DRIVEWAY
ECC	ECCENTRIC
ELEV (or EL.)	ELEVATION
EMB	EMBANKMENT
EOP	EDGE OF PAVEMENT
EXIST (or EX)	EXISTING
EXC	EXCAVATION
F&C	FRAME AND COVER
F&G	FRAME AND GRATE
FDN.	FOUNDATION
FLDSTN	FIELDSTONE
GAR	GARAGE
GD	GROUND
GG	GAS GATE
GI	GUTTER INLET
GIP	GALVANIZED IRON PIPE
GRAN	GRANITE
GRAV	GRAVEL
GRD	GUARD
HDW	HEADWALL
HMA	HOT MIX ASPHALT
HOR	HORIZONTAL
HYD	HYDRANT
INV	INVERT
JCT	JUNCTION
L	LENGTH OF CURVE
LB	LEACH BASIN
LP	LIGHT POLE
LSA	LANDSCAPED AREA
LT	LEFT
MAX	MAXIMUM
MB	MAILBOX
MH	MANHOLE
MHB	MASSACHUSETTS HIGHWAY BOUND
MIN	MINIMUM
NG	NATIONAL GRID
NIC	NOT IN CONTRACT
NO.	NUMBER
PC	POINT OF CURVATURE
PCC	POINT OF COMPOUND CURVATURE
PCR	PEDESTRIAN CURB RAMP
P.G.L.	PROFILE GRADE LINE
PI	POINT OF INTERSECTION
POC	POINT ON CURVE
POT	POINT ON TANGENT
PRC	POINT OF REVERSE CURVATURE
PROJ	PROJECT
PROP	PROPOSED
PSB	PLANTABLE SOIL BORROW
PT	POINT OF TANGENCY

ABBREVIATIONS (cont.)

GENERAL

PVC	POINT OF VERTICAL CURVATURE
PVI	POINT OF VERTICAL INTERSECTION
PVT	POINT OF VERTICAL TANGENCY
PVMT	PAVEMENT
PWW	PAVED WATER WAY
R	RADIUS OF CURVATURE
R&D	REMOVE AND DISPOSE
R&R UP	REMOVE AND REPLACE UTILITY POLE
R&R	REMOVE AND RESET
RCP	REINFORCED CONCRETE PIPE
RD	ROAD
RDWY	ROADWAY
REM	REMOVE
RET	RETAIN
RET WALL	RETAINING WALL
RMD	REMODEL
ROW	RIGHT OF WAY
RR	RAILROAD
R&R	REMOVE AND RESET
R&S	REMOVE AND STACK
RT	RIGHT
SB	STONE BOUND
SHLD	SHOULDER
SMH	SEWER MANHOLE
ST	STREET
STA	STATION
SSD	STOPPING SIGHT DISTANCE
SHLO	STATE HIGHWAY LAYOUT LINE
SW	SIDEWALK
T	TANGENT DISTANCE OF CURVE/TRUCK %
TAN	TANGENT
TEMP	TEMPORARY
TC	TOP OF CURB
TOS	TOP OF SLOPE
TYP	TYPICAL
UP	UTILITY POLE
VAR	VARIES
VERT	VERTICAL
VC	VERTICAL CURVE
VP	VENT PIPE
VZ	VERIZON
WG	WATER GATE
WIP	WROUGHT IRON PIPE
WM	WATER METER/WATER MAIN
X-SECT	CROSS SECTION

TRAFFIC SIGNAL

CAB.	CABINET
CCVE	CLOSED CIRCUIT VIDEO EQUIPMENT
DW	STEADY DON'T WALK
FDW	FLASHING DON'T WALK
FR	FLASHING CIRCULAR RED
FRL	FLASHING RED LEFT ARROW
FRR	FLASHING RED RIGHT ARROW
FY	FLASHING CIRCULAR AMBER
FYL	FLASHING AMBER LEFT ARROW
FYR	FLASHING AMBER RIGHT ARROW
G	STEADY CIRCULAR GREEN
GL	STEADY GREEN LEFT ARROW
GR	STEADY GREEN RIGHT ARROW
GSL	STEADY GREEN SLASH LEFT ARROW
GSR	STEADY GREEN SLASH RIGHT ARROW
GV	STEADY GREEN VERTICAL ARROW
OL	OVERLAP
PED	PEDESTRIAN
PTZ	PAN, TILE, ZOOM
R	STEADY CIRCULAR RED
RL	STEADY RED LEFT ARROW
RR	STEADY RED RIGHT ARROW
TR SIG	TRAFFIC SIGNAL
TSC	TRAFFIC SIGNAL CONDUIT
W	STEADY WALK
Y	STEADY CIRCULAR AMBER
YL	STEADY AMBER LEFT ARROW

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	2	391
PROJECT FILE NO.	608051		

LEGEND & ABBREVIATIONS

608051_HD02(LEGEND).DWG Plotted on 12-Mar-2025 2:26 PM
Proposal No. 608051 - 132406
A008060 - 128

GENERAL NOTES

1. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES AND PROCEDURES; AND FOR SAFETY PRECAUTIONS AND PROGRAMS REQUIRED FOR THE WORK UNDER THIS CONTRACT. THE CONTRACTOR SHALL COMPLY WITH OSHA REQUIREMENTS.
2. ALL TREE REMOVALS AND TREE TRIMMING SHALL BE APPROVED BY THE RESIDENT ENGINEER. ANY TREES IMPACTED BY PROPOSED WORK, THAT ARE NOT MARKED TO BE REMOVED ON THE PLAN SHALL BE EVALUATED BY A MASSACHUSETTS CERTIFIED ARBORIST. ALL TREE TRIMMING SHALL BE OVERSEEN BY A MASSACHUSETTS CERTIFIED ARBORIST.
3. AREAS OUTSIDE THE LIMITS OF PROPOSED WORK DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED BY THE CONTRACTOR TO THEIR ORIGINAL CONDITION AT NO EXPENSE TO THE OWNER.
4. MINIMUM CLEAR PATH ON THE SIDEWALK SHALL BE 3'-0" EXCLUDING THE SURFACE OF THE CURB. THE CONTRACTOR SHALL MAINTAIN AMERICANS WITH DISABILITIES ACT (ADA) COMPLIANCE AROUND ALL EXISTING UTILITY POLES AND RELOCATED MAILBOXES.
5. CURB RAMPS SHALL CONFORM TO THE LATEST ADA/AAB STANDARDS.
6. TRANSITION CURB AT PROJECT LIMITS TO MATCH EXISTING ELEVATIONS (PAVEMENT OR EXISTING CURB). WITHIN ABUTTING PROPERTIES, UNLESS NOTED OTHERWISE. WHEN RETAINING THESE ITEMS IS NOT PRACTICAL IN THE OPINION OF THE ENGINEER, THE CONTRACTOR SHALL REMOVE, STOCKPILE, PROTECT AND RESET THE ITEMS. THE CONTRACTOR SHALL REPLACE ITEMS DAMAGED DURING REMOVAL, STOCKPILING, OR RESETTING DUE TO NEGLIGENCE, CARELESSNESS, OR MISHANDLING WITH EQUIVALENT NEW ITEMS AT NO COST TO THE OWNER.
7. ALL TREES CALLED OUT TO BE RETAINED ON THE CONSTRUCTION PLANS SHALL HAVE TREE PROTECTION - INDIVIDUAL AND TREE PROTECTION - TEMPORARY FENCE.
8. THE CONCRETE SLAB OF BRIDGE NO. W-38-011 (802) SHALL BE RETAINED DURING THE CONSTRUCTION OF THE PROJECT. THE DEPTH OF THE PROPOSED ROADWAY SUBBASE SHALL VARY IN DEPTH ACROSS THE BRIDGE.
9. ROCKS AND BOULDERS IDENTIFIED R&R ON THE PLANS SHALL BE REMOVED DURING CONSTRUCTION AND RESET AS DIRECTED PER THE ENGINEER.
10. MILLED LONGITUDINAL RUMBLE STRIP SHALL BE INSTALLED ACCORDING TO ENGINEERING DIRECTIVE E20-007.
11. THE CONTRACTOR SHALL FIELD VERIFY ALL MAILBOXES ARE INSTALLED PER MASSDOT STANDARD DETAIL E 504.1.0, AND MEETS ADA REQUIREMENTS.

SURVEY NOTES

1. THE EXISTING CONDITIONS SHOWN ON THIS BASE MAP ARE THE RESULT OF AN ON THE GROUND INSTRUMENT SURVEY PERFORMED BETWEEN OCTOBER 11, 2016 AND DECEMBER 7, 2016 BY GREEN INTERNATIONAL AFFILIATES, INC. (GREEN). SEE FIELD NOTES IN MASSDOT DISTRICT 4 FIELD BOOK 41142.
2. HORIZONTAL AND VERTICAL CONTROL WAS ESTABLISHED BY GREEN ON OCTOBER 28, 2016 WITH STATIC GPS VECTORS CALCULATED BY NATIONAL GEODETIC SURVEY'S OPUS SERVICE, IN MASSDOT DISTRICT 4 FIELD BOOK 41142, PAGE 84. HORIZONTAL DATUM IS BASED ON THE MASSACHUSETTS STATE PLANE COORDINATE SYSTEM, NAD83 (2011) EPOCH 2010.0000, VERTICAL DATUM IS NAVD 88 (COMPUTED USING GEOID12B) USING THE FOLLOWING CONTROL POINTS:

POINT	GRID NORTHING	GRID EASTING	ELEVATION	COMBINED GROUND TO GRID SCALE FACTOR
2-MDHL	3024249.8723	744113.8185	108.896	0.99998182
28-MMAG	3014918.9153	748357.2529	91.352	0.99998006

THE UNIT OF MEASUREMENTS IS US FEET. THE PROJECT COMBINED SCALE FACTOR IS 0.99998094.

3. THE RIGHT OF WAY LINES SHOWN ON THIS BASE MAP ARE THE DIRECT RESULT OF AN INSTRUMENT SURVEY PERFORMED ON THE GROUND BY GREEN, WITH A TRAVERSE CLOSURE OF 1 IN 92,559 AND FROM PLANS AND DEEDS OF RECORD. PRIVATE PROPERTY LINES HAVE NOT BEEN SURVEYED, THEY ARE COMPILED FROM GIS & RECORD PLAN INFORMATION AND SHOULD BE CONSIDERED APPROXIMATE. THE SAID PARCELS SHOWN HEREON ARE SUBJECT TO RIGHTS AND EASEMENTS AS CONTAINED IN THE VARIOUS DEEDS OF RECORD DESCRIBING SAID PREMISES. THE LOCATIONS AND EXTENT OF SAID RIGHTS AND EASEMENTS ARE NOT SUBJECT TO THE SURVEY.
4. WETLANDS WERE DELINEATED AND FIELD LOCATED BY GREEN IN NOVEMBER, 2016.

EROSION AND SEDIMENT CONTROL NOTES

1. ALL EROSION CONTROL MEASURES MUST BE INSTALLED PRIOR TO THE START OF ANY LAND DISTURBANCE / EARTHWORK ACTIVITIES.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR THE REPAIR, REPLACEMENT AND MAINTENANCE OF ALL SEDIMENTATION / EROSION CONTROL MEASURES UNTIL ALL DISTURBED AREAS ARE STABILIZED.

UTILITY NOTES

1. ALL UNDERGROUND UTILITIES AS SHOWN WERE COMPILED USING FIELD SURVEY INFORMATION AND AVAILABLE RECORD INFORMATION.
2. RECORD UTILITY INFORMATION FROM THE VARIOUS UTILITY COMPANIES AND PUBLIC AGENCIES ARE APPROXIMATE ONLY AND ACTUAL LOCATIONS MUST BE DETERMINED IN THE FIELD. IN ADDITION, ANY UTILITIES NORMALLY LOCATED IN THE STREETS AND NOT SHOWN ON THESE PLANS SHALL BE ANTICIPATED BY THE CONTRACTOR IN ALL HIS OPERATIONS.
3. SUBSURFACE UTILITY LOCATIONS HAVE BEEN PLOTTED TO MEET UTILITY QUALITY LEVEL "C" AS DESCRIBED IN ASCE STANDARD 38-02 AND SUMMARIZED BELOW. THE UNDERGROUND UTILITIES ARE SHOWN IN APPROXIMATE LOCATIONS BASED ON ABOVE-GROUND FIELD OBSERVATION AND EXISTING RECORD INFORMATION RECEIVED FROM UTILITY STAKE-HOLDERS.

   SUMMARY OF UTILITY MAPPING QUALITY LEVELS:

   THE FOLLOWING IS A SUMMARY OF THE SURVEY MAPPING LEVELS FOR UTILITIES AS DESCRIBED IN ASCE STANDARD 38-02, "STANDARD GUIDELINE FOR THE DEPICTION OF EXISTING SUBSURFACE UTILITY DATA". THESE GUIDELINES ARE MORE FULLY DESCRIBED IN THE ASCE STANDARD.

   - UTILITY QUALITY LEVEL A:
     PRECISE HORIZONTAL AND VERTICAL LOCATION OF UTILITIES OBTAINED BY THE ACTUAL EXPOSURE (OR VERIFICATION OF PREVIOUSLY EXPOSED AND SURVEYED UTILITIES) AND SUBSEQUENT MEASUREMENT OF SUBSURFACE UTILITIES, USUALLY AT A SPECIFIC POINT. MINIMALLY INTRUSIVE EXCAVATION EQUIPMENT IS TYPICALLY USED TO MINIMIZE THE POTENTIAL FOR UTILITY DAMAGE. A PRECISE HORIZONTAL AND VERTICAL LOCATION, AS WELL AS OTHER UTILITY ATTRIBUTES, IS SHOWN ON PLAN DOCUMENTS. ACCURACY IS TYPICALLY SET TO 15-MM VERTICAL AND TO APPLICABLE HORIZONTAL SURVEY AND MAPPING ACCURACY AS DEFINED OR EXPECTED BY THE PROJECT OWNER.
   - UTILITY QUALITY LEVEL B:
     INFORMATION OBTAINED THROUGH THE APPLICATION OF APPROPRIATE SURFACE GEOPHYSICAL METHODS TO DETERMINE THE EXISTENCE AND APPROXIMATE HORIZONTAL POSITION OF SUBSURFACE UTILITIES. QUALITY LEVEL B DATA SHOULD BE REPRODUCIBLE BY SURFACE GEOPHYSICS AT ANY POINT OF THEIR DEPICTION. THIS INFORMATION IS SURVEYED TO APPLICABLE TOLERANCES DEFINED BY THE PROJECT AND REDUCED ONTO PLAN DOCUMENTS.
   - UTILITY QUALITY LEVEL C:
     INFORMATION OBTAINED BY SURVEYING AND PLOTTING VISIBLE ABOVE-GROUND UTILITY FEATURES AND BY USING PROFESSIONAL JUDGMENT IN CORRELATING THIS INFORMATION TO QUALITY LEVEL D INFORMATION.
   - UTILITY QUALITY LEVEL D:
     INFORMATION DERIVED FROM EXISTING RECORDS OR ORAL RECOLLECTIONS.
4. ALL UTILITY COMPANIES, PUBLIC AND PRIVATE MUST BE NOTIFIED, INCLUDING THOSE IN CONTROL OF UTILITIES NOT SHOWN ON THIS PLAN, (SEE CHAPTER 370, ACTS OF 1963, MASSACHUSETTS) PRIOR TO EXCAVATING, BLASTING, INSTALLING, BACKFILLING, GRADING, PAVEMENT RESTORING OR REPAVING.
5. THE LOCATION OF EXISTING PIPES OR OTHER UNDERGROUND STRUCTURES ARE NOT WARRANTED TO BE EXACT, NOR IS IT WARRANTED THAT ALL UNDERGROUND PIPES OR STRUCTURES ARE SHOWN. THE CONTRACTOR SHALL CALL "DIG SAFE" (1-888-344-7233) 72 HOURS (EXCLUDING SATURDAYS, SUNDAYS AND HOLIDAYS) PRIOR TO ANY EXCAVATION TO OBTAIN ACCURATE UTILITY LOCATIONS. MUNICIPALITIES, THE STATE AND THE MBTA ARE NOT MEMBERS OF DIG-SAFE AND SHALL BE CONTACTED INDIVIDUALLY BY THE CONTRACTOR.
6. THE EXISTING INVERTS ARE SHOWN FOR BIDDING PURPOSES ONLY. ACTUAL INVERT ELEVATIONS SHALL BE CONFIRMED IN THE FIELD BY THE CONTRACTOR PRIOR TO ORDERING STRUCTURES.
7. THE CONTRACTOR SHALL INVESTIGATE ALL UNKNOWN MANHOLES TO DETERMINE OWNERSHIP AND CONTACT THE APPROPRIATE UTILITY AGENCIES TO COORDINATE WORK. THE ENGINEER SHALL BE NOTIFIED OF ANY MANHOLES DETERMINED TO BE PART OF SEWER, DRAIN OR WATER SYSTEMS.
8. WHERE AN EXISTING UTILITY IS FOUND TO CONFLICT WITH THE PROPOSED WORK, THE LOCATION, ELEVATION AND SIZE OF THE UTILITY SHALL BE ACCURATELY DETERMINED WITHOUT DELAY BY THE CONTRACTOR, AND THE INFORMATION FURNISHED TO THE ENGINEER FOR RESOLUTION OF THE CONFLICT.
9. THE CONTRACTOR SHALL EXERCISE EXTREME CARE WHEN EXCAVATING NEAR AND BACKFILLING IN THE VICINITY OF EXISTING UTILITIES. CONTRACTOR SHALL USE HAND EXCAVATION WHERE APPROPRIATE TO PROTECT EXISTING UTILITIES.
10. UNLESS OTHERWISE NOTED OR APPROVED BY THE ENGINEER, THE CONTRACTOR SHALL MAINTAIN ALL EXISTING UTILITIES IN SERVICE AT ALL TIMES. IF THE CONTRACTOR DAMAGES UTILITY SYSTEMS, THEY SHALL IMMEDIATELY NOTIFY THE RESPECTIVE UTILITY COMPANY AND SHALL REPAIR/REPLACE THE AFFECTED SYSTEM AT HIS OWN EXPENSE.
11. THE CONTRACTOR SHALL COORDINATE WITH PRIVATE UTILITY COMPANIES AND MAKE ARRANGEMENTS FOR ADJUSTMENTS, ALTERATIONS, AND REPLACEMENT OF PRIVATE UTILITIES WHICH ARE TO BE DONE BY THE UTILITY COMPANY.
12. THE CONTRACTOR SHALL ALTER THE MASONRY OF THE TOP SECTION OF ALL EXISTING DRAINAGE AND SEWER STRUCTURES AS NECESSARY FOR CHANGES IN GRADE, AND RESET ALL WATER, SEWER, DRAINAGE SURFACE CASTINGS, TRAFFIC SIGNALS, PUBLIC ELECTRICAL ITEMS, AND PRIVATE LIGHTING (ETC.) WITHIN THE LIMITS OF CONSTRUCTION TO THE PROPOSED FINISH SURFACE GRADE. REQUIRED NEW MASONRY SHALL BE CLAY BRICK CONFORMING TO M4.05.2. IF AN EXISTING UTILITY STRUCTURE WITHIN IN THE PROJECT LIMITS IS WITHIN A PROPOSED ACCESSIBLE SURFACE, THE STRUCTURE SHALL BE CAREFULLY ADJUSTED SUCH THAT THE TOPMOST SURFACES OR THE STRUCTURE COVER SHALL BE FLUSH WITH THE SURFACE.
13. THE CONTRACTOR SHALL CONSIDER THE INDIVIDUAL SERVICE LINES TO EACH BUILDING FROM ALL UTILITIES, WHETHER MARKED OUT OR NOT, WHEN PROCEEDING WITH EXCAVATION.
14. SURPLUS MATERIALS OBTAINED FROM ANY TYPE OF EXCAVATION, AND ALL EXISTING AND OTHER MATERIALS NOT REQUIRED TO BE REMOVED AND STACKED OR NEEDED FOR USE ON THE PROJECT, AS DETERMINED BY THE ENGINEER, SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND DISPOSED OF SUBJECT TO THE REGULATIONS AND REQUIREMENTS OF LOCAL AUTHORITIES GOVERNING THE DISPOSAL OF SUCH MATERIALS, AT NO ADDITIONAL COMPENSATION.
15. THE CONTRACTOR SHALL SUPPORT AND PROTECT EXISTING UTILITIES IN AND AROUND EXCAVATIONS, AND, IN PARTICULAR, WHEN CROSSING UNDER OR OVER ANY DUCT OR PIPE. ALL PROTECTIVE MEASURES AND SUPPORTS SHALL BE CONSIDERED INCIDENTAL WORK AND SHALL BE INCLUDED IN THE UNIT PRICE BID FOR THE ITEM BEING INSTALLED.
16. A MINIMUM 24-INCHES OF SEPARATION IS REQUIRED BETWEEN THE HIGH PRESSURE GAS MAIN AND DRAINAGE LINE AND ALSO BETWEEN THE HIGH PRESSURE GAS MAIN AND WATER MAIN.
17. PROPOSED WATER MAIN SHALL BE INSTALLED WITH VERTICAL BENDS TO CROSS UNDER EXISTING WATER MAIN TO AVOID CONFLICTS AND CONNECTION FOR THE HYDRANTS.
18. GUTTER INLETS AND CATCH BASINS WITH FRAME AND COVER ARE PROPOSED DUE TO CONFLICTS WITH EXISTING UTILITIES. IN LOCATIONS WHERE THE CONTRACTOR HAS DETERMINED NO SUCH CONFLICTS EXIST, THE CONTRACTOR SHALL USE MASSDOT STANDARD CATCH BASINS.
19. THE CONTRACTOR SHALL PROTECT PRIVATE IRRIGATION SYSTEM TO EACH PRIVATE PROPERTY, WHETHER MARKED OUT OR NOT, WHEN PROCEEDING WITH EXCAVATION AND GRADING. REPAIR TO DAMAGED IRRIGATION SYSTEM SHALL BE INCIDENTAL TO THE WORK PERFORMED AND INCLUDED IN THE UNIT PRICE BID FOR THE ITEM BEING INSTALLED.

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	--	3	391
PROJECT FILE NO.	608051		

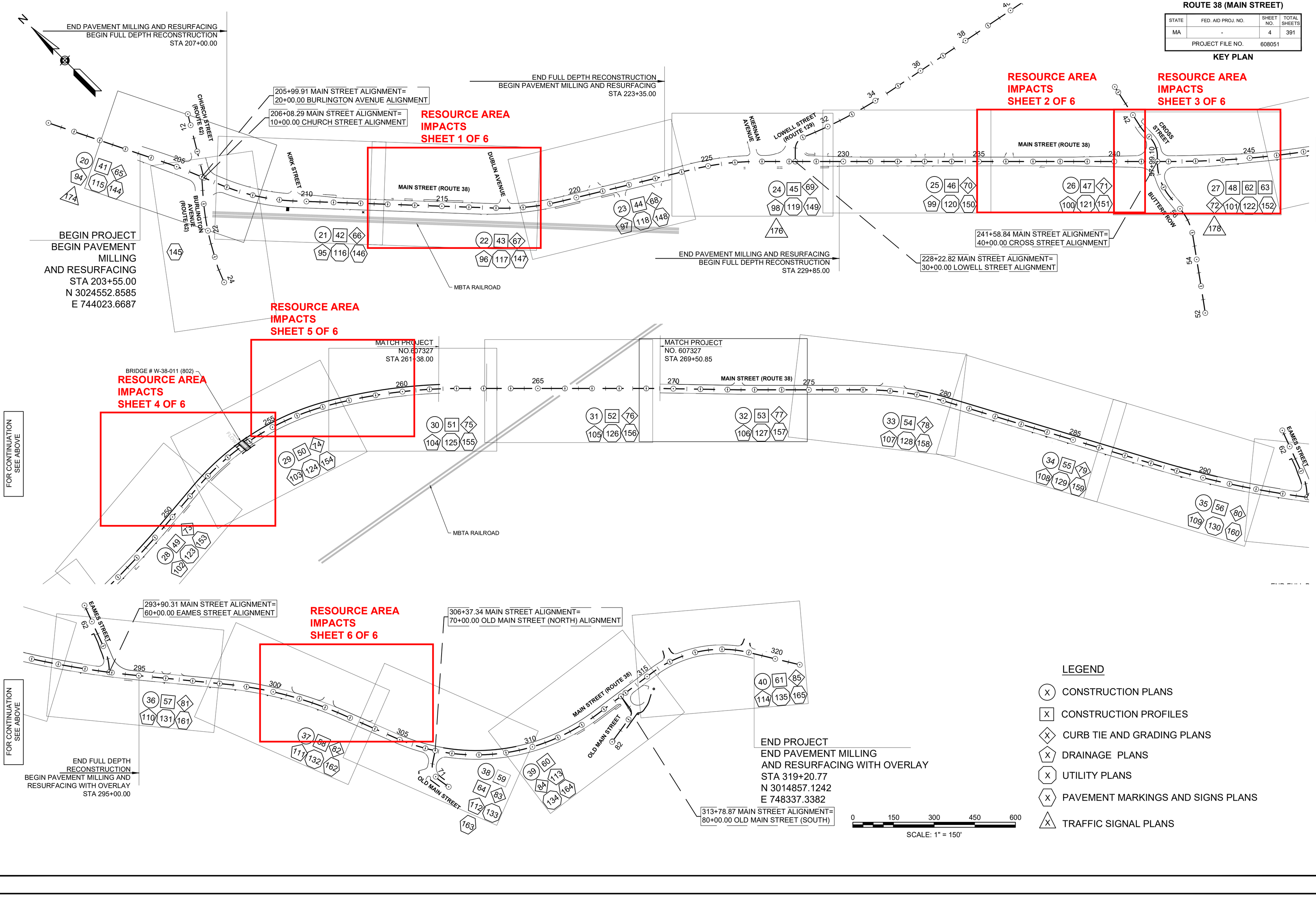
GENERAL NOTES

608051_HD03(GENERAL NOTES).DWG Plotted on 12-Mar-2025 2:27 PM
Proposal No. 608051 - 132406
A00860 - 129

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	4	391
PROJECT FILE NO.	608051		

KEY PLAN



LEGEND

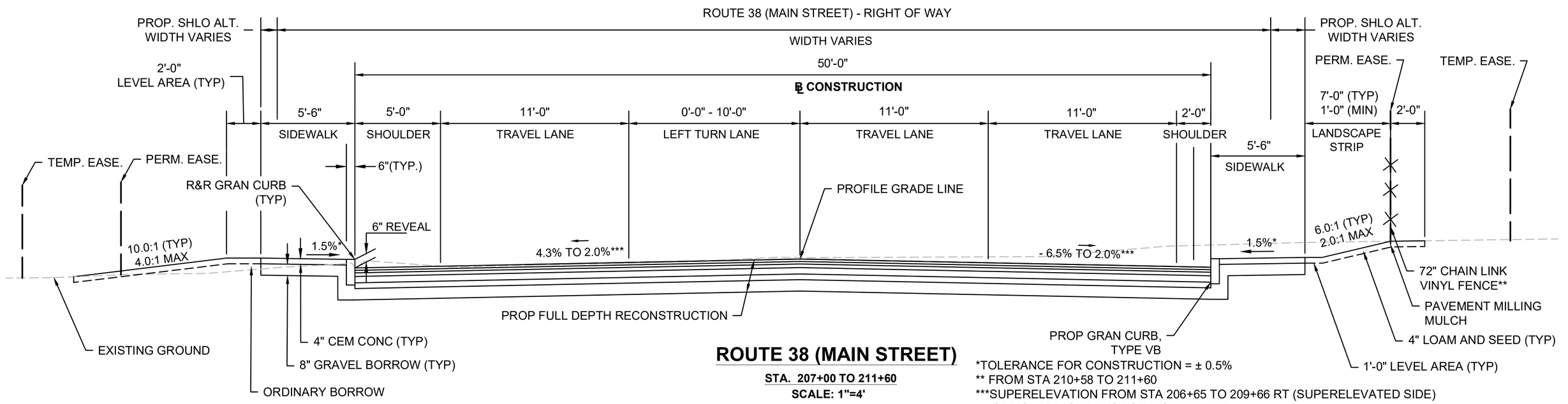
- (X) CONSTRUCTION PLANS
- [X] CONSTRUCTION PROFILES
- ◇X◇ CURB TIE AND GRADING PLANS
- ⬡X⬡ DRAINAGE PLANS
- ⬡X⬡ UTILITY PLANS
- ⬡X⬡ PAVEMENT MARKINGS AND SIGNS PLANS
- △X△ TRAFFIC SIGNAL PLANS

608051_HD04(KEY PLAN).DWG Plotted on 12-Mar-2025 2:27 PM
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A008600 - 130

WILMINGTON
ROUTE 38 (MAIN STREET)

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PROJECT FILE NO.	608051		

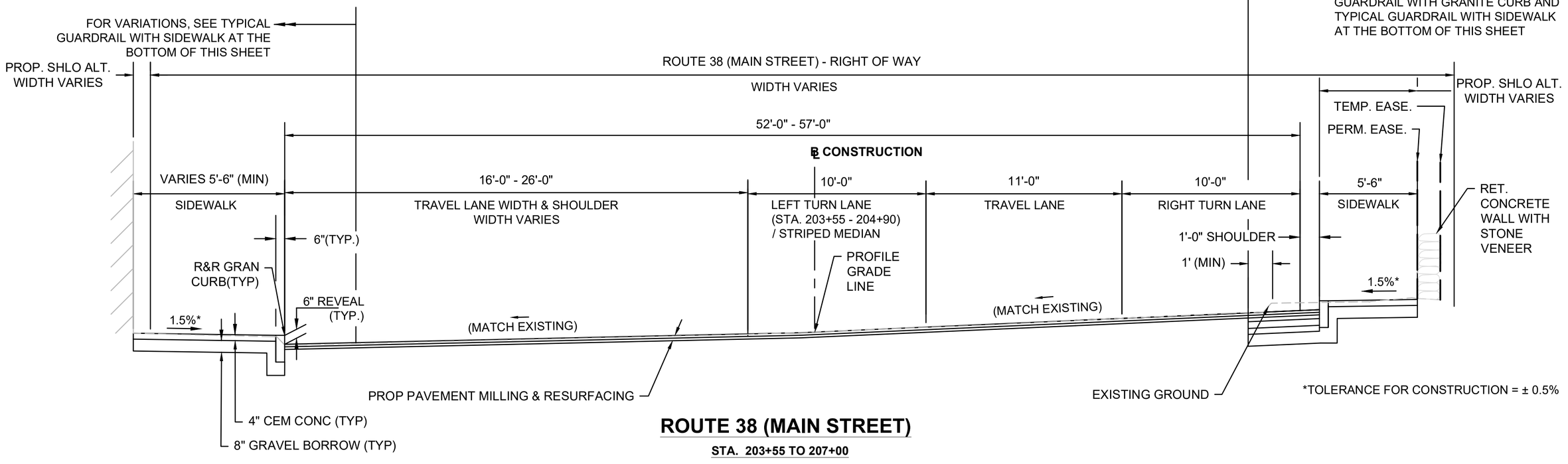
TYPICAL SECTIONS - 1



ROUTE 38 (MAIN STREET)

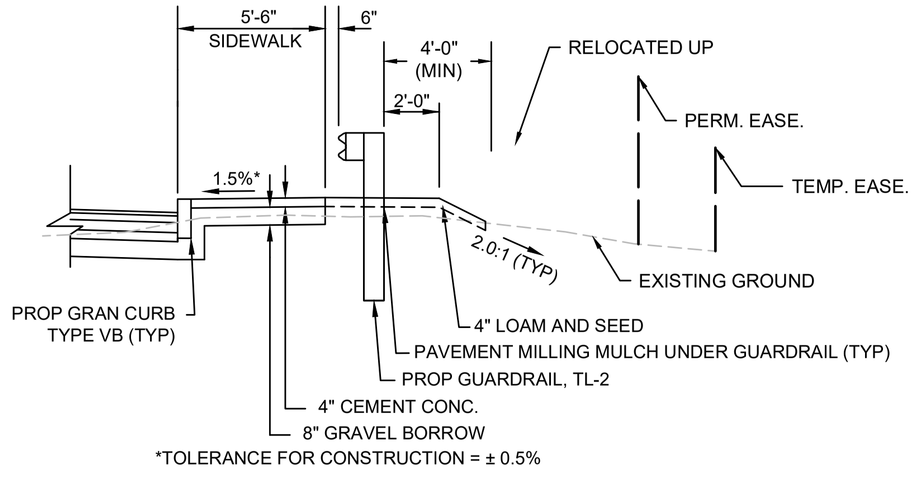
STA. 207+00 TO 211+60
SCALE: 1"=4'

*TOLERANCE FOR CONSTRUCTION = ± 0.5%
** FROM STA 210+58 TO 211+60
***SUPERELEVATION FROM STA 206+65 TO 209+66 RT (SUPERELEVATED SIDE)
SEE GRADING PLANS FOR MORE DETAIL



ROUTE 38 (MAIN STREET)

STA. 203+55 TO 207+00
SCALE: 1"=4'



TYPICAL GUARDRAIL WITH SIDEWALK

STA. 206+71 RT - 209+05 RT
STA. 216+75 RT - 218+34 RT
STA. 217+61 LT - 218+33 LT
STA. 216+75 RT - 218+34 RT
STA. 236+88 RT - 53+00 RT
STA. 40+29 LT - 41+30 LT
STA. 52+16 LT - 52+84 LT
STA. 252+13 RT - 252+89 RT
STA. 253+50 RT - 257+92 RT
STA. 260+14 LT - 260+73 LT
STA. 260+78 RT - 261+38 RT
STA. 274+93 RT - 276+14 RT
STA. 316+37 LT - 317+62 LT

SCALE: 1"=4'

PAVEMENT NOTES

PROPOSED FULL DEPTH RECONSTRUCTION

SURFACE: 1.75" SUPERPAVE SURFACE COURSE 12.5 POLYMER (SSC-12.5-P) OVER ASPHALT EMULSION FOR TACK COAT (RS-1H) OVER 1.75" SUPERPAVE INTERMEDIATE COURSE 12.5 POLYMER (SIC-12.5-P) OVER ASPHALT EMULSION FOR TACK COAT (RS-1H) OVER

INTERMEDIATE COURSE: 2.5" SUPERPAVE INTERMEDIATE COURSE 19.0 (SIC-19.0) OVER ASPHALT EMULSION FOR TACK COAT (RS-1H) OVER

BASE COURSE: 4.5" SUPERPAVE BASE COURSE 37.5 (SBC-37.5) PLACED IN ONE COURSE

SUBBASE: 4" DENSE GRADED CRUSHED STONE FOR SUBBASE (COMPACTED) OVER 8" GRAVEL BORROW (TYPE B)(COMPACTED)

PROPOSED BRIDGE PAVEMENT

SURFACE: 1.75" SUPERPAVE SURFACE COURSE 12.5 POLYMER (SSC-B-12.5-P) OVER ASPHALT EMULSION FOR TACK COAT (RS-1H) OVER 1.75" SUPERPAVE INTERMEDIATE COURSE 12.5 POLYMER (SIC-12.5-P)

SUBBASE: OVER 8" GRAVEL BORROW (TYPE B)(COMPACTED)(DEPTH VARIES)

PROPOSED PAVEMENT MILLING & RESURFACING

SURFACE: 1.75" SUPERPAVE SURFACE COURSE 12.5 POLYMER (SSC-12.5-P) OVER ASPHALT EMULSION FOR TACK COAT (RS-1H) OVER 1.75" SUPERPAVE INTERMEDIATE COURSE 12.5 POLYMER (SIC-12.5-P) OVER

ASPHALT EMULSION FOR TACK COAT (RS-1H) OVER MILLED SURFACE.

MILLING: 3.5" PAVEMENT STANDARD MILLING

PROPOSED MILLING & STRUCTURAL OVERLAY

SURFACE: 1.75" SUPERPAVE SURFACE COURSE 12.5 POLYMER (SSC-12.5-P) OVER ASPHALT EMULSION FOR TACK COAT (RS-1H) OVER 1.75" SUPERPAVE INTERMEDIATE COURSE 12.5 POLYMER (SIC-12.5-P) OVER

ASPHALT EMULSION FOR TACK COAT (RS-1H) OVER MILLED SURFACE.

MILLING: 3" PAVEMENT STANDARD MILLING

PROPOSED FULL DEPTH RECONSTRUCTION LESS THAN 4 FEET WIDE

SURFACE: 1.75" SUPERPAVE SURFACE COURSE 12.5 POLYMER (SSC-12.5-P) OVER ASPHALT EMULSION FOR TACK COAT (RS-1H) OVER 1.75" SUPERPAVE INTERMEDIATE COURSE 12.5 POLYMER (SIC-12.5-P) OVER ASPHALT EMULSION FOR TACK COAT (RS-1H) OVER

BASE COURSE: 6" HIGH EARLY STRENGTH CEMENT CONCRETE BASE COURSE OVER

SUBBASE: 8" GRAVEL BORROW (TYPE B)

PROPOSED TEMPORARY TRENCH PATCHES

SURFACE: 1.75" SUPERPAVE SURFACE COURSE 12.5 (SSC-12.5)

INTERMEDIATE COURSE: 1.75" SUPERPAVE INTERMEDIATE COURSE 12.5 (SIC-12.5)

SUBBASE: SUITABLE BACKFILL COMPACTED

PROPOSED CEMENT CONCRETE WALK/ WHEELCHAIR RAMP

SURFACE: 4" CEMENT CONCRETE (AIR ENTRAINED 4000 PSI, 3/4", 610)

FOUNDATION: 8" GRAVEL BORROW (TYPE B)

PROPOSED HMA DRIVEWAY

SURFACE: 4" SUPERPAVE (1.5" SUPERPAVE SURFACE COURSE - 9.5 (SSC-9.5) OVER 2.5" SUPER PAVE SURFACE COURSE - 12.5 (SSC-12.5))

SUBBASE: 8" GRAVEL BORROW (TYPE B)

PROPOSED HMA WALK SURFACE

SURFACE: 3" SUPERPAVE (1.25" SUPERPAVE SURFACE COURSE - 9.5 (SSC-9.5) OVER 1.75" SUPER PAVE SURFACE COURSE - 12.5 (SSC-12.5))

SUBBASE: 8" GRAVEL BORROW (TYPE B)

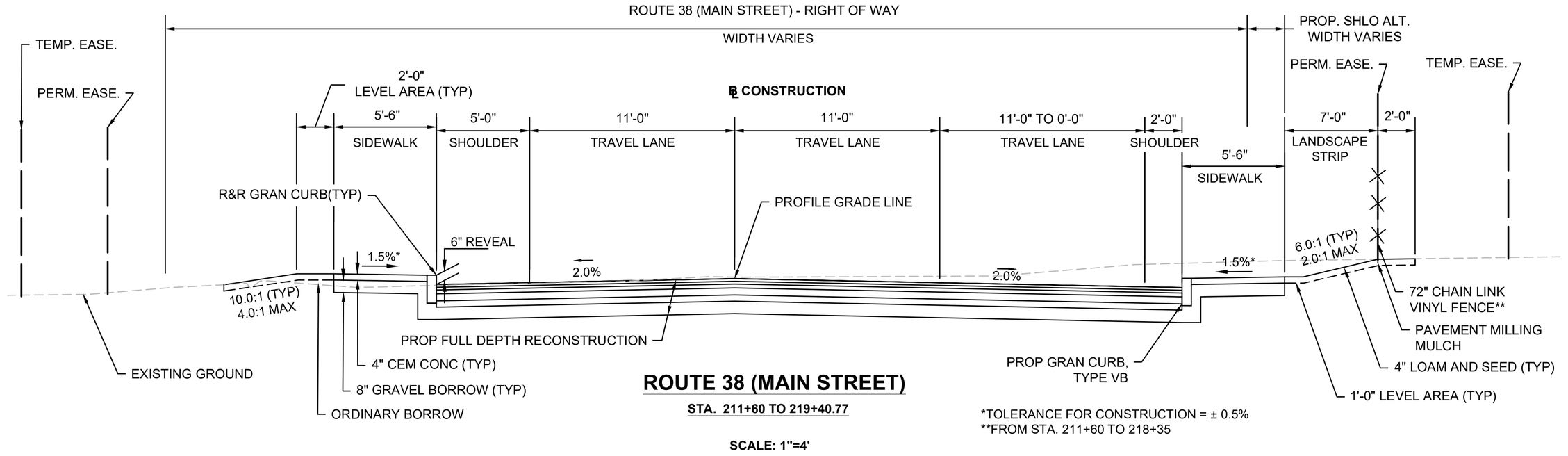
NOTE:
1. TACK COAT SHALL BE APPLIED BETWEEN PAVEMENT LAYERS AT A RATE PER THE LATEST MASSDOT STANDARD SPECIFICATION SUBSECTION 450.
2. TEMPORARY TRENCH PATCHES ARE PAID UNDER ITEM 472 TEMPORARY ASPHALT PATCHING.

608051_HD05(TYPICAL SECTIONS).DWG Plotted on 12-Mar-2025 2:28 PM
Proposal No. 608051 - 132406
A00860 - 131

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	16	391
PROJECT FILE NO.	608051		

TYPICAL SECTIONS - 2

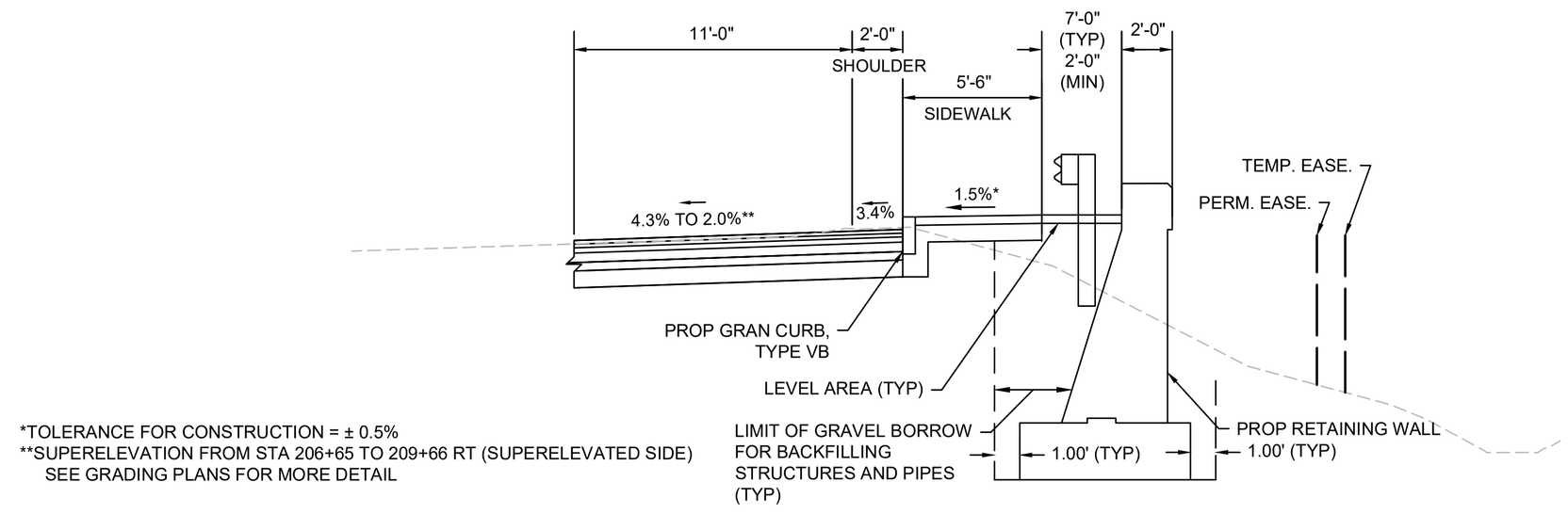


ROUTE 38 (MAIN STREET)

STA. 211+60 TO 219+40.77

SCALE: 1"=4'

*TOLERANCE FOR CONSTRUCTION = ± 0.5%
**FROM STA. 211+60 TO 218+35

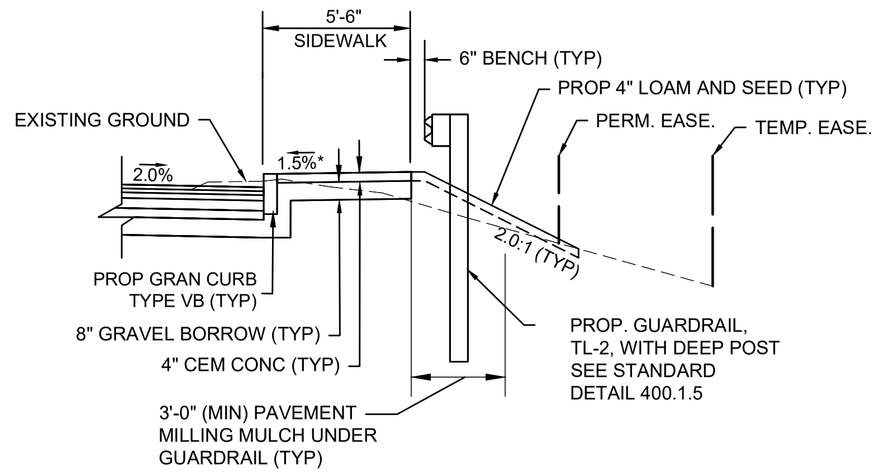


*TOLERANCE FOR CONSTRUCTION = ± 0.5%
**SUPERELEVATION FROM STA 206+65 TO 209+66 RT (SUPERELEVATED SIDE)
SEE GRADING PLANS FOR MORE DETAIL

ROUTE 38 (MAIN STREET)

STA. 207+22 TO 209+00

SCALE: 1"=4'



TYPICAL GUARDRAIL WITH DEEP POST AND SIDEWALK

STA. 217+77 TO 217+96 LT & RT
STA. 237+00 TO 240+75 RT
STA. 253+30 TO 257+92 RT
STA. 260+78 TO 261+38 RT

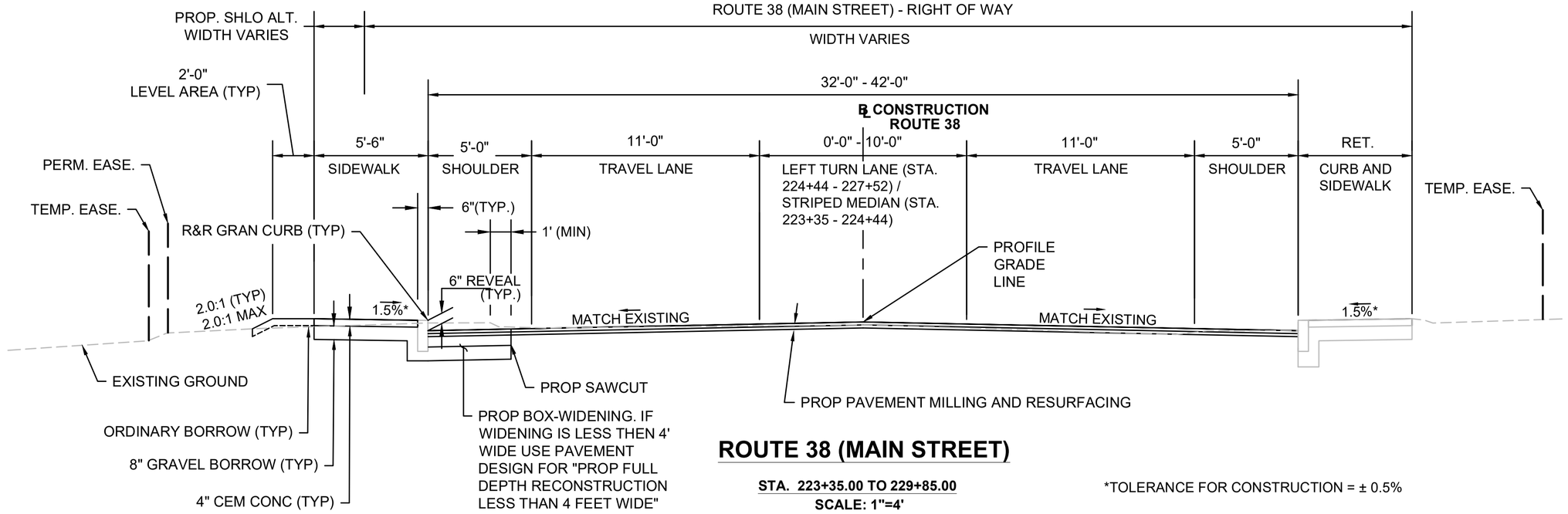
SCALE: 1"=4'

608051_HD05(TYPICAL SECTIONS).DWG Plotted on 12-Mar-2025 2:28 PM
Proposal No. 608051 - 132406
A00860 - 132

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	17	391
PROJECT FILE NO.	608051		

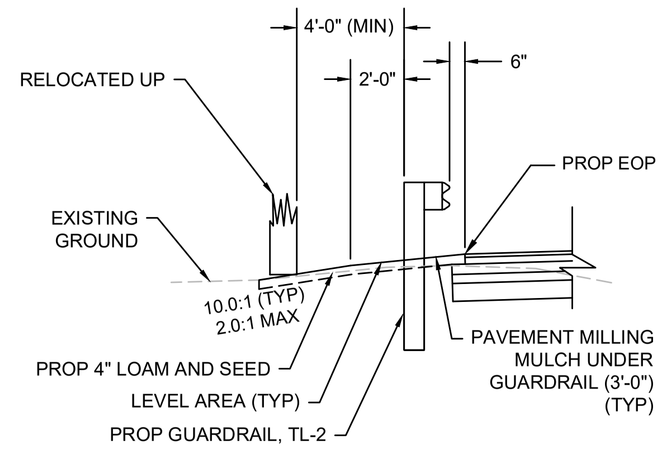
TYPICAL SECTIONS - 3



ROUTE 38 (MAIN STREET)

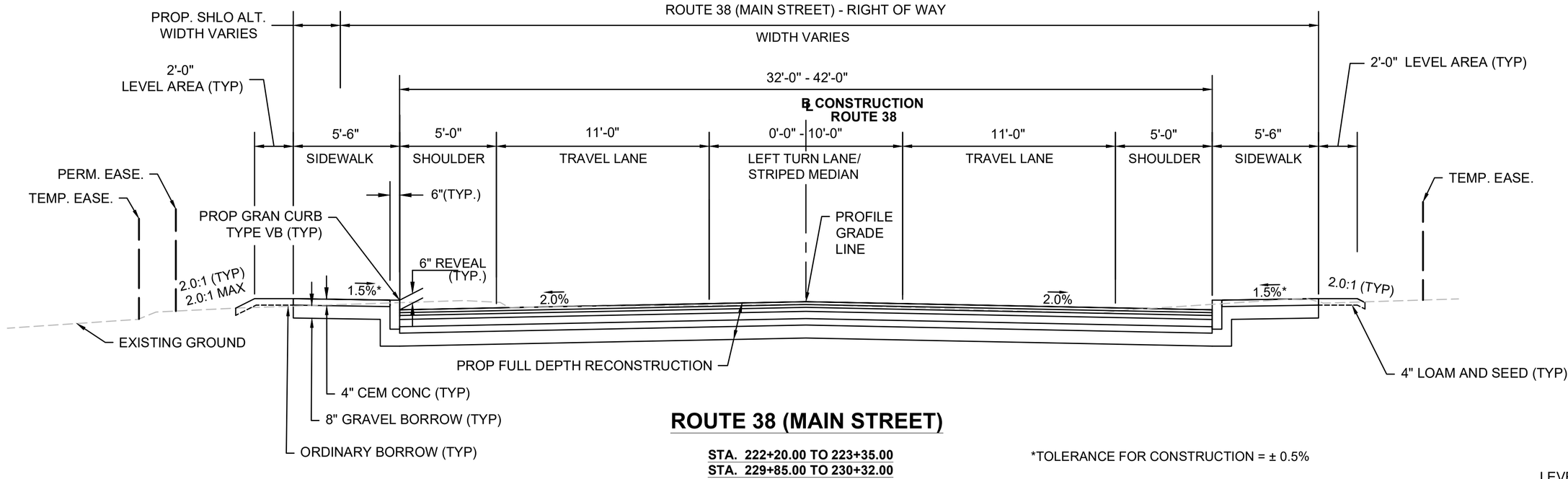
STA. 223+35.00 TO 229+85.00
SCALE: 1"=4'

*TOLERANCE FOR CONSTRUCTION = ± 0.5%



TYPICAL GUARDRAIL AT EOP

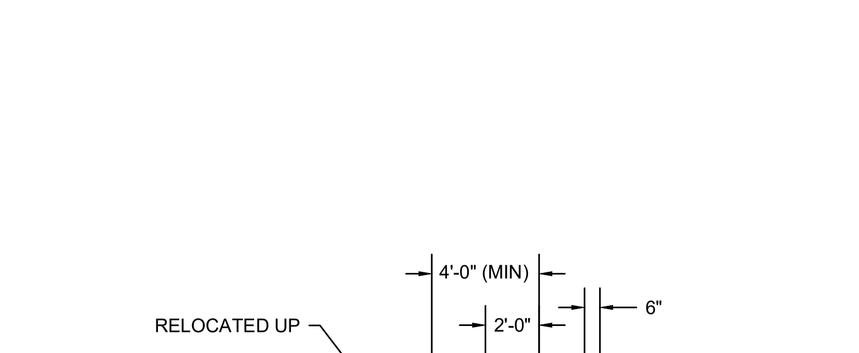
STA 248+24 TO 255+50 LT
SCALE: 1"=4'



ROUTE 38 (MAIN STREET)

STA. 222+20.00 TO 223+35.00
STA. 229+85.00 TO 230+32.00
STA. 238+50.00 TO 245+00.00
SCALE: 1"=4'

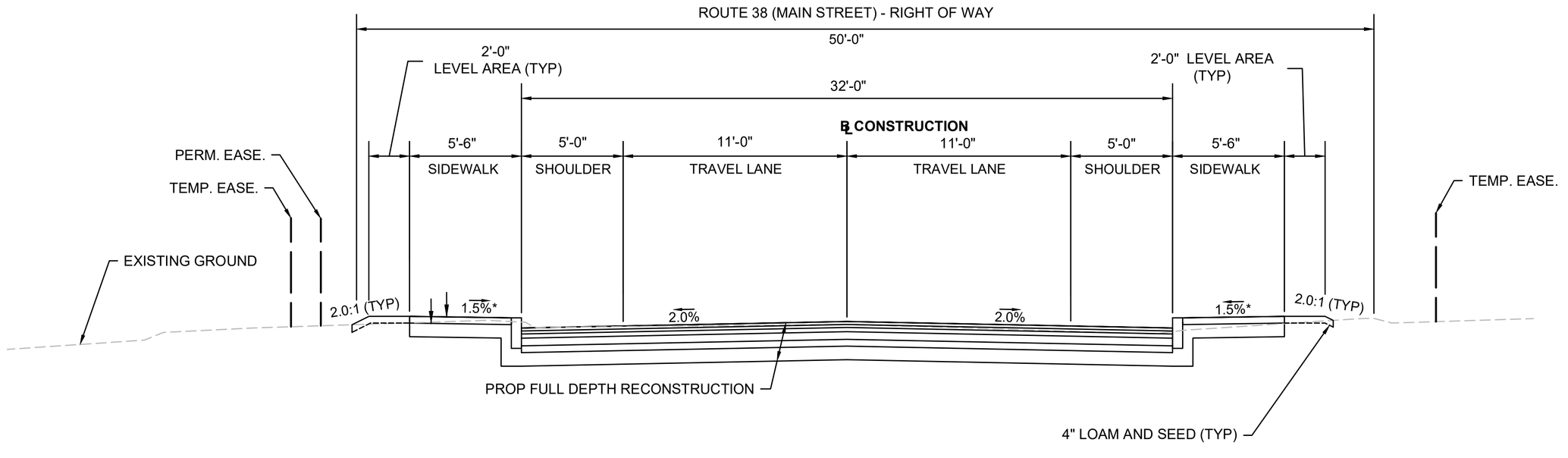
*TOLERANCE FOR CONSTRUCTION = ± 0.5%



**SEE MASSDOT CONSTRUCTION STANDARD DETAILS 400.5.1

TYPICAL GUARDRAIL AT FACE OF CURB

STA. 236+36 TO 240+81 LT
SCALE: 1"=4'



ROUTE 38 (MAIN STREET)

STA. 219+40.77 TO 222+20.00
STA. 230+32.00 TO 238+50.00
STA. 245+00.00 TO 248+18.00
SCALE: 1"=4'

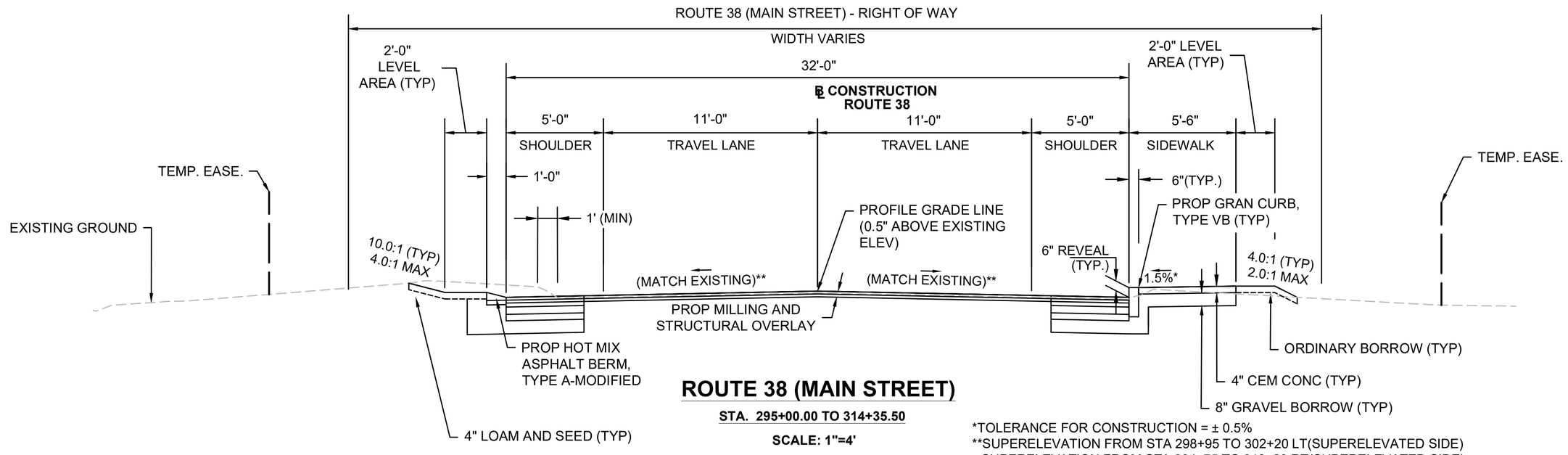
*TOLERANCE FOR CONSTRUCTION = ± 0.5%

608051_HD05(TYPICAL SECTIONS).DWG Plotted on 12-Mar-2025 2:28 PM
Proposal No. 608051 - 132406
A008860 - 133

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	18	391
PROJECT FILE NO.	608051		

TYPICAL SECTIONS - 4

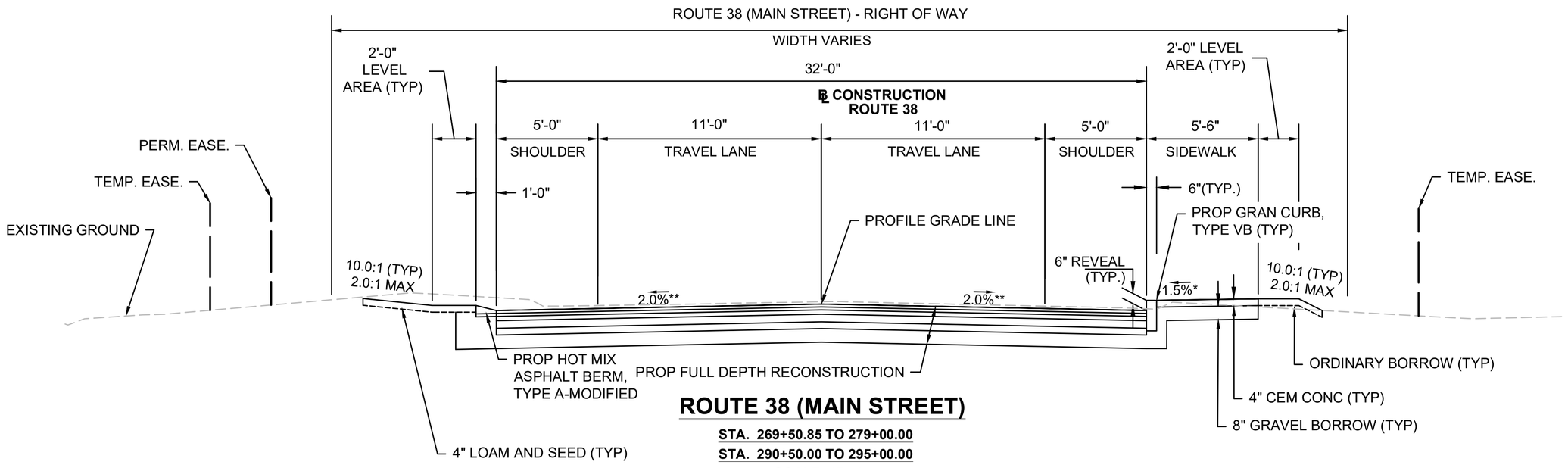


ROUTE 38 (MAIN STREET)

STA. 295+00.00 TO 314+35.50

SCALE: 1"=4'

*TOLERANCE FOR CONSTRUCTION = ± 0.5%
**SUPERELEVATION FROM STA 298+95 TO 302+20 LT(SUPERELEVATED SIDE)
SUPERELEVATION FROM STA 304+75 TO 312+20 RT(SUPERELEVATED SIDE)

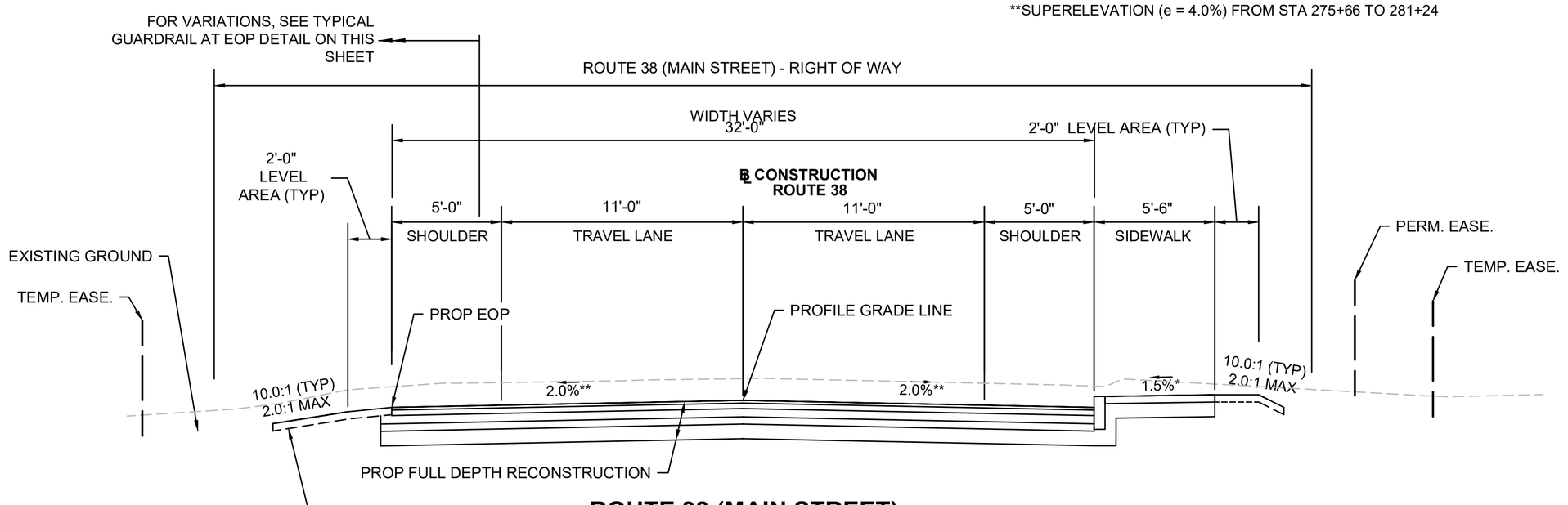


ROUTE 38 (MAIN STREET)

STA. 269+50.85 TO 279+00.00
STA. 290+50.00 TO 295+00.00

SCALE: 1"=4'

*TOLERANCE FOR CONSTRUCTION = ± 0.5%
**SUPERELEVATION (e = 4.0%) FROM STA 275+66 TO 281+24

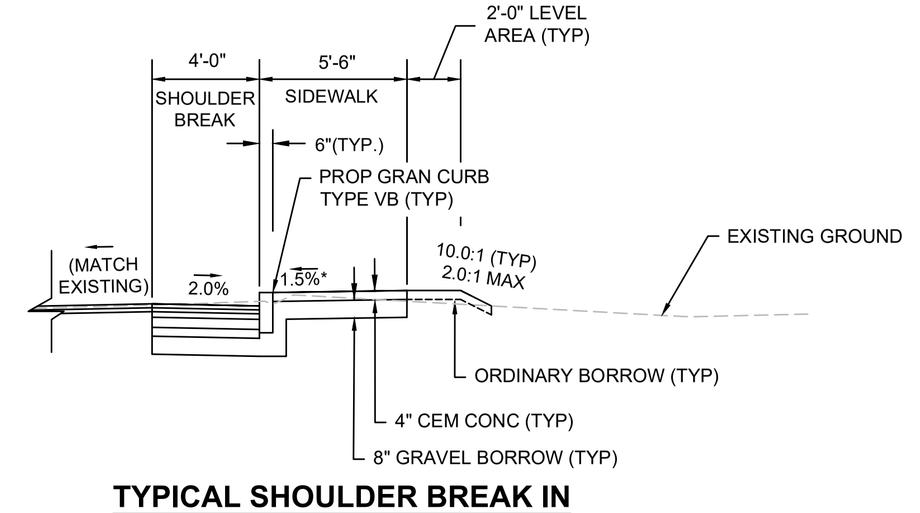


ROUTE 38 (MAIN STREET)

STA. 248+18.00 TO 253+50.00***
STA. 253+50.00 TO 254+00.00***
STA. 254+00.00 TO 261+38.00
STA. 279+00.00 TO 290+50.00

SCALE: 1"=4'

*TOLERANCE FOR CONSTRUCTION = ± 0.5%
**FULL SUPERELEVATION (e = 4.0%) FROM STA 250+65 TO 258+24
***REFER TO BRIDGE PLANS FOR TYPICAL SECTION AT THE MAPLE MEADOW BROOK BRIDGE



TYPICAL SHOULDER BREAK IN SUPERELEVATED SECTION

STA 298+95 TO 302+20 LT (NO SIDEWALK)
STA 302+75 TO 312+20 RT
STA 313+90 TO 318+70 LT

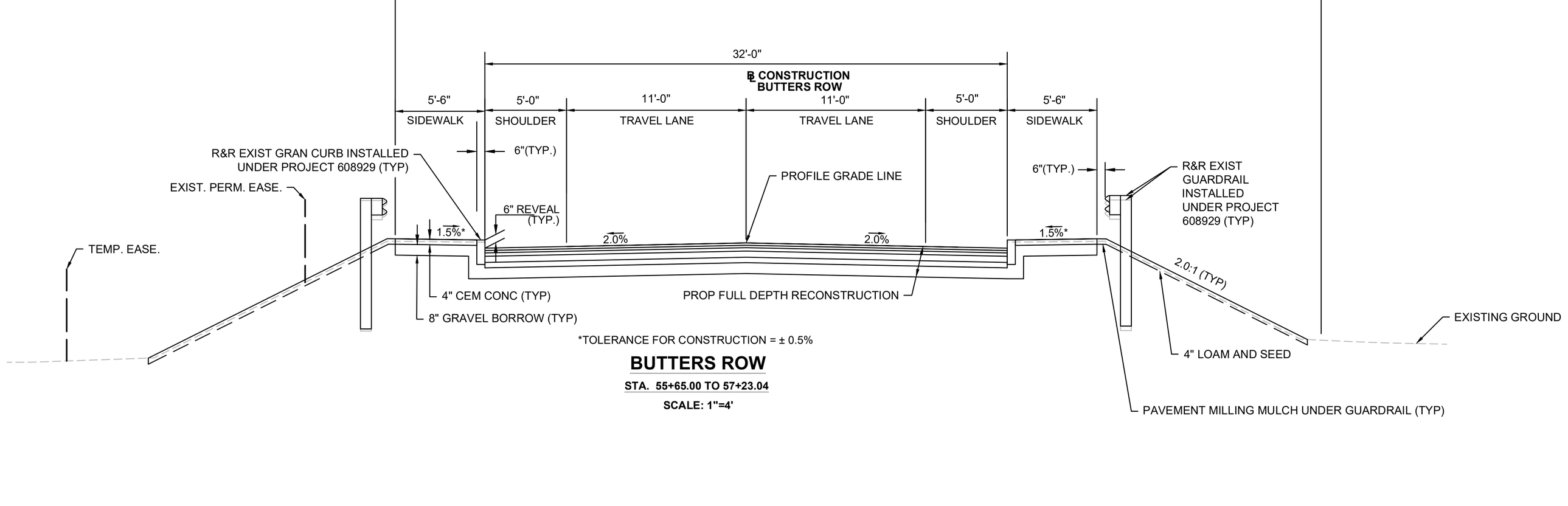
SCALE: 1"=4'

608051_HD05(TYPICAL SECTIONS).DWG Plotted on 12-Mar-2025 2:28 PM
Proposal No. 608051 - 132406
A00860 - 134

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	19	391
PROJECT FILE NO.	608051		

TYPICAL SECTIONS - 5

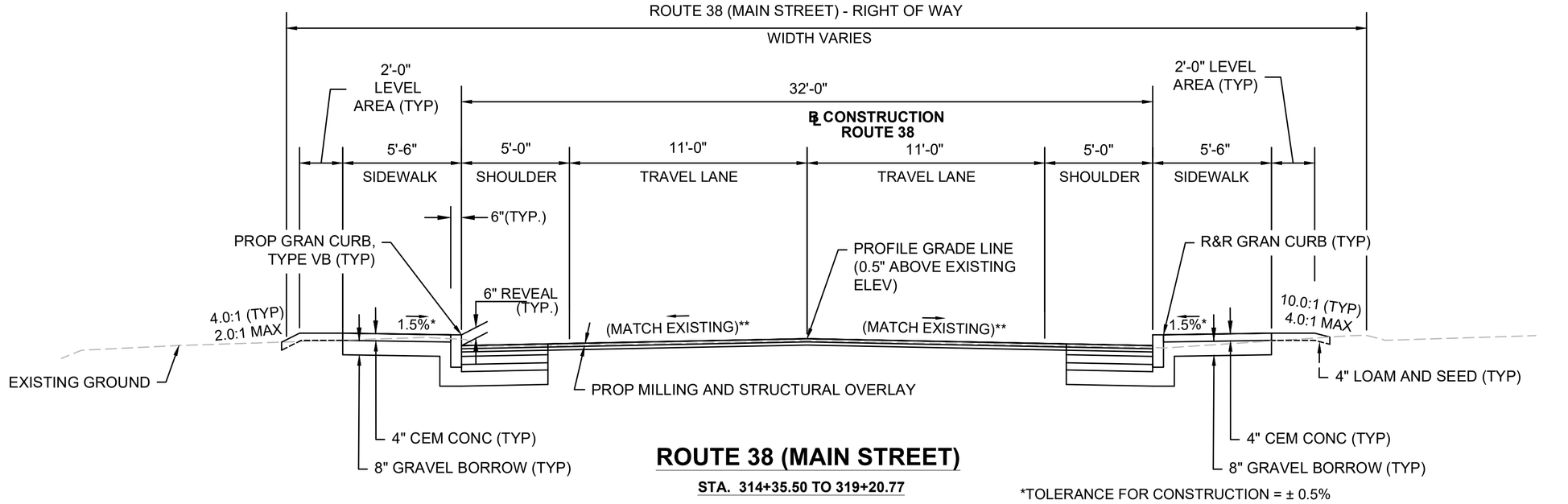


*TOLERANCE FOR CONSTRUCTION = ± 0.5%

BUTTERS ROW

STA. 55+65.00 TO 57+23.04

SCALE: 1"=4'



ROUTE 38 (MAIN STREET)

STA. 314+35.50 TO 319+20.77

SCALE: 1"=4'

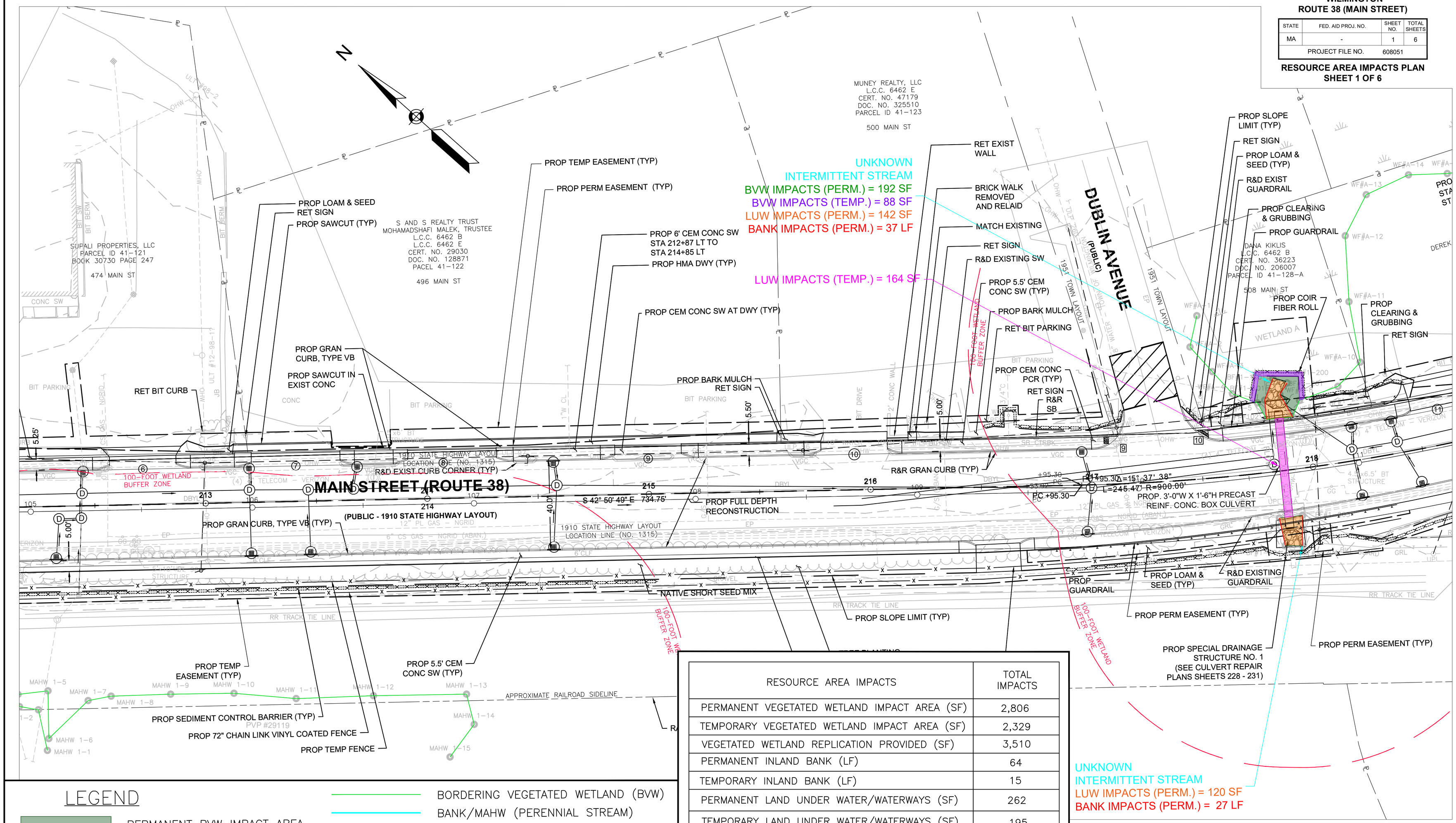
*TOLERANCE FOR CONSTRUCTION = ± 0.5%
**SUPERELEVATION FROM STA 313+90 TO 318+70 LT(SUPERELEVATED SIDE)

608051_HD05(TYPICAL SECTIONS).DWG Plotted on 12-Mar-2025 2:28 PM
Proposal No. 608051 - 132406
A00860 - 135

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	1	6
PROJECT FILE NO.	608051		

RESOURCE AREA IMPACTS PLAN
SHEET 1 OF 6



LEGEND

- PERMANENT BVW IMPACT AREA
- TEMPORARY BVW IMPACT AREA
- TEMPORARY LUW IMPACT AREA
- BVW REPLICATION AREA
- BLSF IMPACT AREA
- PERMANENT LUW IMPACT AREA
- BORDERING VEGETATED WETLAND (BVW)
- BANK/MAHW (PERENNIAL STREAM)
- BANK (INTERMITTENT STREAM)
- 100-FOOT BUFFER ZONE
- 200-FOOT RIVERFRONT AREA
- PERMANENT BANK IMPACT
- TEMPORARY BANK IMPACT
- 100-YEAR FLOODPLAIN (BLSF) LINE
- COMPOST FILTER TUBE

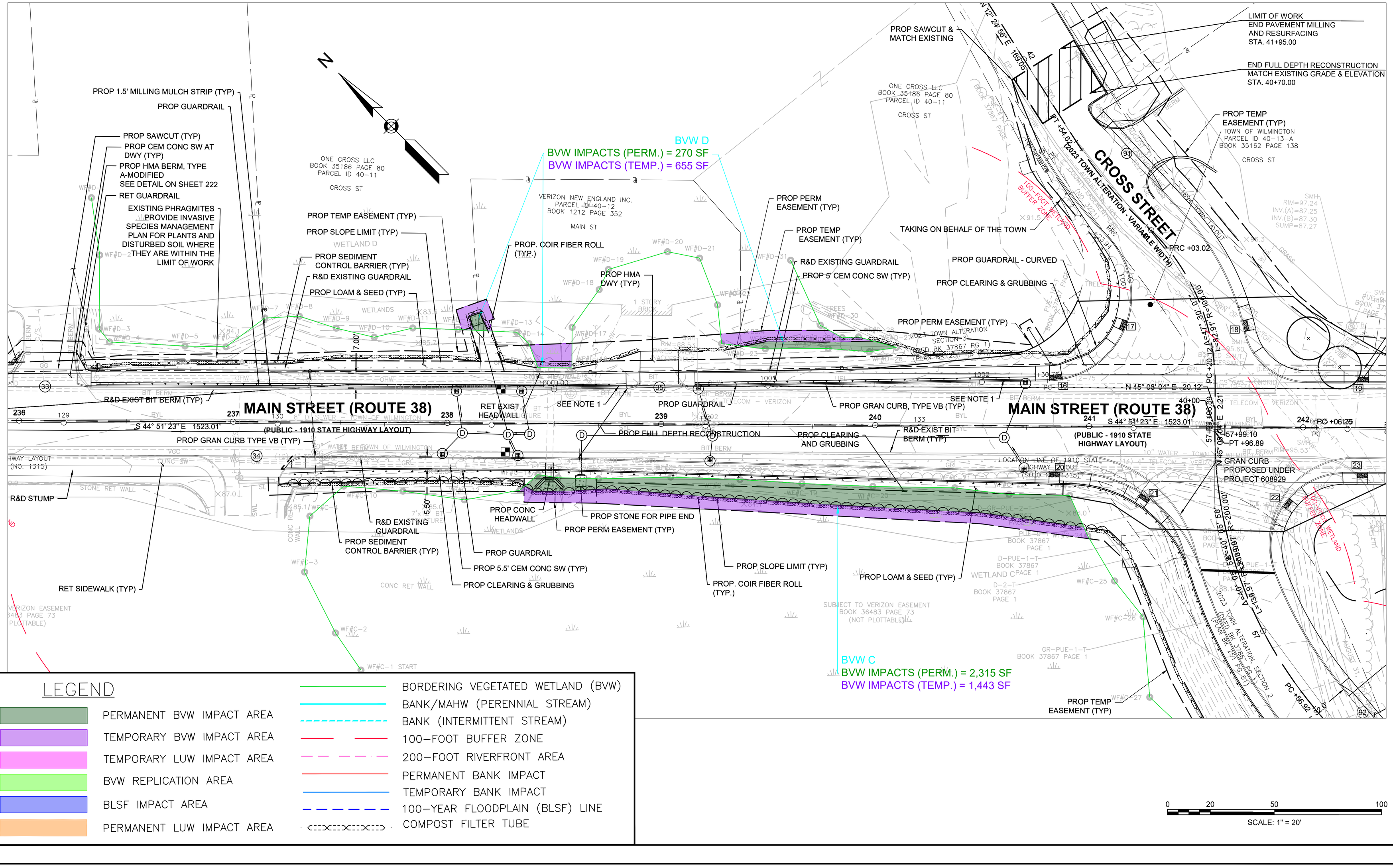
RESOURCE AREA IMPACTS	TOTAL IMPACTS
PERMANENT VEGETATED WETLAND IMPACT AREA (SF)	2,806
TEMPORARY VEGETATED WETLAND IMPACT AREA (SF)	2,329
VEGETATED WETLAND REPLICATION PROVIDED (SF)	3,510
PERMANENT INLAND BANK (LF)	64
TEMPORARY INLAND BANK (LF)	15
PERMANENT LAND UNDER WATER/WATERWAYS (SF)	262
TEMPORARY LAND UNDER WATER/WATERWAYS (SF)	195
RIVERFRONT AREA (SF)	71,960
0-100 (SF)	50,357
100-200 (SF)	21,603
BUFFER ZONES (SF)	189,596
BORDERING LAND SUBJECT TO FLOODING (SF)	6,815
COMPENSATORY FLOOD STORAGE PROVIDED (SF/CF)	4,261/4,161

RESOURCE AREA IMPACTS PLANS.DWG Plotted on 12-Mar-2025 8:58 AM
Proposal No. 608051 - 132406
A00860 - 136

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	2	6
PROJECT FILE NO.	608051		

RESOURCE AREA IMPACTS PLAN
SHEET 2 OF 6



LEGEND

- PERMANENT BVW IMPACT AREA
- TEMPORARY BVW IMPACT AREA
- TEMPORARY LUW IMPACT AREA
- BVW REPLICATION AREA
- BLSF IMPACT AREA
- PERMANENT LUW IMPACT AREA
- BORDERING VEGETATED WETLAND (BVW)
- BANK/MAHW (PERENNIAL STREAM)
- BANK (INTERMITTENT STREAM)
- 100-FOOT BUFFER ZONE
- 200-FOOT RIVERFRONT AREA
- PERMANENT BANK IMPACT
- TEMPORARY BANK IMPACT
- 100-YEAR FLOODPLAIN (BLSF) LINE
- COMPOST FILTER TUBE

RESOURCE AREA IMPACTS PLANS.DWG Plotted on 12-Mar-2025 9:11 AM

Proposal No. 608051 - 132406

A00860 - 137

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	3	6
PROJECT FILE NO.	608051		

RESOURCE AREA IMPACTS PLAN
SHEET 3 OF 6

BVW C
BVW IMPACTS (PERM.) = 2,315 SF
BVW IMPACTS (TEMP.) = 1,443 SF

635 MAIN STREET OWNER LLC
AKA 635 MAIN STREET OWNER, LLC
BOOK 34786 PAGE 182
PARCEL ID 40-1
635 MAIN ST

JOHN C. OLSON
PARCEL ID 39-14
BOOK 23310 PAGE 186
673 MAIN ST

MIDDLESEX COUNTY
EASEMENT FOR HIGHWAY
PURPOSES
(BOOK 1178 PAGE 237)

JARID POLLEY AND
MARY POLLEY
BOOK 37173 PAGE 123
PARCEL ID 39-15
669 MAIN ST

ANDREA J. DELUCA
PARCEL ID 39-16
BOOK 18231 PAGE 111
665 MAIN ST

LEGEND

- PERMANENT BVW IMPACT AREA
- TEMPORARY BVW IMPACT AREA
- TEMPORARY LUW IMPACT AREA
- BVW REPLICATION AREA
- BLSF IMPACT AREA
- PERMANENT LUW IMPACT AREA
- BORDERING VEGETATED WETLAND (BVW)
- BANK/MAHW (PERENNIAL STREAM)
- BANK (INTERMITTENT STREAM)
- 100-FOOT BUFFER ZONE
- 200-FOOT RIVERFRONT AREA
- PERMANENT BANK IMPACT
- TEMPORARY BANK IMPACT
- 100-YEAR FLOODPLAIN (BLSF) LINE
- COMPOST FILTER TUBE

0 20 50 100
SCALE: 1" = 20'

RESOURCE AREA IMPACTS PLANS.DWG Plotted on 12-Mar-2025 9:13 AM

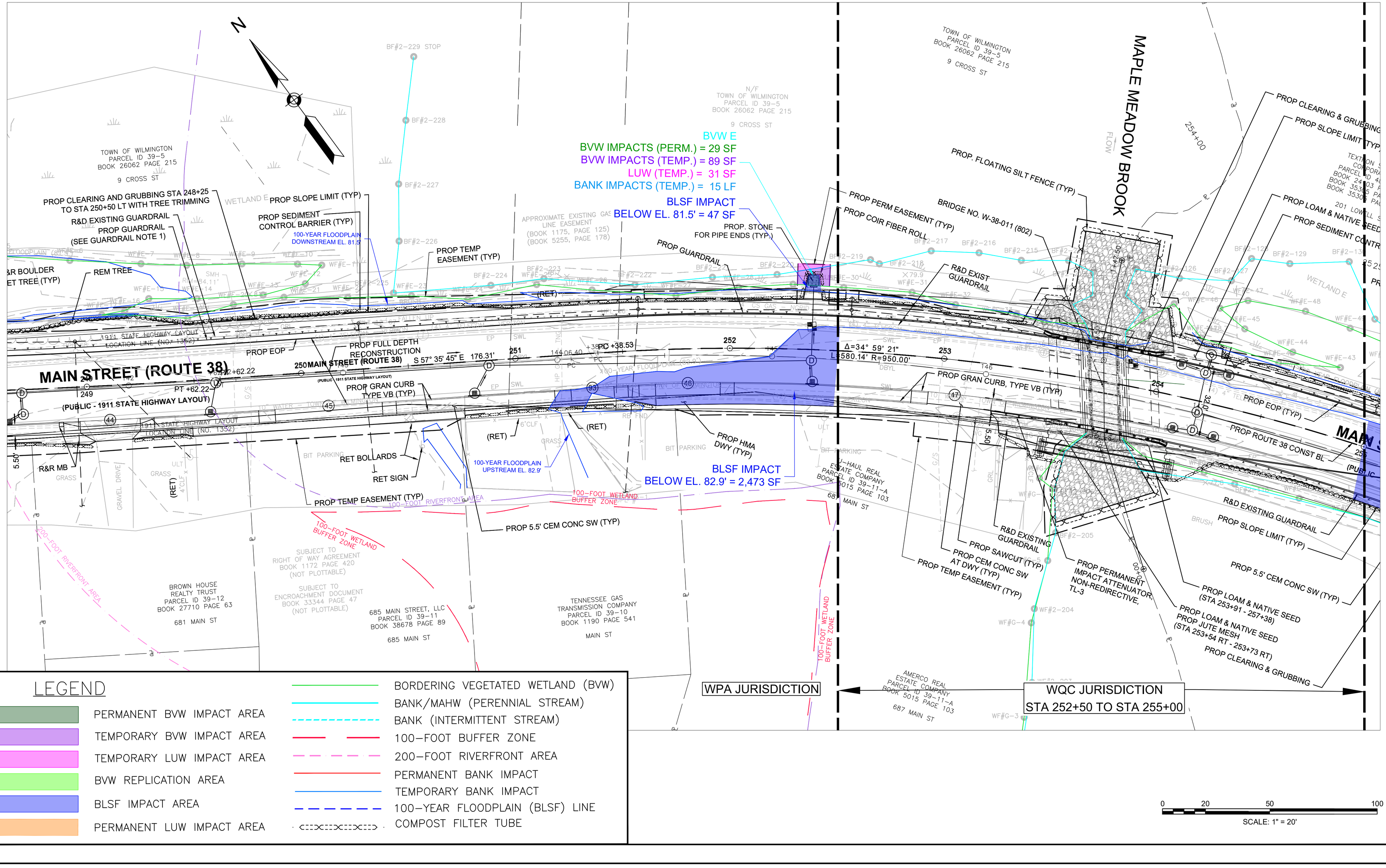
Proposal No. 608051 - 132406

A008640 - 138

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	4	6
PROJECT FILE NO.	608051		

RESOURCE AREA IMPACTS PLAN
SHEET 4 OF 6



LEGEND

- PERMANENT BVW IMPACT AREA
- TEMPORARY BVW IMPACT AREA
- TEMPORARY LUW IMPACT AREA
- BVW REPLICATION AREA
- BLSF IMPACT AREA
- PERMANENT LUW IMPACT AREA
- BORDERING VEGETATED WETLAND (BVW)
- BANK/MAHW (PERENNIAL STREAM)
- BANK (INTERMITTENT STREAM)
- 100-FOOT BUFFER ZONE
- 200-FOOT RIVERFRONT AREA
- PERMANENT BANK IMPACT
- TEMPORARY BANK IMPACT
- 100-YEAR FLOODPLAIN (BLSF) LINE
- COMPOST FILTER TUBE

RESOURCE AREA IMPACTS PLANS.DWG Plotted on 12-Mar-2025 9:19 AM
Proposal No. 608051 - 132406
A00860 - 139

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	5	6
PROJECT FILE NO.	608051		

RESOURCE AREA IMPACTS PLAN
SHEET 5 OF 6

TABLE 1 - UPSTREAM COMPENSATORY FLOOD STORAGE VOLUME TO BE COMPENSATED (100-YR FLOOD ELEVATION = 82.9)			
Elevation	**Cut Volume (CF)**	**Fill Volume (CF)**	**Incremental Net Cut/Fill Volume (CF)**
79-80	0	0	0
80-81	147	7	-140
81-82	1,804	925	-879
82-82.9	2,210	1,222	-988
Total	**4,161**	**2,155**	**-2,007**

PROP WETLAND REPLICATION AREA - 3,510 SF (SEE SHEET 212)

LIMIT OF REPLICATION AREA

PROP WETLAND REPLICATION AREA: SEE SHEET: ###

PROP HMA DWY (TYP)

100-YEAR FLOODPLAIN DOWNSTREAM EL. 81.5'

100-FOOT RIVERFRONT AREA

200-FOOT RIVERFRONT AREA

100-FOOT WETLAND BUFFER ZONE

PROP LOAM & SEED (TYP)

1911 STATE HIGHWAY LAYOUT LOCATION LINE (NO. 1352)

MAIN STREET (ROUTE 38)

PUBLIC - 1911 STATE HIGHWAY LAYOUT)

PROP GUARDRAIL

BLSF IMPACT BELOW EL. 82.9' = 4,295 SF

100-YEAR FLOODPLAIN UPSTREAM EL. 82.9'

REM TREE

COMPENSATORY FLOOD STORAGE AREA SEE SHEET: 219

R&D EXISTING GUARDRAIL

PROP GUARDRAIL

100-YEAR FLOODPLAIN ZONE II

PROP LOAM & SEED (TYP)

PROP COMPENSATORY FLOOD STORAGE AREA - 4,261 SF (SEE SHEET 213)

ACCESS EASEMENT BOOK 8868 PAGE 82 BOOK 38733 PAGE 145

SUBJECT TO RECIPROCAL EASEMENTS BOOK 37155 PAGE 258 (NOT PLOTTABLE)

N/F TOWN OF WILMINGTON BOOK 2299 PAGE 288 PARCEL ID 39-9 MAIN ST

TOWN OF WILMINGTON BOOK 2299 PAGE 288 PARCEL ID 39-9

WETLAND I

WETLAND J

EDGE OF WETLAND

TEMPORARY EASEMENT PARCEL 25-TE-6 SHLO 8859

PERMANENT EASEMENT PARCEL 25-PUE-1 SHLO 8859

LEGEND

- PERMANENT BVW IMPACT AREA
- TEMPORARY BVW IMPACT AREA
- TEMPORARY LUW IMPACT AREA
- BVW REPLICATION AREA
- BLSF IMPACT AREA
- PERMANENT LUW IMPACT AREA
- AREAS TO BE EXCAVATED
- BORDERING VEGETATED WETLAND (BVW)
- BANK/MAHW (PERENNIAL STREAM)
- BANK (INTERMITTENT STREAM)
- 100-FOOT BUFFER ZONE
- 200-FOOT RIVERFRONT AREA
- PERMANENT BANK IMPACT
- TEMPORARY BANK IMPACT
- 100-YEAR FLOODPLAIN (BLSF) LINE
- COMPOST FILTER TUBE
- COMPOST BLANKET AND WETLAND SEASONALLY FLOODED MIX
- 4" LOAM AND COMPOST BLANKET & SHORT GRASSLAND MIX

0 20 50 100
SCALE: 1" = 20'

608051_EV(IMPACT-PLANS).DWG Plotted on 12-Mar-2025 7:02 PM

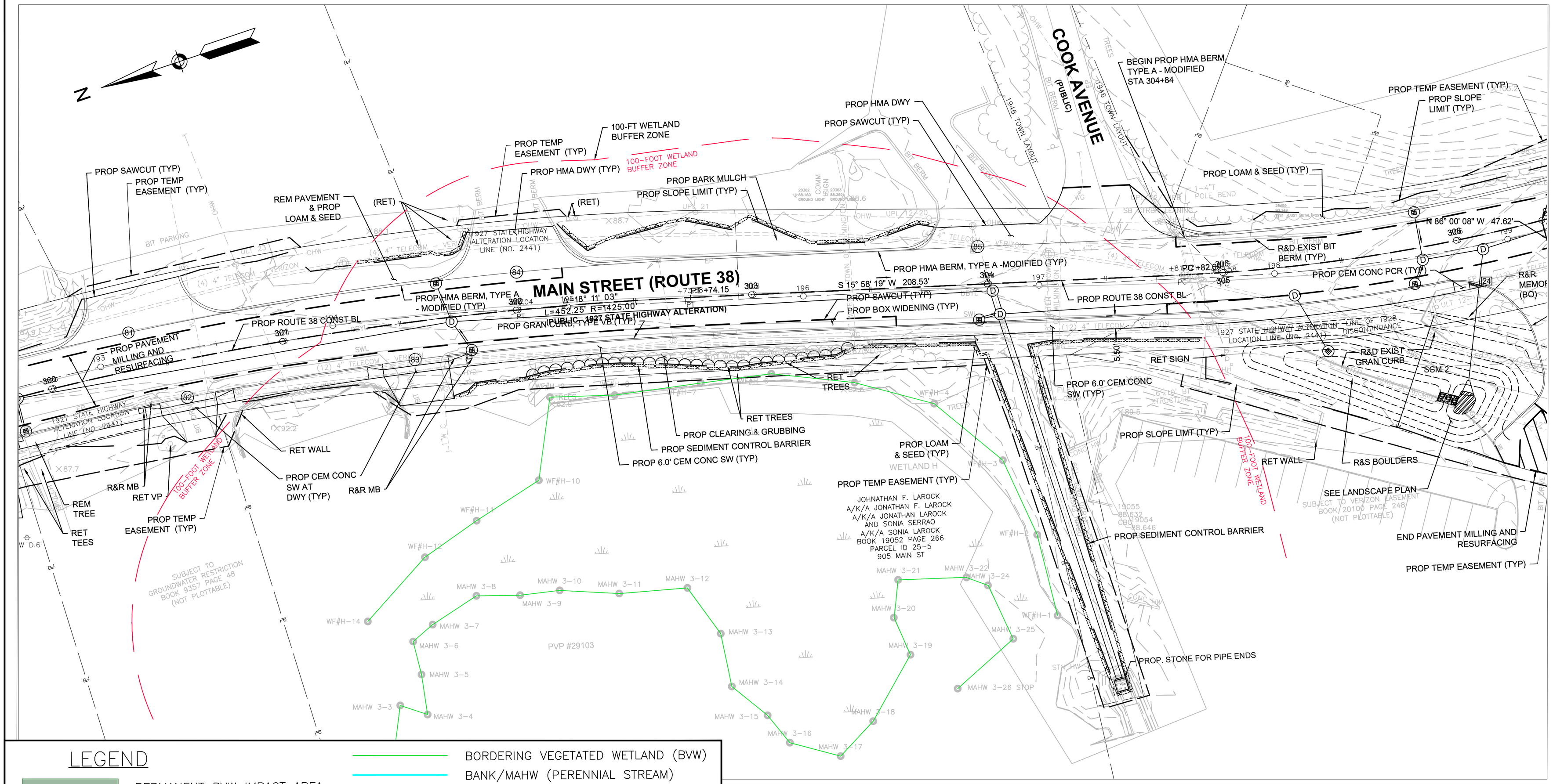
Proposal No. 608051 - 132406

A00860 - 140

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	6	6
PROJECT FILE NO.	608051		

RESOURCE AREA IMPACTS PLAN
SHEET 6 OF 6



LEGEND

- PERMANENT BVW IMPACT AREA
- TEMPORARY BVW IMPACT AREA
- TEMPORARY LUW IMPACT AREA
- BVW REPLICATION AREA
- BLSF IMPACT AREA
- PERMANENT LUW IMPACT AREA
- BORDERING VEGETATED WETLAND (BVW)
- BANK/MAHW (PERENNIAL STREAM)
- BANK (INTERMITTENT STREAM)
- 100-FOOT BUFFER ZONE
- 200-FOOT RIVERFRONT AREA
- PERMANENT BANK IMPACT
- TEMPORARY BANK IMPACT
- 100-YEAR FLOODPLAIN (BLSF) LINE
- COMPOST FILTER TUBE

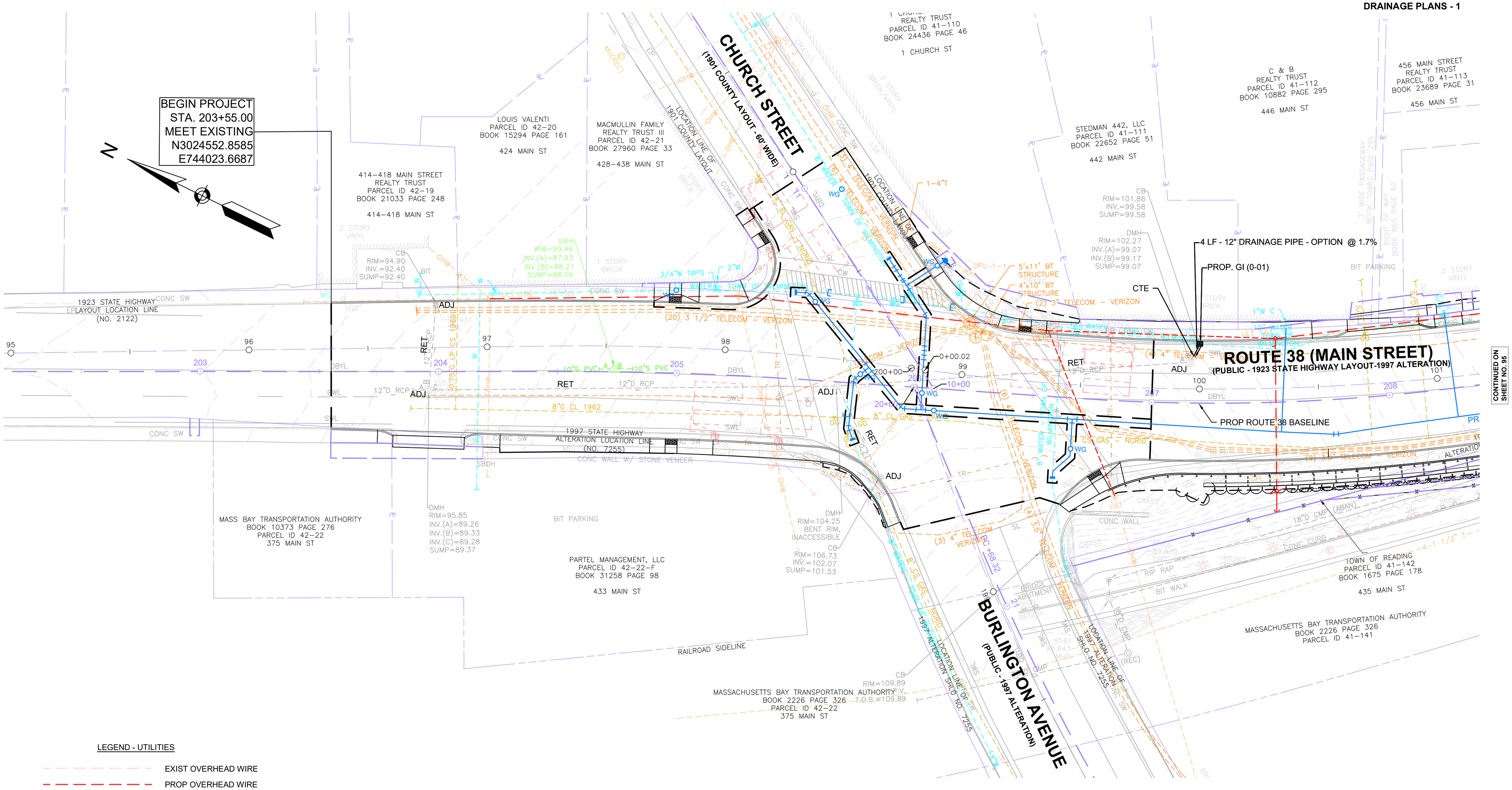
RESOURCE AREA IMPACTS PLANS.DWG Plotted on 12-Mar-2025 9:24 AM
Proposal No. 608051 - 132406
A008560 - 141

HIGHWAY GUARD DETAILS	TRAFFIC SIGNAL CONDUIT	WATER SUPPLY ALTERATIONS	DRAINAGE DETAILS	UTILITY PLAN
SEE SHEET 33	NONE	SEE SHEET 133	SEE BELOW	SEE SHEET 109

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	94	391
PROJECT FILE NO.	608051		

DRAINAGE PLANS - 1



LEGEND - UTILITIES

- EXIST OVERHEAD WIRE
- PROP OVERHEAD WIRE
- EXIST GAS-OIL-STEAM
- EXIST COMMUNICATION/CATV
- PROP COMMUNICATION/CATV
- EXIST SEWER
- PROP SEWER
- EXIST DRAINAGE
- PROP DRAINAGE
- EXIST POTABLE WATER
- PROP POTABLE WATER

0 20 50 100

SCALE: 1" = 20'

CONTINUED ON SHEET NO. 95

608051_UT03(DRAINAGE-PLANS).DWG Plotted on 13-Mar-2025 8:52 AM
Proposal No. 608051 - 132406
A008869 - 142

HIGHWAY GUARD DETAILS

SEE SHEET 33

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

SEE SHEET 133

DRAINAGE DETAILS

SEE BELOW

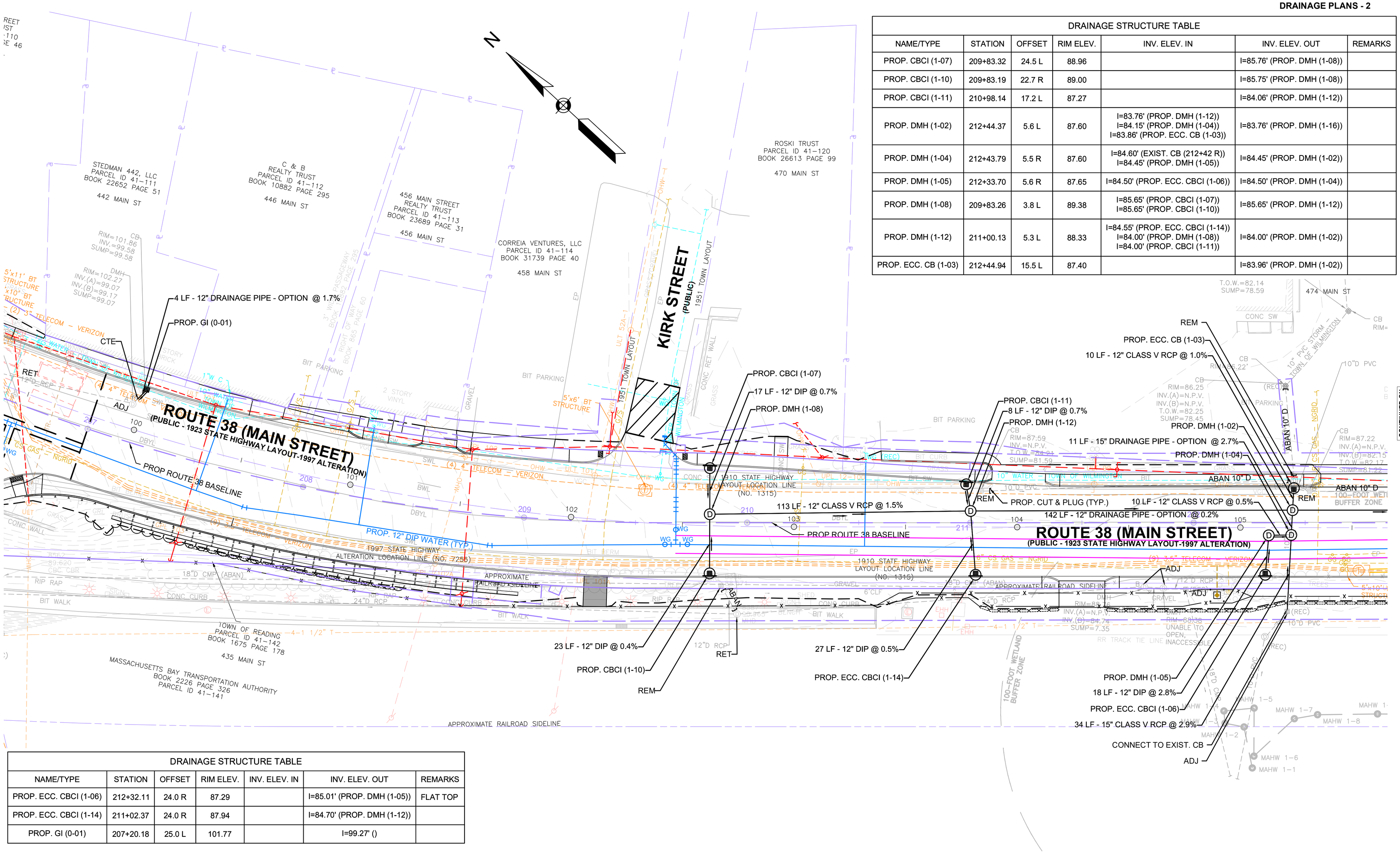
UTILITY PLAN

SEE SHEET 110

DRAINAGE PLANS
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	95	391
PROJECT FILE NO.	608051		

DRAINAGE PLANS - 2



DRAINAGE STRUCTURE TABLE						
NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
PROP. CBCI (1-07)	209+83.32	24.5 L	88.96		I=85.76' (PROP. DMH (1-08))	
PROP. CBCI (1-10)	209+83.19	22.7 R	89.00		I=85.75' (PROP. DMH (1-08))	
PROP. CBCI (1-11)	210+98.14	17.2 L	87.27		I=84.06' (PROP. DMH (1-12))	
PROP. DMH (1-02)	212+44.37	5.6 L	87.60	I=83.76' (PROP. DMH (1-12)) I=84.15' (PROP. DMH (1-04)) I=83.86' (PROP. ECC. CB (1-03))	I=83.76' (PROP. DMH (1-16))	
PROP. DMH (1-04)	212+43.79	5.5 R	87.60	I=84.60' (EXIST. CB (212+42 R)) I=84.45' (PROP. DMH (1-05))	I=84.45' (PROP. DMH (1-02))	
PROP. DMH (1-05)	212+33.70	5.6 R	87.65	I=84.50' (PROP. ECC. CBCI (1-06))	I=84.50' (PROP. DMH (1-04))	
PROP. DMH (1-08)	209+83.26	3.8 L	89.38	I=85.65' (PROP. CBCI (1-07)) I=85.65' (PROP. CBCI (1-10))	I=85.65' (PROP. DMH (1-12))	
PROP. DMH (1-12)	211+00.13	5.3 L	88.33	I=84.55' (PROP. ECC. CBCI (1-14)) I=84.00' (PROP. DMH (1-08)) I=84.00' (PROP. CBCI (1-11))	I=84.00' (PROP. DMH (1-02))	
PROP. ECC. CB (1-03)	212+44.94	15.5 L	87.40		I=83.96' (PROP. DMH (1-02))	

DRAINAGE STRUCTURE TABLE						
NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
PROP. ECC. CBCI (1-06)	212+32.11	24.0 R	87.29		I=85.01' (PROP. DMH (1-05))	FLAT TOP
PROP. ECC. CBCI (1-14)	211+02.37	24.0 R	87.94		I=84.70' (PROP. DMH (1-12))	
PROP. GI (0-01)	207+20.18	25.0 L	101.77		I=99.27' ()	

0 20 50 100

SCALE: 1" = 20'

608051_UT03(DRAINAGE-PLANS).DWG Plotted on 13-Mar-2025 8:52 AM

Proposal No. 608051 - 132406

A008600 - 143

HIGHWAY GUARD DETAILS

SEE SHEET 33

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

SEE SHEET 133

DRAINAGE DETAILS

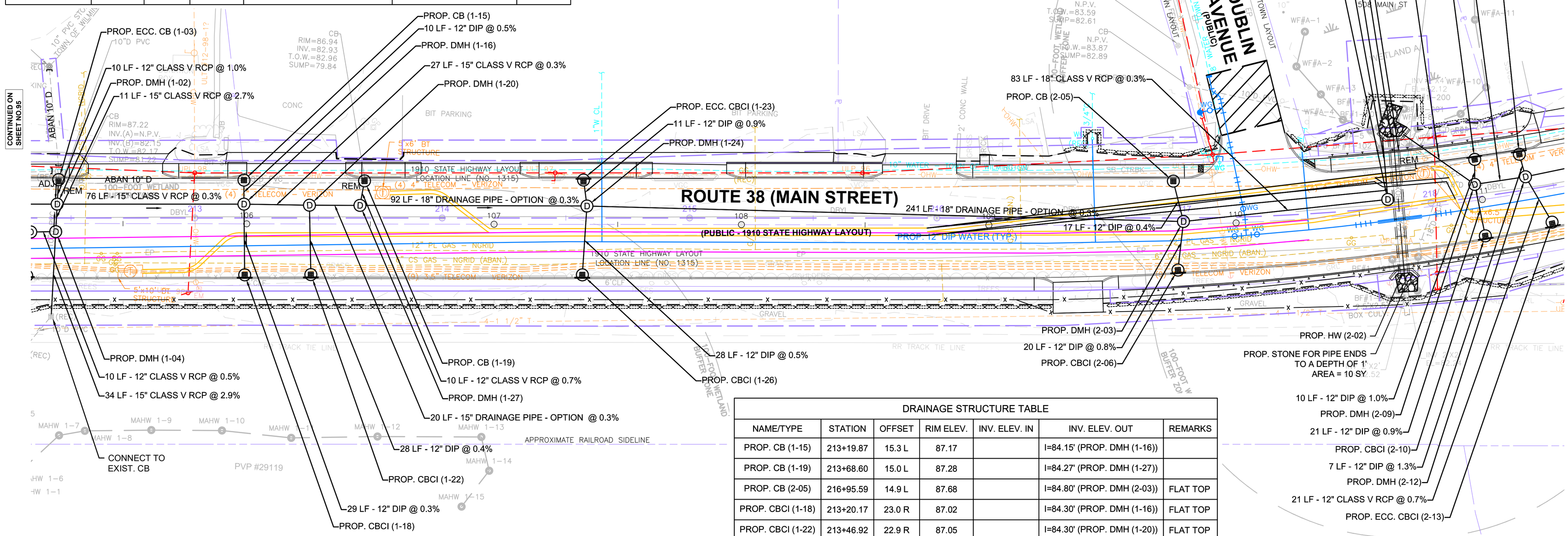
SEE BELOW

UTILITY PLAN

SEE SHEET 111

DRAINAGE STRUCTURE TABLE						
NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
PROP. DMH (1-02)	212+44.37	5.6 L	87.60	I=83.76' (PROP. DMH (1-12)) I=84.15' (PROP. DMH (1-04)) I=83.86' (PROP. ECC. CB (1-03))	I=83.76' (PROP. DMH (1-16))	
PROP. DMH (1-04)	212+43.79	5.5 R	87.60	I=84.60' (EXIST. CB (212+42 R)) I=84.45' (PROP. DMH (1-05))	I=84.45' (PROP. DMH (1-02))	
PROP. DMH (1-05)	212+33.70	5.6 R	87.65	I=84.50' (PROP. ECC. CBCI (1-06))	I=84.50' (PROP. DMH (1-04))	
PROP. DMH (1-16)	213+19.88	5.6 L	87.36	I=83.54' (PROP. DMH (1-02)) I=84.10' (PROP. CB (1-15)) I=84.20' (PROP. CBCI (1-18))	I=83.54' (PROP. DMH (1-20))	
PROP. DMH (1-20)	213+46.38	5.2 L	87.40	I=83.47' (PROP. DMH (1-16)) I=84.20' (PROP. CBCI (1-22))	I=83.47' (PROP. DMH (1-27))	
PROP. DMH (1-24)	214+58.54	4.9 L	87.92	I=84.75' (PROP. CBCI (1-26)) I=83.12' (PROP. DMH (1-27)) I=84.64' (PROP. ECC. CBCI (1-23))	I=83.12' (PROP. DMH (2-03))	
PROP. DMH (1-27)	213+66.78	5.1 L	87.47	I=83.41' (PROP. DMH (1-20)) I=84.20' (PROP. CB (1-19))	I=83.41' (PROP. DMH (1-24))	
PROP. DMH (2-02)	217+82.74	3.3 L	87.55	I=82.17' (PROP. DMH (2-03))	I=82.17' ()	
PROP. DMH (2-03)	216+99.68	1.4 R	87.93	I=84.74' (PROP. CB (2-05)) I=82.39' (PROP. DMH (1-24)) I=82.95' (PROP. CBCI (2-06))	I=82.39' (PROP. DMH (2-02))	
PROP. DMH (2-12)	218+39.42	5.2 L	87.45	I=84.00' (PROP. ECC. CBCI (2-13)) I=83.40' (PROP. CBCI (2-11)) I=82.36' (PROP. DMH (2-15))	I=82.36' (PROP. DMH (2-09))	

DRAINAGE STRUCTURE TABLE						
NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
PROP. ECC. CB (1-03)	212+44.94	15.5 L	87.40		I=83.96' (PROP. DMH (1-02))	
PROP. ECC. CBCI (1-06)	212+32.11	24.0 R	87.29		I=85.01' (PROP. DMH (1-05))	FLAT TOP
PROP. ECC. CBCI (1-23)	214+57.13	16.0 L	87.69		I=84.74' (PROP. DMH (1-24))	FLAT TOP
PROP. ECC. CBCI (2-13)	218+46.95	14.6 R	87.26		I=84.15' (PROP. DMH (2-12))	
PROP. HW (2-01)	217+87.51	26.9 L	85.95	I=82.12' ()		
PROP. HW (2-02)	217+86.35	26.1 R	0.00			



NOTES:
1. CONTRACTOR SHALL FIELD VERIFY GUARDRAIL POST SPACING CAN ACCOMMODATE PROPOSED AND EXISTING DRAINAGE.
2. EXCAVATE TO DEPTH OF RIPRAP AND MATCH EXISTING SURFACE. FINAL GRADE SHALL MATCH EXISTING GRADE.

0 20 50 100

SCALE: 1" = 20'

DRAINAGE STRUCTURE TABLE						
NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
PROP. CB (1-15)	213+19.87	15.3 L	87.17		I=84.15' (PROP. DMH (1-16))	
PROP. CB (1-19)	213+68.60	15.0 L	87.28		I=84.27' (PROP. DMH (1-27))	
PROP. CB (2-05)	216+95.59	14.9 L	87.68		I=84.80' (PROP. DMH (2-03))	FLAT TOP
PROP. CBCI (1-18)	213+20.17	23.0 R	87.02		I=84.30' (PROP. DMH (1-16))	FLAT TOP
PROP. CBCI (1-22)	213+46.92	22.9 R	87.05		I=84.30' (PROP. DMH (1-20))	FLAT TOP
PROP. CBCI (1-26)	214+56.66	23.0 R	87.55		I=84.90' (PROP. DMH (1-24))	FLAT TOP
PROP. CBCI (2-06)	216+97.41	21.0 R	87.55		I=83.10' (PROP. DMH (2-03))	
PROP. CBCI (2-08)	218+19.93	15.2 L	87.22		I=84.10' (PROP. DMH (2-09))	
PROP. CBCI (2-10)	218+19.91	16.0 R	87.21		I=84.10' (PROP. DMH (2-09))	
PROP. CBCI (2-11)	218+38.37	14.6 L	86.61		I=83.50' (PROP. DMH (2-12))	

DRAINAGE PLANS
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	96	391
PROJECT FILE NO.	608051		

DRAINAGE PLANS - 3

608051_UT03(DRAINAGE-PLANS).DWG Plotted on 13-Mar-2025 8:53 AM

Proposal No. 608051 - 132406

A00980 - 144

HIGHWAY GUARD DETAILS

SEE SHEET 33

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

SEE SHEET 133

DRAINAGE DETAILS

SEE BELOW

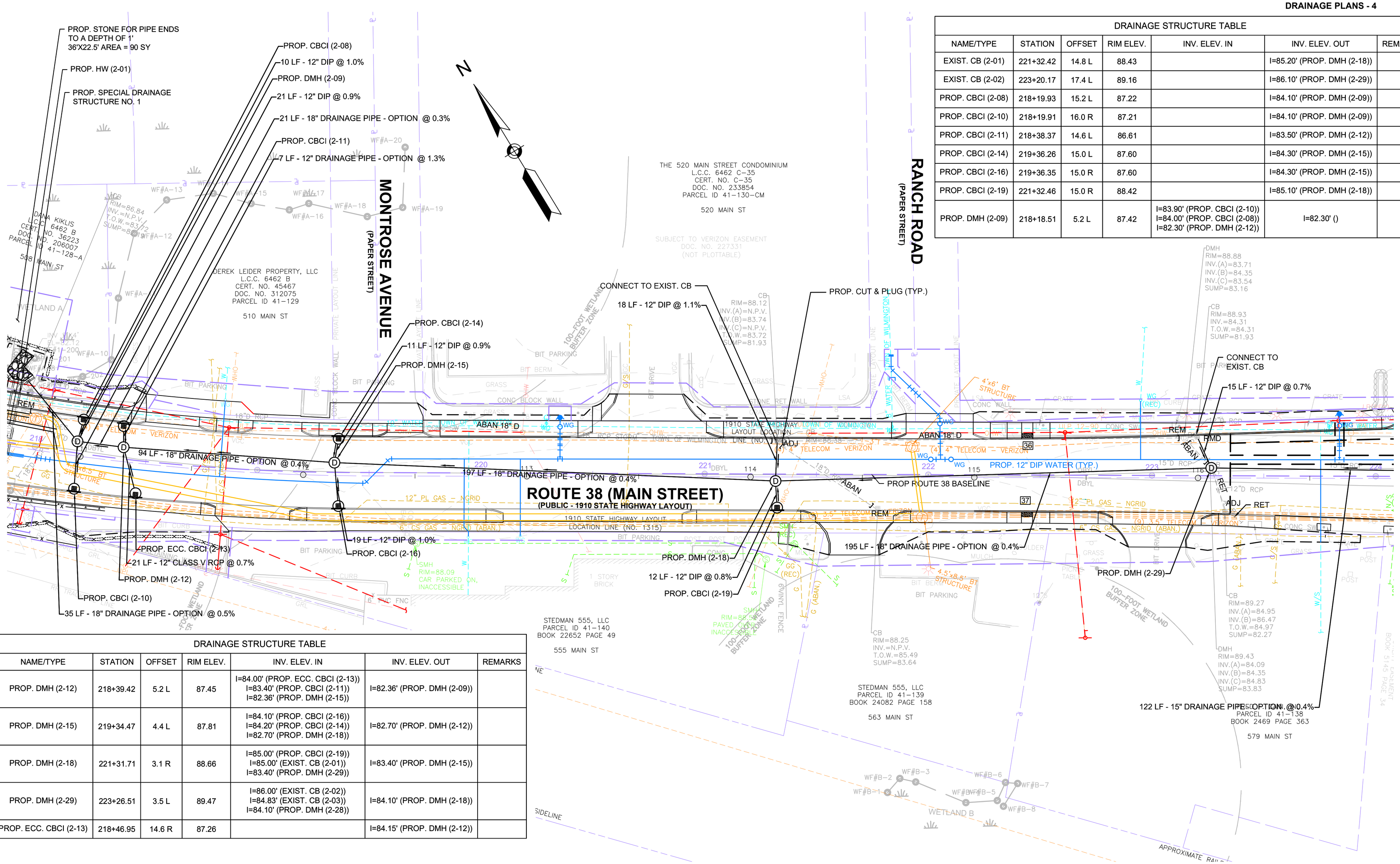
UTILITY PLAN

SEE SHEET 112

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	97	391
PROJECT FILE NO.	608051		

DRAINAGE PLANS - 4



DRAINAGE STRUCTURE TABLE

NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
EXIST. CB (2-01)	221+32.42	14.8 L	88.43		I=85.20' (PROP. DMH (2-18))	
EXIST. CB (2-02)	223+20.17	17.4 L	89.16		I=86.10' (PROP. DMH (2-29))	
PROP. CBCI (2-08)	218+19.93	15.2 L	87.22		I=84.10' (PROP. DMH (2-09))	
PROP. CBCI (2-10)	218+19.91	16.0 R	87.21		I=84.10' (PROP. DMH (2-09))	
PROP. CBCI (2-11)	218+38.37	14.6 L	86.61		I=83.50' (PROP. DMH (2-12))	
PROP. CBCI (2-14)	219+36.26	15.0 L	87.60		I=84.30' (PROP. DMH (2-15))	
PROP. CBCI (2-16)	219+36.35	15.0 R	87.60		I=84.30' (PROP. DMH (2-15))	
PROP. CBCI (2-19)	221+32.46	15.0 R	88.42		I=85.10' (PROP. DMH (2-18))	
PROP. DMH (2-09)	218+18.51	5.2 L	87.42	I=83.90' (PROP. CBCI (2-10)) I=84.00' (PROP. CBCI (2-08)) I=82.30' (PROP. DMH (2-12))	I=82.30' ()	

DRAINAGE STRUCTURE TABLE

NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
PROP. DMH (2-12)	218+39.42	5.2 L	87.45	I=84.00' (PROP. ECC. CBCI (2-13)) I=83.40' (PROP. CBCI (2-11)) I=82.36' (PROP. DMH (2-15))	I=82.36' (PROP. DMH (2-09))	
PROP. DMH (2-15)	219+34.47	4.4 L	87.81	I=84.10' (PROP. CBCI (2-16)) I=84.20' (PROP. CBCI (2-14)) I=82.70' (PROP. DMH (2-18))	I=82.70' (PROP. DMH (2-12))	
PROP. DMH (2-18)	221+31.71	3.1 R	88.66	I=85.00' (PROP. CBCI (2-19)) I=85.00' (EXIST. CB (2-01)) I=83.40' (PROP. DMH (2-29))	I=83.40' (PROP. DMH (2-15))	
PROP. DMH (2-29)	223+26.51	3.5 L	89.47	I=86.00' (EXIST. CB (2-02)) I=84.83' (EXIST. CB (2-03)) I=84.10' (PROP. DMH (2-28))	I=84.10' (PROP. DMH (2-18))	
PROP. ECC. CBCI (2-13)	218+46.95	14.6 R	87.26		I=84.15' (PROP. DMH (2-12))	

NOTES:
1. CONTRACTOR SHALL FIELD VERIFY GUARDRAIL POST SPACING CAN ACCOMMODATE PROPOSED AND EXISTING DRAINAGE.
2. EXCAVATE TO DEPTH OF RIPRAP AND MATCH EXISTING SURFACE. FINAL GRADE SHALL MATCH EXISTING GRADE.

608051_UT03(DRAINAGE-PLANS).DWG Plotted on 13-Mar-2025 8:54 AM
Proposal No. 608051 - 132406
A008600 - 145

HIGHWAY GUARD DETAILS

SEE SHEET 33

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

SEE SHEET 133

DRAINAGE DETAILS

SEE BELOW

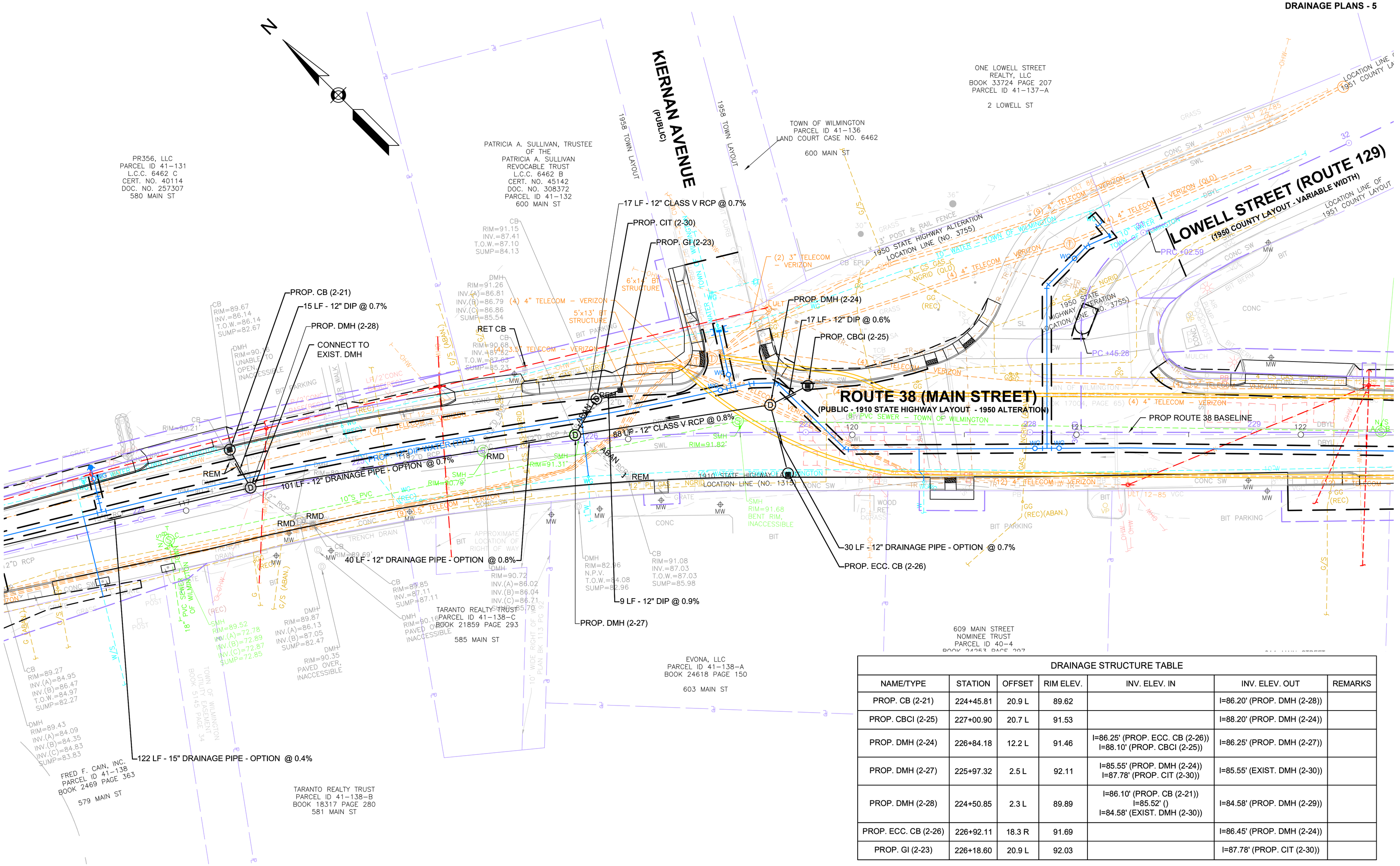
UTILITY PLAN

SEE SHEET 113

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	98	391
PROJECT FILE NO.	608051		

DRAINAGE PLANS - 5



DRAINAGE STRUCTURE TABLE

NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
PROP. CB (2-21)	224+45.81	20.9 L	89.62		I=86.20' (PROP. DMH (2-28))	
PROP. CBCI (2-25)	227+00.90	20.7 L	91.53		I=88.20' (PROP. DMH (2-24))	
PROP. DMH (2-24)	226+84.18	12.2 L	91.46	I=86.25' (PROP. ECC. CB (2-26)) I=88.10' (PROP. CBCI (2-25))	I=86.25' (PROP. DMH (2-27))	
PROP. DMH (2-27)	225+97.32	2.5 L	92.11	I=85.55' (PROP. DMH (2-24)) I=87.78' (PROP. CIT (2-30))	I=85.55' (EXIST. DMH (2-30))	
PROP. DMH (2-28)	224+50.85	2.3 L	89.89	I=86.10' (PROP. CB (2-21)) I=85.52' () I=84.58' (EXIST. DMH (2-30))	I=84.58' (PROP. DMH (2-29))	
PROP. ECC. CB (2-26)	226+92.11	18.3 R	91.69		I=86.45' (PROP. DMH (2-24))	
PROP. GI (2-23)	226+18.60	20.9 L	92.03		I=87.78' (PROP. CIT (2-30))	

0 20 50 100

SCALE: 1" = 20'

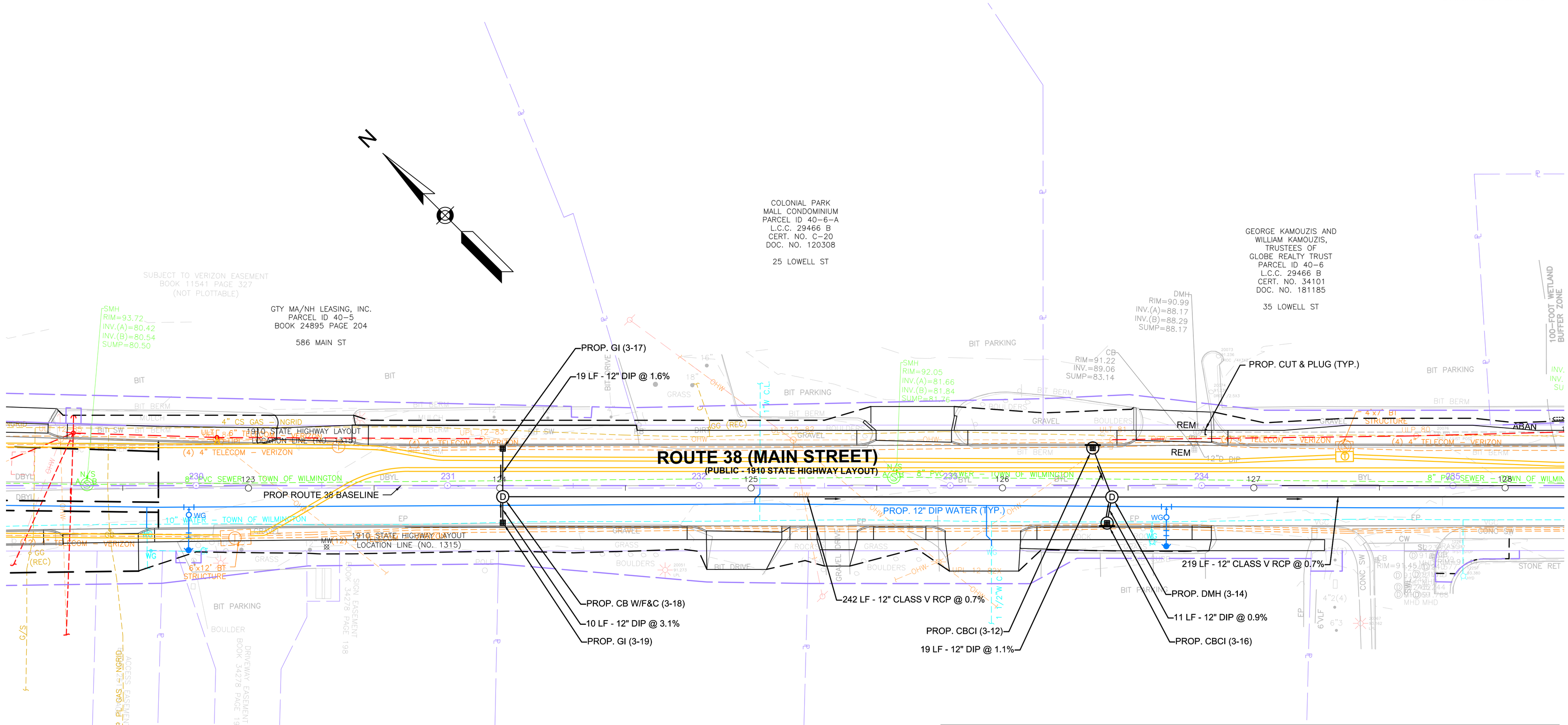
608051_UT03(DRAINAGE-PLANS).DWG Plotted on 13-Mar-2025 8:54 AM
Proposal No. 608051 - 132406
A008(6) - 146

HIGHWAY GUARD DETAILS	TRAFFIC SIGNAL CONDUIT	WATER SUPPLY ALTERATIONS	DRAINAGE DETAILS	UTILITY PLAN
SEE SHEET 33	NONE	SEE SHEET 133	SEE BELOW	SEE SHEET 114

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	99	391
PROJECT FILE NO.	608051		

DRAINAGE PLANS - 6



DRAINAGE STRUCTURE TABLE						
NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
PROP. CB W/F&C (3-18)	231+21.98	4.4 R	92.63	I=89.60' (PROP. GI (3-19)) I=89.60' (PROP. GI (3-17))	I=89.60' (PROP. DMH (3-14))	
PROP. CBCI (3-12)	233+56.71	15.0 L	91.32		I=88.50' (PROP. DMH (3-14))	FLAT TOP
PROP. CBCI (3-16)	233+62.39	14.9 R	91.30		I=88.40' (PROP. DMH (3-14))	FLAT TOP
PROP. DMH (3-14)	233+64.32	4.5 R	91.50	I=88.30' (PROP. CBCI (3-16)) I=88.30' (PROP. CBCI (3-12)) I=88.00' (PROP. CB W/F&C (3-18))	I=88.00' (PROP. DMH (3-09))	
PROP. GI (3-17)	231+21.98	14.7 L	92.42		I=89.90' (PROP. CB W/F&C (3-18))	
PROP. GI (3-19)	231+22	14.7 R	92.42		I=89.92' (PROP. CB W/F&C (3-18))	

608051_UT03(DRAINAGE-PLANS).DWG Plotted on 13-Mar-2025 8:54 AM
Proposal No. 608051 - 132406
A008(60) - 147

HIGHWAY GUARD DETAILS	TRAFFIC SIGNAL CONDUIT	WATER SUPPLY ALTERATIONS	DRAINAGE DETAILS	UTILITY PLAN
SEE SHEET 33	NONE	SEE SHEET 133	SEE BELOW	SEE SHEET 115

WILMINGTON
ROUTE 38 (MAIN STREET)

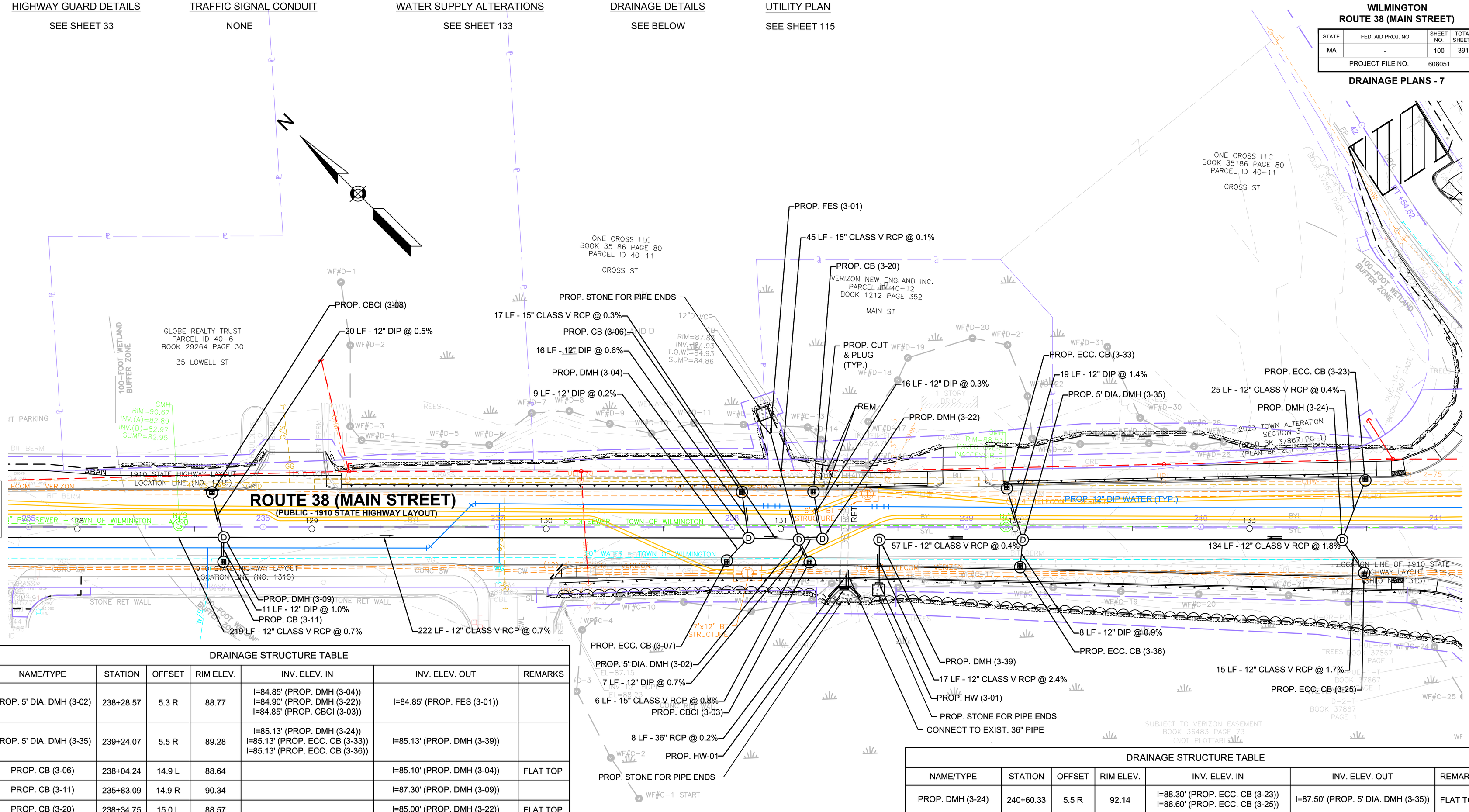
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	100	391
PROJECT FILE NO.	608051		

DRAINAGE PLANS - 7

608051_UT03(DRAINAGE-PLANS).DWG Plotted on 13-Mar-2025 8:55 AM

Proposal No. 608051 - 123406

A008(6) - 148



DRAINAGE STRUCTURE TABLE						
NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
PROP. 5' DIA. DMH (3-02)	238+28.57	5.3 R	88.77	I=84.85' (PROP. DMH (3-04)) I=84.90' (PROP. DMH (3-22)) I=84.85' (PROP. CBCI (3-03))	I=84.85' (PROP. FES (3-01))	
PROP. 5' DIA. DMH (3-35)	239+24.07	5.5 R	89.28	I=85.13' (PROP. DMH (3-24)) I=85.13' (PROP. ECC. CB (3-33)) I=85.13' (PROP. ECC. CB (3-36))	I=85.13' (PROP. DMH (3-39))	
PROP. CB (3-06)	238+04.24	14.9 L	88.64		I=85.10' (PROP. DMH (3-04))	FLAT TOP
PROP. CB (3-11)	235+83.09	14.9 R	90.34		I=87.30' (PROP. DMH (3-09))	
PROP. CB (3-20)	238+34.75	15.0 L	88.57		I=85.00' (PROP. DMH (3-22))	FLAT TOP
PROP. CBCI (3-03)	238+33.11	15.1 R	88.32		I=84.90' (PROP. 5' DIA. DMH (3-02))	
PROP. CBCI (3-08)	235+78.19	14.7 L	90.37		I=87.50' (PROP. DMH (3-09))	FLAT TOP
PROP. DMH (3-04)	238+07.09	4.7 R	88.83	I=85.00' (PROP. DMH (3-09)) I=84.90' (PROP. ECC. CB (3-07)) I=85.00' (PROP. CB (3-06))	I=84.90' (PROP. 5' DIA. DMH (3-02))	
PROP. DMH (3-09)	235+83.23	4.4 R	90.55	I=86.55' (PROP. DMH (3-14)) I=87.40' (PROP. CBCI (3-08)) I=87.20' (PROP. CB (3-11))	I=86.55' (PROP. DMH (3-04))	
PROP. DMH (3-22)	238+38.58	5.1 R	88.78	I=84.96' (PROP. CB (3-20))	I=84.95' (PROP. 5' DIA. DMH (3-02))	

DRAINAGE STRUCTURE TABLE						
NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
PROP. DMH (3-24)	240+60.33	5.5 R	92.14	I=88.30' (PROP. ECC. CB (3-23)) I=88.60' (PROP. ECC. CB (3-25))	I=87.50' (PROP. 5' DIA. DMH (3-35))	FLAT TOP
PROP. ECC. CB (3-07)	237+97.82	14.3 R	88.64		I=84.92' (PROP. DMH (3-04))	FLAT TOP
PROP. ECC. CB (3-23)	240+70.21	19.9 L	91.98		I=88.40' (PROP. DMH (3-24))	FLAT TOP
PROP. ECC. CB (3-25)	240+69.72	19.6 R	92.42		I=88.85' (PROP. DMH (3-24))	
PROP. ECC. CB (3-33)	239+17.25	16.4 L	88.99		I=85.40' (PROP. 5' DIA. DMH (3-35))	FLAT TOP
PROP. ECC. CB (3-36)	239+22.92	17.2 R	88.77		I=85.20' (PROP. 5' DIA. DMH (3-35))	FLAT TOP
PROP. FES (3-01)	238+16.47	40.2 L	86.25	I=84.80' (PROP. 5' DIA. DMH (3-02))		
PROP. HW-01	238+47.90	26.6 R	85.65		I=84.00' ()	
PROP. HW (3-01)	238+62.78	24.1 R	86.17	I=84.50' (PROP. DMH (3-39))		

NOTES:
1. CONTRACTOR SHALL FIELD VERIFY GUARDRAIL POST SPACING CAN ACCOMMODATE PROPOSED AND EXISTING DRAINAGE.

0 20 50 100
SCALE: 1" = 20'

HIGHWAY GUARD DETAILS
SEE SHEET 20

TRAFFIC SIGNAL CONDUIT
SEE SHEET 178

WATER SUPPLY ALTERATIONS
SEE SHEET 120

DRAINAGE DETAILS
SEE BELOW

UTILITY PLAN
SEE SHEET 116

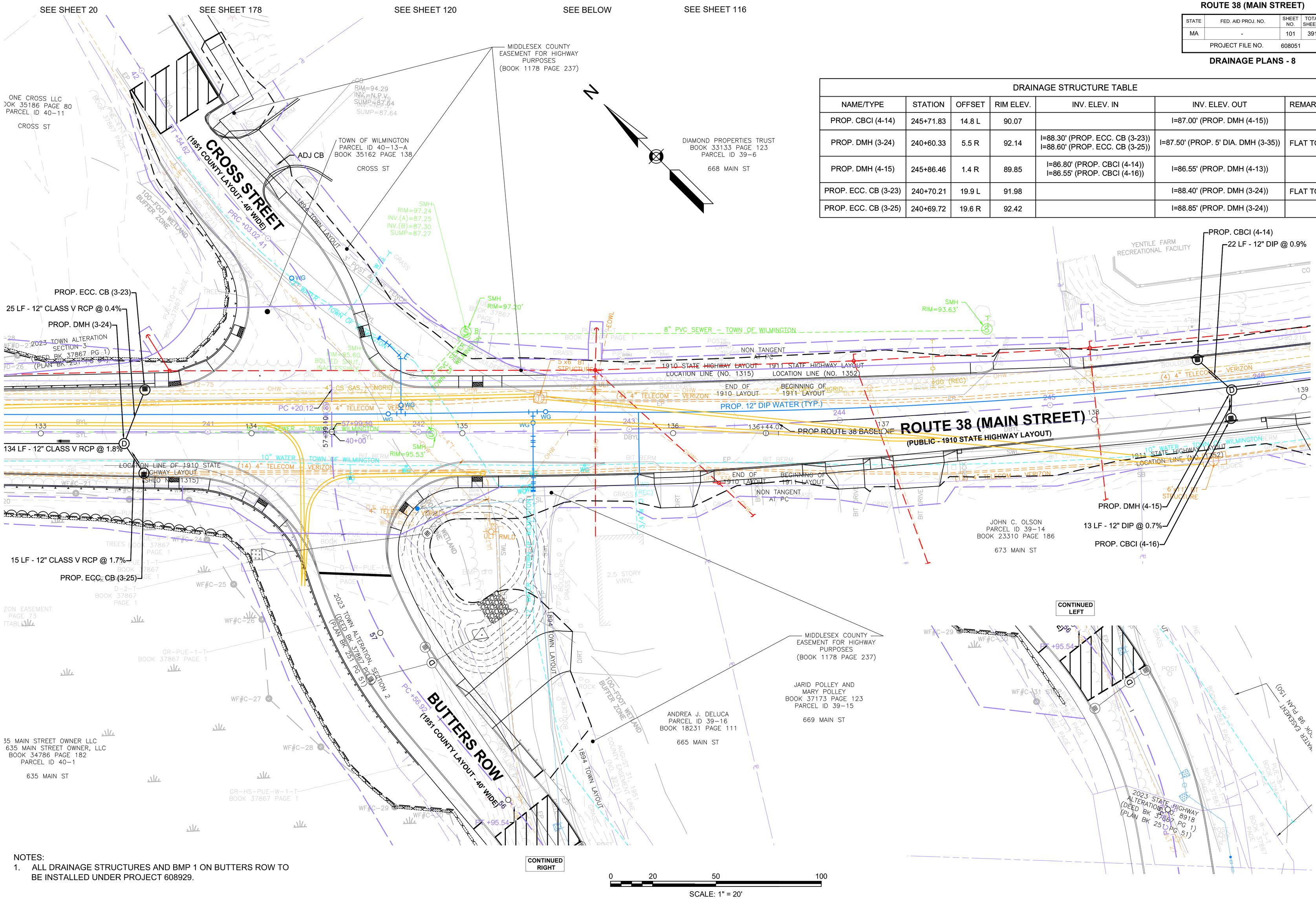
WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	101	391
PROJECT FILE NO.	608051		

DRAINAGE PLANS - 8

DRAINAGE STRUCTURE TABLE

NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
PROP. CBCI (4-14)	245+71.83	14.8 L	90.07		I=87.00' (PROP. DMH (4-15))	
PROP. DMH (3-24)	240+60.33	5.5 R	92.14	I=88.30' (PROP. ECC. CB (3-23)) I=88.60' (PROP. ECC. CB (3-25))	I=87.50' (PROP. 5' DIA. DMH (3-35))	FLAT TOP
PROP. DMH (4-15)	245+86.46	1.4 R	89.85	I=86.80' (PROP. CBCI (4-14)) I=86.55' (PROP. CBCI (4-16))	I=86.55' (PROP. DMH (4-13))	
PROP. ECC. CB (3-23)	240+70.21	19.9 L	91.98		I=88.40' (PROP. DMH (3-24))	FLAT TOP
PROP. ECC. CB (3-25)	240+69.72	19.6 R	92.42		I=88.85' (PROP. DMH (3-24))	



NOTES:
1. ALL DRAINAGE STRUCTURES AND BMP 1 ON BUTTERS ROW TO BE INSTALLED UNDER PROJECT 608929.

608051_UT03(DRAINAGE-PLANS).DWG Plotted on 13-Mar-2025 8:55 AM
Proposal No. 608051 - 132406
A00860 - 149

HIGHWAY GUARD DETAILS

SEE SHEET 33

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

SEE SHEET 133

DRAINAGE DETAILS

SEE BELOW

UTILITY PLAN

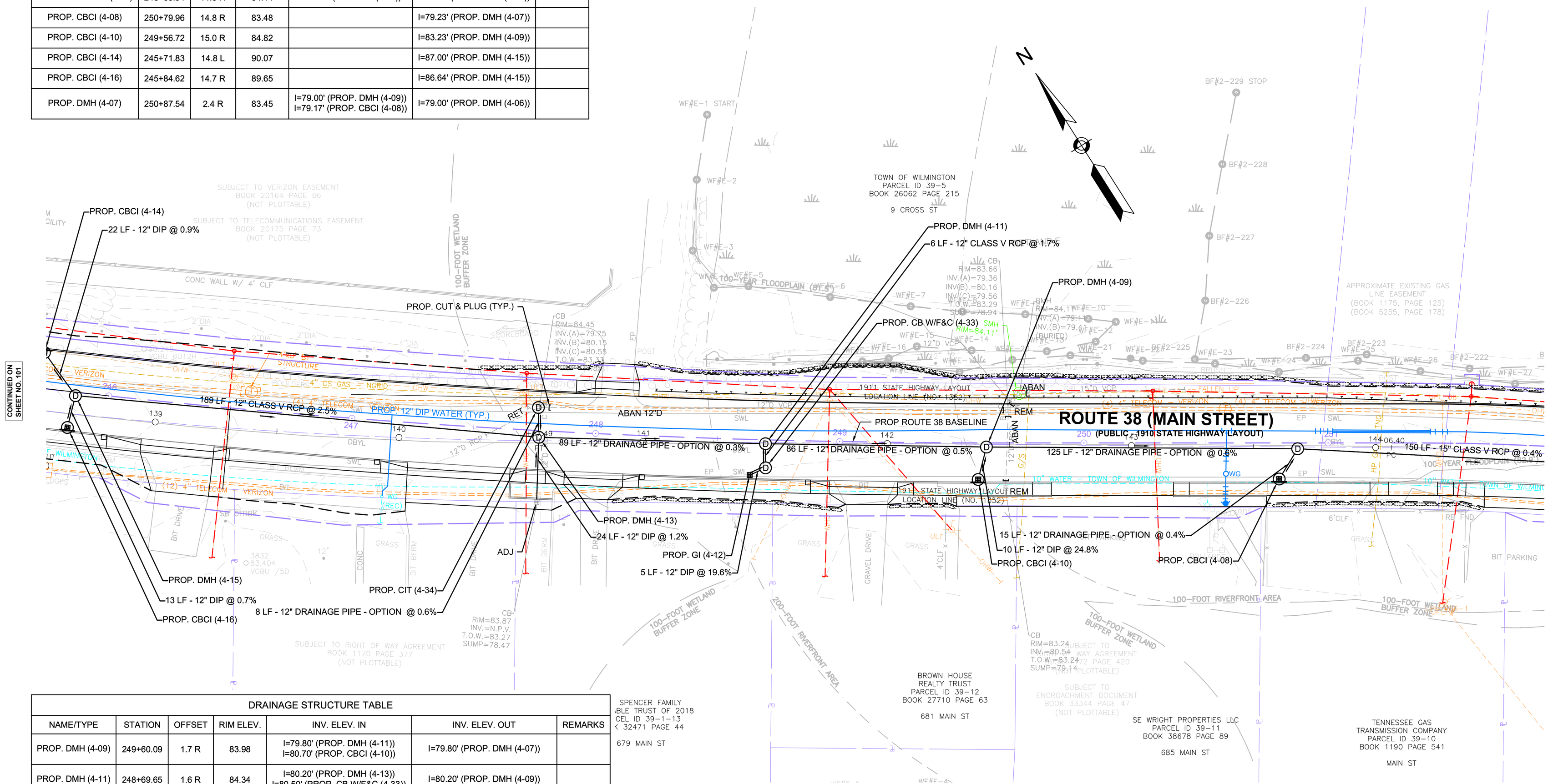
SEE SHEET 117

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	102	391
PROJECT FILE NO.	608051		

DRAINAGE PLANS - 9

DRAINAGE STRUCTURE TABLE						
NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
EXIST. CB (247+12 R)	247+77.40	29.2 R	84.49		I=81.30' (PROP. DMH (4-13))	
PROP. CB W/F&C (4-33)	248+69.94	11.5 R	84.14	I=80.60' (PROP. GI (4-12))	I=80.60' (PROP. DMH (4-11))	
PROP. CBCI (4-08)	250+79.96	14.8 R	83.48		I=79.23' (PROP. DMH (4-07))	
PROP. CBCI (4-10)	249+56.72	15.0 R	84.82		I=83.23' (PROP. DMH (4-09))	
PROP. CBCI (4-14)	245+71.83	14.8 L	90.07		I=87.00' (PROP. DMH (4-15))	
PROP. CBCI (4-16)	245+84.62	14.7 R	89.65		I=86.64' (PROP. DMH (4-15))	
PROP. DMH (4-07)	250+87.54	2.4 R	83.45	I=79.00' (PROP. DMH (4-09)) I=79.17' (PROP. CBCI (4-08))	I=79.00' (PROP. DMH (4-06))	



DRAINAGE STRUCTURE TABLE						
NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
PROP. DMH (4-09)	249+60.09	1.7 R	83.98	I=79.80' (PROP. DMH (4-11)) I=80.70' (PROP. CBCI (4-10))	I=79.80' (PROP. DMH (4-07))	
PROP. DMH (4-11)	248+69.65	1.6 R	84.34	I=80.20' (PROP. DMH (4-13)) I=80.50' (PROP. CB W/F&C (4-33))	I=80.20' (PROP. DMH (4-09))	
PROP. DMH (4-13)	247+76.84	2.7 R	85.05	I=81.90' (PROP. DMH (4-15)) I=81.00' (EXIST. CB (247+12 R)) I=80.50' (PROP. CIT (4-34))	I=80.50' (PROP. DMH (4-11))	
PROP. DMH (4-15)	245+86.46	1.4 R	89.85	I=86.80' (PROP. CBCI (4-14)) I=86.55' (PROP. CBCI (4-16))	I=86.55' (PROP. DMH (4-13))	
PROP. GI (4-12)	248+63.57	14.6 R	84.10		I=81.60' (PROP. CB W/F&C (4-33))	

0 20 50 100

SCALE: 1" = 20'

NOTES:
1. A MINIMUM OF 24 INCHES OF SEPARATION IS REQUIRED BETWEEN THE HIGH PRESSURE GAS MAIN AND DRAINAGE LINE AND ALSO BETWEEN THE HIGH PRESSURE GAS MAIN AND WATER MAIN. SEE PROFILE ON SHEET 127 FOR CROSSING OF EXISTING AND PROPOSED UTILITIES.

608051_UT03(DRAINAGE-PLANS).DWG Plotted on 13-Mar-2025 8:56 AM

Proposal No. 608051 - 132406

AM8X9 - 150

HIGHWAY GUARD DETAILS	TRAFFIC SIGNAL CONDUIT	WATER SUPPLY ALTERATIONS	DRAINAGE DETAILS	UTILITY PLAN
SEE SHEET 33	NONE	SEE SHEET 133	SEE BELOW	SEE SHEET 118

WILMINGTON
ROUTE 38 (MAIN STREET)

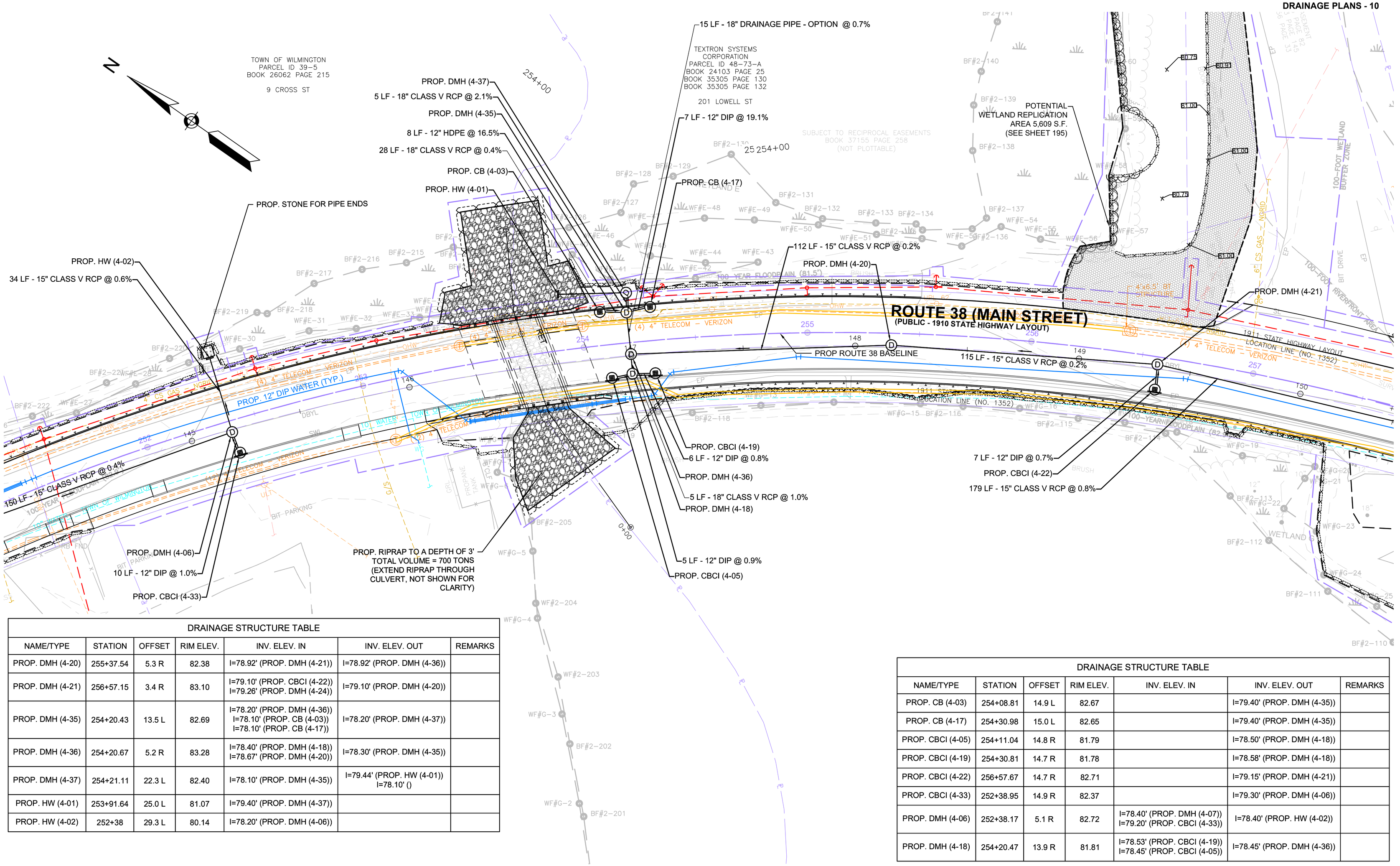
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	103	391
PROJECT FILE NO.	608051		

DRAINAGE PLANS - 10

608051_UT03(DRAINAGE-PLANS).DWG Plotted on 13-Mar-2025 8:56 AM

Proposal No. 608051 - 132406

A008360 - 151



DRAINAGE STRUCTURE TABLE						
NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
PROP. DMH (4-20)	255+37.54	5.3 R	82.38	I=78.92' (PROP. DMH (4-21))	I=78.92' (PROP. DMH (4-36))	
PROP. DMH (4-21)	256+57.15	3.4 R	83.10	I=79.10' (PROP. CBCI (4-22)) I=79.26' (PROP. DMH (4-24))	I=79.10' (PROP. DMH (4-20))	
PROP. DMH (4-35)	254+20.43	13.5 L	82.69	I=78.20' (PROP. DMH (4-36)) I=78.10' (PROP. CB (4-03)) I=78.10' (PROP. CB (4-17))	I=78.20' (PROP. DMH (4-37))	
PROP. DMH (4-36)	254+20.67	5.2 R	83.28	I=78.40' (PROP. DMH (4-18)) I=78.67' (PROP. DMH (4-20))	I=78.30' (PROP. DMH (4-35))	
PROP. DMH (4-37)	254+21.11	22.3 L	82.40	I=78.10' (PROP. DMH (4-35))	I=79.44' (PROP. HW (4-01)) I=78.10' ()	
PROP. HW (4-01)	253+91.64	25.0 L	81.07	I=79.40' (PROP. DMH (4-37))		
PROP. HW (4-02)	252+38	29.3 L	80.14	I=78.20' (PROP. DMH (4-06))		

DRAINAGE STRUCTURE TABLE						
NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
PROP. CB (4-03)	254+08.81	14.9 L	82.67		I=79.40' (PROP. DMH (4-35))	
PROP. CB (4-17)	254+30.98	15.0 L	82.65		I=79.40' (PROP. DMH (4-35))	
PROP. CBCI (4-05)	254+11.04	14.8 R	81.79		I=78.50' (PROP. DMH (4-18))	
PROP. CBCI (4-19)	254+30.81	14.7 R	81.78		I=78.58' (PROP. DMH (4-18))	
PROP. CBCI (4-22)	256+57.67	14.7 R	82.71		I=79.15' (PROP. DMH (4-21))	
PROP. CBCI (4-33)	252+38.95	14.9 R	82.37		I=79.30' (PROP. DMH (4-06))	
PROP. DMH (4-06)	252+38.17	5.1 R	82.72	I=78.40' (PROP. DMH (4-07)) I=79.20' (PROP. CBCI (4-33))	I=78.40' (PROP. HW (4-02))	
PROP. DMH (4-18)	254+20.47	13.9 R	81.81	I=78.53' (PROP. CBCI (4-19)) I=78.45' (PROP. CBCI (4-05))	I=78.45' (PROP. DMH (4-36))	

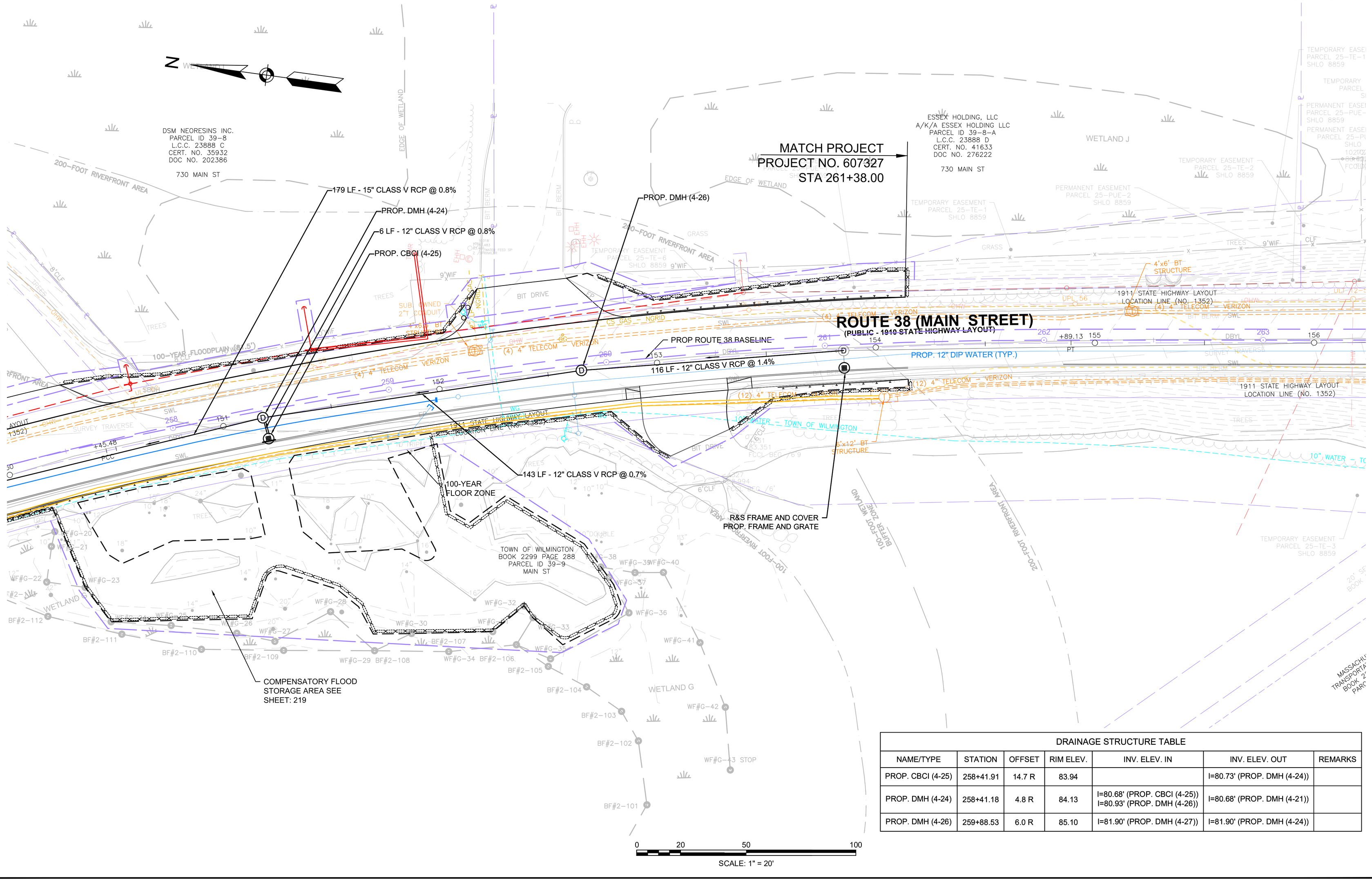
NOTES:
1. CONTRACTOR SHALL FIELD VERIFY GUARDRAIL POST SPACING CAN ACCOMMODATE PROPOSED AND EXISTING DRAINAGE.
2. EXCAVATE TO DEPTH OF RIPRAP AND MATCH EXISTING SURFACE. FINAL GRADE SHALL MATCH EXISTING GRADE.

HIGHWAY GUARD DETAILS	TRAFFIC SIGNAL CONDUIT	WATER SUPPLY ALTERATIONS	DRAINAGE DETAILS	UTILITY PLAN
SEE SHEET 33	NONE	SEE SHEET 133	SEE BELOW	SEE SHEET 119

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	104	391
PROJECT FILE NO.	608051		

DRAINAGE PLANS - 11



DRAINAGE STRUCTURE TABLE						
NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
PROP. CBCI (4-25)	258+41.91	14.7 R	83.94		I=80.73' (PROP. DMH (4-24))	
PROP. DMH (4-24)	258+41.18	4.8 R	84.13	I=80.68' (PROP. CBCI (4-25)) I=80.93' (PROP. DMH (4-26))	I=80.68' (PROP. DMH (4-21))	
PROP. DMH (4-26)	259+88.53	6.0 R	85.10	I=81.90' (PROP. DMH (4-27))	I=81.90' (PROP. DMH (4-24))	

608051_UT03(DRAINAGE-PLANS).DWG Plotted on 13-Mar-2025 8:57 AM
Proposal No. 608051 - 132406
A00860 - 152

HIGHWAY GUARD DETAILS

SEE SHEET 33

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

SEE SHEET 133

DRAINAGE DETAILS

SEE BELOW

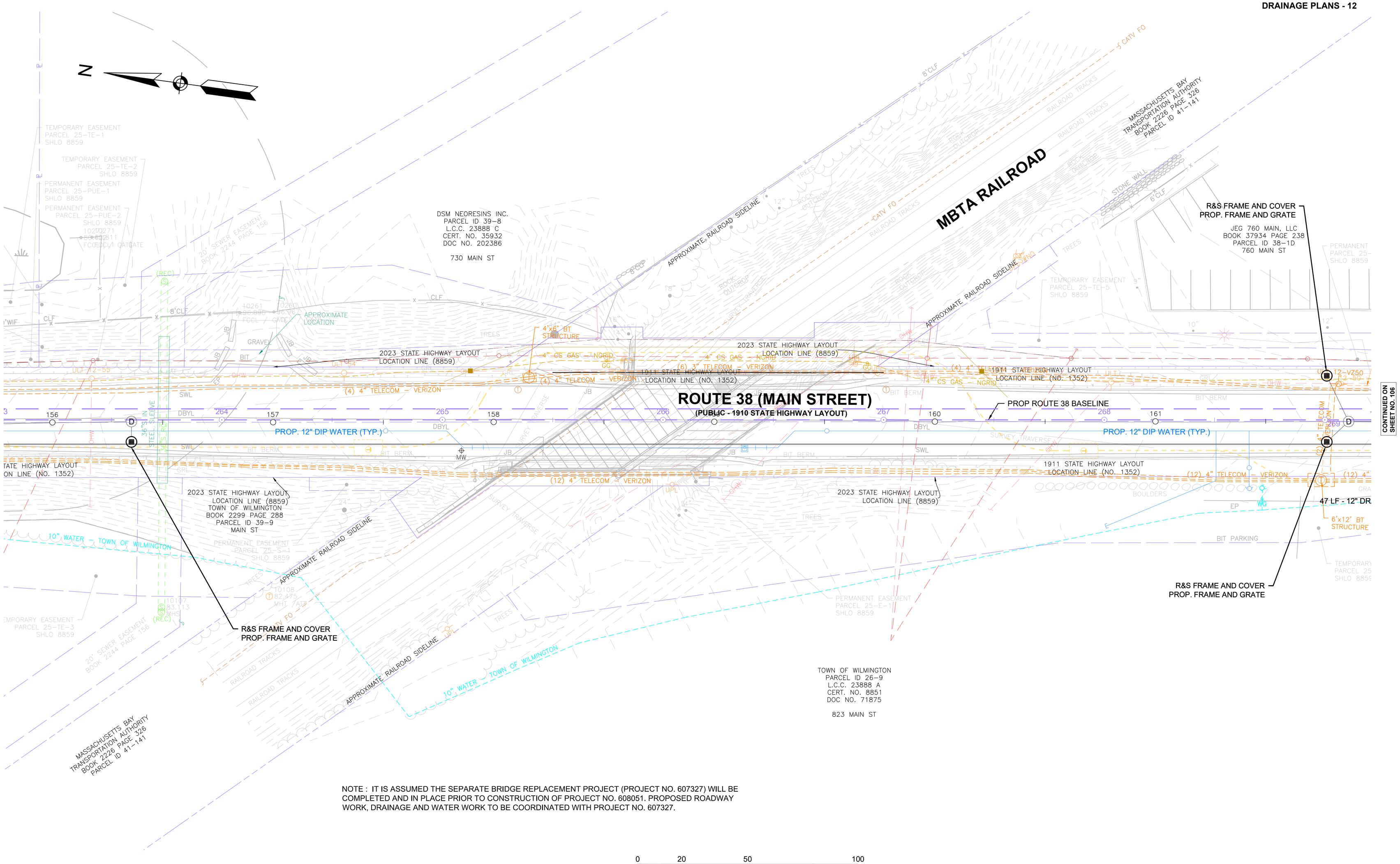
UTILITY PLAN

SEE SHEET 120

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	105	391
PROJECT FILE NO.	608051		

DRAINAGE PLANS - 12



NOTE : IT IS ASSUMED THE SEPARATE BRIDGE REPLACEMENT PROJECT (PROJECT NO. 607327) WILL BE COMPLETED AND IN PLACE PRIOR TO CONSTRUCTION OF PROJECT NO. 608051. PROPOSED ROADWAY WORK, DRAINAGE AND WATER WORK TO BE COORDINATED WITH PROJECT NO. 607327.

0 20 50 100

SCALE: 1" = 20'

608051_UT03(DRAINAGE-PLANS).DWG Plotted on 13-Mar-2025 8:57 AM
Proposal No. 608051 - 132406
A008560 - 153

HIGHWAY GUARD DETAILS

SEE SHEET 33

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

SEE SHEET 133

DRAINAGE DETAILS

SEE BELOW

UTILITY PLAN

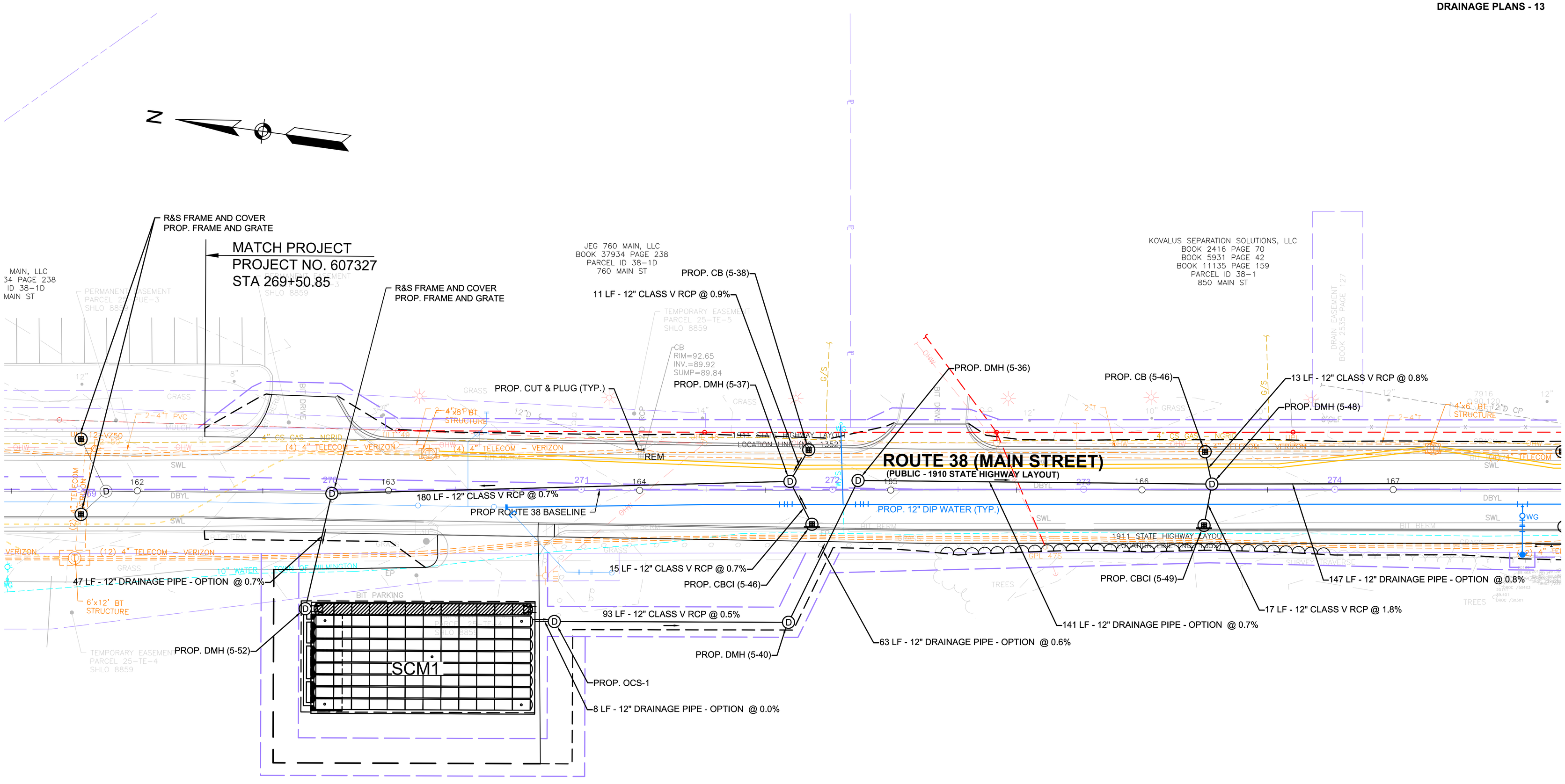
SEE SHEET 121

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	106	391
PROJECT FILE NO.	608051		

DRAINAGE PLANS - 13

608051_UT03(DRAINAGE-PLANS).DWG Plotted on 13-Mar-2025 8:58 AM



DRAINAGE STRUCTURE TABLE						
NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
PROP. DMH (5-40)	271+84.22	53.9 R	92.83	I=88.50' (PROP. OCS-1)	I=86.50' (PROP. DMH (5-36))	
PROP. DMH (5-48)	273+51.83	2.1 L	91.26	I=85.10' (PROP. DMH (5-36)) I=87.90' (PROP. CB (5-46)) I=87.20' (PROP. CBCI (5-49))	I=85.10' (PROP. DMH (5-31))	
PROP. OCS-1	270+90.97	55.2 R	92.62	I=88.10' (SCM1)	I=89.00' (PROP. DMH (5-40))	

DRAINAGE STRUCTURE TABLE						
NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
PROP. CB (5-38)	271+91.05	14.9 L	91.89		I=88.70' (PROP. DMH (5-37))	FLAT TOP
PROP. CB (5-46)	273+49.14	15.0 L	91.02		I=88.00' (PROP. DMH (5-48))	
PROP. CBCI (5-46)	271+92.83	14.7 R	91.89		I=88.70' (PROP. DMH (5-37))	
PROP. CBCI (5-49)	273+48.72	14.4 R	91.03		I=87.50' (PROP. DMH (5-48))	
PROP. DMH (5-36)	272+10.91	3.1 L	92.01	I=86.10' (PROP. DMH (5-40))	I=86.10' (PROP. DMH (5-48))	
PROP. DMH (5-37)	271+83.81	2.2 L	92.20	I=88.60' (PROP. CB (5-38)) I=88.60' (PROP. CBCI (5-46))	I=88.60' (PROP. DMH (5-41))	

A00860 - 154

Proposal No. 608051 - 132406

HIGHWAY GUARD DETAILS

SEE SHEET 33

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

SEE SHEET 133

DRAINAGE DETAILS

SEE BELOW

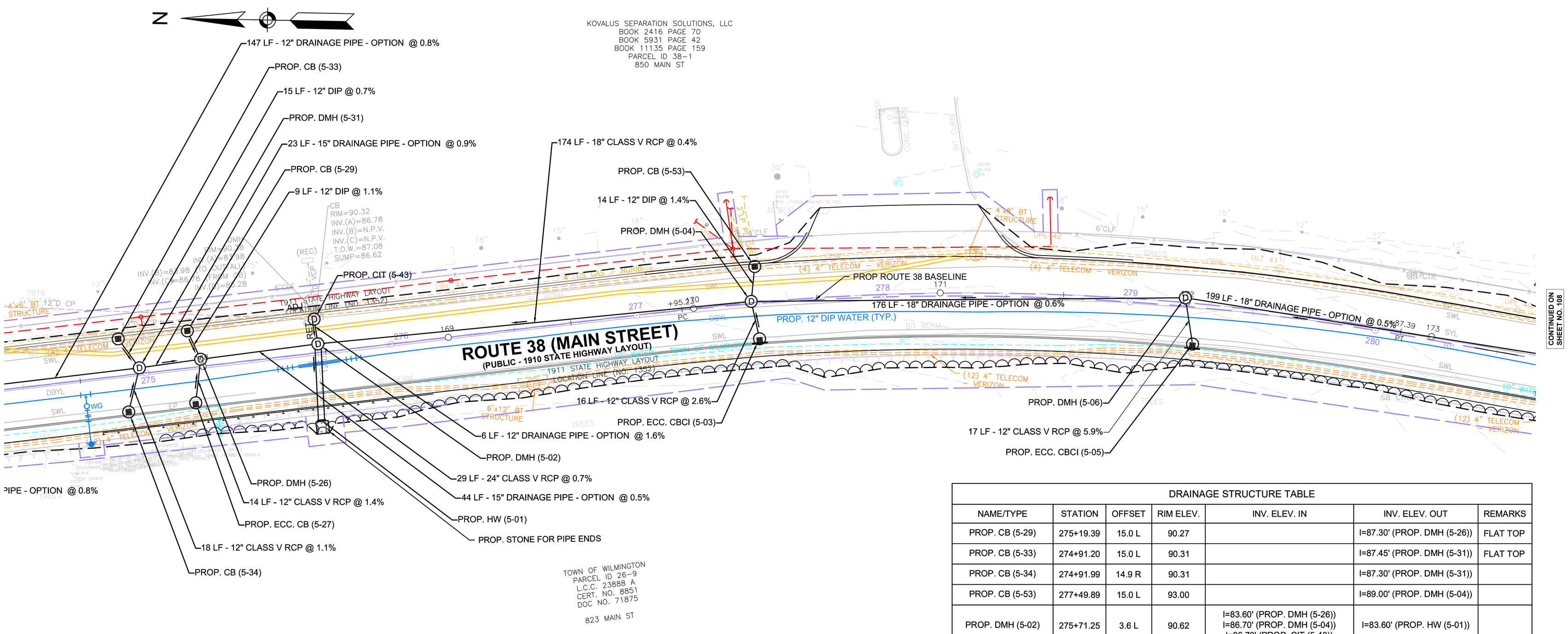
UTILITY PLAN

SEE SHEET 122

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	107	391
PROJECT FILE NO.	608051		

DRAINAGE PLANS - 14



DRAINAGE STRUCTURE TABLE						
NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
PROP. ECC. CBCI (5-03)	277+49.63	14.4 R	92.00		I=88.90' (PROP. DMH (5-04))	
PROP. ECC. CBCI (5-05)	279+27.56	15.0 R	94.47		I=91.00' (PROP. DMH (5-06))	
PROP. HW (5-01)	275+69.12	27.4 R	86.05	I=83.40' (PROP. DMH (5-02))		

0 20 50 100

SCALE: 1" = 20'

DRAINAGE STRUCTURE TABLE						
NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
PROP. CB (5-29)	275+19.39	15.0 L	90.27		I=87.30' (PROP. DMH (5-26))	FLAT TOP
PROP. CB (5-33)	274+91.20	15.0 L	90.31		I=87.45' (PROP. DMH (5-31))	FLAT TOP
PROP. CB (5-34)	274+91.99	14.9 R	90.31		I=87.30' (PROP. DMH (5-31))	
PROP. CB (5-53)	277+49.89	15.0 L	93.00		I=89.00' (PROP. DMH (5-04))	
PROP. DMH (5-02)	275+71.25	3.6 L	90.62	I=83.60' (PROP. DMH (5-26)) I=86.70' (PROP. DMH (5-04)) I=86.70' (PROP. CIT (5-43))	I=83.60' (PROP. HW (5-01))	
PROP. DMH (5-04)	277+47.43	1.0 L	92.59	I=88.80' (PROP. CB (5-53)) I=88.50' (PROP. ECC. CBCI (5-03)) I=87.40' (PROP. DMH (5-06))	I=87.40' (PROP. DMH (5-02))	
PROP. DMH (5-06)	279+22.97	3.4 L	95.14	I=88.40' (PROP. DMH (5-10)) I=90.00' (PROP. ECC. CBCI (5-05))	I=88.40' (PROP. DMH (5-04))	
PROP. DMH (5-26)	275+23.41	2.9 L	90.52	I=83.80' (PROP. DMH (5-31)) I=87.20' (PROP. CB (5-29)) I=87.10' (PROP. ECC. CB (5-27))	I=83.80' (PROP. DMH (5-02))	
PROP. DMH (5-31)	274+98.37	2.4 L	90.54	I=84.00' (PROP. DMH (5-48)) I=87.10' (PROP. CB (5-34)) I=87.35' (PROP. CB (5-33))	I=84.00' (PROP. DMH (5-26))	
PROP. ECC. CB (5-27)	275+19.35	14.4 R	90.29		I=87.30' (PROP. DMH (5-26))	FLAT TOP

608051_UT03(DRAINAGE-PLANS).DWG Plotted on 13-Mar-2025 8:59 AM
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A008600 - 155

HIGHWAY GUARD DETAILS

SEE SHEET 33

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

SEE SHEET 133

DRAINAGE DETAILS

SEE BELOW

UTILITY PLAN

SEE SHEET 123

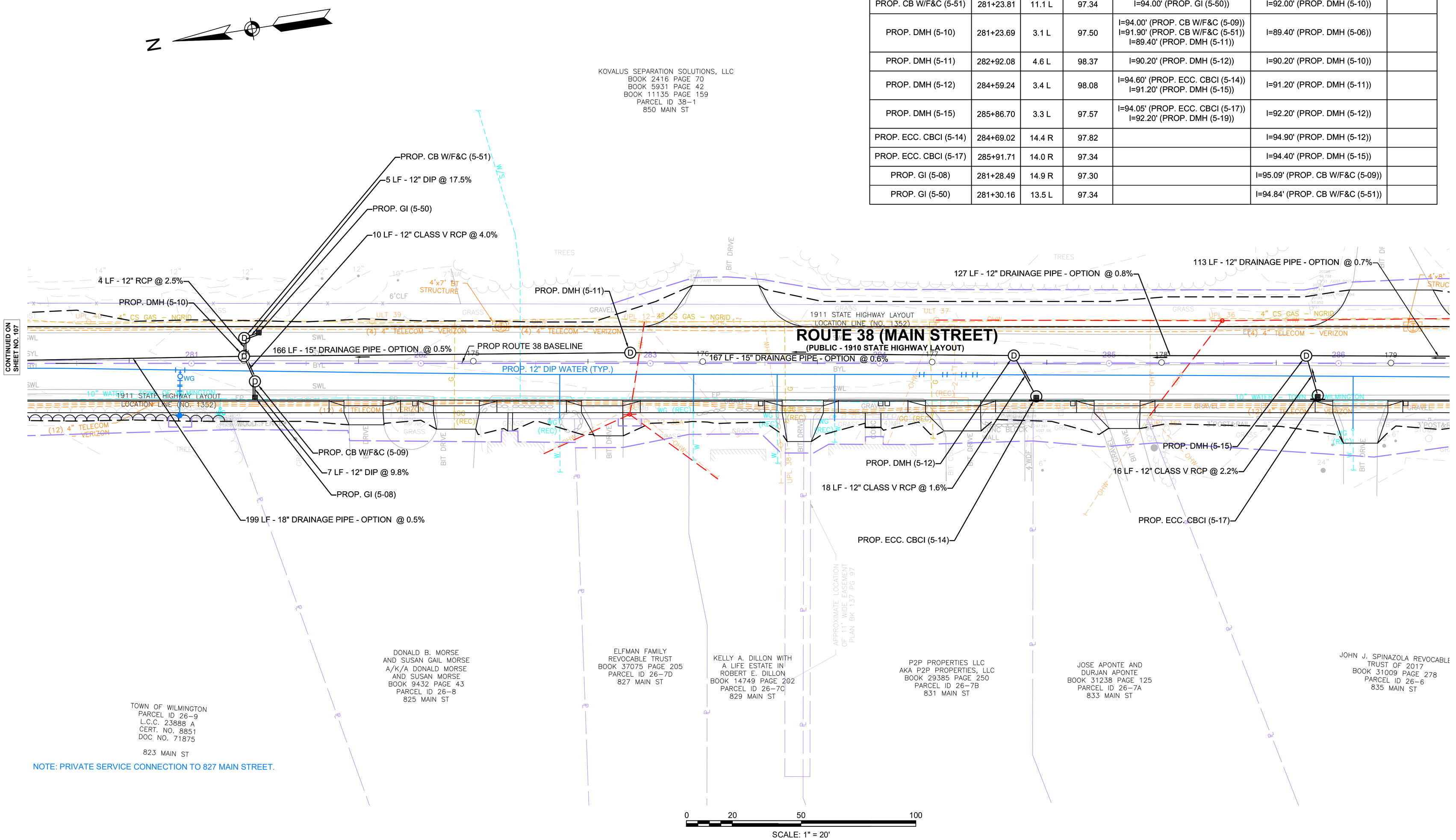
WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	108	391
PROJECT FILE NO.	608051		

DRAINAGE PLANS - 15

DRAINAGE STRUCTURE TABLE

NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
PROP. CB W/F&C (5-09)	281+28.47	7.9 R	97.44	I=94.40' (PROP. GI (5-08))	I=94.40' (PROP. DMH (5-10))	
PROP. CB W/F&C (5-51)	281+23.81	11.1 L	97.34	I=94.00' (PROP. GI (5-50))	I=92.00' (PROP. DMH (5-10))	
PROP. DMH (5-10)	281+23.69	3.1 L	97.50	I=94.00' (PROP. CB W/F&C (5-09)) I=91.90' (PROP. CB W/F&C (5-51)) I=89.40' (PROP. DMH (5-11))	I=89.40' (PROP. DMH (5-06))	
PROP. DMH (5-11)	282+92.08	4.6 L	98.37	I=90.20' (PROP. DMH (5-12))	I=90.20' (PROP. DMH (5-10))	
PROP. DMH (5-12)	284+59.24	3.4 L	98.08	I=94.60' (PROP. ECC. CBCI (5-14)) I=91.20' (PROP. DMH (5-15))	I=91.20' (PROP. DMH (5-11))	
PROP. DMH (5-15)	285+86.70	3.3 L	97.57	I=94.05' (PROP. ECC. CBCI (5-17)) I=92.20' (PROP. DMH (5-19))	I=92.20' (PROP. DMH (5-12))	
PROP. ECC. CBCI (5-14)	284+69.02	14.4 R	97.82		I=94.90' (PROP. DMH (5-12))	
PROP. ECC. CBCI (5-17)	285+91.71	14.0 R	97.34		I=94.40' (PROP. DMH (5-15))	
PROP. GI (5-08)	281+28.49	14.9 R	97.30		I=95.09' (PROP. CB W/F&C (5-09))	
PROP. GI (5-50)	281+30.16	13.5 L	97.34		I=94.84' (PROP. CB W/F&C (5-51))	



608051_UT03(DRAINAGE-PLANS).DWG Plotted on 13-Mar-2025 8:59 AM
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A008360 - 156

Proposal No. 608051 - 132406

608051_UT03(DRAINAGE-PLANS).DWG Plotted on 13-Mar-2025 9:00 AM

A00860 - 157

HIGHWAY GUARD DETAILS	TRAFFIC SIGNAL CONDUIT	WATER SUPPLY ALTERATIONS	DRAINAGE DETAILS	UTILITY PLAN
SEE SHEET 33	NONE	SEE SHEET 133	SEE BELOW	SEE SHEET 124

DRAINAGE PLANS - 16

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
NA	-	109	391
PROJECT FILE NO.	608051		

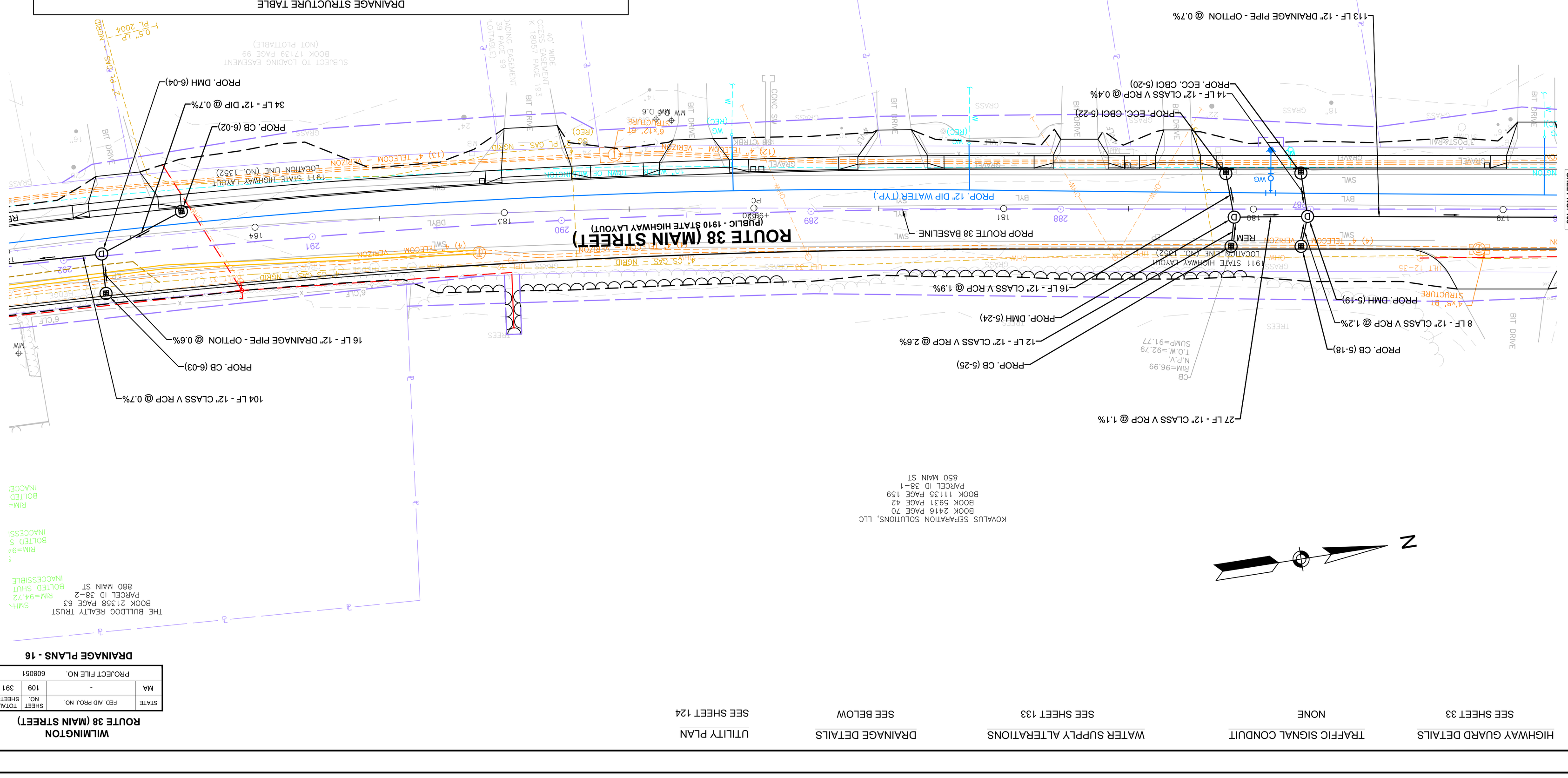
WILMINGTON
ROUTE 38 (MAIN STREET)

SCALE: 1" = 20'

0 20 50 100

DRAINAGE STRUCTURE TABLE

NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
PROP. CB (5-18)	287+04.52	14.9 L	97.00		I=93.85' (PROP. DMH (5-19))	
PROP. CB (5-25)	287+32.57	14.9 L	97.03		I=93.80' (PROP. DMH (5-24))	
PROP. CB (6-02)	291+52.01	14.7 R	95.36		I=92.25' (PROP. DMH (6-04))	
PROP. CB (6-03)	291+85.30	15.0 L	94.95		I=89.50' (PROP. DMH (6-04))	
PROP. DMH (5-19)	287+01.93	2.9 L	97.24	I=93.50' (PROP. ECC. CBCI (5-20)) I=93.75' (PROP. CB (5-18)) I=93.20' (PROP. DMH (5-24))	I=93.00' (PROP. DMH (5-15))	
PROP. DMH (5-24)	287+31.32	3.2 L	97.26	I=93.60' (PROP. ECC. CBCI (5-22)) I=93.50' (PROP. CB (5-25))	I=93.50' (PROP. DMH (5-19))	
PROP. DMH (6-04)	291+85.41	0.9 R	95.23	I=92.00' (PROP. CB (6-02)) I=89.40' (PROP. CB (6-03))	I=89.40' (PROP. DMH (6-07))	
PROP. ECC. CBCI (5-20)	287+04.58	14.5 R	97.01		I=93.56' (PROP. DMH (5-19))	
PROP. ECC. CBCI (5-22)	287+34.66	14.3 R	98.15		I=93.90' (PROP. DMH (5-24))	

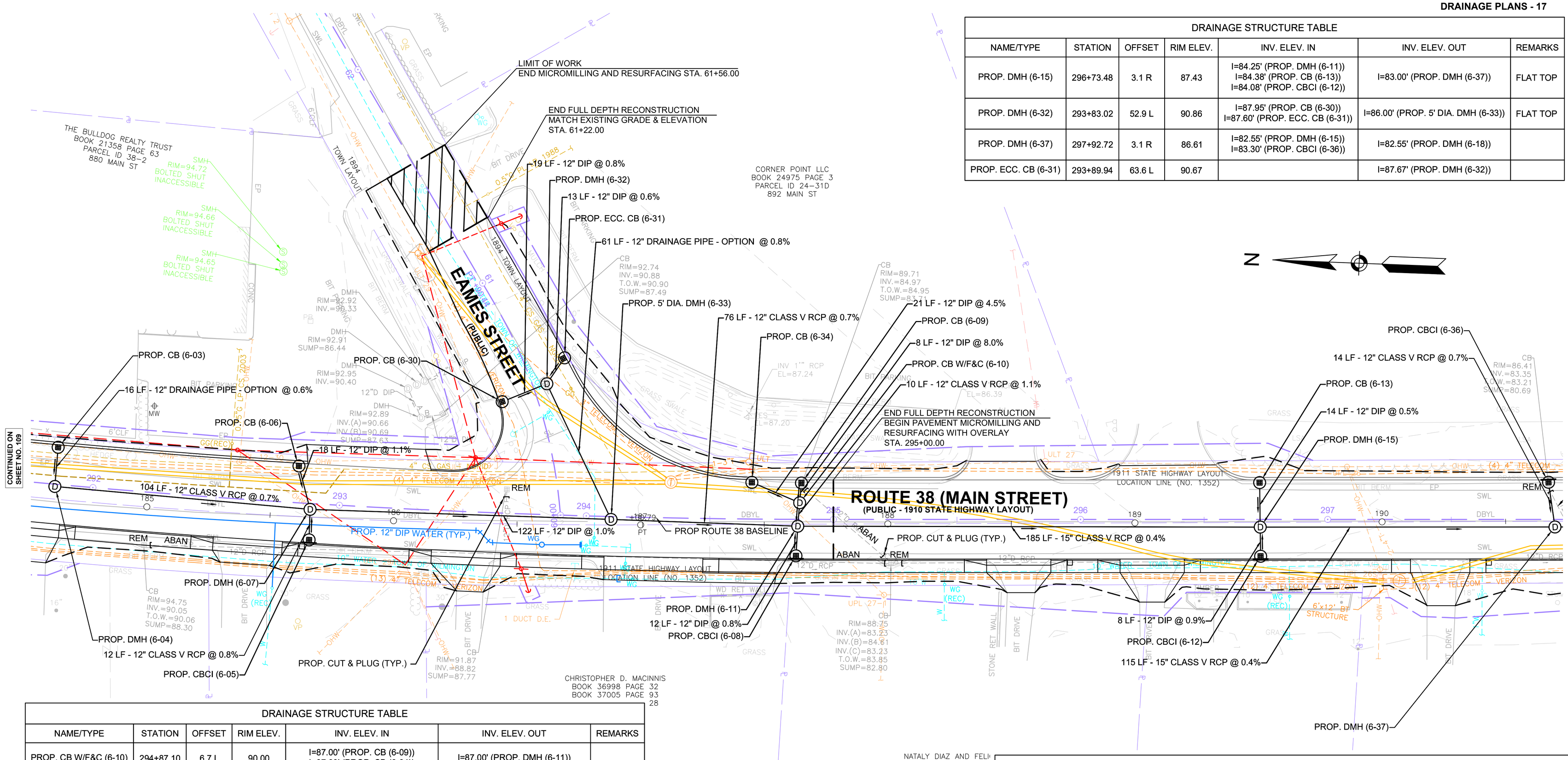


WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	110	391
PROJECT FILE NO.	608051		

DRAINAGE PLANS - 17

DRAINAGE STRUCTURE TABLE						
NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
PROP. DMH (6-15)	296+73.48	3.1 R	87.43	I=84.25' (PROP. DMH (6-11)) I=84.38' (PROP. CB (6-13)) I=84.08' (PROP. CBCI (6-12))	I=83.00' (PROP. DMH (6-37))	FLAT TOP
PROP. DMH (6-32)	293+83.02	52.9 L	90.86	I=87.95' (PROP. CB (6-30)) I=87.60' (PROP. ECC. CB (6-31))	I=86.00' (PROP. 5' DIA. DMH (6-33))	FLAT TOP
PROP. DMH (6-37)	297+92.72	3.1 R	86.61	I=82.55' (PROP. DMH (6-15)) I=83.30' (PROP. CBCI (6-36))	I=82.55' (PROP. DMH (6-18))	
PROP. ECC. CB (6-31)	293+89.94	63.6 L	90.67		I=87.67' (PROP. DMH (6-32))	



DRAINAGE STRUCTURE TABLE						
NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
PROP. CB W/F&C (6-10)	294+87.10	6.7 L	90.00	I=87.00' (PROP. CB (6-09)) I=87.00' (PROP. CB (6-34))	I=87.00' (PROP. DMH (6-11))	
PROP. CBCI (6-05)	292+89.38	14.7 R	93.38		I=90.30' (PROP. DMH (6-07))	
PROP. CBCI (6-08)	294+85.67	14.8 R	89.86		I=86.75' (PROP. DMH (6-11))	
PROP. CBCI (6-12)	296+73.62	14.9 R	87.20		I=84.15' (PROP. DMH (6-15))	FLAT TOP
PROP. CBCI (6-36)	297+90.12	15.0 L	86.50		I=83.40' (PROP. DMH (6-37))	
PROP. DMH (6-04)	291+85.41	0.9 R	95.23	I=92.00' (PROP. CB (6-02)) I=89.40' (PROP. CB (6-03))	I=89.40' (PROP. DMH (6-07))	
PROP. DMH (6-07)	292+89.03	2.3 R	93.63	I=88.70' (PROP. DMH (6-04)) I=90.20' (PROP. CBCI (6-05)) I=87.70' (PROP. CB (6-06))	I=87.20' (PROP. 5' DIA. DMH (6-33))	
PROP. DMH (6-11)	294+86.36	2.8 R	90.09	I=85.00' (PROP. 5' DIA. DMH (6-33)) I=86.90' (PROP. CB W/F&C (6-10)) I=86.65' (PROP. CBCI (6-08))	I=85.00' (PROP. DMH (6-15))	

DRAINAGE STRUCTURE TABLE						
NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
PROP. 5' DIA. DMH (6-33)	294+10.83	1.1 R	91.42	I=86.00' (PROP. DMH (6-07)) I=85.50' (PROP. DMH (6-32))	I=85.50' (PROP. DMH (6-11))	
PROP. CB (6-02)	291+52.01	14.7 R	95.36		I=92.25' (PROP. DMH (6-04))	
PROP. CB (6-03)	291+85.30	15.0 L	94.95		I=89.50' (PROP. DMH (6-04))	
PROP. CB (6-06)	292+83.44	14.9 L	93.48		I=87.90' (PROP. DMH (6-07))	
PROP. CB (6-09)	294+87.77	14.7 L	89.83		I=87.64' (PROP. CB W/F&C (6-10))	
PROP. CB (6-13)	296+73.21	14.9 L	87.44		I=84.45' (PROP. DMH (6-15))	FLAT TOP
PROP. CB (6-30)	293+64.96	45.0 L	91.14		I=88.10' (PROP. DMH (6-32))	
PROP. CB (6-34)	294+67.62	14.8 L	90.14		I=87.95' (PROP. CB W/F&C (6-10))	

608051_UT03(DRAINAGE-PLANS).DWG Plotted on 13-Mar-2025 9:00 AM
Proposal No. 608051 - 132406
A008860 - 158

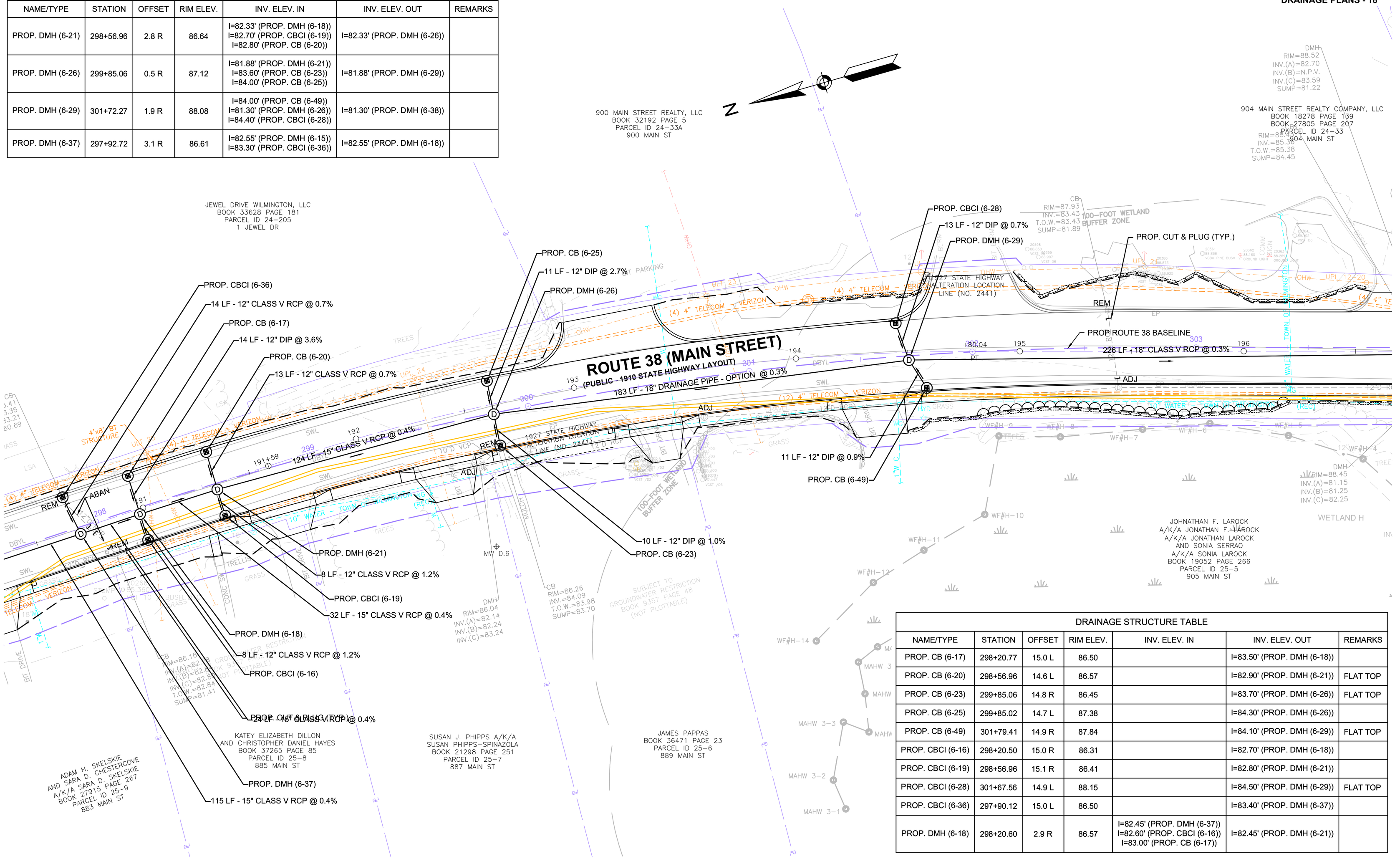
HIGHWAY GUARD DETAILS	TRAFFIC SIGNAL CONDUIT	WATER SUPPLY ALTERATIONS	DRAINAGE DETAILS	UTILITY PLAN
SEE SHEET 33	NONE	SEE SHEET 133	SEE BELOW	SEE SHEET 126

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	111	391
PROJECT FILE NO.	608051		

DRAINAGE PLANS - 18

DRAINAGE STRUCTURE TABLE						
NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
PROP. DMH (6-21)	298+56.96	2.8 R	86.64	I=82.33' (PROP. DMH (6-18)) I=82.70' (PROP. CBCI (6-19)) I=82.80' (PROP. CB (6-20))	I=82.33' (PROP. DMH (6-26))	
PROP. DMH (6-26)	299+85.06	0.5 R	87.12	I=81.88' (PROP. DMH (6-21)) I=83.60' (PROP. CB (6-23)) I=84.00' (PROP. CB (6-25))	I=81.88' (PROP. DMH (6-29))	
PROP. DMH (6-29)	301+72.27	1.9 R	88.08	I=84.00' (PROP. CB (6-49)) I=81.30' (PROP. DMH (6-26)) I=84.40' (PROP. CBCI (6-28))	I=81.30' (PROP. DMH (6-38))	
PROP. DMH (6-37)	297+92.72	3.1 R	86.61	I=82.55' (PROP. DMH (6-15)) I=83.30' (PROP. CBCI (6-36))	I=82.55' (PROP. DMH (6-18))	



DRAINAGE STRUCTURE TABLE						
NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
PROP. CB (6-17)	298+20.77	15.0 L	86.50		I=83.50' (PROP. DMH (6-18))	
PROP. CB (6-20)	298+56.96	14.6 L	86.57		I=82.90' (PROP. DMH (6-21))	FLAT TOP
PROP. CB (6-23)	299+85.06	14.8 R	86.45		I=83.70' (PROP. DMH (6-26))	FLAT TOP
PROP. CB (6-25)	299+85.02	14.7 L	87.38		I=84.30' (PROP. DMH (6-26))	
PROP. CB (6-49)	301+79.41	14.9 R	87.84		I=84.10' (PROP. DMH (6-29))	FLAT TOP
PROP. CBCI (6-16)	298+20.50	15.0 R	86.31		I=82.70' (PROP. DMH (6-18))	
PROP. CBCI (6-19)	298+56.96	15.1 R	86.41		I=82.80' (PROP. DMH (6-21))	
PROP. CBCI (6-28)	301+67.56	14.9 L	88.15		I=84.50' (PROP. DMH (6-29))	FLAT TOP
PROP. CBCI (6-36)	297+90.12	15.0 L	86.50		I=83.40' (PROP. DMH (6-37))	
PROP. DMH (6-18)	298+20.60	2.9 R	86.57	I=82.45' (PROP. DMH (6-37)) I=82.60' (PROP. CBCI (6-16)) I=83.00' (PROP. CB (6-17))	I=82.45' (PROP. DMH (6-21))	

608051_UT03(DRAINAGE-PLANS).DWG Plotted on 13-Mar-2025 9:01 AM
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A008060 - 159

HIGHWAY GUARD DETAILS

SEE SHEET 33

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

SEE SHEET 133

DRAINAGE DETAILS

SEE BELOW

UTILITY PLAN

SEE SHEET 127

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	112	391
PROJECT FILE NO.	608051		

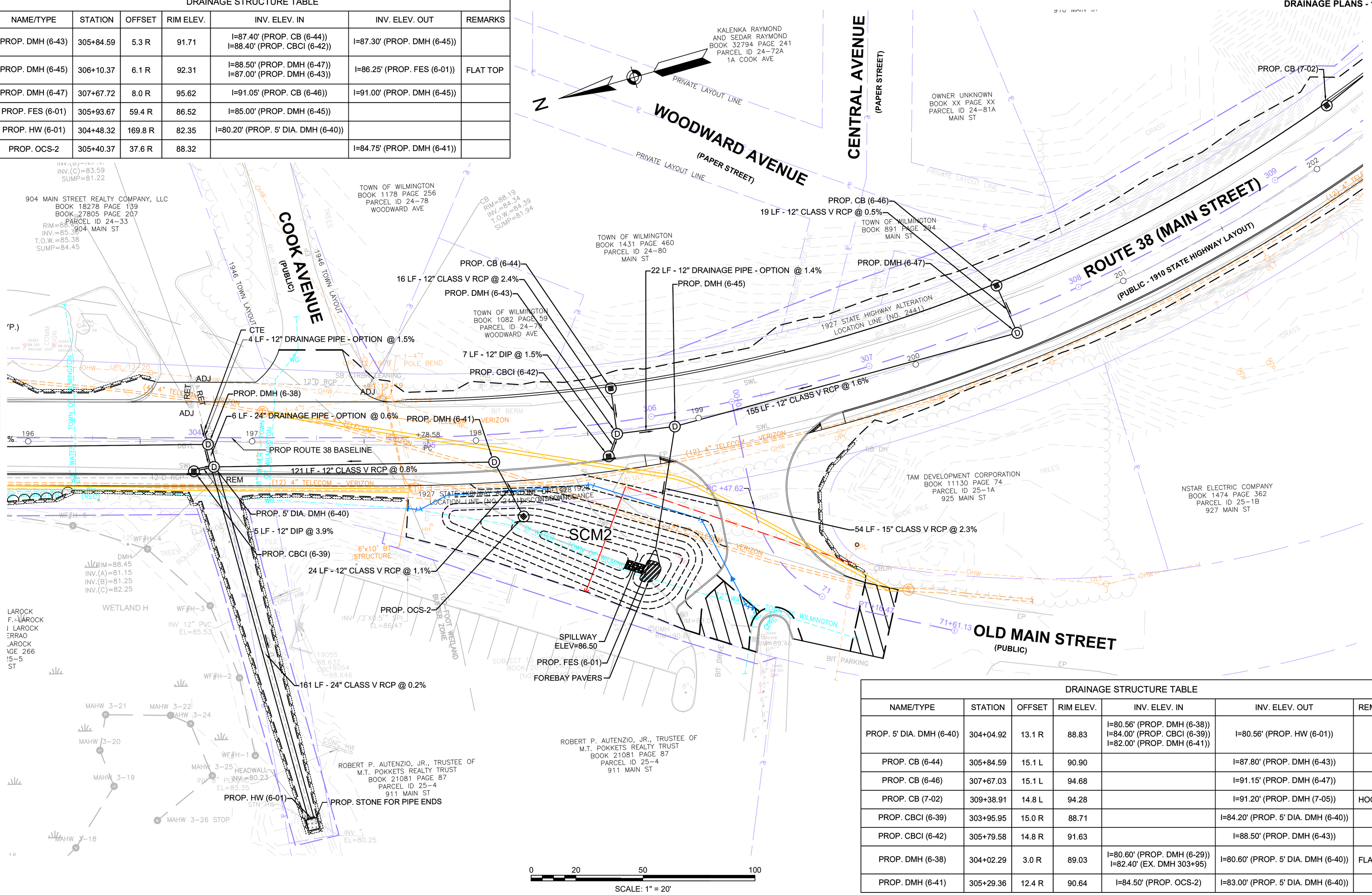
DRAINAGE PLANS - 19

608051_UT03(DRAINAGE-PLANS).DWG Plotted on 13-Mar-2025 9:01 AM

Proposal No. 608051 - 132406

AW080-160

DRAINAGE STRUCTURE TABLE						
NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
PROP. DMH (6-43)	305+84.59	5.3 R	91.71	I=87.40' (PROP. CB (6-44)) I=88.40' (PROP. CBCI (6-42))	I=87.30' (PROP. DMH (6-45))	
PROP. DMH (6-45)	306+10.37	6.1 R	92.31	I=88.50' (PROP. DMH (6-47)) I=87.00' (PROP. DMH (6-43))	I=86.25' (PROP. FES (6-01))	FLAT TOP
PROP. DMH (6-47)	307+67.72	8.0 R	95.62	I=91.05' (PROP. CB (6-46))	I=91.00' (PROP. DMH (6-45))	
PROP. FES (6-01)	305+93.67	59.4 R	86.52	I=85.00' (PROP. DMH (6-45))		
PROP. HW (6-01)	304+48.32	169.8 R	82.35	I=80.20' (PROP. 5' DIA. DMH (6-40))		
PROP. OCS-2	305+40.37	37.6 R	88.32		I=84.75' (PROP. DMH (6-41))	



DRAINAGE STRUCTURE TABLE						
NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
PROP. 5' DIA. DMH (6-40)	304+04.92	13.1 R	88.83	I=80.56' (PROP. DMH (6-38)) I=84.00' (PROP. CBCI (6-39)) I=82.00' (PROP. DMH (6-41))	I=80.56' (PROP. HW (6-01))	
PROP. CB (6-44)	305+84.59	15.1 L	90.90		I=87.80' (PROP. DMH (6-43))	
PROP. CB (6-46)	307+67.03	15.1 L	94.68		I=91.15' (PROP. DMH (6-47))	
PROP. CB (7-02)	309+38.91	14.8 L	94.28		I=91.20' (PROP. DMH (7-05))	HOOD
PROP. CBCI (6-39)	303+95.95	15.0 R	88.71		I=84.20' (PROP. 5' DIA. DMH (6-40))	
PROP. CBCI (6-42)	305+79.58	14.8 R	91.63		I=88.50' (PROP. DMH (6-43))	
PROP. DMH (6-38)	304+02.29	3.0 R	89.03	I=80.60' (PROP. DMH (6-29)) I=82.40' (EX. DMH 303+95)	I=80.60' (PROP. 5' DIA. DMH (6-40))	FLAT TOP
PROP. DMH (6-41)	305+29.36	12.4 R	90.64	I=84.50' (PROP. OCS-2)	I=83.00' (PROP. 5' DIA. DMH (6-40))	

HIGHWAY GUARD DETAILS

SEE SHEET 33

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

SEE SHEET 133

DRAINAGE DETAILS

SEE BELOW

UTILITY PLAN

SEE SHEET 128

WILMINGTON
ROUTE 38 (MAIN STREET)

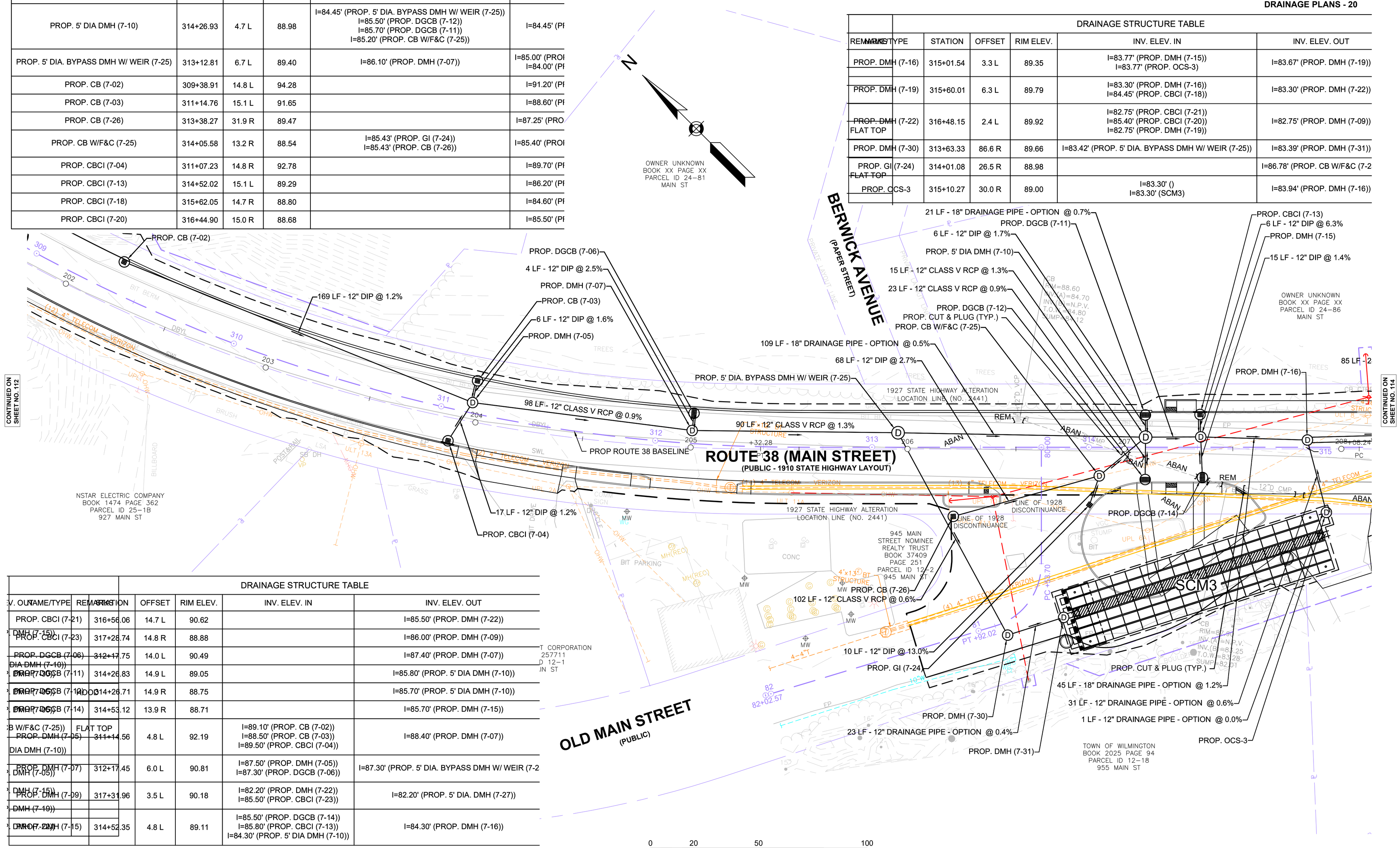
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	113	391
PROJECT FILE NO.	608051		

DRAINAGE PLANS - 20

DRAINAGE STRUCTURE TABLE					
NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV.
PROP. 5' DIA DMH (7-10)	314+26.93	4.7 L	88.98	I=84.45' (PROP. 5' DIA. BYPASS DMH W/ WEIR (7-25)) I=85.50' (PROP. DGCB (7-12)) I=85.70' (PROP. DGCB (7-11)) I=85.20' (PROP. CB W/F&C (7-25))	I=84.45' (PI
PROP. 5' DIA. BYPASS DMH W/ WEIR (7-25)	313+12.81	6.7 L	89.40	I=86.10' (PROP. DMH (7-07))	I=85.00' (PROI I=84.00' (PI
PROP. CB (7-02)	309+38.91	14.8 L	94.28		I=91.20' (PI
PROP. CB (7-03)	311+14.76	15.1 L	91.65		I=88.60' (PI
PROP. CB (7-26)	313+38.27	31.9 R	89.47		I=87.25' (PRO
PROP. CB W/F&C (7-25)	314+05.58	13.2 R	88.54	I=85.43' (PROP. GI (7-24)) I=85.43' (PROP. CB (7-26))	I=85.40' (PROI
PROP. CBCI (7-04)	311+07.23	14.8 R	92.78		I=89.70' (PI
PROP. CBCI (7-13)	314+52.02	15.1 L	89.29		I=86.20' (PI
PROP. CBCI (7-18)	315+62.05	14.7 R	88.80		I=84.60' (PI
PROP. CBCI (7-20)	316+44.90	15.0 R	88.68		I=85.50' (PI

DRAINAGE STRUCTURE TABLE					
REMARKS NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT
PROP. DMH (7-16)	315+01.54	3.3 L	89.35	I=83.77' (PROP. DMH (7-15)) I=83.77' (PROP. OCS-3)	I=83.67' (PROP. DMH (7-19))
PROP. DMH (7-19)	315+60.01	6.3 L	89.79	I=83.30' (PROP. DMH (7-16)) I=84.45' (PROP. CBCI (7-18))	I=83.30' (PROP. DMH (7-22))
PROP. DMH (7-22) FLAT TOP	316+48.15	2.4 L	89.92	I=82.75' (PROP. CBCI (7-21)) I=85.40' (PROP. CBCI (7-20)) I=82.75' (PROP. DMH (7-19))	I=82.75' (PROP. DMH (7-09))
PROP. DMH (7-30)	313+63.33	86.6 R	89.66	I=83.42' (PROP. 5' DIA. BYPASS DMH W/ WEIR (7-25))	I=83.39' (PROP. DMH (7-31))
PROP. GI (7-24) FLAT TOP	314+01.08	26.5 R	88.98		I=86.78' (PROP. CB W/F&C (7-2
PROP. OCS-3	315+10.27	30.0 R	89.00	I=83.30' () I=83.30' (SCM3)	I=83.94' (PROP. DMH (7-16))

DRAINAGE STRUCTURE TABLE					
V. OUT NAME/TYPE REMARKS	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT
PROP. CBCI (7-21) DMH (7-15))	316+56.06	14.7 L	90.62		I=85.50' (PROP. DMH (7-22))
PROP. CBCI (7-23)	317+28.74	14.8 R	88.88		I=86.00' (PROP. DMH (7-09))
PROP. DGCB (7-06) DIA DMH (7-10))	312+17.75	14.0 L	90.49		I=87.40' (PROP. DMH (7-07))
PROP. DGCB (7-11) DMH (7-05))	314+26.83	14.9 L	89.05		I=85.80' (PROP. 5' DIA DMH (7-10))
PROP. DGCB (7-12) DMH (7-05))	314+26.71	14.9 R	88.75		I=85.70' (PROP. DMH (7-15))
PROP. DGCB (7-14) B W/F&C (7-25))	314+53.12	13.9 R	88.71		I=85.70' (PROP. DMH (7-15))
PROP. DMH (7-05) DIA DMH (7-10))	311+14.56 FLAT TOP	4.8 L	92.19	I=89.10' (PROP. CB (7-02)) I=88.50' (PROP. CB (7-03)) I=89.50' (PROP. CBCI (7-04))	I=88.40' (PROP. DMH (7-07))
PROP. DMH (7-07) DMH (7-05))	312+17.45	6.0 L	90.81	I=87.50' (PROP. DMH (7-05)) I=87.30' (PROP. DGCB (7-06))	I=87.30' (PROP. 5' DIA. BYPASS DMH W/ WEIR (7-2
PROP. DMH (7-09) DMH (7-19))	317+31.96	3.5 L	90.18	I=82.20' (PROP. DMH (7-22)) I=85.50' (PROP. CBCI (7-23))	I=82.20' (PROP. 5' DIA. DMH (7-27))
PROP. DMH (7-15) DMH (7-22))	314+52.35	4.8 L	89.11	I=85.50' (PROP. DGCB (7-14)) I=85.80' (PROP. CBCI (7-13)) I=84.30' (PROP. 5' DIA DMH (7-10))	I=84.30' (PROP. DMH (7-16))



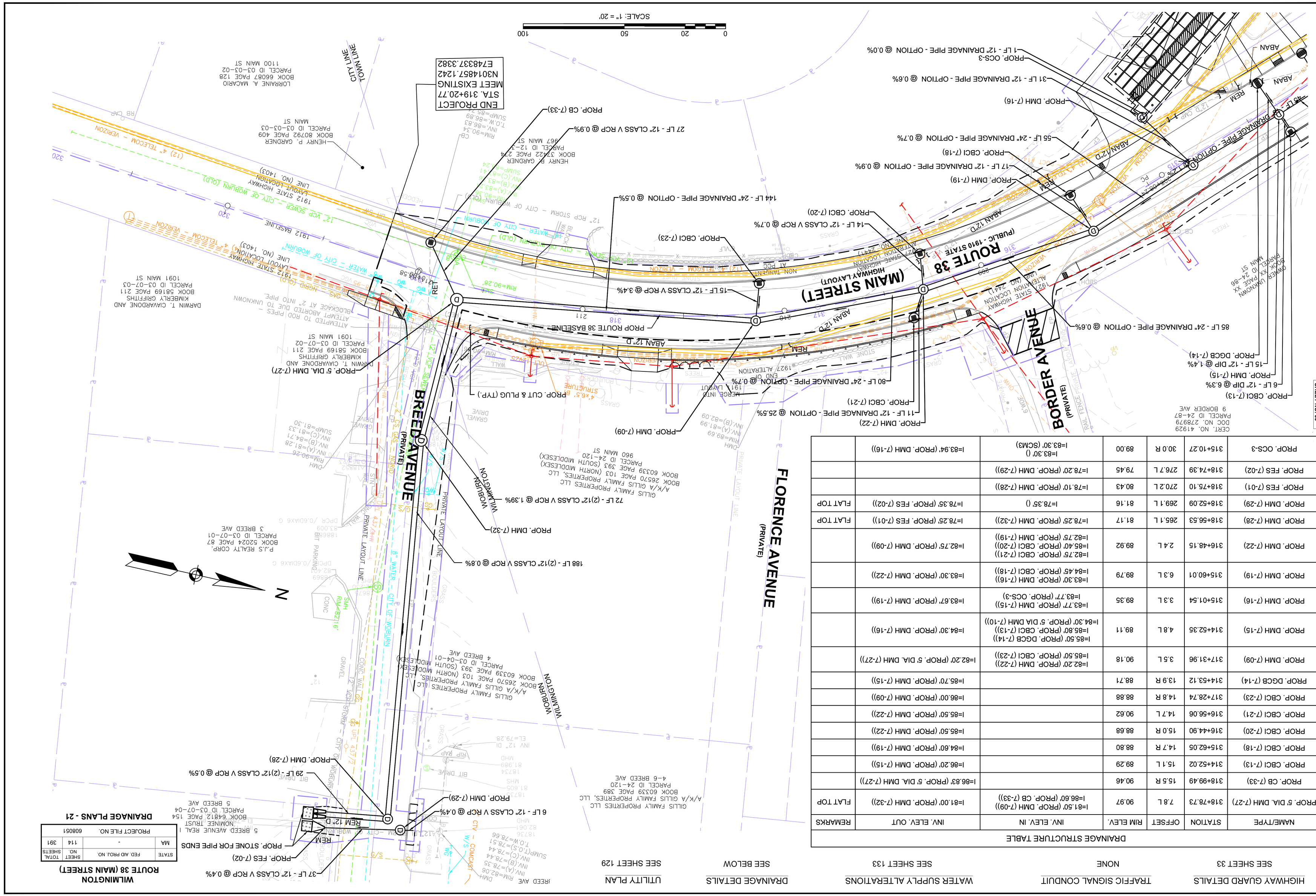
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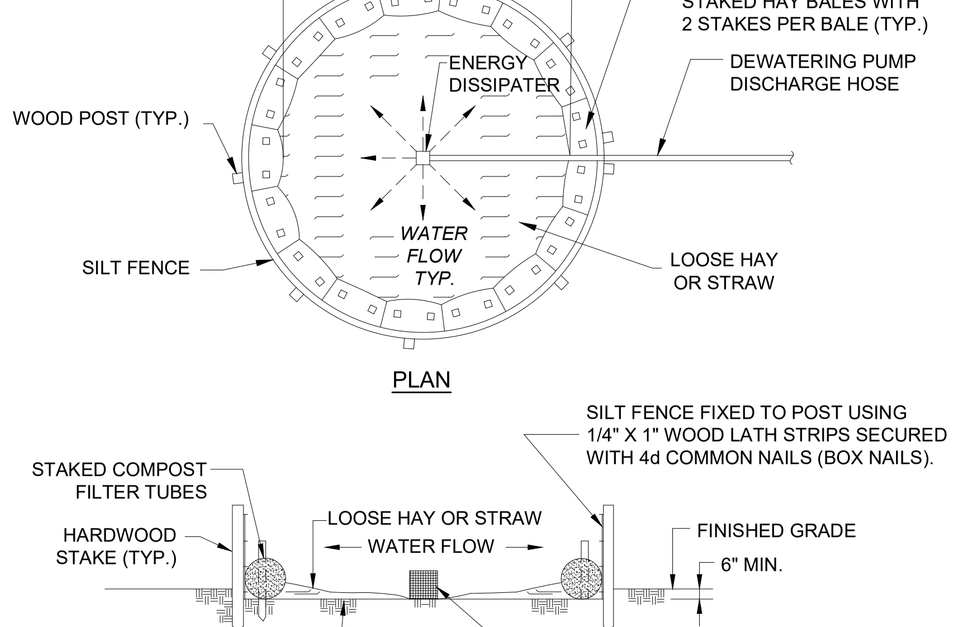
608051_UT03(DRAINAGE-PLANS).DWG Plotted on 13-Mar-2025 9:02 AM

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A008060 - 161


SCALE: 1" = 20'
0
20
50
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N
BREED AVENUE
(PRIVATE)
FLORENCE AVENUE
(PRIVATE)
BORDER AVENUE
(PRIVATE)
ROUTE 38
(MAIN STREET)
HIGHWAY LAYOUT)
(PUBLIC - 1910 STATE
WOBURN
WILLMINGTON
CITY LINE
TOWN LINE
END PROJECT
STA. 319+20.77
MEET EXISTING
N3014857.1242
E748337.3382
PROP. 5' DIA. DMH (7-27)
PROP. CUT & PLUG (TYP.)
PROP. DMH (7-09)
PROP. CB (7-33)
27 LF - 12" CLASS V RCP @ 0.9%
144 LF - 24" DRAINAGE PIPE - OPTION @ 0.5%
PROP. CBCI (7-23)
14 LF - 12" CLASS V RCP @ 0.7%
PROP. CBCI (7-20)
15 LF - 12" CLASS V RCP @ 3.4%
PROP ROUTE 38 BASELINE
ABAN 12"D
REM 12"D
80 LF - 24" DRAINAGE PIPE - OPTION @ 0.7%
PROP. CBCI (7-21)
11 LF - 12" DRAINAGE PIPE - OPTION @ 25.5%
PROP. DMH (7-22)
PROP. DMH (7-19)
17 LF - 12" DRAINAGE PIPE - OPTION @ 0.9%
PROP. CBCI (7-18)
55 LF - 24" DRAINAGE PIPE - OPTION @ 0.7%
PROP. DMH (7-16)
31 LF - 12" DRAINAGE PIPE - OPTION @ 0.6%
PROP. OCS-3
1 LF - 12" DRAINAGE PIPE - OPTION @ 0.0%
85 LF - 24" DRAINAGE PIPE - OPTION @ 0.6%
PROP. CBCI (7-13)
6 LF - 12" DIP @ 6.3%
15 LF - 12" DIP @ 1.4%
PROP. DMH (7-15)
PROP. DGCB (7-14)
PROP. 5' DIA. DMH (7-27)
29 LF - (2)12" CLASS V RCP @ 0.5%
PROP. DMH (7-28)
6 LF - 12" CLASS V RCP @ 0.4%
PROP. DMH (7-29)
PROP. FES (7-02)
PROP. STONE FOR PIPE ENDS
37 LF - 12" CLASS V RCP @ 0.4%
REM 12"D
REM
72 LF - (2)12" CLASS V RCP @ 1.39%
PROP. DMH (7-32)
188 LF - (2)12" CLASS V RCP @ 0.8%
PROP. CB (7-33)
PROP. DMH (7-16)
PROP. DMH (7-19)
PROP. CBCI (7-18)
PROP. DMH (7-22)
PROP. CBCI (7-21)
PROP. DMH (7-15)
PROP. DGCB (7-14)
PROP. CBCI (7-13)
PROP. DMH (7-09)
PROP. CBCI (7-20)
PROP. DMH (7-28)
PROP. DMH (7-29)
PROP. DMH (7-32)
PROP. CB (7-33)
PROP. DMH (7-15)
PROP. DMH (7-16)
PROP. DMH (7-19)
PROP. DMH (7-22)
PROP. DMH (7-09

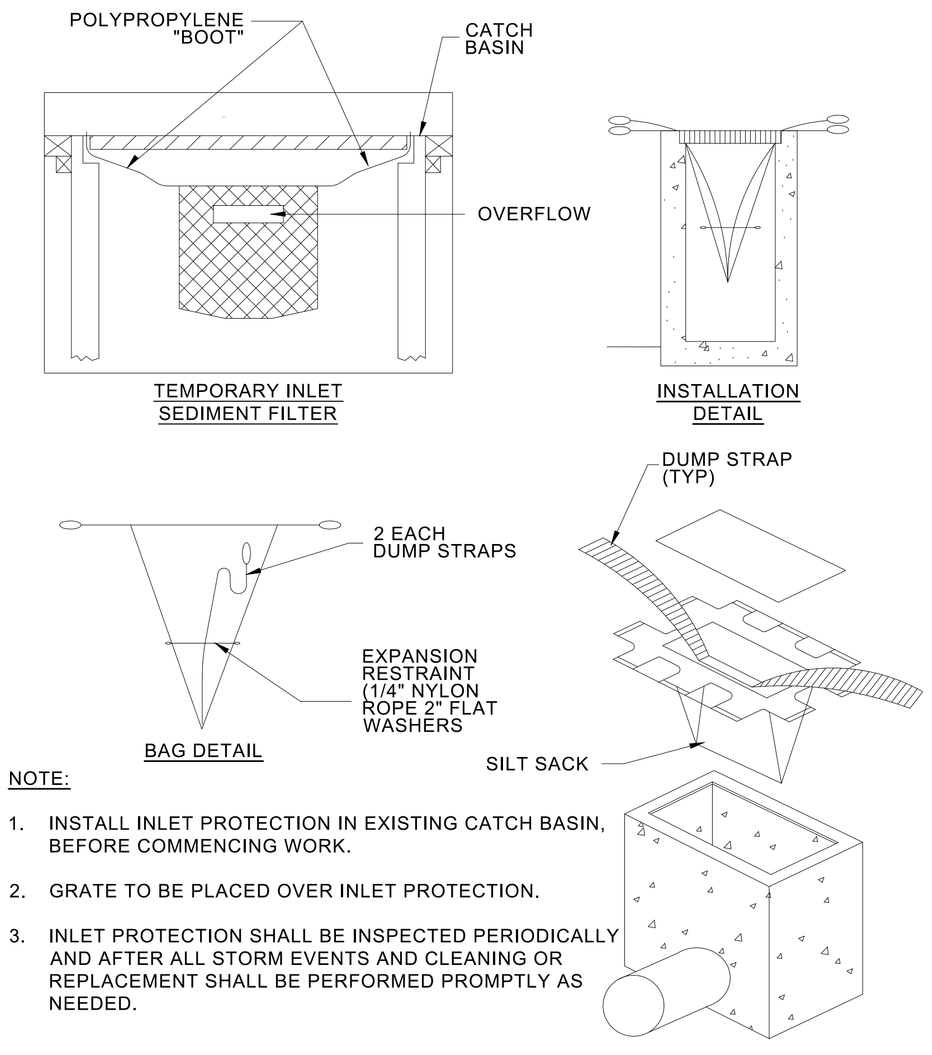
608051_UT02(DRAINAGE-DETAILS).DWG Plotted on 12-Mar-2025 3:14 PM
Proposal No. 608051 - 132406
A008860 - 163



NOTE:
THIS DETAIL SHOWS ONE METHOD OF SEDIMENTATION CONTROL DURING DEWATERING.

DEWATERING SEDIMENTATION BASIN DETAIL

NOT TO SCALE

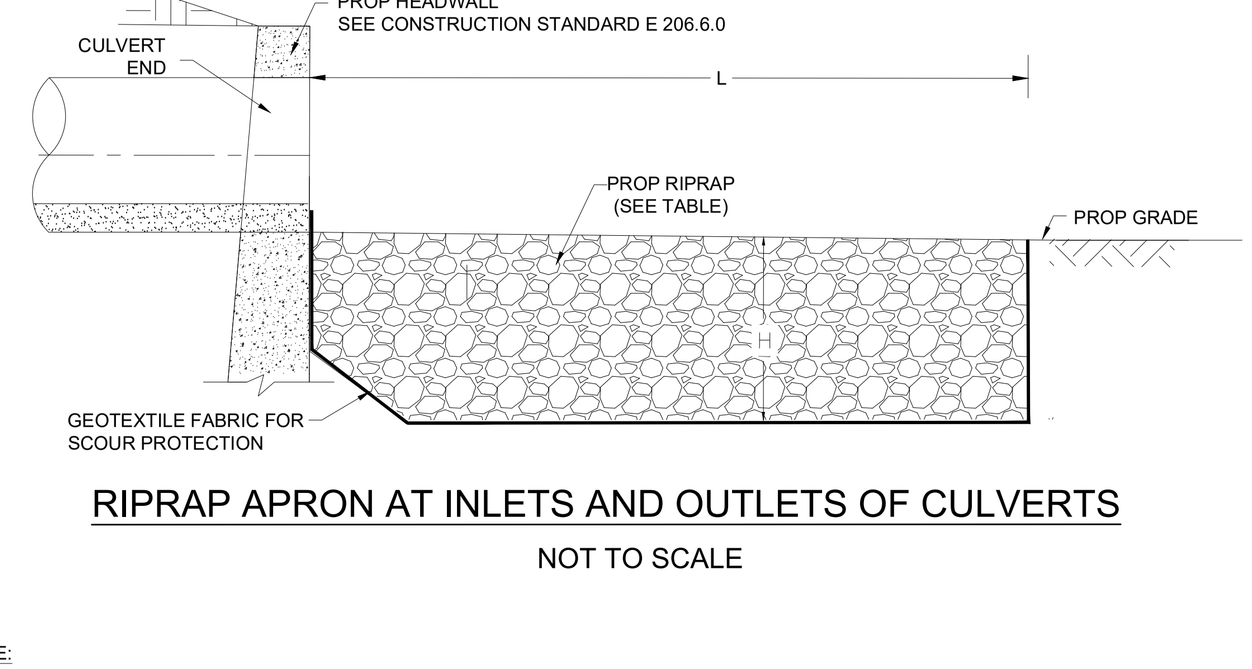


NOTE:

1. INSTALL INLET PROTECTION IN EXISTING CATCH BASIN, BEFORE COMMENCING WORK.
2. GRATE TO BE PLACED OVER INLET PROTECTION.
3. INLET PROTECTION SHALL BE INSPECTED PERIODICALLY AND AFTER ALL STORM EVENTS AND CLEANING OR REPLACEMENT SHALL BE PERFORMED PROMPTLY AS NEEDED.

INLET PROTECTION FILTER BAG

NOT TO SCALE

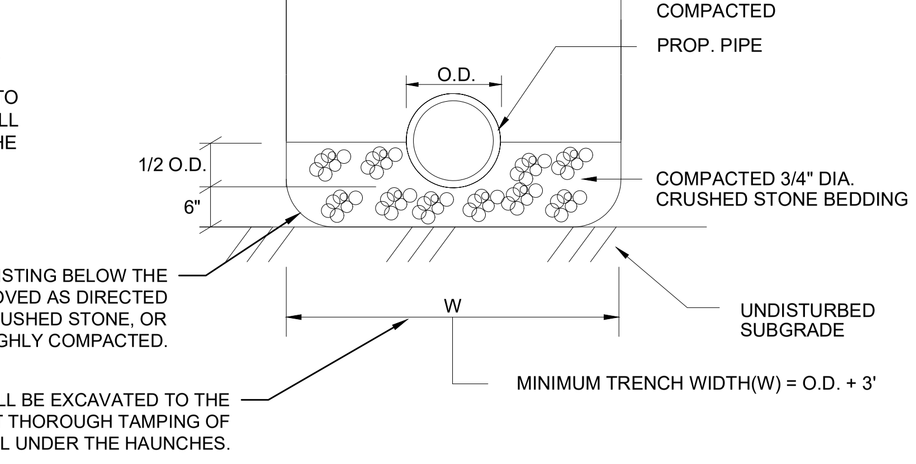


RIPRAP APRON AT INLETS AND OUTLETS OF CULVERTS

NOT TO SCALE

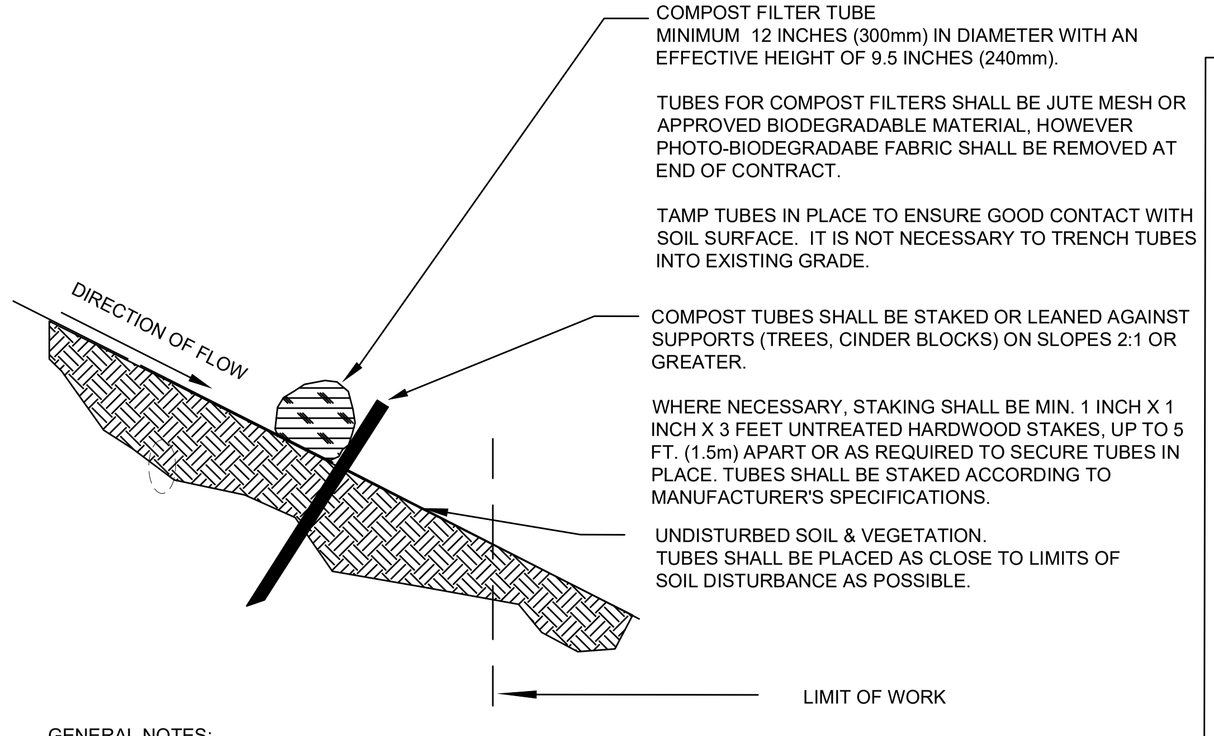
NOTE:

1. PERMANENT PAVING TO BE USED IN ALL AREAS OF MILL AND OVERLAY. MATERIALS SHALL MATCH CORRESPONDING FULL DEPTH SECTION. REFER TO TYPICAL ROADWAY SECTIONS.
2. HMA FOR PATCHING TO BE USED IN AREAS OF FUTURE FULL DEPTH CONSTRUCTION.
3. EXISTING MATERIAL OBTAINED FROM EXCAVATION THAT IS DETERMINED TO BE SUITABLE, AND APPROVED BY THE ENGINEER, OR SATISFACTORY BORROW SHALL BE USED. BACKFILL SHALL BE PLACED IN LAYERS NO MORE THAN 6 INCHES IN DEPTH AND THOROUGHLY COMPACTED. BACKFILLING TO A POINT 2 FEET OVER THE PIPE SHALL CONTAIN NO STONES LARGER THAN 3 INCHES - EXCEPT MATERIAL USED TO BACKFILL CORRUGATED PLASTIC PIPE SHALL CONSIST OF GRAVEL BORROW MEETING THE REQUIREMENTS OF M1.03.0: GRAVEL BORROW TYPE D, TO A DEPTH OF 2 FEET OVER THE TOP OF PIPE.



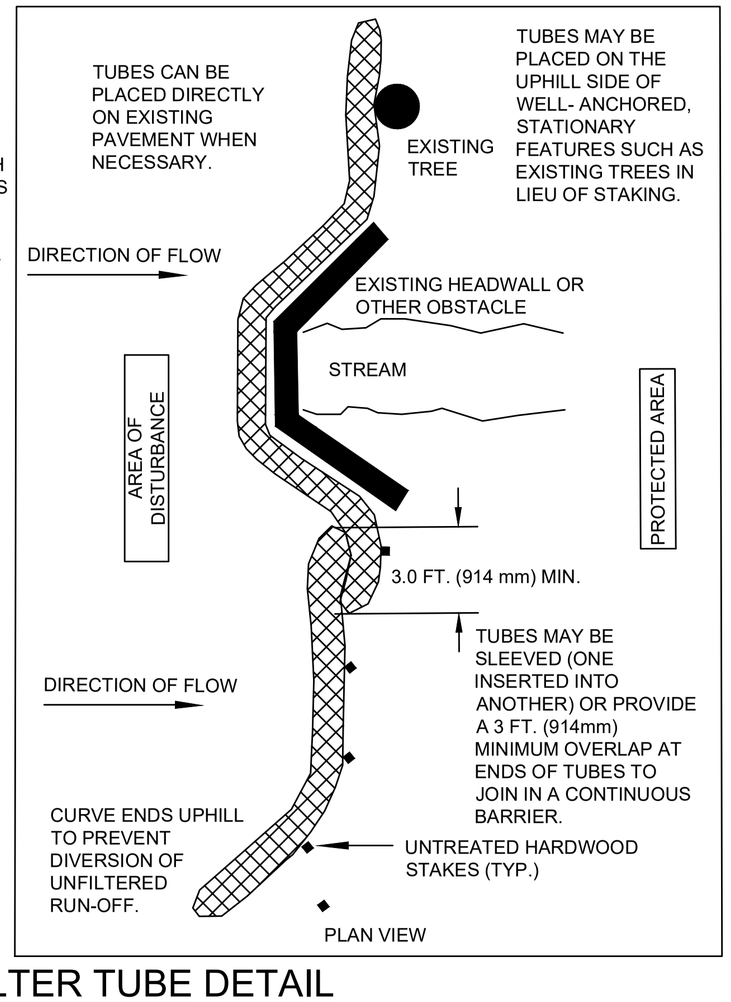
TYPICAL PIPE TRENCH

NOT TO SCALE



GENERAL NOTES:

1. PROVIDE A MINIMUM TUBE DIAMETER OF 12 INCHES (300mm) FOR SLOPES UP TO 50 FEET (15.24m) 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. TUBE LOCATION MAY BE SHIFTED TO ADJUST TO LANDSCAPE FEATURES, BUT SHALL PROTECT UNDISTURBED AREA AND VEGETATION TO MAXIMUM EXTENT POSSIBLE.
4. DO NOT INSTALL IN PERENNIAL, EPHEMERAL OR INTERMITTENT STREAMS.
5. ADDITIONAL TUBES SHALL BE USED AT THE DIRECTION OF THE ENGINEER.
6. ADDITIONAL STAKING SHALL BE USED AT THE DIRECTION OF THE ENGINEER.



TYPICAL COMPOST FILTER TUBE DETAIL

NOT TO SCALE

EROSION AND SEDIMENT CONTROLS

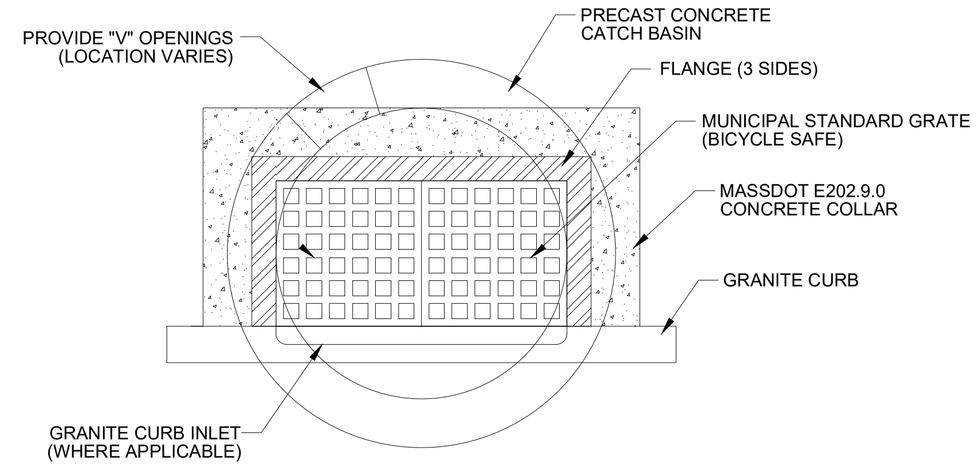
1. THE CONTRACTOR IS RESPONSIBLE FOR CONTROLLING THE EROSION AND SEDIMENT DURING THE CONSTRUCTION PROCESS. SITE SPECIFIC CONDITIONS MAY REQUIRE MODIFICATIONS IN THE FIELD, BUT THE CONTRACTOR MUST ENSURE THAT THE CHANGES MEET THE MINIMUM REQUIREMENTS OF THIS PLAN AND ARE APPROVED BY THE ENGINEER.
2. IN ORDER TO MINIMIZE EROSION AND SEDIMENT RUNOFF FROM THE SITE, THE CONTRACTOR SHALL MAINTAIN EXISTING VEGETATION WHERE POSSIBLE AND STABILIZE THE DISTURBED PORTIONS OF THE SITE AS QUICKLY AS POSSIBLE. THIS MAY INCLUDE PHASING THE PROJECT AS NEEDED TO MINIMIZE THE SIZE OF THE DISTURBED AREAS ON THE SITE. THE COST OF PHASING THE PROJECT IS INCIDENTAL TO THE CONTRACT.
3. THE CONTRACTOR MUST ALSO ANTICIPATE INCREASED RUNOFF FROM STEEPER SLOPES AND DURING HIGH GROUNDWATER CONDITIONS. THIS MAY OCCUR DURING THE WET SEASON (TYPICALLY MARCH THROUGH APRIL) OR AFTER SIGNIFICANT PRECIPITATION EVENTS.
4. THE CONTRACTOR IS RESPONSIBLE FOR THE INSTALLATION OF SILT FENCES, DRAINAGE SWALES, EARTH DIKES, TEMPORARY SETTLING BASINS, CHECK DAMS AND TEMPORARY SEDIMENT BASINS. THESE PRACTICES INCLUDE DIVERTING FLOWS FROM EXPOSED SOILS, LIMITING RUNOFF AND LIMITING THE DISCHARGE OF POLLUTANTS FROM EXPOSED AREAS OF THE SITE TO THE MAXIMUM EXTENT PRACTICABLE AND SHALL BE CONSIDERED INCIDENTAL TO THE CONTRACT.
5. ALL DISTURBED SURFACES SHALL BE STABILIZED WITHIN 14 DAYS AFTER CONSTRUCTION IN ANY PORTION OF THE SITE THAT HAS BEEN COMPLETED OR WHERE CONSTRUCTION HAS TEMPORARILY CEASED.
6. THE CONTRACTOR SHALL, AT ALL TIMES, HAVE A STOCKPILE OF COMPOST FILTER TUBES AND SILT FENCE ADEQUATE TO REINFORCE/REPLACE EROSION AND SEDIMENT CONTROL AS NEEDED.
7. IF REQUIRED, THE CONTRACTOR SHALL OBTAIN ALL PERMITS ASSOCIATED WITH DEWATERING ACTIVITIES AT NO ADDITIONAL COST TO THE TOWN.

WILMINGTON, MA
ROUTE 38 (MAIN STREET)

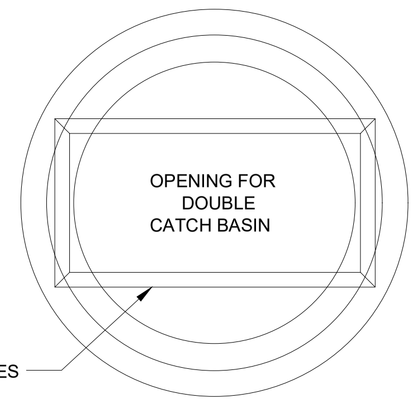
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	###	391
PROJECT FILE NO.		608051	

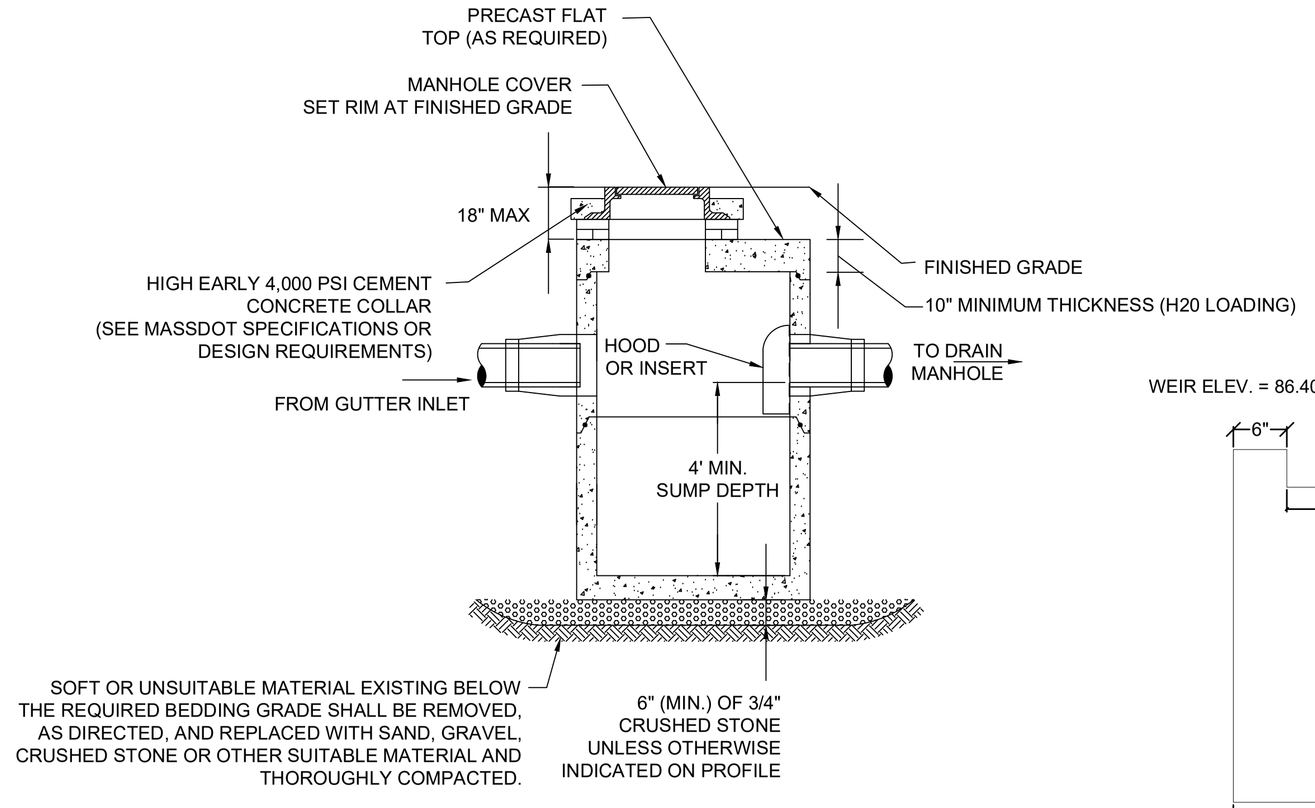
DRAINAGE & UTILITY DETAILS - 2

608051_UT02(DRAINAGE-DETAILS).DWG Plotted on 12-Mar-2025 3:14 PM
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A008860 - 164



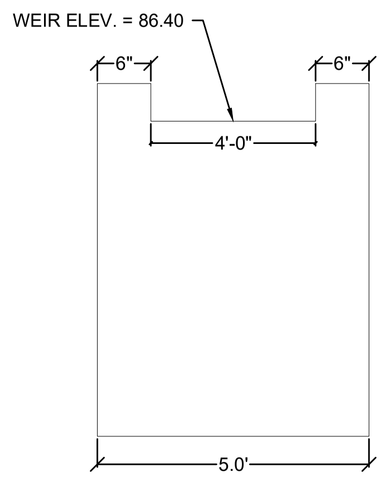
PLAN



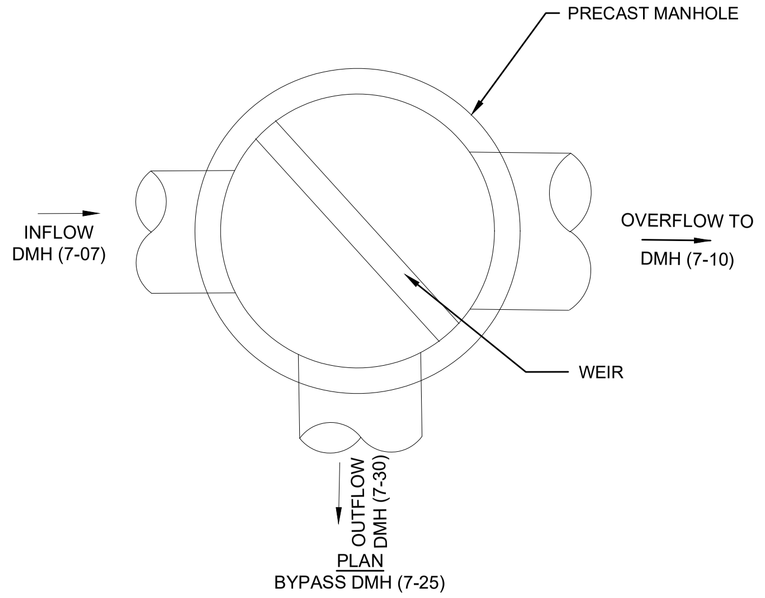


CATCH BASIN WITH FRAME AND COVER

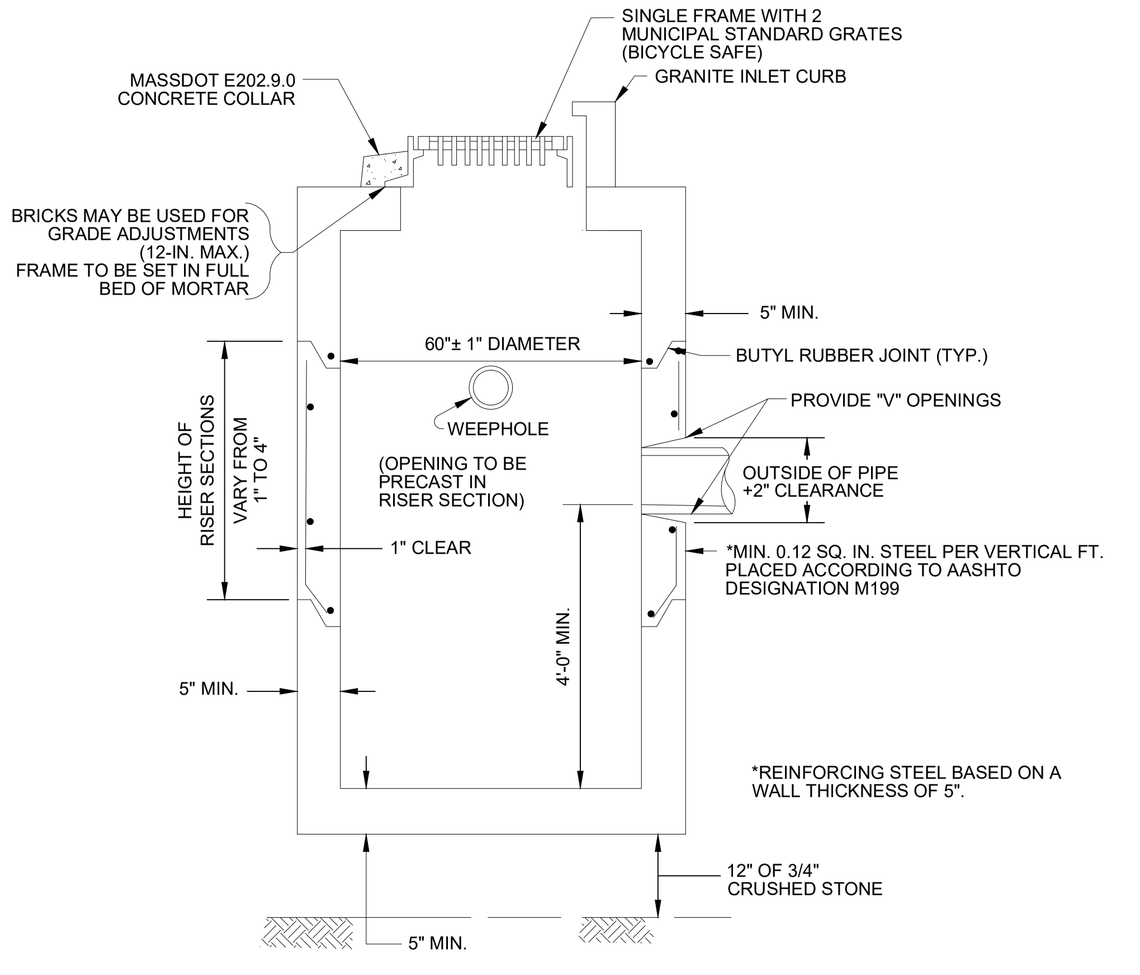
NOT TO SCALE



CONCRETE WEIR PROFILE
NOT TO SCALE



PLAN
BYPASS DMH (7-25)

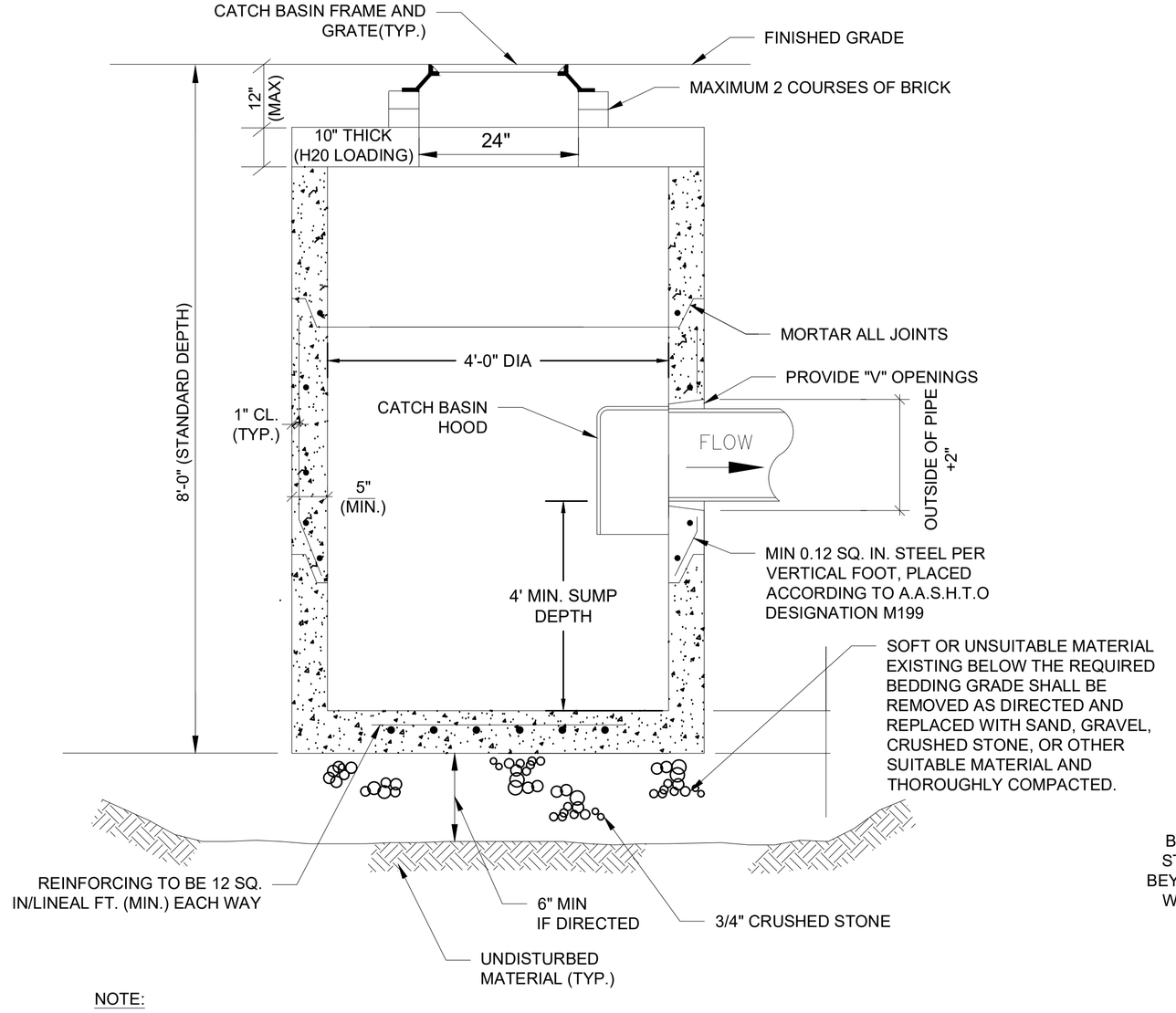


DOUBLE GRATE CATCH BASIN

NOT TO SCALE

NOTE:

1. FACE OF PIPE FLUSH OR NOT TO PROJECT MORE THAN 4" FROM FACE OF WALL ALONG CENTERLINE OF PIPE.
2. FRAME SHALL BE EQUAL TO EJUSA 0MA544000001
3. ALL CONCRETE TO BE AIR ENTRAINED.
4. FOR DESCRIPTION, MATERIALS AND CONSTRUCTION METHOD, SEE SPECIFICATIONS.

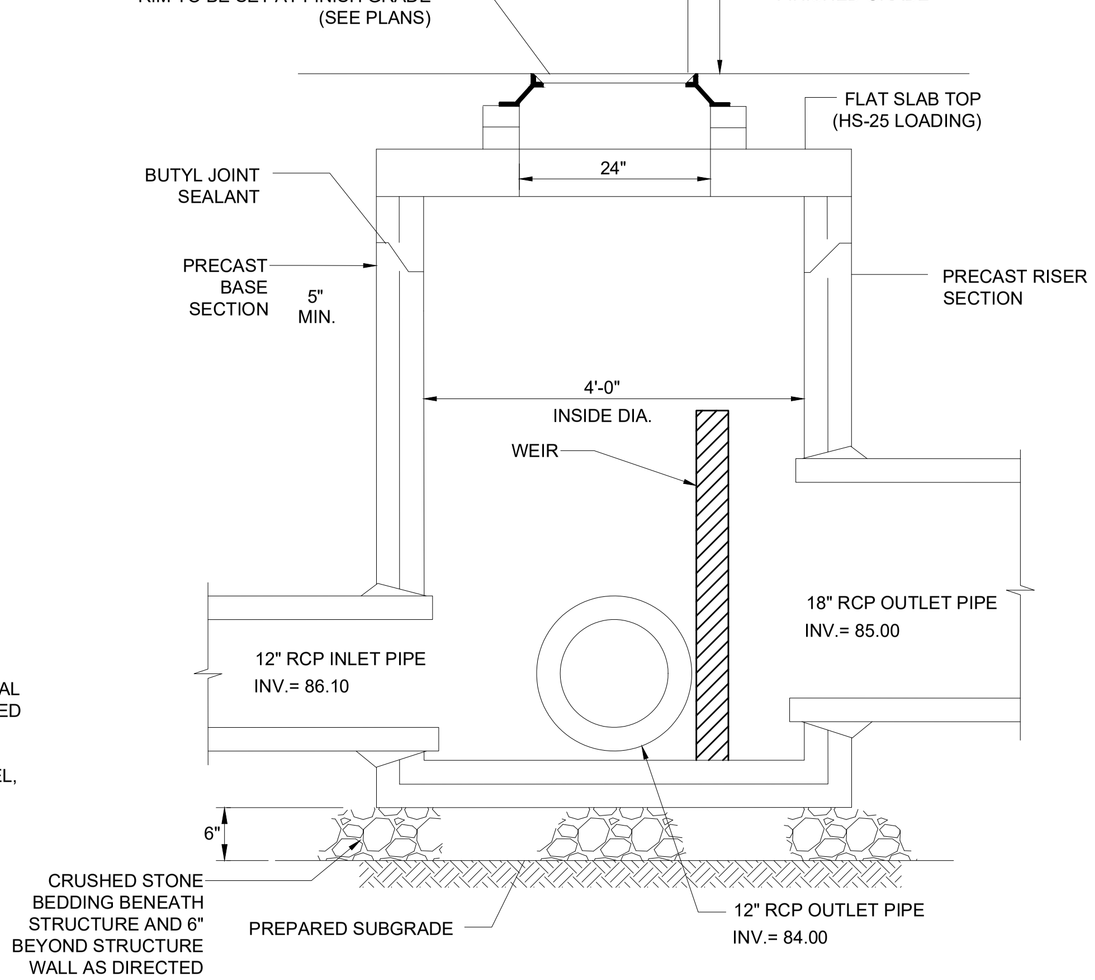


NOTE:

4" HEAVY DUTY FRAME AND GRATE TO BE USED FOR FLAT TOP DRAINAGE STRUCTURES WHERE DISTANCE BETWEEN TOP OF PIPE AND GROUND IS 2 FEET OR LESS.

TYPICAL FLAT TOP SLAB CATCH BASIN DETAIL

NOT TO SCALE



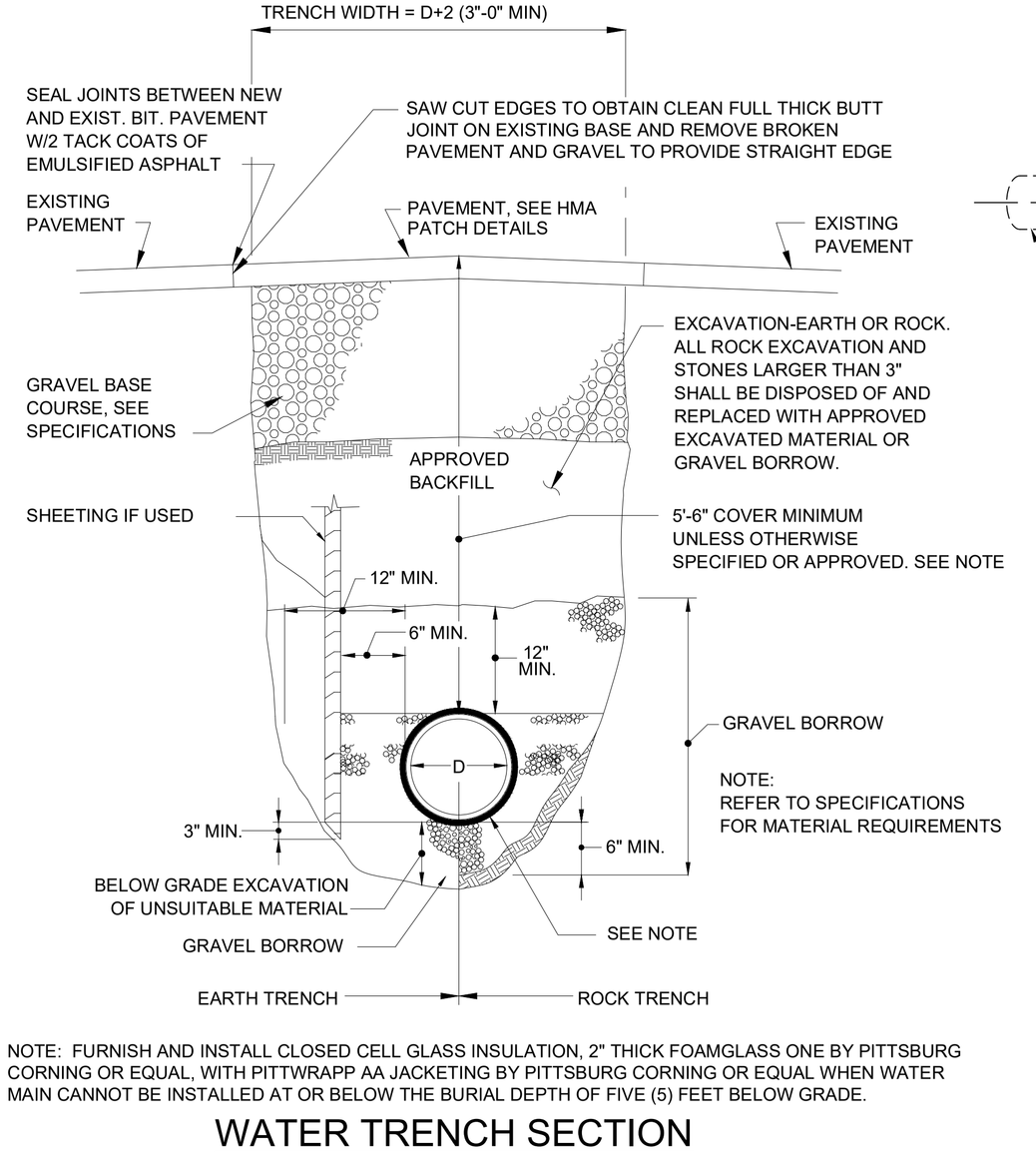
NOTES:

1. PRECAST CONCRETE SECTIONS SHALL CONFORM TO ASTM C-478
2. STEEL REINFORCING SHALL CONFORM TO ASTM A185

5' DIAMETER BYPASS DMH WITH WEIR (7-25)

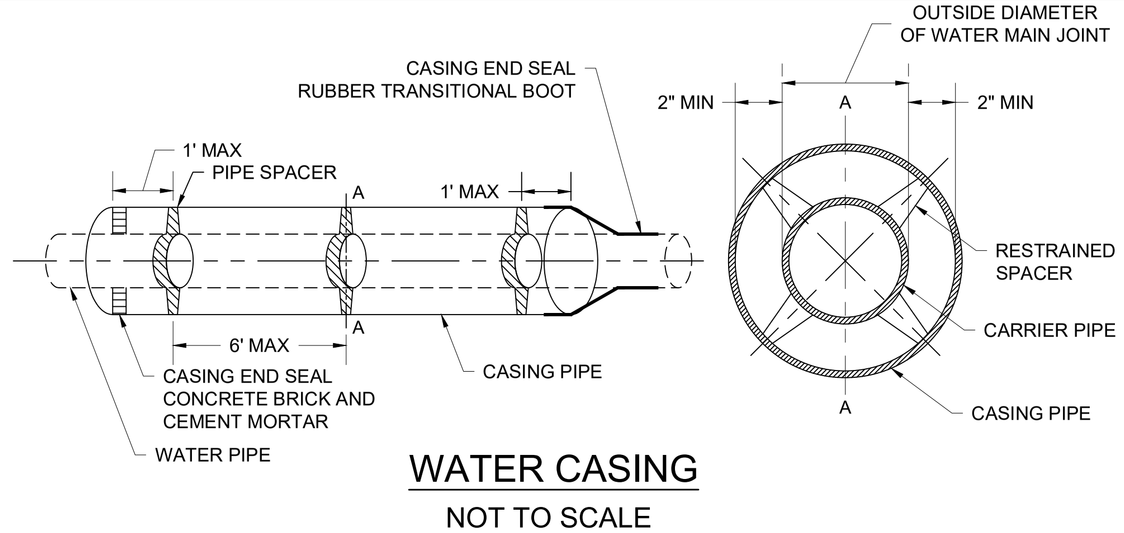
NOT TO SCALE

608051_UT02(DRAINAGE-DETAILS).DWG Plotted on 12-Mar-2025 3:14 PM
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NOTE: FURNISH AND INSTALL CLOSED CELL GLASS INSULATION, 2" THICK FOAMGLASS ONE BY PITTSBURG CORNING OR EQUAL, WITH PITTWRAPP AA JACKETING BY PITTSBURG CORNING OR EQUAL WHEN WATER MAIN CANNOT BE INSTALLED AT OR BELOW THE BURIAL DEPTH OF FIVE (5) FEET BELOW GRADE.

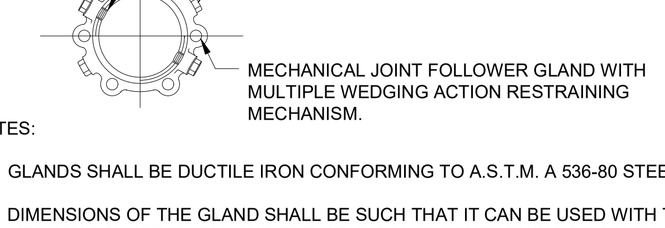
WATER TRENCH SECTION
NOT TO SCALE



WATER CASING
NOT TO SCALE

NOTE:

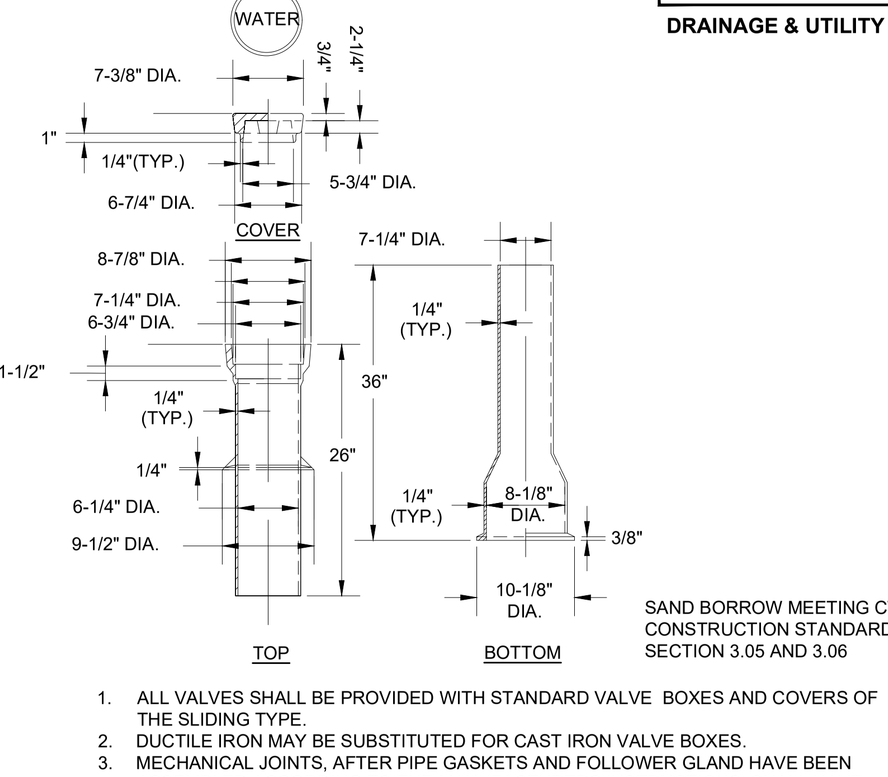
1. CARRIER PIPE MUST BE REMOVABLE FROM CASING IN EITHER DIRECTION.
2. SPACERS ARE REQUIRED FOR ALL USES OF CASING PIPE.
3. SPACER TO BE INSTALLED WITHIN TWO FEET OF SPIGOT END OF PIPE.
4. ADJUSTABLE CASING SPACERS ARE ALLOWED FOR ADJUSTMENT OF CARRIER PIPE SLOPE.
5. FOR DESCRIPTION, MATERIALS AND CONSTRUCTION METHOD, SEE SPECIFICATIONS.



NOTES:

1. GLANDS SHALL BE DUCTILE IRON CONFORMING TO A.S.T.M. A 536-80 STEEL.
2. DIMENSIONS OF THE GLAND SHALL BE SUCH THAT IT CAN BE USED WITH THE STANDARDIZED MECHANICAL JOINT BELL AND TEE-HEAD BOLTS CONFORMING TO A.N.S.I./A.W.W.A. A 21.11 AND A.N.S.I./A.W.W.A. C 153/A 21.53 OF LATEST REVISION.
3. LENGTH OF RESTRAINED PIPE SHALL BE IN ACCORDANCE WITH "THRUST RESTRAINT DESIGN FOR DUCTILE IRON PIPE" AS PUBLISHED BY THE DUCTILE IRON PIPE RESEARCH ASSOCIATION (DIPRA).

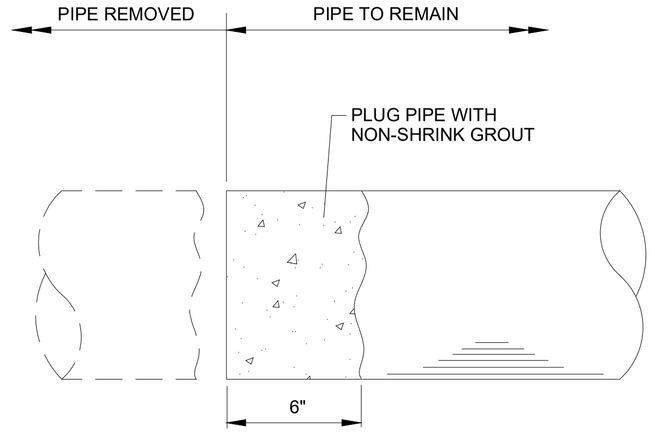
MECHANICAL JOINT RESTRAINT
NOT TO SCALE



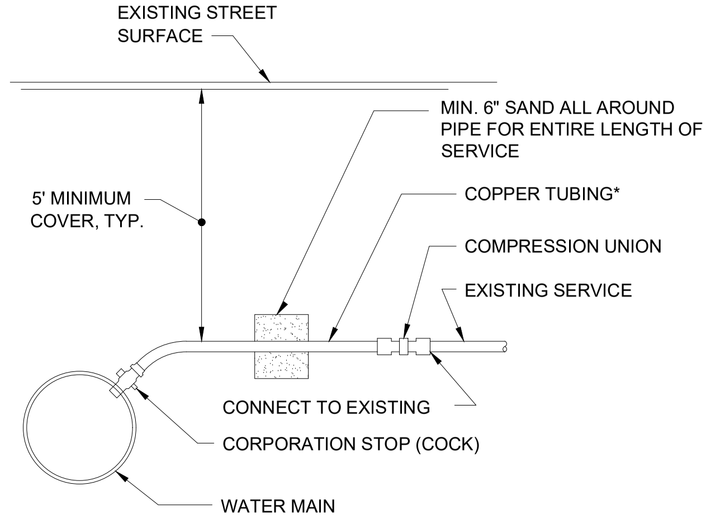
SAND BORROW MEETING CWD CONSTRUCTION STANDARDS SECTION 3.05 AND 3.06

1. ALL VALVES SHALL BE PROVIDED WITH STANDARD VALVE BOXES AND COVERS OF THE SLIDING TYPE.
2. DUCTILE IRON MAY BE SUBSTITUTED FOR CAST IRON VALVE BOXES.
3. MECHANICAL JOINTS, AFTER PIPE GASKETS AND FOLLOWER GLAND HAVE BEEN ASSEMBLED ACCORDING TO THE MANUFACTURERS INSTRUCTIONS, SHALL HAVE BOLTS INSERTED AND TIGHTENED BY HAND UNTIL ALL ARE EVEN. A RATCHET WRENCH IS THEN USED TO COMPLETE TIGHTENING OF THE BOLTS AND NUTS WITH CARE BEING TAKEN TO TIGHTEN THE OPPOSITE NUTS SO AS TO KEEP GLAND SQUARE WITH SOCKET AND BOLT STRESS EVENLY DISTRIBUTED.
4. DIRECTION OF VALVE OPENING TO BE IN ACCORDANCE WITH TOWN OF WILMINGTON REQUIREMENTS.

STANDARD VALVE BOX AND COVER
NOT TO SCALE

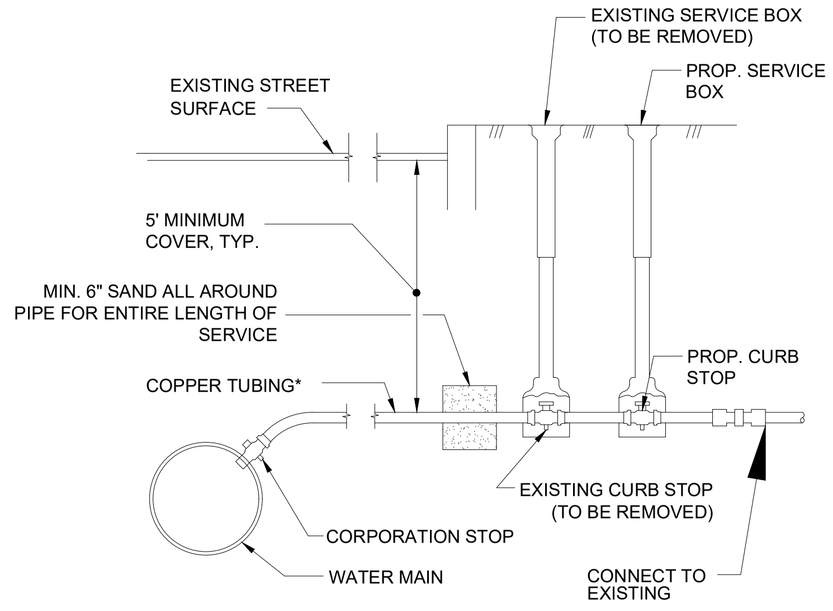


TYPICAL PIPE PLUGGING DETAIL
NOT TO SCALE



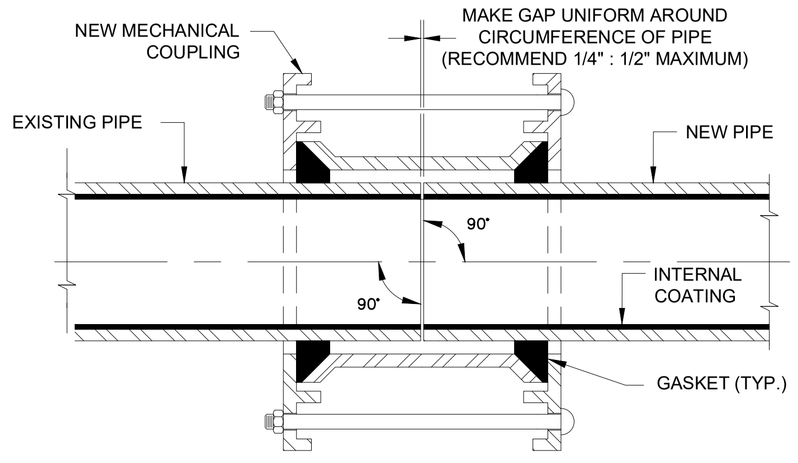
* NOTE: REFER TO SPECIAL PROVISIONS FOR MATERIAL REQUIREMENTS

WATER SERVICE CONNECTION
NOT TO SCALE



*NOTE: FOR USE ONLY AREAS DESCRIBED IN GENERAL NOTE 8. REFER TO SPECIAL PROVISIONS FOR MATERIAL REQUIREMENTS.

WATER SERVICE CONNECTION WITH NEW CURB STOP
NOT TO SCALE



MECHANICAL COUPLING (NON-INSULATING)

NOTES:

1. CONTRACTOR TO VERIFY OUTSIDE DIAMETER OF ALL EXISTING AND PROPOSED PIPES FOR SIZING COUPLINGS.
2. TRANSITION COUPLINGS WITH LARGER GASKETS OR REDUCING MIDDLE RINGS AS REQUIRED BY MANUFACTURER TO SPAN PIPES WITH DIFFERENT SIZE OUTSIDE DIAMETERS. A REDUCING MIDDLE RING SHALL BE USED AT LOCATIONS WHERE OUTSIDE DIAMETERS DIFFER BY 1-INCH OR MORE.
3. MECHANICAL COUPLINGS AND ALL HARDWARE SHALL BE COMPLETELY WRAPPED WITH WAX-TAPE COATING SYSTEM.
4. MECHANICAL COUPLINGS AND ALL HARDWARE SHALL BE INSTALLED AND TESTED AS PER MANUFACTURER'S STANDARDS AND INSTALLATION GUIDELINES.

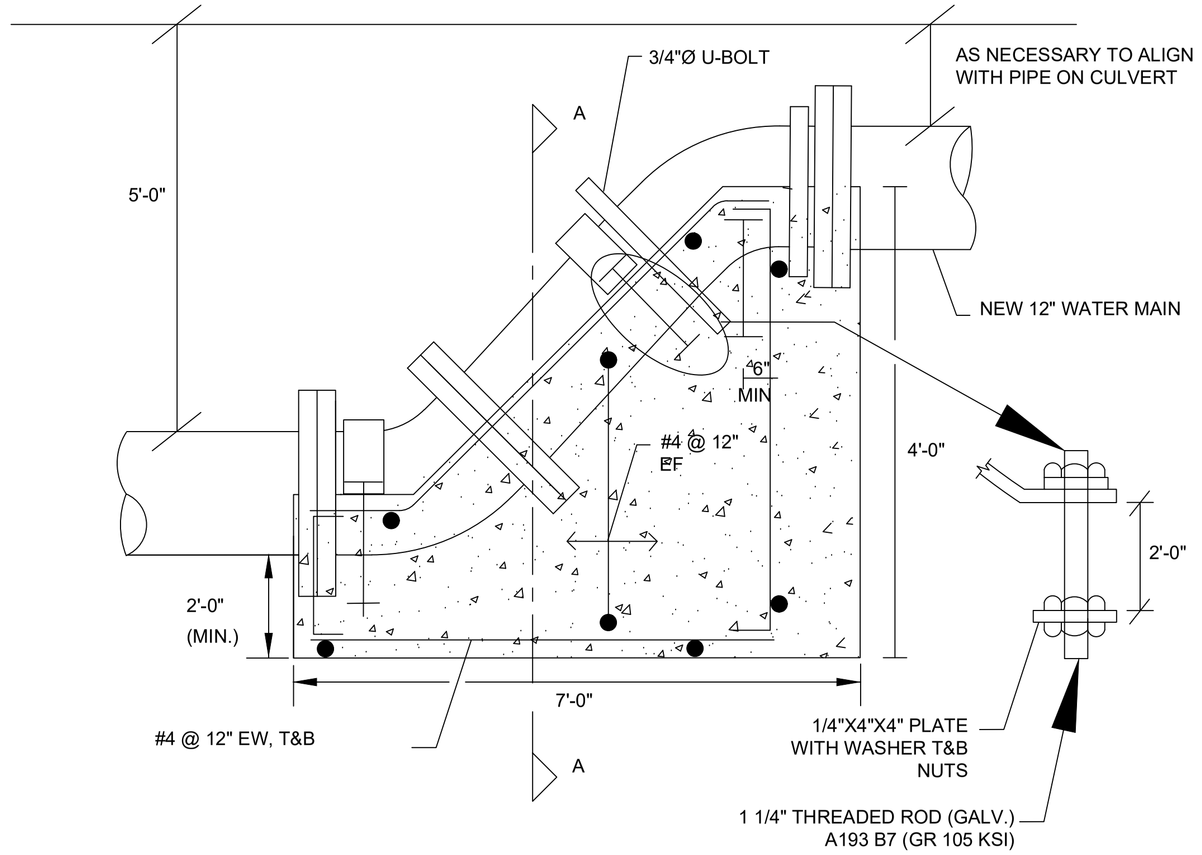
MECHANICAL COUPLINGS
NOT TO SCALE

WILMINGTON, MA
ROUTE 38 (MAIN STREET)

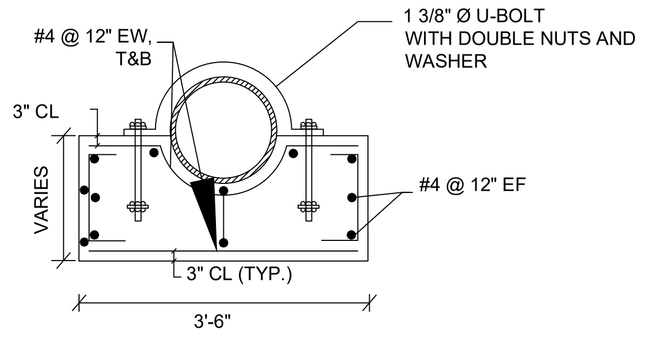
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	###	391
PROJECT FILE NO.	608051		

DRAINAGE & UTILITY DETAILS - 4

608051_UT02(DRAINAGE-DETAILS).DWG Plotted on 12-Mar-2025 3:14 PM
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A00809 - 166



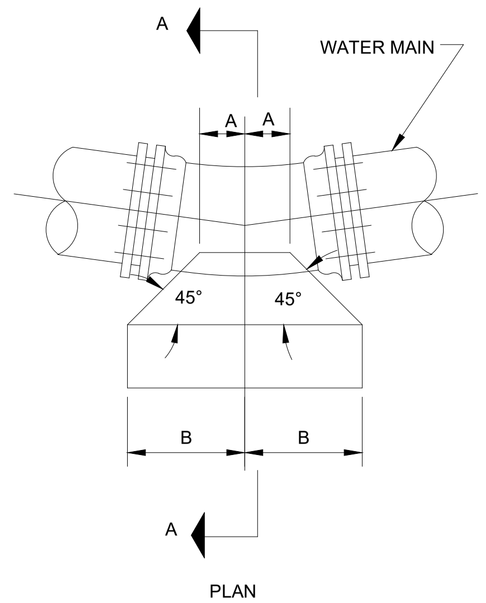
ELEVATION



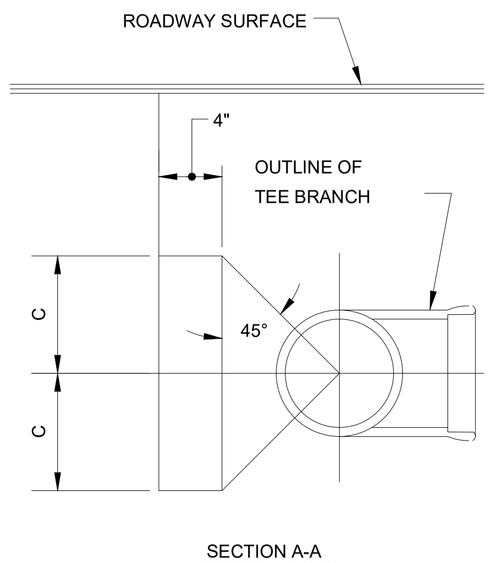
SECTION A-A

THRUST BLOCK DETAIL - VERTICAL BENDS AT MAPLE MEADOW BROOK CULVERT

NOT TO SCALE



PLAN
NOT TO SCALE



SECTION A-A
NOT TO SCALE

HORIZONTAL THRUST BLOCK SCHEDULE
TABLE OF DIMENSIONS IN INCHES

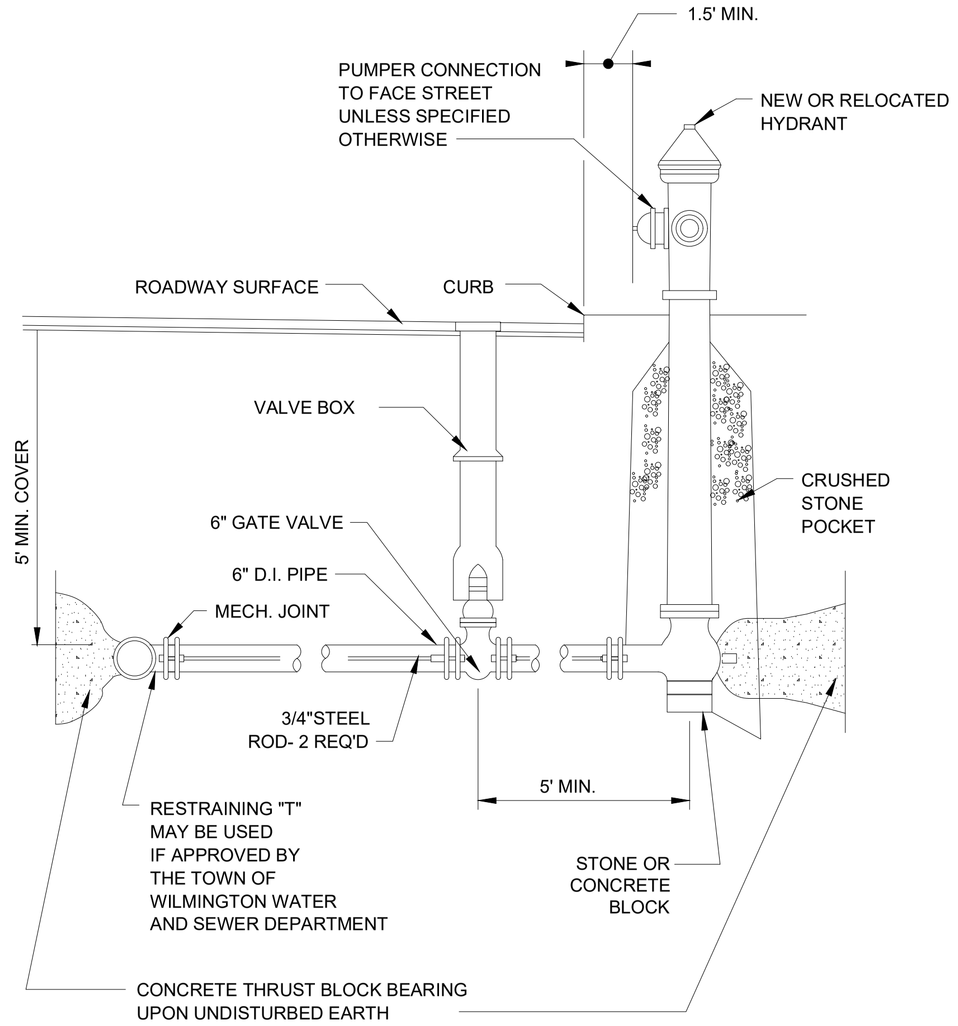
		A	B	C
6", 8" BEND				
	11 1/4°, 22 1/2°	6"	10"	10"
	45°	6"	14"	14"
	90°	9"	19"	19"
10", 12" BEND				
	11 1/4°, 22 1/2°	6"	14"	14"
	45°	6"	20"	20"
	90°	9"	27"	27"
	TEE (BRANCH)/CAP			
	6"	6"	15"	15"
	8"	9"	16"	16"
	10"	9"	19"	19"
	12"	9"	23"	23"

NOTE : REFER TO SPECIFICATIONS FOR MATERIAL REQUIREMENTS

SUBJECT TO FIELD MODIFICATION BY ENGINEER

THRUST BLOCK DETAIL

NOT TO SCALE



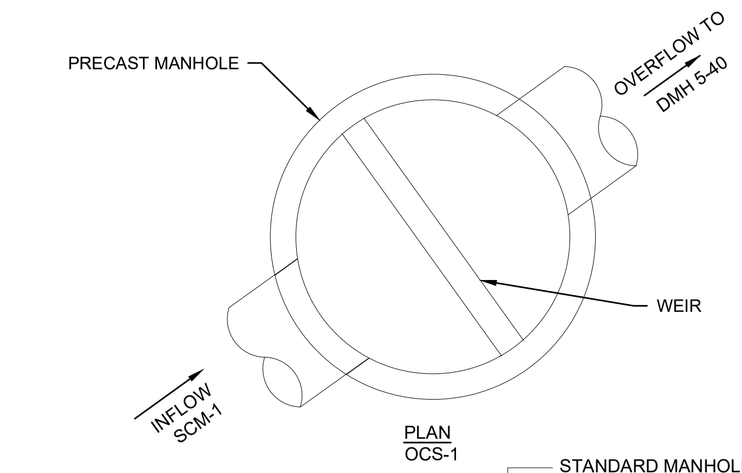
FIRE HYDRANT DETAIL

NOT TO SCALE

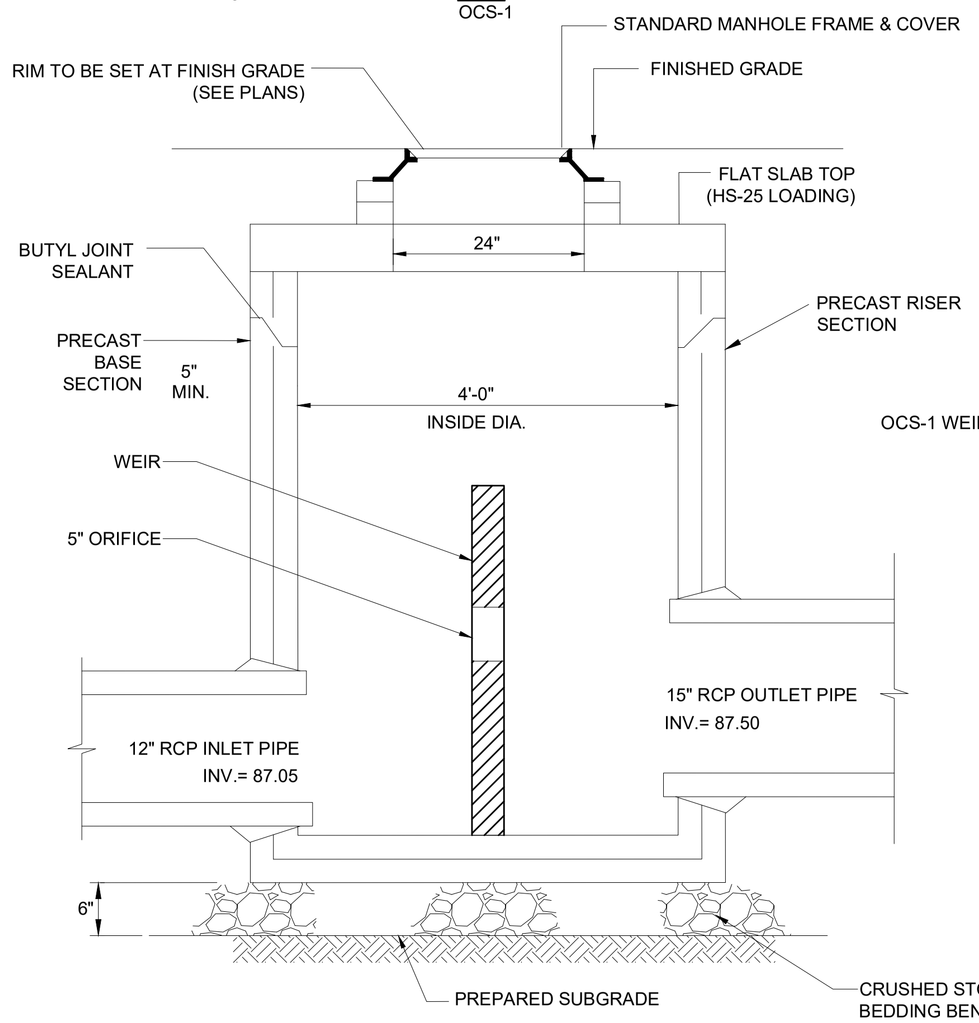
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	###	391
PROJECT FILE NO.	608051		

DRAINAGE & UTILITY DETAILS - 5

608051_UT02(DRAINAGE-DETAILS).DWG Plotted on 12-Mar-2025 3:14 PM
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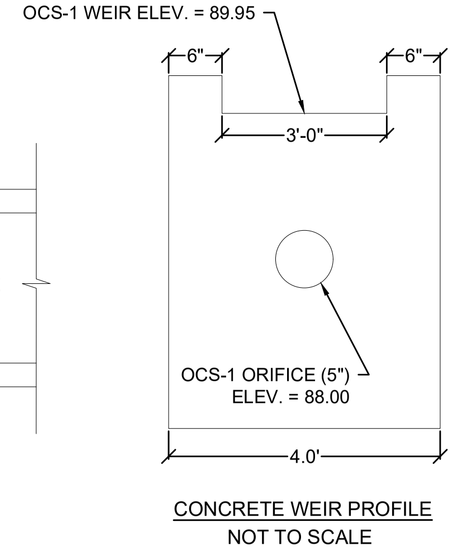
PLAN
OCS-1



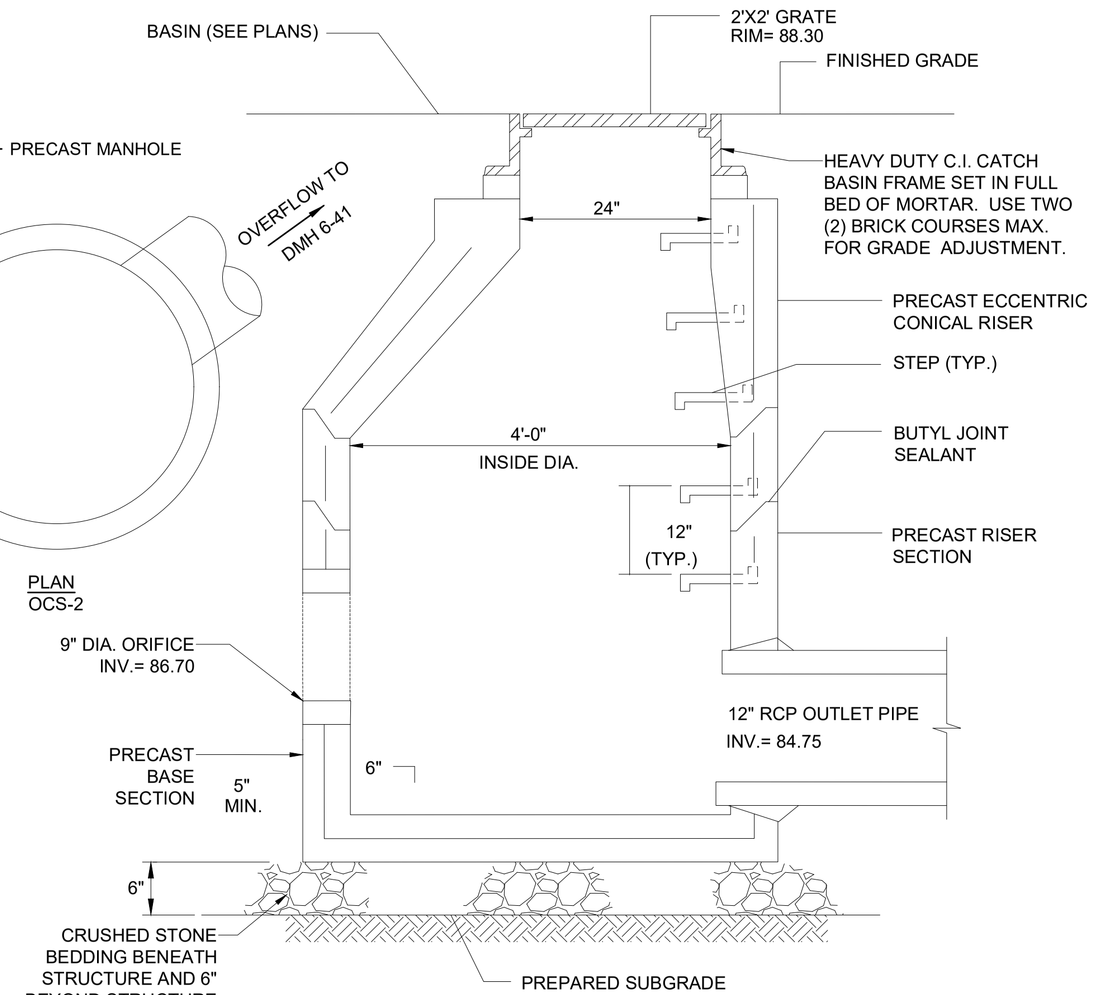
NOTES:

1. PRECAST CONCRETE SECTIONS SHALL CONFORM TO ASTM C-478
2. STEEL REINFORCING SHALL CONFORM TO ASTM A185

TYPICAL OUTLET CONTROL STRUCTURE (OCS-1)
NOT TO SCALE



CONCRETE WEIR PROFILE
NOT TO SCALE

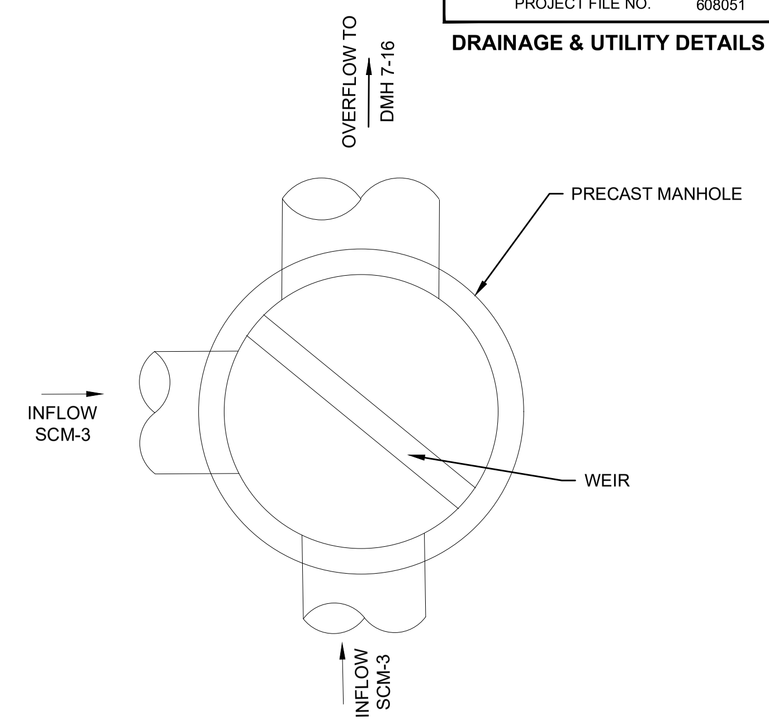


PLAN
OCS-2

NOTES:

1. PRECAST CONCRETE SECTIONS SHALL CONFORM TO ASTM C-478
2. STEEL REINFORCING SHALL CONFORM TO ASTM A185
3. MANHOLE STEPS SHALL BE 14" WIDE STEEL REINFORCED COPOLYMER POLYPROPYLENE PLASTIC AND SHALL BE CAST INTO MANHOLE SECTIONS BY THE PRECAST MANHOLE MANUFACTURER.

TYPICAL OUTLET CONTROL STRUCTURE (OCS-2)
NOT TO SCALE

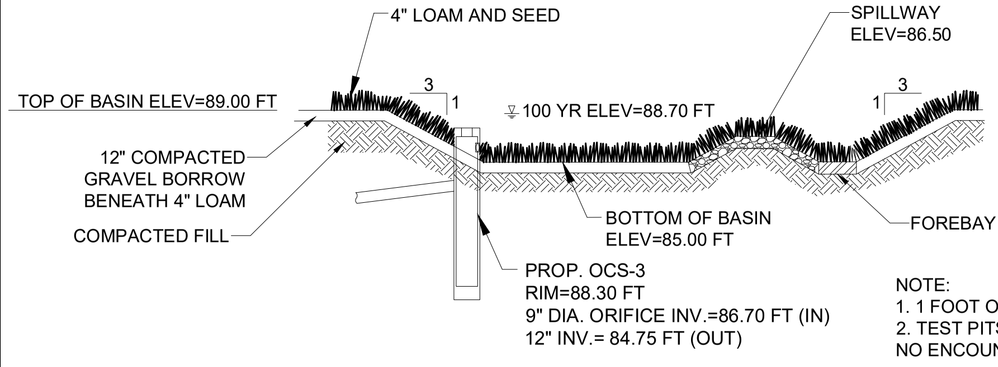


PLAN
OCS-3

NOTES:

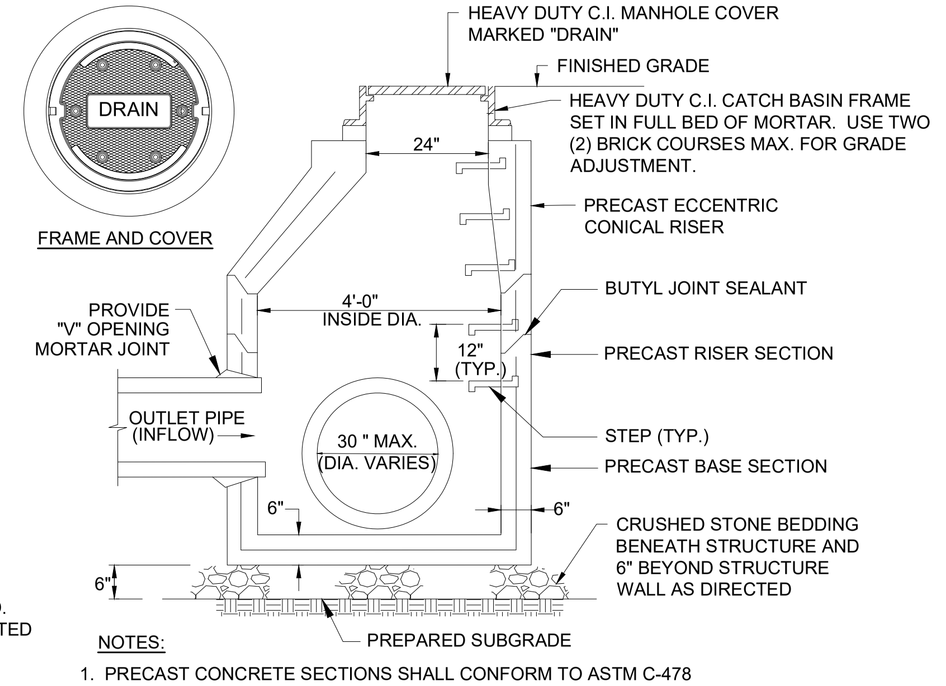
1. PRECAST CONCRETE SECTIONS SHALL CONFORM TO ASTM C-478
2. STEEL REINFORCING SHALL CONFORM TO ASTM A185

TYPICAL OUTLET CONTROL STRUCTURE (OCS-3)
NOT TO SCALE



NOTE:
1. 1 FOOT OF FREEBOARD IS PROVIDED.
2. TEST PITS WITHIN THE BASIN INDICATED NO ENCOUNTER WITH GROUNDWATER

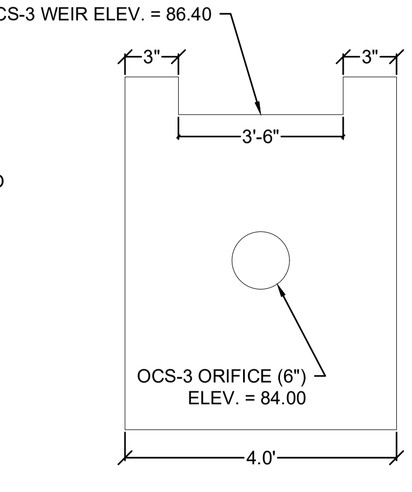
TYPICAL SECTION
INFILTRATION BASIN (SCM-2)
NOT TO SCALE



NOTES:

1. PRECAST CONCRETE SECTIONS SHALL CONFORM TO ASTM C-478
2. STEEL REINFORCING SHALL CONFORM TO ASTM A185
3. MANHOLE STEPS SHALL BE 14" WIDE STEEL REINFORCED COPOLYMER POLYPROPYLENE PLASTIC AND SHALL BE CAST INTO MANHOLE SECTIONS BY THE PRECAST MANHOLE MANUFACTURER.
4. OCS-2 AND OCS-4 ARE TYPICAL DRAIN MANHOLES WHERE THE OUTFLOW INVERT IS HIGHER THAN INFLOW INVERT.

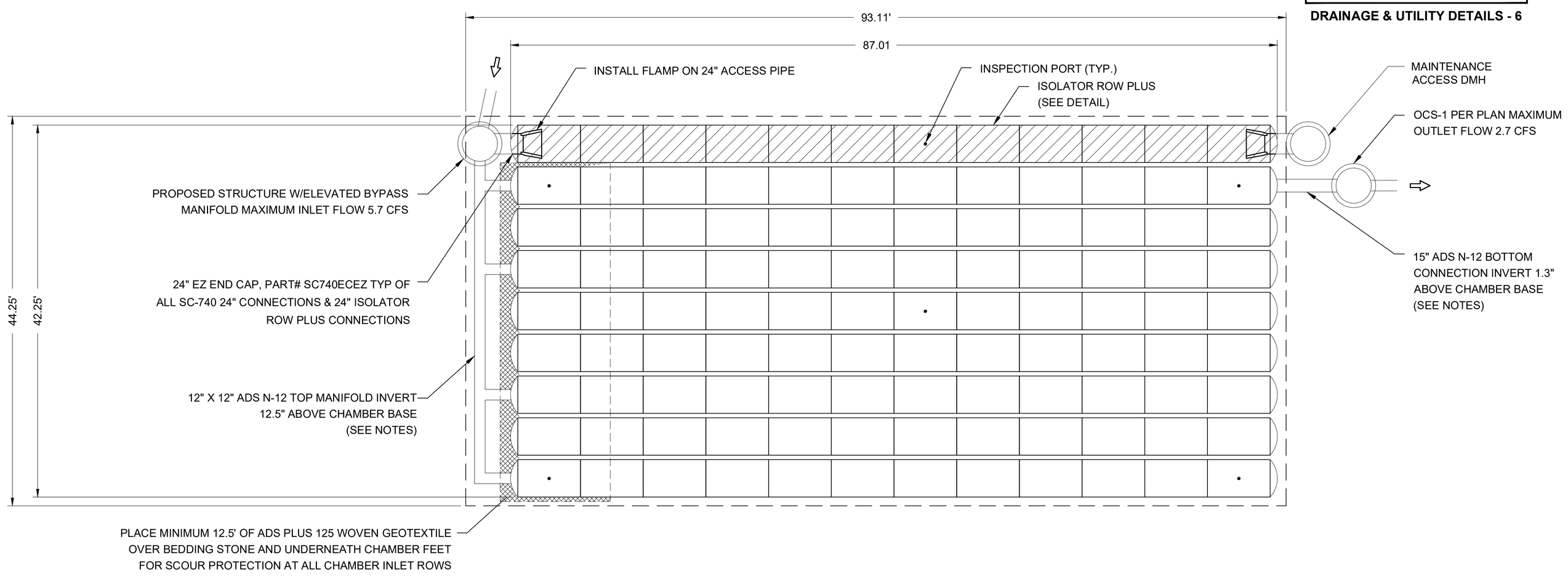
TYPICAL DRAIN MANHOLE DETAIL
NOT TO SCALE



CONCRETE WEIR PROFILE
NOT TO SCALE

PROPOSED LAYOUT (SCM1)	
108	STORMTECH SC-740 CHAMBERS
18	STORMTECH SC-740 END CAPS
12	STONE ABOVE (in)
6	STONE BELOW (in)
30	% STONE VOID
8,418	**INSTALLED SYSTEM VOLUME (CF) (PERIMETER STONE INCLUDED)**
4120	SYSTEM AREA (ft²)
275	SYSTEM PERIMETER (ft)
PROPOSED ELEVATIONS (SCM2)	
97.55	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED)
91.55	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC)
91.05	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC)
91.05	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT)
91.05	MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT)
90.55	TOP OF STONE
89.55	TOP OF SC-740 CHAMBER
88.09	12" TOP MANIFOLD INVERT
87.06	15" BOTTOM CONNECTION INVERT
87.06	24" ISOLATOR ROW PLUS CONNECTION INVERT
87.05	BOTTOM OF SC-740 CHAMBER
86.55	BOTTOM OF STONE

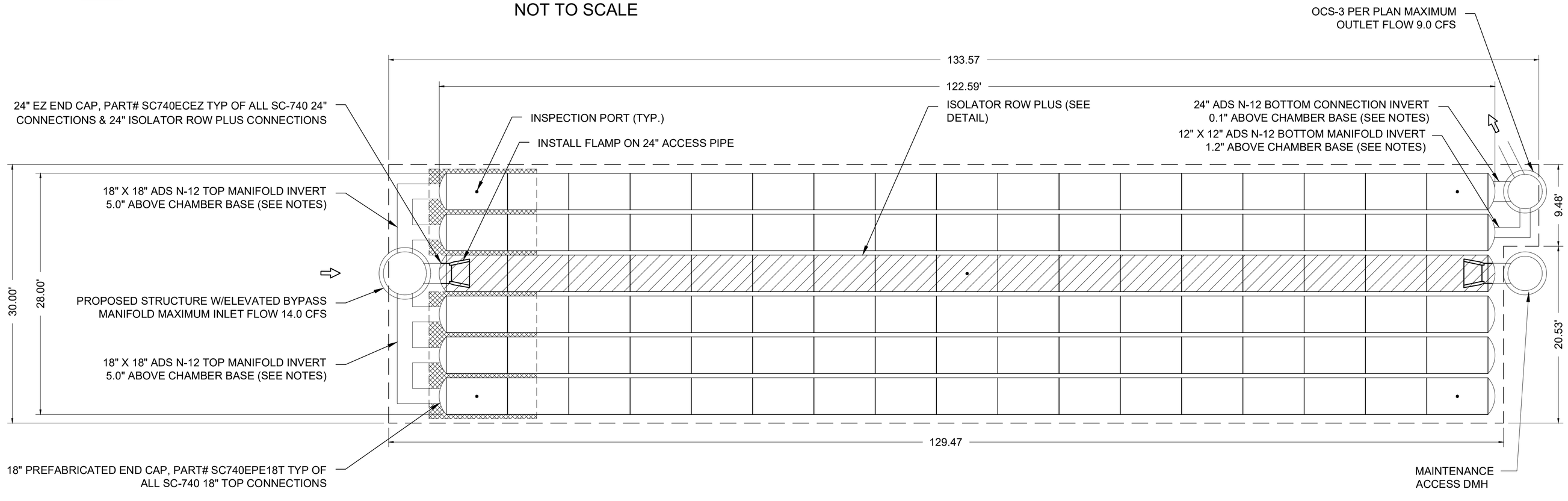
NOTES
- SEE TECHNICAL NOTE 6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.



SUBSURFACE INFILTRATION SYSTEM (SCM-1) (STORMTECH SC-740 OR APPROVED EQUAL)

NOT TO SCALE

PROPOSED LAYOUT (SCM3)	
102	STORMTECH SC-740 CHAMBERS
12	STORMTECH SC-740 END CAPS
12	STONE ABOVE (in)
6	STONE BELOW (in)
30	% STONE VOID
7,988	**INSTALLED SYSTEM VOLUME (CF) (PERIMETER STONE INCLUDED)**
3923	SYSTEM AREA (ft²)
327	SYSTEM PERIMETER (ft)
PROPOSED ELEVATIONS (SCM3)	
93.70	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED)
87.70	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC)
87.20	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC)
87.20	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT)
87.20	MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT)
86.70	TOP OF STONE
85.70	TOP OF SC-740 CHAMBER
83.62	18" TOP MANIFOLD INVERT
83.30	12" BOTTOM CONNECTION INVERT
83.21	24" BOTTOM CONNECTION INVERT
83.21	24" ISOLATOR ROW PLUS CONNECTION INVERT
83.20	BOTTOM OF SC-740 CHAMBER
82.70	BOTTOM OF STONE



SUBSURFACE INFILTRATION SYSTEM (SCM-3) (STORMTECH SC-740 OR APPROVED EQUAL)

NOT TO SCALE

WILMINGTON, MA
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	###	391
PROJECT FILE NO.	608051		

DRAINAGE & UTILITY DETAILS - 6

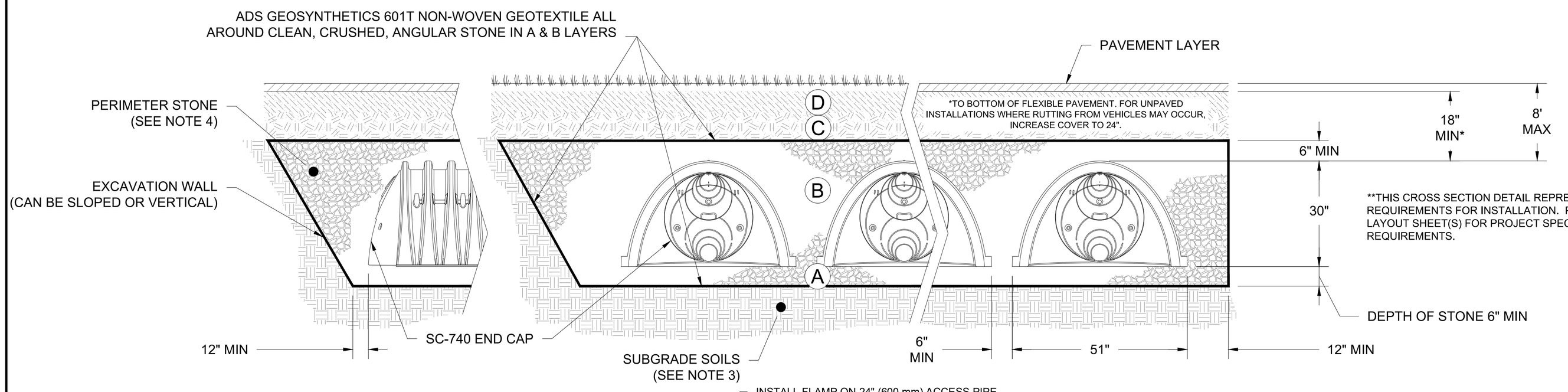
608051_UT02(DRAINAGE-DETAILS).DWG Plotted on 12-Mar-2025 3:14 PM
Proposal No. 608051 - 132406
A00860 - 168

ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 CHAMBER SYSTEMS

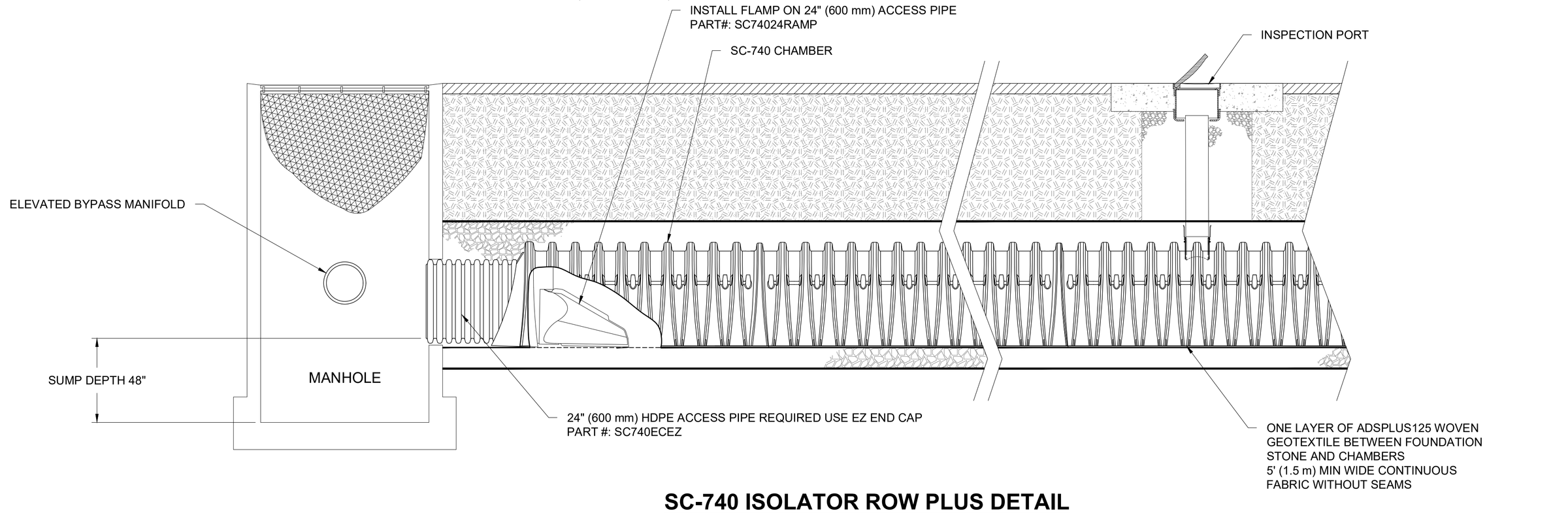
MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:

1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



**THIS CROSS SECTION DETAIL REPRESENTS MINIMUM REQUIREMENTS FOR INSTALLATION. PLEASE SEE THE LAYOUT SHEET(S) FOR PROJECT SPECIFIC REQUIREMENTS.



SC-740 ISOLATOR ROW PLUS DETAIL

NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

WILMINGTON, MA
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	###	391
PROJECT FILE NO.	608051		

DRAINAGE & UTILITY DETAILS - 7

NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-740 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, A) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT/%. AND B) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

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Proposal No. 608051 - 132406
A00860 - 169

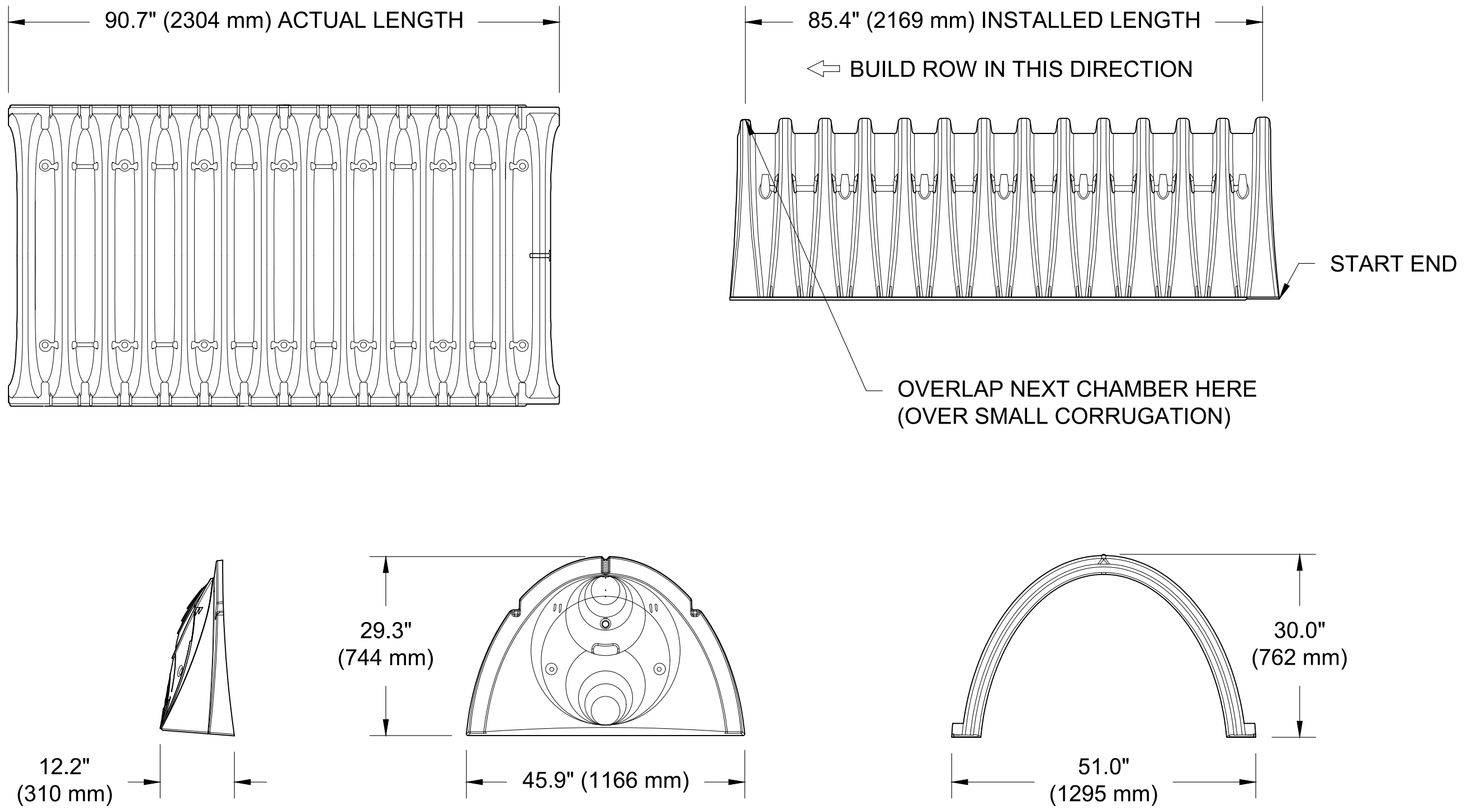
WILMINGTON, MA
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	###	391
PROJECT FILE NO.	608051		

DRAINAGE & UTILITY DETAILS - 8

SC-740 TECHNICAL SPECIFICATION

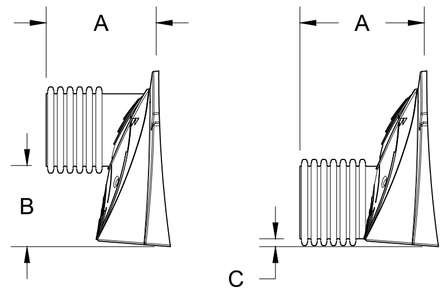
NTS



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	51.0" X 30.0" X 85.4"	(1295 mm X 762 mm X 2169 mm)
CHAMBER STORAGE	45.9 CUBIC FEET	(1.30 m³)
MINIMUM INSTALLED STORAGE*	74.9 CUBIC FEET	(2.12 m³)
WEIGHT	75.0 lbs.	(33.6 kg)

*ASSUMES 6" (152 mm) STONE ABOVE, BELOW, AND BETWEEN CHAMBERS



PRE-FAB STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PRE-FAB STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
PRE-CORED END CAPS END WITH "PC"

PART #	STUB	A	B	C
SC740EPE06T / SC740EPE06TPC	6" (150 mm)	10.9" (277 mm)	18.5" (470 mm)	---
SC740EPE06B / SC740EPE06BPC			---	0.5" (13 mm)
SC740EPE08T /SC740EPE08TPC	8" (200 mm)	12.2" (310 mm)	16.5" (419 mm)	---
SC740EPE08B / SC740EPE08BPC			---	0.6" (15 mm)
SC740EPE10T / SC740EPE10TPC	10" (250 mm)	13.4" (340 mm)	14.5" (368 mm)	---
SC740EPE10B / SC740EPE10BPC			---	0.7" (18 mm)
SC740EPE12T / SC740EPE12TPC	12" (300 mm)	14.7" (373 mm)	12.5" (318 mm)	---
SC740EPE12B / SC740EPE12BPC			---	1.2" (30 mm)
SC740EPE15T / SC740EPE15TPC	15" (375 mm)	18.4" (467 mm)	9.0" (229 mm)	---
SC740EPE15B / SC740EPE15BPC			---	1.3" (33 mm)
SC740EPE18T / SC740EPE18TPC	18" (450 mm)	19.7" (500 mm)	5.0" (127 mm)	---
SC740EPE18B / SC740EPE18BPC			---	1.6" (41 mm)
SC740ECEZ*	24" (600 mm)	18.5" (470 mm)	---	0.1" (3 mm)

ALL STUBS, EXCEPT FOR THE SC740ECEZ ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

* FOR THE SC740ECEZ THE 24" (600 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 1.75" (44 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

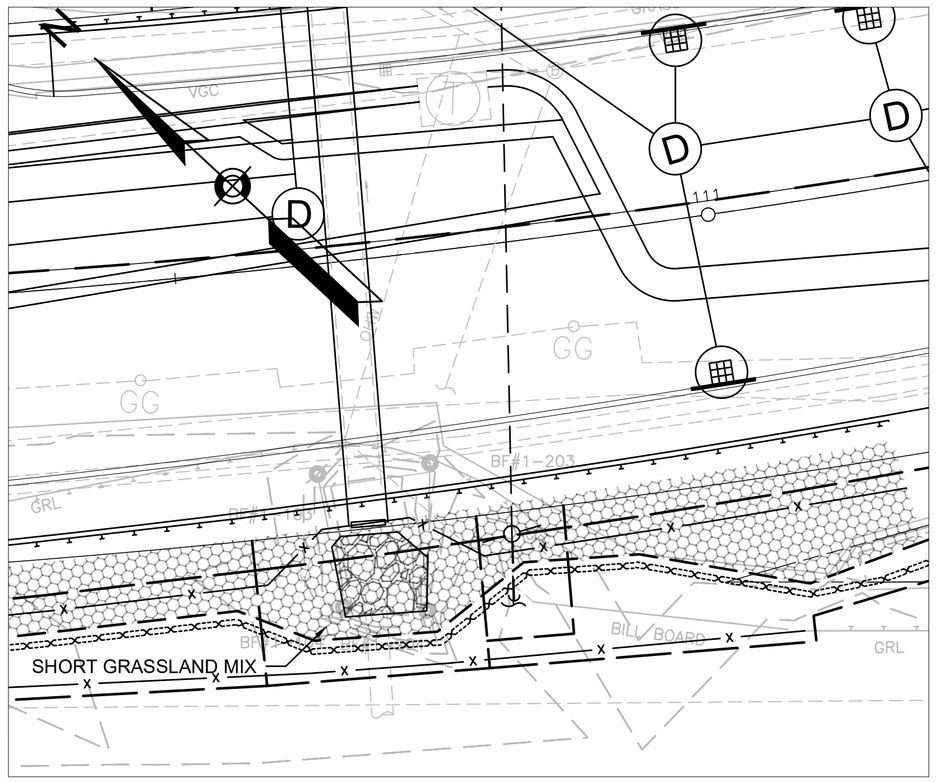
NOTE: ALL DIMENSIONS ARE NOMINAL

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Proposal No. 608051 - 132406
A00860 - 170

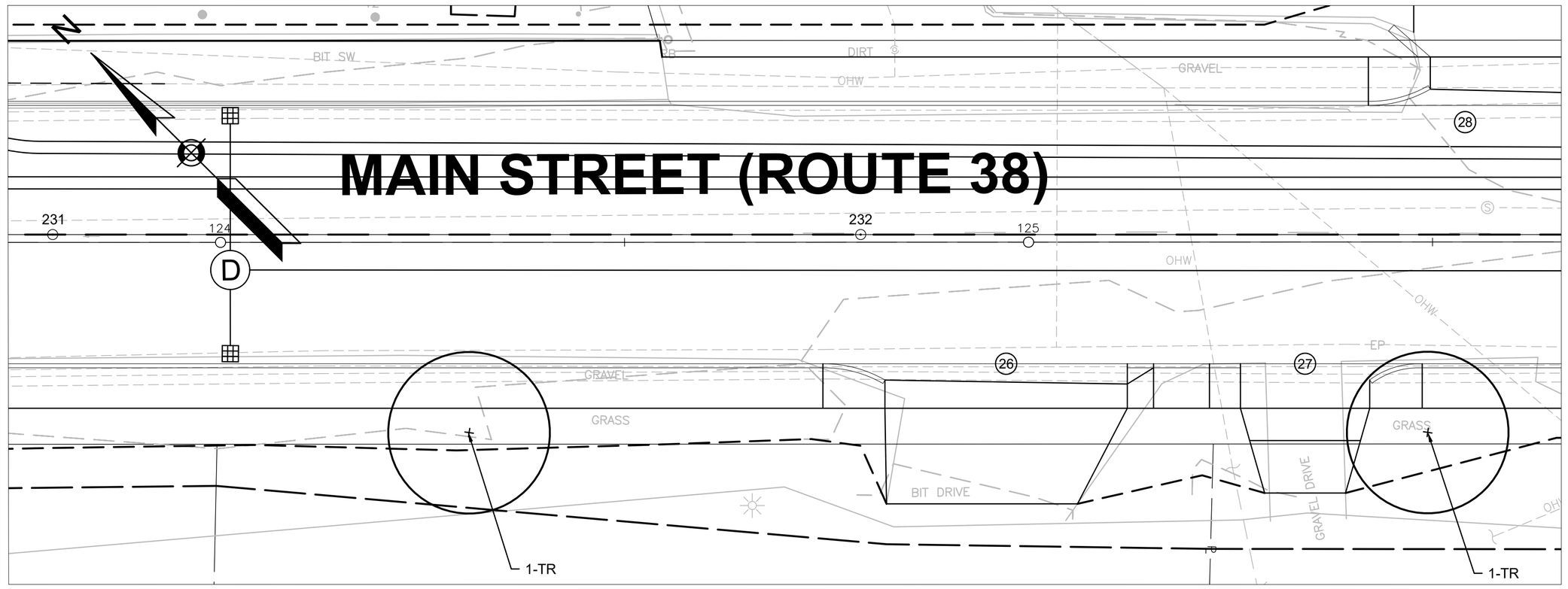
WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	213	391
PROJECT FILE NO.		608051	

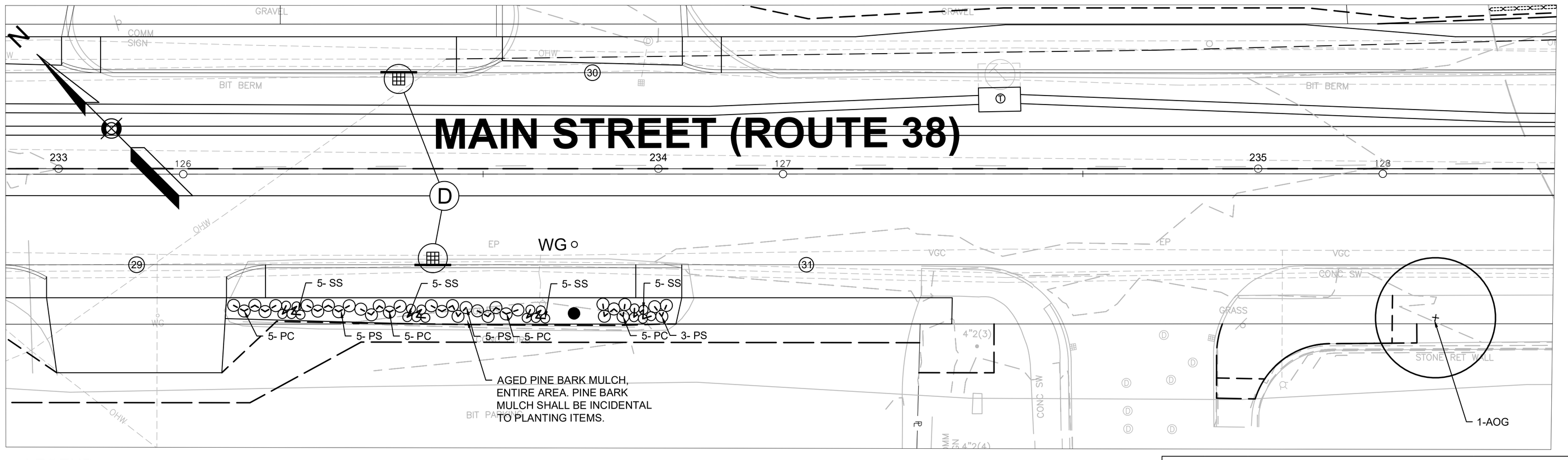
LANDSCAPING PLANS - 2



STATION 218 RT PLANTING PLAN



STATION 231 TO STATION 233 LT PLANTING PLAN



STATION 233 TO STATION 235 RT PLANTING PLAN

LEGEND

COMPOST BLANKET & PART SHADE ROADSIDE MIX

4" LOAM, COMPOST BLANKET AND SHORT GRASSLAND MIX

NOTE: ANY DISTURBED AREAS NOT DESIGNATED FOR NATIVE SEED MIX SHALL BE LOAM AND SEED

PLANTING BED WITH ORNAMENTAL GRASS, EVERGREENS AND PINE BARK MULCH

SEE LANDSCAPE PLANS - 3 FOR PLANTING, WATERING AND UPLAND NATIVE SEEDING NOTES.

0 10 20 30 40

SCALE: 1" = 10'

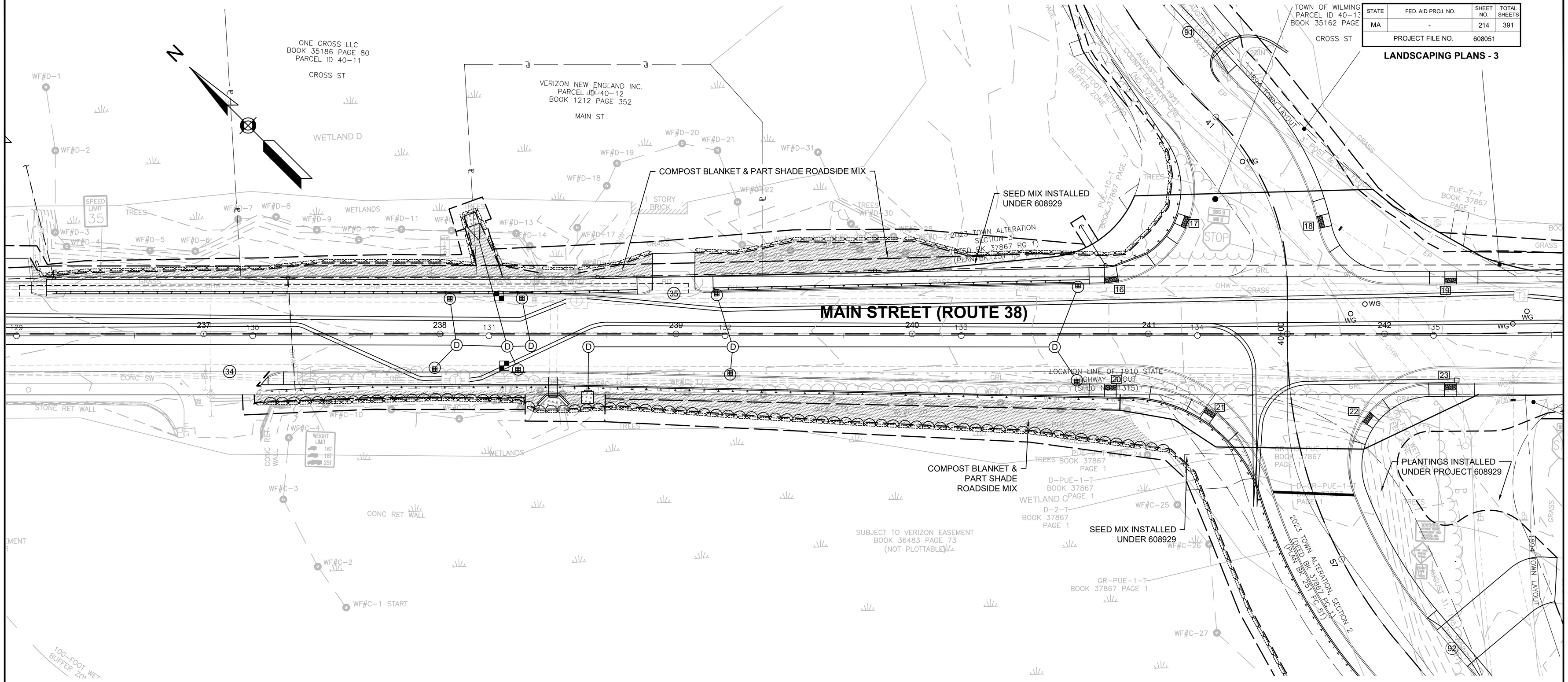
PLANT LIST - SHEET 2

KEY	QTY	BOTANICAL NAME	COMMON NAME	SIZE	SPACING	ROOT
		DECIDUOUS TREES				
AOG	1	ACER RUBRUM 'OCTOBER GLORY'	OCTOBER GLORY RED MAPLE	2-2.5" CAL		B&B
TR	2	TILIA AMERICANA 'REMOND'	REDMOND LINDEN	2-2.5" CAL		B&B
		ORNAMENTAL GRASSES				
PC	20	PANICUM VIRGATUM 'CLOUD NINE'	CLOUD NINE SWITCH GRASS		24" SP	#1 CONT.
PS	13	PANICUM VIRGATUM 'SHENANDOAH'	SHENANDOAH SWITCH GRASS		24" SP	#1 CONT.
SS	20	SCHIZACHYRIUM SCOPARIUM 'THE BLUES'	THE BLUES LITTLE BLUESTEM		18" SP	#1 CONT.

NOTE: MASSDOT LANDSCAPE ARCHITECT SHALL BE ON SITE FOR ALL PLANTING.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	214	391
PROJECT FILE NO.		608051	

LANDSCAPING PLANS - 3



STATION 237 TO STATION 241 PLANTING PLAN

0 20 50 100

SCALE: 1" = 20'

LEGEND

- COMPOST BLANKET & PART SHADE ROADSIDE MIX
- 4" LOAM, COMPOST BLANKET AND SHORT GRASSLAND MIX

  NOTE: ANY DISTURBED AREAS NOT DESIGNATED FOR NATIVE SEED MIX SHALL BE LOAM AND SEED
- PLANTING BED WITH ORNAMENTAL GRASS, EVERGREENS AND PINE BARK MULCH

PLANTING NOTES

1. CONTRACTOR SHALL HAVE ALL SUBSURFACE UTILITIES MARKED PRIOR TO THE START OF WORK.
2. PLANT LOCATIONS ARE APPROXIMATE. PRIOR TO PLANTING, LOCATION OF ALL PLANT MATERIAL WILL BE APPROVED BY THE RESIDENT ENGINEER AND THE LANDSCAPE ARCHITECT.
3. ALL PLANT MATERIAL WILL HAVE TAGS INDICATING COMMON NAME, BOTANICAL NAME, CULTIVAR, & SIZE.
4. IMMEDIATELY AFTER ACCEPTANCE OF PLANTING, TAGS AND RIBBONS SHALL BE REMOVED.
5. ALL PLANTS WILL BE MULCHED PER PLANS AND SPECIFICATIONS.
6. ALL SHRUB AND PERENNIAL BEDS WILL BE WEEDED AND OTHERWISE NEATLY MAINTAINED FOR THE DURATION OF THE CONTRACT.
7. PLANTS AND PLANTING BEDS SHALL BE THOROUGHLY WATERED AS NECESSARY AND PER SPECIFICATIONS.

WATERING NOTES

1. IRRIGATION BAGS MAY BE USED FOR STREETSCAPE AND PARK PLANTINGS ONLY.
2. A SCHEDULE FOR FILLING AND REMOVAL SHALL BE SUBMITTED TO THE ENGINEER.
3. USE AND SCHEDULE MUST BE APPROVED BY THE MASSDOT LANDSCAPE ARCHITECT.
4. A MINIMUM OF 2 BAGS PER TREE SHALL BE USED. BAGS SHALL BE ATTACHED TO STAKES.
5. NO BAGS SHALL BE PLACED AROUND THE TREE TRUNK.
6. BAGS SHALL BE MAINTAINED FULL JUNE 1 - OCTOBER 1 OR AS APPROVED.
7. BAGS SHALL BE REMOVED AT THE END OF THE SEASON.

UPLAND NATIVE SEEDING NOTES

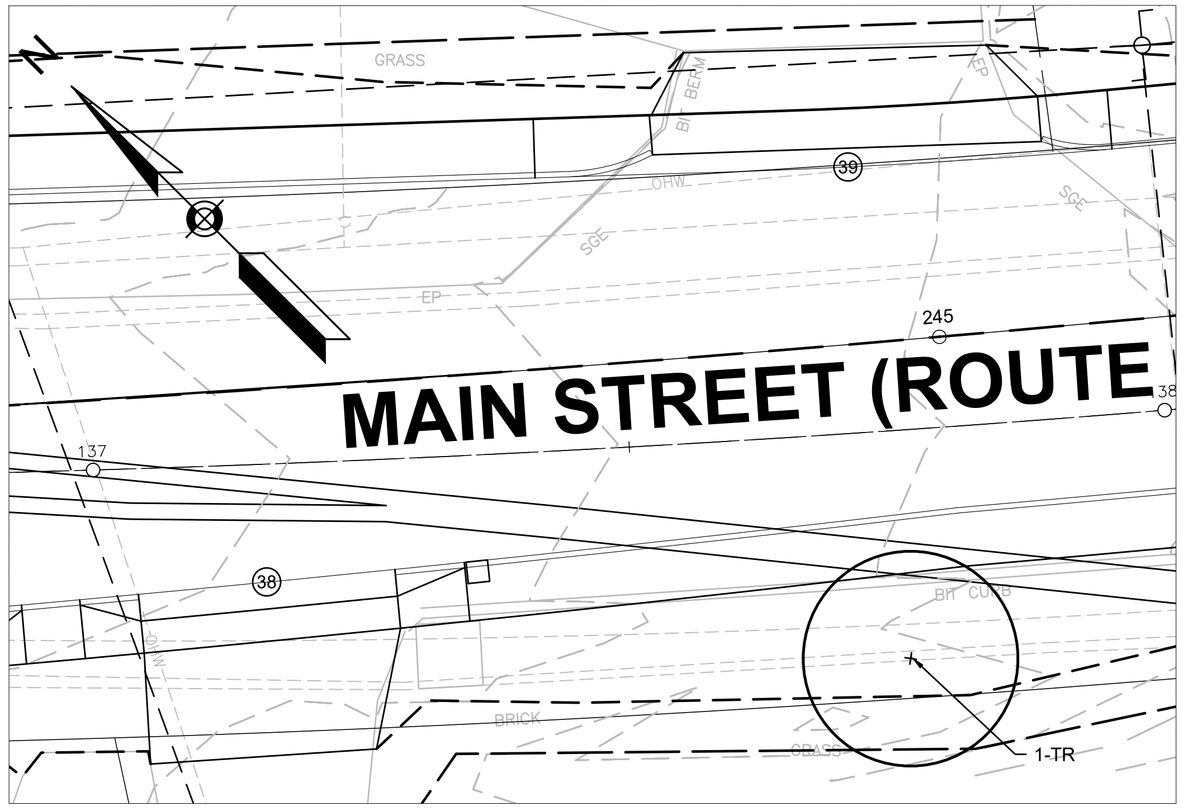
1. SEEDING SHALL BE BROADCAST METHOD ONLY (NOT HYDROSEED) UNLESS APPROVED OTHERWISE BY THE MASSDOT LANDSCAPE ARCHITECT.
2. SEEDING AND SUBMITTALS SHALL BE PER THE SPECIAL PROVISIONS.
3. SUBMITTALS FOR SEED MIXES SHALL BE APPROVED BY THE ENGINEER AND LANDSCAPE ARCHITECT PRIOR TO SEED APPLICATION.
4. SITE PREPARATION SHALL BE PER SPECIFICATIONS AND APPROVED BY THE ENGINEER PRIOR TO SEEDING.
5. WHEN SEEDING OUT OF SEASON APPLICATION RATE SHALL BE INCREASED BY 50%.

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Proposal No. 608051 - 132406
A00860 - 172

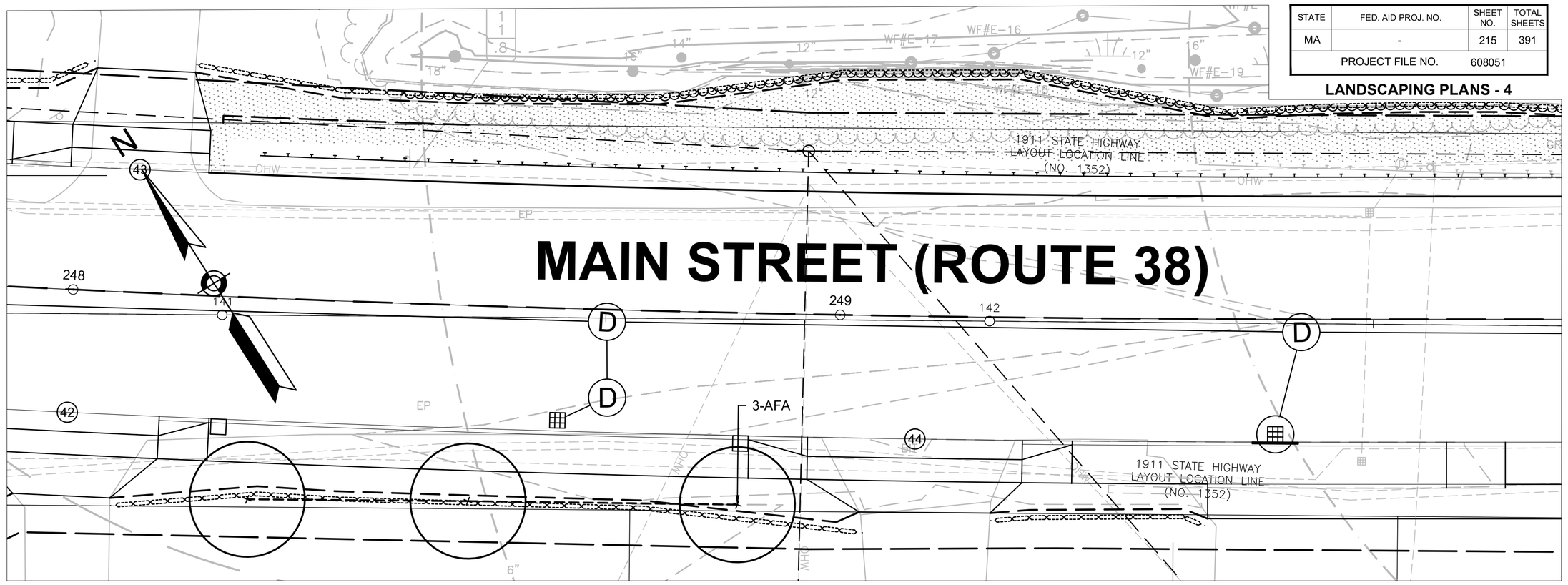
WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	215	391
PROJECT FILE NO.		608051	

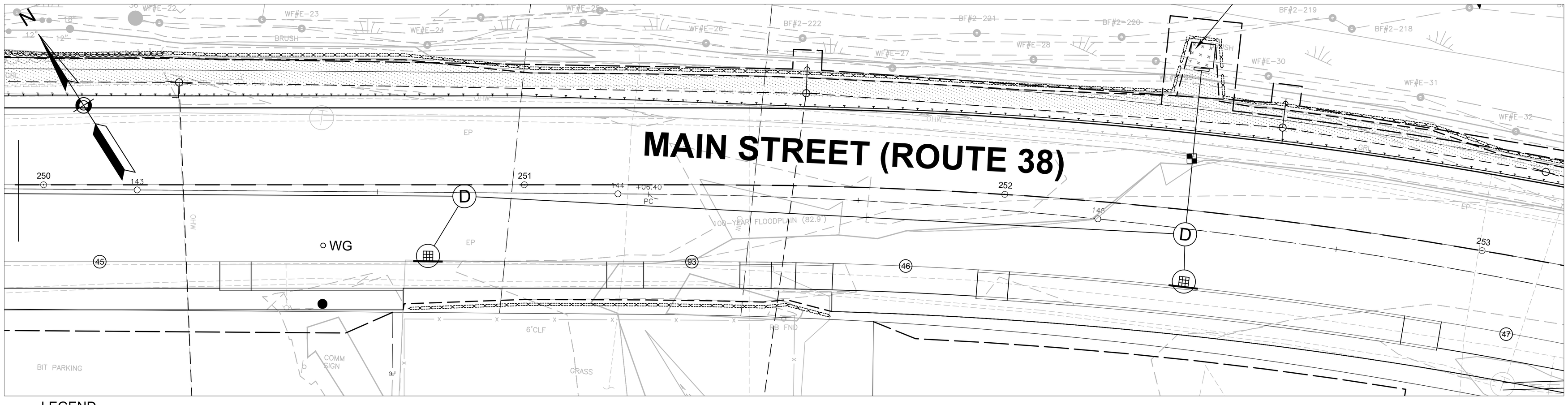
LANDSCAPING PLANS - 4



STATION 244 TO STATION 245 RT PLANTING PLAN



STATION 248 TO STATION 249 RT PLANTING PLAN



STATION 250 TO STATION 253 LT PLANTING PLAN

0 10 20 30 40
SCALE: 1" = 10'

LEGEND

COMPOST BLANKET & PART SHADE ROADSIDE MIX

4" LOAM, COMPOST BLANKET AND SHORT GRASSLAND MIX

NOTE: ANY DISTURBED AREAS NOT DESIGNATED FOR NATIVE SEED MIX SHALL BE LOAM AND SEED

SEE LANDSCAPE PLANS - 3 FOR PLANTING, WATERING AND UPLAND NATIVE SEEDING NOTES.

PLANTING BED WITH ORNAMENTAL GRASS, EVERGREENS AND PINE BARK MULCH

PLANT LIST - SHEET 4

KEY	QTY	BOTANICAL NAME	COMMON NAME	SIZE	ROOT
		DECIDUOUS TREES			
TR	1	TILIA AMERICANA 'REMOND'	REDMOND LINDEN	2-2.5" CAL	B&B
AFA	3	ACER X FREEMANII 'ARMSTRONG'	ARMSTRONG MAPLE	2-2.5" CAL	B&B

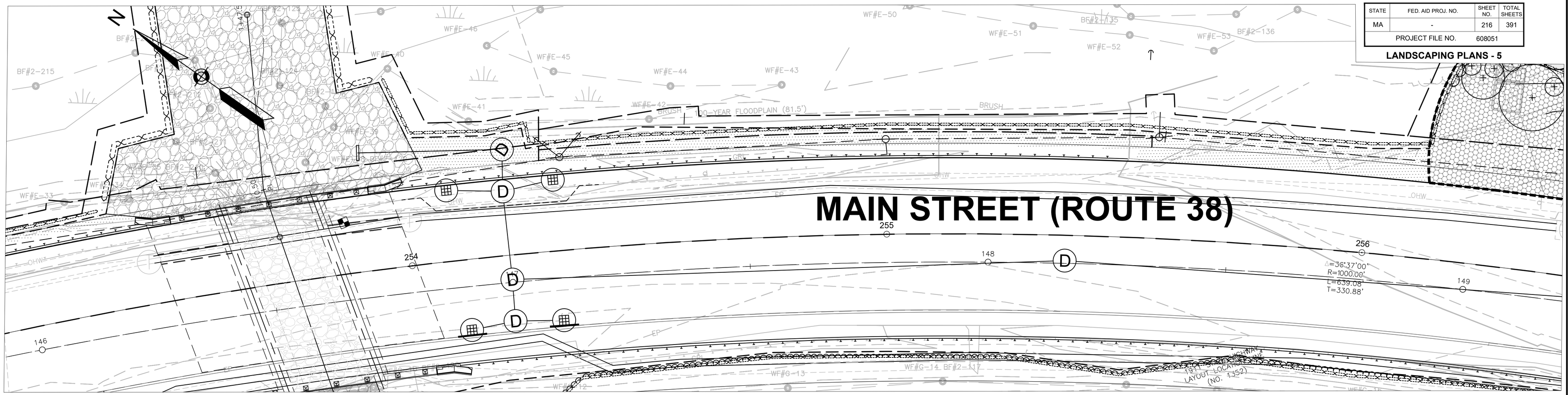
NOTE: MASSDOT LANDSCAPE ARCHITECT SHALL BE ON SITE FOR ALL PLANTING.

608051_LD02 (LANDSCAPING PLANS).DWG Plotted on 12-Mar-2025 3:19 PM
Proposal No. 608051 - 132406
A008669 - 173

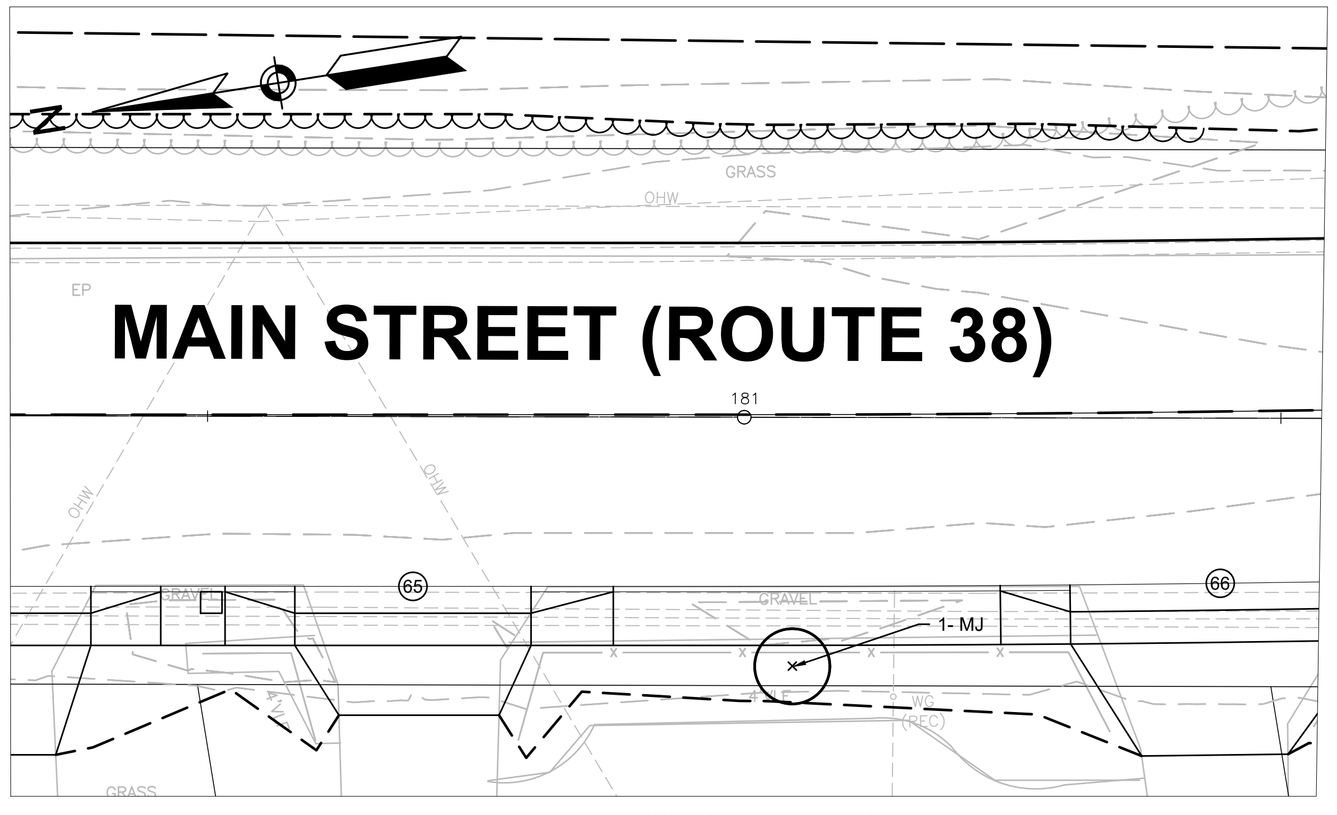
WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	216	391
PROJECT FILE NO.		608051	

LANDSCAPING PLANS - 5



STATION 254 TO STATION 256 LT PLANTING PLAN



STATION 288 PLANTING PLAN

LEGEND

COMPOST BLANKET & PART SHADE ROADSIDE MIX

4" LOAM, COMPOST BLANKET AND SHORT GRASSLAND MIX

NOTE: ANY DISTURBED AREAS NOT DESIGNATED FOR NATIVE SEED MIX SHALL BE LOAM AND SEED

PLANTING BED WITH ORNAMENTAL GRASS, EVERGREENS AND PINE BARK MULCH

SEE LANDSCAPE PLANS - 3 FOR PLANTING, WATERING AND UPLAND NATIVE SEEDING NOTES.

0 10 20 30 40

SCALE: 1" = 10'

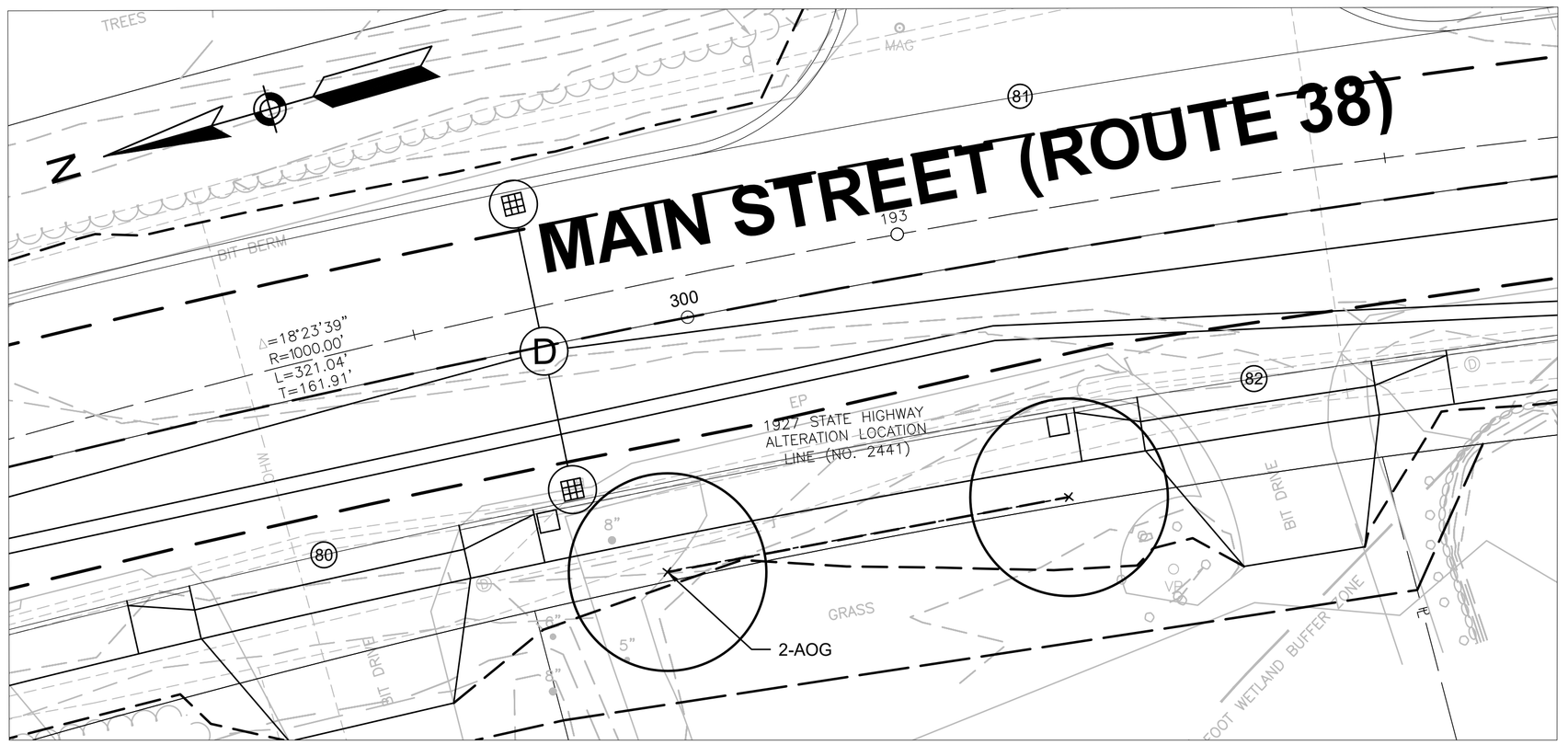
PLANT LIST - SHEET 5					
KEY	QTY	BOTANICAL NAME	COMMON NAME	SIZE	ROOT
		DECIDUOUS TREES			
MJ	1	MALUS 'JFS KW214MX' PP 31076	IVORY SPEAR CRABAPPLE	1.5-2" CAL	B&B

NOTE: MASSDOT LANDSCAPE ARCHITECT SHALL BE ON SITE FOR ALL PLANTING.

608051_LD02 (LANDSCAPING PLANS).DWG Plotted on 12-Mar-2025 3:19 PM

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	217	391
PROJECT FILE NO.	608051		

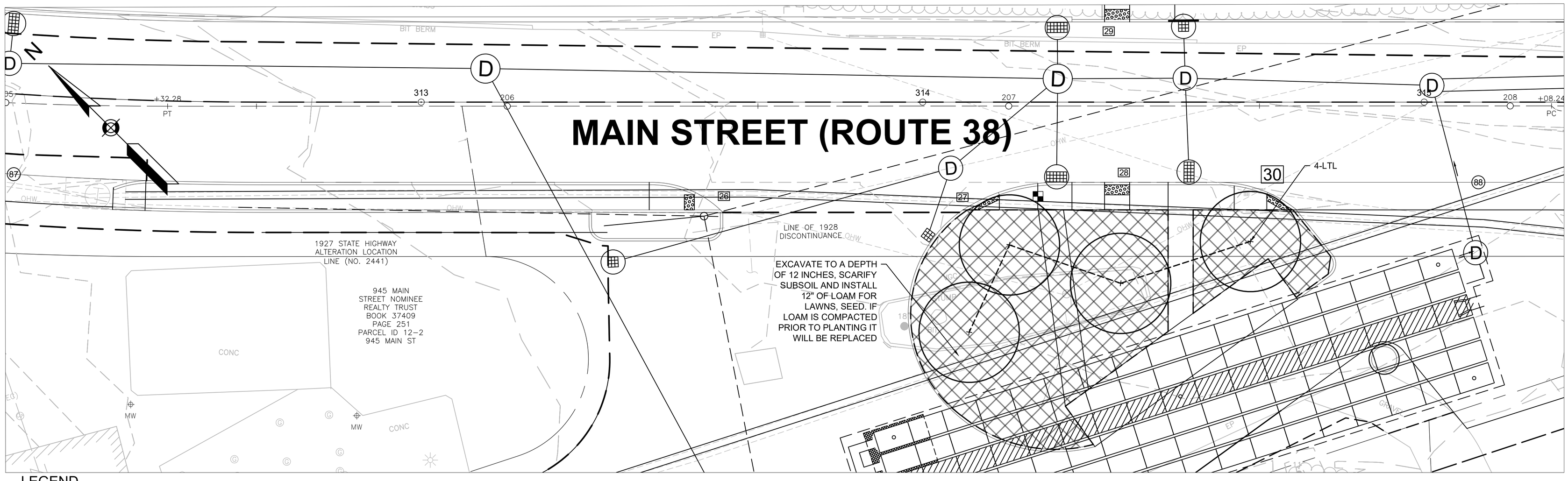
LANDSCAPING PLANS - 6



STATION 300 PLANTING PLAN

PLANT LIST - SHEET 6					
KEY	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**SIZE**	**ROOT**
		DECIDUOUS TREES			
AOG	2	ACER RUBRUM 'OCTOBER GLORY'	OCTOBER GLORY RED MAPLE	2-2.5" CAL	B&B
LTL	4	LIRODENDRON TULIPIFERA	TULIP TREE	2-2.5" CAL	B&B

NOTE: MASSDOT LANDSCAPE ARCHITECT SHALL BE ON SITE FOR ALL PLANTING.



STATION 314 TO 315 PLANTING PLAN

0 10 20 30 40

SCALE: 1" = 10'

LEGEND

COMPOST BLANKET & PART SHADE ROADSIDE MIX

4" LOAM, COMPOST BLANKET AND SHORT GRASSLAND MIX

NOTE: ANY DISTURBED AREAS NOT DESIGNATED FOR NATIVE SEED MIX SHALL BE LOAM AND SEED

SEE LANDSCAPE PLANS - 3 FOR PLANTING, WATERING AND UPLAND NATIVE SEEDING NOTES.

PLANTING BED WITH ORNAMENTAL GRASS, EVERGREENS AND PINE BARK MULCH

608051_LD02 (LANDSCAPING PLANS).DWG Plotted on 12-Mar-2025 3:19 PM
Proposal No. 608051 - 132406
A008600 - 175

LEGEND

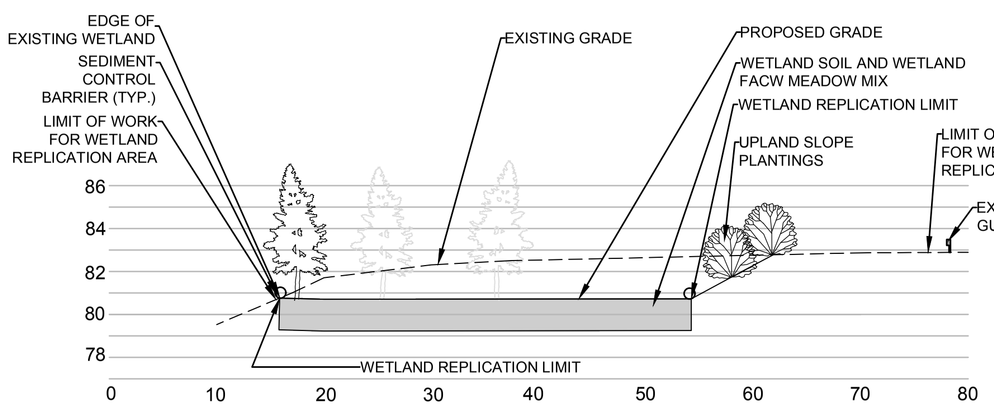
- LIMIT OF WORK
- SEDIMENT CONTROL BARRIER
- 595 — PROPOSED CONTOUR
- 595 — EXISTING CONTOUR
- 124.694 — PROPOSED SPOT GRADE
- 124.694 — EXISTING SPOT GRADE
- 4" LOAM AND COMPOST BLANKET & SHORT GRASSLAND MIX
- WETLAND SOIL AND WETLAND FACW MEADOW MIX
- COMPOST BLANKET & PART SHADE ROADSIDE MIX
- PROPOSED SHRUB
- PROPOSED TREE
- PROPOSED SHRUB WITHIN WETLAND REPLICATION
- PROPOSED TREE WITHIN WETLAND REPLICATION

FACW MEADOW MIX = 4,400 S.F.

NATIVE SHORT GRASSLAND MIX = 5,807 S.F.

NOTES:

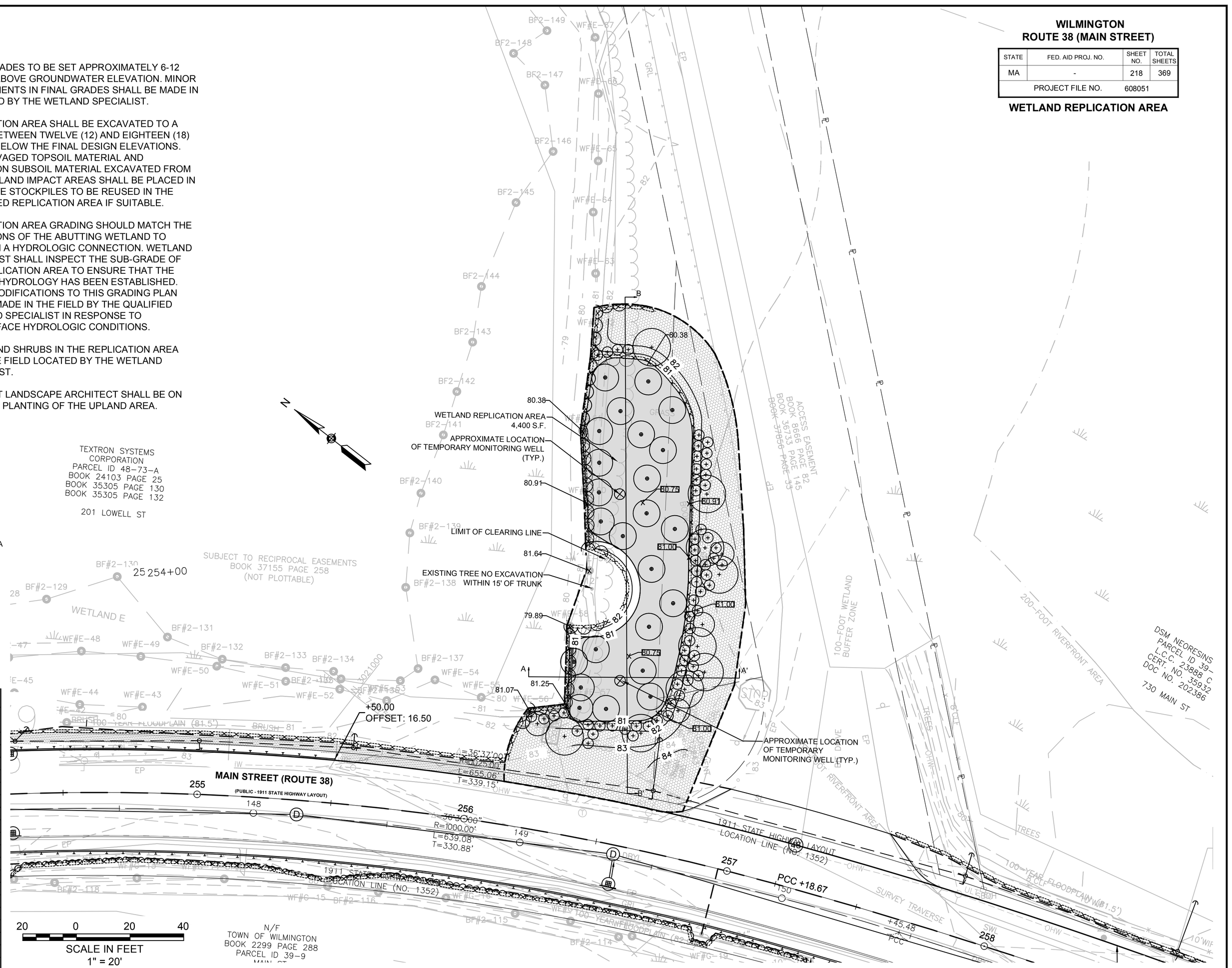
1. FINAL GRADES TO BE SET APPROXIMATELY 6-12 INCHES ABOVE GROUNDWATER ELEVATION. MINOR ADJUSTMENTS IN FINAL GRADES SHALL BE MADE IN THE FIELD BY THE WETLAND SPECIALIST.
2. REPLICATION AREA SHALL BE EXCAVATED TO A DEPTH BETWEEN TWELVE (12) AND EIGHTEEN (18) INCHES BELOW THE FINAL DESIGN ELEVATIONS. THE SALVAGED TOPSOIL MATERIAL AND B-HORIZON SUBSOIL MATERIAL EXCAVATED FROM THE WETLAND IMPACT AREAS SHALL BE PLACED IN SEPARATE STOCKPILES TO BE REUSED IN THE PROPOSED REPLICATION AREA IF SUITABLE.
3. REPLICATION AREA GRADING SHOULD MATCH THE ELEVATIONS OF THE ABUTTING WETLAND TO MAINTAIN A HYDROLOGIC CONNECTION. WETLAND SPECIALIST SHALL INSPECT THE SUB-GRADE OF THE REPLICATION AREA TO ENSURE THAT THE PROPER HYDROLOGY HAS BEEN ESTABLISHED. MINOR MODIFICATIONS TO THIS GRADING PLAN MAY BE MADE IN THE FIELD BY THE QUALIFIED WETLAND SPECIALIST IN RESPONSE TO SUBSURFACE HYDROLOGIC CONDITIONS.
4. TREES AND SHRUBS IN THE REPLICATION AREA SHALL BE FIELD LOCATED BY THE WETLAND SPECIALIST.
5. MASSDOT LANDSCAPE ARCHITECT SHALL BE ON SITE FOR PLANTING OF THE UPLAND AREA.

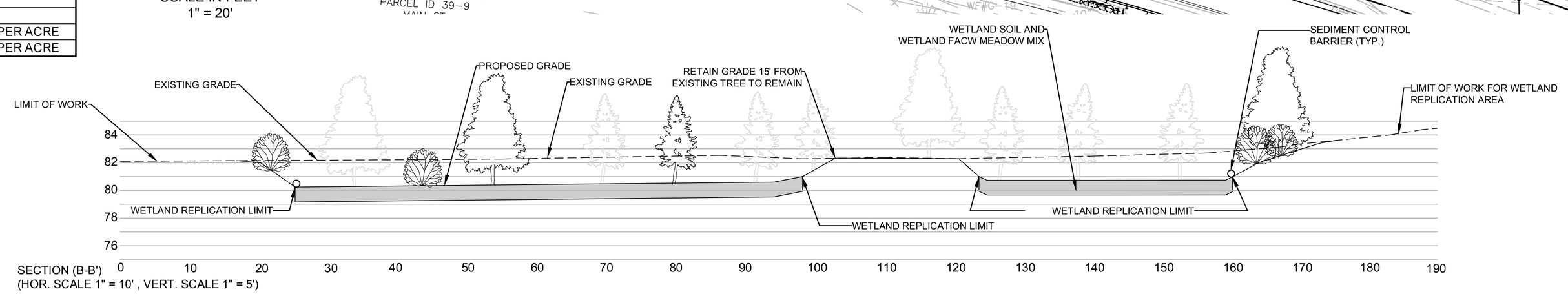


SECTION (A-A')
(HOR. SCALE 1" = 10' , VERT. SCALE 1" = 5')

PLANT LIST - WETLAND REPLICATION AND ASSOCIATED UPLAND

KEY	QTY	WETLAND STATUS	BOTANICAL NAME	COMMON NAME	PLANT SIZE
DECIDUOUS TREES IN UPLAND AREA					
AC	4	FAC	AMELANCHIER CANADENSIS	SERVICEBERRY	4-5' HT
LT	4	FACU	LIRODENDRON TULIPIFERA	TULIP TREE	1-1.5" CAL.
QC	5	FACU	QUERCUS COCCINEA	SCARLET OAK	1-1.5" CAL.
DECIDUOUS TREES IN REPLICATION AREA- 24 TOTAL					
AR	2	FAC	ACER RUBRUM	RED MAPLE	4-6' HT
AS	10	FACW	ACER SACCHARINUM	SILVER MAPLE	4-6' HT
QB	4	FACW	QUERCUS BICOLOR	SWAMP WHITE OAK	4-6' HT
SN	8	OBL	SALIX NIGRA	BLACK WILLOW	4-6' HT
DECIDUOUS SHRUBS IN UPLAND AREA					
CP	15	UPL	COMPTONIA PEREGRINA	SWEETFERN	1 GALLON
CR	15	FAC	CORNUS RACEMOSA	GRAY TWIG DOGWOOD	2-3' HT
RA	15	UPL	RHUS AROMATICA (NO CULTIVARS)	FRAGRANT SUMAC	2-3' HT
VD	15	FAC	VIBURNUM DENTATUM	ARROWWOOD VIBURNUM	2-3' HT
HERBACEOUS					
	-	-	WETLAND FACW MEADOW MIX		20 LBS PER ACRE
	-	-	SHORT GRASSLAND MIX		20 LBS PER ACRE





SECTION (B-B')
(HOR. SCALE 1" = 10' , VERT. SCALE 1" = 5')

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	218	369
PROJECT FILE NO.	608051		

WETLAND REPLICATION AREA

608051_EV(P-REPLICATION).DWG Plotted on 12-Mar-2025 3:30 PM

Proposal No. 608051 - 132406

A00860 - 176

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	219	391
PROJECT FILE NO.	608051		

COMPENSATORY FLOOD STORAGE PLAN

608051_EVP-COMPENSATORY FLOOD).DWG Plotted on 12-Mar-2025 3:27 PM

Proposal No. 608051 - 132406

A00860 - 177

REMOVE GEOTEXTILE FABRIC AND STONE AFTER CONSTRUCTION IS COMPLETED AND INSTALL LOAM AND COMPOST BLANKET & PART SHADE ROADSIDE MIX

TEMPORARY CONSTRUCTION ENTRANCE WITH GEOTEXTILE FOR TEMPORARY SOIL PROTECTION

TREE CARE PRUNING AS NEEDED FOR ACCESS

R&D TREE

SELECT WOODY DEBRIS TO REMAIN SEE NOTE.

TREE PROTECTION FENCE

FFL (82.9)

TREE TO REMAIN AS SNAG SEE NOTE

AREAS TO BE EXCAVATED FOR FLOOD COMPENSATION (TYP.)

REMOVE MOUND AND CONSTRUCT AN EVEN SLOPE BETWEEN PROPOSED CONTOUR 82 AND THE WORK LIMIT

TREE TO REMAIN AS SNAG SEE NOTE

TREE PROTECTION FENCE

COMPOST FILTER TUBES AND SEDIMENTATION FENCE AT THE EDGE OF COMPENSATION AREA

UPSTREAM COMPENSATORY FLOOD STORAGE AREA.
CUT = 4161 CF

TOWN OF WILMINGTON
BOOK 2599 PAGE 288
PARCEL ID 39-9
MAIN ST

1911 STATE HIGHWAY LAYOUT LOCATION LINE

WETLAND G

WETLAND

LEGEND

- LIMIT OF WORK
- AREAS TO BE EXCAVATED
- COMPOST FILTER TUBE
- TREE PROTECTION FENCE
- PROPOSED CONTOUR
- EXISTING CONTOUR
- FFL
- SNAG TREE
- COMPOST BLANKET AND WETLAND SEASONALLY FLOODED MIX

NOTE:
1. THE WETLAND SPECIALIST SHALL MARK TREES TO BE CONVERTED TO SNAGS, SELECT COURSE WOODY DEBRIS TO BE RETAINED FOR RE-USE, AND SELECT ROCKS OR OTHER ELEMENTS TO BE USED FOR HABITAT FEATURES.
2. COURSE WOODY MATERIAL, SELECT ROCKS AND OTHER ELEMENTS TO BE RETAINED SHALL BE NEATLY PILED OR ARRANGED ON SITE AS DIRECTED BY THE WETLAND SPECIALIST.

403 LF LENGTH OF COMPOST FILTER TUBE
8787 SQ FT AREA OF SEEDING - WETLAND SEASONALLY FLOODED MIX

10 0 10 20
SCALE IN FEET
1" = 10'

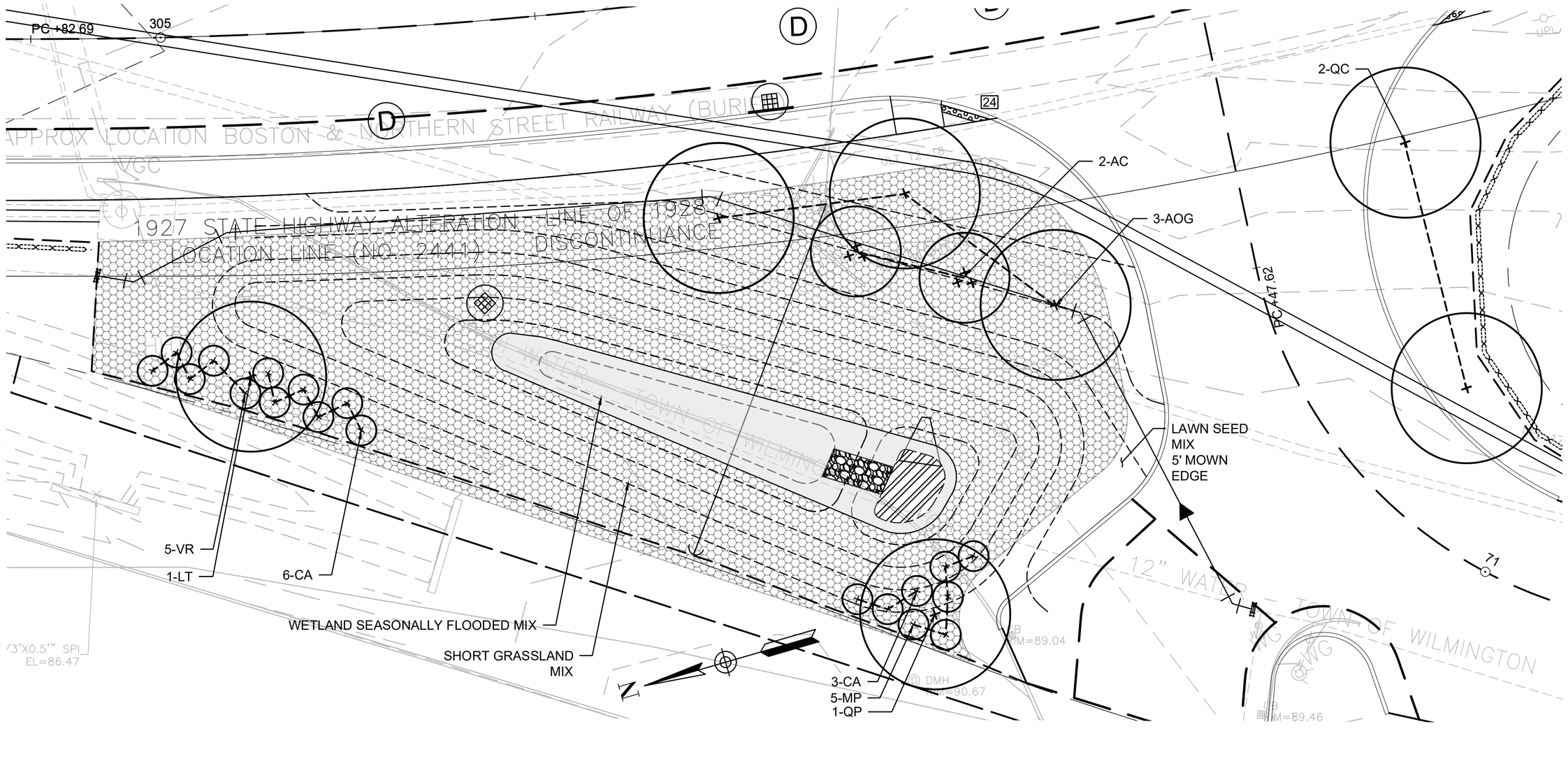
TABLE1 - Upstream Compensatory Flood Storage
Volume to be Compensated (100-yr Flood Elevation = 82.9)

Elevation	Cut Volume (CF)	Fill Volume (CF)	Incremental Net Cut/Fill Volume (CF)
79-80	0	0	0
80-81	147	7	-140
81-82	1804	925	-879
82-82.9	2210	1222	-988
Total	**4161**	**2154**	**-2007**

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	220	391
PROJECT FILE NO.	608051		

INFILTRATION BASIN PLAN



LEGEND

4" LOAM, COMPOST BLANKET AND SHORT GRASSLAND MIX

COMPOST BLANKET AND WETLAND SEASONALLY FLOODED MIX

INFILTRATION BASIN AT OLD MAIN STREET - PLANTING DESIGN PLAN

PLANT LIST - INFILTRATION BASIN PLAN

KEY	QTY	BOTANICAL NAME	COMMON NAME	SIZE	ROOT
		DECIDUOUS TREES			
AOG	3	ACER RUBRUM 'OCTOBER GLORY'	OCTOBER GLORY RED MAPLE	2-2.5" CAL	B&B
LT	1	LIRODENDRON TULIPIFERA	TULIP TREE	1-1.5" CAL	B&B
QC	2	QUERCUS COCCINEA	SCARLET OAK	2-2.5" CAL	B&B
QP	1	QUERCUS PALUSTIS	PIN OAK	1-1.5" CAL	B&B
AC	2	AMELANCHIER CANADENSIS	SERVICEBERRY	4-5' MULTI-STEMMED	B&B
		DECIDUOUS SHRUBS			
CA	9	CORNUS SERICEA	REDTWIG DOGWOOD	2-3' HT	#3 CONT.
MP	5	MYRICA PENSYLVANICA	NORTHERN BAYBERRY	2-3' HT	#3 CONT.
VR	5	VIBURNUM RECOGNITUM	NORTHERN ARROWWOOD	2-3' HT	#3 CONT.

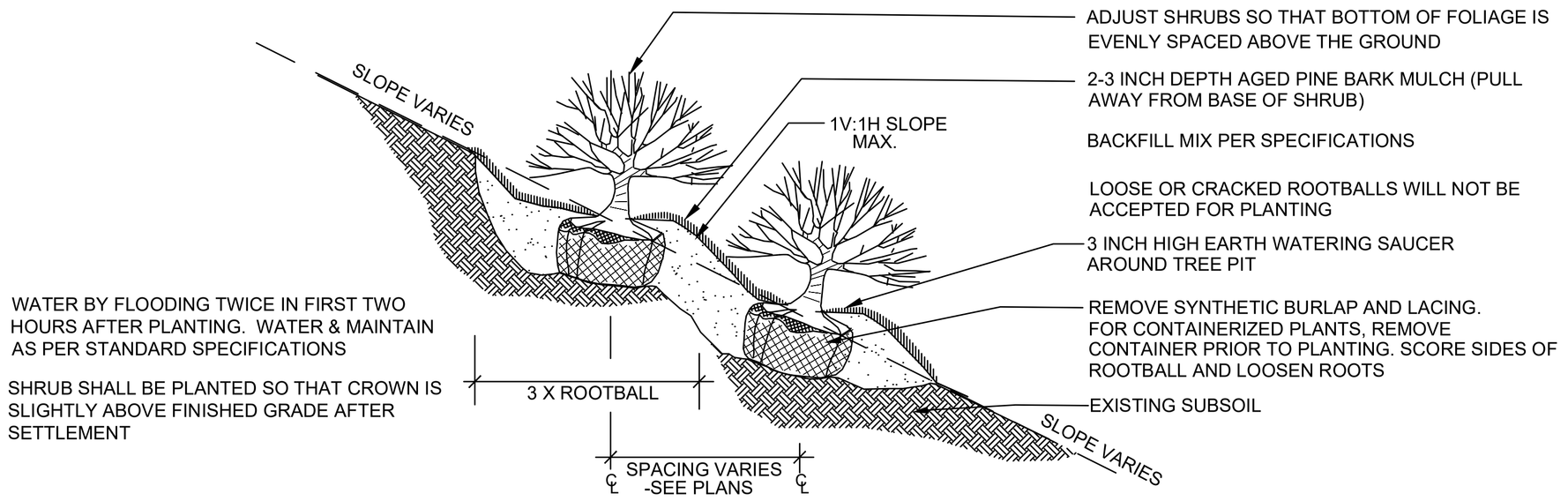
0 10 20 30 40

SCALE: 1" = 10'

PLANT LIST - UPLAND PROJECT TOTAL

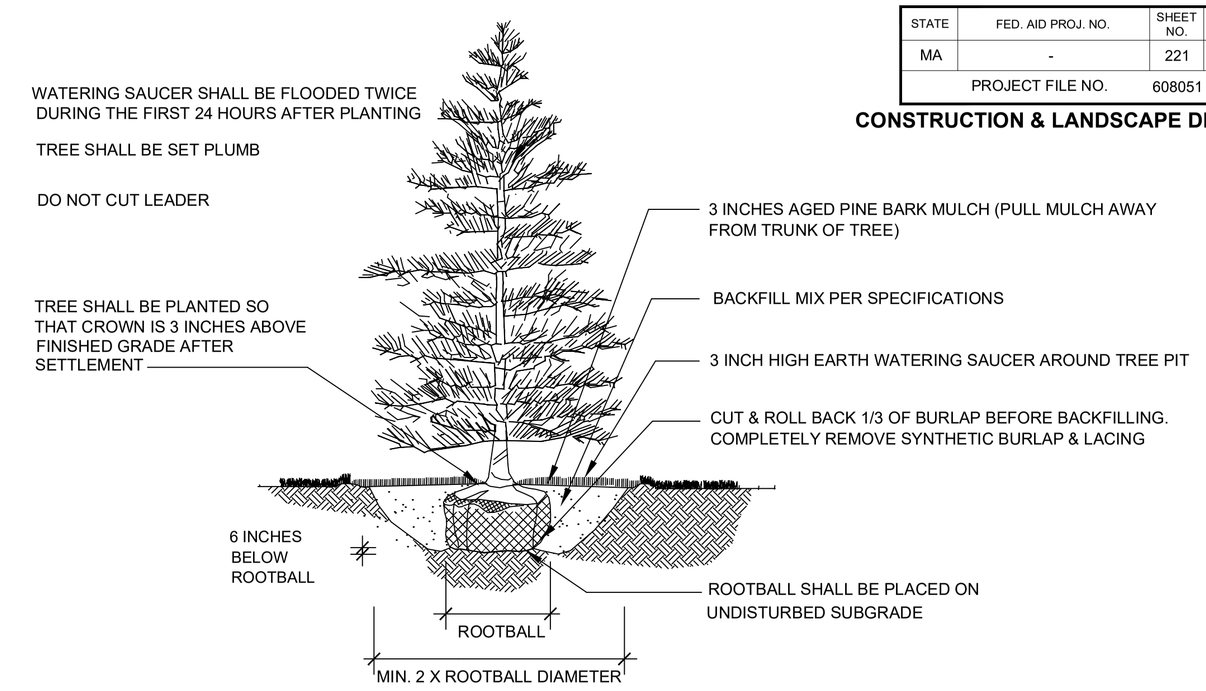
KEY	QTY	BOTANICAL NAME	COMMON NAME	SIZE	SPACING	ROOT
		DECIDUOUS TREES				
AFA	3	ACER X FREEMANII 'ARMSTRONG'	ARMSTRONG MAPLE	2-2.5" CAL		B&B
AC	2	AMELANCHIER CANADENSIS	SERVICEBERRY	4-5' MULTI-STEMMED		B&B
AOG	6	ACER RUBRUM 'OCTOBER GLORY'	OCTOBER GLORY RED MAPLE	2-2.5" CAL		B&B
LT	1	LIRODENDRON TULIPIFERA	TULIP TREE	1-1.5" CAL		B&B
LTL	4	LIRODENDRON TULIPIFERA	TULIP TREE	2-2.5" CAL		B&B
QC	2	QUERCUS COCCINEA	SCARLET OAK	2-2.5" CAL		B&B
QP	1	QUERCUS PALUSTIS	PIN OAK	1-1.5" CAL		B&B
TR	3	TILIA AMERICANA 'REDMOND'	REDMOND LINDEN	2-2.5" CAL		B&B
MJ	1	MALUS 'JFS KW214MX' PP 31076	IVORY SPEAR CRABAPPLE	1.5-2" CAL		B&B
		EVERGREEN TREES				
JK	34	JUNIPERUS CHINENSIS 'KETELEERI'	KETELEERI JUNIPER	3-4' HT		B&B
		EVERGREEN SHRUBS				
JGO	30	JUNIPERUS VIRGINIANA 'GREY OWL'	GREY OWL JUNIPER	2-2.5' HT		#3 CONT.
		DECIDUOUS SHRUBS				
CA	9	CORNUS SERICEA	REDTWIG DOGWOOD	2-3' HT		#3 CONT.
MP	5	MYRICA PENSYLVANICA	NORTHERN BAYBERRY	2-3' HT		#3 CONT.
VR	5	VIBURNUM RECOGNITUM	NORTHERN ARROWWOOD	2-3' HT		#3 CONT.
		ORNAMENTAL GRASSES				
MC	38	MUHLENBERGIA CAPILLARIS	PINK MUHLY GRASS		24" SP	#1 CONT.
PC	30	PANICUM VIRGATUM 'CLOUD NINE'	CLOUD NINE SWITCH GRASS		24" SP	#1 CONT.
PS	21	PANICUM VIRGATUM 'SHENANDOAH'	SHENANDOAH SWITCH GRASS		24" SP	#1 CONT.
SS	39	SCHIZACHYRIUM SCOPARIUM 'THE BLUES'	THE BLUES LITTLE BLUESTEM		18" SP	#1 CONT.

608051_LD01(LANDSCAPE DETAILS).DWG Plotted on 12-Mar-2025 3:30 PM
Proposal No. 608051 - 132406
A00860 - 178



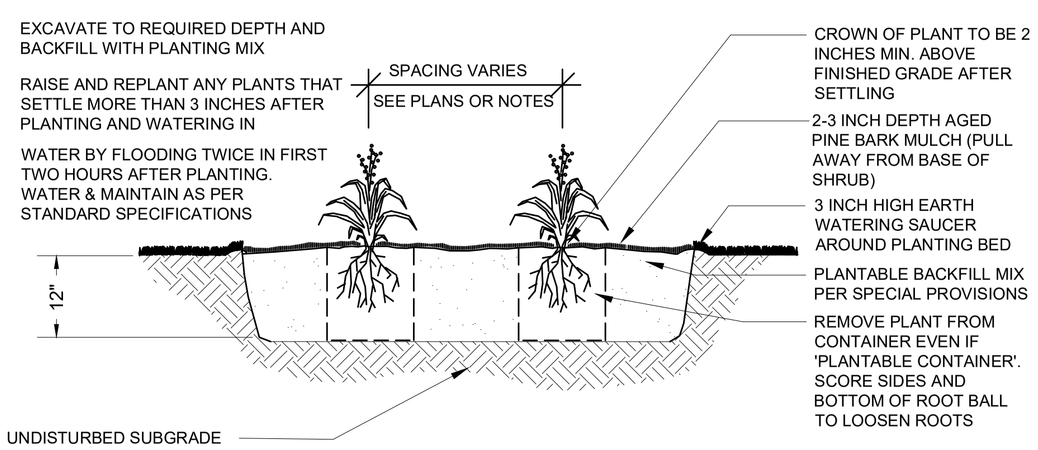
1 CONTAINERIZED SHRUB PLANTING (SLOPE) DETAIL

NOT TO SCALE



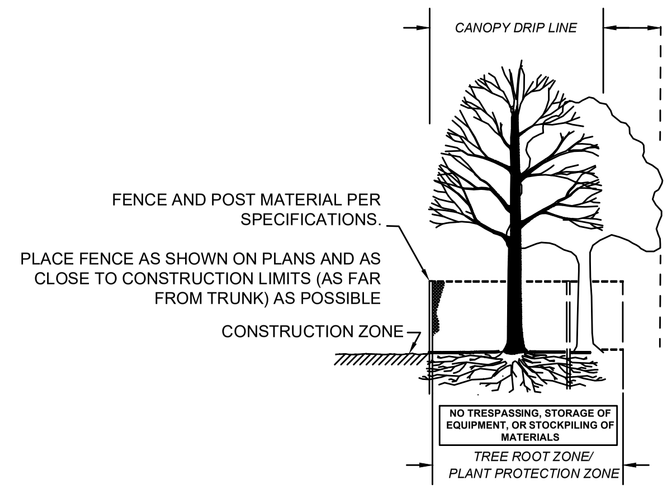
2 EVERGREEN TREE PLANTING

NOT TO SCALE

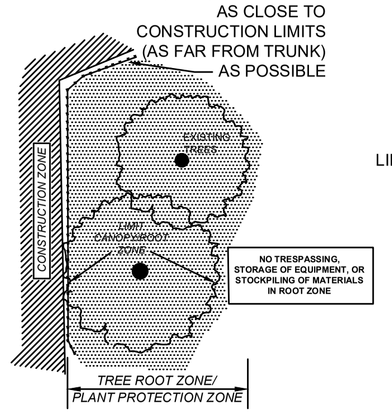


3 ORNAMENTAL GRASS PLANTING

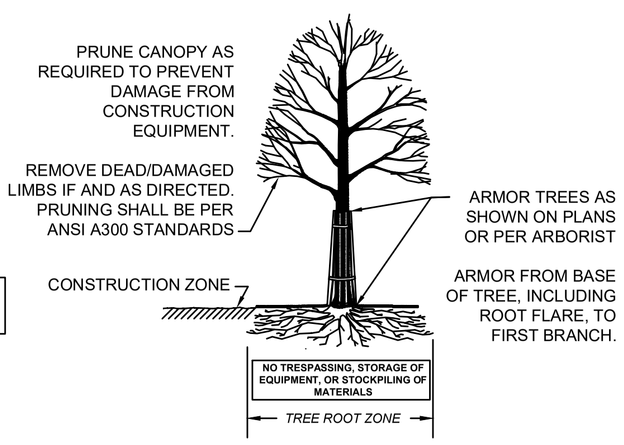
NOT TO SCALE



SECTION - FENCE PROTECTION OF ROOT ZONE



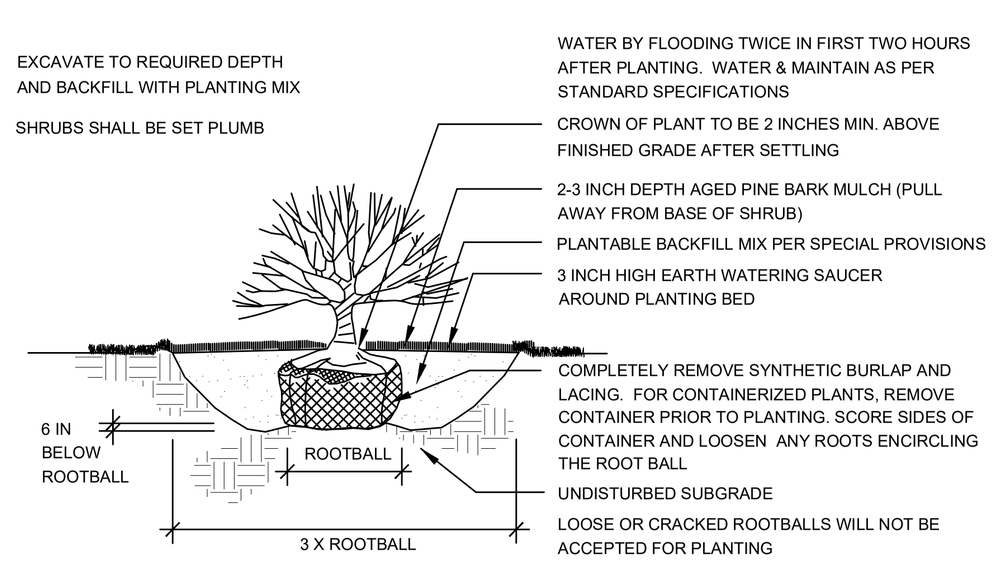
PLAN VIEW - FENCE PROTECTION OF ROOT ZONE



SECTION - TRUNK ARMORING & PRUNING

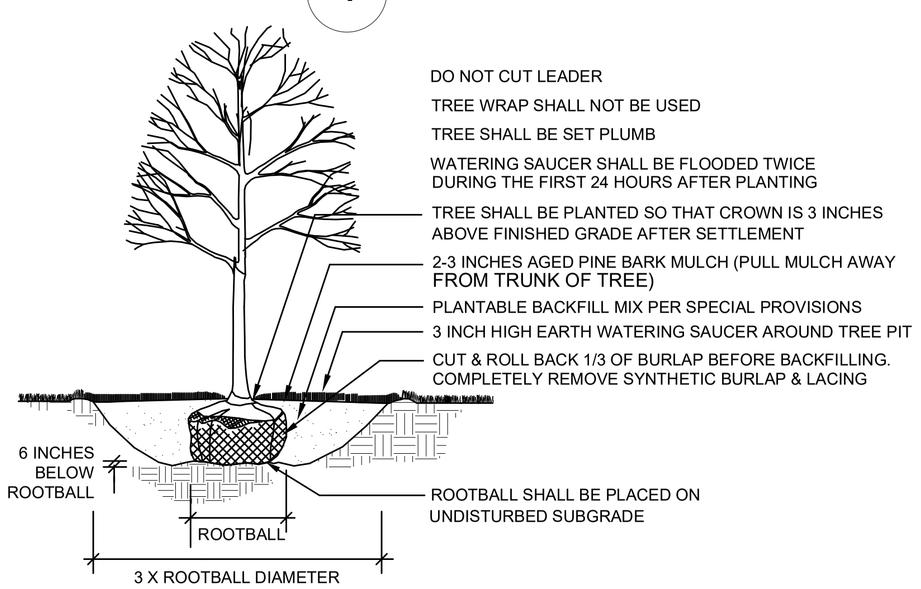
4 TREE PROTECTION DETAILS

NOT TO SCALE



5 SHRUB PLANTING

NOT TO SCALE



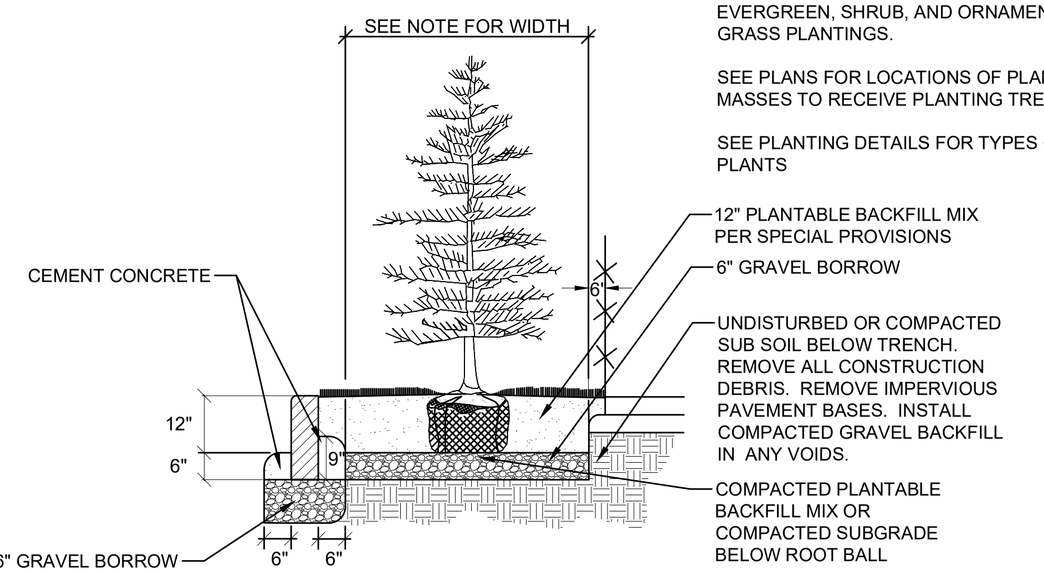
6 TREE PLANTING

NOT TO SCALE

NOTE:
PLANTING TRENCH SHALL EXTEND 6" FROM THE FENCE TO 6" FROM THE BACK OF THE GRANITE STREET CURB AT EVERGREEN, SHRUB, AND ORNAMENTAL GRASS PLANTINGS.

SEE PLANS FOR LOCATIONS OF PLANT MASSES TO RECEIVE PLANTING TRENCH

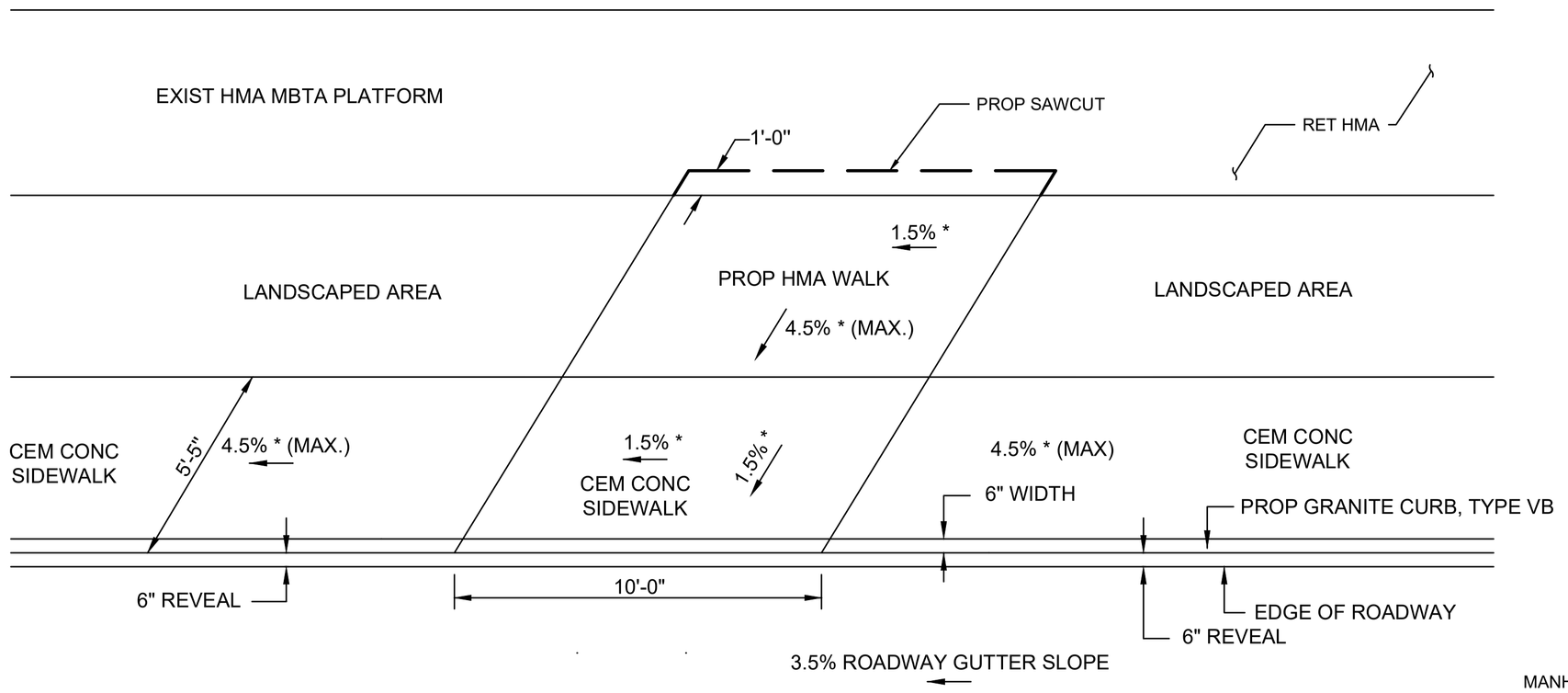
SEE PLANTING DETAILS FOR TYPES OF PLANTS



7 PLANTING TRENCH

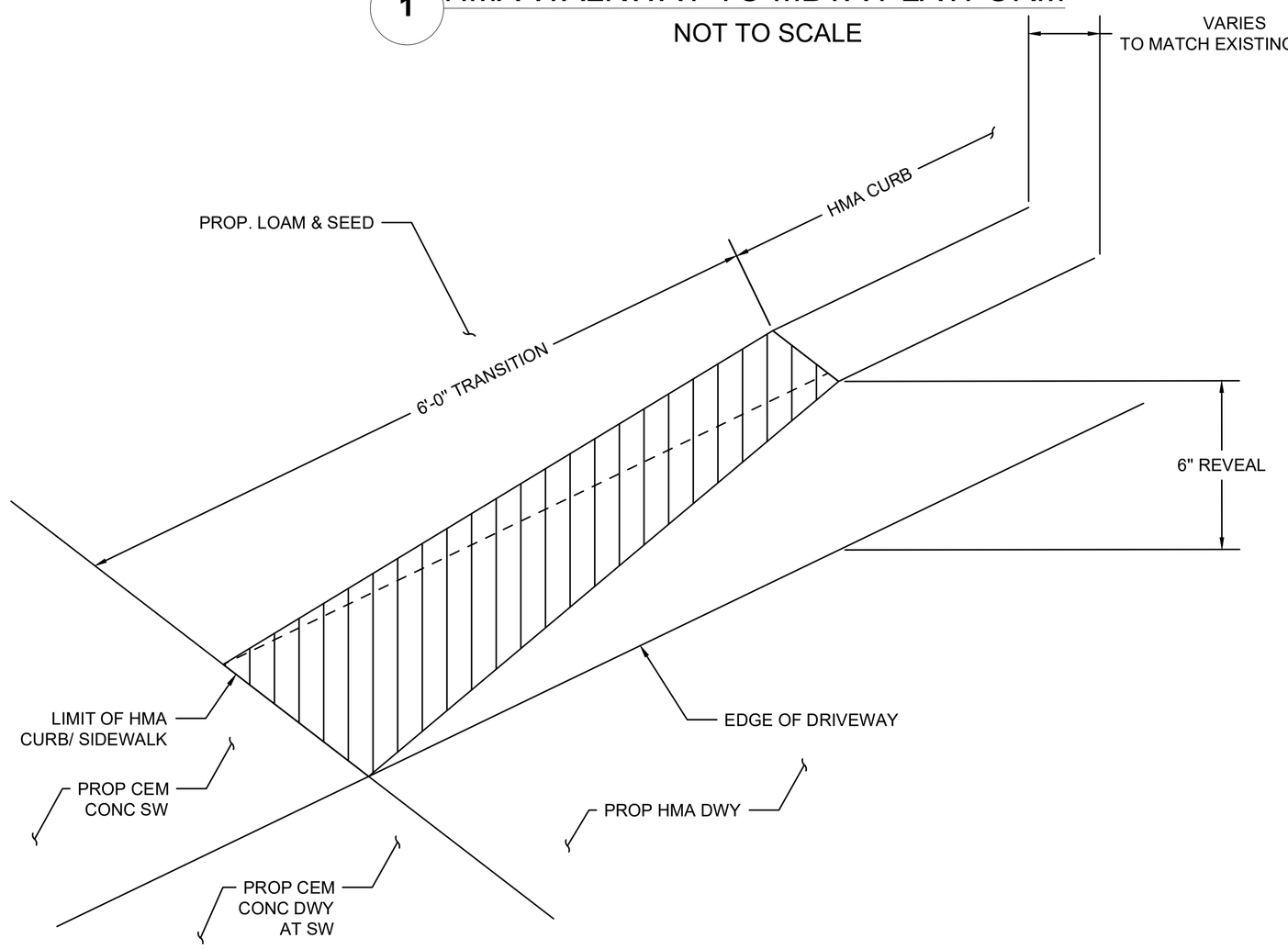
NOT TO SCALE

608051_HD11(CONSTRUCTION DETAILS).DWG Plotted on 12-Mar-2025 3:30 PM
Proposal No. 608051 - 132406
A008660 - 179

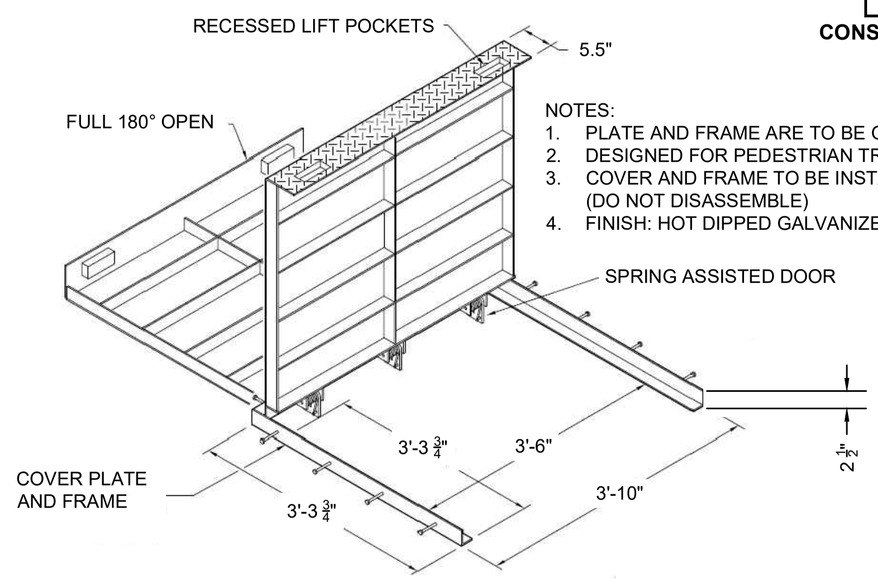


NOTES:
* CONSTRUCTION TOLERANCE ± 0.5%
- CONTRACTOR IS ULTIMATELY RESPONSIBLE FOR CONSTRUCTING RAMPS COMPLIANT WITH ADA/AAB RULES, REGULATIONS AND STANDARDS. CONTRACTOR SHALL VERIFY RAMPS ARE ADA/AAB COMPLIANT BEFORE POURING CEMENT CONCRETE.

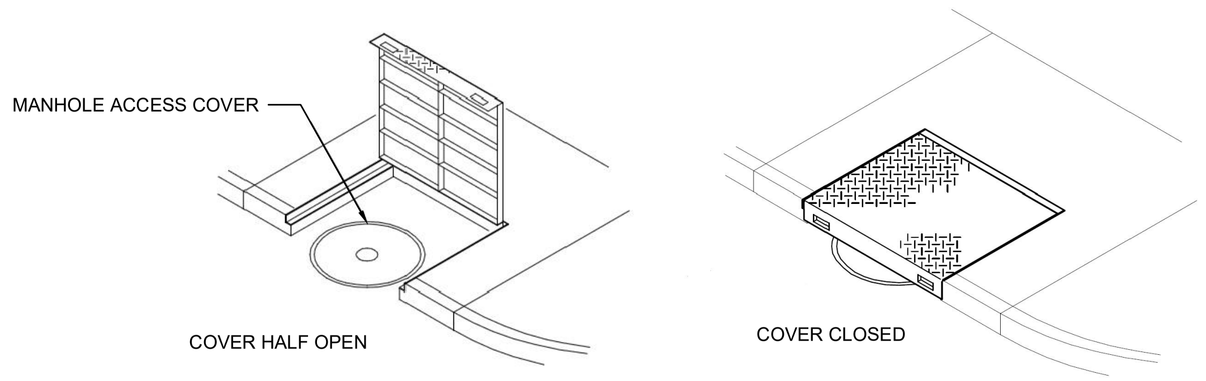
1 HMA WALKWAY TO MBTA PLATFORM
NOT TO SCALE



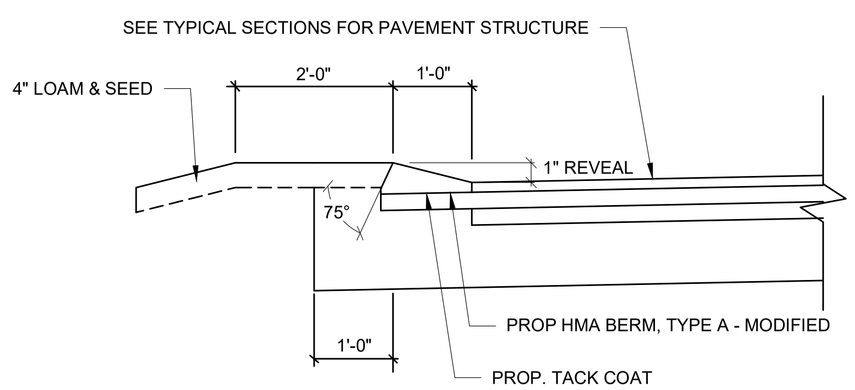
3 HMA CURB TRANSITION TO BACK OF SIDEWALK
NOT TO SCALE



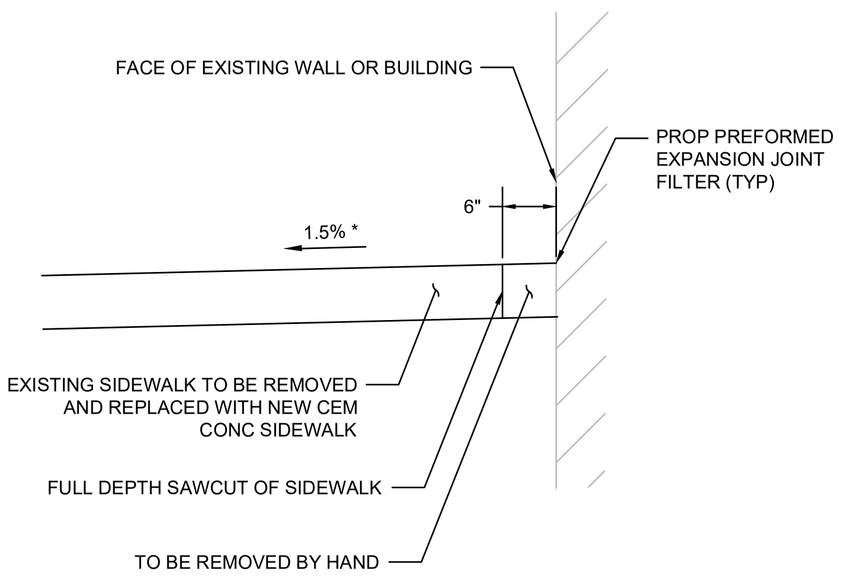
NOTES:
1. PLATE AND FRAME ARE TO BE GALVANIZED STEEL
2. DESIGNED FOR PEDESTRIAN TRAFFIC ONLY
3. COVER AND FRAME TO BE INSTALLED AS ONE UNIT (DO NOT DISASSEMBLE)
4. FINISH: HOT DIPPED GALVANIZED



2 CURB COVER AND FRAME
NOT TO SCALE



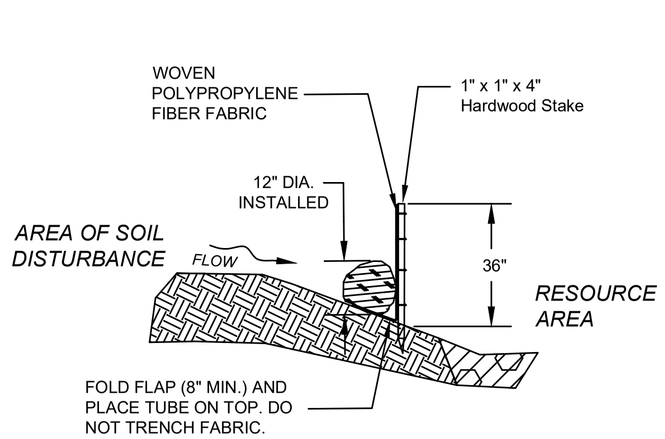
4 HMA BERM, TYPE A - MODIFIED
NOT TO SCALE



5 EXCAVATION ADJACENT TO WALL OR BUILDING DETAIL
NOT TO SCALE

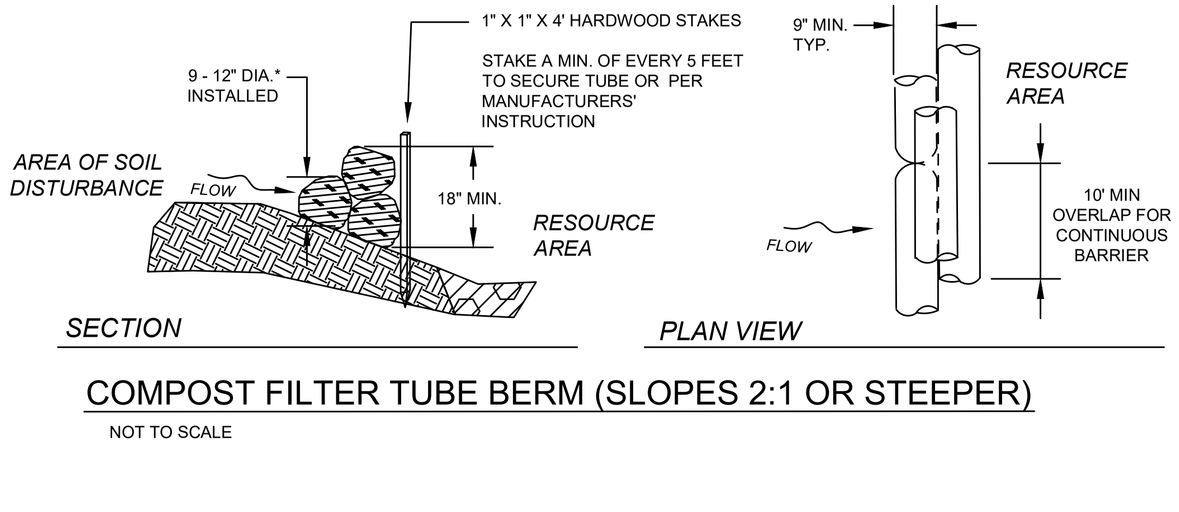
NOTES:
* CONSTRUCTION TOLERANCE ± 0.5%

608051_HD11(CONSTRUCTION DETAILS).DWG Plotted on 12-Mar-2025 3:30 PM
Proposal No. 608051 - 132406
A008860 - 180



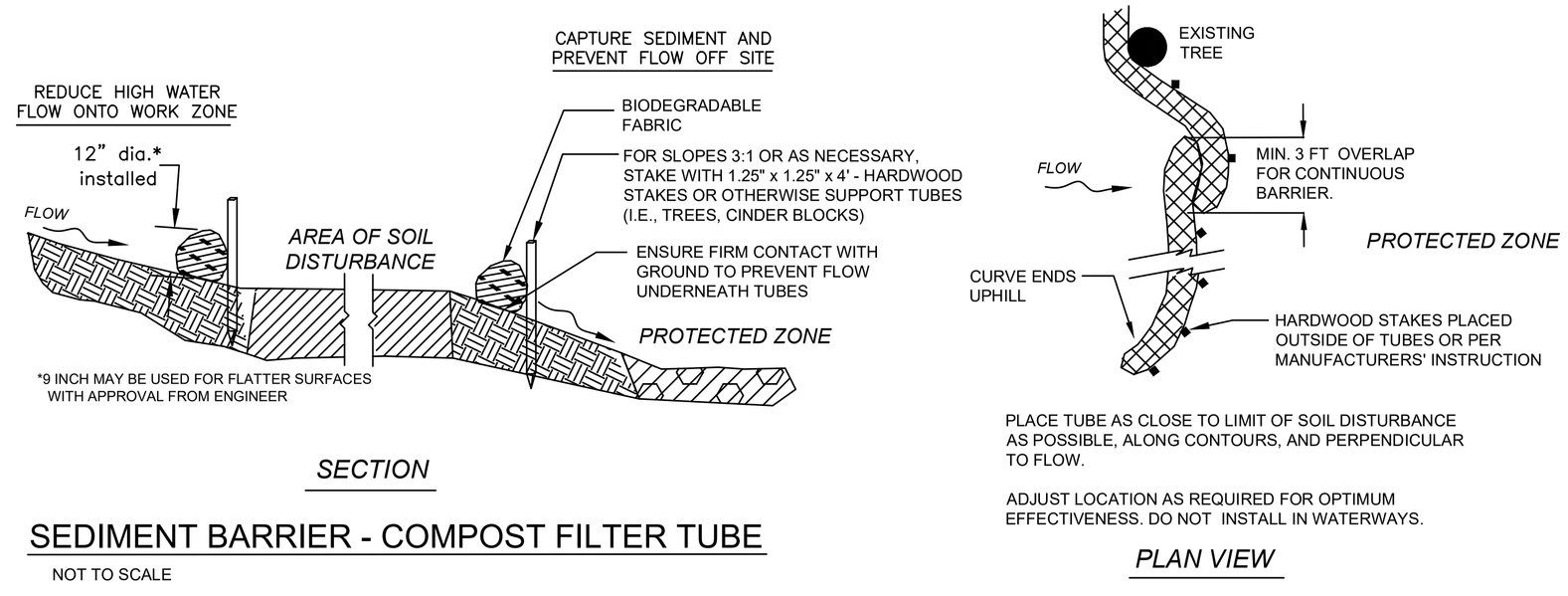
COMPOST FILTER TUBE & SILT FENCE

NOT TO SCALE



COMPOST FILTER TUBE BERM (SLOPES 2:1 OR STEEPER)

NOT TO SCALE

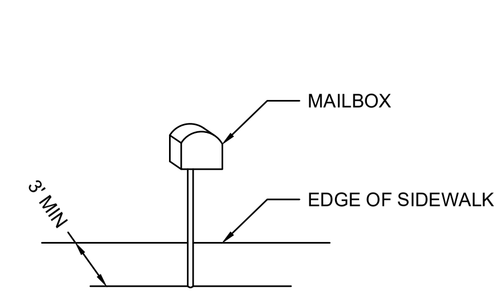


SEDIMENT BARRIER - COMPOST FILTER TUBE

NOT TO SCALE

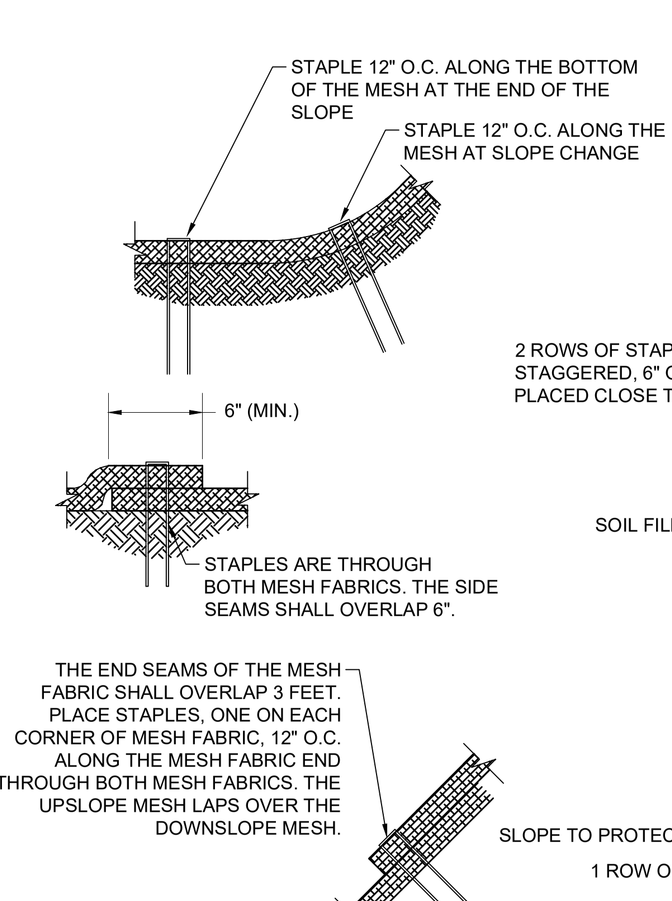
1 SEDIMENT CONTROL BARRIERS - COMPOST FILTER TUBE

NOT TO SCALE



2 MAILBOX

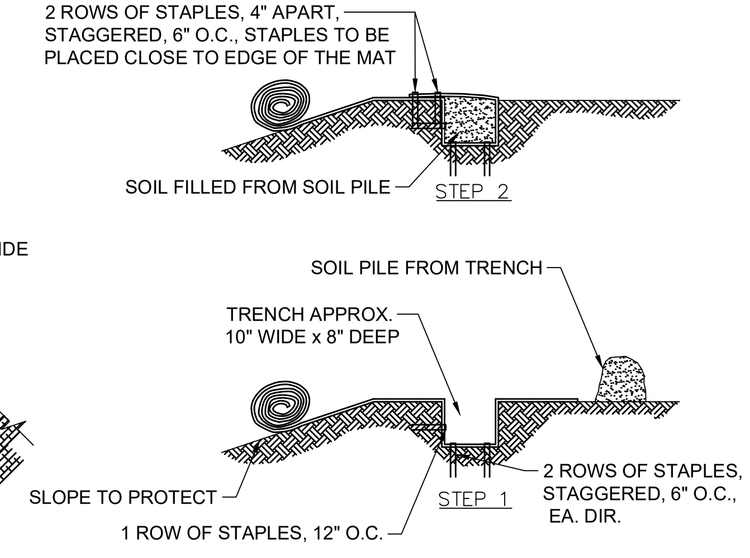
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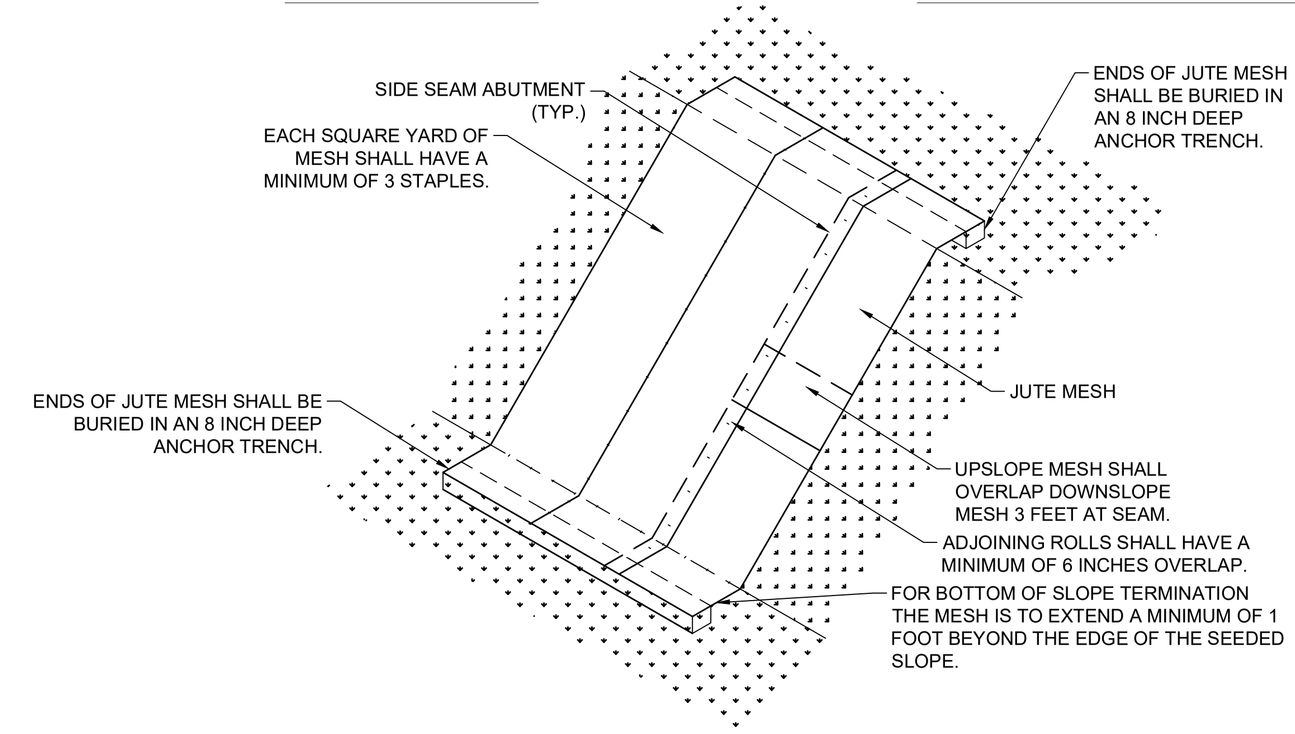
NOTE:

1. RESEED ANCHORING TRENCHES.

STAPLING DETAILS



ANCHORING TRENCH DETAILS



JUTE MESH FABRIC ON SLOPE

NOTES:

1. SEE MANUFACTURER'S STAPLE PATTERN GUIDE FOR DETAILS.
2. INSTALL JUTE MESH ON SLOPES GREATER THAN 3 FEET HORIZONTAL TO 1 FOOT VERTICAL AND WHERE ADDED STABILIZATION FOR EROSION CONTROL IS NEEDED.
3. JUTE MESH SHALL BE INSTALLED WITH CONTINUOUS CONTACT WITH THE SOIL.
4. AREAS WITH JUTE MESH SHALL BE SEEDED PRIOR TO THE INSTALLATION OF THE JUTE MESH.
5. STAPLES SHALL BE DRIVEN IN UNTIL THEIR TOPS ARE FLUSH WITH THE SOIL.
6. STAPLES SHALL BE 11 GAUGE STEEL 6 OR 9 INCHES IN LENGTH. IN AREAS THAT WILL BE MOWN FREQUENTLY EIGHT INCH WOOD STAKES SHALL BE USED TO ANCHOR MESH.
7. JUTE MESH SHALL BE BIODEGRADABLE.

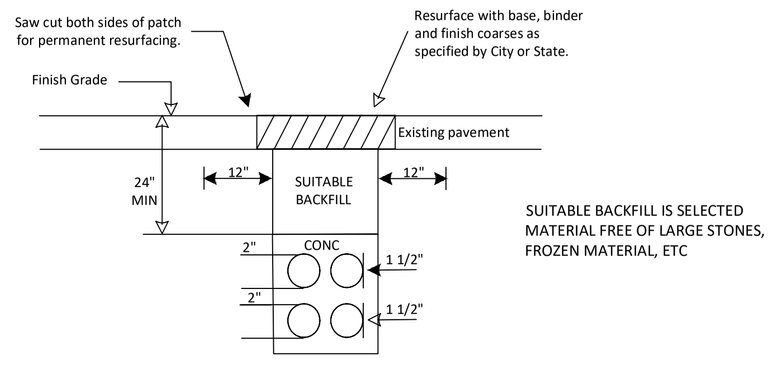
3 JUTE MESH

NOT TO SCALE

608051_HD11(CONSTRUCTION DETAILS).DWG Plotted on 12-Mar-2025 3:30 PM
Proposal No. 608051 - 132406
A008860 - 181

VERIZON CONDUIT REQUIREMENT

- 4" PVC – SCHEDULE 40
- 3" SEPARATION IN COMMON TRENCH WITH SEPARATE POURS
- PIPES (GAS,OIL, WATER, ETC) 6" WHEN CROSSING; 12" WHEN PARALLEL (SEE-NESC 320 B 2)
- 2500 lb. 3/8" CONCRETE



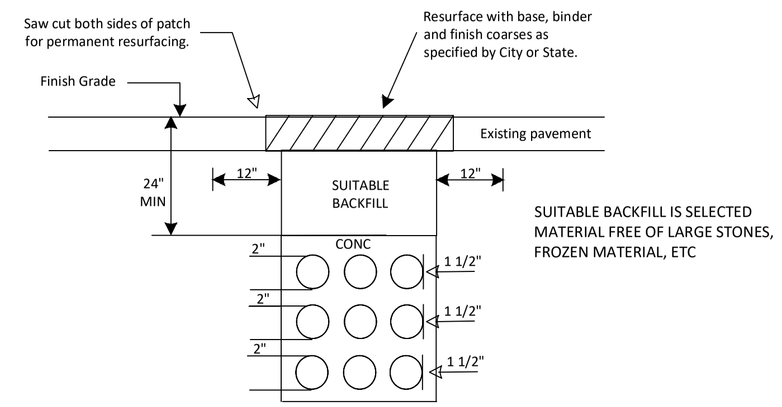
Typical Verizon duct bank cross section

TYPICAL VERIZON DUCT BANK - 2X2 CONFIGURATION

NOT TO SCALE

VERIZON CONDUIT REQUIREMENT

- 4" PVC – SCHEDULE 40
- 3" SEPARATION IN COMMON TRENCH WITH SEPARATE POURS
- PIPES (GAS,OIL, WATER, ETC) 6" WHEN CROSSING; 12" WHEN PARALLEL (SEE-NESC 320 B 2)
- 2500 lb. 3/8" CONCRETE



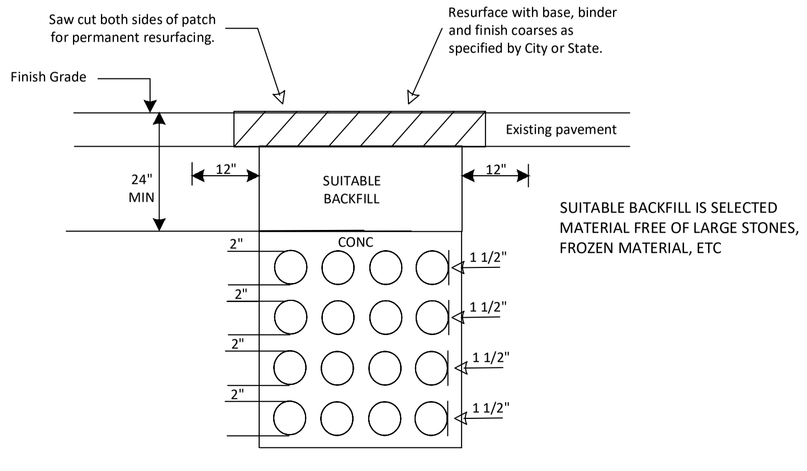
Typical Verizon duct bank cross section

TYPICAL VERIZON DUCT BANK - 3X3 CONFIGURATION

NOT TO SCALE

VERIZON CONDUIT REQUIREMENT

- 4" PVC – SCHEDULE 40
- 3" SEPARATION IN COMMON TRENCH WITH SEPARATE POURS
- PIPES (GAS,OIL, WATER, ETC) 6" WHEN CROSSING; 12" WHEN PARALLEL (SEE-NESC 320 B 2)
- 2500 lb. 3/8" CONCRETE



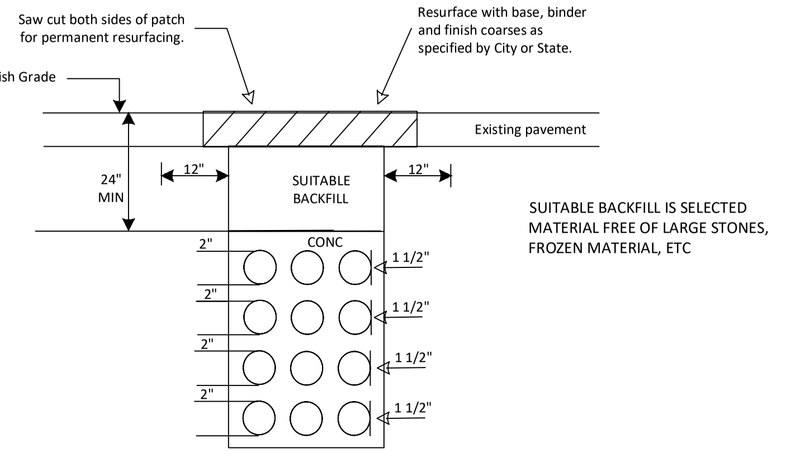
Typical Verizon duct bank cross section

TYPICAL VERIZON DUCT BANK - 4X4 CONFIGURATION

NOT TO SCALE

VERIZON CONDUIT REQUIREMENT

- 4" PVC – SCHEDULE 40
- 3" SEPARATION IN COMMON TRENCH WITH SEPARATE POURS
- PIPES (GAS,OIL, WATER, ETC) 6" WHEN CROSSING; 12" WHEN PARALLEL (SEE-NESC 320 B 2)
- 2500 lb. 3/8" CONCRETE



Typical Verizon duct bank cross section

TYPICAL VERIZON DUCT BANK - 3X4 CONFIGURATION

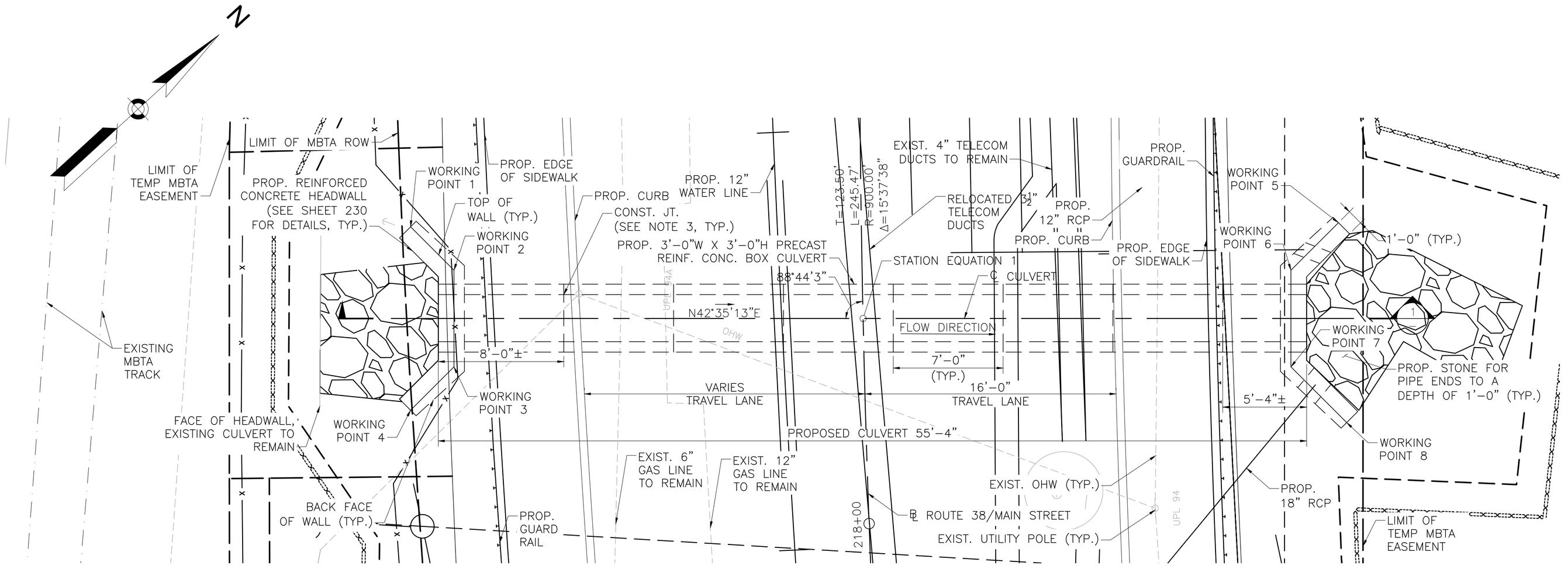
NOT TO SCALE

608051_HD11(CONSTRUCTION DETAILS).DWG Plotted on 12-Mar-2025 3:30 PM
Proposal No. 608051 - 132406
A00860 - 182

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	228	391
PROJECT FILE NO.	608051		

SPECIAL DRAINAGE STRUCTURE NO. 1 PLAN AND ELEVATION



SPECIAL DRAINAGE STRUCTURE NO. 1 PLAN

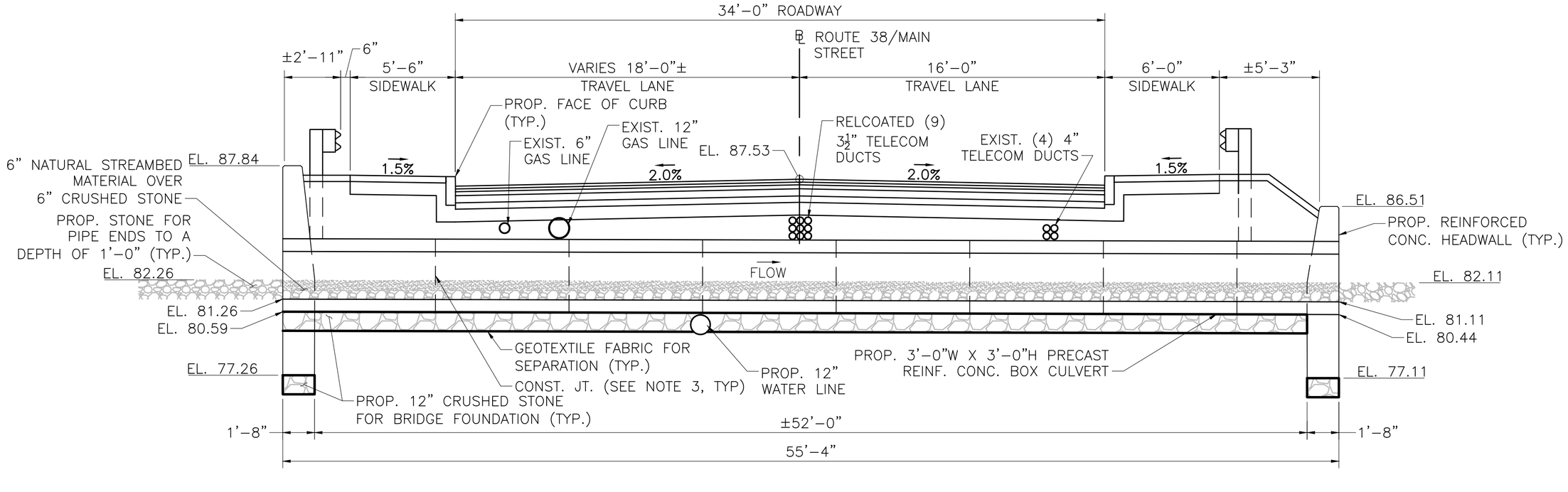
SCALE: ¼" = 1'-0"

WORKING POINT	STA.	OFFSET R, FT	NORTHING	EASTING
1	217+80.64	28.73	3023401.55	744848.30
2	217+83.36	26.01	3023401.72	744852.21
3	217+89.34	26.14	3023397.55	744856.75
4	217+91.96	28.98	3023393.64	744856.91
5	217+81.28	−30.41	3023445.28	744888.13
6	217+84.36	−27.33	3023441.00	744888.31
7	217+90.71	−27.19	3023436.83	744892.85
8	217+94.48	−30.64	3023437.04	744897.87

STATION EQUATION 1: RT 38 CONSTRUCTION ℄ STA. 217+86.85 = CULVERT CENTERLINE

NOTES:

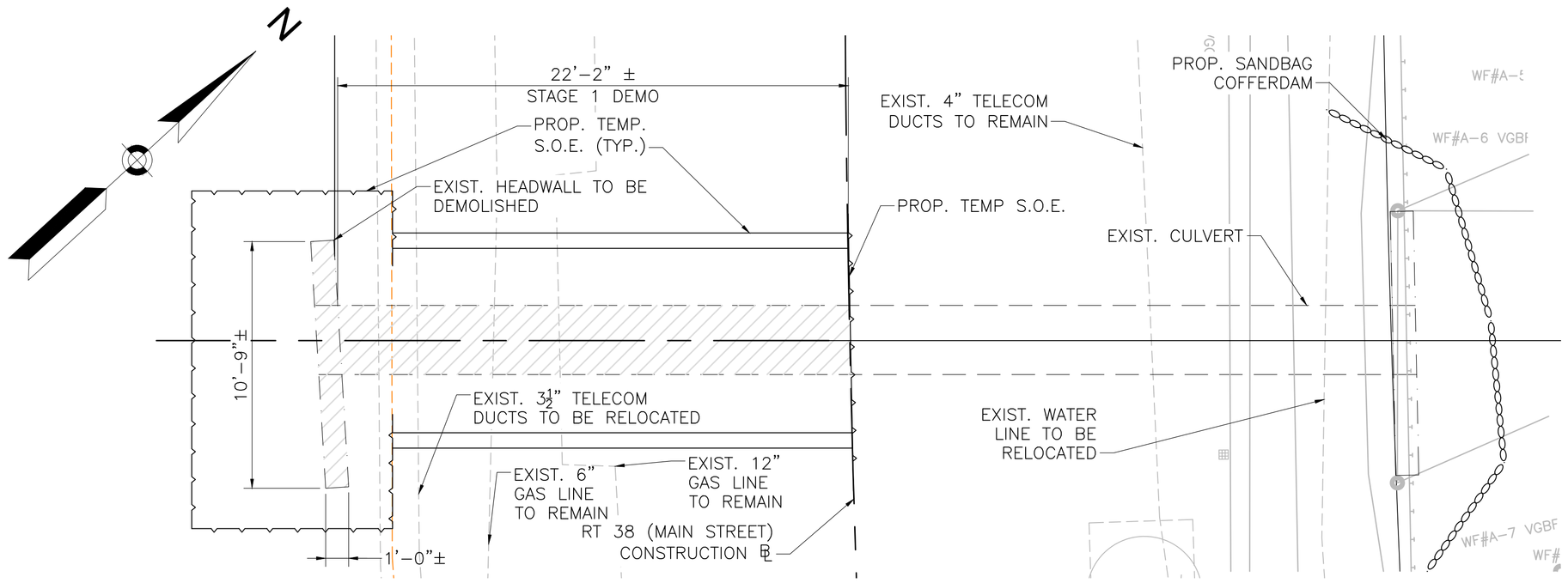
1. GUARDRAIL WILL SPAN OVER PROPOSED CULVERT SECTION.
2. SEE SHEETS 15 – 19 FOR TYPICAL APPROACH/ROADWAY CROSS SECTION AT CULVERT LOCATION.
3. PRECAST REINFORCED CONCRETE CULVERT CONSTRUCTION JOINT SPACING WILL VARY PER PRECASTER UP TO 7'-0" MAXIMUM SPACING.



SECTION (DOWNSTATION) 1/–

SCALE: ¼" = 1'-0"

6080051_BR01.DWG Plotted on 12-Mar-2025 3:32 PM
Proposal No. 608051 - 132406
A00860 - 183

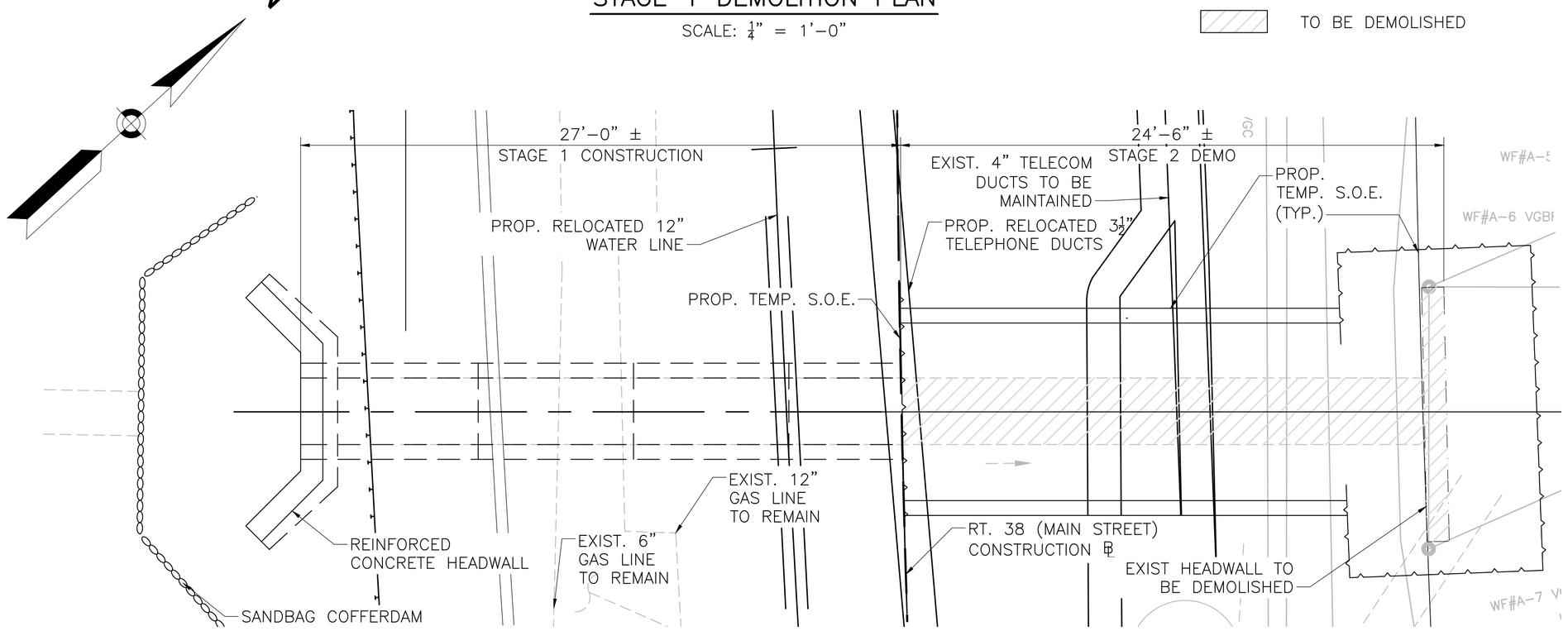


STAGE 1 DEMOLITION PLAN

SCALE: ¼" = 1'-0"

LEGEND:

TO BE DEMOLISHED



STAGE 1 CONSTRUCTION & STAGE 2 DEMOLITON PLAN

SCALE: ¼" = 1'-0"

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	229	391
PROJECT FILE NO.	608051		

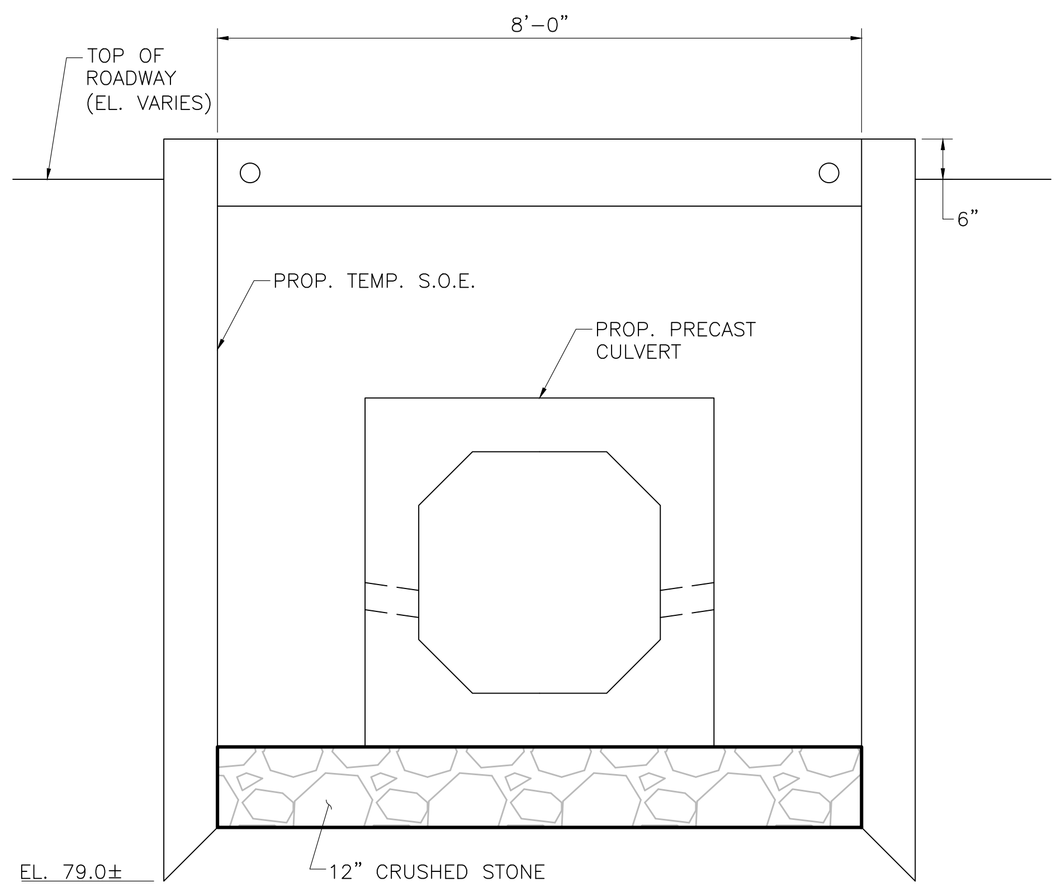
CULVERT DEMOLITION PLAN

GENERAL STAGE CONSTRUCTION NOTES:

1. THE SUPPORT OF EXCAVATION IS DESIGNED AS A TEMPORARY STRUCTURE.
2. SURCHARGES AND STOCKPILES SHALL BE LIMITED TO 250 PSF.
3. LOCATE ALL UTILITIES, EXISTING, AND PROPOSED STRUCTURES PRIOR TO THE START OF WORK.
4. INSTALL SUPPORT OF EXCAVATION (S.O.E.) TO THE REQUIRED DEPTHS AS DESIGNED BY THE CONTRACTOR.
5. UNLESS OTHERWISE NOTED, DETAILS SHOWN ON ANY DRAWING ARE TO BE CONSIDERED TYPICAL FOR ALL SIMILAR CONDITIONS.
6. VERIFY NEARBY STRUCTURES WILL NOT BE AFFECTED BY PROPOSED WORK.

SUGGESTED SEQUENCE OF CONSTRUCTION:

1. INSTALL SANDBAG COFFERDAM AT THE UPSTREAM END OF CULVERT. INSTALL S.O.E. AROUND LIMITS OF PROPOSED STAGE 1 HEADWALL DEMOLITION.
2. EXCAVATE AND REMOVE EXISTING CULVERT TO STAGE 1 LIMITS SHOWN. PLACE AND MAINTAIN TRENCH BOX TO SUPPORT EXCAVATION FOR STAGE 1 CONSTRUCTION.
3. RELOCATE 12" WATER LINE TO PROPOSED LOCATION
4. CONSTRUCT STAGE 1 PORTION OF PROPOSED CULVERT.
5. REMOVE AND RESET S.O.E./SANDBAG COFFERDAM TO STAGE 2 LOCATIONS. REMOVAL OF SOE MUST NOT RESULT IN SETTLEMENT OF ANY PROPOSED WORK.
6. EXCAVATE AND REMOVE EXISTING CULVERT TOP STAGE 2 LIMITS SHOWN. PLACE AND MAINTAIN TRENCH BOX TO SUPPORT EXCAVATION FOR STAGE 2 CONSTRUCTION.
7. CONSTRUCT STAGE 2 PORTION OF PROPOSED CULVERT.



STAGE CONSTRUCTION SECTION

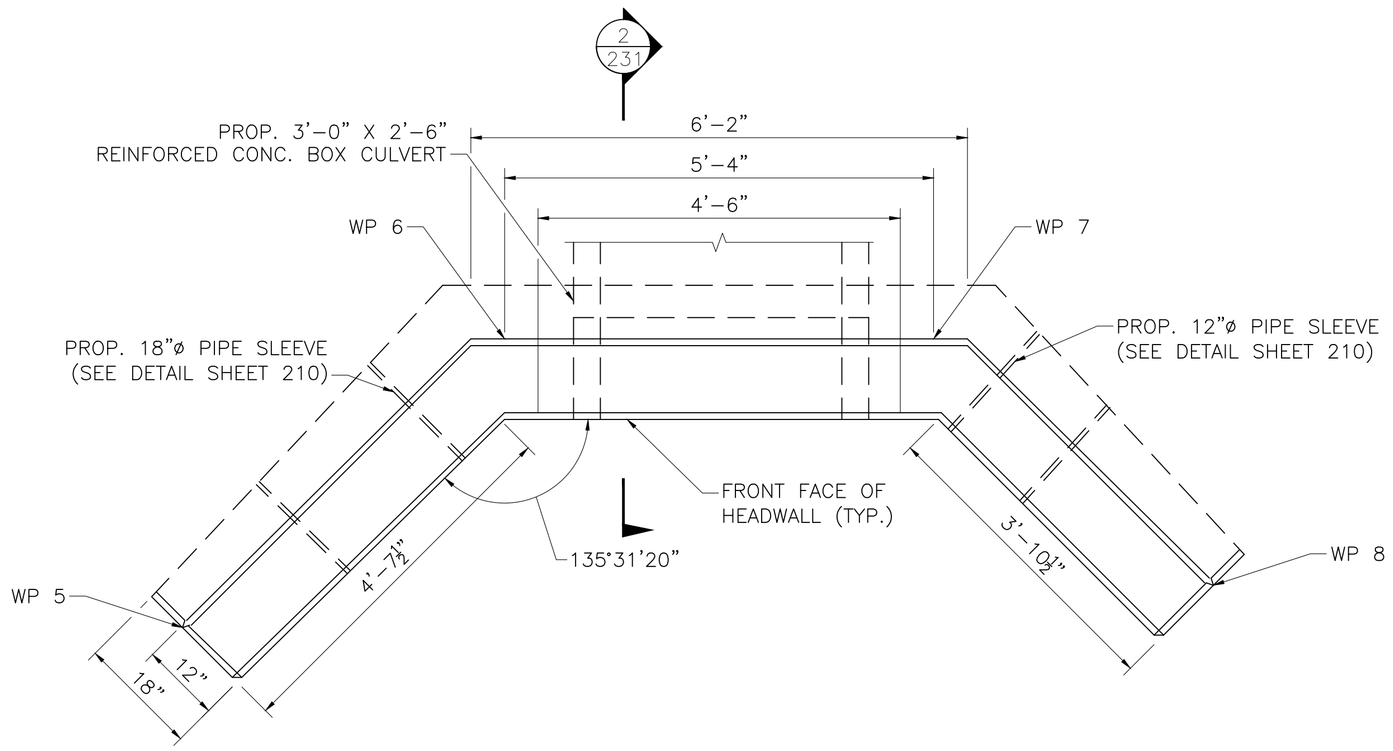
SCALE: ¾" = 1'-0"

6080051_BR03_RECOVER.DWG Plotted on 12-Mar-2025 3:33 PM
Proposal No. 608051 - 132406
A00860 - 184

WILMINGTON
ROUTE 38 (MAIN STREET)

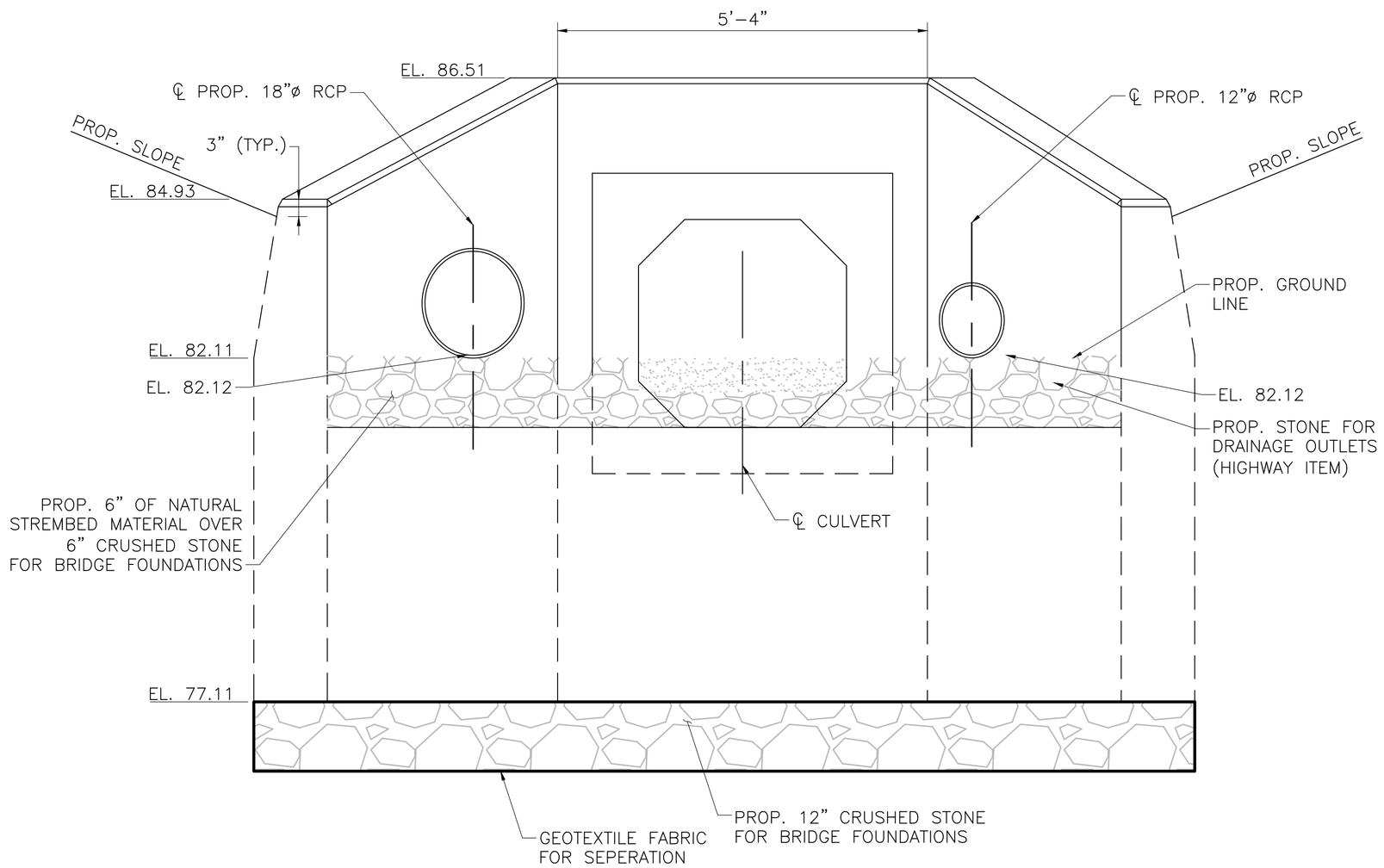
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	230	391
PROJECT FILE NO.		608051	

SPECIAL DRAINAGE STRUCTURE NO. 1 DETAILS



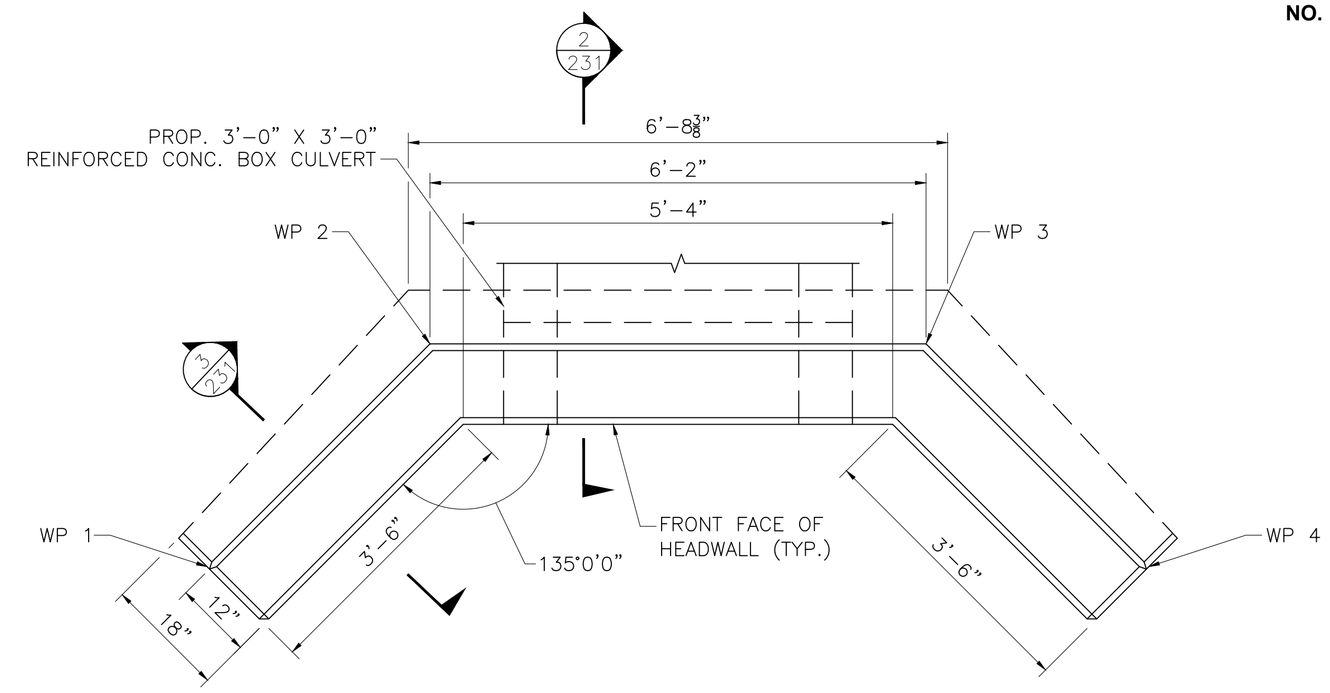
NORTH HEADWALL PLAN

SCALE: ¾" = 1'-0"



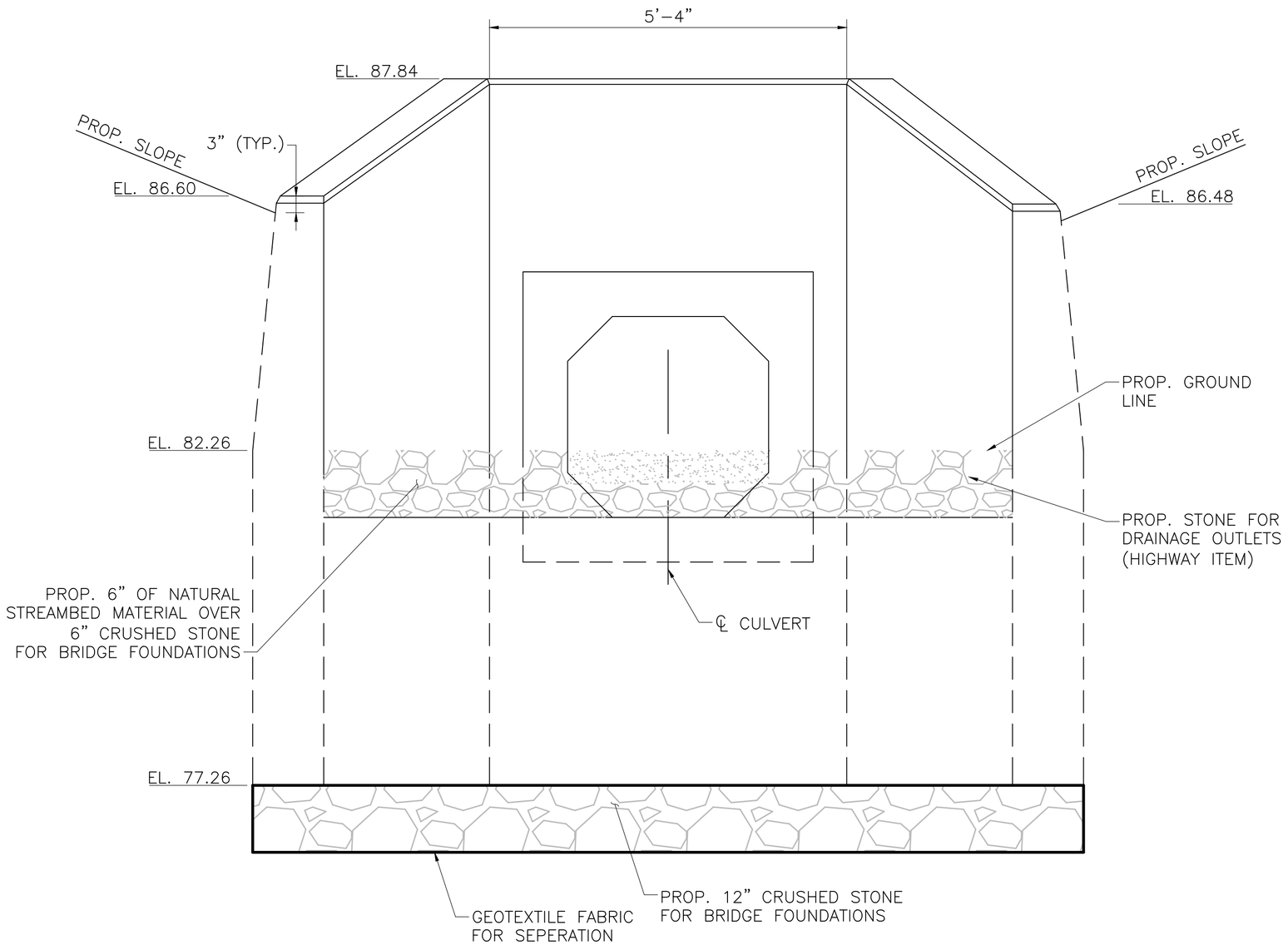
NORTH HEADWALL ELEVATION

SCALE: ¾" = 1'-0"



SOUTH HEADWALL PLAN

SCALE: ¾" = 1'-0"



SOUTH HEADWALL ELEVATION

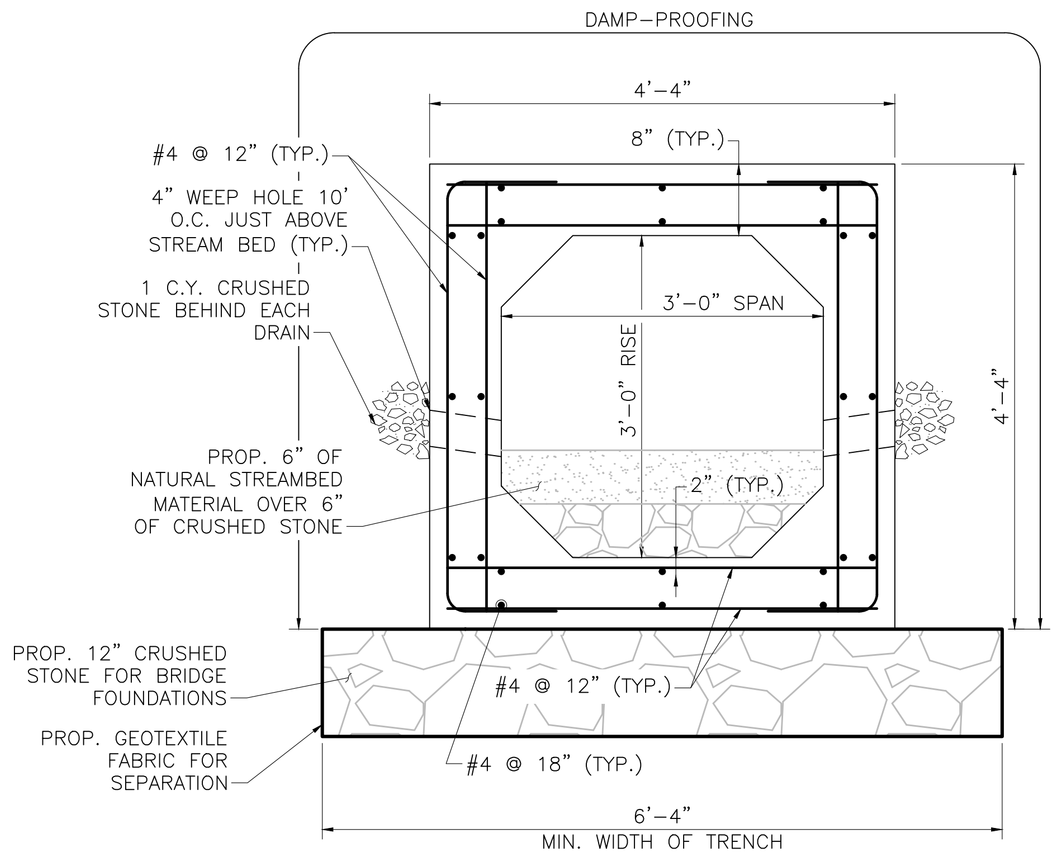
SCALE: ¾" = 1'-0"

6080051_BR02.DWG Plotted on 12-Mar-2025 3:33 PM
Proposal No. 608051 - 132406
A00R60 - 185

WILMINGTON
ROUTE 38 (MAIN STREET)

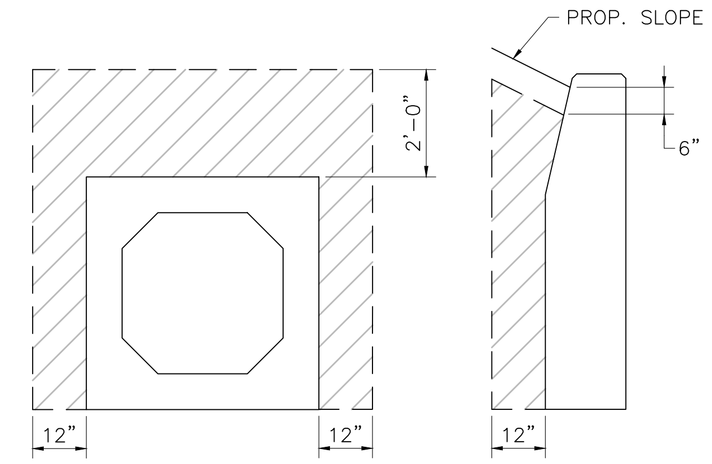
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	210	391
PROJECT FILE NO.	608051		

SPECIAL DRAINAGE STRUCTURE NO. 1 DETAILS



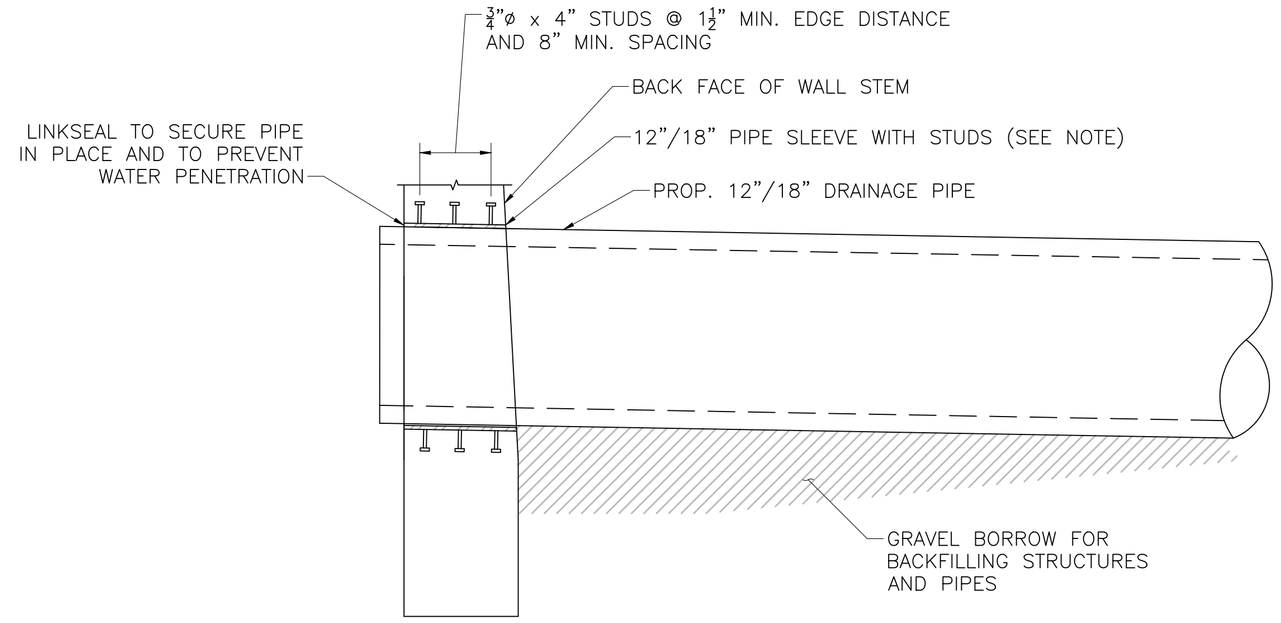
NOTES:
1. THE MAXIMUM FACTORED BEARING PRESSURE IS 2.02 KSF AS PER AASHTO LRFD BRIDGE SPECIFICATION STRENGTH 1 LOAD COMBINATION. FACTORED BEARING RESISTANCE IS 9.3 KSF. FACTORED BEARING RESISTANCE IS THE PRODUCT OF THE NOMINAL BEARING RESISTANCE OF 20.7 AND A RESISTANCE FACTOR OF 0.45.
2. REFER TO GEOTECHNICAL REPORT, DATED OCTOBER 2020, PREPARED BY LAMSON ENGINEERING CORPORATION.
3. TRANSVERSE REINFORCING SHALL BE PLACED NORMAL TO THE ℄ OF THE CULVERT.
4. PRECAST CONCRETE CULVERT TO BE 5000 PSI, ¾ INCH, 686 HP CEMENT CONCRETE.

CULVERT REINFORCEMENT
SCALE: 1" = 1'-0"



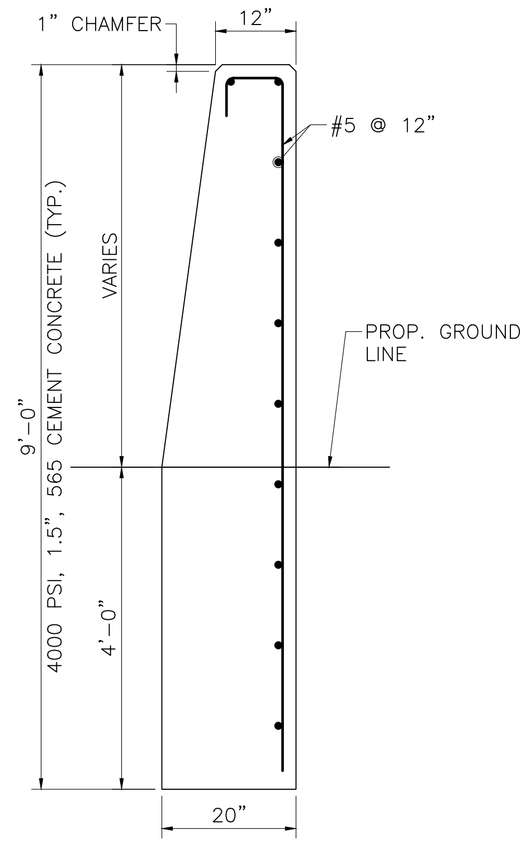
NOTE:
HATCHED AREA INDICATES LIMITS OF GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES

LIMITS OF GRAVEL BORROW FOR BACK FILLING STRUCTURES AND PIPES
SCALE: ½" = 1'-0"

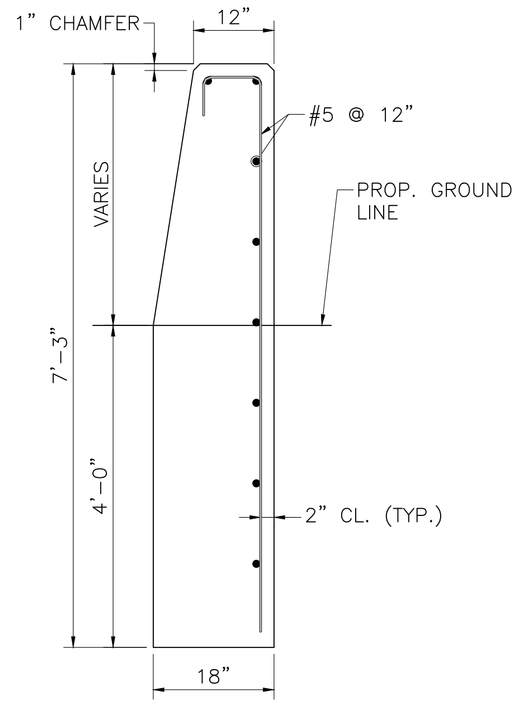


NOTE:
FOR CULVERT INVERT AND WALL ELEVATIONS, SEE SHEET 209.

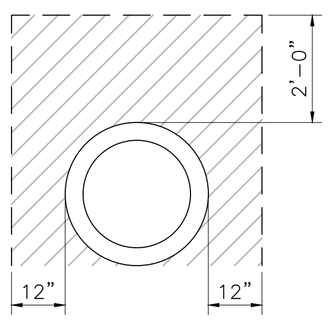
TYPICAL CULVERT WALL PENETRATION DETAIL
SCALE: ½" = 1'-0"



SECTION 2
SCALE: ¾" = 1'-0"

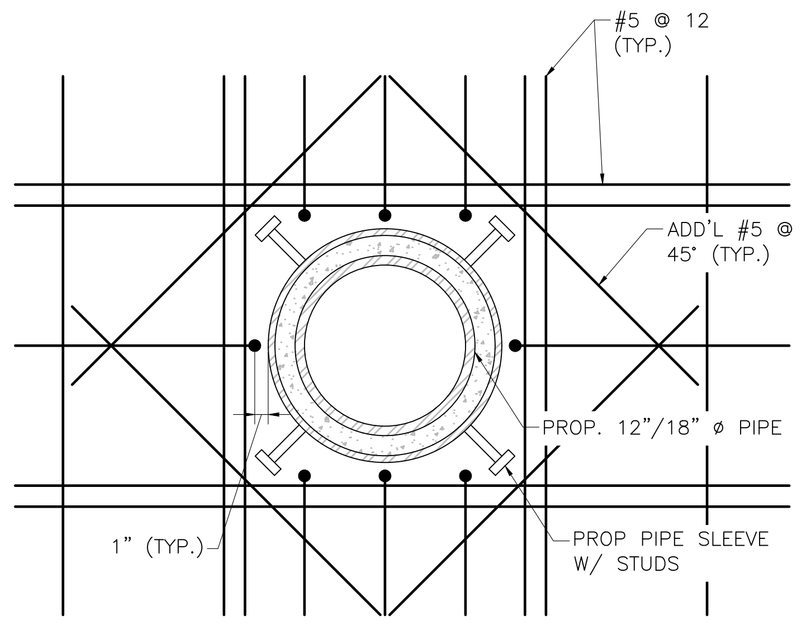


SECTION 3
SCALE: ¾" = 1'-0"



NOTE:
HATCHED AREA INDICATES LIMITS OF GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES.

LIMITS OF GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES
NOT TO SCALE



PIPE OPENING DETAIL
SCALE: 1½" = 1'-0"

6080051_BR04.DWG Plotted on 12-Mar-2025 3:33 PM
Proposal No. 608051 - 132406
A00860 - 186

Stormwater Management Report

Reconstruction of Route 38 (Main Street)

Wilmington, MA

PREPARED FOR

massDOT

10 Park Plaza
Boston, MA 02116

PREPARED BY

GREEN

Green International Affiliates
100 Ames Pond Drive, Suite 200
Tewksbury, MA 01876

March 2025

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2 **Project Summary** 2

3 **Existing Conditions** 4

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6 **Stormwater Management Standards** 1

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Attachments

Appendix A: MassDEP Checklist for Stormwater Report

Appendix B: Soils and FEMA Information

Appendix C: Supporting Calculations

Appendix D: Hydraulic and Hydrologic Data

Appendix E: O&M Plan and LTPPP

1

Introduction

To: MassDOT

Date: 3/12/2025

Project No: 608051

From: Green International Affiliates Inc.

Re: Reconstruction of Route 38 (Main Street)

This Stormwater Management Report has been prepared to demonstrate compliance with the Massachusetts Stormwater Management Standards in accordance with the Massachusetts Wetlands Protection Act Regulations (310 CMR 10.00) and Water Quality Certification Regulations (314 CMR 9.00). Appendix A includes a completed Massachusetts Department of Environmental Protection (MassDEP) Checklist for Stormwater Report, stamped by a professional engineer.

The project follows the guidance presented in the MassDOT Stormwater Design Guide (SDG), and stormwater management systems are designed in accordance with MassDEP Standards.

The following MassDOT standard methodologies are being employed in this project:

- Use of Macro Approach for Standards 2, 3, and 4 to meet requirements to the maximum extent practicable.

2

Project Summary

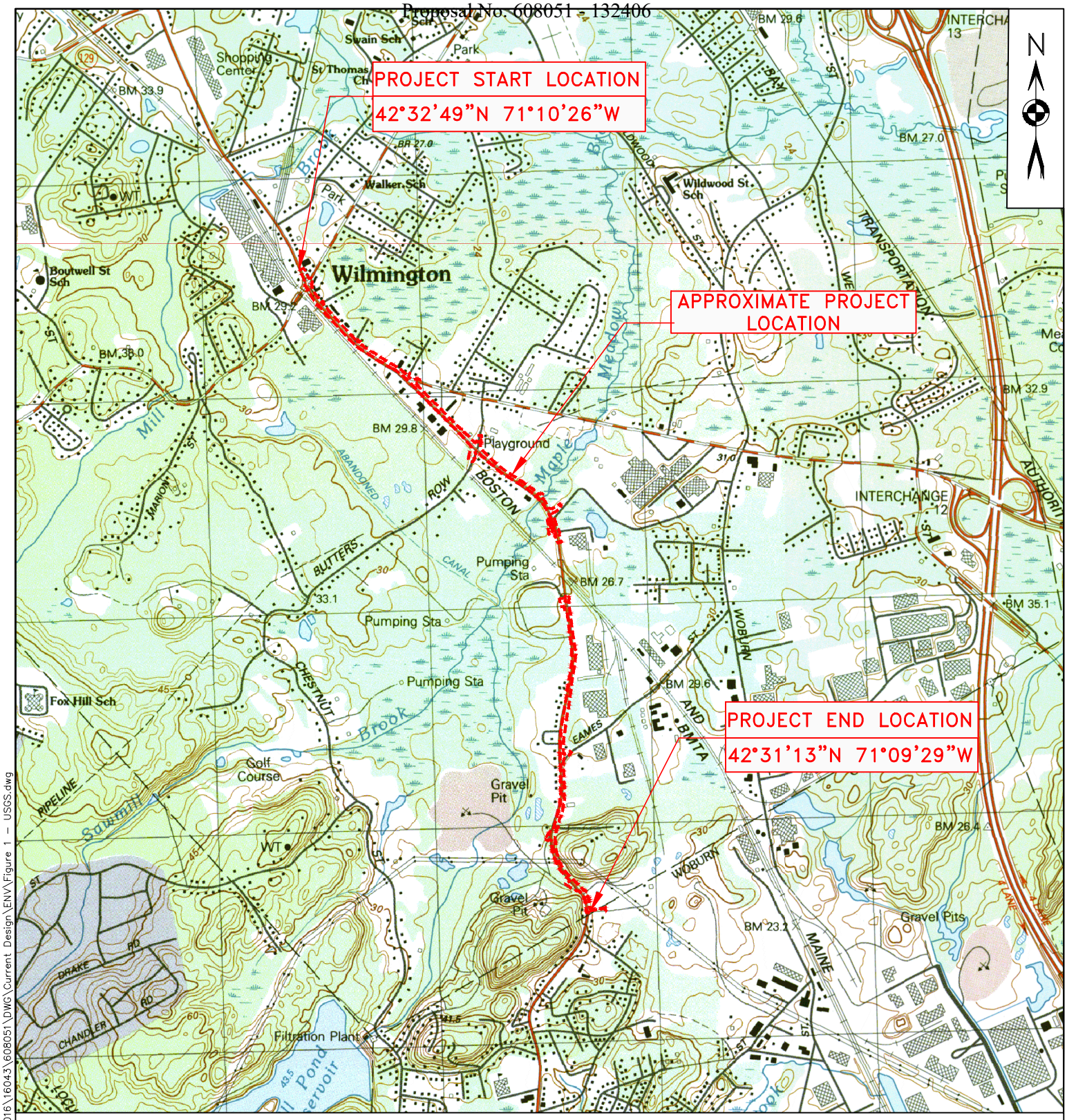
On behalf of MassDOT (Applicant), Green International Affiliates, Inc (Green) is submitting this Stormwater Management Report to accompany the Notice of Intent Application to the Wilmington Conservation Commission for roadway, safety, and drainage improvements on Route 38 (Main Street) in the Town of Wilmington.

The project MassDOT Project No. 608051 consists of the reconstruction/rehabilitation of Route 38 (Main Street) from the Woburn Town Line to the Route 62 (Burlington Avenue/Church Street) intersection (approximately 2.2 miles). The proposed roadway curb to curb width is 32 feet with sidewalk(s) along the project corridor. The proposed improvements consist of maintenance and improvement of the existing roadway. The work includes improving existing drainage systems, improving existing water system, constructing sidewalks, repaving, and minor sewer improvements. As the proposed project is a roadway project, it is therefore categorized as a "Redevelopment Project" under the Massachusetts Stormwater Management Standards. The project is required to meet only Standards 2 & 3 and the pretreatment and structural stormwater best management practice requirements of Standards 4, 5 & 6 to the maximum extent practicable.

The combined project provides an opportunity to improve the existing drainage system and improve the quality of stormwater runoff discharged to adjacent wetlands. This project will incorporate the installation of three infiltrating Stormwater Control Measures (SCMs) located at approximate station 270+00 south of the railroad crossing bridge replacement, station 305+00 at the northern intersection of Old Main St and Main St, and 314+00 at the southern intersection of Old Main St and Main St. The goals of the proposed stormwater improvements are to improve public safety on the roadway by reducing ponding on the roadway, to control the flow of stormwater discharged to the wetlands, and to improve the water quality of discharged stormwater, to the maximum extent practical.

The following report was created in accordance with the "Massachusetts Stormwater Handbook" last revised in January 2008. The report is organized into sections that correspond to the categories listed in the "Massachusetts Stormwater Report Checklist." The checklist is included in Appendix A of this report. The following is a more detailed description of the existing and proposed drainage areas and the design methodology for this project.

See Figure 1 for the Project Locus Map.



LEGEND:

APPROXIMATE PROJECT AREA

SCALE IN FEET

1000 0 1000 2000

1" = 2000'

ELEVATIONS IN METERS

NOTE: DATA TAKEN FROM MASSGIS

USGS LOCUS MAP

WILMINGTON – RECONSTRUCTION ON ROUTE 38 (MAIN STREET)
FROM ROUTE 62 TO THE WOBURN CITY LINE, PROJECT #608051

PREPARED BY:
GREEN INTERNATIONAL AFFILIATES, INC.
CIVIL AND STRUCTURAL ENGINEERS
100 AMES POND DRIVE, SUITE 200, TEWKSBURY, MA
24 ALBION RD, LINCOLN, RI (401) 305-7895

PREPARED FOR:
MassDOT
Massachusetts Department of Transportation
Highway Division

SCALE: AS NOTED	PROJECT NO. 13033.19	FIGURE 1
DATE: 01/09/2025	DRAWN BY: VR/EL	
REVISED:	CHECKED BY: OF	

\\EgnyteDrive\greenint\Shared\Engineering\Projects\2016\16043\608051\DWG\Current Design\ENV\Figure 1 – USGS.dwg

3

Existing Conditions

The existing site can be analyzed as 27 watershed areas that contribute runoff to 21 discharge points. The existing drainage areas are delineated in Figure 6 – Existing Watershed Plan. For the purpose of this hydrologic analysis, the following assumptions were made:

- When the watershed boundary fell outside of the limit of work an arbitrary line was delineated as the watershed boundary.
- The total watershed area for the existing conditions is used as the comparison base for the watershed area in the proposed conditions.

The project on Route 38 extends from the Woburn Town Line in the south to the Route 62 (Burlington Avenue/Church Street) intersection in the north. Route 38 is a State Highway. Route 38 is located within a public right-of-way which is typically fifty (50) feet wide. The existing pavement width varies between 30 and 34 feet. The pavement width increases to approximately 50 feet at the Burlington Avenue / Church Street intersection, with a wider right-of-way at this location. There is an existing sidewalk on the east side of the road from Church Street to 579 Main Street (Heavenly Donuts). There is an existing sidewalk on both sides of the roadway from 579 Main Street to just south of the Lowell Street intersection. There are no existing sidewalks from just south of the Lowell Street intersection to the Woburn Town Line. The total length of the project is approximately 2.2 miles.

Wetlands exist on both sides of Route 38 immediately adjacent to the roadway for much of the project length. They are connected by existing culverts which cross the roadway at three locations in the northern portion of the project.

The existing drainage system on the roadways within the project limits includes portions of "country drainage" (i.e. no curb), where the runoff sheet flows off the pavement into the pervious shoulder, roadside ditches, or private front yards. There are lengths of bituminous berm gutter, where the road runoff flows as concentrated flow to catch basins, or to a point where the berm discontinues, and the runoff flows onto adjacent wetland or wooded areas as shallow concentrated flow. Vertical curb is present in the northern portion of the site (EDA 1, 2, 3, 4) and on the inside of the southernmost bend on the site near the Woburn Town line (EDA-20).

There are separate closed drainage systems spread throughout the project, servicing EDA-1 and parts of EDA-3, 4, 5, 7A, 9A, 12, 13, 14A, 16, 18A, 18B, and 20. Three of the drainage areas contribute to closed pipe networks that flow away from the project (EDA 1, 2, and EDA-20).

There is one existing stormwater basin located in EDA-18B which collects runoff from part of Old Main Road. This basin outfalls to DP-18 at Wetland H. The project does not contribute runoff to this existing basin in the proposed condition.

The existing drainage areas are described below and key statistics about each area are shown in Table 1 – Existing Drainage Areas. The landcover of all areas is predominated by impervious roadway and parking areas.

DRAINAGE AREA EDA-1

This area consists of impervious roadway and sidewalk. Stormwater runoff from this area travels via gutter flow and discharges to catch basins. These catch basins connect to an existing closed drainage network that flows north away from the project to DP-1.

DRAINAGE AREA EDA-2

This area consists mostly of impervious roadway and sidewalk. Stormwater runoff from this area travels via gutter flow eastward and discharges to DP-2, located at the project limit. Catch basins capture the runoff approximately sixty (60) ft beyond the project limit.

DRAINAGE AREA EDA-3

This area consists mostly of impervious roadway and sidewalk. At the northern end of this area the road is superelevated, pitching towards the east and south. The road transitions to crowned about 100 feet south of Kirk Street. Stormwater runoff from this area travels via gutter flow on the east side and overland flow on the west side into three catch basins as part of a closed drainage system that discharges to DP-3. This drainage system outfalls beyond the site limits but it is assumed it outfalls to Wetland A, which discharges to the same wetland as DP-4. There is a 10" PVC pipe crossing beneath the road at DP-3 location which provides a low flow connection between the Wetland southwest of the train tracks beyond our project limits at DP5 and Wetland A at DP3. This pipe connection was not included in the hydrologic analysis because it was assumed to convey a negligible flow during the events analyzed. The wetland southwest of the train tracks (DP-5) is hydraulically connected to Wetland A (DP-3, DP-4) via the existing 3.5' x 1.5' culvert at DP-6 to DP-4.

DRAINAGE AREA EDA-4

This area consists mostly of impervious roadway and sidewalk. This area includes area from Route 38, intersecting streets, and adjacent properties. Stormwater runoff from this area travels via gutter flow along the curb into existing catch basins of a closed network that discharges northeast to DP-4 at Wetland A.

DRAINAGE AREA EDA-5

This area consists mostly of woodland area alongside the train tracks and impervious roadway on the western side of Route 38. Stormwater runoff from this area travels via overland flow into two catch basins of a closed drainage system that discharges to DP-5, which outfalls to the Wetland southwest of the tracks beyond the project limits. As stated above, there is an existing 10" PVC pipe connection from DP5 to DP3 and was not modeled in the hydrologic analysis. The wetland southwest of the train tracks (DP-5) is hydraulically connected to Wetland A (DP-3, DP-4) via the existing 3.5' x 1.5' culvert at DP-6 to DP-4.

DRAINAGE AREA EDA-6

This area consists mostly of impervious roadway and impervious parking lot on the southbound side of Route 38. Stormwater runoff from this area travels via overland into a BVW at the upstream end of the existing box culvert connecting the Wetland southwest of the train tracks (DP-5) to Wetland A (DP-3, DP-4).

DRAINAGE AREA EDA-7A

This area consists mostly of impervious roadway on the northbound side of Route 38 between Lowell Street and Cross Street. Stormwater runoff from this area travels via a combination of gutter flow and country drainage. There are two catch basins that collect most of the gutter flow and outfalls at the low point to DP-7 at Wetland D. Wetland D (DP-7) is hydraulically connected to Wetland C (DP-8) via a 36" diameter culvert.

DRAINAGE AREA EDA-7B

This area consists mostly of impervious roadway on cross street and a portion of its intersection with Route 38. Cross Street is superelevated in this area and stormwater runoff from this area travels via overland flow to the adjacent forested area and eventually to DP-7 at Wetland D. Wetland D (DP-7) is hydraulically connected to Wetland C (DP-8) via a 36" diameter culvert.

DRAINAGE AREA EDA-8A

This area consists mostly of impervious roadway on the southbound side of Route 38 between Lowell Street and Butters Row. Stormwater runoff from this area travels via gutter flow and country drainage. There is a break in the bituminous berm at the low point to allow the catchment area to discharge to DP-8 at Wetland C via overland flow.

DRAINAGE AREA EDA-8B

This area consists mostly of impervious roadway on a portion of the intersection of Route 38 and Butters Row Stormwater runoff from this area travels via country drainage and discharges overland to DP-8 at Wetland C.

DRAINAGE AREA EDA-9A

This area consists mostly of impervious roadway on both sides of Route 38. Stormwater runoff from this area travels via gutter flow and country drainage. There is a small separate closed drainage system that collects the area within this sub catchment that appears to outfall to DP-9 at Wetland E. Although, the existing outfall was not found in the field and CCTV could not locate the outfall because of blockage within the pipe. The pipe travels in the direction of DP-9; therefore it is assumed to outfall to DP-9.

DRAINAGE AREA EDA-9B

This area consists mostly of impervious roadway on the east side of Route 38. Stormwater runoff from this area travels via country drainage and discharges overland east to DP-9 at Wetland E.

DRAINAGE AREA EDA-10A

This area mostly consists of impervious roadway on both sides of Route 38. Stormwater runoff from this area travels via gutter flow and country drainage. The stormwater on the east side of roadway uses a natural berm and the west side of roadway sheet flows off the roadway. The roadway is mostly superelevated discharging stormwater from both sides of the roadway south to DP-10 at Wetland G. Wetland G (DP-10) is hydraulically connected to Wetland E (DP-9) via a 144" box culvert.

DRAINAGE AREA EDA-10B

This area mostly consists of impervious roadway on the western side of Route 38 that is part of both MassDOT Projects No. 608051 and 607327. Stormwater runoff from this area travels via a combination of gutter flow and country drainage. The stormwater discharges west via overland flow to DP-10 at Wetland G. Wetland G (DP-10) is hydraulically connected to Wetland E (DP-9) via a 144" box culvert.

DRAINAGE AREA EDA-11

This area mostly consists of impervious roadway on the eastern side of Route 38 that is part of both MassDOT Projects No. 608051 and 607327. Stormwater runoff from this area travels via a combination of gutter flow and country drainage. The stormwater discharges east via overland flow to DP-11 at Wetland I.

DRAINAGE AREA EDA-12

This area mostly consists of impervious roadway on the eastern side of Route 38 that is part of both MassDOT Projects No. 608051 and 607327. Stormwater runoff from this area travels via gutter flow. This area discharges to the east via overland flow and a catch basin outfalling at DP-12.

DRAINAGE AREA EDA-13

This area mostly consists of previous grass and bituminous driveways on the eastern side of Route 38. Stormwater runoff from this area travels via overland flow to a grassed depression at DP-13. There is a record headwall and culvert at DP-13 that outfalls across Route 38 to DP-14.

DRAINAGE AREA EDA-14A

This area mostly consists of impervious roadway on the southbound side of Route 38 that is part of both MassDOT Projects No. 608051 and 607327. Stormwater runoff from this area travels via gutter flow. Runoff sheet flows off the road at the Dog Park parking lot and travels overland to DP-14.

DRAINAGE AREA EDA-14B

This area mostly consists of impervious roadway on both sides of Route 38. Stormwater runoff from this area travels via gutter flow. At the low point, the east side enters a catch basin and outfalls across the street to the west at DP-14. At the low point, the west side has a break in the bit berm where it sheet flows off the road to west at DP-14.

DRAINAGE AREA EDA-15

This area mostly consists of impervious roadway on the northbound side of Route 38. Stormwater runoff from this area travels via country drainage into a wooded depression area at DP-15.

DRAINAGE AREA EDA-16

This area mostly consists of impervious roadway on the northbound side of Route 38. Stormwater runoff from this area travels via country drainage into a wooded depression area at DP-16. There is an existing catch basin with no visible outlet pipe at the time of survey.

DRAINAGE AREA EDA-17

This area mostly consists of impervious roadway and driveways on the southbound side of Route 38. Stormwater runoff from this area travels via country drainage and discharges to the west at DP-17.

DRAINAGE AREA EDA-18A

This area mostly consists of impervious roadway on both sides Route 38, Eames Street, and Cook Avenue. This area also includes a large offsite area south of Cook Ave consisting mostly of woods and gravel roads. Stormwater runoff travels via a combination of gutter flow, country drainage, and overland flow. There is a closed drainage system that outfalls to DP-18 at Wetland H.

DRAINAGE AREA EDA-18B

This area mostly consists of a small section of impervious roadway from Old Main St and the adjacent property. Stormwater runoff travels via sheet flow into a closed drainage system within the adjacent property. The closed drainage system enters an existing infiltration SCM that overflows to DP-18 at Wetland H.

DRAINAGE AREA EDA-19

This area mostly consists of impervious roadway on Old Main Street and a portion of wooded land between Route 38 and Old Main Street. Stormwater runoff from this area travels via country drainage and overland flow. This area discharges to the south on Old Main Street at DP-19.

DRAINAGE AREA EDA-20

This area mostly consists of impervious roadway on Route 38 and Old Main Street. This area also includes two large offsite areas: south of Cook Ave, consisting mostly of woods and gravel roads and properties across from Florence Ave on the west side of Route 38 containing woods, roof, and impervious parking. Stormwater runoff from this area travels via a combination of overland flow and gutter flow. There is a bituminous berm or natural berm throughout that conveys stormwater to a closed drainage system. The drainage system bucks grade and outfalls on Breed Avenue at DP-20.

DRAINAGE AREA EDA-21

This area mostly consists of a small portion of impervious roadway on Route 38 northbound and the intersection of Border Road that discharges to a vegetated area east of the Route 38 at DP-21.

Table 1 presents the existing drainage areas and their characteristics. See Figure 2 for existing drainage areas and existing SCMs by design point.

Table 1 Existing Drainage Areas

Drainage Area	Design Point	Area (acres)	Curve Number
EDA-1	*DP-1*	*0.64*	*97*
EDA-2	*DP-2*	*0.26*	*95*
EDA-3	*DP-3*	*1.21*	*89*
EDA-4	*DP-4*	*2.84*	*90*
EDA-5	*DP-5*	*0.52*	*77*
EDA-6	*DP-6*	*0.61*	*92*
EDA-7A	*DP-7*	*0.93*	*81*
EDA-7B	*DP-7*	*0.26*	*70*
EDA-8A	*DP-8*	*0.86*	*85*
EDA-8B	*DP-8*	*0.12*	*55*
EDA-9A	*DP-9*	*1.12*	*78*
EDA-9B	*DP-9*	*0.10*	*76*
EDA-10A	*DP-10*	*0.87*	*84*
EDA-10B	*DP-10*	*0.58*	*79*
EDA-11	*DP-11*	*0.50*	*94*
EDA-12	*DP-12*	*0.33*	*87*
EDA-13	*DP-13*	*0.26*	*60*
EDA-14A	*DP-14*	*0.27*	*85*
EDA-14B	*DP-14*	*1.37*	*83*
EDA-15	*DP-15*	*0.20*	*80*
EDA-16	*DP-16*	*0.27*	*74*
EDA-17	*DP-17*	*0.39*	*84*
EDA-18A	*DP-18*	*6.13*	*73*
EDA-18B	*DP-18*	*0.12*	*72*
EDA-19	*DP-19*	*0.18*	*73*
EDA-20	*DP-20*	*4.99*	*89*
EDA-21	*DP-21*	*0.10*	*82*

Table 2 lists the existing SCMs and provides a description of each.

Table 2 Existing SCMs

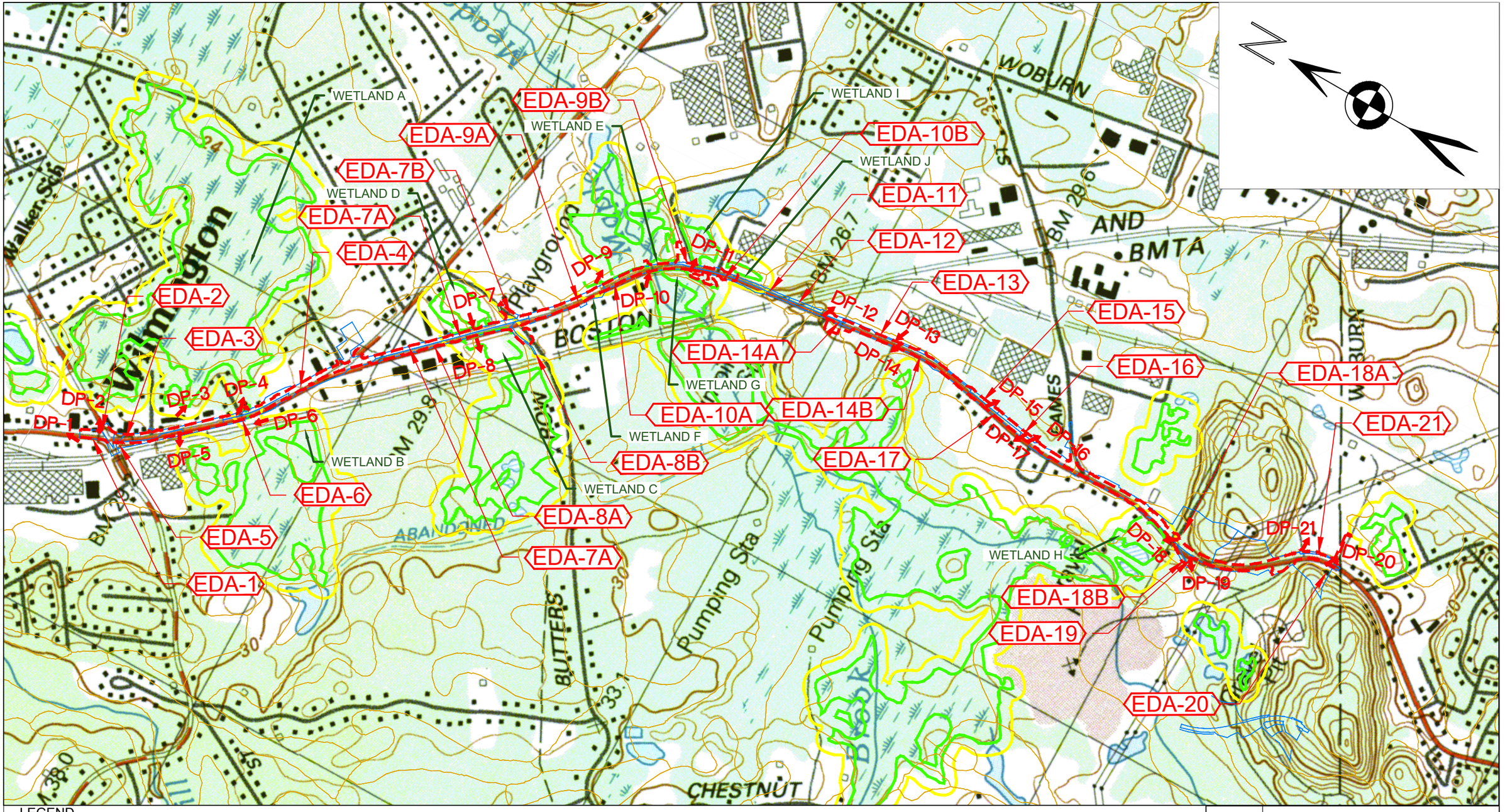
SCM	Description
EDA-18B SCM	*Existing infiltration basin*

Wetlands exist on both the eastern and western sides of the roadway. There are three culvert crossings that connect upper and low waterbodies (wetlands) and convey water from the west to the east side of Route 38. These culverts are to be retained and are located; just south of the Dublin Ave intersection (near DP-4 and DP-6), just north of Cross Street (near DP-8 and DP-7) and where Maple Meadow Brook crosses the roadway (near DP-10). The highest point of the site is at the northern end, at the intersection of Main Street and Church Street, where the elevation is 111 ft. The lowest point on the roadway within the site is at Maple Meadow Brook where the road elevation is 82 ft and a culvert conveys the brook across the roadway. See Figure 6 - Existing Watershed Plan showing the existing drainage patterns and key features.

Per the Flood Insurance Rate Maps (FIRM) for the Town of Wilmington, Massachusetts, Middlesex County, Panels 25017C0291E, 25017C0292E, 25017C0293E, and 25017C0294E, dated 06/04/2010, a portion of the project that includes the Route 38 crossing over Maple Meadow Brook, is located within the 100-year flood plain. The flood plain areas are shown on Figure 4 – FEMA Map. The Flood Insurance Study, by the Federal Management Agency and last revised on July 6, 2016, includes a detailed study of the project area, showing the 100-year floodplain elevations in the project vicinity. Maple Meadow Brook has a 100-year flood elevation of 82.9 feet upstream and 81.5 feet downstream of Route 38 (NAVD 88).

Review of the NRCS Soil Survey map of the Project area identified the following hydrologic soil groups (HSG): Scarboro mucky fine sandy loam (HSG A/D), Swansea Muck (HSG B/D), Freetown muck (HSG B/D), Charlton-Hollis-Rock outcrop complex (HSG A), Charlton-Hollis-Rock outcrop complex (HSG B), Hollis-Rock outcrop-Charlton complex (HSG D), Rock outcrop-Hollis complex, Hinckley loamy sand (HSG A), Windsor loamy sand (HSG A), Deerfield loamy fine sand (HSG A), Montauk fine sandy loam (HSG C), Canton fine sandy loam (HSG B), Urban land, Urban land wet substratum, Charlton-Urban land-Hollis complex (HSG A), Udorthents sandy, Udorthents wet substratum, and Udorthents-Urban land complex. For areas where the soil designation does not have an associated HSG (e.g. 602), the HSG was adopted from the nearest neighboring soil with a designated HSG.

Geotechnical investigation was undertaken by Lamson Engineering Corporation between the 7th and 12th August 2020 and presented in the Data Report dated 8/26/2020. The purpose of the investigation was to establish the ground conditions at the locations of the proposed SCMs. Specifically, to determine the depth to groundwater and to bedrock or ledge and the type of material. Where there were two tests, the more conservative result was adopted as the design constraint at that location. These values are included in the Geotechincal Report included in Appendix B and include 2' separation where groundwater is the constraint.



LEGEND

- LIMIT OF WORK
- WETLANDS
- 100-FT WETLAND BUFFER
- NRCS SOIL SURVEY BOUNDARY
- EXISTING WATERSHED BOUNDARY
- EXISTING WATERSHED NUMBER (EDA-1)
- DESIGN POINT (DP-1)

0' 400' 800' 1600'

1" = 800 FEET

NOTE: DATA TAKEN FROM MASSGIS

DATE	REVISIONS

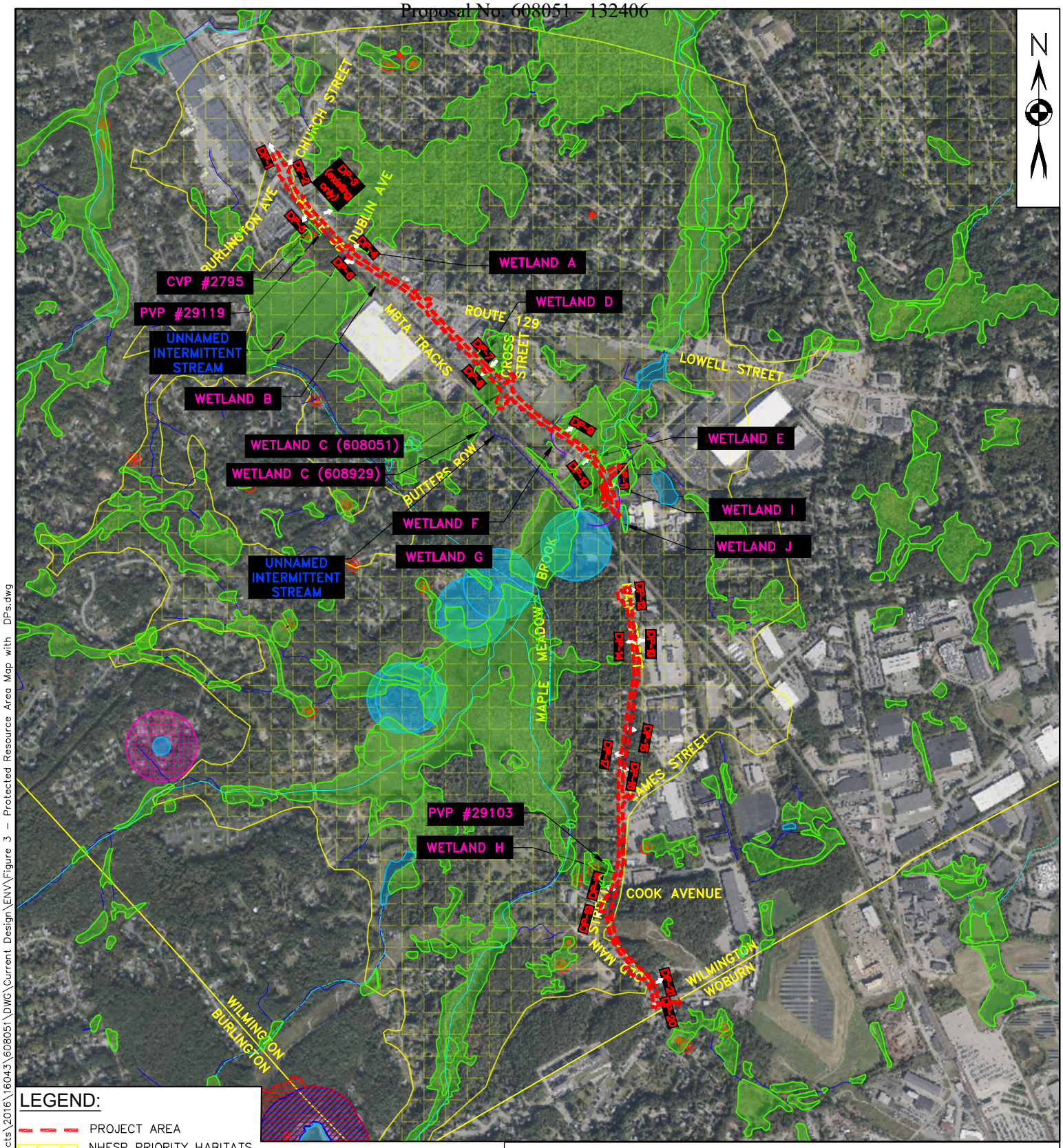
EXISTING WATERSHED PLAN

WILMINGTON, MASSACHUSETTS
ROUTE 38

PREPARED BY:
GREEN INTERNATIONAL AFFILIATES, INC.
CIVIL AND STRUCTURAL ENGINEERS
100 AMES POND DR, SUITE 200,
TEWKSBURY, MA (978) 923-0400

PREPARED FOR:
massDOT
Massachusetts Department of Transportation
Highway Division

SCALE 1" = 800'	DATE: 1/5/2024	PROJECT NO. 13033.19XX
APPROVED: _____	DESIGNED BY: JT/BV DRAWN BY: BV CHECKED BY: JT	FIGURE NO. 6



LEGEND:

- PROJECT AREA
- NHESP PRIORITY HABITATS OF RARE SPECIES
- NHESP ESTIMATED HABITATS OF RARE WILDLIFE
- OUTSTANDING RESOURCE WATER (ORW)
- AREAS OF CRITICAL ENVIRONMENTAL CONCERN (ACEC)
- INTERIM WELLHEAD RPROTECTION AREAS (IWPAs)
- DEP APPROVED WELLHEAD PROTECTION AREAS (ZONE I)
- APPROVED WELLHEAD PROTECTION AREAS (ZONE II)
- SURFACE WATER PROTECTION AREAS (ZONE A)
- SURFACE WATER PROTECTION AREAS (ZONE B)
- DEP/SURVEYED WETLANDS
- DEP HYDROLOGIC CONNECTIONS
- MAHW/BANK/PERENNIAL INTERMITTENT STREAM
- CERTIFIED VERNAL POOLS
- POTENTIAL VERNAL POOLS

SCALE IN FEET

750 0 750 1500

1" = 1500'

NOTE: DATA TAKEN FROM MASSGIS

ENVIRONMENTAL CONSTRAINTS MAP

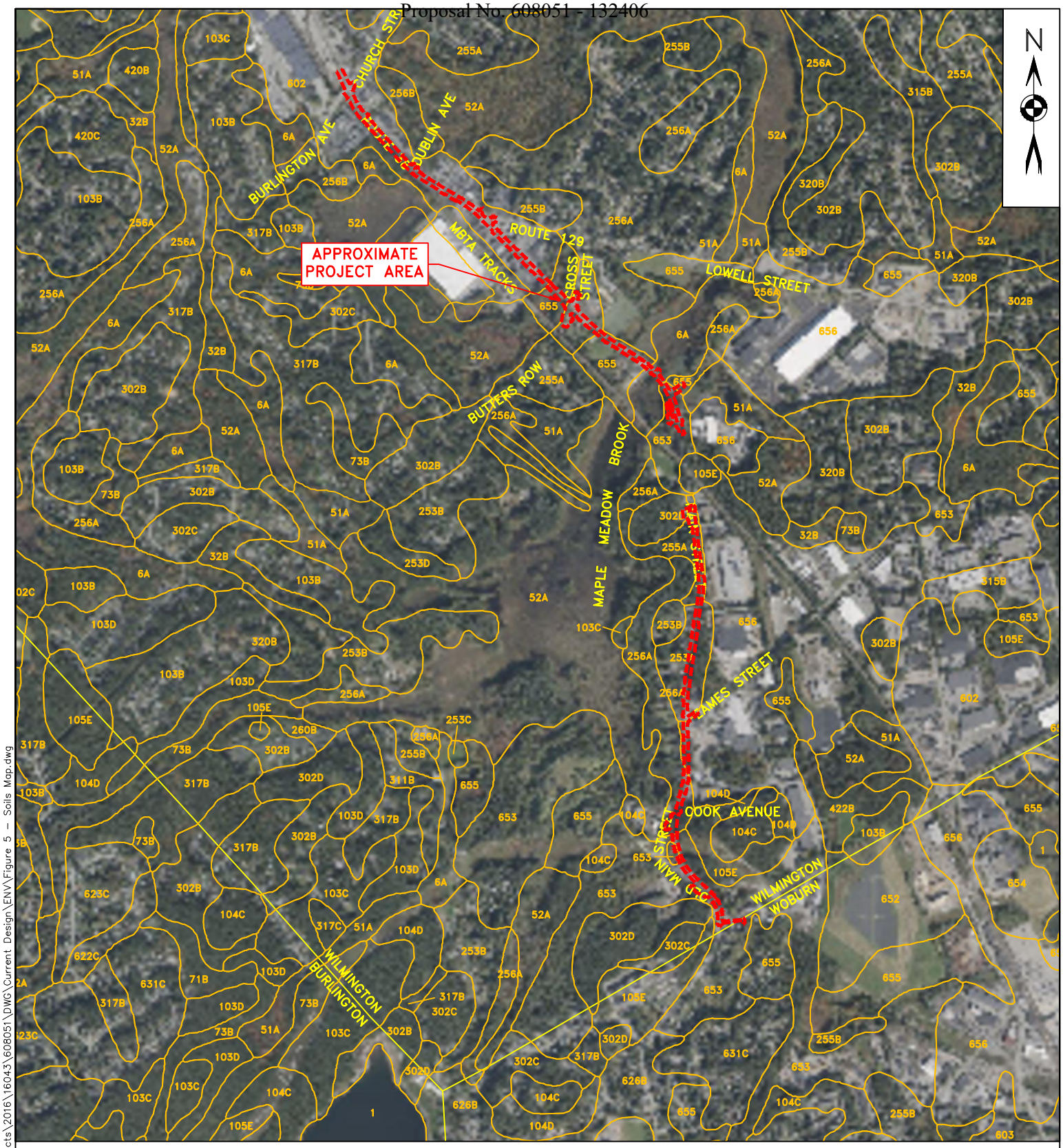
WILMINGTON – RECONSTRUCTION ON ROUTE 38 (MAIN STREET)
FROM ROUTE 62 TO THE WOBURN CITY LINE, PROJECT #608051

PREPARED BY:
GREEN INTERNATIONAL AFFILIATES, INC.
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PREPARED FOR:
massDOT
Massachusetts Department of Transportation
Highway Division

SCALE: AS NOTED	PROJECT NO. 13033.19	FIGURE 3
DATE: 01/09/2025	DRAWN BY: VR/EL	
REVISED:	CHECKED BY: OF	

\\EgnyteDrive\greenintl\Shared\Engineering\Projects\2016\16043\608051\DWG\Current Design\ENV\Figure 3 – Protected Resource Area Map with DPs.dwg



LEGEND:

- APPROXIMATE LIMIT OF WORK
- NRCS SOIL SURVEY BOUNDARY
- 103C NRCS SOIL SURVEY SYMBOL

NOTE: MAP INFORMATION TAKEN FROM MASSGIS AND SOILS INFORMATION TAKEN FROM NRCS WEB SOIL SURVEY FOR MIDDLESEX COUNTY, MA.

SCALE IN FEET

750 0 750 1500

1" = 1500'

SOILS MAP

WILMINGTON – RECONSTRUCTION ON ROUTE 38 (MAIN STREET)
FROM ROUTE 62 TO THE WOBURN CITY LINE, PROJECT #608051

PREPARED BY:
GREEN INTERNATIONAL AFFILIATES, INC.
CIVIL AND STRUCTURAL ENGINEERS
100 AMES POND DRIVE, SUITE 200, TEWKSBURY, MA
24 ALBION RD, LINCOLN, RI (401) 305-7895

PREPARED FOR:
massDOT
Massachusetts Department of Transportation
Highway Division

SCALE: AS NOTED	PROJECT NO. 13033.19	FIGURE 5
DATE: 01/09/2025	DRAWN BY: VR/EL	
REVISED:	CHECKED BY: OF	

\\EgnyteDrive\greenintl\Shared\Engineering\Projects\2016\16043\608051\DWG\Current Design\ENV\Figure 5 – Soils Map.dwg

4

Proposed Conditions

The proposed stormwater management analysis can be analyzed as twenty-nine watershed areas contributing runoff to twenty-one discharge points, which are the same under existing conditions. The limits of the overall watershed and discharge points of analysis are the same in proposed and existing conditions. The proposed drainage areas are delineated in Figure 7 - Proposed Watershed Plan.

The project proposes to reconstruct the existing two-lane two-way road to achieve generally two 11-foot lanes and two 5-foot bike lanes along the project corridor. The 5'-6" sidewalk will be added on one, or both sides of the roadway depending on location. There will be two 11-foot southbound travel lanes and a 2-foot shoulder for 900 feet south of the Route 62 and Route 38 intersection. The project will also incorporate improvements to the existing closed drainage system, including headwall and culvert replacement, a new water system along Route 38 from Route 62 to Eames Street. The project also proposes to add bicycle accommodations, improve pedestrian accommodations, and install traffic signal improvements along the Route 38 (Main Street) corridor. The project will upgrade the signage and pavement markings to improve driver safety along the project corridor. New signage and pavement markings also will be provided to enhance safety for bicyclists on the widened roadway. Bicycle access and pedestrian access will be improved along the entire project corridor to and from the MBTA Wilmington commuter rail station and the recently constructed Yentile Farm recreational facility. This roadway upgrade will require full-depth reconstruction of the existing Route 38 pavement from Route 62 to Eames Street. Micromilling and resurfacing will be proposed along Route 38 from Eames Street to the Woburn City Line.

Improvements at the intersection of Route 38 and Route 62 (Burlington Avenue and Church Street) will include re-striping to provide additional turning lanes for the northern, southern, and western legs of the intersection, adding bicycle detection, and reconstructing the traffic signal, as well as a new retaining wall along the MBTA tracks south of this intersection. These improvements will result in less congestion along the corridor, and significantly lower delays and queues at the intersection. The project will only include pavement resurfacing and minor pavement widening and drainage improvements at the intersection of Route 129 (Lowell Street) because this section of Route 38 was reconstructed approximately 15 years ago. The project will also include a traffic signal at the intersection of Route 38 with Cross Street and Butters Row. This signalization will provide more orderly traffic control for vehicles, pedestrians, and bicyclists. The side street approaches at this intersection are proposed to be realigned to provide improved sight distances and geometry. The improvements will add a left turn lane from northbound Route 38 to Butters Row.

Realignments of Eames Street and Old Main Street are also proposed to improve safety. In all, these improvements will result in enhanced safety of roadway for all roadway users including bicyclists, pedestrians, and vehicles.

To improve bicycle and pedestrian safety and accommodation, 5' bike lanes and 5.5' sidewalks will be proposed on both side of Butters Row for the length of the project.

The project also provides a modified drainage collection system to address the changes caused by the proposed road improvements as well as protecting the nearby downstream watershed and the environment. The proposed drainage improvements include installation of new deep sump catch basins with hoods, new drain manholes, replacement of existing drainage outfalls, as well as three proposed infiltration Stormwater Control Measures (SCMs) to mitigate the increase in peak rates of runoff within the project limits. While curbing will be added in sections of the roadway that used to sheet flow away from the project, the new drainage systems will maintain the historic drainage patterns, distributing runoff to the existing discharge points.

Each of the watershed areas were analyzed as a Discharge Point during the hydrologic analysis, as indicated on the attached Watershed Plan. The stormwater approach maintains existing drainage and grading patterns to the maximum extent possible.

DRAINAGE AREA PDA-1

This drainage area will not change under the proposed conditions. This area consists of impervious roadway and sidewalk. Stormwater runoff from this area travels via gutter flow and discharges to catch basins. These catch basins connect to an existing closed drainage network that flows north away from the project to DP-1.

DRAINAGE AREA PDA-2

This drainage area will not change under the proposed conditions. This area consists mostly of impervious roadway and sidewalk. Stormwater runoff from this area travels via gutter flow eastward and discharges to DP-2, located at the project limit. Catch basins capture the runoff approximately sixty (60) ft beyond the project limit.

DRAINAGE AREA PDA-3

This drainage area is rerouted to DP-4 under proposed conditions via a new closed drainage system in order to increase the efficiency of stormwater runoff along the roadway.

DRAINAGE AREA PDA-4

This drainage area will increase under the proposed conditions by incorporating area that was originally discharging to DP-3, DP-5, and DP-6, due to new curbing and an improved closed drainage system. This area consists mostly of impervious roadway and sidewalk. This area includes Route 38, intersecting streets, and adjacent properties. The road is superelevated at the northern end of this area, pitching the east and south. The road transitions to crowned grading about 100 feet south of Kirk Street. Stormwater runoff from this area travels via gutter flow into multiple catch basins on both sides of the road. There are two improved closed drainage networks that both outfall to DP-4 at Wetland A near an existing outfall and the outlet of the 3.5'x1.5' box culvert. The box culvert is being retained.

The wetland southwest of the train tracks (DP-5) is hydraulically connected to Wetland A (DP-3, DP-4) via the existing 3.5' x 1.5' culvert at DP-6 to DP-4. Therefore, rerouting this area from DP-5 and -6 to DP-4 maintains existing drainage patterns.

DRAINAGE AREA PDA-5

This proposed drainage area will be reduced from the existing drainage area. This area consists mostly of woodland area alongside the train tracks on the western side of Route 38. Stormwater runoff from this area travels via overland flow and into two catch basins of a closed drainage system that discharges to DP-5 which outfalls to the Wetland southwest of the tracks beyond the project limits. As stated above, there is an existing 10" PVC pipe connection that will be upsized from DP-5 to DP-3 and was not modeled in the hydrologic analysis. The wetland southwest of the train tracks (DP-5) is hydraulically connected to Wetland A (DP-3, DP-4) via the existing 3.5' x 1.5' culvert at DP-6 to DP-4.

DRAINAGE AREA PDA-6

This area will be reduced to a small pervious surface which will flow overland to the upstream end of the existing 3.5' x1.5' box culvert, which outfalls to DP-6.

DRAINAGE AREA PDA-7A

This area consists mostly of impervious roadway on the northbound side of Route 38 between Lowell Street and Cross Street. Stormwater runoff from this area travels via a combination of gutter flow and overland flow. There are multiple catch basins which collect most of the gutter flow and outfalls at the low point to DP-7 at Wetland D. Wetland D (DP-7) is hydraulically connected to Wetland C (DP-8) via a 36" diameter culvert.

DRAINAGE AREA PDA-7B

This area is larger in the proposed condition due to a slightly larger contributing area from Route 38. This area consists mostly of impervious roadway of Cross Street and a portion of its intersection with Route 38. Cross Street is superelevated in this area and stormwater runoff from this area travels via overland flow to the adjacent forested area and eventually to DP-7 at Wetland D. Wetland D (DP-7) is hydraulically connected to Wetland C (DP-8) via a 36" diameter culvert.

DRAINAGE AREA PDA-8A

This area consists of pervious slopes adjacent to the southbound side of Route 38 from Lowell Street to the bridge on Butters Row. Stormwater runoff from this area travels via overland flow to DP-8 at Wetland C.

DRAINAGE AREA PDA-8B

This area consists of impervious roadway of Route 38 between Lowell Street and Cross Street. Stormwater runoff from this area travels via gutter flow into a closed drainage system that discharges southwest to DP-8 at Wetland C. The outfall is located near the existing culvert and is near the existing low point in the roadway where there is an existing natural discharge point.

DRAINAGE AREA PDA-9

This area consists mostly of impervious roadway on both sides of Route 38 for the northern portion and only the southbound side on the southern portion. Stormwater runoff from this area travels via gutter flow into a closed drainage system that discharges southwest to DP-9 at Wetland E. There are three new outfalls that are located near the existing low point in the roadway and existing culvert outlet. The roadway is mostly superelevated similar to existing conditions, but due to the proposed curbing and new closed drainage system, stormwater that was discharging to DP-10 at Wetland G will be rerouted to discharge to DP-9 at Wetland E. Wetland G (DP-10) is hydraulically connected to Wetland E (DP-9) via a 144" box culvert. Therefore, rerouting area from DP-10 to DP-9 maintains existing drainage patterns.

DRAINAGE AREA PDA-10A

This area mostly consists of pervious surface on the southbound side of Route 38. Stormwater runoff from this area travels via overland flow to DP-10 at Wetland G. Wetland G (DP-10) is hydraulically connected to Wetland E (DP-9) via a 144" box culvert.

DRAINAGE AREA PDA-10B

This area mostly consists of pervious surface on the southbound side of Route 38. Stormwater runoff from this area travels via overland flow to DP-10 at Wetland G. Wetland G (DP-10) is hydraulically connected to Wetland E (DP-9) via a 144" box culvert.

DRAINAGE AREA PDA-11

This area mostly consists of impervious roadway on the eastern side of Route 38 that is part of both MassDOT Projects No. 608051 and 607327. Stormwater runoff from this area travels via gutter flow. The stormwater discharges east via overland flow to DP-11 at Wetland I.

DRAINAGE AREA PDA-12

This area is routed to DP-14 under existing conditions with the addition of a new closed drainage system in order to increase the efficiency of stormwater runoff along the roadway.

DRAINAGE AREA PDA-13

This area mostly consists of pervious grass area and bituminous driveways on the eastern side of Route 38. Stormwater runoff from this area travels via overland flow to a grassed depression at DP-13. There is a record headwall and culvert at DP-13 that outfalls across Route 38 to DP-14. The culvert and headwall at DP-14 is being replaced.

DRAINAGE AREA PDA-14A

This area mostly consists of impervious roadway on both sides of Route 38 that is part of both MassDOT Projects No. 608051 and 607327. Stormwater runoff from this area travels via gutter flow, which enters a closed drainage system that is pretreated by isolator rows, then captured and treated by a subsurface infiltration system (SCM-1). The chambers overflow into the closed drainage system within Route 38 and outfalls to DP-14. There is an existing outfall at DP-14 that will be replaced.

DRAINAGE AREA PDA-14B

This area mostly consists of impervious roadway on both sides of Route 38. Stormwater runoff from this area travels via gutter flow into a closed drainage system that will outfall southwest to DP-14. At the low point, the east side enters a catch basin and outfalls across the street to the west at DP-14. There is an existing outfall at DP-14 that will be replaced.

DRAINAGE AREA PDA-15

This drainage area will not change under the proposed conditions. This area mostly consists of impervious roadway on the northbound side of Route 38. Stormwater runoff from this area travels via country drainage into a wooded depression area at DP-15.

DRAINAGE AREA PDA-16

This area mostly consists of impervious roadway on the northbound side of Route 38. Stormwater runoff from this area travels via country drainage into a wooded depression area at DP-16.

DRAINAGE AREA PDA-17

This area mostly consists of pervious surface and driveways on the southbound side of Route 38. Stormwater runoff from this area travels via overland flow and discharges to the west at DP-17.

DRAINAGE AREA PDA-18A

This area mostly consists of pervious surface and driveways on the southbound side of Route 38. Stormwater runoff from this area travels via overland flow and discharges to the west at DP-18.

DRAINAGE AREA PDA-18B

This area mostly consists of impervious roadway on both sides Route 38 and Eames Street. Stormwater runoff travels via gutter flow into a closed drainage system that outfalls to DP-18 at Wetland H. The proposed outfall is replacing the existing outfall.

DRAINAGE AREA PDA-18C

This area mostly consists of impervious roadway on both sides Route 38 and Cook Avenue. This area also includes a large offsite area south of Cook Ave consisting of mostly woods and gravel roads. Stormwater runoff travels via a combination of gutter flow and overland flow. There is a closed drainage system that outfalls to DP-18 at Wetland H. The proposed outfall is replacing the existing outfall.

DRAINAGE AREA PDA-18D1

This area mostly consists of impervious roadway on both sides Route 38 and a large offsite area south of Cook Ave, which consists mostly of woods and gravel roads. Stormwater runoff travels via a combination of gutter flow and overland flow. There is a closed drainage system that discharges to an infiltration basin (SCM-2) that has a sediment forebay for pretreatment. The infiltration basin has an outlet control structure that connects back into

the closed drainage system within Route 38. The closed drainage system outfalls to DP-18 at Wetland H. The proposed outfall is replacing the existing outfall.

DRAINAGE AREA PDA-18D2

This area mostly consists of a small section of impervious driveway of an adjacent property. Stormwater runoff travels via sheet flow into a closed drainage system within the adjacent property. The closed drainage system outfalls to DP-18 at Wetland H.

DRAINAGE AREA PDA-19

This area mostly consists of impervious roadway on Old Main Street and a portion of wooded land between Route 38 and Old Main Street. Stormwater runoff from this area travels via gutter flow and overland flow. This area discharges to the south on Old Main Street at DP-19.

DRAINAGE AREA PDA-20A

This area mostly consists of impervious roadway on Route 38 and a large offsite area in between Cook Ave and Berwick Ave that consists mostly of woods and gravel roads. Stormwater runoff from this area travels via a combination of overland flow and gutter flow into a closed drainage system. The closed drainage system outlets to a subsurface infiltration system (SCM-3) that is pretreated by isolator rows. The chambers have an outlet control structure that connects back into the closed drainage system within Route 38. The drainage system follows existing conditions by bucking grade and outfalls to DP-20, adjacent to Breed Avenue. The existing outfall will be replaced.

DRAINAGE AREA PDA-20B

This area mostly consists of impervious roadway on Route 38 and Old Main Street. This area also includes one large offsite area and properties across from Florence Ave on the west side of Route 38 containing woods, roof, and impervious parking. Stormwater runoff from this area travels via a combination of overland flow and gutter flow to a closed drainage system. The drainage system bucks grade and outfalls on Breed Avenue at DP-20. The existing outfall will be replaced.

DRAINAGE AREA PDA-21

This area mostly consists of a small portion of impervious roadway on Route 38 northbound and the intersection of Border Road that discharges to a vegetated area east of the Route 38 at DP-21.

Table 3 provides a breakdown of the impervious area for the Project.

Table 3 Impervious Area

Condition	Impervious Area (sq. ft)
Existing	*506,710*
Proposed	*567,432*
Net	*+60,722*

Table 4 presents the proposed drainage areas and their characteristics under proposed conditions. Figure 5 shows proposed drainage patterns and drainage area delineations by design point.

Table 4 Proposed Drainage Areas

Drainage Area	Design Point	Area (acres)	Curve Numbers
PDA-1	*DP-1*	*0.64*	*97*
PDA-2	*DP-2*	*0.26*	*95*
PDA-3	*DP-3*	*0*	*0*
PDA-4	*DP-4*	*4.85*	*91*
PDA-5	*DP-5*	*0.33*	*81*
PDA-6	*DP-6*	*0.01*	*98*
PDA-7A	*DP-7*	*1.14*	*94*
PDA-7B	*DP-7*	*0.37*	*87*
PDA-8A	*DP-8*	*0.35*	*80*
PDA-8B	*DP-8*	*0.30*	*90*
PDA-9	*DP-9*	*2.11*	*92*
PDA-10A	*DP-10*	*0.37*	*68*
PDA-10B	*DP-10*	*0.18*	*70*
PDA-11	*DP-11*	*0.50*	*91*
PDA-12	*DP-12*	*0*	*0*
PDA-13	*DP-13*	*0.24*	*60*
PDA-14A	*DP-14*	*0.72*	*89*
PDA-14B	*DP-14*	*1.57*	*92*
PDA-15	*DP-15*	*0.19*	*95*
PDA-16	*DP-16*	*0.25*	*76*
PDA-17	*DP-17*	*0.11*	*62*
PDA-18A	*DP-18*	*0.37*	*64*
PDA-18B	*DP-18*	*2.20*	*85*
PDA-18C	*DP-18*	*1.92*	*66*
PDA-18D1	*DP-18*	*1.80*	*69*
PDA-18D2	*DP-18*	*0.03*	*94*
PDA-19	*DP-19*	*0.11*	*87*
PDA-20A	*DP-20*	*1.92*	*89*
PDA-20B	*DP-20*	*3.08*	*87*
PDA-21	*DP-21*	*0.09*	*85*

See Figure 5 for proposed drainage areas and proposed SCMs by design point.

The entire project corridor was analyzed for potential SCMs. The SCM alternatives and feasibility analysis was focused at each of discharge points, including the system that discharges to Maple Meadow Brook. The SCMs considered along the project corridor include water quality swales, infiltration trenches, subsurface chamber systems, qualified pervious areas, and leaching basins. The following is a summary of all the areas and SCMs that were considered, as well as a description of whether an SCM was feasible or not:

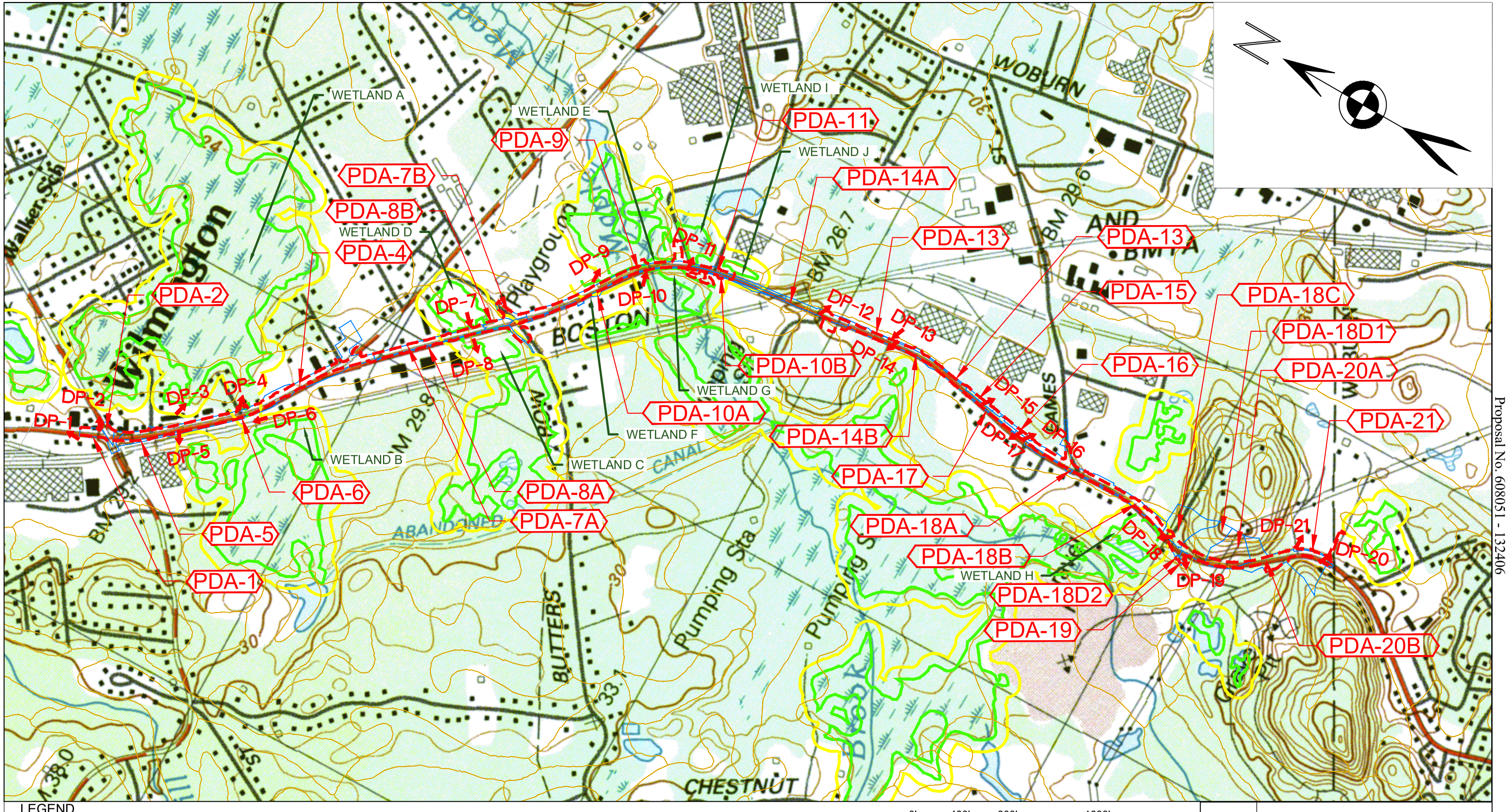
- Gutter flow away from project site at DP-1, STA. 203: No SCM feasible due to limited ROW and adjacent private properties.
- Gutter flow away from project site at DP-2, STA. 11: No SCM feasible due to limited ROW and adjacent private properties.
- Closed drainage system outfall to DP-4 at Wetland A near an existing outfall and the outlet of the 3.5'x1.5' box culvert, STA. 217+75 (L): No SCM feasible due to presence of existing resource areas, limited ROW, and adjacent private properties.
- Closed drainage system outfall at DP-5 to the Wetland southwest of the tracks beyond the project limits, STA. 104 (R): This area consists mostly of woodland area alongside the train tracks on the western side of Route 38. No SCM feasible due to limited ROW and presence of existing train tracks.
- Overland flow to upstream end of existing box culvert at DP-6, STA. 218 (R): No SCM feasible due to limited ROW and presence of existing train tracks.
- Gutter flow and closed drainage system to DP-7 at Wetland D, STA. 238+50 (L): No SCM feasible due to Wetland D directly abutting the roadway and adjacent private property.
- Closed drainage system outfall to DP-8 at Wetland C, STA. 238+50 (R): No SCM feasible due to Wetland C directly abutting the roadway.
- Closed drainage system at DP-9 to Wetland E, STA. 250 (L): No SCM feasible due to Wetland E directly abutting the roadway.
- Overland flow to DP-10 at Wetland G, STA. 253+75 (R): No SCM feasible due to Wetland G directly abutting the roadway.
- Overland flow to DP-11 at Wetland I, STA. 258 (L): No SCM feasible due to limited ROW and adjacent private properties.
- Overland flow to DP-13, STA. 275+75 (L): No SCM feasible due to limited ROW and adjacent private properties.
- Closed drainage system outfall at DP-14, STA. 275+75 (R): One SCM is feasible in this location, a subsurface infiltration system (SCM-1). Stormwater runoff from this area travels via gutter flow, which enters a closed drainage system that is pretreated by isolator rows, then captured and treated by the subsurface infiltration system.
- Country drainage to wooded depression area at DP-15, STA. 285+70 (L): No SCM feasible due to limited ROW and adjacent private properties.
- Country drainage to wooded depression area at DP-16, STA. 290+30 (L): No SCM feasible due to limited ROW and adjacent private properties.

- Overland flow to DP-17, STA. 285+60 (R): No SCM feasible due to limited ROW and adjacent private properties.
- Closed drainage system outfall at DP-18, STA. 304 (R): One SCM is feasible in this location. The closed drainage system discharges to an infiltration basin (SCM-2) that has a sediment forebay for pretreatment. The infiltration basin has an outlet control structure that connects back into the closed drainage system within Route 38.
- Closed drainage system outfall at DP-20, STA. 318 +75 (L): One SCM is feasible in this location, a subsurface infiltration system (SCM-3). Stormwater runoff from this area travels via a combination of overland flow and gutter flow into a closed drainage system. The closed drainage system outlets to a subsurface infiltration system (SCM-3) that is pretreated by isolator rows.
- Overland flow to vegetated area at DP-21, STA. 316+50 (L): No SCM feasible due to limited ROW and adjacent private properties.

Table 5 lists the proposed SCMs and provides a description of each.

Table 5 Proposed SCMs

SCM	Description
SCM-1	Stormwater runoff from PDA-14A is directed to this subsurface infiltration system, which discharges offsite to a wooded area at DP-14.
SCM-2	Stormwater runoff from PDA-18D1 is directed to this infiltration basin, which discharges to Wetland H at DP-18.
SCM-3	Stormwater runoff from PDA-20A is directed to this subsurface infiltration system, which discharges at DP-20.



LEGEND

- LIMIT OF WORK
- WETLANDS
- 100-FT WETLAND BUFFER
- NRCS SOIL SURVEY BOUNDARY
- PROPOSED WATERSHED BOUNDARY
- PROPOSED WATERSHED NUMBER (PDA-1)
- DESIGN POINT (DP-1)

NOTE: DATA TAKEN FROM MASSGIS

DATE	REVISIONS

PROPOSED WATERSHED PLAN

WILMINGTON, MASSACHUSETTS
ROUTE 38

PREPARED BY:
GREEN INTERNATIONAL AFFILIATES, INC.
CIVIL AND STRUCTURAL ENGINEERS
100 AMES POND DR, SUITE 200,
TEWKSBURY, MA (978) 923-0400

PREPARED FOR:
massDOT
Massachusetts Department of Transportation
Highway Division

SCALE 1" = 800'	DATE: 1/5/2024	PROJECT NO. 13033.19XX
APPROVED: _____	DESIGNED BY: JT/BV DRAWN BY: BV CHECKED BY: JT	FIGURE NO. 7

5

Impaired Waters and TMDLs

As described under the Proposed Conditions section, the Project will discharge to Bordering Vegetated Wetlands (BVWs), Land Under Water (LUW), Inland Bank, and Bordering Land Subject to Flooding (BLSF) resulting from permanent construction and temporary work taking place along Route 38. There are several wetland resource areas adjacent to the roadway within a project corridor. Maple Meadow Brook is a perennial stream that crosses the project at approximate Sta. 253+70 and has LUW associated with it. There is one intermittent stream and one perennial stream crossing the Route 38 project area that have an associated Bank. These streams include Unnamed Intermittent Stream at Sta. 218+00 and Maple Meadow Brook. Resource area impacts are described in more detail in the Notice of Intent (NOI).

Table 6 lists the receiving water bodies that are impaired, if the water body is covered by a TMDL, and the TMDL's Waste Load Allocation (WLA) for MassDOT property.

Table 6 Impaired Waters and TMDL Information

Water Body	303(d) Category	303(d) Impairments	TMDL	TMDL Pollutant	TMDL Report Name
Maple Meadow Brook	*5*	*(Dewatering) Dissolved Oxygen*	*No*	*N/A*	*N/A*

Table 7 lists each water body and the proposed SCMs within its watershed. It also provides each SCM's estimated amount of removal per year, the MassDOT pollutant load before the project, and the MassDOT pollutant load after the project is constructed.

Table 7 Nutrient Removal for Project

Water Body	SCM	*Nutrient* Removal (lbs/yr)
N/A		
	N/A	***N/A***
	Total Provided by SCMs	***N/A***

Stormwater from the proposed project does not discharge to any perennial or intermittent streams or waterbodies with a TMDL, so TMDL removal calculations were not performed. See Standard 4 for more detailed water quality calculations and discussion.

6

Stormwater Management Standards

As demonstrated below, the proposed Project complies with MassDEP Stormwater Management Standards (the Standards). The Project is considered a redevelopment project and only meets Standards 3 and 4 to the maximum extent practicable.

The Project utilized the MassDOT Macro Approach[1] (a methodology that allows the design to provide peak rate control, recharge, and/or water quality treatment holistically on a project-wide scale to overcome site constraints) for the entire project due to constraints at the project site. The Macro Approach was employed due to several constraints within the project site limiting the opportunity to implement more infiltration SCMs, including limited space in the ROW, existing utilities, and close proximity to wetlands.

By implementing the Macro Approach, the Project achieves compliance with the given Standard on a project-wide scale. The approach was utilized for Standards 2, 3, and 4. Implementation of the Macro Approach for these Standards is described in the following sections.

[1] Authorized by MassDEP per the Massachusetts Stormwater Handbook, Vol. 1 Ch. 1.

Standard 1: No New Untreated Discharges

No new stormwater conveyances may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

The Massachusetts Stormwater Handbook, Standard 1, requires that the project demonstrates that there are no new untreated discharges and that new discharges will not cause erosion or scour to downstream wetlands.

The project has been designed to comply with Standard 1. All new outfalls are designed with flared end sections and rip rap protection to prevent erosion to the existing wetland systems. Appendix C provides supporting calculations for the outlet protection design. Stormwater runoff will be treated by deep sump hooded catch basins, two subsurface infiltration systems with isolator rows for pretreatment (at DP-14 and DP-20), and an above ground infiltration basin with a forebay to provide additional treatment (at DP-18). See Standard 4 for the water quality treatment provided by the Project.

There are no new untreated point source discharges created as a result of this project. This standard is fully met.

Standard 2: Peak Rate Attenuation

Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04.

Standard 2 requires that the rates of flow be attenuated for the proposed development condition. This project is a redevelopment project and is required to meet Standard 2 to the maximum extent practicable.

The peak flow rates were calculated for the 2-, 10-, and 100-year storm events under proposed conditions and compared to the existing peak flow rates. The realignment of the roadway and construction of a typical 32-foot pavement width results in an overall increase of 60,722 square feet in impervious area within the project limits. While there is a net increase in impervious area, the proposed project will implement three proposed SCMs to help mitigate the increase in peak rates.

Though there is an increase in peak flow rates for DP-4, DP-7, DP-9, DP-11, DP-14, DP-15, DP-16, DP-18, and DP-19 for some or all storm events, the corresponding increase in peak volume translates to a small impact to the corresponding downstream wetland or waterbody. The following is a summary of each DP that has a peak rate increase and how the project will mitigate this increase:

Area from DP-3 has been rerouted to DP-4 under proposed conditions, which discharges to Wetland A and has an approximate area of 55.33 acres. While there is an increase in peak rates for all storm events at DP-4 (Wetland A), the total peak volume for the 100-year storm event will result in a net increase of 0.586 af, which results in a net rise of approximately 0.13 inches, which is negligible.

DP-7 discharges to Wetland D, which has an approximate area of 2.80 acres and will see an increase in peak rates for all storm events. The total peak volume for the 100-year storm event will result in a net increase of 0.341 af, which results in an increased depth of approximately 1.46 inches within the wetland. The increase in peak rates is mainly due to rerouting of the roadway runoff from the upstream area (DP-8) to the downstream area (DP-7). Wetland D (DP-7) is hydraulically connected to Wetland C (DP-8) though a 36" culvert and has a total area of 4.78 acres. Since Wetland D and C are hydraulically connected, when combining volumes for DP-7 (Wetland D) and DP-8 (Wetland C), Wetland C/D will see an increase of 0.241 af, resulting in a net rise of approximately 0.60 inches, which is negligible.

DP-9 discharges to Wetland E, which has an approximate area of 14.72 acres and will see an increase in peak rates for all storm events. The total peak volume for the 100-year storm event will result in a net increase of 0.693 af, which results in an increased depth of approximately 0.57 inches, which is negligible.

DP-11 discharges to Wetland I, which has an approximate area of 1.35 acres and will see an increase in peak rates for all storm events. The total peak volume for the 100-year storm event will result in a net increase of 0.029 af, which results in an increased depth of approximately 0.26 inches, which is negligible.

DP-14 discharges at an existing outfall that will be replaced as part of this project and stormwater travels via overland flow to the west into wooded property. There is an increase in peak rates for 2-, 10- and 100-year storm events at DP-14. The increase in peak rates is due to site constraints along the roadway corridor that limit where a proposed Stormwater Control Measure (SCM) can be constructed. The proposed project includes a new subsurface infiltration system (SCM-1) within a parking lot owned by the Town; however, it is in a location that only captures the upstream stormwater runoff from this area (PDA-14A). Runoff downstream from this SCM (PDA-14B) is not able to be captured and treated with a SCM. The proposed SCM will provide significant mitigation; however, this discharge point will have a minor increase in peak rates consisting of 0.48 cfs, 0.05 cfs, and 0.10 cfs for the 2-, 10-, and 100-year storm events respectively, which are negligible.

DP-15 discharges overland flow to the east and will see an increase in peak rates for all storm events. The increase in peak rates are 0.23 cfs, 0.23 cfs, and 0.19 cfs for the 2-, 10-, and 100-year storm events respectively, which are negligible.

DP-16 discharges overland flow to the east and will see an increase in peak rates for 2- and 10-year storm events. The increase in peak rates are 0.04 cfs and 0.03 cfs for the 2- and 10-year storm events respectively, which are negligible.

DP-18 discharges to Wetland H, which has an approximate area of 2.42 acres and will see an increase in peak rates for all storm events. An aboveground infiltration basin (SCM-2) is proposed to treat a portion of the watershed area (PDA-18D1) to help mitigate peak rates; however, due to site constraints it is not feasible to treat the entire area discharging to DP-18. The total peak volume for the 100-year storm event will result in a net increase of 0.161 af, which results in an increased depth of approximately 0.80 inches, which is negligible.

DP-19 discharges overland flow and gutter flow to the east and will see an increase in peak rates for for all storm events. The increase in peak rates are 0.18 cfs, 0.18 cfs, and 0.14 cfs for the 2-, 10-, and 100-year storm events respectively, which are negligible.

Per MassDOT Requirements, a proposed stormwater SCM must hold peak volumes up to the 10-year storm event. The proposed SCMs meet this requirement to the maximum extent practicable. Therefore, this standard is met to the maximum extent practicable.

Table 8 Rainfall Depths (in)

Design Storm Event	Rainfall Depth (in)
2-year	*3.30*
10-year	*5.20*
25-year	*6.39*
100-year	*8.23*

Table 9 provides a summary of peak rates for each design point under existing and proposed conditions. Appendix D provides computations and supporting information regarding the hydraulic and hydrologic modeling.

Table 9 Peak Discharge Rates (cfs)

Design Point	Existing			Proposed		
	2-year	10-year	100-year	2-year	10-year	100-year
DP-1	*1.97*	*3.15*	*5.02*	*1.96*	*3.14*	*5.00*
DP-2	*0.77*	*1.27*	*2.04*	*0.77*	*1.27*	*2.04*
DP-3	*2.98*	*5.30*	*8.97*	*0*	*0*	*0*
DP-4	*5.81*	*10.20*	*17.12*	*10.61*	*18.07*	*29.79*
DP-5	*0.68*	*1.50*	*2.95*	*0.25*	*0.70*	*1.55*
DP-6	*1.66*	*2.83*	*4.65*	*0.03*	*0.05*	*0.08*
W-D (DP-7)	*1.92*	*4.02*	*7.55*	*4.02*	*6.82*	*11.24*
W-C (DP-8)	*1.71*	*3.21*	*5.71*	*1.05*	*1.91*	*3.41*
W-E (DP-9)	*1.84*	*4.01*	*7.70*	*5.31*	*9.17*	*15.24*
W-G (DP-10)	*2.69*	*5.39*	*9.83*	*0.44*	*1.27*	*2.83*
W-I (DP-11)	*1.29*	*2.26*	*3.78*	*1.52*	*2.45*	*3.92*
DP-12	*0.58*	*1.20*	*2.21*	*0*	*0*	*0*
DP-13	*0.08*	*0.38*	*1.02*	*0.07*	*0.36*	*0.95*
DP-14	*2.88*	*5.91*	*10.93*	*3.36*	*5.96*	*11.03*
DP-15	*0.34*	*0.71*	*1.32*	*0.57*	*0.94*	*1.51*
DP-16	*0.32*	*0.77*	*1.55*	*0.36*	*0.80*	*1.55*
DP-17	*0.79*	*1.52*	*2.71*	*0.05*	*0.19*	*0.48*
W-H (DP-18)	*4.03*	*9.91*	*20.50*	*5.00*	*10.82*	*21.18*
DP-19	*0.12*	*0.37*	*0.81*	*0.30*	*0.55*	*0.95*
DP-20	*8.94*	*16.22*	*27.78*	*6.34*	*15.42*	*26.94*
DP-21	*0.19*	*0.38*	*0.70*	*0.19*	*0.37*	*0.67*
W-A (DP-3 + DP-4)	*8.79*	*15.50*	*26.09*	*10.61*	*18.07*	*29.79*
W-C/D (DP-7 + DP-8)	*3.65*	*7.93*	*15.44*	*5.09*	*9.5*	*16.73*

Standard 3: Recharge

Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures, including environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

Standard 3 requires that three computations or demonstrations be fulfilled in order to satisfy the stormwater recharge requirements. They are as follows:

- Impervious Area
- Required Recharge Volume
- Bottom Area Sizing for Infiltration Basins

As stated previously, this project is a redevelopment project and is required to meet Standard 3 to the maximum extent practicable. This project has 506,710 square feet of total existing impervious area and 567,432 square feet of total proposed area within the limit of work. The required recharge volume for the total proposed impervious and the net increase in impervious area is 28,175 cubic feet (CF) and 2,990 CF, respectively. There is a net increase in impervious area of 60,722 square feet under proposed conditions, so there is a recharge volume requirement.

The project has implemented three SCMs to maximize recharge at all feasible locations within the project limits. These SCMs will provide an improvement to existing conditions as there are presently no stormwater mitigation practices within the project limits.

The Soil Survey Analysis is included in Section 1.1 of this report, Figure 3 Soils Map, and Appendix B Soil Information. Multiple test pits were performed by Lamson Engineering Corporation in August 2020 near the proposed SCMs (see Appendix B for Geotech report). TP #2 and BH #2 is associated with SCM-1, TP #4 and #5 are associated with SCM-2, and BH #3 is associated with SCM-3. Groundwater was not encountered in TP #2, TP #4, or TP #5. The inverts of the proposed SCM's were set at or above the design constraint except for SCM-2.

Within SCM-1, TP #2 groundwater was not encountered. However, excavation did not extend below the bottom elevation of the SCM. BH #2, which is in close proximity to SCM-1 extended 15' below the surface at elevation 79.4' and no groundwater was encountered, which is more than 2' below the bottom of SCM-1.

Due to utility conflicts, the bottom of SCM-2 had to be located at elevation 85 which is 1.2' above the bottom of the test pit (TP #4) taken in the basin. There was no groundwater encountered from the test pits taken within the basin. Also, boring BH #3 was taken approximately 900 feet away which encountered groundwater at an elevation of 80.7 feet.

This is more than 4 feet below the bottom of the infiltration basin; therefore SCM-2 exceeds the minimum separation to groundwater requirements.

Groundwater was encountered 9' below the surface in BH #3. The surface elevation is 89.7' at the boring, meaning groundwater was located at approximately elevation 80.7'. The bottom of SCM-3 is located at elevation 83.30'. Therefore, the bottom of the SCM-3 will have more than a minimum of 2-feet separation to ledge and/or seasonal high groundwater.

Based on the NRCS Soil information, SCM-1 and -2 are located within A soils and SCM-3 is located in C soils. Therefore, the required recharge calculations were made using A soils for SCM-1 and -2, and C soils for SCM-3. The recharge calculations are included in Appendix C of this report.

The contributing impervious areas and underlying Hydrologic Soil Group were used to estimate the recharge volume lost by development, which was used to calculate the required recharge volume for each SCM. The required recharge volume for the net increase in impervious area is 2,990 CF which corresponds to 1,167 CF, 462 CF, and 260 CF for SCM-1, -2, and -3, respectively. The recharge required based on the total impervious area within the limit of work is 28,135 CF. The recharge storage volume provided is 3,511 CF, 955 CF, and 2,453 CF for SCM-1, -2, and -3, respectively. Therefore, each SCM provides adequate volume for the impervious area that is routed to them. In addition, the combination of recharge volume provided by all three SCMs provides adequate storage for the required net increase of proposed impervious area for the project, but not for the required total proposed impervious area within the site. Therefore, Standard 3 is met to the maximum extent practicable.

The SCMs were designed using the static method, so that the storage available below the first overflow is equivalent or larger than the required recharge volume. Drawdown calculations were performed to show that the infiltration basin will drain within 72 hours. For this calculation, the RAWLs infiltration rates were used to estimate the recharge potential of the SCM.

Table 10 provides the required recharge volume for the Project, and Table 11 provides the recharge volumes proposed for each design point.

Table 10 Required Recharge Volume for Project

	HSG A	HSG B	HSG C	HSG D	Total
Existing Impervious (sq. ft.)	*503,081*	*0*	*0*	*3,629*	*506,710*
Proposed Impervious (sq. ft.)	*562,704*	*0*	*0*	*4,728*	*567,432*
Net Impervious Area (sq. ft.)	*59,623*	*0*	*0*	*1,099*	*60,722*
Target depth, F (in)	0.60	0.35	0.25	0.10	-
Required Recharge Volume, ReV (cf)					*28,175*

Table 11 Provided Recharge Volumes at Each Design Point

	HSG A	HSG B	HSG C	HSG D	Total
DP-14 (PDA-14A)					
Net Impervious Area (sf)	*23,330*	*0*	*0*	*0*	*23,330*
Required Recharge Volume, ReV (cf)	*1,167*	*0*	*0*	*0*	*1,167*
Provided Recharge Volume (cf)	*3,511*	*0*	*0*	*0*	*3,511*
DP-18 (PDA-18D1)					
Net Impervious Area (sf)	*9,233*	*0*	*0*	*0*	*9,233*
Required Recharge Volume, ReV (cf)	*462*	*0*	*0*	*0*	*462*
Provided Recharge Volume (cf)	*955*	*0*	*0*	*0*	*955*
DP-20 (PDA-20A)					
Net Impervious Area (sf)	*0*	*0*	*12,491*	*0*	*12,491*
Required Recharge Volume, ReV (cf)	*0*	*0*	*260*	*0*	*260*
Provided Recharge Volume (cf)	*0*	*0*	*2,453*	*0*	*2,453*

The infiltration SCMs are designed to drain completely within 72 hours.

Appendix B provides soil evaluation information (including the geotechnical report) and Appendix C provides computations, drawdown calculations, and supporting information regarding recharge.

The Macro Approach is being used for compliance with this standard due to constraints at the project site. Infiltration SCMs were considered for the project, but only three locations were feasible due to limited space in the ROW, existing utilities, and close proximity to wetlands. Drywells were considered but provide very little stormwater treatment volume, and the large number of drywells required would be impractical for all design points. Another option was to use proprietary devices at each discharge point for stormwater treatment volume, but due to high cost and the conflicts stated above were not practical for this project. This standard is met to the maximum extent practicable.

Standard 4: Water Quality Treatment

Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This Standard is met when:

- *Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained.*
- *Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook.*
- *Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.*

As stated previously, this project is a redevelopment project and is required to meet Standard 4 to the maximum extent practicable. As mentioned in Standard 3, there is a net increase in impervious area and three SCMs are proposed as part of this project. It has been designed to provide water quality treatment for the area of impervious surface that it captures. The treatment practices are:

- (1) Aboveground Infiltration Basin
- (2) Subsurface infiltration chamber systems

This standard is met to the maximum extent practicable.

Massachusetts Stormwater Regulations require a "Water Quality Depth" of 1 inch when the project site is located within a "critical area". This project is located within a Zone II, which is considered a critical area; therefore, a depth of 1" was used for the Water Quality calculations. This project is considered a redevelopment project; one of the objectives of the proposed stormwater improvements is to improve the quality of discharged stormwater.

The proposed design aims to improve the water quality by installing three new infiltration SCMs. The required water quality volume for the total impervious area is 58,400 CF. The required water quality volume for the net increase in impervious area is 5,060 CF. The required water quality volume for the impervious area that SCM-1, SCM-2, and SCM-3 receives is 1,944 CF, 751 CF, and 1,041 CF, respectively. The combined storage volume of the three proposed SCMs is 6,919 CF, which provides enough volume for the net increase in impervious area, but not the total proposed impervious area. The SCMs also exceed the water quality volume requirement for the area they are designed to hold, by providing 3,511 CF, 955 CF, and 2,453 CF of storage for SCM-1, SCM-2, and SCM-3, respectively. Therefore, this standard will be met to the maximum extent practicable. See Appendix C for required water quality volume calculations.

The Project has been designed to comply with Standard 4. A Stormwater control measure has been sized to treat the required water quality volume and remove required pollutant load to the maximum extent practicable.

The TSS calculations were completed based on the removal rates per the Massachusetts State Standards for each SCM.

The project has been designed to include a minimum of 25% TSS removal for areas where SCM's were not feasible. Where SCM's are able to be installed, more than 80% TSS removal will be achieved. Since the project is located within a stormwater critical area, pretreatment of 44% TSS removal is required prior to an infiltration basin. All three SCM's include a combination of deep sump catch basins with either a forebay or isolator row that provide 44% TSS removal before the infiltration basins.

Table 12 shows the WQV to be treated for both new and existing impervious area within each drainage area, organized by design point.

Table 12 WQV at Each Design Point

Design Point	WQV for New IA (cf)	WQV for Existing IA (cf)	Total WQV (cf)
DP-14			
PDA-14A	*175*	*1,770*	*1,944*
Total	175	1,770	1,944
DP-18			
PDA-18D1	*0*	*751*	*751*
Total	0	751	751
DP-20			
PDA-20A	149	*892*	*1,041*
Total	149	892	1,041
Project Total	324	3,413	3,736

Table 13 shows the WQV provided by the SCMs at each design point.

Table 13 WQV Provided by the SCMs at Each Design Point

Design Point	Pretreatment (y/n)	WQV Provided (cf)	Meets Total WQV	Meets Required WQV for New IA
DP-18 (PDA-18D1)				
Infiltration Basin	*Y*	*3,511*	*no*	*yes*
Total		3,511		
DP-14 (PDA-14A)				
Subsurface Infiltration System	*Y*	*955*	*no*	*yes*
Total		955		
DP-20 (PDA-20A)				
Subsurface Infiltration System	*Y*	2,453	*no*	*yes*
Total		2,453		
Project Total		**6,919**	***no***	***yes***

Appendix C provides the MassDEP TSS Removal Calculation Worksheets.

For MassDOT facilities, Long-Term Pollution Prevention Plans (LTPPPs) are implemented at a statewide, programmatic level through the State's highway operation and maintenance program. Appendix E includes the LTPPP for this project.

The Macro Approach is being used for compliance with this standard due to constraints at the project site. Three infiltration SCMs have been included where feasible within the project limits.

Water quality treatment provided is calculated by design point and an area-weighted average is calculated to obtain the overall water quality treatment provided by the Project. Specifically, the percent reduction for TSS provided by the SCMs for each design point is multiplied by the drainage area to that design point, summed for all design points, and divided by the entire drainage area of the project to obtain the Project's provided pollutant reduction. The Project's water quality treatment provides a minimum of 25% removal where closed drainage only is proposed, and more than 80% of removal where the infiltration basin is provided. Overall, the project will provide more than 25% TSS removal and meets Standard 4 to the maximum extent practicable.

Standard 5: Land Uses with Higher Potential Pollutant Loads

For Land Uses with Higher Potential Pollutant Loads (LUHPPLs), source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If through source control and/or pollution prevention all LHPPLs cannot be completely protected from exposure to rain, snow, snow melt, and stormwater runoff, the proponent shall use the specific structural stormwater BMPs determined by the Department to be suitable for such uses as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from LUHPPLs shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53 and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.

Standard 5 does not apply to the Project. There are no land uses with higher pollutant loads within the Project area.

Standard 6: Critical Areas

Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharges near or to any other critical area require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site-specific factors. Stormwater discharges to Outstanding Resource Waters and Special Resource Waters shall be removed and set back from the receiving water or wetland and receive the highest and best practical method of treatment. A "stormwater discharge" as defined in 314 CMR 3.04(2)(a)1 or (b), to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00. Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of a public water supply.

This site discharges within a Zone II, which is considered a "critical area." This standard applies and the project must meet the 1" water quality requirement.

Standard 6 requires that all stormwater management systems within a critical area be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS) prior to discharge and that the treatment train shall provide for at least 44% TSS removal prior to discharge to the infiltration structure. The water quality standards for the proposed stormwater system have been addressed in Standard 4 of this report.

Catch Basins with plastic hoods and 4 foot sumps are proposed throughout portions of the project. In these areas, the hoods will provide some volume to capture floatable oil, grease, and petroleum hydrocarbons if a spill occurs.

In addition, MassDOT follows established Best Management Practices (BMPs) and operational procedures and has implemented a range of strategies statewide to reduce the amount of road salt used and minimize its environmental impact. Such strategies include the increased use of liquid deicers to pre-wet dry material in order to reduce bounce and scatter and for pre-treating roadways prior to storms when conditions allow. Both techniques have been shown to reduce the overall application of sodium chloride. In addition, the use of closed loop controllers, pavement sensors and other equipment allow for more efficient operations.

Additional measures required for stormwater management systems in critical areas are the installation of shut-off valves at all outlets to a critical area. For areas where there is a closed drainage system, the risk of potential tampering by the public with the shut-off valves and the required response time by a town official to operate the valve in case of an emergency outweigh the benefits of installing the shut-off valves; therefore, they are not included in the design. This standard is met to the maximum extent practicable.

Standard 7: Redevelopment

A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

The improvements to Route 38 are considered a Redevelopment; therefore, Standard 7 is applicable to this project. Standard 7 requires a redevelopment project to meet Standards 2, 3 and the pretreatment and structural stormwater best management practice requirements of Standards 4, 5 and 6 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

This project provides an opportunity to improve the quality of stormwater runoff discharged to adjacent wetlands. The proposed stormwater enhancements are summarized below:

- There are three SCMs proposed as part of this project. A portion of the proposed drainage system has been designed to convey runoff to the SCMs for water quality treatment, and attenuation prior to discharge to the surrounding environment. The proposed SCMs are two subsurface infiltration systems and an infiltration basin.

- The new drainage system will follow existing drainage patterns by discharging at natural existing discharge points.

While the project includes striping a new lane between Sta. 206 and Sta. 216, it does not include adding a new lane of pavement. The maximum section between Sta. 206 and Sta. 216 is adding 7.5' of pavement from the existing edge to the edge of shoulder. Therefore, this project meets the Redevelopment as well as Limited Project Provisions under the WPA.

Below is a bulleted summary of project compliance to the standards:

- Standard 1 (Untreated Discharges) – Fully Met
- Standard 2 (Peak Rate Control and Flood Prevention) – Maximum Extent Practicable
- Standard 3 (Recharge to Groundwater) – Maximum Extent Practicable
- Standard 4 (80% TSS Removal) – Maximum Extent Practicable
- Standard 5 (Higher Potential Pollutant Loads) – N/A
- Standard 6 (Critical Areas) – Maximum Extent Practicable
- Standard 8 (Erosion Sediment Control) – Fully Met
- Standard 9 (Operations and Maintenance) – Fully Met
- Standard 10 (Illicit Discharges) – Fully Met

Standard 8: Erosion and Sediment Control

A plan to control construction related impacts, including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.

The implementation of erosion and sediment controls (ESC) during construction is considered a standard practice for all MassDOT projects. ESC will be installed before any land disturbance begins for the Project and will remain in place for the duration of the project. Construction period pollution prevention and erosion and sedimentation control measures will be implemented at the project site to control construction related impacts during construction and land disturbance activities. The General Contractor for the project will be responsible for implementation of the construction period controls.

The project will disturb more than one acre of land during the construction process and will require a NPDES Construction General Permit issued by the Environmental Protection Agency. As a result, the General Contractor will be required to prepare a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP document will satisfy the requirements of the Construction General Permit and the construction period erosion, sedimentation and pollution prevention plan requirements outlined in Standard 8 of the Massachusetts Stormwater Handbook. A SWPPP has not been prepared for inclusion with this stormwater report; however, one will be prepared prior to any construction activities at the site by the General Contractor.

Erosion and sedimentation controls will be employed to prevent the erosion and transport of sediment into resource areas during the earthwork and construction phases of the project. Erosion and sedimentation control measures will be installed prior to site excavation or disturbance and will be maintained throughout the construction period.

Below is a description of some of the erosion and sediment control measures that will be employed at the project and that will be included in the SWPPP.

Minimize Disturbed Area and Protect Natural Features and Soil

The most important aspects of controlling erosion and sedimentation are limiting the extent of disturbance and limiting the size and length of the tributary drainage areas to the worksite and drainage structures. These fundamental principles will be the key factors in the Contractor's control of erosion on the project site. If appropriate, the Contractor will construct temporary diversion swales and settling basins or use a settling tank. If additional drainage or erosion control measures are needed, they will be located up-gradient from the compost filter tubes and sedimentation fences when possible.

The Contractor is responsible for the maintenance and repair of all on-site erosion control devices. All erosion control devices will be regularly inspected. At no time will silt-laden water be allowed to enter sensitive areas (wetlands, streams, and drainage systems). Any runoff from disturbed surfaces will be directed through a sedimentation process prior to being discharged to the existing on-site drainage system.

The contractor will establish a staging area(s) on areas to be disturbed for the overnight storage of equipment and stockpiling of materials.

In the staging area, the Contractor will have a stockpile of materials required to control erosion on-site to be used to supplement or repair erosion control devices. These materials will include, but are not limited to, compost filter tubes, sedimentation fence, erosion control matting and crushed stone. As mentioned previously, erosion and sedimentation controls will be employed to minimize the erosion and transport of sediment into resource areas during the earthwork and construction phases of the project. Erosion and sedimentation control measures will be installed prior to site excavation or disturbance and will be maintained throughout the construction period.

The Contractor is responsible for erosion control on the site and will utilize erosion control measures where needed, regardless of whether the measures are specified on the construction plans or in supplemental plans prepared for the Stormwater Pollution Prevention Plan (SWPPP).

Primary erosion control techniques proposed include compost filter tubes, sedimentation fence barriers, and a stabilized construction entrance. A detailed description of each technique is discussed below.

Best Management Practices (BMPs)

COMPOST FILTER TUBES

Erosion control barriers (such as compost filter tubes and/or sedimentation fence) will be installed where required prior to the start of construction. These barriers will remain in place until all tributary surfaces have been fully stabilized.

Compost filter tube barriers will be placed to trap sediment transported by runoff before it reaches the drainage system or leaves the construction site. In areas where high runoff velocities or high sediment loads are expected, sedimentation fencing may be installed adjacent to the compost filter tubes. This semi-permeable barrier made of a synthetic porous fabric will provide additional protection. The sedimentation fences and compost filter tube barrier will be replaced as determined by periodic field inspection. Compost filter tubes and sedimentation fences will be maintained and cleaned until the tributary area is fully stabilized.

DRAINAGE SYSTEM PROTECTION

Sediment filters (silt sacks) will be installed at all existing and proposed drainage structures and maintained and cleaned as required to maintain their effectiveness. Catch basins, drainage manholes and storm drain pipes will be cleaned of sediment and debris after the completion of construction. Sediment collected in structures will be disposed of properly and covered, if stored on-site. The following construction measures will be implemented to prevent the transport of sediment through the drainage system.

- Any proposed drainage system will be installed from the downstream end to the upstream end.

- Until tributary areas are stabilized, catch basin inlets will be filtered with a silt sack. If intense rainfall is predicted before all tributary areas are stabilized, erosion control measures will be reinforced for the duration of the storm. Downstream areas will be inspected, and any sediment removed at the end of the storm.
- Unfiltered water will not be allowed to enter pipes from unstabilized surfaces.
- Trench excavation will be limited to the minimum length required for daily pipe installation. All trenches will be backfilled as soon as possible. The ends of pipes will be closed nightly with plywood.
- Silt-laden waters will be intercepted prior to reaching catch basins during construction. Any gross depositions of materials on paved surfaces will be removed.
- Catch basins will be inspected monthly and cleaned in anticipation of the winter season in November.

UTILITY CONSTRUCTION

The Contractor will construct utility trenches in a manner that will not direct runoff toward wetlands resources or to drainage system structures.

STABILIZATION ACTIVITIES

All disturbed surfaces will be stabilized a maximum of 14 days after construction on any portion of the project site that is completed or is temporarily halted, unless additional construction is intended to be initiated within 21 days. The Contractor will not disturb more area than can be stabilized within 14 days unless the area is to remain active. The Contractor will not disturb more area than can be stabilized within the same construction season.

SLOPE STABILIZATION

The smallest practicable area of land will be exposed at a time. Slopes greater than three-to-one (horizontal to vertical) will be stabilized with seed, organic mulch, jute fabric, or rip-rap, as appropriate, to prevent erosion during construction. After disturbed areas have been stabilized, the temporary erosion control measures will be removed, and accumulated sediment will be removed and disposed of in an appropriate location. Disturbed areas will be stabilized with appropriate ground cover as soon as possible. After the removal of temporary erosion control measures, disturbed areas will receive a layer of topsoil for stabilization.

STABILIZED CONSTRUCTION ENTRANCE

Temporary stabilized construction entrances may be installed at the project site. The purpose of the stabilized construction entrance is to remove sediment attached to vehicle tires and to minimize sediment transport and deposition onto public road surfaces. The construction entrances will be composed of beds of crushed stone which will be replenished as necessary to maintain their proper function.

Construction Period Pollution Prevention

GOOD HOUSEKEEPING BMPS

The following good housekeeping practices will be followed onsite during the construction project:

- An effort will be made to store only enough product required to do the job.
- All materials stored on-site will be stored in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure.
- Products 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.
- Whenever possible, all of a product will be used up before disposing of the container.
- Manufacturer's recommendations for proper use and disposal will be followed.
- The site superintendent will inspect daily to ensure proper use and disposal of materials.
- The contractor will be required in the Contract documents to control dust.

Material Handling & Waste Management

HAZARDOUS PRODUCTS

These practices will be used to reduce the risks associated with hazardous materials. Material Safety Data Sheets (MSDSs) for each substance with hazardous properties that is used on the job site will be obtained and used for the proper management of potential wastes that may result from these products. An MSDS will be posted in the immediate area where such product is stored and/or used and another copy of each MSDS will be maintained in the SWPPP file at the job site construction office. Since work is located adjacent to wetland resource areas, hazardous fuels or other potential contaminants shall not be stored on site. Each employee who must handle a substance with hazardous properties will be instructed on the use of MSDS sheets and the specific information in the applicable MSDS for the product they are using, particularly regarding spill control techniques.

- Products will be kept in original containers unless they are not re-sealable.
- Original labels and material safety data will be retained, as they contain important product information.
- Manufacturer, local state, and/or federal recommended methods for proper disposal will be followed if surplus product must be disposed of.

HAZARDOUS WASTE

All hazardous waste material will be disposed of by the Contractor in the manner specified by local, state, and/or federal regulations and by the manufacturer of such products. Site personnel will be instructed in these practices by the job site superintendent, who will also be responsible for seeing that these practices are followed.

SOLID AND CONSTRUCTION WASTES

All waste materials will be collected and stored in accordance with state and federal law in an appropriately covered container and/or securely lidded metal dumpster.

All trash and construction debris from the site will be deposited in the dumpster. No construction waste materials will be buried on site. All personnel will be instructed regarding the correct procedures for waste disposal.

All waste dumpsters and roll-off containers will be located in an area where the likelihood of the containers contributing to storm water discharges is negligible. If required, additional BMPs must be implemented, such as sandbags around the base, to prevent wastes from contributing to storm water discharges.

SANITARY WASTES

All sanitary waste will be collected from the portable units as required to maintain proper operation and sanitary conditions of these units. All maintenance work on portable sanitation units shall be performed by a licensed portable facility provider in complete compliance with local and state regulations.

All sanitary waste units will be located in an area where the likelihood of the unit contributing to storm water discharges is negligible. If required, additional BMPs must be implemented, such as sandbags around the base, to prevent wastes from contributing to storm water discharges.

Spill Prevention & Control Plan

The Contractor will train all personnel in the proper handling and cleanup of spilled materials. No spilled hazardous materials or hazardous wastes will be allowed to come in contact with storm water discharges. If such contact occurs, the storm water discharge will be contained on site until appropriate measures in compliance with state and federal regulations are taken to dispose of such contaminated storm water. It shall be the responsibility of the job site superintendent to properly train all personnel in spill prevention and clean up procedures.

In order to minimize the potential for a spill of hazardous materials to come into contact with storm water, the following steps will be implemented:

- All materials with hazardous properties (such as pesticides, petroleum products, fertilizers, detergents, construction chemicals, acids, paints, paint solvents, cleaning solvents, additives for soil stabilization, concrete curing compounds and additives, etc.) will be stored in a secure location, with their lids on, preferably under cover, when not in use.

- During construction, liquid petroleum products and other hazardous materials with the potential to contaminate groundwater may not be stored or handled in areas of the site draining to an infiltration area. An "infiltration area" is any area of the site that by design or as a result of soils, topography and other relevant factors accumulates runoff that infiltrates into the soil. Dikes, berms, sumps, and other forms of secondary containment that prevent discharge to groundwater may be used to isolate portions of the site for the purposes of storage and handling of these materials.

- The minimum practical quantity of all such materials will be kept on the job site.

- A spill control and containment kit (containing, for example, absorbent materials, acid neutralizing powder, brooms, dust pans, mops, rags, gloves, goggles, plastic and metal trash containers, etc.) will be provided at the storage site.

- Manufacturers recommended methods for spill cleanup will be clearly posted and site personnel will be trained regarding these procedures and the location of the information and cleanup supplies.

In the event of a spill, the following procedures should be followed:

- All spills will be cleaned up immediately after discovery.

- The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with the hazardous substances.

- The project manager and the Engineer of Record will be notified immediately.

- Spills of toxic or hazardous materials will be reported to the appropriate federal, state, and/or local government agency, regardless of the size of the spill.

- If the spill exceeds a Reportable Quantity, the SWPPP must be modified within seven (7) calendar days of knowledge of the discharge to provide a description of the release, the circumstances leading to the release, and the date of the release. The plans must identify measures to prevent the recurrence of such releases and to respond to such releases.

The job site superintendent will be the spill prevention and response coordinator. He/She will designate the individuals who will receive spill prevention and response training. These individuals will each become responsible for a particular phase of prevention and response. The names of these personnel will be posted in the material storage area and in the office trailer on-site.

Allowable Non-Stormwater Discharge Management

Certain types of discharges are allowed under the NPDES General Permit for Construction Activity and it is the intent of this project to allow such discharges. These types of discharges will be allowed under the conditions that no pollutants will be allowed to come into contact with the water prior to or after its discharge. The control measures that have been outlined previously in this report will be strictly followed to ensure that no contamination of these non-stormwater discharges takes place. The following non-stormwater discharges that may occur from the job site include:

- Discharges from fire-fighting activities

- Fire hydrant flushing

- Waters used to wash vehicles where detergents are not used

- Water used to control dust in accordance with off-site vehicle tracking

- Potable water including uncontaminated water line flushing

- Routine external building wash down that does not use detergents

- Pavement wash waters where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed) and where detergents are not used
- Uncontaminated air conditioner compressor condensate
- Uncontaminated ground water or spring water
- Foundation or footing drains where flows are not contaminated with process materials such as solvents
- Uncontaminated excavation dewatering
- Landscape irrigation

The Project disturbs one or more acres of land; therefore, the project contractor will request coverage under the NPDES Construction General Permit (CGP) and develop a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP follows the requirements of this standard and is in compliance with the NPDES CGP. This standard is fully met.

Standard 9: Operation and Maintenance Plan

A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.

MassDOT O&M plans are addressed at a statewide, programmatic level through the State's highway operation and maintenance program. Each MassDOT district office is responsible for providing operation and maintenance for the MassDOT stormwater management systems within their respective jurisdictions. Appendix E includes the O&M Plan for this project. This standard is fully met.

Standard 10: Prohibition of Illicit Discharges

All illicit discharges to the stormwater management system are prohibited.

Standard 10 of the Massachusetts Stormwater Handbook prohibits illicit discharges to stormwater management systems. As stated in the handbook, "The stormwater management system is the system for conveying, treating, and infiltrating stormwater on-site, including stormwater Stormwater Control Measures and any pipes intended to transport stormwater to the groundwater, a surface water, or municipal separate storm sewer system. Illicit discharges to the stormwater management system are discharges that are not entirely comprised of stormwater."

Proponents of projects within Wetlands jurisdiction must demonstrate compliance with this requirement by submitting to the issuing authority an Illicit Discharge Compliance Statement verifying that no illicit discharges exist on the site and by including in the pollution prevention plan measures to prevent illicit discharges to the stormwater management system.

Standard 10 also states that "The Illicit Discharge Compliance Statement must be accompanied by a site map that is drawn to scale and that identifies the location of any systems for conveying stormwater on the site and shows that these systems do not allow the entry of any illicit discharges into the stormwater management system. The site map shall identify the location of any systems for conveying wastewater and/or groundwater on the site and show that there are no connections between the stormwater and wastewater management systems and the location of any measures taken to prevent the entry of illicit discharges into the stormwater management system." Included with the Notice of Intent Submission are construction plans that displays the location of all stormwater management components as well as other utilities (existing and proposed) on the project site and conforms to requirements of a "site map" to accompany the Illicit Discharge Compliance Statement.

An Illicit Discharge Compliance Statement is included in Appendix E – Illicit Discharge Compliance Statement of this Report.

Where a new closed drainage system will be constructed, there will be no connections to sanitary sewer. In other areas, stormwater runoff discharges via overland flow.

The design plans submitted with this report have been designed in full compliance with Standard 10. The project area does not have any known illicit connections. Any illicit connections to the stormwater management system found in the project limit of work during construction will be removed and/or resolved through MassDOT's Illicit Discharge Detention and Elimination (IDDE) Program. The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges. Appendix E includes the LTPPP for this project. This standard is fully met.

Appendix A: MassDEP Checklist for Stormwater Report

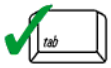
Insert a completed checklist, stamped by a registered professional engineer.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

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.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

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.

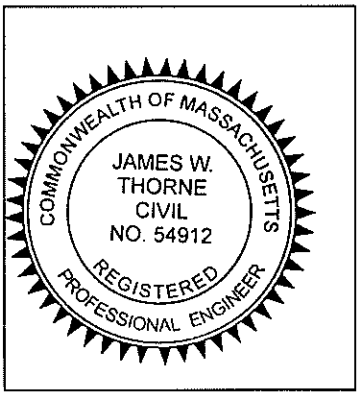
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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



3/11/2025

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

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

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

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

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.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

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.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

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

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

Standard 4: Water Quality

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

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

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

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

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

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

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

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

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

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

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

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

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

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

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

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

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

☐ All exposure has been eliminated.

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

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

Standard 6: Critical Areas

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

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

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

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

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

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

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

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

Standard 9: Operation and Maintenance Plan

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

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

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

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

Standard 10: Prohibition of Illicit Discharges

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

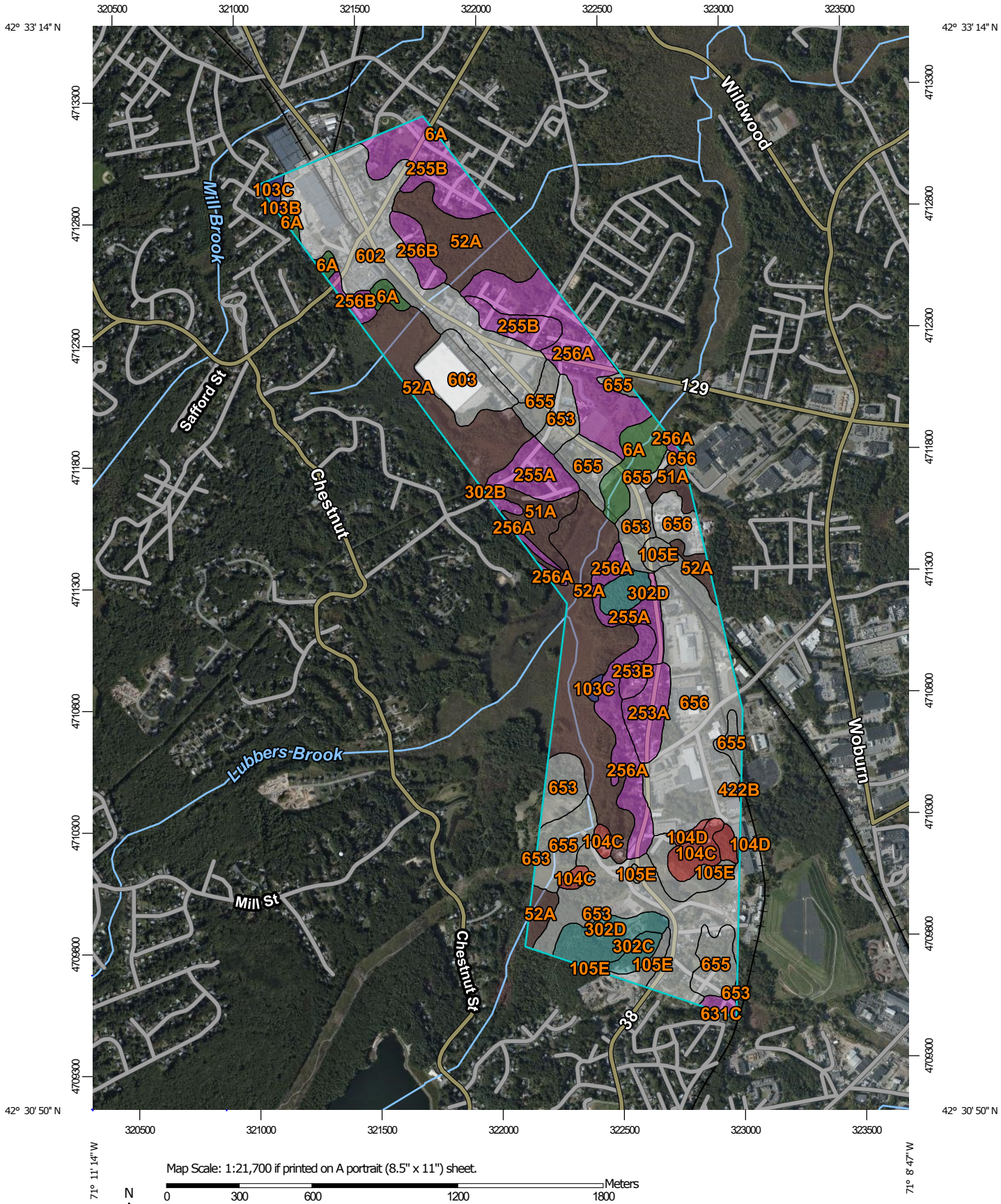
☒ An Illicit Discharge Compliance Statement is attached;

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

Appendix B: Soils and FEMA Information

- NRCS Soil Survey Information
- On-Site Subsurface Investigations
- FEMA Flood Insurance Rate Map (FIRM)

Hydrologic Soil Group—Middlesex County, Massachusetts
(Wilmington Route 38 Hydrologic Soil Group)



Map Scale: 1:21,700 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 300 600 1200 1800

Feet: 0 1000 2000 4000 6000

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

Hydrologic Soil Group—Middlesex County, Massachusetts
(Wilmington Route 38 Hydrologic Soil Group)

MAP LEGEND

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

Soils

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

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 20, Jun 9, 2020

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

Date(s) aerial images were photographed: Sep 13, 2019—Oct 5, 2019

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
6A	Scarboro mucky fine sandy loam, 0 to 3 percent slopes	A/D	20.0	2.8%
51A	Swansea muck, 0 to 1 percent slopes	B/D	16.8	2.4%
52A	Freetown muck, 0 to 1 percent slopes	B/D	137.2	19.4%
103B	Charlton-Hollis-Rock outcrop complex, 3 to 8 percent slopes	A	0.5	0.1%
103C	Charlton-Hollis-Rock outcrop complex, 8 to 15 percent slopes	B	3.0	0.4%
104C	Hollis-Rock outcrop-Charlton complex, 0 to 15 percent slopes	D	12.0	1.7%
104D	Hollis-Rock outcrop-Charlton complex, 15 to 25 percent slopes	D	4.3	0.6%
105E	Rock outcrop-Hollis complex, 3 to 35 percent slopes		17.9	2.5%
253A	Hinckley loamy sand, 0 to 3 percent slopes	A	12.9	1.8%
253B	Hinckley loamy sand, 3 to 8 percent slopes	A	3.5	0.5%
255A	Windsor loamy sand, 0 to 3 percent slopes	A	22.1	3.1%
255B	Windsor loamy sand, 3 to 8 percent slopes	A	35.6	5.0%
256A	Deerfield loamy fine sand, 0 to 3 percent slopes	A	70.9	10.0%
256B	Deerfield loamy fine sand, 3 to 8 percent slopes	A	11.8	1.7%
302B	Montauk fine sandy loam, 0 to 8 percent slopes, extremely stony	C	0.1	0.0%
302C	Montauk fine sandy loam, 8 to 15 percent slopes, extremely stony	C	5.5	0.8%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
302D	Montauk fine sandy loam, 15 to 35 percent slopes, extremely stony	C	21.9	3.1%
422B	Canton fine sandy loam, 0 to 8 percent slopes, extremely stony	B	0.2	0.0%
602	Urban land		77.3	10.9%
603	Urban land, wet substratum		21.2	3.0%
631C	Charlton-Urban land-Hollis complex, 3 to 15 percent slopes, rocky	A	2.3	0.3%
653	Udorthents, sandy		76.8	10.8%
655	Udorthents, wet substratum		49.3	7.0%
656	Udorthents-Urban land complex		85.8	12.1%
Totals for Area of Interest			**708.9**	**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

Data Report

for

Massachusetts Department of Transportation – Highway Division

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Project File No. 608051

BMP & Test Pit Results

for

State Route 38 (Main Street)

Wilmington, Massachusetts

Date: 8/26/2020

Prepared for:
Green International Affiliates, Inc.
239 Littleton Road, Suite 3
Westford, Massachusetts 01886
Phone: 978-923-0400

Prepared by:
Lamson Engineering Corporation
437 Cherry Street, Room # 109
Newton, Massachusetts 02465
Phone: 617-558-0101

TABLE OF CONTENTS

– Introduction

Appendices

1. Project Location Plan
2. As-Drilled BMP & As-Dug Test Pit Location Plan
3. Boring & Test Pit Logs
4. Test Pit Lab Testing Results

INTRODUCTION

The purpose of this Data Report is to present the results of 2020 BMP (Best Management Practices) boring and test pit exploration program for the State Route 38 (Main Street) project in the Town of Wilmington, Massachusetts

2020 Subsurface Exploration Program

A subsurface exploration program consisting of test borings BH-1 to BH-3 and test pits TP-1 to TP-6 was completed in August 2020 for the proposed Route 38 project, as indicated on Appendix 2, 'As-Drilled BMP & As-Dug Test Pit Location Plan'.

Borings BH-1 to BH-3 were conducted by using all-terrain vehicle (ATV) drilling. Test Pits TP-1 to TP-6 were conducted by using Mini Excavator.

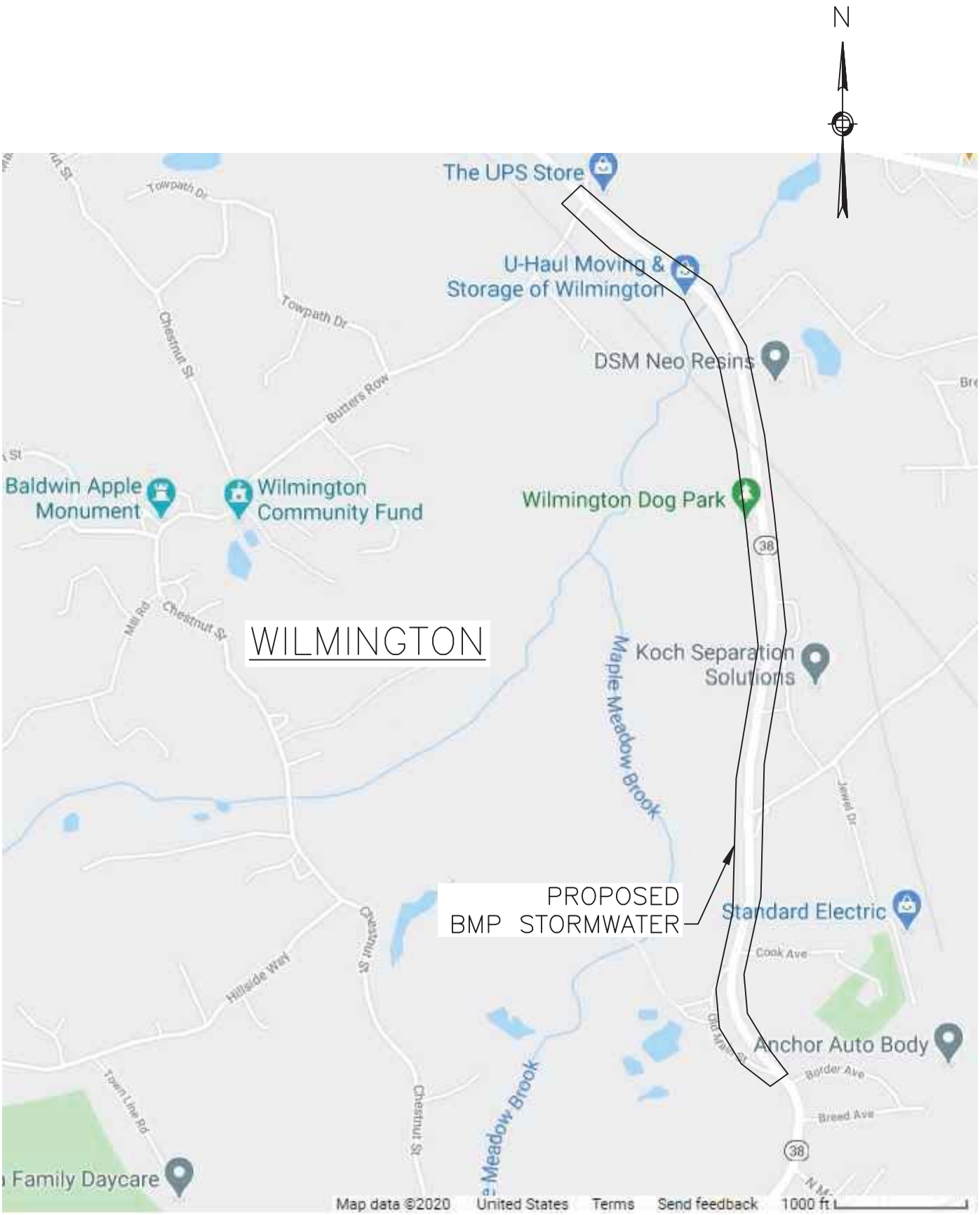
The exploration was performed between August 07 and August 12, 2020 by New England Boring Contractors located on 40 Fordway Street, Derry, New Hampshire (Phone: 603-437-1610). The monitoring of boring exploration was performed by Lamson Engineering Corporation. Materials recorded on the boring logs were visually identified at the site by an engineer from Lamson Engineering, who is also involved in the preparation of this report.

The soil samples were taken using a 2" outside diameter split spoon sampler driven 24" into the soil by a 140-pound hammer falling 30". Blows per 6" were recorded. The visual classification of the collected sample materials at the site was included on the boring logs.

APPENDIX 1

Project Location Plan

(1 Sheet)



massDOT Highway

GREEN INTERNATIONAL AFFILIATES, INC.
PROJECT FILE NO.: 608051
STATE ROUTE 38 (MAIN STREET)
WILMINGTON, MASSACHUSETTS



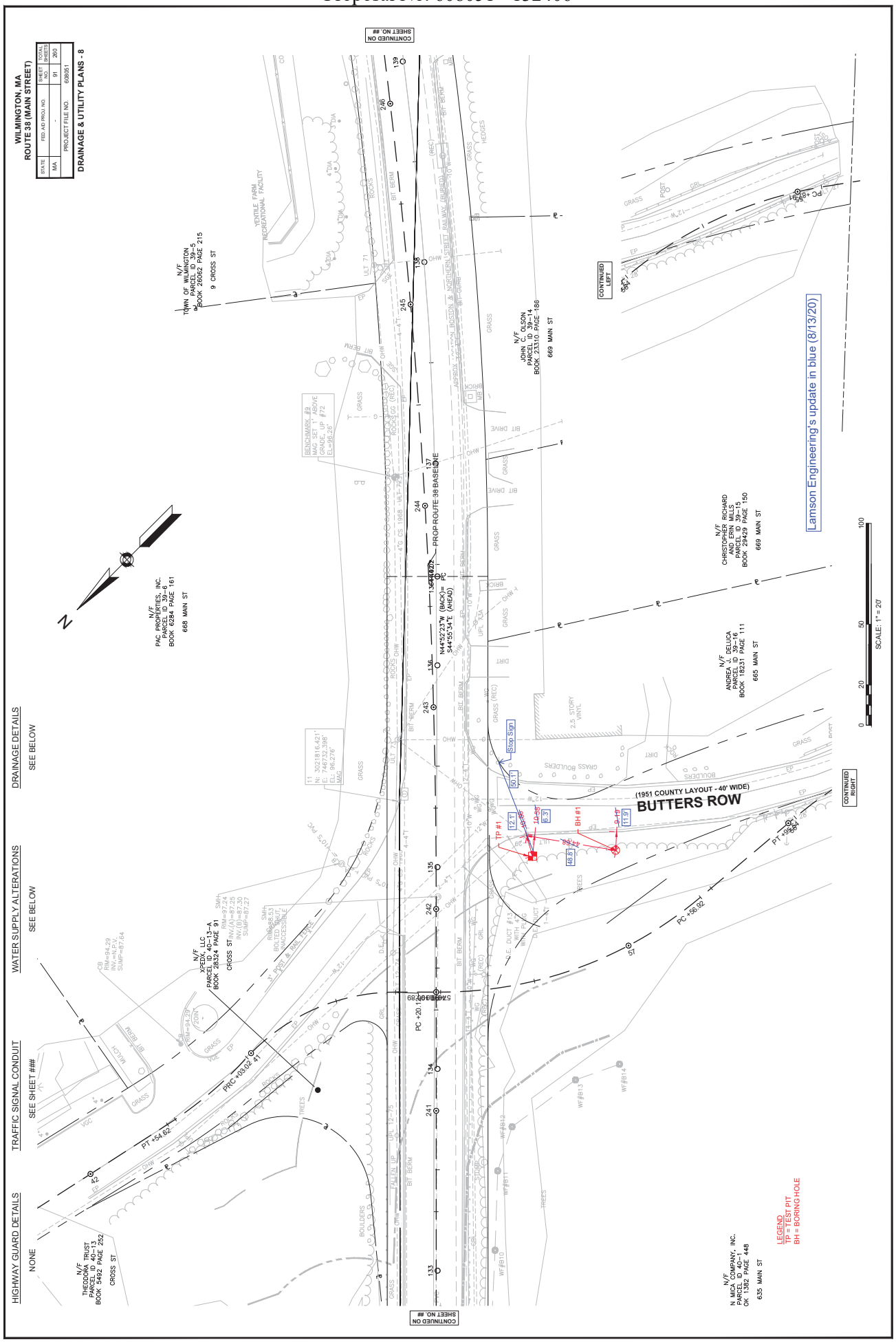
PROJECT LOCATION PLAN
AS NOTED

PREPARED BY
LAMSON ENGINEERING CORP.
NEWTON, MASS.

APPENDIX 2

As-Drilled BMP & As-Dug Test Pit Location Plan

(5 Sheets)


WILMINGTON, MA
ROUTE 38 (MAIN STREET)
DRAINAGE & UTILITY PLANS - 8
STATE: MA
FED. AID PROJ. NO.: -
PROJECT FILE NO.: 608051
SHEET NO.: 91
TOTAL SHEETS: 260
HIGHWAY GUARD DETAILS: NONE
TRAFFIC SIGNAL CONDUIT: SEE SHEET ###
WATER SUPPLY ALTERATIONS: SEE BELOW
DRAINAGE DETAILS: SEE BELOW
PROP ROUTE 38 BASELINE
(1951 COUNTY LAYOUT - 40' WIDE)
BUTTERS ROW
Lamson Engineering's update in blue (8/13/20)
SCALE: 1" = 20'
LEGEND
TP = TEST PIT
BH = BORING HOLE
CONTINUED ON SHEET NO. ##
CONTINUED LEFT
CONTINUED RIGHT
N/F TOWN OF WILMINGTON PARCEL ID 39-5 BOOK 26062 PAGE 215 9 CROSS ST
N/F JOHN V. OLSON PARCEL ID 39-14 BOOK 23310 PAGE 186 669 MAIN ST
N/F CHRISTOPHER RICHARD AND ERIN MILLS PARCEL ID 39-15 BOOK 29429 PAGE 150 669 MAIN ST
N/F ANDREA J. DELUCA PARCEL ID 39-16 BOOK 18231 PAGE 111 685 MAIN ST
N/F PAC PROPERTIES, INC. PARCEL ID 39-16 BOOK 6284 PAGE 161 668 MAIN ST
N/F XPEDX, LLC PARCEL ID 40-13-A BOOK 28324 PAGE 91 CROSS ST
N/F THEODORA TRUST PARCEL ID 40-13 BOOK 5492 PAGE 252 CROSS ST
N/F N. MICA COMPANY, INC. PARCEL ID 40-1 OK 1382 PAGE 448 635 MAIN ST
BENCHMARK #9 MAG SET 1" ABOVE GRADE, UP #72 EL=96.28
N: 3021816.421' E: 746732.398' EL: 96.276' MAG
N44°52'23"W (BACK)= S44°55'34"E (AHEAD)
PC +89.01
PT +54.62
PRC +69.02
PC +20.14
PT +38.64
PC +56.92
TP #1
BH #1
Stop Sign
6.17
12.1
10.25
8.3
48.8
11.9
6.1
VENTILE FARM RECREATIONAL FACILITY
BOULDERS
GRASS BOULDERS
2.5 STORY VINYL
DIRT
GRASS
TREES
BIT BERM
BIT DRIVE
STONE WALL
HEDGES
CB RIM=94.29 INV.=N.P.V. SUMP=87.64
SMH RIM=94.24 INV.(A)=87.24 INV.(B)=87.30 SUMP=87.27
SMH RIMS LOST BOLTED GRATE NOT ACCESSIBLE
6" POST & WIRE FENCE
12"W
4" DIA
ROOFS
OHW
MHO
WG
GRL
SB
EP
DRT
BRICK
MULCH
VGE
ULT 71
ULT 72
ULT 73
ULT 75
FALLEN UP
WF#B10
WF#B11
WF#B12
WF#B13
WF#B14
SEE SHEET ###
SEE BELOW
SEE BELOW

A00860 - 268

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

SEE BELOW

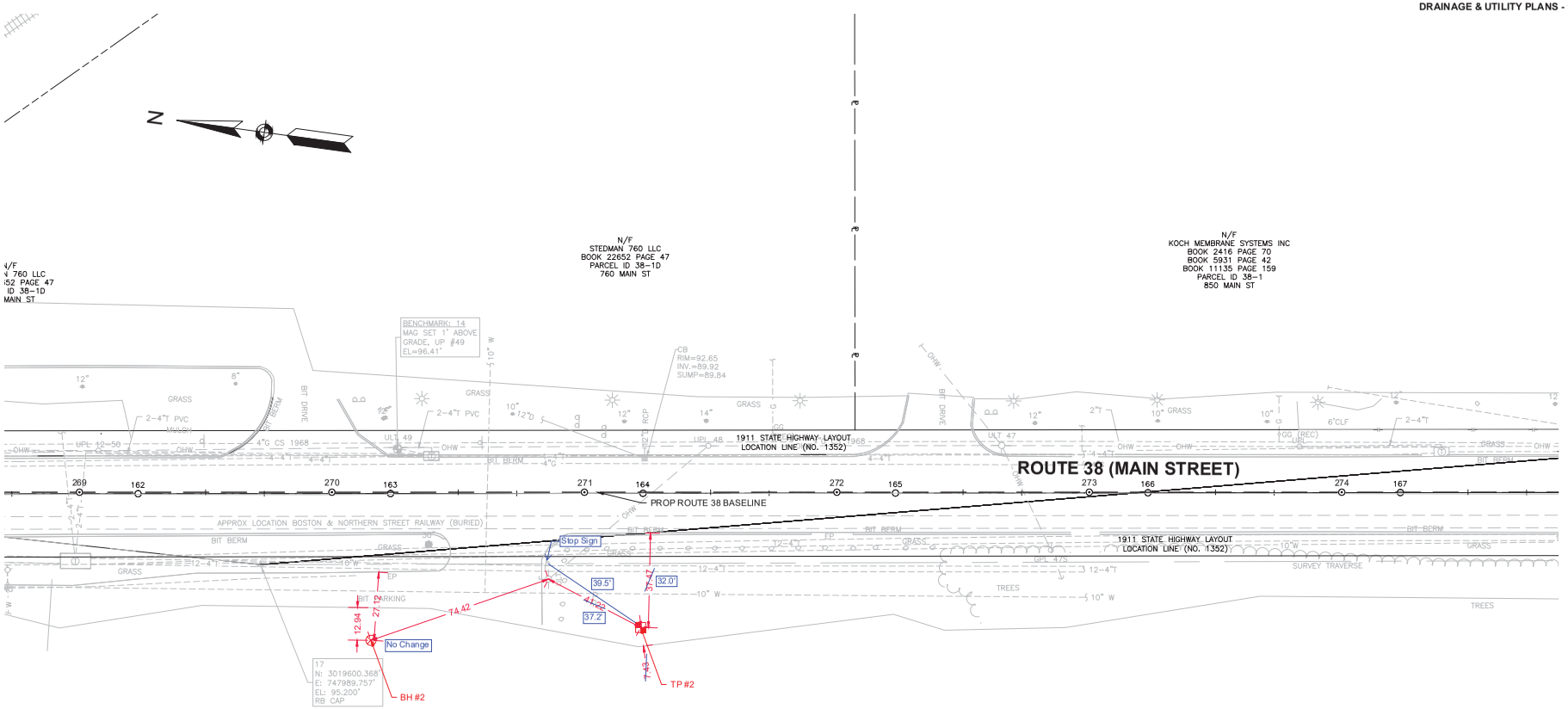
DRAINAGE DETAILS

SEE BELOW

WILMINGTON, MA
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	##	260
PROJECT FILE NO.	608051		

DRAINAGE & UTILITY PLANS - 13



LEGEND
TP = TEST PIT
BH = BORING HOLE

0 20 50 100
SCALE: 1" = 20'

608051_UT01(UTILITY-PLANS)-FOR TEST PIT LOCATIONS.DWG Plotted on 24-Jul-2020 3:16 PM

Proposal No. 608051 - 132406

A00860 - 269

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

SEE BELOW

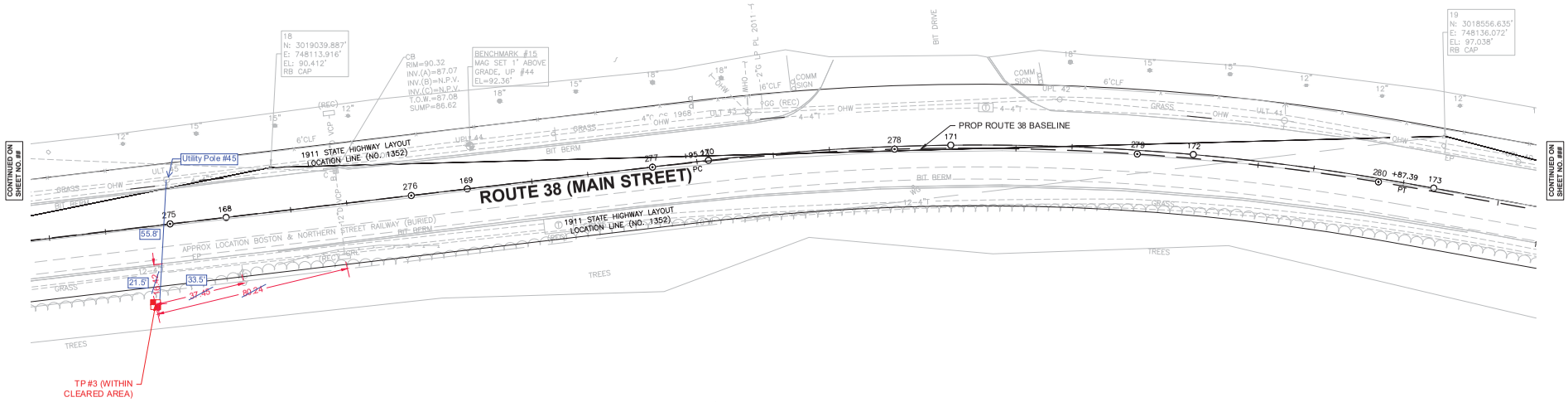
DRAINAGE DETAILS

SEE BELOW

WILMINGTON, MA
ROUTE 38 (MAIN STREET)

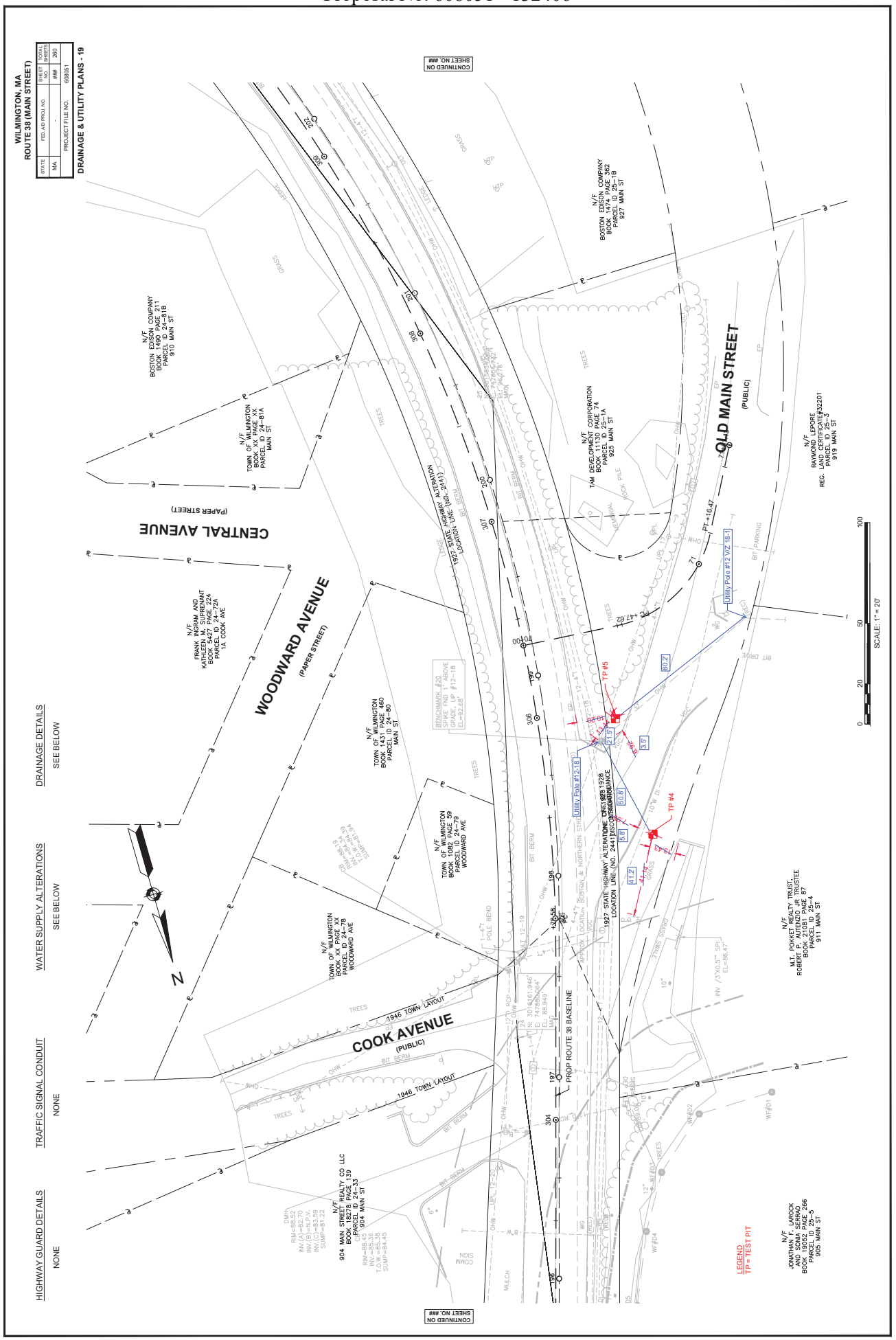
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	###	260
PROJECT FILE NO.	608051		

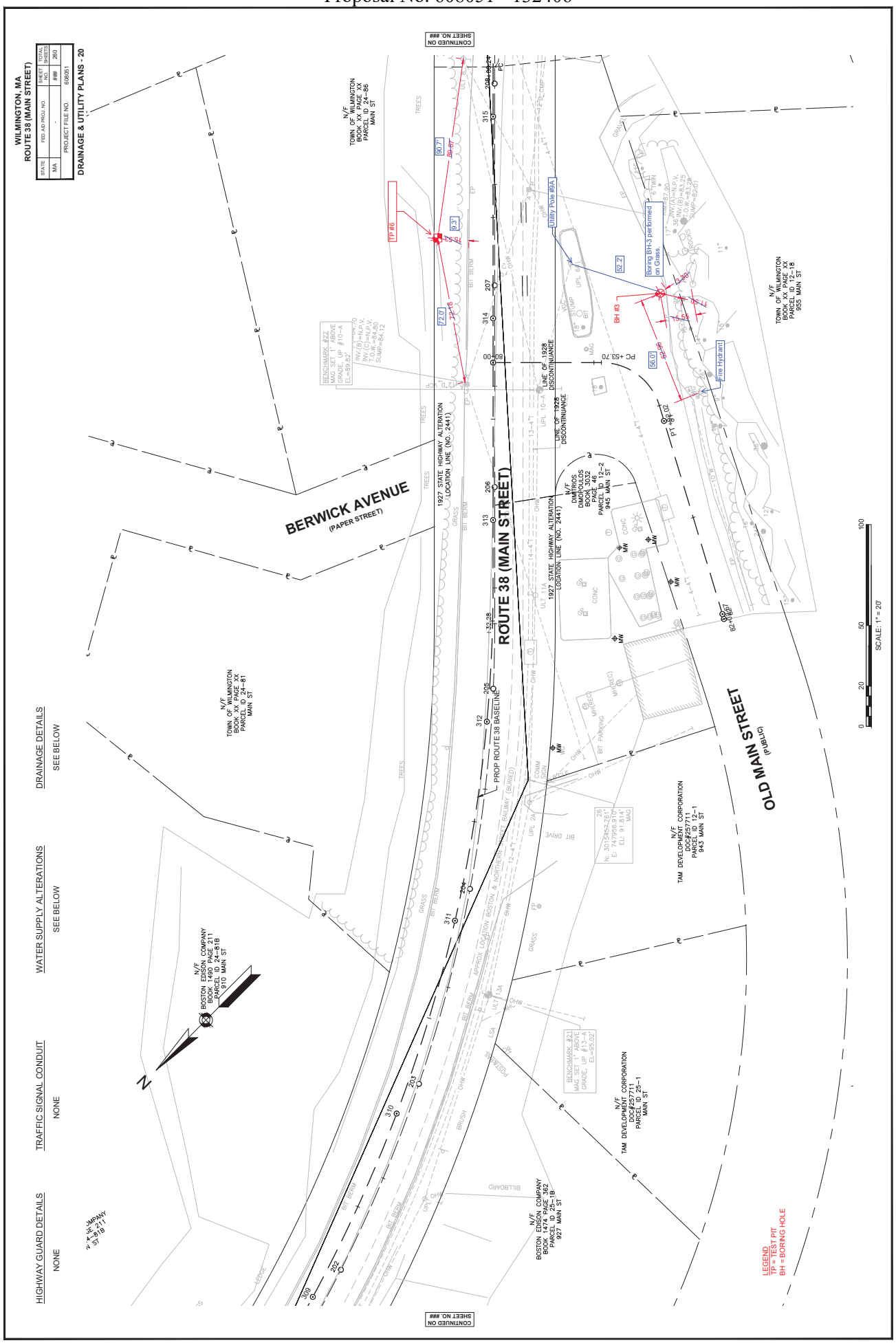
DRAINAGE & UTILITY PLANS - 14



608051_UT01(UTILITY-PLANS)-FOR TEST PIT LOCATIONS.DWG Plotted on 24-Jul-2020 3:16 PM

Proposal No. 608051 - 132406


WILMINGTON, MA
ROUTE 38 (MAIN STREET)
DRAINAGE & UTILITY PLANS - 19
STATE | FED. AID PROJ. NO. | SHEET NO. | TOTAL SHEETS
MA | - | ### | 260
PROJECT FILE NO. 608051
HIGHWAY GUARD DETAILS
NONE
TRAFFIC SIGNAL CONDUIT
NONE
WATER SUPPLY ALTERATIONS
SEE BELOW
DRAINAGE DETAILS
SEE BELOW
CENTRAL AVENUE
(PAPER STREET)
WOODWARD AVENUE
(PAPER STREET)
COOK AVENUE
(PUBLIC)
OLD MAIN STREET
(PUBLIC)
1946 TOWN LAYOUT
PROP ROUTE 38 BASELINE
1927 STATE HIGHWAY ALTERATION (NO. 2441) LOCATION LINE
1927 STATE HIGHWAY ALTERATION (NO. 2441) DISCONTINUANCE
APPROX LOCATION LINE
BENCHMARK #20
CHISELED "X" ON TOP OF GRANITE CURB
EL=92.68'
Utility Pole #12 V/Z 18-1
Utility Pole #12-18
TP #5
TP #4
LEGEND
TP = TEST PIT
SCALE: 1" = 20'
CONTINUED ON SHEET NO. ###
CONTINUED ON SHEET NO. ###
N/F BOSTON EDISON COMPANY BOOK 1490 PAGE 271 PARCEL ID 24-51B 910 MAIN ST
N/F BOSTON EDISON COMPANY BOOK 1414 PAGE 302 PARCEL ID 25-1B 927 MAIN ST
N/F TOWN OF WILMINGTON BOOK XX PAGE XX PARCEL ID 24-61A MAIN ST
N/F TAM DEVELOPMENT CORPORATION BOOK 1130 PAGE 74 PARCEL ID 25-1A 925 MAIN ST
N/F RAYMOND LEPORE REG. LAND CERT. #122201 PARCEL ID 25-3 919 MAIN ST
N/F FRANK INGHAM AND KATHLEEN M. SUPRENANT BOOK 5427 PAGE 224 PARCEL ID 24-72A 1A COOK AVE
N/F TOWN OF WILMINGTON BOOK 1431 PAGE 460 PARCEL ID 24-80 MAIN ST
N/F TOWN OF WILMINGTON BOOK 1082 PAGE 59 PARCEL ID 24-79 WOODWARD AVE
N/F TOWN OF WILMINGTON BOOK XX PAGE XX PARCEL ID 24-78 WOODWARD AVE
N/F MT. POKIT REALTY TRUST ROBERT P. AUTENZIO JR TRUSTEE BOOK 21081 PAGE 87 PARCEL ID 24-4 911 MAIN ST
N/F 904 MAIN STREET REALTY CO LLC BOOK 18782 PAGE 539 PARCEL ID 24-33 904 MAIN ST
N/F JONATHAN T. LABROCK AND SONIA SERRAO BOOK 19252 PAGE 266 PARCEL ID 25-5 905 MAIN ST
N 301,161.946'
E 747,880.084'
EL 88.949'
PT +16.47
PT +47.62
60.2
60.6
5.6
41.2
3.5
2.15
5.7
10.4
10.0
10.1
10.2
10.3
10.4
WF#01
WF#02
WF#03
WF#04


WILMINGTON, MA
ROUTE 38 (MAIN STREET)
DRAINAGE & UTILITY PLANS - 20
STATE | FED. AID PROJ. NO. | SHEET NO. | TOTAL SHEETS
MA | - | ### | 260
PROJECT FILE NO. 608051
HIGHWAY GUARD DETAILS: NONE
TRAFFIC SIGNAL CONDUIT: NONE
WATER SUPPLY ALTERATIONS: SEE BELOW
DRAINAGE DETAILS: SEE BELOW
ROUTE 38 (MAIN STREET)
BERWICK AVENUE (PAPER STREET)
OLD MAIN STREET (PUBLIC)
1927 STATE HIGHWAY ALTERATION LOCATION LINE (NO. 2441)
PROP ROUTE 38 BASELINE
LINE OF 1928 DISCONTINUANCE
APPROX LOCATION BOSTON & NORTHERN STREET RAILWAY (BURIED)
N/F TOWN OF WILMINGTON BOOK XX PAGE XX PARCEL ID 24-66 MAIN ST
N/F TOWN OF WILMINGTON BOOK XX PAGE XX PARCEL ID 24-81 MAIN ST
N/F BOSTON EDISON COMPANY BOOK 1490 PAGE 211 PARCEL ID 24-81B 910 MAIN ST
N/F BOSTON EDISON COMPANY BOOK 1474 PAGE 362 PARCEL ID 25-1B 927 MAIN ST
N/F TAM DEVELOPMENT CORPORATION DOC#257711 PARCEL ID 25-1 MAIN ST
N/F TAM DEVELOPMENT CORPORATION DOC#257711 PARCEL ID 32-1 943 MAIN ST
N/F DIMITRIOS DIMAKOPOULOS BOOK 3032 PAGE 46 PARCEL ID 32-2 945 MAIN ST
N/F TOWN OF WILMINGTON BOOK XX PAGE XX PARCEL ID 25-18 955 MAIN ST
TP #6
BH #3
Boring BH-3 performed on Grass
Utility Pole #9A
Fire Hydrant
BENCHMARK #22 MAG SET 1" ABOVE GRADE, UP #10-A EL=89.82
BENCHMARK #21 MAG SET 1" ABOVE GRADE, UP #13-A EL=95.02
PC +53.70
202
203
204
205
206
207
208
309
310
311
312
313
314
315
SCALE: 1" = 20'
LEGEND
TP = TEST PIT
BH = BORING HOLE
CONTINUED ON SHEET NO. ###
CONTINUED ON SHEET NO. ###

APPENDIX 3

Boring & Test Pit Logs

(9 Sheets)

Note:

- For 2020 boring and test pit locations see Appendix 1, 'As-Drilled BMP & As-Dug Test Pit Location Plan'.
- There are 3 sheets for Borings BH-1, BH-2, and BH-3.
- There are 6 sheets for Test Pits TP-1, TP-2, TP-3, TP-4, TP-5, and TP-6.
- The elevations shown on the attached 2020 logs are based on 1988 NAVD datum.

Moving Massachusetts Forward massDOT Highway

Boring Log

LAMSON ENGINEERING CORPORATION

437 Cherry Street, #109, Newton, Massachusetts 02465
Phone: (617) 558-0101 E-Mail: Lamsoneng@msn.com

Boring No. BH-1 (BMP Boring) | Page 1/1

Scale: 1" = 3'

City/Town: Wilmington	Bridge No.: -	Project File No.: 608051	Contract No.: -
Location: State Route 38 (Main Street)		Date & Time Started: 8/12/20 8:30 a.m.	Total Hours:
Groundwater Depth (Feet): 10' Date & Time: 8/12/20 11:30 a.m.		Date & Time Completed: 8/12/20 12:00 p.m.	3.5
Coordinates: N 3,021,757 E 746,635	Ground Elevation (Feet): 94.5'	Inspector's Name: Weijie Dong	
Drilling Company: New England Boring Contractors		Driller's Name: Manlea Thompson	Helper's Name: Will Sebigny

Sample Number	Depth Range (Feet)	Blow Counts per 6 Inches (Coring Times Minute Per Foot)	Recovery (inches)	Field Description	Strata Changes
S-1	0' - 2'	2 3 7 8	10"	Grass O Layer 1" Dry, loose, dark brown, LOAMY SAND, some vegetation. 4"	A Layer
				Dry, medium dense, brown, FINE SAND, some fine to medium gravel, trace inorganic silt.	B Layer
S-2	2' - 2'5"	120/5"	3"	Dry, loose, brown, FINE SAND, trace inorganic silt.	2'5"
				Boulder	3'7"
S-3	4' - 6'	1 1 3 3	12"	Dry, loose, brown, FINE SAND, trace inorganic silt.	
S-4	6' - 8'	7 6 7 9	9"	Dry, medium dense, brown, FINE SAND, trace inorganic silt.	B Layer
S-5	8' - 10'	12 11 11 11	12"	Dry, medium dense, brown, FINE SAND, trace inorganic silt.	
S-6	10' - 12'	6 17 21 16	11"	Wet, dense, brown, FINE TO COARSE SAND, some fine to coarse gravel, trace inorganic silt.	
S-7	12' - 13'6"	23 20 125	14"	Wet, dense, brown, FINE TO COARSE SAND, some fine to coarse gravel, trace inorganic silt.	13'
				Top of Possible Bedrock @ 13'6" 13'6"	C Layer
				Rollerbit into possible bedrock.	R Layer 15'
				Bottom of Exploration @ 15'	

Legend:
O Layer = Organic Surface Layer
A Layer = Surface Layer
B Layer = Subsoil
C Layer = Substratum
R Layer = Bedrock

Notes:

Arrow-Board: N/A
Signs: -
Cones: 12

Protective Device Stand: - Box: -
Well Depth: - Solid Pipe: -
Stick Up Pipe: - Screen Pipe: -

Penetration Resistance (N) Guide:

Cohesionless Soils (Sands, Gravels)		Cohesive Soils (Silts, Clays)	
Relative Density	Penetration Resistance	Consistency	Penetration Resistance
Very Loose	0 - 4	Very Soft	0 - 2
Loose	4 - 10	Soft	2 - 4
Medium Dense	10 - 30	Medium Stiff	4 - 8
Dense	30 - 50	Stiff	8 - 15
Very Dense	Over 50	Very Stiff	15 - 30
		Hard	Over 30

N=Sum of Second and Third 6" Blow Counts

Terms Used for Second Entry of Descriptions: and = 40-50%, some = 10-40%, trace = 10% or less

Type of Drill Rig: ATV Mobile B-57
Hammer Weight: 140 lbs Fall: 30"
Casing Types: HW
Size: 4"
Depth: 12'

Sampler Type: S/S Size: 1 3/8" ID
Automatic Hammer Weight: 140 lbs
Safety Hammer Weight:
Donut Hammer Weight: Fall: 30"

Core Barrel Type: - Size: -

Moving Massachusetts Forward massDOT Highway

Boring Log

LAMSON ENGINEERING CORPORATION

437 Cherry Street, #109, Newton, Massachusetts 02465
Phone: (617) 558-0101 E-Mail: Lamsoneng@msn.com

Boring No. BH-2 (BMP Boring) | Page 1/1

Scale: 1" = 3'

City/Town: Wilmington	Bridge No.: -	Project File No.: 608051	Contract No.: -
Location: State Route 38 (Main Street)		Date & Time Started: 8/11/20 11:45 a.m.	Total Hours:
Groundwater Depth (Feet): -	Date & Time: -	Date & Time Completed: 8/11/20 3:15 p.m.	3.5
Coordinates: N 3,019,553 E 747,966	Ground Elevation (Feet): 94.4'	Inspector's Name: Weijie Dong	
Drilling Company: New England Boring Contractors		Driller's Name: Manlea Thompson	Helper's Name: Will Sebigny

Sample Number	Depth Range (Feet)	Blow Counts per 6 Inches / Coring Times Minute Per Foot	Recovery (inches)	Field Description	Strata Changes
				Asphalt & Sub-base Layer.	8"
S-1	1' - 3'	3 14 14 15	15"	Dry, medium dense, brown, FINE SAND, some fine to medium gravel, trace inorganic silt.	
S-2	3' - 5'	16 12 11 9	8"	Dry, medium dense, brown, FINE SAND, some fine to medium gravel, trace inorganic silt.	B Layer
S-3	5' - 7'	4 7 9 9	14"	Dry, medium dense, brown, FINE SAND, some fine gravel, trace inorganic silt.	
S-4	7' - 7'6"	42 120/0"	6"	Dry, very dense, brown, FINE SAND, some fine gravel, trace inorganic silt.	7'6"
				Top of Bedrock @ 7'6"	
				Rollerbit to 10' and begin coring.	
C-1	10' - 15'	3 3 4 5 5	38"	Moderately weathered, fractured, gray, GRANITE GNEISS. Percent Recovery = 63%, RQD = 24"/60" = 24%	R Layer
					15'
				Bottom of Exploration @ 15'	

Legend:

O Layer = Organic Surface Layer
A Layer = Surface Layer
B Layer = Subsoil
C Layer = Substratum
R Layer = Bedrock

Notes:

Arrow-Board: N/A
Signs: -
Cones: 12

Protective Device Stand: - Box: -
Well Depth: - Solid Pipe: -
Stick Up Pipe: - Screen Pipe: -

Penetration Resistance (N) Guide:

Cohesionless Soils (Sands, Gravels)		Cohesive Soils (Silts, Clays)	
Relative Density	Penetration Resistance	Consistency	Penetration Resistance
Very Loose	0 - 4	Very Soft	0 - 2
Loose	4 - 10	Soft	2 - 4
Medium Dense	10 - 30	Medium Stiff	4 - 8
Dense	30 - 50	Stiff	8 - 15
Very Dense	Over 50	Very Stiff	15 - 30
N=Sum of Second and Third 6" Blow Counts		Hard	Over 30

Terms Used for Second Entry of Descriptions: and = 40-50%, some = 10-40%, trace = 10% or less

Type of Drill Rig: ATV Mobile B-57

Hammer Weight: 140 lbs Fall: 30"
Casing Types: HW
Size: 4"
Depth: 9'

Sampler Type: S/S Size: 1 3/8" ID
Automatic Hammer Weight: 140 lbs
Safety Hammer Weight:
Donut Hammer Weight: Fall: 30"

Core Barrel Type: NX Size: 2.15" ID

Moving Massachusetts Forward massDOT Highway

Boring Log

LAMSON ENGINEERING CORPORATION

437 Cherry Street, #109, Newton, Massachusetts 02465
Phone: (617) 558-0101 E-Mail: Lamsoneng@msn.com

Boring No. BH-3 (BMP Boring) | Page 1/1

Scale: 1" = 3'

City/Town: Wilmington	Bridge No.: -	Project File No.: 608051	Contract No.: -
Location: State Route 38 (Main Street)		Date & Time Started: 8/11/20 8:15 a.m.	Total Hours:
Groundwater Depth (Feet): 9' Date & Time: 8/11/20 9:30 a.m.		Date & Time Completed: 8/11/20 11:15 p.m.	3.0
Coordinates: N 3,015,232 E 748,080	Ground Elevation (Feet): 89.7'	Inspector's Name: Weijie Dong	
Drilling Company: New England Boring Contractors		Driller's Name: Manlea Thompson	Helper's Name: Will Sebigny

Sample Number	Depth Range (Feet)	Blow Counts per 6 Inches (Coring Times Minute Per Foot)				Recovery (inches)	Field Description	Strata Changes
							Grass O Layer 1"	
S-1	0' - 2'	2	3	7	8	10"	Dry, medium dense, dark brown, LOAMY SAND, trace vegetation.	A Layer 2'4"
S-2	2' - 4'	7	18	18	11	14"	Dry, dense, brown, FINE SAND, some fine to medium gravel, trace inorganic silt.	
S-3	4' - 6'	22	52	65	76	12"	Dry, very dense, brown, FINE TO COARSE SAND, some fine to medium gravel, trace inorganic silt.	
S-4	6' - 8'	80	81	62	90	20"	Dry, very dense, brown, FINE TO COARSE SAND & FINE TO COARSE GRAVEL, trace inorganic silt.	B Layer
S-5	8' - 10'	20	21	23	29	9"	Moist, dense, brown, FINE TO COARSE SAND & FINE TO COARSE GRAVEL, trace inorganic silt.	
S-6	10' - 12'	13	33	42	25	17"	Wet, very dense, brown, FINE TO COARSE SAND & FINE TO COARSE GRAVEL, trace inorganic silt.	
S-7	12' - 14'	31	29	15	17	12"	Wet, dense, brown, FINE TO COARSE SAND & FINE TO COARSE GRAVEL, trace inorganic silt.	
S-8	14' - 16'	34	14	22	17	9"	Wet, dense, brown, FINE TO COARSE SAND & FINE TO COARSE GRAVEL, trace inorganic silt.	
							Bottom of Exploration @ 16'	16'

Legend:
O Layer = Organic Surface Layer
A Layer = Surface Layer
B Layer = Subsoil
C Layer = Substratum
R Layer = Bedrock

Notes:

Arrow-Board: N/A
Signs: -
Cones: 12

Protective Device Stand: - Box: -
Well Depth: - Solid Pipe: -
Stick Up Pipe: - Screen Pipe: -

Penetration Resistance (N) Guide:

Cohesionless Soils (Sands, Gravels)		Cohesive Soils (Silts, Clays)	
Relative Density	Penetration Resistance	Consistency	Penetration Resistance
Very Loose	0 - 4	Very Soft	0 - 2
Loose	4 - 10	Soft	2 - 4
Medium Dense	10 - 30	Medium Stiff	4 - 8
Dense	30 - 50	Stiff	8 - 15
Very Dense	Over 50	Very Stiff	15 - 30
N=Sum of Second and Third 6" Blow Counts		Hard	Over 30

Terms Used for Second Entry of Descriptions: and = 40-50%, some = 10-40%, trace = 10% or less

Type of Drill Rig: ATV Mobile B-57
Hammer Weight: - Fall: -
Augers: HSA
Size: 4.25"
Depth: 14'

Sampler Type: S/S Size: 1 3/8" ID
Automatic Hammer Weight: 140 lbs
Safety Hammer Weight:
Donut Hammer Weight: Fall: 30"

Core Barrel Type: - Size: -

Moving Massachusetts Forward massDOT Highway

Test Pit Log

LAMSON ENGINEERING CORPORATION
437 Cherry Street, #109, Newton, Massachusetts 02465
Phone: (617) 558-0101 E-Mail: Lamsoneng@msn.com

Test Pit No. TP-1 | Page 1/1

Scale: -

City/Town: Wilmington	Bridge No.: -	Project File No.: 608051	Contract No.: -
Location: Route 38 (Main Street), Wilmington MA		Date & Time Started: 8/10/20 10:00 am	Total Hours: 1.5
Coordinates: N 3,021,784 E 746,664	Ground Elev. (Feet): 93.8'	Date & Time Completed: 8/10/20 11:30 am	
Drilling Company: New England Boring Contractors	Driller's Name: Manlea Thompson	Helper's Name: William Sebigny	
Inspector's Name: Weijie Dong	Equipment Type: Mini Excavator KX71-3		

INFORMATION LOG

Depth Range	Field Description	Strata Changes
0' - 10"	Topsoil	10"
10" - 4'	Dry, brown, BOULDERS, some fine sand, some cobbles, some fine to coarse gravel, trace inorganic silt.	4'
	BOULDERS	

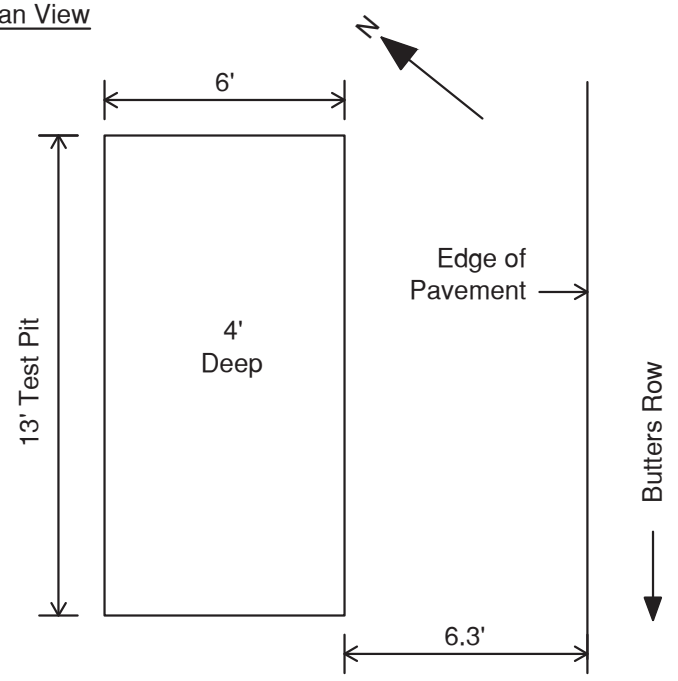
No water encountered.

Remarks:

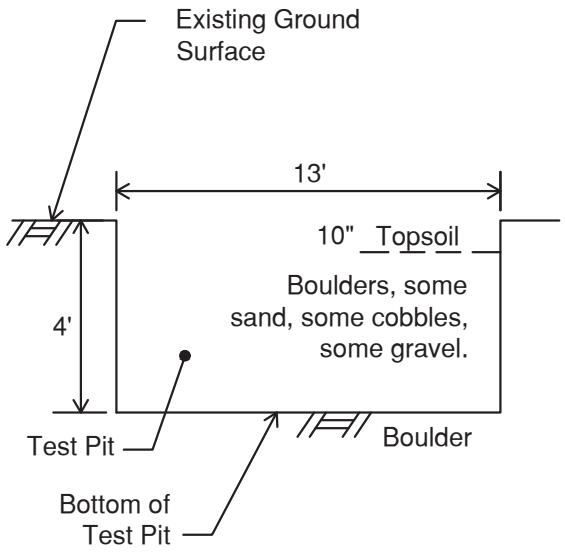
- Terminated at 4' deep due to boulders.

SKETCHES

Plan View



Side View



Remarks:

Test Pit Log

LAMSON ENGINEERING CORPORATION

437 Cherry Street, #109, Newton, Massachusetts 02465
Phone: (617) 558-0101 E-Mail: Lamsoneng@msn.com

Test Pit No. TP-2 | Page 1/1

Scale: -

City/Town: Wilmington	Bridge No.: -	Project File No.: 608051	Contract No.: -
Location: Route 38 (Main Street), Wilmington MA		Date & Time Started: 8/10/20 8:15 am	Total Hours: 1.25
Coordinates: N 3,019,450 E 747,992	Ground Elev. (Feet): 92.9'	Date & Time Completed: 8/10/20 9:30 am	
Drilling Company: New England Boring Contractors	Driller's Name: Manlea Thompson	Helper's Name: William Sebigny	
Inspector's Name: Weijie Dong	Equipment Type: Mini Excavator KX71-3		

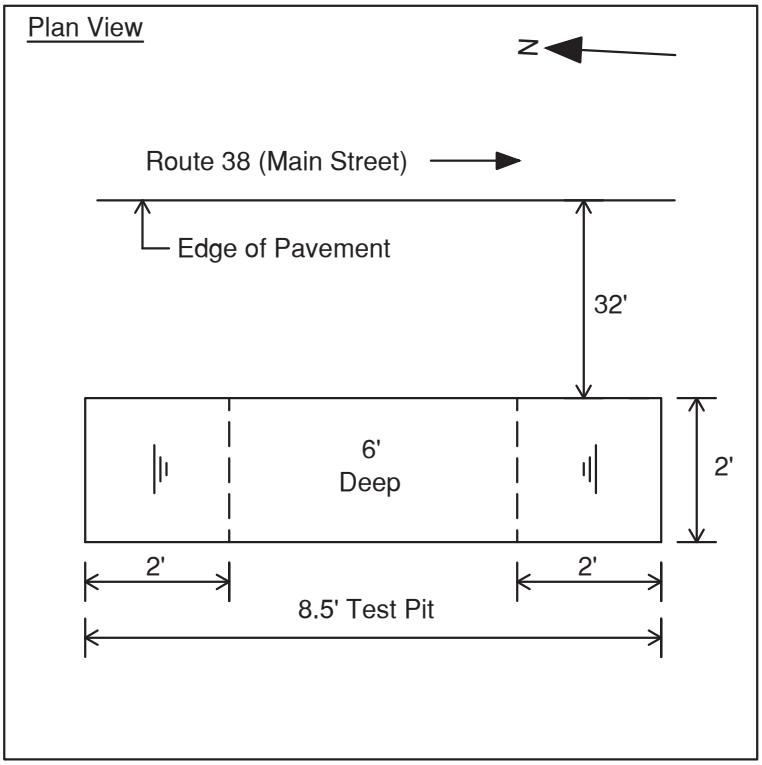
INFORMATION LOG

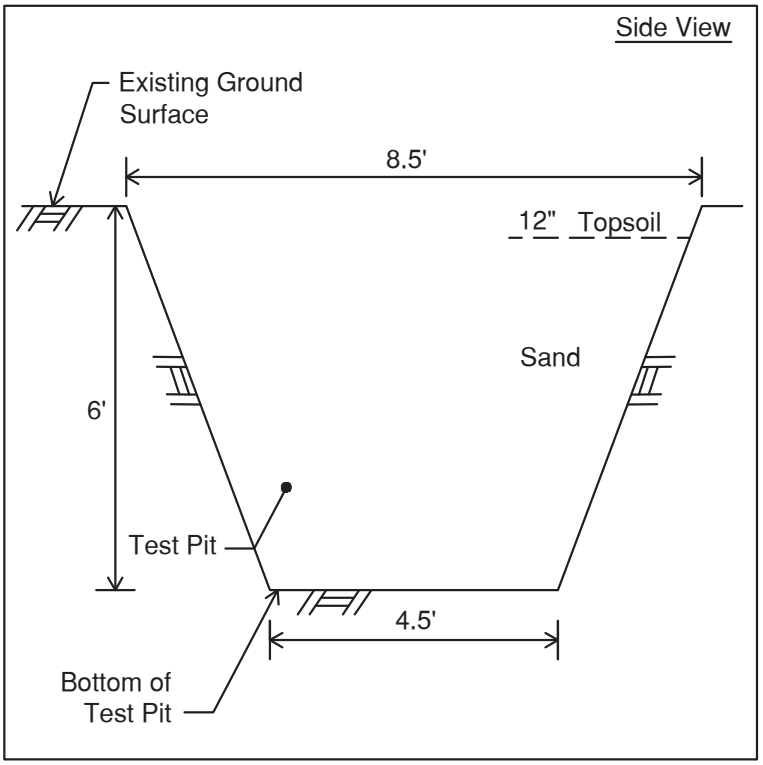
Depth Range	Field Description	Strata Changes
0' - 12"	Topsoil	12"
12" - 6'	Dry, brown, FINE SAND, trace inorganic silt.	6'

No water encountered.

Remarks:

SKETCHES





Remarks:

Test Pit Log

LAMSON ENGINEERING CORPORATION

437 Cherry Street, #109, Newton, Massachusetts 02465
Phone: (617) 558-0101 E-Mail: Lamsoneng@msn.com

Test Pit No. TP-3 | Page 1/1

Scale: -

City/Town: Wilmington	Bridge No.: -	Project File No.: 608051	Contract No.: -
Location: Route 38 (Main Street), Wilmington MA		Date & Time Started: 8/7/20 1:30 pm	Total Hours: 1.25
Coordinates: N 3,019,081 E 748,052	Ground Elev. (Feet): 88.5'	Date & Time Completed: 8/7/20 2:45 pm	
Drilling Company: New England Boring Contractors	Driller's Name: Manlea Thompson	Helper's Name: William Sebigny	
Inspector's Name: Weijie Dong	Equipment Type: Mini Excavator KX71-3		

INFORMATION LOG

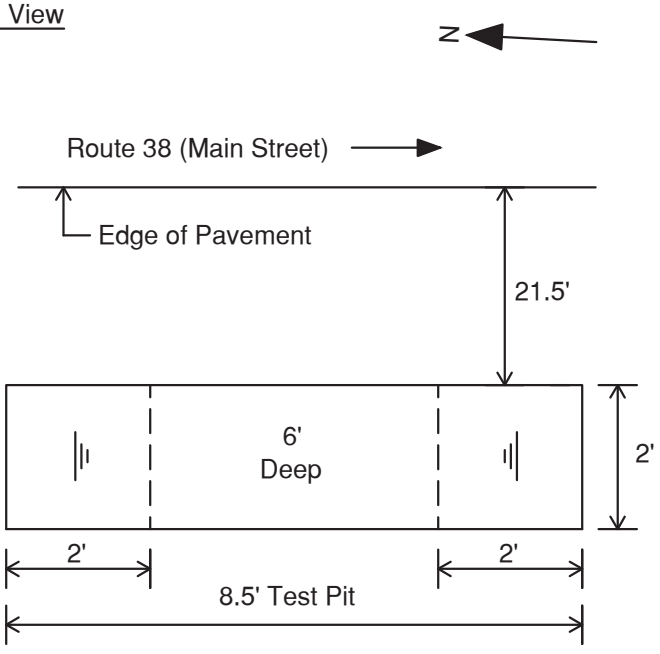
Depth Range	Field Description	Strata Changes
0' - 10"	Topsoil	10"
10" - 2'	Dry, gray, FINE SAND, trace fine gravel, trace inorganic silt.	2'
2' - 6'	Dry, brown, FINE SAND, some inorganic silt.	6'

No water encountered.

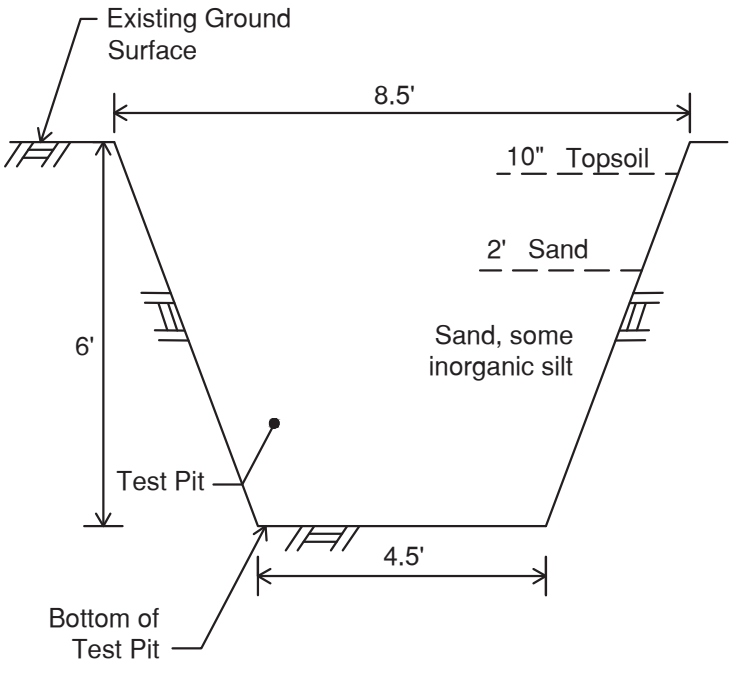
Remarks:

SKETCHES

Plan View



Side View



Remarks:

Test Pit Log

LAMSON ENGINEERING CORPORATION

437 Cherry Street, #109, Newton, Massachusetts 02465
Phone: (617) 558-0101 E-Mail: Lamsoneng@msn.com

Test Pit No. TP-4 | Page 1/1

Scale: -

City/Town: Wilmington	Bridge No.: -	Project File No.: 608051	Contract No.: -
Location: Route 38 (Main Street), Wilmington MA		Date & Time Started: 8/7/20 11:30 am	Total Hours: 1.5
Coordinates: N 3,016,081 E 747,790	Ground Elev. (Feet): 89.8'	Date & Time Completed: 8/7/20 1:00 pm	
Drilling Company: New England Boring Contractors	Driller's Name: Manlea Thompson	Helper's Name: William Sebigny	
Inspector's Name: Weijie Dong	Equipment Type: Mini Excavator KX71-3		

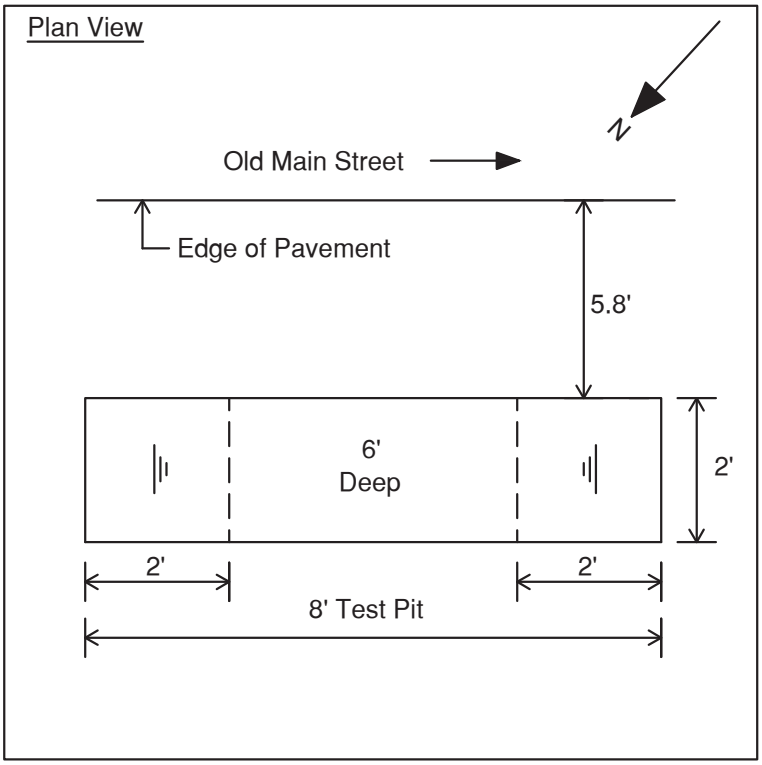
INFORMATION LOG

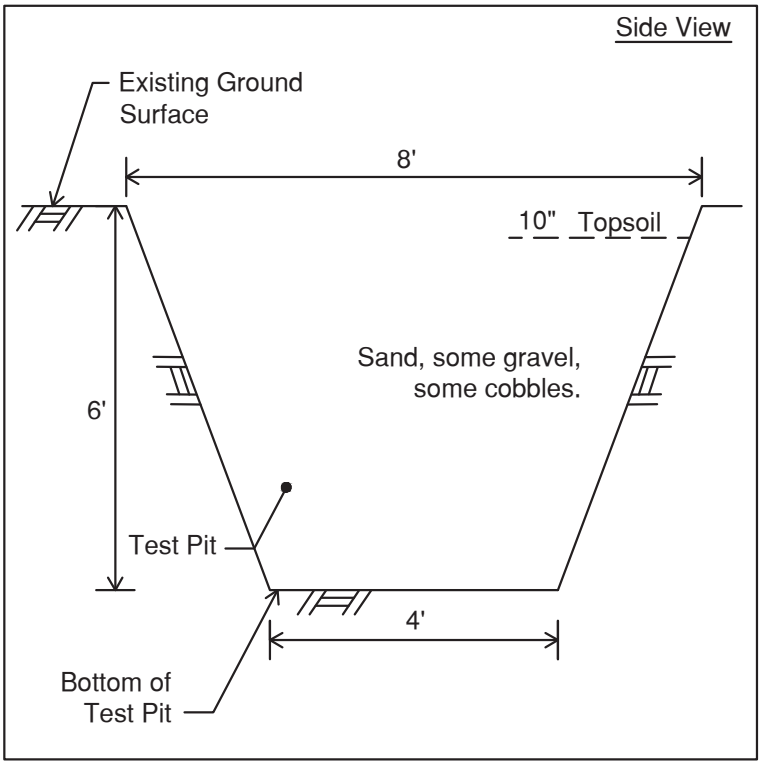
Depth Range	Field Description	Strata Changes
0' - 10"	Topsoil	10"
10" - 6'	Dry, brown, FINE SAND, some fine to coarse gravel, some cobbles, trace inorganic silt.	6'

No water encountered.

Remarks:

SKETCHES





Remarks:

Moving Massachusetts Forward massDOT Highway

Test Pit Log

LAMSON ENGINEERING CORPORATION
437 Cherry Street, #109, Newton, Massachusetts 02465
Phone: (617) 558-0101 E-Mail: Lamsoneng@msn.com

Test Pit No. TP-5 | Page 1/1

Scale: -

City/Town: Wilmington	Bridge No.: -	Project File No.: 608051	Contract No.: -
Location: Route 38 (Main Street), Wilmington MA		Date & Time Started: 8/7/20 9:45 am	Total Hours: 1.25
Coordinates: N 3,016,026 E 747,789	Ground Elev. (Feet): 90.5'	Date & Time Completed: 8/7/20 11:00 am	
Drilling Company: New England Boring Contractors	Driller's Name: Manlea Thompson	Helper's Name: William Sebigny	
Inspector's Name: Weijie Dong	Equipment Type: Mini Excavator KX71-3		

INFORMATION LOG

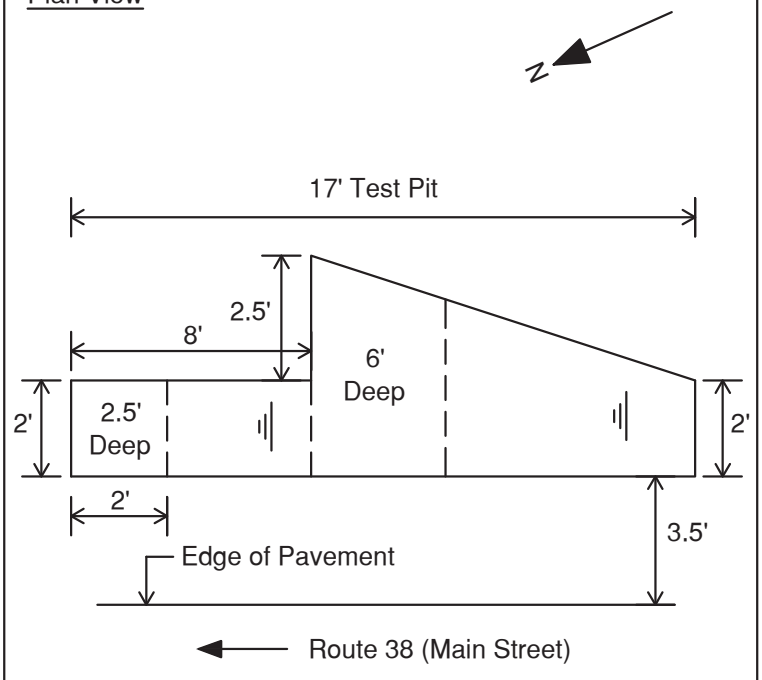
Depth Range	Field Description	Strata Changes
0' - 10"	Topsoil	10"
10" - 2'6"	Dry, brown, FINE SAND, some fine to coarse gravel, some cobbles, trace inorganic silt.	2'6"
2'6" - 6'	Dry, brown, FINE SAND, some fine to coarse gravel, some cobbles, some boulders, trace inorganic silt.	6'

No water encountered.

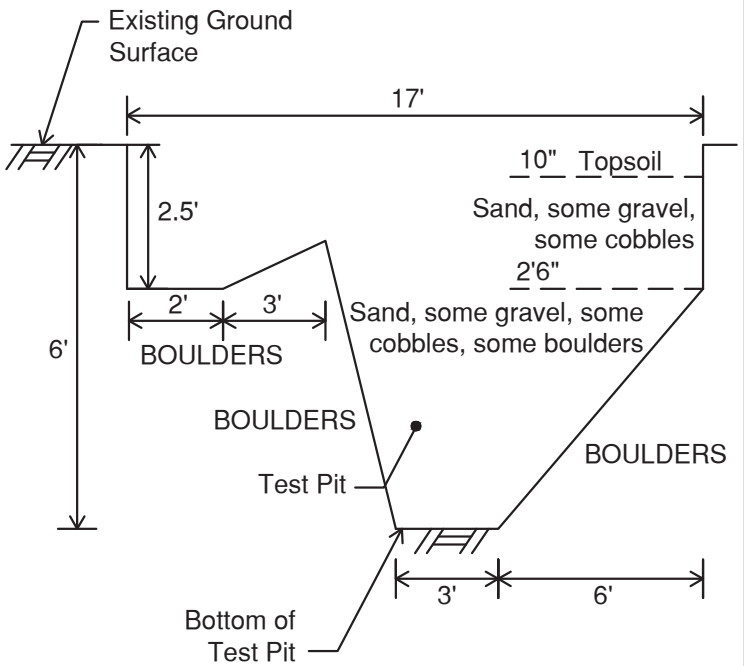
Remarks:

SKETCHES

Plan View



Side View



Remarks:

Moving Massachusetts Forward massDOT Highway

Test Pit Log

LAMSON ENGINEERING CORPORATION
437 Cherry Street, #109, Newton, Massachusetts 02465
Phone: (617) 558-0101 E-Mail: Lamsoneng@msn.com

Test Pit No. TP-6 | Page 1/1

Scale: -

City/Town: Wilmington	Bridge No.: -	Project File No.: 608051	Contract No.: -
Location: Route 38 (Main Street), Wilmington MA		Date & Time Started: 8/7/20 8:45 am	Total Hours: 0.75
Coordinates: N 3,015,297 E 748,175	Ground Elev. (Feet): 89.2'	Date & Time Completed: 8/7/20 9:30 am	
Drilling Company: New England Boring Contractors	Driller's Name: Manlea Thompson	Helper's Name: William Sebigny	
Inspector's Name: Weijie Dong	Equipment Type: Mini Excavator KX71-3		

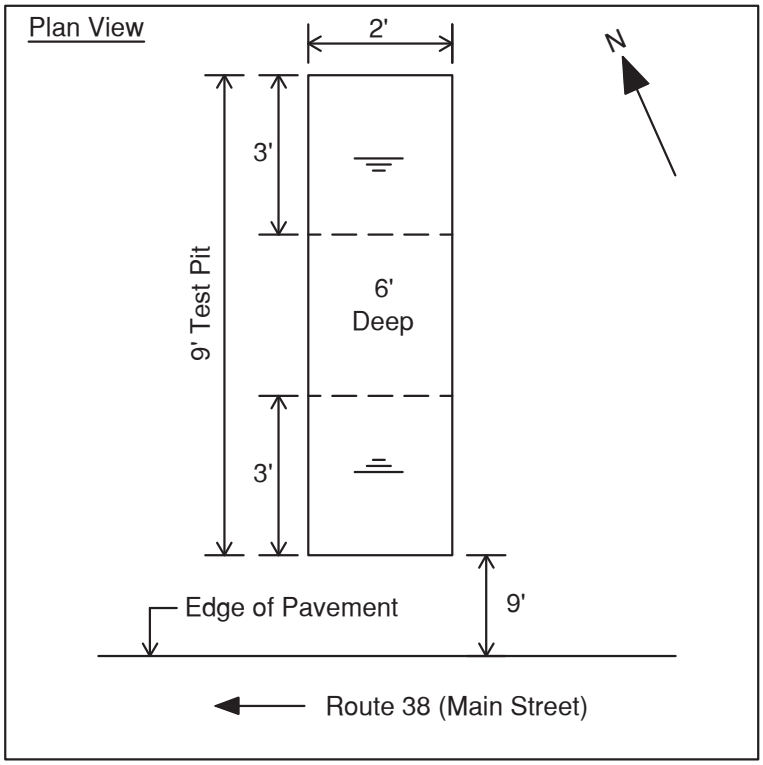
INFORMATION LOG

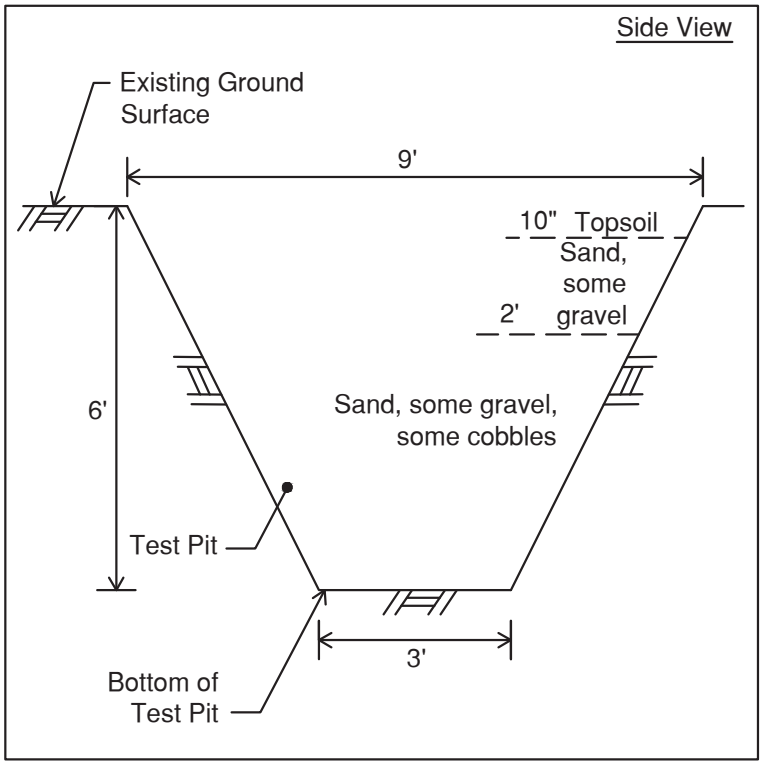
Depth Range	Field Description	Strata Changes
0' - 10"	Topsoil	10"
10" - 3'6"	Dry, brown, FINE TO COARSE SAND, some fine to coarse gravel, trace inorganic silt.	3'6"
3'6" - 6'	Dry, brown, FINE TO COARSE SAND, some fine to coarse gravel, some cobbles, trace inorganic silt.	6'

No water encountered.

Remarks:

SKETCHES





Remarks:

APPENDIX 4

Test Pit Lab Testing Results

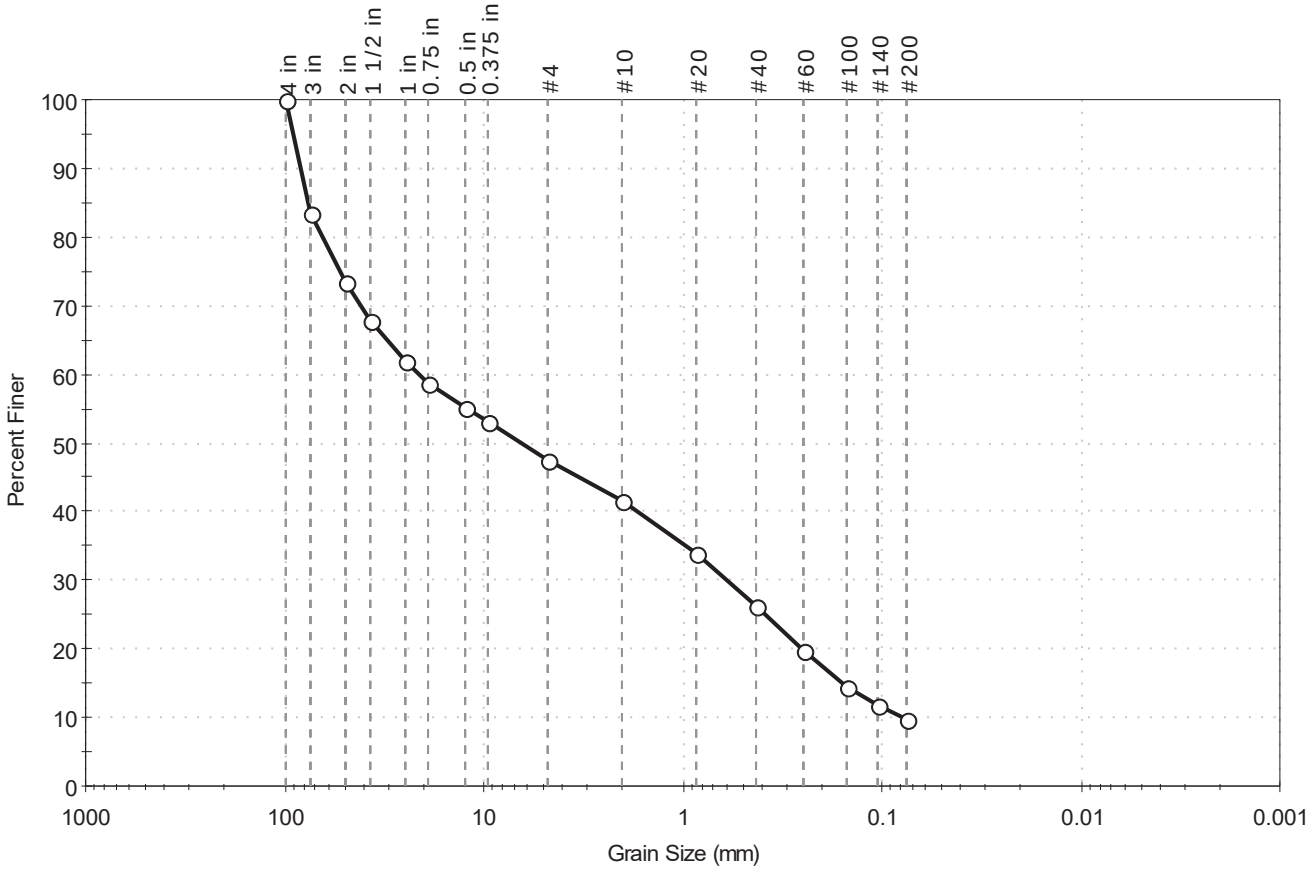
(6 Sheets)

Note:

- Soil samples (5-gal bucket) taken for testing are obtained from test pits TP-1 to TP-6.

Client:	Lamson Engineering Corporation				
Project:	Project File No. 608051				
Location:	Wilmington, MA			Project No:	GTX-312218
Boring ID:	---	Sample Type:	bucket	Tested By:	ckg
Sample ID:	TP-1	Test Date:	08/24/20	Checked By:	bfs
Depth :	1-4 ft	Test Id:	572208		
Test Comment:	---				
Visual Description:	Moist, olive brown sand with silt and gravel				
Sample Comment:	Sample contains asphalt				

Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
16.4	36.2	37.7	9.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
4 in	100.00	100		
3 in	75.00	84		
2 in	50.00	73		
1 1/2 in	37.50	68		
1 in	25.00	62		
0.75 in	19.00	59		
0.5 in	12.50	55		
0.375 in	9.50	53		
#4	4.75	47		
#10	2.00	42		
#20	0.85	34		
#40	0.42	26		
#60	0.25	20		
#100	0.15	14		
#140	0.11	12		
#200	0.075	9.7		

Coefficients

D_{85} = 76.8674 mm
D_{30} = 0.5903 mm
D_{60} = 21.3072 mm
D_{15} = 0.1595 mm
D_{50} = 6.5479 mm
D_{10} = 0.0795 mm
C_u = 268.015
C_c = 0.206

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-a (1))

Sample / Test Description

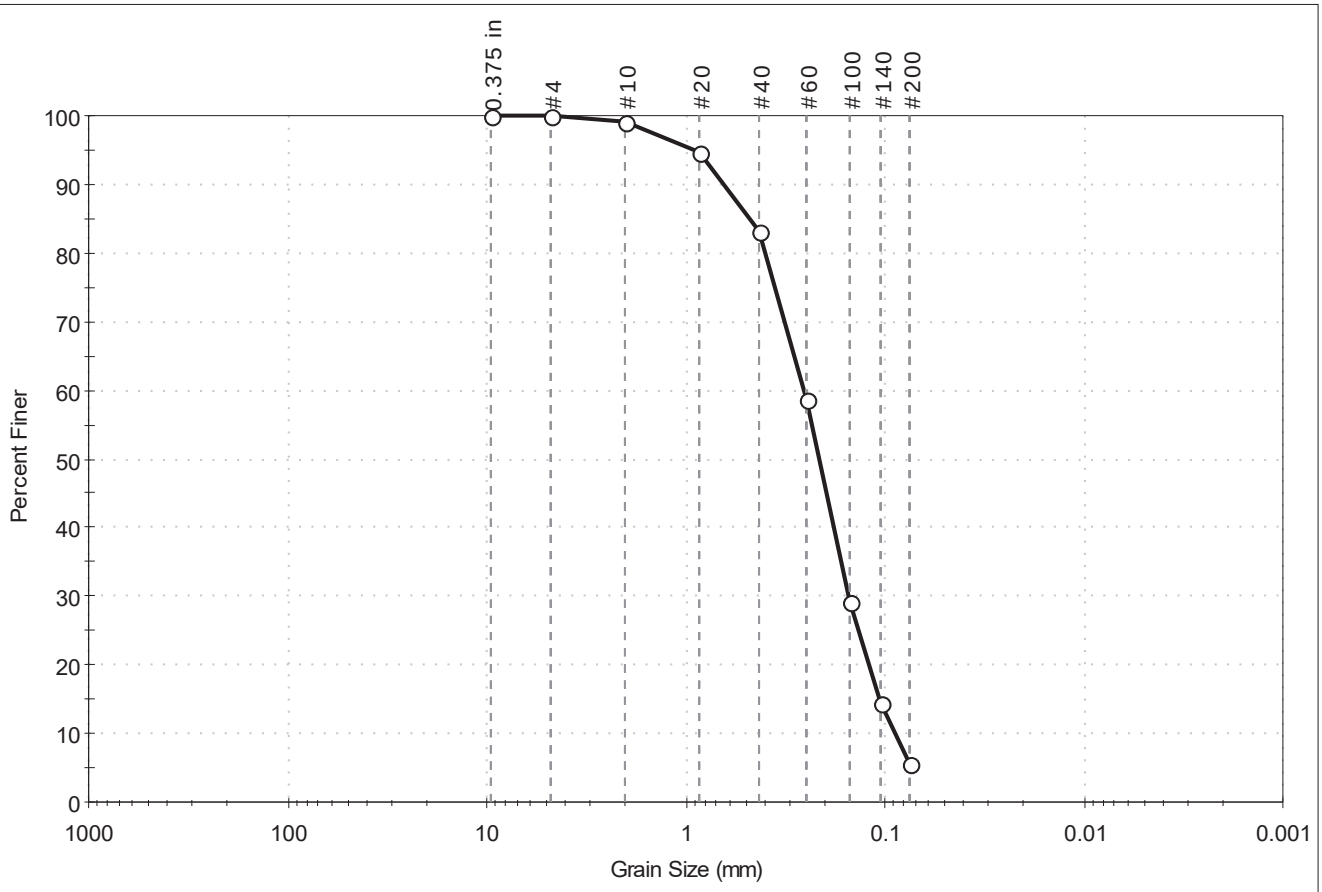
Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

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Client:	Lamson Engineering Corporation				
Project:	Project File No. 608051				
Location:	Wilmington, MA			Project No:	GTX-312218
Boring ID:	---	Sample Type:	bucket	Tested By:	ckg
Sample ID:	TP-2	Test Date:	08/19/20	Checked By:	bfs
Depth :	1-6 ft	Test Id:	572209		
Test Comment:	---				
Visual Description:	Moist, light yellowish brown sand with silt				
Sample Comment:	---				

Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	94.5	5.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	99		
#20	0.85	95		
#40	0.42	83		
#60	0.25	59		
#100	0.15	29		
#140	0.11	14		
#200	0.075	5.5		

Coefficients

D_{85} = 0.4756 mm D_{30} = 0.1521 mm
D_{60} = 0.2578 mm D_{15} = 0.1076 mm
D_{50} = 0.2154 mm D_{10} = 0.0895 mm
C_u = 2.880 C_c = 1.003

Classification

ASTM N/A

AASHTO Fine Sand (A-3 (1))

Sample / Test Description

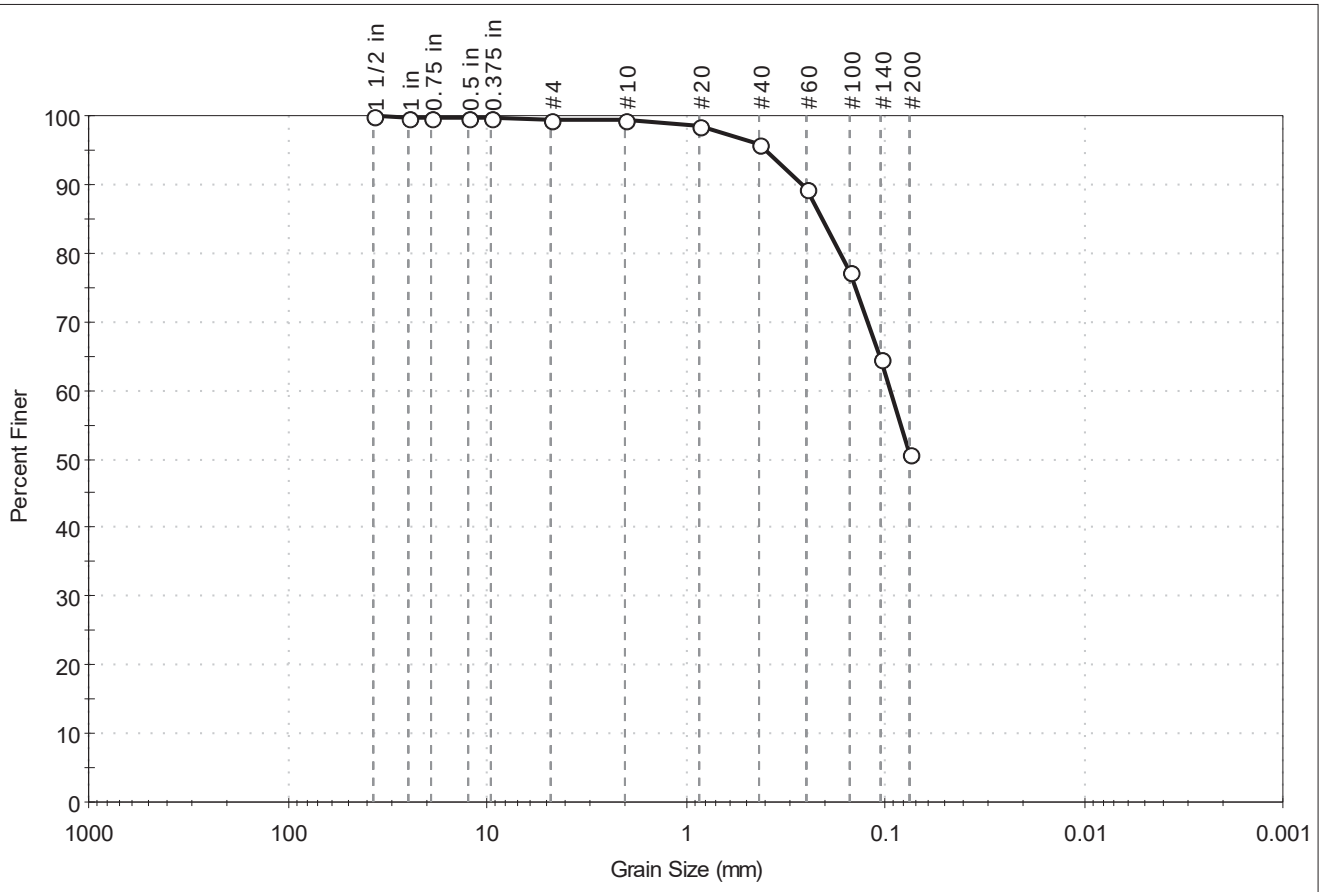
Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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Client:	Lamson Engineering Corporation				
Project:	Project File No. 608051				
Location:	Wilmington, MA			Project No:	GTX-312218
Boring ID:	---	Sample Type:	bucket	Tested By:	ckg
Sample ID:	TP-3	Test Date:	08/20/20	Checked By:	bfs
Depth :	1-6 ft	Test Id:	572210		
Test Comment:	---				
Visual Description:	Moist, light olive brown sandy silty clay				
Sample Comment:	---				

Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.4	48.8	50.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 1/2 in	37.50	100		
1 in	25.00	100		
0.75 in	19.00	100		
0.5 in	12.50	100		
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	99		
#20	0.85	99		
#40	0.42	96		
#60	0.25	90		
#100	0.15	77		
#140	0.11	64		
#200	0.075	51		

Coefficients

D_{85} = 0.2074 mm	D_{30} = N/A
D_{60} = 0.0947 mm	D_{15} = N/A
D_{50} = N/A	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample / Test Description

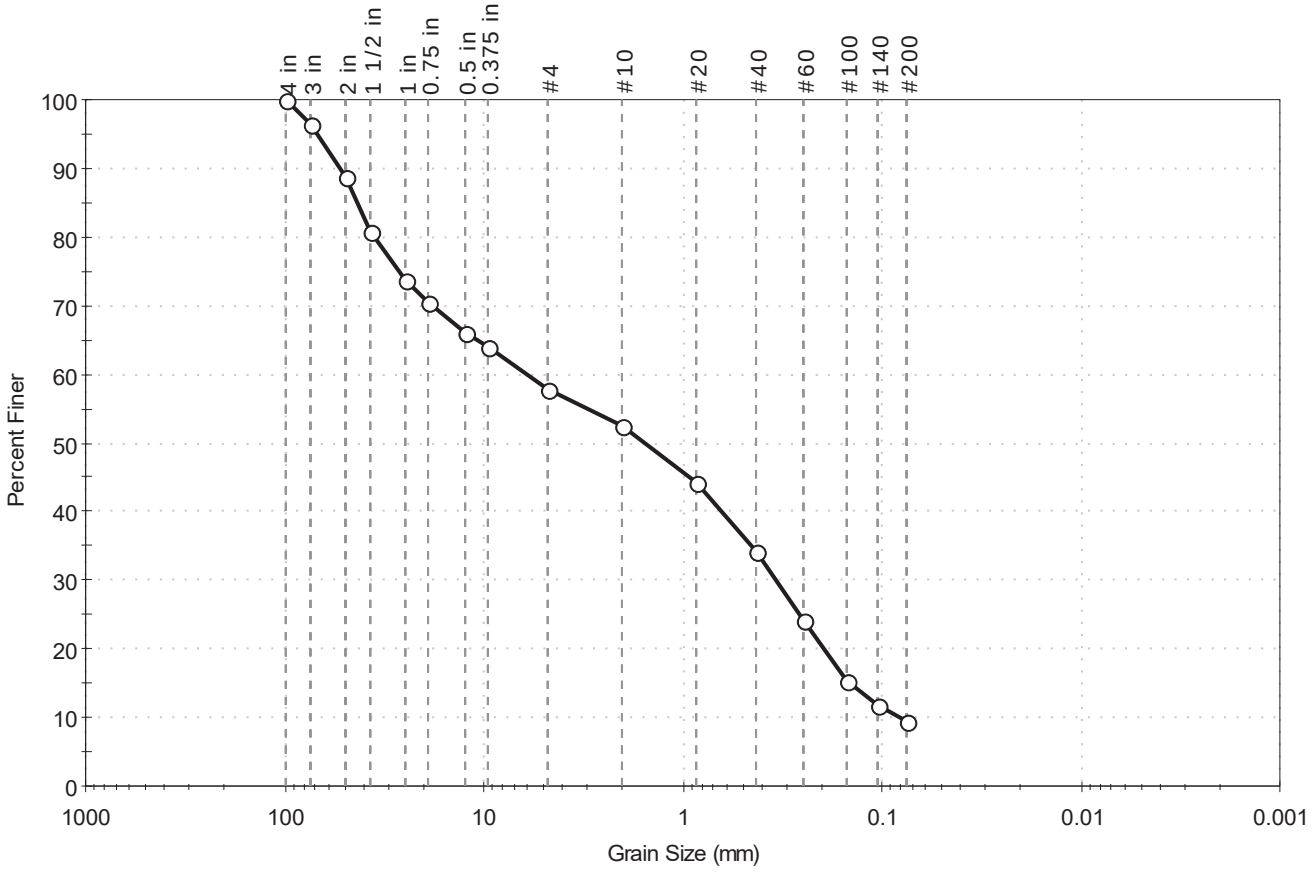
Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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Client:	Lamson Engineering Corporation				
Project:	Project File No. 608051				
Location:	Wilmington, MA			Project No:	GTX-312218
Boring ID:	---	Sample Type:	bucket	Tested By:	ckg
Sample ID:	TP-4	Test Date:	08/20/20	Checked By:	bfs
Depth :	1-6 ft	Test Id:	572211		
Test Comment:	---				
Visual Description:	Moist, dark olive brownsand with silt and gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
3.7	38.4	48.5	9.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
4 in	100.00	100		
3 in	75.00	96		
2 in	50.00	89		
1 1/2 in	37.50	81		
1 in	25.00	74		
0.75 in	19.00	70		
0.5 in	12.50	66		
0.375 in	9.50	64		
#4	4.75	58		
#10	2.00	53		
#20	0.85	44		
#40	0.42	34		
#60	0.25	24		
#100	0.15	15		
#140	0.11	12		
#200	0.075	9.4		

Coefficients

D_{85} = 43.6610 mm	D_{30} = 0.3384 mm
D_{60} = 6.0682 mm	D_{15} = 0.1447 mm
D_{50} = 1.5414 mm	D_{10} = 0.0814 mm
C_u = 74.548	C_c = 0.232

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (1))

Sample / Test Description

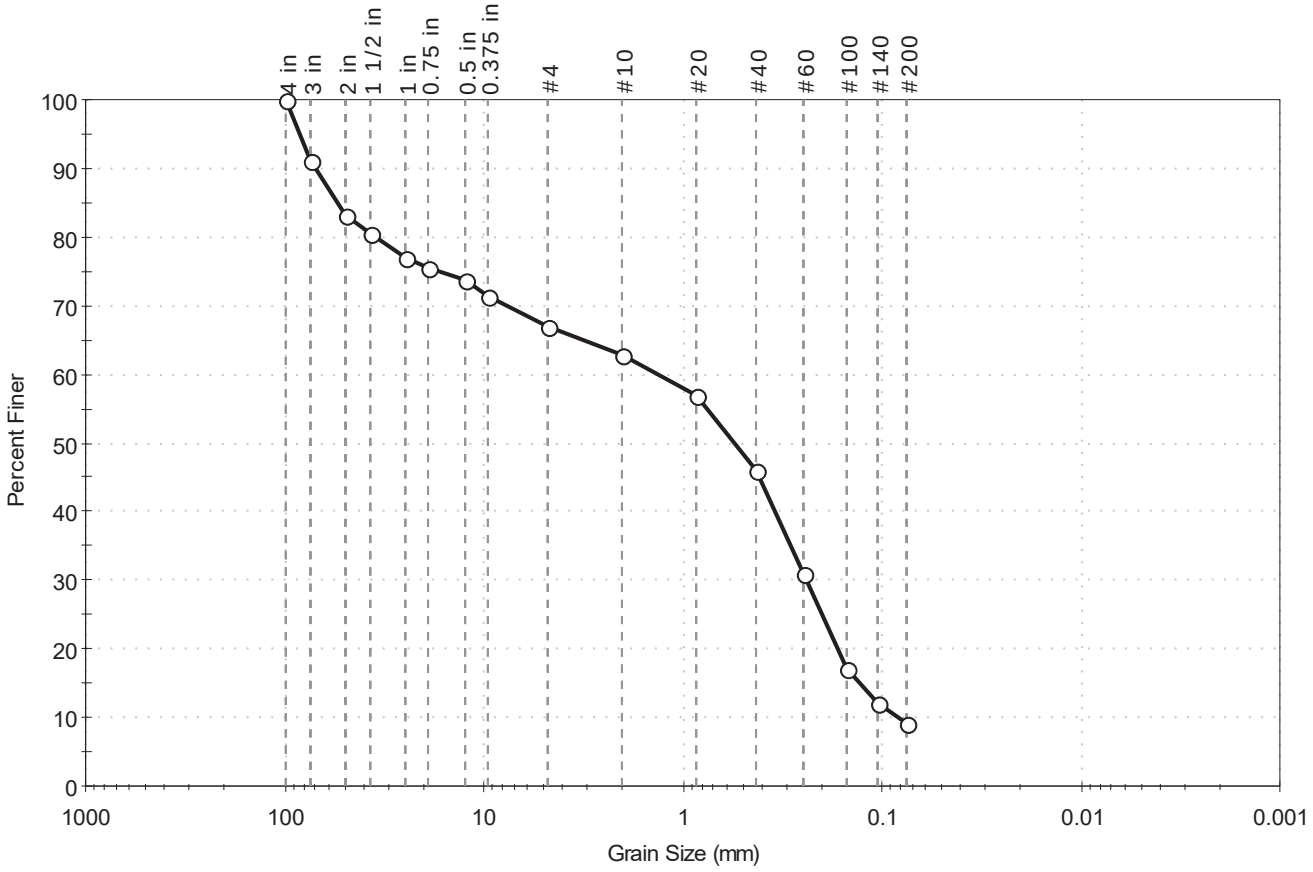
Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

printed 8/24/2020 1:15:56 PM

Client:	Lamson Engineering Corporation				
Project:	Project File No. 608051				
Location:	Wilmington, MA			Project No:	GTX-312218
Boring ID:	---	Sample Type:	bucket	Tested By:	ckg
Sample ID:	TP-5	Test Date:	08/20/20	Checked By:	bfs
Depth :	1-6 ft	Test Id:	572212		
Test Comment:	---				
Visual Description:	Moist, light yellowish brown sand with silt and gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
8.9	24.0	58.0	9.1

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
4 in	100.00	100		
3 in	75.00	91		
2 in	50.00	83		
1 1/2 in	37.50	81		
1 in	25.00	77		
0.75 in	19.00	76		
0.5 in	12.50	74		
0.375 in	9.50	71		
#4	4.75	67		
#10	2.00	63		
#20	0.85	57		
#40	0.42	46		
#60	0.25	31		
#100	0.15	17		
#140	0.11	12		
#200	0.075	9.1		

Coefficients

D_{85} = 54.9536 mm	D_{30} = 0.2403 mm
D_{60} = 1.3171 mm	D_{15} = 0.1293 mm
D_{50} = 0.5458 mm	D_{10} = 0.0835 mm
C_u = 15.774	C_c = 0.525

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (1))

Sample / Test Description

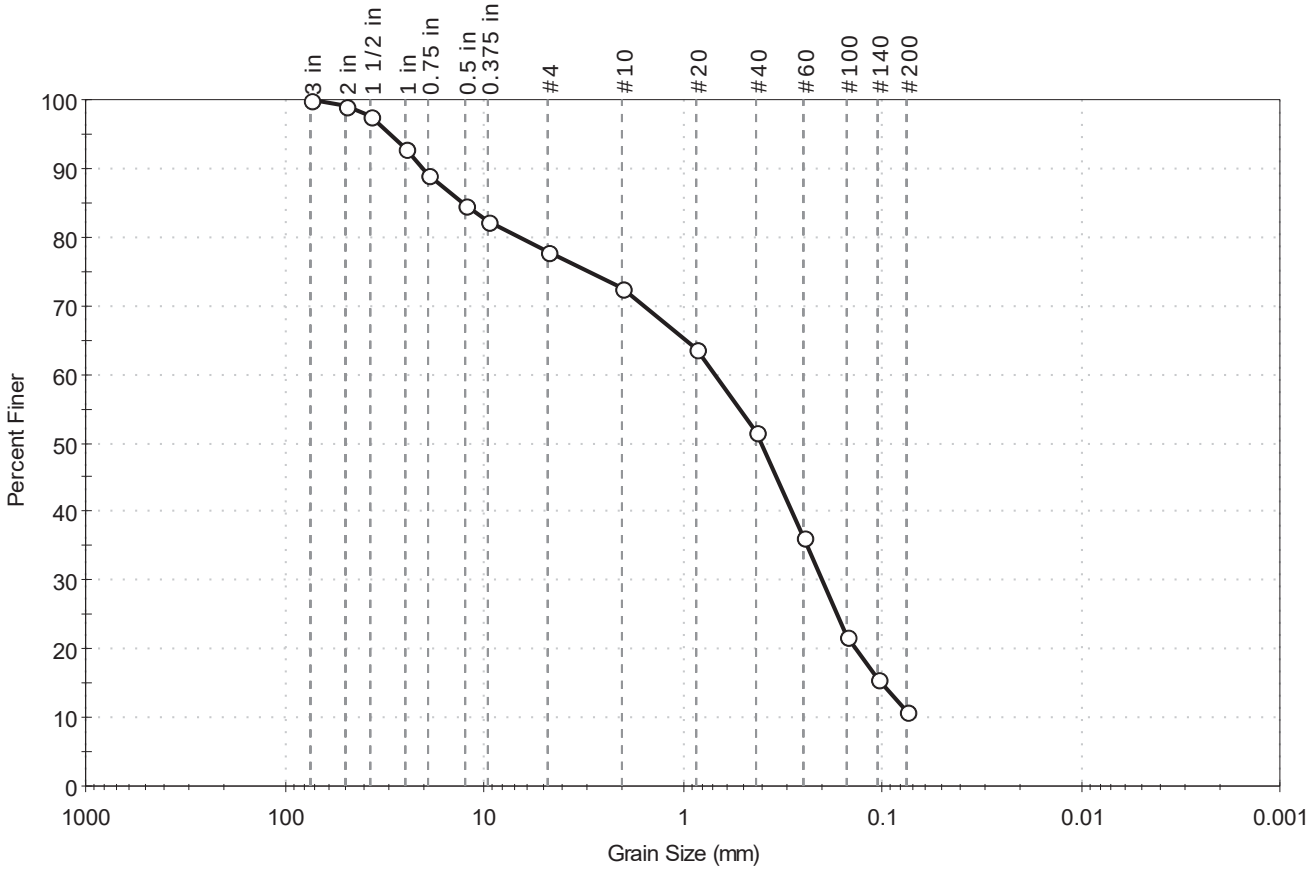
Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

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Client:	Lamson Engineering Corporation				
Project:	Project File No. 608051				
Location:	Wilmington, MA			Project No:	GTX-312218
Boring ID:	---	Sample Type:	bucket	Tested By:	ckg
Sample ID:	TP-6	Test Date:	08/20/20	Checked By:	bfs
Depth :	1-6 ft	Test Id:	572213		
Test Comment:	---				
Visual Description:	Moist, dark yellowish brown sand with silt and gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	22.1	66.9	11.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
3 in	75.00	100		
2 in	50.00	99		
1 1/2 in	37.50	98		
1 in	25.00	93		
0.75 in	19.00	89		
0.5 in	12.50	85		
0.375 in	9.50	82		
#4	4.75	78		
#10	2.00	72		
#20	0.85	64		
#40	0.42	52		
#60	0.25	36		
#100	0.15	22		
#140	0.11	16		
#200	0.075	11		

Coefficients

D_{85} = 12.7569 mm	D_{30} = 0.2005 mm
D_{60} = 0.6886 mm	D_{15} = 0.1019 mm
D_{50} = 0.4012 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

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WILMINGTON, MA
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	83	224
PROJECT FILE NO.	608051		

DRAINAGE & UTILITY PLANS - 8

HIGHWAY GUARD DETAILS	TRAFFIC SIGNAL CONDUIT	WATER SUPPLY ALTERATIONS	DRAINAGE DETAILS
NONE	SEE SHEET 106	SEE BELOW	SEE BELOW

LIMIT OF WOR□
END PA□EMENT MICROMILLING &
AND RESURFACING
STA. 40□00.00

END FULL DEPTH RECONSTRUCTION MATCH
STA. 40□25.00

N/F
THEODORA TRUST
PARCEL ID 40-13
BOOK 5492 PAGE 252

CROSS ST

PC 35.38

R&R-BO

100-FT WETLAND
BUFFER ZONE

PRC □93.04

N/F
XPEDX, LLC
PARCEL ID 40-13-A
BOOK 28324 PAGE 91

CROSS ST

SMH
RIM=97.24
INV.(A)=87.25
INV.(B)=87.30
SUMP=87.27

PT □28.52
PC □30.83

SMH
RIM=88.53
BOLTED SHUT,
INACCESSIBLE

PROP UP-BO

50-FT NO-BUILD
□ONE

PROP. CB (TYP.)

23 LF - 12" RCP

PROP. □GATE □AL□E AND BOX
CONNECT TO EXISTING 12" W

PROP. 1□8 BEND

PROP. 12" DIP WATER

PROP. □GATE □AL□E AND BOX

R&R-BO

ADJ-BO

PT □88.79

PROP. 12" DIP WATER

PROP. 12" P□C SEWER

241

42□06.10

242

243

244

245

246

50□00

76 LF - 12" RCP

ADJ

R&S

R&R

PROP. 1□8 BEND

PROP ROUTE 38 BASELINE

END OF
1910 LAYOUT

BEGINNING OF
1911 LAYOUT

R&R-BO

BEGINNING OF
1911 LAYOUT

END OF
1910 LAYOUT

ABANDON EXIST.
10" WATER MAIN

N/F
JOHN C. OLSON
PARCEL ID 39-14
BOOK 23310 PAGE 186

669 MAIN ST

N/F
PAC PROPERTIES, INC.
PARCEL ID 39-6
BOOK 6284 PAGE 161

668 MAIN ST

N/F
TOWN OF WILMINGTON
PARCEL ID 39-5
BOOK 26062 PAGE 215

9 CROSS ST

YENTILE FARM
RECREATIONAL FACILITY

CONTINUED ON
SHEET NO. 82

CONTINUED ON
SHEET NO. 84

TP # 1

BH # 1

PROP. OUTLET
CONTROL
STRUCTURE

POTENTIAL BMP
LOCATION

BUTTERS ROW

(1951 COUNTY LAYOUT - 40' WIDE)

2.5 STORY
VINYL

13 LF - 12" RCP

19 LF - 12" RCP

PROP. DMH
(TYP.)

PROP. FLARED END SECTION

22 LF - 12" RCP

PROP. WATER QUALITY STRUCTURE

15 LF - 12" RCP

11 LF - 12" RCP

PROP UP-BO

PT □89.54

PC 31.76

86 LF - 12" RCP

N/F
N MICA COMPANY, INC.
PARCEL ID 40-1
OK 1382 PAGE 448

635 MAIN ST

N/F
ANDREA J. DELUCA
PARCEL ID 39-16
BOOK 18231 PAGE 111

665 MAIN ST

N/F
CHRISTOPHER RICHARD
AND ERIN MILLS
PARCEL ID 39-15
BOOK 29429 PAGE 150

669 MAIN ST

CONTINUED
RIGHT

CONTINUED
LEFT

PC 39.35

PT □84.62

END FULL DEPTH RECONSTRUCTION
STA. 53□00.00

LIMIT OF WOR□
END PA□EMENT MICROMILLING
AND RESURFACING
STA. 53□15.00

53+23.11

TP = TEST PIT

0 20 50 100
SCALE: 1" = 20'

608051_UT01(DRAINAGE-UTILITY-PLANS).DWG Plotted on 25-Oct-2017 9:51 AM

Proposal No. 608051 - 132406

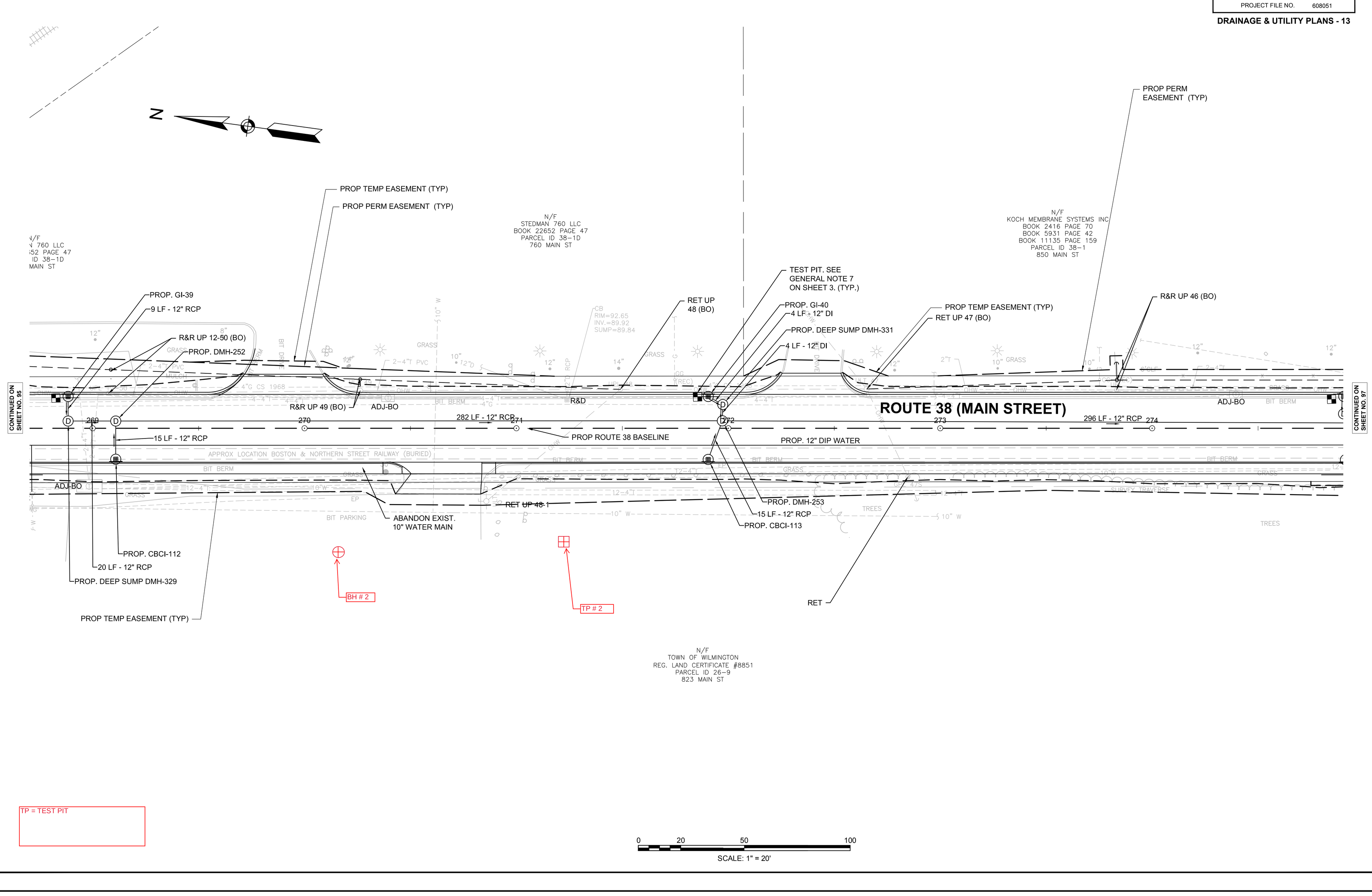
A00860 - 289

WILMINGTON, MA
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	96	260
PROJECT FILE NO.	608051		

DRAINAGE & UTILITY PLANS - 13

HIGHWAY GUARD DETAILS	TRAFFIC SIGNAL CONDUIT	WATER SUPPLY ALTERATIONS	DRAINAGE DETAILS
NONE	NONE	SEE BELOW	SEE BELOW



608051_UT01(DRAINAGE-UTILITY-PLANS).DWG Plotted on 1-Oct-2019 5:09 PM

Proposal No. 608051 - 132406

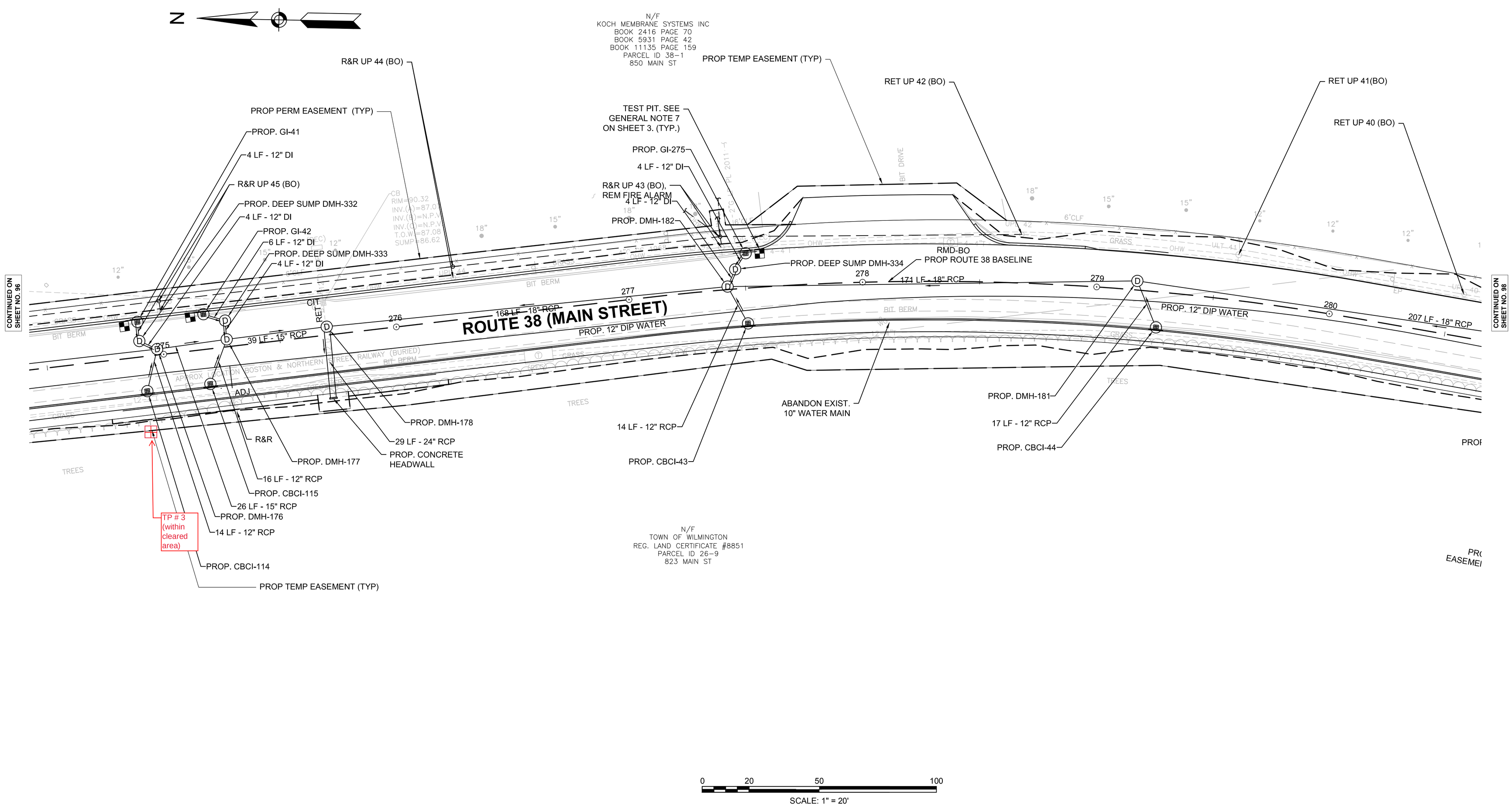
A008(6) - 290

WILMINGTON, MA
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	97	260
PROJECT FILE NO.		608051	

DRAINAGE & UTILITY PLANS - 14

HIGHWAY GUARD DETAILS	TRAFFIC SIGNAL CONDUIT	WATER SUPPLY ALTERATIONS	DRAINAGE DETAILS
NONE	NONE	SEE BELOW	SEE BELOW



608051_UT01(DRAINAGE-UTILITY-PLANS).DWG Plotted on 8-Oct-2019 4:23 PM
Proposal No. 608051 - 132406
A008360 - 291

WILMINGTON, MA
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	94	224
PROJECT FILE NO.	608051		

DRAINAGE & UTILITY PLANS - 19

HIGHWAY GUARD DETAILS
NONE

TRAFFIC SIGNAL CONDUIT
NONE

WATER SUPPLY ALTERATIONS
SEE BELOW

DRAINAGE DETAILS
SEE BELOW

CONTINUED ON SHEET NO. 93

CONTINUED ON SHEET NO. 95

N

WOODWARD AVENUE
(PAPER STREET)

COOK AVENUE
(PUBLIC)

CENTRAL AVENUE
(PAPER STREET)

OLD MAIN STREET
(PRIVATE)

N/F
FRANK INGRAM AND
KATHLEEN M. SUPRENANT
BOOK 5427 PAGE 224
PARCEL ID 24-72A
1A COOK AVE

N/F
BOSTON EDISON COMPANY
BOOK 1490 PAGE 211
PARCEL ID 24-81B
910 MAIN ST

N/F
TOWN OF WILMINGTON
BOOK XX PAGE XX
PARCEL ID 24-81A
MAIN ST

N/F
904 MAIN STREET REALTY CO LLC
BOOK 18278 PAGE 139
PARCEL ID 24-33
904 MAIN ST

N/F
TOWN OF WILMINGTON
BOOK XX PAGE XX
PARCEL ID 24-78
WOODWARD AVE

N/F
TOWN OF WILMINGTON
BOOK 1431 PAGE 460
PARCEL ID 24-80
MAIN ST

N/F
TAM DEVELOPMENT CORPORATION
BOOK 11130 PAGE 74
PARCEL ID 25-1A
925 MAIN ST

N/F
BOSTON EDISON COMPANY
BOOK 1474 PAGE 362
PARCEL ID 25-1B
927 MAIN ST

N/F
JONATHAN F. LAROCK
AND SONIA SERRAO
BOOK 19052 PAGE 266
PARCEL ID 25-5
905 MAIN ST

N/F
M.T. POKKET REALTY TRUST,
ROBERT P. AUTENZIO JR TRUSTEE
BOOK 21081 PAGE 87
PARCEL ID 25-4
911 MAIN ST

N/F
RAYMOND LEPORE
REG. LAND CERTIFICATE#32201
PARCEL ID 25-3
919 MAIN ST

171 LF

PROP. CB (TYP.)
6 LF - 12" RCP
5 LF - 12" RCP
PROP. DMH (TYP.)
R&R-BO
180 LF - 12" RCP
16 LF - 12" RCP
176 LF - 15" RCP
PROP ROUTE 38 BASELINE
18 LF - 12" RCP
7 LF - 24" RCP
PROP. CONCRETE HEADWALL
4 LF - 12" RCP
50-FT NO-BUILD ZONE
15-FT NO-DISTURB ZONE
100-FT WETLAND BUFFER ZONE
POTENTIAL BMP LOCATION
LINE OF 1928 DISCONTINUANCE
TP # 4
TP # 5
71+90.70
71+03.08
PC 34.24
END FULL DEPTH RECONSTRUCTION
STA. 71+33.00
LIMIT OF WORK
END PAVEMENT MICROMILLING AND RESURFACING
STA. 71+18.00
END FULL DEPTH RECONSTRUCTION
LIMIT OF WORK
END PAVEMENT MICROMILLING AND RESURFACING

304 305 306 307 308 309

TP = TEST PIT

0 20 50 100
SCALE: 1" = 20'

608051_UT01(DRAINAGE-UTILITY-PLANS).DWG Plotted on 24-Oct-2017 10:46 AM

Proposal No. 608051 - 132406

A008860 - 292

WILMINGTON, MA
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	95	224
PROJECT FILE NO.	608051		

DRAINAGE & UTILITY PLANS - 20

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

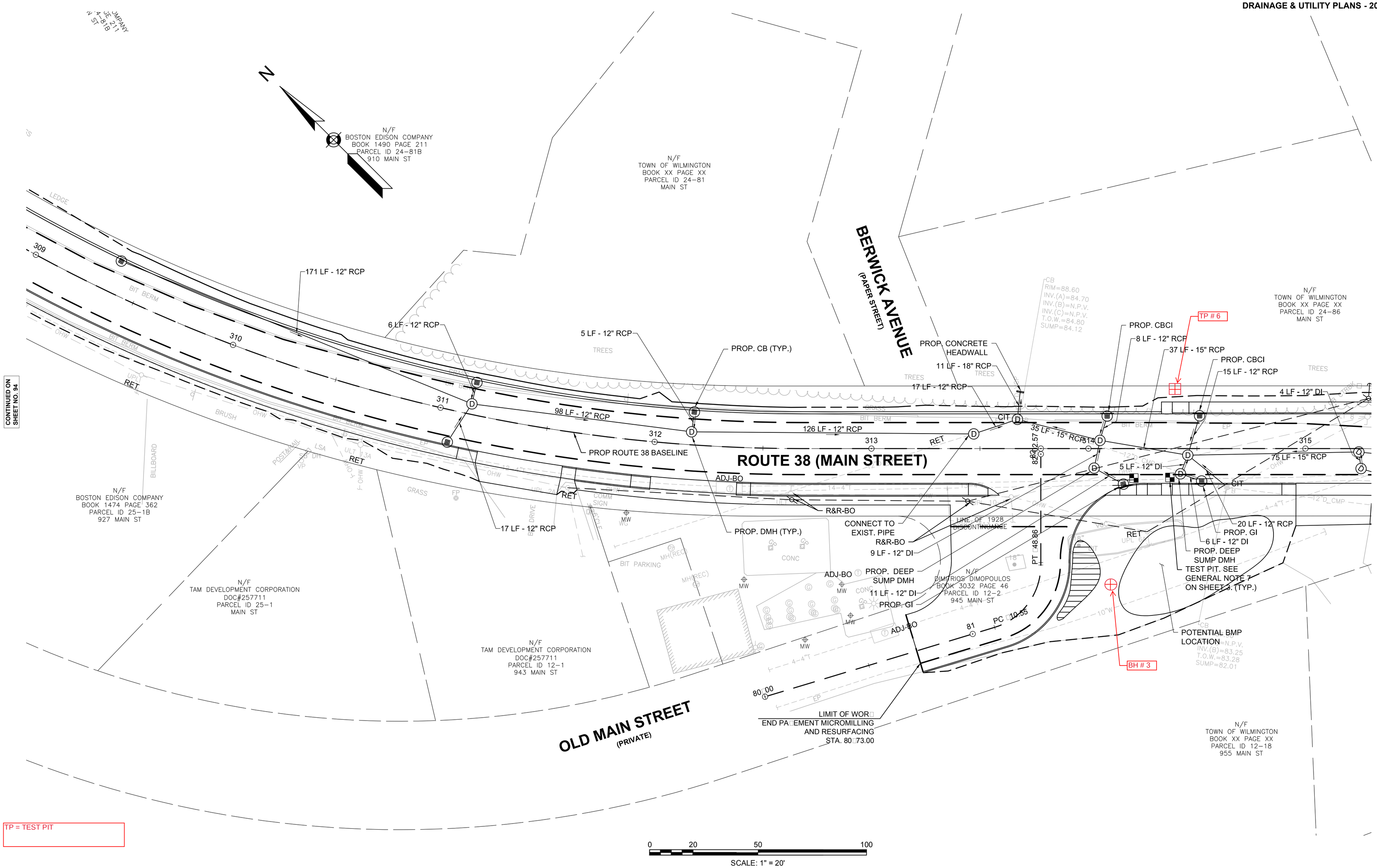
NONE

WATER SUPPLY ALTERATIONS

SEE BELOW

DRAINAGE DETAILS

SEE BELOW



608051_UT01(DRAINAGE-UTILITY-PLANS).DWG Plotted on 24-Oct-2017 10:46 AM
Proposal No. 608051 - 132406
A000600 - 293

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' National North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Massachusetts State Plane Mainland zone (FIPSZONE 2001), meters. The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was provided in digital format by the Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Energy and Environmental Affairs. This information was derived from digital orthophotos produced at a scale of 1:5,000 from aerial photography dated April 2005.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

- A — A — Cross section line
- 23 — — — 23 — Transect line
- 87°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 2676000mN — 1000-meter Universal Transverse Mercator grid values, zone 19
- 600000 FT — 5000-foot grid values: Massachusetts State Plane coordinate system, Mainland zone (FIPSZONE 2001), Lambert Conformal Conic projection
- DX5510 × — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- ● M1.5 — River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
June 4, 2010

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0291E

FIRM
FLOOD INSURANCE RATE MAP

MIDDLESEX COUNTY, MASSACHUSETTS
(ALL JURISDICTIONS)

PANEL 291 OF 656
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
WILMINGTON, TOWN OF	250227	0291	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
25017C0291E

EFFECTIVE DATE
JUNE 4, 2010

Federal Emergency Management Agency

MAP NUMBER 25017C0291E - 294 - EFFECTIVE DATE JUNE 4, 2010
Proposal No. 08051 - 13246

Appendix C: Supporting Calculations

- Recharge Volume Calculations
- Water Quality Calculations
- TSS Removal Calculations
- Pretreatment Calculations
- HydroCAD Storage Tables
- ADS Cumulatrive Storage Volumes
- Outlet Protection Design Calculations

Green International Affiliates, Inc.
100 Ames Pond Drive, Suite 200 Tewksbury, MA 01876
T: (978) 923-0400 | www.greenintl.com

RECHARGE VOLUME CALCULATIONS

Date: January 14, 2025
Revised:
Project: Reconstruction on Route 38 (Main Street) from Route 62 to the Woburn City Line
Project No: 13033.19 #608051
Location: Wilmington, MA

Prepared By: BV
Checked By: JT

Recharge Volume Design

Objective: Size infiltration SCMs that will approximate the annual recharge from the existing. This project is a redevelopment and is required to meet this Standard (3) to the maximum extent practicable.

Methodology: MA Department of Environmental Protection (DEP) Massachusetts Stormwater Handbook (Vol.3, Ch.1)

Design Criteria:

The required recharge volume equals a depth of runoff corresponding to the soil type times the net increase in impervious areas covering that soil type at the post-development site.

Based on the Site Hydrologic Soil Group:

Hydrologic Soil Gro	Soil Texture	Target Depth Factor (F)
A	Sand	0.60 inches
B	Loam	0.35 inches
C	Silty Loam	0.25 inches
D	Clay	0.10 inches

The soils are defined by the Soil Conservation Services (SCS) Soil Survey of Suffolk County of Massachusetts.

Required Drawdown Time: Maximum of 72 Hours using the following equation:

$$\text{Drawdown Time} = \frac{R_v}{(K x A_{Bot})}$$

R_v = Required Recharge Volume
K = Permeability Rate
A_{Bot} = Bottom area of basin

Calculation Results:

Designation	Volume Required Total (cf)	Volume Required Net (cf)	Volume Provided (cf)
For Entire Project Site	**28,175**	**2,990**	**6,919**

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Recharge Volume Calculations

Required: **Recharge Required based on Total Impervious Area within LOW**

Hydrologic Soil Group	Proposed Impervious Area (sf)*	Target Depth	Volume Required (cf)
A	562,704	0.60	28,135
B	0	0.35	0
C	0	0.25	0
D	4,728	0.10	39
Total	567,432		**28,175**

* The existing impervious area is 506,710 sf within the LOW, so there is a net increase of 60,722 sf.

Required: **Recharge Required based on Net Impervious Area within LOW**

Hydrologic Soil Group	Net Impervious Area (sf)*	Target Depth	Volume Required (cf)
A	59,623	0.60	2,981
B	0	0.35	0
C	0	0.25	0
D	1,099	0.10	9
Total	60,722		**2,990**

Provided: **Sum of BMP's**
METHOD USED: STATIC

R_v = combined storage below lowest outlets for all BMP's = **6,919** cf

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RECHARGE VOLUME CALCULATIONS

Date: January 14, 2025
Revised:
Project: Reconstruction on Route 38 (Main Street) from Route 62 to the Woburn City Line
Project No: 13033.19 #608051
Location: Wilmington, MA - SCM1 (Dog Park parking lot)

Prepared By: AKM/BV
Checked By: JT

Recharge Volume Design

Objective: Size infiltration SCMs that will approximate the annual recharge from the existing conditions.

Methodology: MA Department of Environmental Protection (DEP) Massachusetts Stormwater Handbook (Vol.3, Ch.1)

Design Criteria:

The required recharge volume equals a depth of runoff corresponding to the soil type times the increase in impervious areas covering that soil type at the post-development site.

Based on the Site Hydrologic Soil Group:

Hydrologic Soil Group	Soil Texture	Target Depth Factor (F)
A	Sand	0.60 inches
B	Loam	0.35 inches
C	Silty Loam	0.25 inches
D	Clay	0.10 inches

The soils are defined by the Soil Conservation Services (SCS) Soil Survey of Middlesex County of Massachusetts. This watershed is comprised of 'A' soils.

Required Drawdown Time: Maximum of 72 Hours using the following equation:

$$\text{Drawdown Time} = \frac{R_v}{(K x A_{Bot})}$$

R_v = Required Recharge Volume
K = Permeability
A_{Bot} = Bottom area of basin

Calculation Results:

Designation	Volume Required (cf)	Volume Provided (cf)
Subsurface Infiltration System	**1,167**	**3,511**

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Recharge Volume Required: **Total Recharge Required**

Hydrologic Soil Group	Proposed Impervious Area* (sf)	Target Depth	Volume Required (cf)
A	23,330	0.60	1,167
B	0	0.35	0
C	0	0.25	0
D	0	0.10	0
Total	23,330		**1,167**

Recharge Volume Provided:

METHOD USED: STATIC

Drainage Area to Subsurface Infiltration Chamber

R_v = storage below lowest outlet (orifice) = **3,511** cf (Elev. 88.00, see

A_{Bot} = bottom area (L x W) = 3,941 sf HydroCAD table)

R_v cf	K * in/hr	A_{Bot} sf	Drawdown Time Hours		
3,511	0.27	3,941	**39.60**	**<**	**72 Hours**

*Catchment is HSG A. Chambers are in HSG C per NRCS. Test pits indicate A soils. To be conservative C-Soil infiltration rate per RAWLS was used

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RECHARGE VOLUME CALCULATIONS

Date: January 14, 2025
Revised:
Project: Reconstruction on Route 38 (Main Street) from Route 62 to the Woburn City Line
Project No: 13033.19 #608051
Location: Wilmington, MA - SCM2 (North end of Old Main Street)

Prepared By: AKM/BV
Checked By: JT

Recharge Volume Design

Objective: Size infiltration SCMs that will approximate the annual recharge from the existing conditions.

Methodology: MA Department of Environmental Protection (DEP) Massachusetts Stormwater Handbook (Vol.3, Ch.1)

Design Criteria:

The required recharge volume equals a depth of runoff corresponding to the soil type times the increase in impervious areas covering that soil type at the post-development site.

Based on the Site Hydrologic Soil Group:

Hydrologic Soil Group	Soil Texture	Target Depth Factor (F)
A	Sand	0.60 inches
B	Loam	0.35 inches
C	Silty Loam	0.25 inches
D	Clay	0.10 inches

The soils are defined by the Soil Conservation Services (SCS) Soil Survey of Middlesex County of Massachusetts. This watershed is comprised of 'A' soils.

Required Drawdown Tim Maximum of 72 Hours using the following equation:

$$\text{Drawdown Time} = \frac{R_v}{(K x A_{Bot})}$$

R_v = Required Recharge Volume
K = Permeability Rate
A_{Bot} = Bottom area of basin

Calculation Results:

Designation	Volume Required (cf)	Volume Provided (cf)
Surface Infiltration Basin	**462**	**955**

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Recharge Volume

Required: **Total Recharge Required**

Hydrologic Soil Group	Proposed Impervious Area (sf)	Target Depth	Volume Required (cf)
A	9,233	0.60	462
B	0	0.35	0
C	0	0.25	0
D	0	0.10	0
Total	9,233		462

Recharge Volume

Provided: **METHOD USED:** STATIC

Drainage Area to Surface Infiltration Basin

R_v = storage below lowest outlet (orifice) = **955** cf (Elev. 86.70, see HydroCAD table)

A_{Bot} = bottom area (irregular) = 235 sf

R_v cf	K in/hr	A_{Bot} sf	Drawdown Time Hours		
955	2.41	235	**20.23**	**<**	**72 Hours**

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RECHARGE VOLUME CALCULATIONS

Date: January 14, 2025
Revised:
Project: Reconstruction on Route 38 (Main Street) from Route 62 to the Woburn City Line
Project No: 13033.19 #608051
Location: Wilmington, MA - SCM3 (South End of Old Main Street)

Prepared By: AKM/BV
Checked By: JT

Recharge Volume Design

Objective: Size infiltration SCMs that will approximate the annual recharge from the existing conditions.

Methodology: MA Department of Environmental Protection (DEP) Massachusetts Stormwater Handbook (Vol.3, Ch.1)

Design Criteria:

The required recharge volume equals a depth of runoff corresponding to the soil type times the increase in impervious areas covering that soil type at the post-development site.

Based on the Site Hydrologic Soil Group:

Hydrologic Soil Group	Soil Texture	Target Depth Factor (F)
A	Sand	0.60 inches
B	Loam	0.35 inches
C	Silty Loam	0.25 inches
D	Clay	0.10 inches

The soils are defined by the Soil Conservation Services (SCS) Soil Survey of Middlesex County of Massachusetts. The site is comprised of 'C' soils.

Required Drawdown Time: Maximum of 72 Hours using the following equation:

$$\text{Drawdown Time} = \frac{R_v}{(KxA_{Bot})}$$

R_v = Required Recharge Volume
K = Permeability
A_{Bot} = Bottom area of basin

Calculation Results:

Designation	Volume Required (cf)	Volume Provided (cf)
Subsurface Infiltration System	**260**	**2,453**

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Recharge Volume

Required: **Total Recharge Required**

Hydrologic Soil Group	Proposed Impervious Area (sf)	Target Depth	Volume Required (cf)
A	0	0.60	0
B	0	0.35	0
C	12,491	0.25	260
D	0	0.10	0
Total	12,491		260

Recharge Volume

Provided: **METHOD USED:** STATIC

Infiltration System

Drainage Area to Subsurface infiltration Basin

R_v = storage below lowest outlet (orifice) = **2,453** cf (Elev.83.94 see HydroCAD table)

A_{Bot} = bottom area (L x W) = 3,740 sf

R_v cf	K in/hr	A_{Bot} sf	Drawdown Time Hours		
2,453	0.27	3,740	**29.15**	**<**	**72 Hours**

*Catchment is HSG A and C. Chambers are near HSG C per NRCS. Test pits indicate A soils. To be conservative C-Soil infiltration rate per RAWLS was used

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WATER QUALITY CALCULATIONS

Date: January 14, 2025
Revised:
Project: Reconstruction on Route 38 (Main Street) from Route 62 to the Woburn City Line
Project No: 13033.19 #608051
Location: Wilmington, MA - SCM1 (Dog Park parking lot)

Prepared By: BV
Checked By: JT

Objective: To determine the required Water Quality Volume (WQV) for adaqute stormwater treatment. This project is a redevelopment and is required to meet this Standard (4) to the maximum extent practicable.

Methodology: MA Department of Environmental Protection (DEP) Stormwater Management (Vol. 3, Ch. 1)

Design Criteria: Volume to be treated =1.0" x Post Development Impervious Area

Critical Areas (include ORW, ACEC, recharge areas for public water supplies (Zone Is, Zone IIs and Interim Wellhead Protection Areas for ground water sources and Zone As for surface water sources), bathing beaches, cold water fisheries, shellfish growing areas and LUHPPL's

Volume to be treated = 1.0" x Post Development Impervious Area

All WQ calculations use 1" since the site is located within a Zone II

Calculation results:

Designation	Volume Required (cf)	Volume Provided (cf)
Subsurface Infiltration System	**1,944**	**3,511**

Volume to be Treated:

Drainage to SCM1

Total Proposed Impervious Area: **23,330** sf
Total Volume to be treated: **1,944 cf**

Volume Provided:

Drainage to SCM1

WQ_v = storage below lowest outlet (bypass) = **3,511 cf** (Elev. 88.00, see HydroCAD

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WATER QUALITY CALCULATIONS

Date: January 14, 2025
Revised:
Project: Reconstruction on Route 38 (Main Street) from Route 62 to the Woburn City Li
Project No: 13033.19 #608051
Location: Wilmington, MA - SCM2 (North end of Old Main Road)

Prepared By: BV
Checked By: JT/DS

Objective: To determine the required Water Quality Volume (WQV) for adaqute stormwater treatment. This project is a redevelopment and is required to meet this Standard (4) to the maximum extent practicable.

Methodology: MA Department of Environmental Protection (DEP) Stormwater Management (Vol. 3, Ch. 1)

Design Criteria: Volume to be treated =1.0" x Post Development Impervious Area

Critical Areas (include ORW, ACEC, recharge areas for public water supplies (Zone Is, Zone IIs and Interim Wellhead Protection Areas for ground water sources and Zone As for surface water sources), bathing beaches, cold water fisheries, shellfish growing areas and LUHPPL's

Volume to be treated = 1.0" x Post Development Impervious Area

All WQ calculations use 1" since the site is located within a Zone II

Calculation results:

Designation	Volume Required (cf)	Volume Provided (cf)
Surface Infiltration Basin	**751**	**955**

Volume to be Treated:

Drainage to SCM2

Total Proposed Impervious Area: **9,006** sf
Total Volume to be treated: **751 cf**

Volume Provided:

Drainage to SCM2

WQ_v = storage below lowest outlet (orifice) = **955 cf** Elev. 86.70, see HydroCA

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WATER QUALITY CALCULATIONS

Date: January 14, 2025
Revised:
Project: Reconstruction on Route 38 (Main Street) from Route 62 to the Woburn City Line
Project No: 13033.19 #608051
Location: Wilmington, MA - SCM3 (South end of Old Main Road)

Prepared By: BV
Checked By: JT

Objective: To determine the required Water Quality Volume (WQV) for adaqute stormwater treatment. This project is a redevelopment and is required to meet this Standard (4) to the maximum extent practicable.

Methodology: MA Department of Environmental Protection (DEP) Stormwater Management (Vol. 3, Ch. 1)

Design Criteria: Volume to be treated =1.0" x Post Development Impervious Area

Critical Areas (include ORW, ACEC, recharge areas for public water supplies (Zone Is, Zone IIs and Interim Wellhead Protection Areas for ground water sources and Zone As for surface water sources), bathing beaches, cold water fisheries, shellfish growing areas and LUHPPL's

Volume to be treated = 1.0" x Post Development Impervious Area

All WQ calculations use 1" since the site is located within a Zone II

Calculation results:

Designation	Volume Required (cf)	Volume Provided (cf)
Subsurface Infiltration System	**1,041**	**2,453**

Volume to be Treated:

Drainage to SCM3

Total Proposed Impervious Area: **12,491** sf
Total Volume to be treated: **1,041 cf**

Volume Provided:

Drainage to SCM3

WQ_v = storage below lowest outlet (orifice) = **2,453 cf** Elev.83.94, see HydroCAD tabl

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: Wilmington Rte 38 Pretreatment to SCM-1 & SCM-3

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Subsurface Infiltration Structure	0.80	0.75	0.60	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15

Total TSS Removal = 85%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: 13033.19 #608051
Prepared By: BV
Date: 1/14/2025

*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

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: Wilmington Rte 38 SCM-2 to DP-18

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Infiltration Basin	0.80	0.75	0.60	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15

Total TSS Removal = 85%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: 13033.19 #608051
Prepared By: BV/JM
Date: 1/14/2025

*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

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: Wilmington Rte 38 Pretreatment to SCMs

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Sediment Forebay	0.25	0.75	0.19	0.56
	0.00	0.56	0.00	0.56
	0.00	0.56	0.00	0.56
	0.00	0.56	0.00	0.56

Total TSS Removal = 44%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: 13033.19 #608051
Prepared By: BV/JM
Date: 1/14/2025

*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

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: Wilmington Rte 38 DP-1,3,4,5,7,8,9,14,18,20

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
	0.00	0.75	0.00	0.75
	0.00	0.75	0.00	0.75
	0.00	0.75	0.00	0.75
	0.00	0.75	0.00	0.75

Total TSS Removal = 25%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: 13033.19 #608051
Prepared By: BV
Date: 1/14/2025

*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

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PRETREATMENT CALCULATION

Date: January 14, 2025
Revised:
Project: Reconstruction on Route 38 (Main Street) from Route 62 to the Woburn City Line
Project No: 13033.19 #608051
Location: Wilmington, MA - SCM1

Prepared By: BV
Checked By:

Objective: To determine the required pretreatment Volume for adaqute stormwater treatment. This project is a redevelopment and is required to meet this Standard (4) to the maximum extent practicable.

Methodology: MA Department of Environmental Protection (DEP) Stormwater Management (Vol. 2, Ch. 2)

Design Criteria: Volume to be treated = (0.1" x Post Development Impervious Area)

Calculation results:

Pretreatment requires 44% TSS removal since the site is located within a Zone II

Designation	Required (cfs)	Provided (cfs)
Drainage to Isolator Rows at SCM1	**0.62**	**0.62**

Volume to be Treated:

Drainage to Isolator Rows at SCM1

T_c =	6.0 min	0.1 hr	
qu =	774.0 csm/in (From Type II Chart)		
A =	22,330 sf	0.000801 sm	
WQV =	1,861 cf		
$Q_{1.0}$ =	0.62 cfs		

Volume Provided:

Isolator Rows at SCM1

Provided: 0.62 cfs (ADS Isolator Rows)

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PRETREATMENT CALCULATION

Date: January 14, 2025
Revised:
Project: Reconstruction on Route 38 (Main Street) from Route 62 to the Woburn City Line
Project No: 13033.19 #608051
Location: Wilmington, MA - SCM2 (North end of Old Main Road)

Prepared By: BV
Checked By:

Objective: To determine the required pretreatment Volume for adaqute stormwater treatment. This project is a redevelopment and is required to meet this Standard (4) to the maximum extent practicable.

Methodology: MA Department of Environmental Protection (DEP) Stormwater Management (Vol. 2, Ch. 2)

Design Criteria: Volume to be treated = (0.1" x Post Development Impervious Area)

Pretreatment requires 44% TSS removal since the site is located within a Zone II

Calculation results:

Designation	Volume Required (cf)	Volume Provided (cf)
Drainage to Forebay of SCM2	**77**	**188**

Volume to be Treated:

Drainage to Forebay of SCM2

Total Proposed Impervious Area: 9,233 sf
Total Treatment Volume: **77 cf**

Volume Provided:

Forebay of SCM2

Top Elevation = 86.50 Area of contour = 189 sf
Bottom Elev = 85.00 Area of contour = 62 sf Volume of storage: 188 cf

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PRETREATMENT CALCULATION

Date: January 14, 2025
Revised:
Project: Reconstruction on Route 38 (Main Street) from Route 62 to the Woburn City Line
Project No: 13033.19 #608051
Location: Wilmington, MA - SCM3

Prepared By: BV
Checked By:

Objective: To determine the required pretreatment Volume for adaqute stormwater treatment. This project is a redevelopment and is required to meet this Standard (4) to the maximum extent practicable.

Methodology: MA Department of Environmental Protection (DEP) Stormwater Management (Vol. 2, Ch. 2)

Design Criteria: Volume to be treated = (0.1" x Post Development Impervious Area)

Calculation results: **Pretreatment requires 44% TSS removal since the site is located within a Zone II**

Designation	Required (cfs)	Provided (cfs)
Drainage to Isolator Rows at SCM3	**0.33**	**0.33**

Volume to be Treated:

Drainage to Isolator Rows at SCM3

T_c =	6.0	min	0.1	hr
qu =	774.0	csm/in (From Type II Chart)		
A =	12,000	sf	0.0004304	sm
WQV =	1,000	cf		
$Q_{1.0}$ =	0.33	cfs		

Volume Provided:

Isolator Rows at SCM3

Provided: 0.33 cfs (ADS Isolator Rows)

Proposed Condition *Type III 24-hr 100y24h Rainfall=8.23"*
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Stage-Area-Storage for Pond SCM1: Subsurface Infiltration System

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
86.55	0	87.07	655	87.59	2,286
86.56	12	87.08	687	87.60	2,316
86.57	24	87.09	718	87.61	2,347
86.58	35	87.10	750	87.62	2,377
86.59	47	87.11	782	87.63	2,408
86.60	59	87.12	814	87.64	2,438
86.61	71	87.13	846	87.65	2,469
86.62	83	87.14	878	87.66	2,499
86.63	95	87.15	909	87.67	2,530
86.64	106	87.16	941	87.68	2,560
86.65	118	87.17	973	87.69	2,590
86.66	130	87.18	1,005	87.70	2,621
86.67	142	87.19	1,036	87.71	2,651
86.68	154	87.20	1,068	87.72	2,681
86.69	166	87.21	1,100	87.73	2,711
86.70	177	87.22	1,131	87.74	2,741
86.71	189	87.23	1,163	87.75	2,771
86.72	201	87.24	1,195	87.76	2,801
86.73	213	87.25	1,226	87.77	2,831
86.74	225	87.26	1,258	87.78	2,861
86.75	236	87.27	1,290	87.79	2,891
86.76	248	87.28	1,321	87.80	2,921
86.77	260	87.29	1,353	87.81	2,951
86.78	272	87.30	1,384	87.82	2,981
86.79	284	87.31	1,416	87.83	3,011
86.80	296	87.32	1,447	87.84	3,040
86.81	307	87.33	1,479	87.85	3,070
86.82	319	87.34	1,510	87.86	3,100
86.83	331	87.35	1,541	87.87	3,129
86.84	343	87.36	1,573	87.88	3,159
86.85	355	87.37	1,604	87.89	3,189
86.86	366	87.38	1,635	87.90	3,218
86.87	378	87.39	1,666	87.91	3,248
86.88	390	87.40	1,698	87.92	3,277
86.89	402	87.41	1,729	87.93	3,306
86.90	414	87.42	1,760	87.94	3,336
86.91	426	87.43	1,791	87.95	3,365
86.92	437	87.44	1,822	87.96	3,394
86.93	449	87.45	1,853	87.97	3,423
86.94	461	87.46	1,885	87.98	3,453
86.95	473	87.47	1,916	87.99	3,482
86.96	485	87.48	1,947	88.00	3,511
86.97	497	87.49	1,978	88.01	3,540
86.98	508	87.50	2,009	88.02	3,569
86.99	520	87.51	2,039	88.03	3,598
87.00	532	87.52	2,070	88.04	3,627
87.01	544	87.53	2,101	88.05	3,656
87.02	556	87.54	2,132	88.06	3,684
87.03	567	87.55	2,163	88.07	3,713
87.04	579	87.56	2,194	88.08	3,742
87.05	591	87.57	2,224	88.09	3,771
87.06	623	87.58	2,255	88.10	3,799

Water Quality Volume provided below lowest orifice for SCM-1

Proposed Condition *Type III 24-hr 100y24h Rainfall=8.23"*
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Stage-Area-Storage for Pond SCM1: Subsurface Infiltration System (continued)

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
88.11	3,828	88.63	5,233	89.15	6,414
88.12	3,856	88.64	5,258	89.16	6,434
88.13	3,885	88.65	5,283	89.17	6,453
88.14	3,913	88.66	5,308	89.18	6,472
88.15	3,941	88.67	5,333	89.19	6,491
88.16	3,970	88.68	5,358	89.20	6,509
88.17	3,998	88.69	5,383	89.21	6,528
88.18	4,026	88.70	5,408	89.22	6,546
88.19	4,054	88.71	5,433	89.23	6,564
88.20	4,082	88.72	5,457	89.24	6,582
88.21	4,110	88.73	5,482	89.25	6,599
88.22	4,138	88.74	5,506	89.26	6,616
88.23	4,166	88.75	5,530	89.27	6,633
88.24	4,194	88.76	5,554	89.28	6,650
88.25	4,222	88.77	5,579	89.29	6,666
88.26	4,250	88.78	5,602	89.30	6,682
88.27	4,277	88.79	5,626	89.31	6,698
88.28	4,305	88.80	5,650	89.32	6,713
88.29	4,332	88.81	5,674	89.33	6,728
88.30	4,360	88.82	5,697	89.34	6,743
88.31	4,387	88.83	5,721	89.35	6,758
88.32	4,415	88.84	5,744	89.36	6,773
88.33	4,442	88.85	5,767	89.37	6,787
88.34	4,469	88.86	5,791	89.38	6,801
88.35	4,497	88.87	5,814	89.39	6,815
88.36	4,524	88.88	5,837	89.40	6,829
88.37	4,551	88.89	5,860	89.41	6,842
88.38	4,578	88.90	5,883	89.42	6,856
88.39	4,605	88.91	5,905	89.43	6,869
88.40	4,632	88.92	5,928	89.44	6,882
88.41	4,659	88.93	5,950	89.45	6,895
88.42	4,686	88.94	5,973	89.46	6,908
88.43	4,712	88.95	5,995	89.47	6,921
88.44	4,739	88.96	6,017	89.48	6,934
88.45	4,765	88.97	6,039	89.49	6,947
88.46	4,792	88.98	6,061	89.50	6,959
88.47	4,818	88.99	6,083	89.51	6,971
88.48	4,845	89.00	6,105	89.52	6,984
88.49	4,871	89.01	6,126	89.53	6,996
88.50	4,897	89.02	6,148	89.54	7,008
88.51	4,924	89.03	6,169	89.55	7,020
88.52	4,950	89.04	6,190	89.56	7,032
88.53	4,976	89.05	6,211	89.57	7,043
88.54	5,002	89.06	6,232	89.58	7,055
88.55	5,028	89.07	6,253	89.59	7,067
88.56	5,054	89.08	6,274	89.60	7,079
88.57	5,079	89.09	6,294	89.61	7,091
88.58	5,105	89.10	6,315	89.62	7,103
88.59	5,131	89.11	6,335	89.63	7,114
88.60	5,156	89.12	6,355	89.64	7,126
88.61	5,182	89.13	6,375	89.65	7,138
88.62	5,207	89.14	6,395	89.66	7,150

Proposed Condition *Type III 24-hr 100y24h Rainfall=8.23"*
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Stage-Area-Storage for Pond SCM1: Subsurface Infiltration System (continued)

Elevation (feet)	Storage (cubic-feet)
89.67	7,162
89.68	7,173
89.69	7,185
89.70	7,197
89.71	7,209
89.72	7,221
89.73	7,233
89.74	7,244
89.75	7,256
89.76	7,268
89.77	7,280
89.78	7,292
89.79	7,303
89.80	7,315
89.81	7,327
89.82	7,339
89.83	7,351
89.84	7,363
89.85	7,374
89.86	7,386
89.87	7,398
89.88	7,410
89.89	7,422
89.90	7,434
89.91	7,445
89.92	7,457
89.93	7,469
89.94	7,481
89.95	7,493
89.96	7,504
89.97	7,516
89.98	7,528
89.99	7,540
90.00	7,552
90.01	7,564
90.02	7,575
90.03	7,587
90.04	7,599
90.05	7,611
90.06	7,623
90.07	7,635
90.08	7,646
90.09	7,658
90.10	7,670
90.11	7,682
90.12	7,694
90.13	7,705
90.14	7,717
90.15	7,729
90.16	7,741
90.17	7,753
90.18	7,765
90.19	7,776
90.20	7,788
90.21	7,800
90.22	7,812
90.23	7,824
90.24	7,835
90.25	7,847
90.26	7,859
90.27	7,871
90.28	7,883
90.29	7,895
90.30	7,906
90.31	7,918
90.32	7,930
90.33	7,942
90.34	7,954
90.35	7,966
90.36	7,977
90.37	7,989
90.38	8,001
90.39	8,013
90.40	8,025
90.41	8,036
90.42	8,048
90.43	8,060
90.44	8,072
90.45	8,084
90.46	8,096
90.47	8,107
90.48	8,119
90.49	8,131
90.50	8,143
90.51	8,155
90.52	8,167
90.53	8,178
90.54	8,190
90.55	**8,202**

Proposed Condition *Type III 24-hr 100y24h Rainfall=8.23"*

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Stage-Area-Storage for Pond SCM2: Old Main St Infiltration Basin

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
85.00	235	0	85.52	412	166
85.01	238	2	85.53	416	170
85.02	241	5	85.54	420	174
85.03	244	7	85.55	424	179
85.04	247	10	85.56	428	183
85.05	250	12	85.57	432	187
85.06	253	15	85.58	436	192
85.07	256	17	85.59	440	196
85.08	259	20	85.60	444	200
85.09	262	22	85.61	448	205
85.10	265	25	85.62	452	209
85.11	268	28	85.63	456	214
85.12	272	30	85.64	460	218
85.13	275	33	85.65	464	223
85.14	278	36	85.66	469	228
85.15	281	39	85.67	473	232
85.16	284	41	85.68	477	237
85.17	288	44	85.69	481	242
85.18	291	47	85.70	485	247
85.19	294	50	85.71	489	252
85.20	297	53	85.72	494	257
85.21	301	56	85.73	498	262
85.22	304	59	85.74	502	267
85.23	307	62	85.75	507	272
85.24	311	65	85.76	511	277
85.25	314	68	85.77	515	282
85.26	317	72	85.78	520	287
85.27	321	75	85.79	524	292
85.28	324	78	85.80	528	298
85.29	328	81	85.81	533	303
85.30	331	85	85.82	537	308
85.31	335	88	85.83	542	314
85.32	338	91	85.84	546	319
85.33	342	95	85.85	551	324
85.34	345	98	85.86	555	330
85.35	349	102	85.87	560	336
85.36	352	105	85.88	564	341
85.37	356	109	85.89	569	347
85.38	360	112	85.90	573	353
85.39	363	116	85.91	578	358
85.40	367	119	85.92	582	364
85.41	371	123	85.93	587	370
85.42	374	127	85.94	592	376
85.43	378	131	85.95	596	382
85.44	382	134	85.96	601	388
85.45	386	138	85.97	606	394
85.46	389	142	85.98	611	400
85.47	393	146	85.99	615	406
85.48	397	150	86.00	620	412
85.49	401	154	86.01	624	418
85.50	405	158	86.02	628	425
85.51	408	162	86.03	632	431

Proposed Condition
Type III 24-hr 100y24h Rainfall=8.23"
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Stage-Area-Storage for Pond SCM2: Old Main St Infiltration Basin (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
86.04	637	437
86.05	641	444
86.06	645	450
86.07	649	457
86.08	653	463
86.09	658	470
86.10	662	476
86.11	666	483
86.12	670	490
86.13	675	496
86.14	679	503
86.15	683	510
86.16	688	517
86.17	692	524
86.18	696	531
86.19	701	538
86.20	705	545
86.21	709	552
86.22	714	559
86.23	718	566
86.24	723	573
86.25	727	580
86.26	732	588
86.27	736	595
86.28	741	602
86.29	745	610
86.30	750	617
86.31	754	625
86.32	759	632
86.33	763	640
86.34	768	648
86.35	772	655
86.36	777	663
86.37	782	671
86.38	786	679
86.39	791	687
86.40	796	695
86.41	800	703
86.42	805	711
86.43	810	719
86.44	814	727
86.45	819	735
86.46	824	743
86.47	829	751
86.48	833	760
86.49	838	768
86.50	843	777
86.51	848	785
86.52	853	793
86.53	857	802
86.54	862	811
86.55	867	819
86.56	872	828
86.57	877	837
86.58	882	846
86.59	887	854
86.60	892	863
86.61	897	872
86.62	902	881
86.63	906	890
86.64	911	899
86.65	916	908
86.66	921	918
86.67	926	927
86.68	932	936
86.69	937	946
86.70	942	955
86.71	947	964
86.72	952	974
86.73	957	983
86.74	962	993
86.75	967	1,003
86.76	972	1,012
86.77	977	1,022
86.78	983	1,032
86.79	988	1,042
86.80	993	1,052
86.81	998	1,062
86.82	1,004	1,072
86.83	1,009	1,082
86.84	1,014	1,092
86.85	1,019	1,102
86.86	1,025	1,112
86.87	1,030	1,122
86.88	1,035	1,133
86.89	1,041	1,143
86.90	1,046	1,154
86.91	1,051	1,164
86.92	1,057	1,175
86.93	1,062	1,185
86.94	1,067	1,196
86.95	1,073	1,207
86.96	1,078	1,217
86.97	1,084	1,228
86.98	1,089	1,239
86.99	1,095	1,250
87.00	1,100	1,261
87.01	1,105	1,272
87.02	1,110	1,283
87.03	1,115	1,294
87.04	1,120	1,305
87.05	1,125	1,316
87.06	1,130	1,328
87.07	1,135	1,339

Water Quality Volume provided below lowest orifice for SCM-1

Proposed Condition *Type III 24-hr 100y24h Rainfall=8.23"*
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Stage-Area-Storage for Pond SCM2: Old Main St Infiltration Basin (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
87.08	1,140	1,350
87.09	1,145	1,362
87.10	1,150	1,373
87.11	1,155	1,385
87.12	1,160	1,396
87.13	1,165	1,408
87.14	1,170	1,420
87.15	1,176	1,431
87.16	1,181	1,443
87.17	1,186	1,455
87.18	1,191	1,467
87.19	1,196	1,479
87.20	1,201	1,491
87.21	1,206	1,503
87.22	1,212	1,515
87.23	1,217	1,527
87.24	1,222	1,539
87.25	1,227	1,552
87.26	1,233	1,564
87.27	1,238	1,576
87.28	1,243	1,589
87.29	1,248	1,601
87.30	1,254	1,614
87.31	1,259	1,626
87.32	1,264	1,639
87.33	1,270	1,651
87.34	1,275	1,664
87.35	1,280	1,677
87.36	1,286	1,690
87.37	1,291	1,703
87.38	1,296	1,716
87.39	1,302	1,729
87.40	1,307	1,742
87.41	1,312	1,755
87.42	1,318	1,768
87.43	1,323	1,781
87.44	1,329	1,794
87.45	1,334	1,808
87.46	1,340	1,821
87.47	1,345	1,834
87.48	1,351	1,848
87.49	1,356	1,861
87.50	1,362	1,875
87.51	1,367	1,889
87.52	1,373	1,902
87.53	1,378	1,916
87.54	1,384	1,930
87.55	1,389	1,944
87.56	1,395	1,958
87.57	1,400	1,972
87.58	1,406	1,986
87.59	1,412	2,000
87.60	1,417	2,014
87.61	1,423	2,028
87.62	1,428	2,042
87.63	1,434	2,057
87.64	1,440	2,071
87.65	1,445	2,086
87.66	1,451	2,100
87.67	1,457	2,115
87.68	1,463	2,129
87.69	1,468	2,144
87.70	1,474	2,159
87.71	1,480	2,173
87.72	1,485	2,188
87.73	1,491	2,203
87.74	1,497	2,218
87.75	1,503	2,233
87.76	1,509	2,248
87.77	1,514	2,263
87.78	1,520	2,278
87.79	1,526	2,294
87.80	1,532	2,309
87.81	1,538	2,324
87.82	1,544	2,340
87.83	1,549	2,355
87.84	1,555	2,371
87.85	1,561	2,386
87.86	1,567	2,402
87.87	1,573	2,418
87.88	1,579	2,433
87.89	1,585	2,449
87.90	1,591	2,465
87.91	1,597	2,481
87.92	1,603	2,497
87.93	1,609	2,513
87.94	1,615	2,529
87.95	1,621	2,545
87.96	1,627	2,561
87.97	1,633	2,578
87.98	1,639	2,594
87.99	1,645	2,611
88.00	1,651	2,627
88.01	1,656	2,644
88.02	1,661	2,660
88.03	1,666	2,677
88.04	1,671	2,694
88.05	1,677	2,710
88.06	1,682	2,727
88.07	1,687	2,744
88.08	1,692	2,761
88.09	1,697	2,778
88.10	1,702	2,795
88.11	1,708	2,812

Proposed Condition *Type III 24-hr 100y24h Rainfall=8.23"*
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Stage-Area-Storage for Pond SCM2: Old Main St Infiltration Basin (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
88.12	1,713	2,829
88.13	1,718	2,846
88.14	1,723	2,863
88.15	1,728	2,880
88.16	1,734	2,898
88.17	1,739	2,915
88.18	1,744	2,933
88.19	1,749	2,950
88.20	1,755	2,968
88.21	1,760	2,985
88.22	1,765	3,003
88.23	1,770	3,020
88.24	1,776	3,038
88.25	1,781	3,056
88.26	1,786	3,074
88.27	1,791	3,092
88.28	1,797	3,110
88.29	1,802	3,128
88.30	1,807	3,146
88.31	1,813	3,164
88.32	1,818	3,182
88.33	1,823	3,200
88.34	1,829	3,218
88.35	1,834	3,237
88.36	1,840	3,255
88.37	1,845	3,273
88.38	1,850	3,292
88.39	1,856	3,310
88.40	1,861	3,329
88.41	1,867	3,348
88.42	1,872	3,366
88.43	1,877	3,385
88.44	1,883	3,404
88.45	1,888	3,423
88.46	1,894	3,442
88.47	1,899	3,461
88.48	1,905	3,480
88.49	1,910	3,499
88.50	1,916	3,518
88.51	1,921	3,537
88.52	1,927	3,556
88.53	1,932	3,576
88.54	1,938	3,595
88.55	1,943	3,614
88.56	1,949	3,634
88.57	1,954	3,653
88.58	1,960	3,673
88.59	1,965	3,693
88.60	1,971	3,712
88.61	1,977	3,732
88.62	1,982	3,752
88.63	1,988	3,772
88.64	1,993	3,792
88.65	1,999	3,811
88.66	2,005	3,831
88.67	2,010	3,852
88.68	2,016	3,872
88.69	2,021	3,892
88.70	2,027	3,912
88.71	2,033	3,932
88.72	2,038	3,953
88.73	2,044	3,973
88.74	2,050	3,994
88.75	2,055	4,014
88.76	2,061	4,035
88.77	2,067	4,055
88.78	2,072	4,076
88.79	2,078	4,097
88.80	2,084	4,118
88.81	2,090	4,139
88.82	2,095	4,159
88.83	2,101	4,180
88.84	2,107	4,201
88.85	2,113	4,223
88.86	2,118	4,244
88.87	2,124	4,265
88.88	2,130	4,286
88.89	2,136	4,308
88.90	2,142	4,329
88.91	2,147	4,350
88.92	2,153	4,372
88.93	2,159	4,393
88.94	2,165	4,415
88.95	2,171	4,437
88.96	2,177	4,458
88.97	2,182	4,480
88.98	2,188	4,502
88.99	2,194	4,524
89.00	**2,200**	**4,546**

Proposed Condition
Type III 24-hr 100y24h Rainfall=8.23"
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Stage-Area-Storage for Pond SCM3: Subsurface Infiltration System

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
82.80	0	83.32	621	83.84	2,164
82.81	11	83.33	651	83.85	2,193
82.82	22	83.34	681	83.86	2,222
82.83	34	83.35	712	83.87	2,251
82.84	45	83.36	742	83.88	2,280
82.85	56	83.37	772	83.89	2,309
82.86	67	83.38	802	83.90	2,338
82.87	79	83.39	832	83.91	2,366
82.88	90	83.40	862	83.92	2,395
82.89	101	83.41	892	83.93	2,424
82.90	112	83.42	922	83.94	2,453
82.91	123	83.43	952	83.95	2,481
82.92	135	83.44	982	83.96	2,510
82.93	146	83.45	1,012	83.97	2,538
82.94	157	83.46	1,042	83.98	2,567
82.95	168	83.47	1,072	83.99	2,595
82.96	180	83.48	1,102	84.00	2,624
82.97	191	83.49	1,132	84.01	2,652
82.98	202	83.50	1,162	84.02	2,681
82.99	213	83.51	1,192	84.03	2,709
83.00	224	83.52	1,222	84.04	2,737
83.01	236	83.53	1,252	84.05	2,766
83.02	247	83.54	1,281	84.06	2,794
83.03	258	83.55	1,311	84.07	2,822
83.04	269	83.56	1,341	84.08	2,850
83.05	280	83.57	1,371	84.09	2,878
83.06	292	83.58	1,401	84.10	2,907
83.07	303	83.59	1,430	84.11	2,935
83.08	314	83.60	1,460	84.12	2,963
83.09	325	83.61	1,490	84.13	2,991
83.10	337	83.62	1,519	84.14	3,019
83.11	348	83.63	1,549	84.15	3,047
83.12	359	83.64	1,578	84.16	3,074
83.13	370	83.65	1,608	84.17	3,102
83.14	381	83.66	1,637	84.18	3,130
83.15	393	83.67	1,667	84.19	3,158
83.16	404	83.68	1,696	84.20	3,186
83.17	415	83.69	1,726	84.21	3,213
83.18	426	83.70	1,755	84.22	3,241
83.19	438	83.71	1,785	84.23	3,268
83.20	449	83.72	1,814	84.24	3,296
83.21	460	83.73	1,843	84.25	3,324
83.22	471	83.74	1,873	84.26	3,351
83.23	482	83.75	1,902	84.27	3,378
83.24	494	83.76	1,931	84.28	3,406
83.25	505	83.77	1,961	84.29	3,433
83.26	516	83.78	1,990	84.30	3,461
83.27	527	83.79	2,019	84.31	3,488
83.28	539	83.80	2,048	84.32	3,515
83.29	550	83.81	2,077	84.33	3,542
83.30	561	83.82	2,106	84.34	3,569
83.31	591	83.83	2,135	84.35	3,596

Water Quality Volume provided below lowest orifice for SCM-3

Proposed Condition *Type III 24-hr 100y24h Rainfall=8.23"*
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Stage-Area-Storage for Pond SCM3: Subsurface Infiltration System (continued)

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
84.36	3,623	84.88	4,953	85.40	6,072
84.37	3,650	84.89	4,977	85.41	6,090
84.38	3,677	84.90	5,001	85.42	6,108
84.39	3,704	84.91	5,025	85.43	6,126
84.40	3,731	84.92	5,049	85.44	6,144
84.41	3,758	84.93	5,072	85.45	6,162
84.42	3,785	84.94	5,096	85.46	6,179
84.43	3,811	84.95	5,119	85.47	6,197
84.44	3,838	84.96	5,142	85.48	6,214
84.45	3,864	84.97	5,166	85.49	6,230
84.46	3,891	84.98	5,189	85.50	6,247
84.47	3,917	84.99	5,212	85.51	6,263
84.48	3,944	85.00	5,235	85.52	6,279
84.49	3,970	85.01	5,258	85.53	6,295
84.50	3,996	85.02	5,281	85.54	6,310
84.51	4,023	85.03	5,303	85.55	6,325
84.52	4,049	85.04	5,326	85.56	6,340
84.53	4,075	85.05	5,348	85.57	6,355
84.54	4,101	85.06	5,371	85.58	6,370
84.55	4,127	85.07	5,393	85.59	6,384
84.56	4,153	85.08	5,415	85.60	6,398
84.57	4,179	85.09	5,437	85.61	6,412
84.58	4,205	85.10	5,459	85.62	6,425
84.59	4,231	85.11	5,481	85.63	6,438
84.60	4,256	85.12	5,503	85.64	6,452
84.61	4,282	85.13	5,525	85.65	6,465
84.62	4,308	85.14	5,547	85.66	6,477
84.63	4,333	85.15	5,568	85.67	6,490
84.64	4,359	85.16	5,590	85.68	6,503
84.65	4,384	85.17	5,611	85.69	6,515
84.66	4,410	85.18	5,633	85.70	6,528
84.67	4,435	85.19	5,654	85.71	6,540
84.68	4,461	85.20	5,675	85.72	6,552
84.69	4,486	85.21	5,696	85.73	6,564
84.70	4,511	85.22	5,717	85.74	6,576
84.71	4,536	85.23	5,738	85.75	6,588
84.72	4,561	85.24	5,758	85.76	6,600
84.73	4,586	85.25	5,779	85.77	6,612
84.74	4,611	85.26	5,799	85.78	6,623
84.75	4,636	85.27	5,820	85.79	6,635
84.76	4,661	85.28	5,840	85.80	6,646
84.77	4,685	85.29	5,860	85.81	6,657
84.78	4,710	85.30	5,880	85.82	6,668
84.79	4,735	85.31	5,900	85.83	6,680
84.80	4,759	85.32	5,919	85.84	6,691
84.81	4,784	85.33	5,939	85.85	6,702
84.82	4,808	85.34	5,958	85.86	6,713
84.83	4,832	85.35	5,978	85.87	6,724
84.84	4,857	85.36	5,997	85.88	6,736
84.85	4,881	85.37	6,016	85.89	6,747
84.86	4,905	85.38	6,035	85.90	6,758
84.87	4,929	85.39	6,053	85.91	6,769

Proposed Condition *Type III 24-hr 100y24h Rainfall=8.23"*
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Stage-Area-Storage for Pond SCM3: Subsurface Infiltration System (continued)

Elevation (feet)	Storage (cubic-feet)
85.92	6,780
85.93	6,792
85.94	6,803
85.95	6,814
85.96	6,825
85.97	6,837
85.98	6,848
85.99	6,859
86.00	6,870
86.01	6,881
86.02	6,893
86.03	6,904
86.04	6,915
86.05	6,926
86.06	6,938
86.07	6,949
86.08	6,960
86.09	6,971
86.10	6,982
86.11	6,994
86.12	7,005
86.13	7,016
86.14	7,027
86.15	7,039
86.16	7,050
86.17	7,061
86.18	7,072
86.19	7,083
86.20	7,095
86.21	7,106
86.22	7,117
86.23	7,128
86.24	7,139
86.25	7,151
86.26	7,162
86.27	7,173
86.28	7,184
86.29	7,196
86.30	7,207
86.31	7,218
86.32	7,229
86.33	7,240
86.34	7,252
86.35	7,263
86.36	7,274
86.37	7,285
86.38	7,297
86.39	7,308
86.40	7,319
86.41	7,330
86.42	7,341
86.43	7,353
86.44	7,364
86.45	7,375
86.46	7,386
86.47	7,398
86.48	7,409
86.49	7,420
86.50	7,431
86.51	7,442
86.52	7,454
86.53	7,465
86.54	7,476
86.55	7,487
86.56	7,498
86.57	7,510
86.58	7,521
86.59	7,532
86.60	7,543
86.61	7,555
86.62	7,566
86.63	7,577
86.64	7,588
86.65	7,599
86.66	7,611
86.67	7,622
86.68	7,633
86.69	7,644
86.70	7,656
86.71	7,667
86.72	7,678
86.73	7,689
86.74	7,700
86.75	7,712
86.76	7,723
86.77	7,734
86.78	7,745
86.79	7,757
86.80	**7,768**

Project Name: Rte 38 Date 1/17/2024
Location: Wilminton MA
Site Designation: SCM 3

Site Conditions

Rainfall Depth=	1	in	
Impervious Acreage=	0.29	ac	
Total Acreage=	0.29	ac	
Time of Concentration=	6	min	
I=	100.0	%	
R_v(Runoff Coefficient)=	0.95		
WQ_v=	1000	cf	
q_u(Unit Peak Discharge)=	774	csm/in	From Type II Chart
Q_p(Water Quality Storm)=	0.33	cfs	
SC-740's per row	13	Chambers	

Project: **Route 38 (SCM-1)**

Chamber Model -	SC-740	
Units -	Imperial	
Number of Chambers -	108	
Voids in the stone (porosity) -	30	%
Base of Stone Elevation -	86.55	ft
Amount of Stone Above Chambers -	12	in
Amount of Stone Below Chambers -	6	in
Area of system -	4120	sf Min. Area - 3651 sf min. area

☑ Include Perimeter Stone in Calculations

☐ Click for Stage Area Data

☐ Click to Invert Stage Area Data

Click Here for Metric

StormTech SC-740 Cumulative Storage Volumes

Height of System *(inches)*	Incremental Single Chamber *(cubic feet)*	Incremental Total Chamber *(cubic feet)*	Incremental Stone *(cubic feet)*	Incremental Ch & St *(cubic feet)*	Cumulative Chamber *(cubic feet)*	Elevation *(feet)*
48	0.00	0.00	103.00	103.00	8417.88	90.55
47	0.00	0.00	103.00	103.00	8314.88	90.47
46	0.00	0.00	103.00	103.00	8211.88	90.38
45	0.00	0.00	103.00	103.00	8108.88	90.30
44	0.00	0.00	103.00	103.00	8005.88	90.22
43	0.00	0.00	103.00	103.00	7902.88	90.13
42	0.00	0.00	103.00	103.00	7799.88	90.05
41	0.00	0.00	103.00	103.00	7696.88	89.97
40	0.00	0.00	103.00	103.00	7593.88	89.88
39	0.00	0.00	103.00	103.00	7490.88	89.80
38	0.00	0.00	103.00	103.00	7387.88	89.72
37	0.00	0.00	103.00	103.00	7284.88	89.63
36	0.05	5.94	101.22	107.16	7181.88	89.55
35	0.16	17.60	97.72	115.32	7074.73	89.47
34	0.28	30.45	93.87	124.31	6959.41	89.38
33	0.60	65.23	83.43	148.66	6835.09	89.30
32	0.80	86.59	77.02	163.61	6686.43	89.22
31	0.95	102.67	72.20	174.87	6522.83	89.13
30	1.07	116.05	68.19	184.23	6347.95	89.05
29	1.18	127.49	64.75	192.25	6163.72	88.97
28	1.27	136.69	61.99	198.68	5971.48	88.88
27	1.36	146.34	59.10	205.44	5772.79	88.80
26	1.45	157.04	55.89	212.93	5567.35	88.72
25	1.52	164.67	53.60	218.27	5354.42	88.63
24	1.58	170.89	51.73	222.62	5136.15	88.55
23	1.64	177.37	49.79	227.16	4913.53	88.47
22	1.70	183.55	47.94	231.48	4686.37	88.38
21	1.75	189.32	46.21	235.52	4454.89	88.30
20	1.80	194.70	44.59	239.29	4219.37	88.22
19	1.85	200.34	42.90	243.24	3980.08	88.13
18	1.89	204.45	41.66	246.12	3736.84	88.05
17	1.93	208.87	40.34	249.21	3490.72	87.97
16	1.97	213.30	39.01	252.31	3241.51	87.88
15	2.01	217.07	37.88	254.95	2989.20	87.80
14	2.04	220.86	36.74	257.60	2734.25	87.72
13	2.07	224.10	35.77	259.87	2476.65	87.63
12	2.10	227.33	34.80	262.13	2216.78	87.55
11	2.13	230.23	33.93	264.16	1954.65	87.47
10	2.15	232.62	33.22	265.83	1690.49	87.38
9	2.18	235.12	32.46	267.59	1424.66	87.30
8	2.20	237.42	31.77	269.20	1157.07	87.22
7	2.21	238.39	31.48	269.87	887.87	87.13
6	0.00	0.00	103.00	103.00	618.00	87.05
5	0.00	0.00	103.00	103.00	515.00	86.97
4	0.00	0.00	103.00	103.00	412.00	86.88
3	0.00	0.00	103.00	103.00	309.00	86.80
2	0.00	0.00	103.00	103.00	206.00	86.72
1	0.00	0.00	103.00	103.00	103.00	86.63

Project: **Route 38 (SCM-3)**

Chamber Model -	SC-740	
Units -	Imperial	
Number of Chambers -	102	
Voids in the stone (porosity) -	30	%
Base of Stone Elevation -	82.70	ft
Amount of Stone Above Chambers -	12	in
Amount of Stone Below Chambers -	6	in
Area of system -	3923	sf Min. Area - 3448 sf min. area

☑ Include Perimeter Stone in Calculations

☐ Click for Stage Area Data

☐ Click to Invert Stage Area Data

Click Here for Metric

StormTech SC-740 Cumulative Storage Volumes

Height of System *(inches)*	Incremental Single Chamber *(cubic feet)*	Incremental Total Chamber *(cubic feet)*	Incremental Stone *(cubic feet)*	Incremental Ch & St *(cubic feet)*	Cumulative Chamber *(cubic feet)*	Elevation *(feet)*
48	0.00	0.00	98.08	98.08	7988.49	86.70
47	0.00	0.00	98.08	98.08	7890.42	86.62
46	0.00	0.00	98.08	98.08	7792.34	86.53
45	0.00	0.00	98.08	98.08	7694.27	86.45
44	0.00	0.00	98.08	98.08	7596.19	86.37
43	0.00	0.00	98.08	98.08	7498.12	86.28
42	0.00	0.00	98.08	98.08	7400.04	86.20
41	0.00	0.00	98.08	98.08	7301.97	86.12
40	0.00	0.00	98.08	98.08	7203.89	86.03
39	0.00	0.00	98.08	98.08	7105.82	85.95
38	0.00	0.00	98.08	98.08	7007.74	85.87
37	0.00	0.00	98.08	98.08	6909.67	85.78
36	0.05	5.61	96.39	102.00	6811.59	85.70
35	0.16	16.62	93.09	109.71	6709.59	85.62
34	0.28	28.76	89.45	118.21	6599.88	85.53
33	0.60	61.60	79.59	141.20	6481.68	85.45
32	0.80	81.77	73.54	155.32	6340.48	85.37
31	0.95	96.97	68.98	165.95	6185.16	85.28
30	1.07	109.60	65.19	174.80	6019.21	85.20
29	1.18	120.41	61.95	182.36	5844.41	85.12
28	1.27	129.10	59.35	188.44	5662.05	85.03
27	1.36	138.21	56.61	194.82	5473.61	84.95
26	1.45	148.32	53.58	201.90	5278.78	84.87
25	1.52	155.52	51.42	206.94	5076.89	84.78
24	1.58	161.40	49.66	211.05	4869.95	84.70
23	1.64	167.51	47.82	215.33	4658.89	84.62
22	1.70	173.35	46.07	219.42	4443.56	84.53
21	1.75	178.80	44.44	223.23	4224.14	84.45
20	1.80	183.89	42.91	226.80	4000.90	84.37
19	1.85	189.21	41.31	230.52	3774.11	84.28
18	1.89	193.10	40.15	233.24	3543.59	84.20
17	1.93	197.27	38.89	236.16	3310.34	84.12
16	1.97	201.45	37.64	239.09	3074.18	84.03
15	2.01	205.01	36.57	241.58	2835.09	83.95
14	2.04	208.59	35.50	244.09	2593.51	83.87
13	2.07	211.65	34.58	246.23	2349.42	83.78
12	2.10	214.70	33.66	248.37	2103.19	83.70
11	2.13	217.44	32.84	250.29	1854.83	83.62
10	2.15	219.69	32.17	251.86	1604.54	83.53
9	2.18	222.06	31.46	253.52	1352.68	83.45
8	2.20	224.23	30.81	255.04	1099.17	83.37
7	2.21	225.15	30.53	255.68	844.13	83.28
6	0.00	0.00	98.08	98.08	588.45	83.20
5	0.00	0.00	98.08	98.08	490.38	83.12
4	0.00	0.00	98.08	98.08	392.30	83.03
3	0.00	0.00	98.08	98.08	294.23	82.95
2	0.00	0.00	98.08	98.08	196.15	82.87
1	0.00	0.00	98.08	98.08	98.08	82.78

GREEN INTERNATIONAL AFFILIATES, INC.
Civil & Structural Engineers
100 Ames Pond Drive, Suite 200
Tewksbury, MA 01876

JOB	13033.19		
SHEET NO.	1	OF	1
CALCULATED BY	VP	DATE	1/16/2024
CHECKED BY	AF	DATE	1/16/2024
DESCRIPTION	Culvert Main Street		
SCALE			

Hydraulic Engineering Circular No. 14, Third Edition

Several relationships have been proposed for riprap sizing for culvert aprons and several of these are discussed in greater detail in Appendix D. The independent variables in these relationships include one or more of the following variables: outlet velocity, rock specific gravity, pipe dimension (e.g. diameter), outlet Froude number, and tailwater. The following equation (Fletcher and Grace, 1972) is recommended for circular culverts:

$$D_{50} = 0.2\,D\left(\frac{Q}{\sqrt{g}D^{2.5}}\right)^{4/3}\left(\frac{D}{TW}\right) \qquad (10.4)$$

where,

- D_{50} = riprap size, m (ft)
- Q = design discharge, m^3/s (ft^3/s)
- D = culvert diameter (circular), m (ft)
- TW = tailwater depth, m (ft)
- g = acceleration due to gravity, 9.81 m/s^2 (32.2 ft/s^2)

Tailwater depth for Equation 10.4 should be limited to between 0.4D and 1.0D. If tailwater is unknown, use 0.4D.

D=	4.93	ft	Culvert rise used as culvert diameter
g=	32.2	ft/s^2	
Q=	205.14	cfs	
TW=	0.54	ft	
D_{50}=	1.07	ft	
	12.84	in	
	326.22	mm	Class 4 M2.02.0 Riprap

Table 10.1. Example Riprap Classes and Apron Dimensions

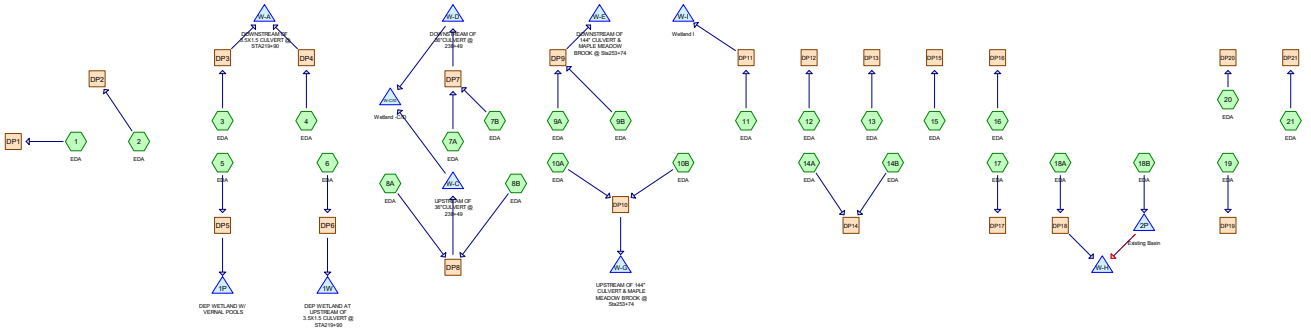
Class	D_{50} (mm)	D_{50} (in)	Apron Length[1]	Apron Depth
1	125	5	4D	$3.5D_{50}$
2	150	6	4D	$3.3D_{50}$
3	250	10	5D	$2.4D_{50}$
4	350	14	6D	$2.2D_{50}$
5	500	20	7D	$2.0D_{50}$
6	550	22	8D	$2.0D_{50}$

[1]D is the culvert rise.

Apron Length=	6.00	x	4.93
	30	ft	
Apron Depth=	2.20	x	1.25
	2.8	ft	
Apron Width=	35	ft	
(Figure 10.4)			

Appendix D: Hydraulic and Hydrologic Data

- Existing Conditions HydroCAD Calculations
- Proposed Conditions HydroCAD Calculations
- Existing Watershed and Drainage Plan
- Proposed Watershed and Drainage Plan



Subcat Reach Pond Link

Routing Diagram for Existing Condition
Prepared by Green International Affiliates, Printed 2/25/2025
HydroCAD® 10.20-5c s/n 06415 © 2023 HydroCAD Software Solutions LLC

Existing Condition

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2y24h	Type III 24-hr		Default	24.00	1	3.30	2
2	10y24h	Type III 24-hr		Default	24.00	1	5.20	2
3	25y24h	Type III 24-hr		Default	24.00	1	6.39	2
4	100y24h	Type III 24-hr		Default	24.00	1	8.23	2

Existing Condition

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
3.523	49	50-75% Grass cover, Fair, HSG A (2, 3, 4, 5, 7A, 7B, 9A, 9B, 10A, 10B, 12, 13, 14A, 14B, 15, 16, 17, 18A, 18B)
0.248	69	50-75% Grass cover, Fair, HSG B (6, 8A, 11)
0.038	79	50-75% Grass cover, Fair, HSG C (21)
0.020	68	<50% Grass cover, Poor, HSG A (1)
0.187	74	>75% Grass cover, Good, HSG C (20)
0.210	80	>75% Grass cover, Good, HSG D (20)
0.800	76	Gravel roads, HSG A (7A, 10A, 13, 17, 18A)
1.553	91	Gravel roads, HSG D (18A, 20)
1.915	98	Impervious (20)
11.188	98	Paved roads w/curbs & sewers, HSG A (1, 2, 3, 4, 5, 7A, 7B, 9A, 9B, 10A, 10B, 12, 13, 14A, 14B, 15, 16, 17, 18A, 18B)
1.445	98	Paved roads w/curbs & sewers, HSG B (6, 8A, 11)
0.030	98	Paved roads w/curbs & sewers, HSG C (21)
0.087	98	Unconnected pavement, HSG A (19)
2.013	36	Woods, Fair, HSG A (4, 7A, 7B, 8B, 14B, 16, 18A, 19)
0.221	60	Woods, Fair, HSG B (8A, 11)
0.036	73	Woods, Fair, HSG C (21)
0.716	79	Woods, Fair, HSG D (18A)
0.540	70	Woods, Good, HSG C (20)
0.949	77	Woods, Good, HSG D (20)
0.241	45	Woods, Poor, HSG A (3, 5)
0.056	65	Woods/grass comb., Fair, HSG B (6)
26.013	**82**	**TOTAL AREA**

Existing Condition

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
17.872	HSG A	1, 2, 3, 4, 5, 7A, 7B, 8B, 9A, 9B, 10A, 10B, 12, 13, 14A, 14B, 15, 16, 17, 18A, 18B, 19
1.970	HSG B	6, 8A, 11
0.830	HSG C	20, 21
3.427	HSG D	18A, 20
1.915	Other	20
26.013		**TOTAL AREA**

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1: EDA Runoff Area=27,790 sf 96.88% Impervious Runoff Depth>2.95"
Tc=6.0 min CN=97 Runoff=1.97 cfs 0.157 af

Subcatchment 2: EDA Runoff Area=11,386 sf 94.54% Impervious Runoff Depth>2.74"
Tc=6.0 min CN=95 Runoff=0.77 cfs 0.060 af

Subcatchment 3: EDA Runoff Area=52,497 sf 81.12% Impervious Runoff Depth>2.17"
Tc=6.0 min CN=89 Runoff=2.98 cfs 0.218 af

Subcatchment 4: EDA Runoff Area=123,722 sf 83.84% Impervious Runoff Depth>2.26"
Tc=13.6 min CN=90 Runoff=5.81 cfs 0.534 af

Subcatchment 5: EDA Runoff Area=22,514 sf 60.31% Impervious Runoff Depth>1.28"
Tc=8.8 min CN=77 Runoff=0.68 cfs 0.055 af

Subcatchment 6: EDA Runoff Area=26,496 sf 80.11% Impervious Runoff Depth>2.44"
Tc=6.0 min CN=92 Runoff=1.66 cfs 0.124 af

Subcatchment 7A: EDA Runoff Area=40,680 sf 65.46% Impervious Runoff Depth>1.62"
Tc=7.0 min CN=82 Runoff=1.69 cfs 0.126 af

Subcatchment 7B: EDA Runoff Area=11,116 sf 48.11% Impervious Runoff Depth>0.89"
Tc=6.0 min CN=70 Runoff=0.24 cfs 0.019 af

Subcatchment 8A: EDA Runoff Area=37,408 sf 66.89% Impervious Runoff Depth>1.92"
Tc=9.0 min CN=86 Runoff=1.71 cfs 0.137 af

Subcatchment 8B: EDA Runoff Area=5,418 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=36 Runoff=0.00 cfs 0.000 af

Subcatchment 9A: EDA Runoff Area=48,757 sf 59.89% Impervious Runoff Depth>1.35"
Tc=6.0 min CN=78 Runoff=1.71 cfs 0.126 af

Subcatchment 9B: EDA Runoff Area=4,197 sf 55.06% Impervious Runoff Depth>1.22"
Tc=6.0 min CN=76 Runoff=0.13 cfs 0.010 af

Subcatchment 10A: EDA Runoff Area=37,841 sf 70.13% Impervious Runoff Depth>1.76"
Tc=6.0 min CN=84 Runoff=1.76 cfs 0.128 af

Subcatchment 10B: EDA Runoff Area=25,272 sf 60.25% Impervious Runoff Depth>1.41"
Tc=6.0 min CN=79 Runoff=0.93 cfs 0.068 af

Subcatchment 11: EDA Runoff Area=21,893 sf 76.18% Impervious Runoff Depth>2.26"
Tc=6.0 min CN=90 Runoff=1.29 cfs 0.095 af

Subcatchment 12: EDA Runoff Area=14,367 sf 64.65% Impervious Runoff Depth>1.55"
Tc=6.0 min CN=81 Runoff=0.58 cfs 0.043 af

Subcatchment 13: EDA Runoff Area=11,148 sf 19.19% Impervious Runoff Depth>0.45"
Tc=6.0 min CN=60 Runoff=0.08 cfs 0.010 af

Subcatchment 14A: EDA Runoff Area=11,849 sf 73.75% Impervious Runoff Depth>1.84"
Tc=6.0 min CN=85 Runoff=0.58 cfs 0.042 af

Subcatchment 14B: EDA Runoff Area=59,685 sf 67.04% Impervious Runoff Depth>1.48"
Tc=6.1 min CN=80 Runoff=2.31 cfs 0.169 af

Subcatchment 15: EDA Runoff Area=8,734 sf 63.20% Impervious Runoff Depth>1.48"
Tc=6.0 min CN=80 Runoff=0.34 cfs 0.025 af

Subcatchment 16: EDA Runoff Area=11,582 sf 52.73% Impervious Runoff Depth>1.10"
Tc=6.0 min CN=74 Runoff=0.32 cfs 0.024 af

Subcatchment 17: EDA Runoff Area=16,849 sf 63.60% Impervious Runoff Depth>1.76"
Tc=6.0 min CN=84 Runoff=0.79 cfs 0.057 af

Subcatchment 18A: EDA Runoff Area=267,229 sf 37.25% Impervious Runoff Depth>1.04"
Tc=31.7 min CN=73 Runoff=3.90 cfs 0.531 af

Subcatchment 18B: EDA Runoff Area=5,148 sf 47.92% Impervious Runoff Depth>0.99"
Tc=6.0 min CN=72 Runoff=0.13 cfs 0.010 af

Subcatchment 19: EDA Runoff Area=7,862 sf 48.17% Impervious Runoff Depth>0.69"
Tc=6.0 min CN=66 Runoff=0.12 cfs 0.010 af

Subcatchment 20: EDA Runoff Area=217,219 sf 38.40% Impervious Runoff Depth>2.08"
Flow Length=455' Slope=0.0900 '/' Tc=16.1 min CN=88 Runoff=8.94 cfs 0.865 af

Subcatchment 21: EDA Runoff Area=4,489 sf 28.98% Impervious Runoff Depth>1.62"
Tc=6.0 min CN=82 Runoff=0.19 cfs 0.014 af

Reach DP1: Inflow=1.97 cfs 0.157 af
Outflow=1.97 cfs 0.157 af

Reach DP10: Inflow=2.70 cfs 0.196 af
Outflow=2.70 cfs 0.196 af

Reach DP11: Inflow=1.29 cfs 0.095 af
Outflow=1.29 cfs 0.095 af

Reach DP12: Inflow=0.58 cfs 0.043 af
Outflow=0.58 cfs 0.043 af

Reach DP13: Inflow=0.08 cfs 0.010 af
Outflow=0.08 cfs 0.010 af

Reach DP14: Inflow=2.88 cfs 0.210 af
Outflow=2.88 cfs 0.210 af

Reach DP15: Inflow=0.34 cfs 0.025 af
Outflow=0.34 cfs 0.025 af

Reach DP16: Inflow=0.32 cfs 0.024 af
Outflow=0.32 cfs 0.024 af

Reach DP17: Inflow=0.79 cfs 0.057 af
Outflow=0.79 cfs 0.057 af

Reach DP18: Inflow=3.90 cfs 0.531 af
Outflow=3.90 cfs 0.531 af

Reach DP19: Inflow=0.12 cfs 0.010 af
Outflow=0.12 cfs 0.010 af

Reach DP2: Inflow=0.77 cfs 0.060 af
Outflow=0.77 cfs 0.060 af

Reach DP20: Inflow=8.94 cfs 0.865 af
Outflow=8.94 cfs 0.865 af

Reach DP21: Inflow=0.19 cfs 0.014 af
Outflow=0.19 cfs 0.014 af

Reach DP3: Inflow=2.98 cfs 0.218 af
Outflow=2.98 cfs 0.218 af

Reach DP4: Inflow=5.81 cfs 0.534 af
Outflow=5.81 cfs 0.534 af

Reach DP5: Inflow=0.68 cfs 0.055 af
Outflow=0.68 cfs 0.055 af

Reach DP6: Inflow=1.66 cfs 0.124 af
Outflow=1.66 cfs 0.124 af

Reach DP7: Inflow=1.92 cfs 0.145 af
Outflow=1.92 cfs 0.145 af

Reach DP8: Inflow=1.71 cfs 0.137 af
Outflow=1.71 cfs 0.137 af

Reach DP9: Inflow=1.84 cfs 0.135 af
Outflow=1.84 cfs 0.135 af

Pond 1P: DEP WETLAND W/ VERNAL POOLS Inflow=0.68 cfs 0.055 af
Primary=0.68 cfs 0.055 af

Pond 1W: DEP WETLAND AT UPSTREAM OF 3.5X1.5 CULVERT @ STA219+90 Inflow=1.66 cfs 0.124 af
Primary=1.66 cfs 0.124 af

Pond 2P: Existing Basin Peak Elev=85.98' Storage=425 cf Inflow=0.13 cfs 0.010 af
Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond W-A: DOWNSTREAM OF 3.5X1.5 CULVERT @ STA219+90 Inflow=8.01 cfs 0.752 af
Primary=8.01 cfs 0.752 af

Pond W-C: UPSTREAM OF 36"CULVERT @ 238+49 Inflow=1.71 cfs 0.137 af
Primary=1.71 cfs 0.137 af

Pond W-C/D: Wetland -C/D Inflow=3.62 cfs 0.282 af
Primary=3.62 cfs 0.282 af

Pond W-D: DOWNSTREAM OF 36"CULVERT @ 238+49 Inflow=1.92 cfs 0.145 af
Primary=1.92 cfs 0.145 af

Pond W-E: DOWNSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Inflow=1.84 cfs 0.135 af
Primary=1.84 cfs 0.135 af

Pond W-G: UPSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Inflow=2.70 cfs 0.196 af
Primary=2.70 cfs 0.196 af

Pond W-H: Inflow=3.90 cfs 0.531 af
Primary=3.90 cfs 0.531 af

Pond W-I: Wetland I Inflow=1.29 cfs 0.095 af
Primary=1.29 cfs 0.095 af

Total Runoff Area = 26.013 ac Runoff Volume = 3.654 af Average Runoff Depth = 1.69"
43.63% Pervious = 11.349 ac 56.37% Impervious = 14.665 ac

Summary for Subcatchment 1: EDA

Runoff = 1.97 cfs @ 12.09 hrs, Volume= 0.157 af, Depth> 2.95"
Routed to Reach DP1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
26,924	98	Paved roads w/curbs & sewers, HSG A
866	68	<50% Grass cover, Poor, HSG A
27,790	97	Weighted Average
866		3.12% Pervious Area
26,924		96.88% Impervious Area

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

Summary for Subcatchment 2: EDA

Runoff = 0.77 cfs @ 12.09 hrs, Volume= 0.060 af, Depth> 2.74"
Routed to Reach DP2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
10,764	98	Paved roads w/curbs & sewers, HSG A
622	49	50-75% Grass cover, Fair, HSG A
11,386	95	Weighted Average
622		5.46% Pervious Area
10,764		94.54% Impervious Area

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

Summary for Subcatchment 3: EDA

Runoff = 2.98 cfs @ 12.09 hrs, Volume= 0.218 af, Depth> 2.17"
Routed to Reach DP3 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
42,583	98	Paved roads w/curbs & sewers, HSG A
6,681	49	50-75% Grass cover, Fair, HSG A
3,233	45	Woods, Poor, HSG A
52,497	89	Weighted Average
9,914		18.88% Pervious Area
42,583		81.12% Impervious Area

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

Summary for Subcatchment 4: EDA

Runoff = 5.81 cfs @ 12.19 hrs, Volume= 0.534 af, Depth> 2.26"
Routed to Reach DP4 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
103,725	98	Paved roads w/curbs & sewers, HSG A
18,190	49	50-75% Grass cover, Fair, HSG A
1,807	36	Woods, Fair, HSG A
123,722	90	Weighted Average
19,997		16.16% Pervious Area
103,725		83.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 5: EDA

Runoff = 0.68 cfs @ 12.13 hrs, Volume= 0.055 af, Depth> 1.28"
Routed to Reach DP5 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
13,579	98	Paved roads w/curbs & sewers, HSG A
1,652	49	50-75% Grass cover, Fair, HSG A
7,283	45	Woods, Poor, HSG A
22,514	77	Weighted Average
8,935		39.69% Pervious Area
13,579		60.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 6: EDA

Runoff = 1.66 cfs @ 12.09 hrs, Volume= 0.124 af, Depth> 2.44"
Routed to Reach DP6 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
21,227	98	Paved roads w/curbs & sewers, HSG B
2,835	69	50-75% Grass cover, Fair, HSG B
2,434	65	Woods/grass comb., Fair, HSG B
26,496	92	Weighted Average
5,269		19.89% Pervious Area
21,227		80.11% Impervious Area

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

Summary for Subcatchment 7A: EDA

Runoff = 1.69 cfs @ 12.11 hrs, Volume= 0.126 af, Depth> 1.62"
Routed to Reach DP7 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
26,629	98	Paved roads w/curbs & sewers, HSG A
2,718	49	50-75% Grass cover, Fair, HSG A
6,904	36	Woods, Fair, HSG A
4,429	76	Gravel roads, HSG A
40,680	82	Weighted Average
14,051		34.54% Pervious Area
26,629		65.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 7B: EDA

Runoff = 0.24 cfs @ 12.10 hrs, Volume= 0.019 af, Depth> 0.89"
Routed to Reach DP7 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
5,348	98	Paved roads w/curbs & sewers, HSG A
3,154	49	50-75% Grass cover, Fair, HSG A
2,614	36	Woods, Fair, HSG A
11,116	70	Weighted Average
5,768		51.89% Pervious Area
5,348		48.11% Impervious Area

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

Summary for Subcatchment 8A: EDA

Runoff = 1.71 cfs @ 12.13 hrs, Volume= 0.137 af, Depth> 1.92"
Routed to Reach DP8 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
25,023	98	Paved roads w/curbs & sewers, HSG B
4,412	69	50-75% Grass cover, Fair, HSG B
7,973	60	Woods, Fair, HSG B
37,408	86	Weighted Average
12,385		33.11% Pervious Area
25,023		66.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 8B: EDA

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Reach DP8 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
5,418	36	Woods, Fair, HSG A
5,418		100.00% Pervious Area

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

Summary for Subcatchment 9A: EDA

Runoff = 1.71 cfs @ 12.10 hrs, Volume= 0.126 af, Depth> 1.35"
Routed to Reach DP9 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
29,203	98	Paved roads w/curbs & sewers, HSG A
19,554	49	50-75% Grass cover, Fair, HSG A
48,757	78	Weighted Average
19,554		40.11% Pervious Area
29,203		59.89% Impervious Area

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

Summary for Subcatchment 9B: EDA

Runoff = 0.13 cfs @ 12.10 hrs, Volume= 0.010 af, Depth> 1.22"
Routed to Reach DP9 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
2,311	98	Paved roads w/curbs & sewers, HSG A
1,886	49	50-75% Grass cover, Fair, HSG A
4,197	76	Weighted Average
1,886		44.94% Pervious Area
2,311		55.06% Impervious Area

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

Summary for Subcatchment 10A: EDA

Runoff = 1.76 cfs @ 12.09 hrs, Volume= 0.128 af, Depth> 1.76"
Routed to Reach DP10 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
26,539	98	Paved roads w/curbs & sewers, HSG A
11,094	49	50-75% Grass cover, Fair, HSG A
208	76	Gravel roads, HSG A
37,841	84	Weighted Average
11,302		29.87% Pervious Area
26,539		70.13% Impervious Area

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

Summary for Subcatchment 10B: EDA

Runoff = 0.93 cfs @ 12.10 hrs, Volume= 0.068 af, Depth> 1.41"
Routed to Reach DP10 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
15,226	98	Paved roads w/curbs & sewers, HSG A
10,046	49	50-75% Grass cover, Fair, HSG A
25,272	79	Weighted Average
10,046		39.75% Pervious Area
15,226		60.25% Impervious Area

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

Summary for Subcatchment 11: EDA

Runoff = 1.29 cfs @ 12.09 hrs, Volume= 0.095 af, Depth> 2.26"
Routed to Reach DP11 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
16,677	98	Paved roads w/curbs & sewers, HSG B
3,572	69	50-75% Grass cover, Fair, HSG B
1,644	60	Woods, Fair, HSG B
21,893	90	Weighted Average
5,216		23.82% Pervious Area
16,677		76.18% Impervious Area

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

Summary for Subcatchment 12: EDA

Runoff = 0.58 cfs @ 12.09 hrs, Volume= 0.043 af, Depth> 1.55"
Routed to Reach DP12 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
9,288	98	Paved roads w/curbs & sewers, HSG A
5,079	49	50-75% Grass cover, Fair, HSG A
14,367	81	Weighted Average
5,079		35.35% Pervious Area
9,288		64.65% Impervious Area

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

Summary for Subcatchment 13: EDA

Runoff = 0.08 cfs @ 12.13 hrs, Volume= 0.010 af, Depth> 0.45"
Routed to Reach DP13 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
2,139	98	Paved roads w/curbs & sewers, HSG A
8,245	49	50-75% Grass cover, Fair, HSG A
764	76	Gravel roads, HSG A
11,148	60	Weighted Average
9,009		80.81% Pervious Area
2,139		19.19% Impervious Area

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

Summary for Subcatchment 14A: EDA

Runoff = 0.58 cfs @ 12.09 hrs, Volume= 0.042 af, Depth> 1.84"
Routed to Reach DP14 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
8,739	98	Paved roads w/curbs & sewers, HSG A
3,110	49	50-75% Grass cover, Fair, HSG A
11,849	85	Weighted Average
3,110		26.25% Pervious Area
8,739		73.75% Impervious Area

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

Summary for Subcatchment 14B: EDA

Runoff = 2.31 cfs @ 12.10 hrs, Volume= 0.169 af, Depth> 1.48"
Routed to Reach DP14 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
40,012	98	Paved roads w/curbs & sewers, HSG A
10,242	49	50-75% Grass cover, Fair, HSG A
9,431	36	Woods, Fair, HSG A
59,685	80	Weighted Average
19,673		32.96% Pervious Area
40,012		67.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 15: EDA

Runoff = 0.34 cfs @ 12.10 hrs, Volume= 0.025 af, Depth> 1.48"
Routed to Reach DP15 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
5,520	98	Paved roads w/curbs & sewers, HSG A
3,214	49	50-75% Grass cover, Fair, HSG A
8,734	80	Weighted Average
3,214		36.80% Pervious Area
5,520		63.20% Impervious Area

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

Summary for Subcatchment 16: EDA

Runoff = 0.32 cfs @ 12.10 hrs, Volume= 0.024 af, Depth> 1.10"
Routed to Reach DP16 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
6,107	98	Paved roads w/curbs & sewers, HSG A
4,630	49	50-75% Grass cover, Fair, HSG A
845	36	Woods, Fair, HSG A
11,582	74	Weighted Average
5,475		47.27% Pervious Area
6,107		52.73% Impervious Area

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

Summary for Subcatchment 17: EDA

Runoff = 0.79 cfs @ 12.09 hrs, Volume= 0.057 af, Depth> 1.76"
Routed to Reach DP17 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
10,716	98	Paved roads w/curbs & sewers, HSG A
3,641	49	50-75% Grass cover, Fair, HSG A
2,492	76	Gravel roads, HSG A
16,849	84	Weighted Average
6,133		36.40% Pervious Area
10,716		63.60% Impervious Area

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

Summary for Subcatchment 18A: EDA

Runoff = 3.90 cfs @ 12.48 hrs, Volume= 0.531 af, Depth> 1.04"
Routed to Reach DP18 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
99,544	98	Paved roads w/curbs & sewers, HSG A
37,004	49	50-75% Grass cover, Fair, HSG A
56,609	36	Woods, Fair, HSG A
31,170	79	Woods, Fair, HSG D
26,944	76	Gravel roads, HSG A
15,958	91	Gravel roads, HSG D
267,229	73	Weighted Average
167,685		62.75% Pervious Area
99,544		37.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.7					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 18B: EDA

AREA GOING TO THE EXISTING BMP

Runoff = 0.13 cfs @ 12.10 hrs, Volume= 0.010 af, Depth> 0.99"
Routed to Pond 2P : Existing Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
2,467	98	Paved roads w/curbs & sewers, HSG A
2,681	49	50-75% Grass cover, Fair, HSG A
5,148	72	Weighted Average
2,681		52.08% Pervious Area
2,467		47.92% Impervious Area

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

Summary for Subcatchment 19: EDA

Runoff = 0.12 cfs @ 12.11 hrs, Volume= 0.010 af, Depth> 0.69"
Routed to Reach DP19 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
3,787	98	Unconnected pavement, HSG A
4,075	36	Woods, Fair, HSG A
7,862	66	Weighted Average
4,075		51.83% Pervious Area
3,787		48.17% Impervious Area
3,787		100.00% Unconnected

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

Summary for Subcatchment 20: EDA

Runoff = 8.94 cfs @ 12.22 hrs, Volume= 0.865 af, Depth> 2.08"
Routed to Reach DP20 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

	Area (sf)	CN	Description
*	83,409	98	Impervious
	8,137	74	>75% Grass cover, Good, HSG C
	9,133	80	>75% Grass cover, Good, HSG D
	23,541	70	Woods, Good, HSG C
	41,329	77	Woods, Good, HSG D
	51,670	91	Gravel roads, HSG D
	217,219	88	Weighted Average
	133,810		61.60% Pervious Area
	83,409		38.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0900	0.07		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.30"
4.5	405	0.0900	1.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
16.1	455	Total			

Summary for Subcatchment 21: EDA

Runoff = 0.19 cfs @ 12.09 hrs, Volume= 0.014 af, Depth> 1.62"
Routed to Reach DP21 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
1,301	98	Paved roads w/curbs & sewers, HSG C
1,640	79	50-75% Grass cover, Fair, HSG C
1,548	73	Woods, Fair, HSG C
4,489	82	Weighted Average
3,188		71.02% Pervious Area
1,301		28.98% Impervious Area

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

Summary for Reach DP1:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.638 ac, 96.88% Impervious, Inflow Depth > 2.95" for 2y24h event
Inflow = 1.97 cfs @ 12.09 hrs, Volume= 0.157 af
Outflow = 1.97 cfs @ 12.09 hrs, Volume= 0.157 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP10:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.449 ac, 66.17% Impervious, Inflow Depth > 1.62" for 2y24h event
Inflow = 2.70 cfs @ 12.09 hrs, Volume= 0.196 af
Outflow = 2.70 cfs @ 12.09 hrs, Volume= 0.196 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-G : UPSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Sta253+74

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP11:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.503 ac, 76.18% Impervious, Inflow Depth > 2.26" for 2y24h event
Inflow = 1.29 cfs @ 12.09 hrs, Volume= 0.095 af
Outflow = 1.29 cfs @ 12.09 hrs, Volume= 0.095 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-I : Wetland I

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP12:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.330 ac, 64.65% Impervious, Inflow Depth > 1.55" for 2y24h event
Inflow = 0.58 cfs @ 12.09 hrs, Volume= 0.043 af
Outflow = 0.58 cfs @ 12.09 hrs, Volume= 0.043 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP13:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.256 ac, 19.19% Impervious, Inflow Depth > 0.45" for 2y24h event
Inflow = 0.08 cfs @ 12.13 hrs, Volume= 0.010 af
Outflow = 0.08 cfs @ 12.13 hrs, Volume= 0.010 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP14:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.642 ac, 68.15% Impervious, Inflow Depth > 1.54" for 2y24h event
Inflow = 2.88 cfs @ 12.10 hrs, Volume= 0.210 af
Outflow = 2.88 cfs @ 12.10 hrs, Volume= 0.210 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP15:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.201 ac, 63.20% Impervious, Inflow Depth > 1.48" for 2y24h event
Inflow = 0.34 cfs @ 12.10 hrs, Volume= 0.025 af
Outflow = 0.34 cfs @ 12.10 hrs, Volume= 0.025 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP16:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.266 ac, 52.73% Impervious, Inflow Depth > 1.10" for 2y24h event
Inflow = 0.32 cfs @ 12.10 hrs, Volume= 0.024 af
Outflow = 0.32 cfs @ 12.10 hrs, Volume= 0.024 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP17:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.387 ac, 63.60% Impervious, Inflow Depth > 1.76" for 2y24h event
Inflow = 0.79 cfs @ 12.09 hrs, Volume= 0.057 af
Outflow = 0.79 cfs @ 12.09 hrs, Volume= 0.057 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP18:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 6.135 ac, 37.25% Impervious, Inflow Depth > 1.04" for 2y24h event
Inflow = 3.90 cfs @ 12.48 hrs, Volume= 0.531 af
Outflow = 3.90 cfs @ 12.48 hrs, Volume= 0.531 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-H :

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP19:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.180 ac, 48.17% Impervious, Inflow Depth > 0.69" for 2y24h event
Inflow = 0.12 cfs @ 12.11 hrs, Volume= 0.010 af
Outflow = 0.12 cfs @ 12.11 hrs, Volume= 0.010 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP2:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.261 ac, 94.54% Impervious, Inflow Depth > 2.74" for 2y24h event
Inflow = 0.77 cfs @ 12.09 hrs, Volume= 0.060 af
Outflow = 0.77 cfs @ 12.09 hrs, Volume= 0.060 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP20:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.987 ac, 38.40% Impervious, Inflow Depth > 2.08" for 2y24h event
Inflow = 8.94 cfs @ 12.22 hrs, Volume= 0.865 af
Outflow = 8.94 cfs @ 12.22 hrs, Volume= 0.865 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP21:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.103 ac, 28.98% Impervious, Inflow Depth > 1.62" for 2y24h event
Inflow = 0.19 cfs @ 12.09 hrs, Volume= 0.014 af
Outflow = 0.19 cfs @ 12.09 hrs, Volume= 0.014 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP3:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.205 ac, 81.12% Impervious, Inflow Depth > 2.17" for 2y24h event
Inflow = 2.98 cfs @ 12.09 hrs, Volume= 0.218 af
Outflow = 2.98 cfs @ 12.09 hrs, Volume= 0.218 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-A : DOWNSTREAM OF 3.5X1.5 CULVERT @ STA219+90

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP4:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.840 ac, 83.84% Impervious, Inflow Depth > 2.26" for 2y24h event
Inflow = 5.81 cfs @ 12.19 hrs, Volume= 0.534 af
Outflow = 5.81 cfs @ 12.19 hrs, Volume= 0.534 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-A : DOWNSTREAM OF 3.5X1.5 CULVERT @ STA219+90

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP5:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.517 ac, 60.31% Impervious, Inflow Depth > 1.28" for 2y24h event
Inflow = 0.68 cfs @ 12.13 hrs, Volume= 0.055 af
Outflow = 0.68 cfs @ 12.13 hrs, Volume= 0.055 af, Atten= 0%, Lag= 0.0 min
Routed to Pond 1P : DEP WETLAND W/ VERNAL POOLS

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP6:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.608 ac, 80.11% Impervious, Inflow Depth > 2.44" for 2y24h event
Inflow = 1.66 cfs @ 12.09 hrs, Volume= 0.124 af
Outflow = 1.66 cfs @ 12.09 hrs, Volume= 0.124 af, Atten= 0%, Lag= 0.0 min
Routed to Pond 1W : DEP WETLAND AT UPSTREAM OF 3.5X1.5 CULVERT @ STA219+90

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP7:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.189 ac, 61.74% Impervious, Inflow Depth > 1.46" for 2y24h event
Inflow = 1.92 cfs @ 12.11 hrs, Volume= 0.145 af
Outflow = 1.92 cfs @ 12.11 hrs, Volume= 0.145 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-D : DOWNSTREAM OF 36"CULVERT @ 238+49

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP8:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.983 ac, 58.43% Impervious, Inflow Depth > 1.68" for 2y24h event
Inflow = 1.71 cfs @ 12.13 hrs, Volume= 0.137 af
Outflow = 1.71 cfs @ 12.13 hrs, Volume= 0.137 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-C : UPSTREAM OF 36"CULVERT @ 238+49

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP9:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.216 ac, 59.51% Impervious, Inflow Depth > 1.34" for 2y24h event
Inflow = 1.84 cfs @ 12.10 hrs, Volume= 0.135 af
Outflow = 1.84 cfs @ 12.10 hrs, Volume= 0.135 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-E : DOWNSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Sta253+74

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond 1P: DEP WETLAND W/ VERNAL POOLS

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.517 ac, 60.31% Impervious, Inflow Depth > 1.28" for 2y24h event
Inflow = 0.68 cfs @ 12.13 hrs, Volume= 0.055 af
Primary = 0.68 cfs @ 12.13 hrs, Volume= 0.055 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond 1W: DEP WETLAND AT UPSTREAM OF 3.5X1.5 CULVERT @ STA219+90

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.608 ac, 80.11% Impervious, Inflow Depth > 2.44" for 2y24h event
Inflow = 1.66 cfs @ 12.09 hrs, Volume= 0.124 af
Primary = 1.66 cfs @ 12.09 hrs, Volume= 0.124 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond 2P: Existing Basin

Inflow Area = 0.118 ac, 47.92% Impervious, Inflow Depth > 0.99" for 2y24h event
Inflow = 0.13 cfs @ 12.10 hrs, Volume= 0.010 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond W-H :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond W-H :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 85.98' @ 24.00 hrs Surf.Area= 1,122 sf Storage= 425 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	85.50'	2,145 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
85.50	652	195.0	0	0	652
86.00	1,139	255.0	442	442	2,804
86.50	1,516	290.0	662	1,104	4,328
87.00	1,884	297.0	848	1,952	4,686
87.10	1,974	299.0	193	2,145	4,785

Device	Routing	Invert	Outlet Devices
#1	Secondary	86.90'	**20.0' long x 10.0' 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) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Primary	84.00'	**12.0" Round RCP_Round 12"** L= 100.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 84.00' / 83.50' S= 0.0050 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf
#3	Device 2	86.47'	**Custom Orifice, Cv= 3.20 (C= 4.00)** Head (feet) 0.00 0.50 Width (feet) 3.00 3.00

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=85.50' (Free Discharge)
↑—**2=RCP_Round 12"** (Passes 0.00 cfs of 2.93 cfs potential flow)
↑—**3=Custom Orifice** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=85.50' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond W-A: DOWNSTREAM OF 3.5X1.5 CULVERT @ STA219+90

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.045 ac, 83.03% Impervious, Inflow Depth > 2.23" for 2y24h event
Inflow = 8.01 cfs @ 12.15 hrs, Volume= 0.752 af
Primary = 8.01 cfs @ 12.15 hrs, Volume= 0.752 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond W-C: UPSTREAM OF 36"CULVERT @ 238+49

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.983 ac, 58.43% Impervious, Inflow Depth > 1.68" for 2y24h event
Inflow = 1.71 cfs @ 12.13 hrs, Volume= 0.137 af
Primary = 1.71 cfs @ 12.13 hrs, Volume= 0.137 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-C/D : Wetland -C/D

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond W-C/D: Wetland -C/D

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.172 ac, 60.24% Impervious, Inflow Depth > 1.56" for 2y24h event
Inflow = 3.62 cfs @ 12.11 hrs, Volume= 0.282 af
Primary = 3.62 cfs @ 12.11 hrs, Volume= 0.282 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond W-D: DOWNSTREAM OF 36"CULVERT @ 238+49

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.189 ac, 61.74% Impervious, Inflow Depth > 1.46" for 2y24h event
Inflow = 1.92 cfs @ 12.11 hrs, Volume= 0.145 af
Primary = 1.92 cfs @ 12.11 hrs, Volume= 0.145 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-C/D : Wetland -C/D

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond W-E: DOWNSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Sta253+74

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.216 ac, 59.51% Impervious, Inflow Depth > 1.34" for 2y24h event
Inflow = 1.84 cfs @ 12.10 hrs, Volume= 0.135 af
Primary = 1.84 cfs @ 12.10 hrs, Volume= 0.135 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond W-G: UPSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Sta253+74

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.449 ac, 66.17% Impervious, Inflow Depth > 1.62" for 2y24h event
Inflow = 2.70 cfs @ 12.09 hrs, Volume= 0.196 af
Primary = 2.70 cfs @ 12.09 hrs, Volume= 0.196 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond W-H:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 6.253 ac, 37.45% Impervious, Inflow Depth > 1.02" for 2y24h event
Inflow = 3.90 cfs @ 12.48 hrs, Volume= 0.531 af
Primary = 3.90 cfs @ 12.48 hrs, Volume= 0.531 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond W-I: Wetland I

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.503 ac, 76.18% Impervious, Inflow Depth > 2.26" for 2y24h event
Inflow = 1.29 cfs @ 12.09 hrs, Volume= 0.095 af
Primary = 1.29 cfs @ 12.09 hrs, Volume= 0.095 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1: EDA Runoff Area=27,790 sf 96.88% Impervious Runoff Depth>4.84"
Tc=6.0 min CN=97 Runoff=3.15 cfs 0.257 af

Subcatchment 2: EDA Runoff Area=11,386 sf 94.54% Impervious Runoff Depth>4.61"
Tc=6.0 min CN=95 Runoff=1.27 cfs 0.101 af

Subcatchment 3: EDA Runoff Area=52,497 sf 81.12% Impervious Runoff Depth>3.96"
Tc=6.0 min CN=89 Runoff=5.30 cfs 0.398 af

Subcatchment 4: EDA Runoff Area=123,722 sf 83.84% Impervious Runoff Depth>4.06"
Tc=13.6 min CN=90 Runoff=10.20 cfs 0.961 af

Subcatchment 5: EDA Runoff Area=22,514 sf 60.31% Impervious Runoff Depth>2.79"
Tc=8.8 min CN=77 Runoff=1.50 cfs 0.120 af

Subcatchment 6: EDA Runoff Area=26,496 sf 80.11% Impervious Runoff Depth>4.28"
Tc=6.0 min CN=92 Runoff=2.83 cfs 0.217 af

Subcatchment 7A: EDA Runoff Area=40,680 sf 65.46% Impervious Runoff Depth>3.26"
Tc=7.0 min CN=82 Runoff=3.39 cfs 0.253 af

Subcatchment 7B: EDA Runoff Area=11,116 sf 48.11% Impervious Runoff Depth>2.18"
Tc=6.0 min CN=70 Runoff=0.63 cfs 0.046 af

Subcatchment 8A: EDA Runoff Area=37,408 sf 66.89% Impervious Runoff Depth>3.65"
Tc=9.0 min CN=86 Runoff=3.21 cfs 0.261 af

Subcatchment 8B: EDA Runoff Area=5,418 sf 0.00% Impervious Runoff Depth>0.14"
Tc=6.0 min CN=36 Runoff=0.00 cfs 0.001 af

Subcatchment 9A: EDA Runoff Area=48,757 sf 59.89% Impervious Runoff Depth>2.88"
Tc=6.0 min CN=78 Runoff=3.71 cfs 0.269 af

Subcatchment 9B: EDA Runoff Area=4,197 sf 55.06% Impervious Runoff Depth>2.70"
Tc=6.0 min CN=76 Runoff=0.30 cfs 0.022 af

Subcatchment 10A: EDA Runoff Area=37,841 sf 70.13% Impervious Runoff Depth>3.45"
Tc=6.0 min CN=84 Runoff=3.41 cfs 0.250 af

Subcatchment 10B: EDA Runoff Area=25,272 sf 60.25% Impervious Runoff Depth>2.97"
Tc=6.0 min CN=79 Runoff=1.98 cfs 0.144 af

Subcatchment 11: EDA Runoff Area=21,893 sf 76.18% Impervious Runoff Depth>4.07"
Tc=6.0 min CN=90 Runoff=2.26 cfs 0.170 af

Subcatchment 12: EDA Runoff Area=14,367 sf 64.65% Impervious Runoff Depth>3.16"
Tc=6.0 min CN=81 Runoff=1.20 cfs 0.087 af

Subcatchment 13: EDA Runoff Area=11,148 sf 19.19% Impervious Runoff Depth>1.42"
Tc=6.0 min CN=60 Runoff=0.38 cfs 0.030 af

Subcatchment 14A: EDA Runoff Area=11,849 sf 73.75% Impervious Runoff Depth>3.55"
Tc=6.0 min CN=85 Runoff=1.10 cfs 0.080 af

Subcatchment 14B: EDA Runoff Area=59,685 sf 67.04% Impervious Runoff Depth>3.07"
Tc=6.1 min CN=80 Runoff=4.81 cfs 0.350 af

Subcatchment 15: EDA Runoff Area=8,734 sf 63.20% Impervious Runoff Depth>3.07"
Tc=6.0 min CN=80 Runoff=0.71 cfs 0.051 af

Subcatchment 16: EDA Runoff Area=11,582 sf 52.73% Impervious Runoff Depth>2.52"
Tc=6.0 min CN=74 Runoff=0.77 cfs 0.056 af

Subcatchment 17: EDA Runoff Area=16,849 sf 63.60% Impervious Runoff Depth>3.45"
Tc=6.0 min CN=84 Runoff=1.52 cfs 0.111 af

Subcatchment 18A: EDA Runoff Area=267,229 sf 37.25% Impervious Runoff Depth>2.42"
Tc=31.7 min CN=73 Runoff=9.59 cfs 1.238 af

Subcatchment 18B: EDA Runoff Area=5,148 sf 47.92% Impervious Runoff Depth>2.35"
Tc=6.0 min CN=72 Runoff=0.32 cfs 0.023 af

Subcatchment 19: EDA Runoff Area=7,862 sf 48.17% Impervious Runoff Depth>1.86"
Tc=6.0 min CN=66 Runoff=0.37 cfs 0.028 af

Subcatchment 20: EDA Runoff Area=217,219 sf 38.40% Impervious Runoff Depth>3.85"
Flow Length=455' Slope=0.0900 '/' Tc=16.1 min CN=88 Runoff=16.22 cfs 1.600 af

Subcatchment 21: EDA Runoff Area=4,489 sf 28.98% Impervious Runoff Depth>3.26"
Tc=6.0 min CN=82 Runoff=0.38 cfs 0.028 af

Reach DP1: Inflow=3.15 cfs 0.257 af
Outflow=3.15 cfs 0.257 af

Reach DP10: Inflow=5.40 cfs 0.394 af
Outflow=5.40 cfs 0.394 af

Reach DP11: Inflow=2.26 cfs 0.170 af
Outflow=2.26 cfs 0.170 af

Reach DP12: Inflow=1.20 cfs 0.087 af
Outflow=1.20 cfs 0.087 af

Reach DP13: Inflow=0.38 cfs 0.030 af
Outflow=0.38 cfs 0.030 af

Reach DP14: Inflow=5.91 cfs 0.430 af
Outflow=5.91 cfs 0.430 af

Reach DP15:	Inflow=0.71 cfs 0.051 af Outflow=0.71 cfs 0.051 af
Reach DP16:	Inflow=0.77 cfs 0.056 af Outflow=0.77 cfs 0.056 af
Reach DP17:	Inflow=1.52 cfs 0.111 af Outflow=1.52 cfs 0.111 af
Reach DP18:	Inflow=9.59 cfs 1.238 af Outflow=9.59 cfs 1.238 af
Reach DP19:	Inflow=0.37 cfs 0.028 af Outflow=0.37 cfs 0.028 af
Reach DP2:	Inflow=1.27 cfs 0.101 af Outflow=1.27 cfs 0.101 af
Reach DP20:	Inflow=16.22 cfs 1.600 af Outflow=16.22 cfs 1.600 af
Reach DP21:	Inflow=0.38 cfs 0.028 af Outflow=0.38 cfs 0.028 af
Reach DP3:	Inflow=5.30 cfs 0.398 af Outflow=5.30 cfs 0.398 af
Reach DP4:	Inflow=10.20 cfs 0.961 af Outflow=10.20 cfs 0.961 af
Reach DP5:	Inflow=1.50 cfs 0.120 af Outflow=1.50 cfs 0.120 af
Reach DP6:	Inflow=2.83 cfs 0.217 af Outflow=2.83 cfs 0.217 af
Reach DP7:	Inflow=4.02 cfs 0.300 af Outflow=4.02 cfs 0.300 af
Reach DP8:	Inflow=3.21 cfs 0.263 af Outflow=3.21 cfs 0.263 af
Reach DP9:	Inflow=4.01 cfs 0.290 af Outflow=4.01 cfs 0.290 af
Pond 1P: DEP WETLAND W/ VERNAL POOLS	Inflow=1.50 cfs 0.120 af Primary=1.50 cfs 0.120 af
Pond 1W: DEP WETLAND AT UPSTREAM OF 3.5X1.5 CULVERT @ STA219+90	Inflow=2.83 cfs 0.217 af Primary=2.83 cfs 0.217 af

Pond 2P: Existing Basin Peak Elev=86.44' Storage=1,008 cf Inflow=0.32 cfs 0.023 af
Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond W-A: DOWNSTREAM OF 3.5X1.5 CULVERT @ STA219+90 Inflow=14.14 cfs 1.359 af
Primary=14.14 cfs 1.359 af

Pond W-C: UPSTREAM OF 36"CULVERT @ 238+49 Inflow=3.21 cfs 0.263 af
Primary=3.21 cfs 0.263 af

Pond W-C/D: Wetland -C/D Inflow=7.20 cfs 0.562 af
Primary=7.20 cfs 0.562 af

Pond W-D: DOWNSTREAM OF 36"CULVERT @ 238+49 Inflow=4.02 cfs 0.300 af
Primary=4.02 cfs 0.300 af

Pond W-E: DOWNSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Inflow=4.01 cfs 0.290 af
Primary=4.01 cfs 0.290 af

Pond W-G: UPSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Inflow=5.40 cfs 0.394 af
Primary=5.40 cfs 0.394 af

Pond W-H: Inflow=9.59 cfs 1.238 af
Primary=9.59 cfs 1.238 af

Pond W-I: Wetland I Inflow=2.26 cfs 0.170 af
Primary=2.26 cfs 0.170 af

Total Runoff Area = 26.013 ac Runoff Volume = 7.153 af Average Runoff Depth = 3.30"
43.63% Pervious = 11.349 ac 56.37% Impervious = 14.665 ac

Summary for Subcatchment 1: EDA

Runoff = 3.15 cfs @ 12.09 hrs, Volume= 0.257 af, Depth> 4.84"
Routed to Reach DP1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
26,924	98	Paved roads w/curbs & sewers, HSG A
866	68	<50% Grass cover, Poor, HSG A
27,790	97	Weighted Average
866		3.12% Pervious Area
26,924		96.88% Impervious Area

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

Summary for Subcatchment 2: EDA

Runoff = 1.27 cfs @ 12.09 hrs, Volume= 0.101 af, Depth> 4.61"
Routed to Reach DP2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
10,764	98	Paved roads w/curbs & sewers, HSG A
622	49	50-75% Grass cover, Fair, HSG A
11,386	95	Weighted Average
622		5.46% Pervious Area
10,764		94.54% Impervious Area

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

Summary for Subcatchment 3: EDA

Runoff = 5.30 cfs @ 12.09 hrs, Volume= 0.398 af, Depth> 3.96"
Routed to Reach DP3 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
42,583	98	Paved roads w/curbs & sewers, HSG A
6,681	49	50-75% Grass cover, Fair, HSG A
3,233	45	Woods, Poor, HSG A
52,497	89	Weighted Average
9,914		18.88% Pervious Area
42,583		81.12% Impervious Area

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

Summary for Subcatchment 4: EDA

Runoff = 10.20 cfs @ 12.18 hrs, Volume= 0.961 af, Depth> 4.06"
Routed to Reach DP4 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
103,725	98	Paved roads w/curbs & sewers, HSG A
18,190	49	50-75% Grass cover, Fair, HSG A
1,807	36	Woods, Fair, HSG A
123,722	90	Weighted Average
19,997		16.16% Pervious Area
103,725		83.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 5: EDA

Runoff = 1.50 cfs @ 12.13 hrs, Volume= 0.120 af, Depth> 2.79"
Routed to Reach DP5 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
13,579	98	Paved roads w/curbs & sewers, HSG A
1,652	49	50-75% Grass cover, Fair, HSG A
7,283	45	Woods, Poor, HSG A
22,514	77	Weighted Average
8,935		39.69% Pervious Area
13,579		60.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 6: EDA

Runoff = 2.83 cfs @ 12.09 hrs, Volume= 0.217 af, Depth> 4.28"
Routed to Reach DP6 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
21,227	98	Paved roads w/curbs & sewers, HSG B
2,835	69	50-75% Grass cover, Fair, HSG B
2,434	65	Woods/grass comb., Fair, HSG B
26,496	92	Weighted Average
5,269		19.89% Pervious Area
21,227		80.11% Impervious Area

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

Summary for Subcatchment 7A: EDA

Runoff = 3.39 cfs @ 12.10 hrs, Volume= 0.253 af, Depth> 3.26"
Routed to Reach DP7 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
26,629	98	Paved roads w/curbs & sewers, HSG A
2,718	49	50-75% Grass cover, Fair, HSG A
6,904	36	Woods, Fair, HSG A
4,429	76	Gravel roads, HSG A
40,680	82	Weighted Average
14,051		34.54% Pervious Area
26,629		65.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 7B: EDA

Runoff = 0.63 cfs @ 12.10 hrs, Volume= 0.046 af, Depth> 2.18"
Routed to Reach DP7 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
5,348	98	Paved roads w/curbs & sewers, HSG A
3,154	49	50-75% Grass cover, Fair, HSG A
2,614	36	Woods, Fair, HSG A
11,116	70	Weighted Average
5,768		51.89% Pervious Area
5,348		48.11% Impervious Area

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

Summary for Subcatchment 8A: EDA

Runoff = 3.21 cfs @ 12.13 hrs, Volume= 0.261 af, Depth> 3.65"
Routed to Reach DP8 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
25,023	98	Paved roads w/curbs & sewers, HSG B
4,412	69	50-75% Grass cover, Fair, HSG B
7,973	60	Woods, Fair, HSG B
37,408	86	Weighted Average
12,385		33.11% Pervious Area
25,023		66.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 8B: EDA

Runoff = 0.00 cfs @ 14.61 hrs, Volume= 0.001 af, Depth> 0.14"
Routed to Reach DP8 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
5,418	36	Woods, Fair, HSG A
5,418		100.00% Pervious Area

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

Summary for Subcatchment 9A: EDA

Runoff = 3.71 cfs @ 12.09 hrs, Volume= 0.269 af, Depth> 2.88"
Routed to Reach DP9 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
29,203	98	Paved roads w/curbs & sewers, HSG A
19,554	49	50-75% Grass cover, Fair, HSG A
48,757	78	Weighted Average
19,554		40.11% Pervious Area
29,203		59.89% Impervious Area

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

Summary for Subcatchment 9B: EDA

Runoff = 0.30 cfs @ 12.09 hrs, Volume= 0.022 af, Depth> 2.70"
Routed to Reach DP9 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
2,311	98	Paved roads w/curbs & sewers, HSG A
1,886	49	50-75% Grass cover, Fair, HSG A
4,197	76	Weighted Average
1,886		44.94% Pervious Area
2,311		55.06% Impervious Area

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

Summary for Subcatchment 10A: EDA

Runoff = 3.41 cfs @ 12.09 hrs, Volume= 0.250 af, Depth> 3.45"
Routed to Reach DP10 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
26,539	98	Paved roads w/curbs & sewers, HSG A
11,094	49	50-75% Grass cover, Fair, HSG A
208	76	Gravel roads, HSG A
37,841	84	Weighted Average
11,302		29.87% Pervious Area
26,539		70.13% Impervious Area

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

Summary for Subcatchment 10B: EDA

Runoff = 1.98 cfs @ 12.09 hrs, Volume= 0.144 af, Depth> 2.97"
Routed to Reach DP10 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
15,226	98	Paved roads w/curbs & sewers, HSG A
10,046	49	50-75% Grass cover, Fair, HSG A
25,272	79	Weighted Average
10,046		39.75% Pervious Area
15,226		60.25% Impervious Area

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

Summary for Subcatchment 11: EDA

Runoff = 2.26 cfs @ 12.09 hrs, Volume= 0.170 af, Depth> 4.07"
Routed to Reach DP11 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
16,677	98	Paved roads w/curbs & sewers, HSG B
3,572	69	50-75% Grass cover, Fair, HSG B
1,644	60	Woods, Fair, HSG B
21,893	90	Weighted Average
5,216		23.82% Pervious Area
16,677		76.18% Impervious Area

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

Summary for Subcatchment 12: EDA

Runoff = 1.20 cfs @ 12.09 hrs, Volume= 0.087 af, Depth> 3.16"
Routed to Reach DP12 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
9,288	98	Paved roads w/curbs & sewers, HSG A
5,079	49	50-75% Grass cover, Fair, HSG A
14,367	81	Weighted Average
5,079		35.35% Pervious Area
9,288		64.65% Impervious Area

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

Summary for Subcatchment 13: EDA

Runoff = 0.38 cfs @ 12.10 hrs, Volume= 0.030 af, Depth> 1.42"
Routed to Reach DP13 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
2,139	98	Paved roads w/curbs & sewers, HSG A
8,245	49	50-75% Grass cover, Fair, HSG A
764	76	Gravel roads, HSG A
11,148	60	Weighted Average
9,009		80.81% Pervious Area
2,139		19.19% Impervious Area

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

Summary for Subcatchment 14A: EDA

Runoff = 1.10 cfs @ 12.09 hrs, Volume= 0.080 af, Depth> 3.55"
Routed to Reach DP14 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
8,739	98	Paved roads w/curbs & sewers, HSG A
3,110	49	50-75% Grass cover, Fair, HSG A
11,849	85	Weighted Average
3,110		26.25% Pervious Area
8,739		73.75% Impervious Area

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

Summary for Subcatchment 14B: EDA

Runoff = 4.81 cfs @ 12.09 hrs, Volume= 0.350 af, Depth> 3.07"
Routed to Reach DP14 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
40,012	98	Paved roads w/curbs & sewers, HSG A
10,242	49	50-75% Grass cover, Fair, HSG A
9,431	36	Woods, Fair, HSG A
59,685	80	Weighted Average
19,673		32.96% Pervious Area
40,012		67.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 15: EDA

Runoff = 0.71 cfs @ 12.09 hrs, Volume= 0.051 af, Depth> 3.07"
Routed to Reach DP15 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
5,520	98	Paved roads w/curbs & sewers, HSG A
3,214	49	50-75% Grass cover, Fair, HSG A
8,734	80	Weighted Average
3,214		36.80% Pervious Area
5,520		63.20% Impervious Area

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

Summary for Subcatchment 16: EDA

Runoff = 0.77 cfs @ 12.09 hrs, Volume= 0.056 af, Depth> 2.52"
Routed to Reach DP16 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
6,107	98	Paved roads w/curbs & sewers, HSG A
4,630	49	50-75% Grass cover, Fair, HSG A
845	36	Woods, Fair, HSG A
11,582	74	Weighted Average
5,475		47.27% Pervious Area
6,107		52.73% Impervious Area

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

Summary for Subcatchment 17: EDA

Runoff = 1.52 cfs @ 12.09 hrs, Volume= 0.111 af, Depth> 3.45"
Routed to Reach DP17 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
10,716	98	Paved roads w/curbs & sewers, HSG A
3,641	49	50-75% Grass cover, Fair, HSG A
2,492	76	Gravel roads, HSG A
16,849	84	Weighted Average
6,133		36.40% Pervious Area
10,716		63.60% Impervious Area

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

Summary for Subcatchment 18A: EDA

Runoff = 9.59 cfs @ 12.46 hrs, Volume= 1.238 af, Depth> 2.42"
Routed to Reach DP18 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
99,544	98	Paved roads w/curbs & sewers, HSG A
37,004	49	50-75% Grass cover, Fair, HSG A
56,609	36	Woods, Fair, HSG A
31,170	79	Woods, Fair, HSG D
26,944	76	Gravel roads, HSG A
15,958	91	Gravel roads, HSG D
267,229	73	Weighted Average
167,685		62.75% Pervious Area
99,544		37.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.7					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 18B: EDA

AREA GOING TO THE EXISTING BMP

Runoff = 0.32 cfs @ 12.10 hrs, Volume= 0.023 af, Depth> 2.35"
Routed to Pond 2P : Existing Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
2,467	98	Paved roads w/curbs & sewers, HSG A
2,681	49	50-75% Grass cover, Fair, HSG A
5,148	72	Weighted Average
2,681		52.08% Pervious Area
2,467		47.92% Impervious Area

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

Summary for Subcatchment 19: EDA

Runoff = 0.37 cfs @ 12.10 hrs, Volume= 0.028 af, Depth> 1.86"
Routed to Reach DP19 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
3,787	98	Unconnected pavement, HSG A
4,075	36	Woods, Fair, HSG A
7,862	66	Weighted Average
4,075		51.83% Pervious Area
3,787		48.17% Impervious Area
3,787		100.00% Unconnected

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

Summary for Subcatchment 20: EDA

Runoff = 16.22 cfs @ 12.22 hrs, Volume= 1.600 af, Depth> 3.85"
Routed to Reach DP20 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

	Area (sf)	CN	Description
*	83,409	98	Impervious
	8,137	74	>75% Grass cover, Good, HSG C
	9,133	80	>75% Grass cover, Good, HSG D
	23,541	70	Woods, Good, HSG C
	41,329	77	Woods, Good, HSG D
	51,670	91	Gravel roads, HSG D
	217,219	88	Weighted Average
	133,810		61.60% Pervious Area
	83,409		38.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0900	0.07		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.30"
4.5	405	0.0900	1.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
16.1	455	Total			

Summary for Subcatchment 21: EDA

Runoff = 0.38 cfs @ 12.09 hrs, Volume= 0.028 af, Depth> 3.26"
Routed to Reach DP21 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
1,301	98	Paved roads w/curbs & sewers, HSG C
1,640	79	50-75% Grass cover, Fair, HSG C
1,548	73	Woods, Fair, HSG C
4,489	82	Weighted Average
3,188		71.02% Pervious Area
1,301		28.98% Impervious Area

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

Summary for Reach DP1:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.638 ac, 96.88% Impervious, Inflow Depth > 4.84" for 10y24h event
Inflow = 3.15 cfs @ 12.09 hrs, Volume= 0.257 af
Outflow = 3.15 cfs @ 12.09 hrs, Volume= 0.257 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP10:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.449 ac, 66.17% Impervious, Inflow Depth > 3.26" for 10y24h event
Inflow = 5.40 cfs @ 12.09 hrs, Volume= 0.394 af
Outflow = 5.40 cfs @ 12.09 hrs, Volume= 0.394 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-G : UPSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Sta253+74

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP11:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.503 ac, 76.18% Impervious, Inflow Depth > 4.07" for 10y24h event
Inflow = 2.26 cfs @ 12.09 hrs, Volume= 0.170 af
Outflow = 2.26 cfs @ 12.09 hrs, Volume= 0.170 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-I : Wetland I

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP12:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.330 ac, 64.65% Impervious, Inflow Depth > 3.16" for 10y24h event
Inflow = 1.20 cfs @ 12.09 hrs, Volume= 0.087 af
Outflow = 1.20 cfs @ 12.09 hrs, Volume= 0.087 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP13:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.256 ac, 19.19% Impervious, Inflow Depth > 1.42" for 10y24h event
Inflow = 0.38 cfs @ 12.10 hrs, Volume= 0.030 af
Outflow = 0.38 cfs @ 12.10 hrs, Volume= 0.030 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP14:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.642 ac, 68.15% Impervious, Inflow Depth > 3.15" for 10y24h event
Inflow = 5.91 cfs @ 12.09 hrs, Volume= 0.430 af
Outflow = 5.91 cfs @ 12.09 hrs, Volume= 0.430 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP15:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.201 ac, 63.20% Impervious, Inflow Depth > 3.07" for 10y24h event
Inflow = 0.71 cfs @ 12.09 hrs, Volume= 0.051 af
Outflow = 0.71 cfs @ 12.09 hrs, Volume= 0.051 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP16:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.266 ac, 52.73% Impervious, Inflow Depth > 2.52" for 10y24h event
Inflow = 0.77 cfs @ 12.09 hrs, Volume= 0.056 af
Outflow = 0.77 cfs @ 12.09 hrs, Volume= 0.056 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP17:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.387 ac, 63.60% Impervious, Inflow Depth > 3.45" for 10y24h event
Inflow = 1.52 cfs @ 12.09 hrs, Volume= 0.111 af
Outflow = 1.52 cfs @ 12.09 hrs, Volume= 0.111 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP18:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 6.135 ac, 37.25% Impervious, Inflow Depth > 2.42" for 10y24h event
Inflow = 9.59 cfs @ 12.46 hrs, Volume= 1.238 af
Outflow = 9.59 cfs @ 12.46 hrs, Volume= 1.238 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-H :

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP19:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.180 ac, 48.17% Impervious, Inflow Depth > 1.86" for 10y24h event
Inflow = 0.37 cfs @ 12.10 hrs, Volume= 0.028 af
Outflow = 0.37 cfs @ 12.10 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP2:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.261 ac, 94.54% Impervious, Inflow Depth > 4.61" for 10y24h event
Inflow = 1.27 cfs @ 12.09 hrs, Volume= 0.101 af
Outflow = 1.27 cfs @ 12.09 hrs, Volume= 0.101 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP20:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.987 ac, 38.40% Impervious, Inflow Depth > 3.85" for 10y24h event
Inflow = 16.22 cfs @ 12.22 hrs, Volume= 1.600 af
Outflow = 16.22 cfs @ 12.22 hrs, Volume= 1.600 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP21:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.103 ac, 28.98% Impervious, Inflow Depth > 3.26" for 10y24h event
Inflow = 0.38 cfs @ 12.09 hrs, Volume= 0.028 af
Outflow = 0.38 cfs @ 12.09 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP3:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.205 ac, 81.12% Impervious, Inflow Depth > 3.96" for 10y24h event
Inflow = 5.30 cfs @ 12.09 hrs, Volume= 0.398 af
Outflow = 5.30 cfs @ 12.09 hrs, Volume= 0.398 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-A : DOWNSTREAM OF 3.5X1.5 CULVERT @ STA219+90

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP4:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.840 ac, 83.84% Impervious, Inflow Depth > 4.06" for 10y24h event
Inflow = 10.20 cfs @ 12.18 hrs, Volume= 0.961 af
Outflow = 10.20 cfs @ 12.18 hrs, Volume= 0.961 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-A : DOWNSTREAM OF 3.5X1.5 CULVERT @ STA219+90

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP5:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.517 ac, 60.31% Impervious, Inflow Depth > 2.79" for 10y24h event
Inflow = 1.50 cfs @ 12.13 hrs, Volume= 0.120 af
Outflow = 1.50 cfs @ 12.13 hrs, Volume= 0.120 af, Atten= 0%, Lag= 0.0 min
Routed to Pond 1P : DEP WETLAND W/ VERNAL POOLS

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP6:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.608 ac, 80.11% Impervious, Inflow Depth > 4.28" for 10y24h event
Inflow = 2.83 cfs @ 12.09 hrs, Volume= 0.217 af
Outflow = 2.83 cfs @ 12.09 hrs, Volume= 0.217 af, Atten= 0%, Lag= 0.0 min
Routed to Pond 1W : DEP WETLAND AT UPSTREAM OF 3.5X1.5 CULVERT @ STA219+90

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP7:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.189 ac, 61.74% Impervious, Inflow Depth > 3.03" for 10y24h event
Inflow = 4.02 cfs @ 12.10 hrs, Volume= 0.300 af
Outflow = 4.02 cfs @ 12.10 hrs, Volume= 0.300 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-D : DOWNSTREAM OF 36"CULVERT @ 238+49

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP8:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.983 ac, 58.43% Impervious, Inflow Depth > 3.21" for 10y24h event
Inflow = 3.21 cfs @ 12.13 hrs, Volume= 0.263 af
Outflow = 3.21 cfs @ 12.13 hrs, Volume= 0.263 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-C : UPSTREAM OF 36"CULVERT @ 238+49

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP9:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.216 ac, 59.51% Impervious, Inflow Depth > 2.87" for 10y24h event
Inflow = 4.01 cfs @ 12.09 hrs, Volume= 0.290 af
Outflow = 4.01 cfs @ 12.09 hrs, Volume= 0.290 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-E : DOWNSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Sta253+74

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond 1P: DEP WETLAND W/ VERNAL POOLS

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.517 ac, 60.31% Impervious, Inflow Depth > 2.79" for 10y24h event
Inflow = 1.50 cfs @ 12.13 hrs, Volume= 0.120 af
Primary = 1.50 cfs @ 12.13 hrs, Volume= 0.120 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond 1W: DEP WETLAND AT UPSTREAM OF 3.5X1.5 CULVERT @ STA219+90

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.608 ac, 80.11% Impervious, Inflow Depth > 4.28" for 10y24h event
Inflow = 2.83 cfs @ 12.09 hrs, Volume= 0.217 af
Primary = 2.83 cfs @ 12.09 hrs, Volume= 0.217 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond 2P: Existing Basin

Inflow Area = 0.118 ac, 47.92% Impervious, Inflow Depth > 2.35" for 10y24h event
Inflow = 0.32 cfs @ 12.10 hrs, Volume= 0.023 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond W-H :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond W-H :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 86.44' @ 24.00 hrs Surf.Area= 1,465 sf Storage= 1,008 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	85.50'	2,145 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
85.50	652	195.0	0	0	652
86.00	1,139	255.0	442	442	2,804
86.50	1,516	290.0	662	1,104	4,328
87.00	1,884	297.0	848	1,952	4,686
87.10	1,974	299.0	193	2,145	4,785

Device	Routing	Invert	Outlet Devices
#1	Secondary	86.90'	**20.0' long x 10.0' 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) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Primary	84.00'	**12.0" Round RCP_Round 12"** L= 100.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 84.00' / 83.50' S= 0.0050 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf
#3	Device 2	86.47'	**Custom Orifice, Cv= 3.20 (C= 4.00)** Head (feet) 0.00 0.50 Width (feet) 3.00 3.00

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=85.50' (Free Discharge)
└─**2=RCP_Round 12"** (Passes 0.00 cfs of 2.93 cfs potential flow)
└─**3=Custom Orifice** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=85.50' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond W-A: DOWNSTREAM OF 3.5X1.5 CULVERT @ STA219+90

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.045 ac, 83.03% Impervious, Inflow Depth > 4.03" for 10y24h event
Inflow = 14.14 cfs @ 12.14 hrs, Volume= 1.359 af
Primary = 14.14 cfs @ 12.14 hrs, Volume= 1.359 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond W-C: UPSTREAM OF 36"CULVERT @ 238+49

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.983 ac, 58.43% Impervious, Inflow Depth > 3.21" for 10y24h event
Inflow = 3.21 cfs @ 12.13 hrs, Volume= 0.263 af
Primary = 3.21 cfs @ 12.13 hrs, Volume= 0.263 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-C/D : Wetland -C/D

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond W-C/D: Wetland -C/D

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.172 ac, 60.24% Impervious, Inflow Depth > 3.11" for 10y24h event
Inflow = 7.20 cfs @ 12.11 hrs, Volume= 0.562 af
Primary = 7.20 cfs @ 12.11 hrs, Volume= 0.562 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond W-D: DOWNSTREAM OF 36"CULVERT @ 238+49

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.189 ac, 61.74% Impervious, Inflow Depth > 3.03" for 10y24h event
Inflow = 4.02 cfs @ 12.10 hrs, Volume= 0.300 af
Primary = 4.02 cfs @ 12.10 hrs, Volume= 0.300 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-C/D : Wetland -C/D

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond W-E: DOWNSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Sta253+74

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.216 ac, 59.51% Impervious, Inflow Depth > 2.87" for 10y24h event
Inflow = 4.01 cfs @ 12.09 hrs, Volume= 0.290 af
Primary = 4.01 cfs @ 12.09 hrs, Volume= 0.290 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond W-G: UPSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Sta253+74

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.449 ac, 66.17% Impervious, Inflow Depth > 3.26" for 10y24h event
Inflow = 5.40 cfs @ 12.09 hrs, Volume= 0.394 af
Primary = 5.40 cfs @ 12.09 hrs, Volume= 0.394 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond W-H:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 6.253 ac, 37.45% Impervious, Inflow Depth > 2.38" for 10y24h event
Inflow = 9.59 cfs @ 12.46 hrs, Volume= 1.238 af
Primary = 9.59 cfs @ 12.46 hrs, Volume= 1.238 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond W-I: Wetland I

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.503 ac, 76.18% Impervious, Inflow Depth > 4.07" for 10y24h event
Inflow = 2.26 cfs @ 12.09 hrs, Volume= 0.170 af
Primary = 2.26 cfs @ 12.09 hrs, Volume= 0.170 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1: EDA Runoff Area=27,790 sf 96.88% Impervious Runoff Depth>6.03"
Tc=6.0 min CN=97 Runoff=3.89 cfs 0.321 af

Subcatchment 2: EDA Runoff Area=11,386 sf 94.54% Impervious Runoff Depth>5.80"
Tc=6.0 min CN=95 Runoff=1.57 cfs 0.126 af

Subcatchment 3: EDA Runoff Area=52,497 sf 81.12% Impervious Runoff Depth>5.11"
Tc=6.0 min CN=89 Runoff=6.75 cfs 0.513 af

Subcatchment 4: EDA Runoff Area=123,722 sf 83.84% Impervious Runoff Depth>5.22"
Tc=13.6 min CN=90 Runoff=12.93 cfs 1.235 af

Subcatchment 5: EDA Runoff Area=22,514 sf 60.31% Impervious Runoff Depth>3.82"
Tc=8.8 min CN=77 Runoff=2.06 cfs 0.164 af

Subcatchment 6: EDA Runoff Area=26,496 sf 80.11% Impervious Runoff Depth>5.45"
Tc=6.0 min CN=92 Runoff=3.55 cfs 0.276 af

Subcatchment 7A: EDA Runoff Area=40,680 sf 65.46% Impervious Runoff Depth>4.34"
Tc=7.0 min CN=82 Runoff=4.49 cfs 0.338 af

Subcatchment 7B: EDA Runoff Area=11,116 sf 48.11% Impervious Runoff Depth>3.11"
Tc=6.0 min CN=70 Runoff=0.91 cfs 0.066 af

Subcatchment 8A: EDA Runoff Area=37,408 sf 66.89% Impervious Runoff Depth>4.78"
Tc=9.0 min CN=86 Runoff=4.17 cfs 0.342 af

Subcatchment 8B: EDA Runoff Area=5,418 sf 0.00% Impervious Runoff Depth>0.39"
Tc=6.0 min CN=36 Runoff=0.02 cfs 0.004 af

Subcatchment 9A: EDA Runoff Area=48,757 sf 59.89% Impervious Runoff Depth>3.92"
Tc=6.0 min CN=78 Runoff=5.03 cfs 0.366 af

Subcatchment 9B: EDA Runoff Area=4,197 sf 55.06% Impervious Runoff Depth>3.72"
Tc=6.0 min CN=76 Runoff=0.41 cfs 0.030 af

Subcatchment 10A: EDA Runoff Area=37,841 sf 70.13% Impervious Runoff Depth>4.56"
Tc=6.0 min CN=84 Runoff=4.46 cfs 0.330 af

Subcatchment 10B: EDA Runoff Area=25,272 sf 60.25% Impervious Runoff Depth>4.03"
Tc=6.0 min CN=79 Runoff=2.67 cfs 0.195 af

Subcatchment 11: EDA Runoff Area=21,893 sf 76.18% Impervious Runoff Depth>5.22"
Tc=6.0 min CN=90 Runoff=2.86 cfs 0.219 af

Subcatchment 12: EDA Runoff Area=14,367 sf 64.65% Impervious Runoff Depth>4.24"
Tc=6.0 min CN=81 Runoff=1.59 cfs 0.116 af

Subcatchment 13: EDA Runoff Area=11,148 sf 19.19% Impervious Runoff Depth>2.18"
Tc=6.0 min CN=60 Runoff=0.62 cfs 0.046 af

Subcatchment 14A: EDA Runoff Area=11,849 sf 73.75% Impervious Runoff Depth>4.67"
Tc=6.0 min CN=85 Runoff=1.42 cfs 0.106 af

Subcatchment 14B: EDA Runoff Area=59,685 sf 67.04% Impervious Runoff Depth>4.13"
Tc=6.1 min CN=80 Runoff=6.45 cfs 0.472 af

Subcatchment 15: EDA Runoff Area=8,734 sf 63.20% Impervious Runoff Depth>4.13"
Tc=6.0 min CN=80 Runoff=0.95 cfs 0.069 af

Subcatchment 16: EDA Runoff Area=11,582 sf 52.73% Impervious Runoff Depth>3.51"
Tc=6.0 min CN=74 Runoff=1.07 cfs 0.078 af

Subcatchment 17: EDA Runoff Area=16,849 sf 63.60% Impervious Runoff Depth>4.56"
Tc=6.0 min CN=84 Runoff=1.99 cfs 0.147 af

Subcatchment 18A: EDA Runoff Area=267,229 sf 37.25% Impervious Runoff Depth>3.39"
Tc=31.7 min CN=73 Runoff=13.52 cfs 1.734 af

Subcatchment 18B: EDA Runoff Area=5,148 sf 47.92% Impervious Runoff Depth>3.31"
Tc=6.0 min CN=72 Runoff=0.45 cfs 0.033 af

Subcatchment 19: EDA Runoff Area=7,862 sf 48.17% Impervious Runoff Depth>2.73"
Tc=6.0 min CN=66 Runoff=0.56 cfs 0.041 af

Subcatchment 20: EDA Runoff Area=217,219 sf 38.40% Impervious Runoff Depth>4.99"
Flow Length=455' Slope=0.0900 '/' Tc=16.1 min CN=88 Runoff=20.78 cfs 2.074 af

Subcatchment 21: EDA Runoff Area=4,489 sf 28.98% Impervious Runoff Depth>4.34"
Tc=6.0 min CN=82 Runoff=0.51 cfs 0.037 af

Reach DP1: Inflow=3.89 cfs 0.321 af
Outflow=3.89 cfs 0.321 af

Reach DP10: Inflow=7.13 cfs 0.525 af
Outflow=7.13 cfs 0.525 af

Reach DP11: Inflow=2.86 cfs 0.219 af
Outflow=2.86 cfs 0.219 af

Reach DP12: Inflow=1.59 cfs 0.116 af
Outflow=1.59 cfs 0.116 af

Reach DP13: Inflow=0.62 cfs 0.046 af
Outflow=0.62 cfs 0.046 af

Reach DP14: Inflow=7.87 cfs 0.578 af
Outflow=7.87 cfs 0.578 af

Reach DP15: Inflow=0.95 cfs 0.069 af
Outflow=0.95 cfs 0.069 af

Reach DP16: Inflow=1.07 cfs 0.078 af
Outflow=1.07 cfs 0.078 af

Reach DP17: Inflow=1.99 cfs 0.147 af
Outflow=1.99 cfs 0.147 af

Reach DP18: Inflow=13.52 cfs 1.734 af
Outflow=13.52 cfs 1.734 af

Reach DP19: Inflow=0.56 cfs 0.041 af
Outflow=0.56 cfs 0.041 af

Reach DP2: Inflow=1.57 cfs 0.126 af
Outflow=1.57 cfs 0.126 af

Reach DP20: Inflow=20.78 cfs 2.074 af
Outflow=20.78 cfs 2.074 af

Reach DP21: Inflow=0.51 cfs 0.037 af
Outflow=0.51 cfs 0.037 af

Reach DP3: Inflow=6.75 cfs 0.513 af
Outflow=6.75 cfs 0.513 af

Reach DP4: Inflow=12.93 cfs 1.235 af
Outflow=12.93 cfs 1.235 af

Reach DP5: Inflow=2.06 cfs 0.164 af
Outflow=2.06 cfs 0.164 af

Reach DP6: Inflow=3.55 cfs 0.276 af
Outflow=3.55 cfs 0.276 af

Reach DP7: Inflow=5.40 cfs 0.404 af
Outflow=5.40 cfs 0.404 af

Reach DP8: Inflow=4.17 cfs 0.346 af
Outflow=4.17 cfs 0.346 af

Reach DP9: Inflow=5.44 cfs 0.396 af
Outflow=5.44 cfs 0.396 af

Pond 1P: DEP WETLAND W/ VERNAL POOLS Inflow=2.06 cfs 0.164 af
Primary=2.06 cfs 0.164 af

Pond 1W: DEP WETLAND AT UPSTREAM OF 3.5X1.5 CULVERT @ STA219+90 Inflow=3.55 cfs 0.276 af
Primary=3.55 cfs 0.276 af

Pond 2P: Existing Basin Peak Elev=86.48' Storage=1,079 cf Inflow=0.45 cfs 0.033 af
Primary=0.02 cfs 0.008 af Secondary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.008 af

Pond W-A: DOWNSTREAM OF 3.5X1.5 CULVERT @ STA219+90 Inflow=17.95 cfs 1.748 af
Primary=17.95 cfs 1.748 af

Pond W-C: UPSTREAM OF 36"CULVERT @ 238+49 Inflow=4.17 cfs 0.346 af
Primary=4.17 cfs 0.346 af

Pond W-C/D: Wetland -C/D Inflow=9.51 cfs 0.750 af
Primary=9.51 cfs 0.750 af

Pond W-D: DOWNSTREAM OF 36"CULVERT @ 238+49 Inflow=5.40 cfs 0.404 af
Primary=5.40 cfs 0.404 af

Pond W-E: DOWNSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Inflow=5.44 cfs 0.396 af
Primary=5.44 cfs 0.396 af

Pond W-G: UPSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Inflow=7.13 cfs 0.525 af
Primary=7.13 cfs 0.525 af

Pond W-H: Inflow=13.52 cfs 1.743 af
Primary=13.52 cfs 1.743 af

Pond W-I: Wetland I Inflow=2.86 cfs 0.219 af
Primary=2.86 cfs 0.219 af

Total Runoff Area = 26.013 ac Runoff Volume = 9.478 af Average Runoff Depth = 4.37"
43.63% Pervious = 11.349 ac 56.37% Impervious = 14.665 ac

Summary for Subcatchment 1: EDA

Runoff = 3.89 cfs @ 12.09 hrs, Volume= 0.321 af, Depth> 6.03"
Routed to Reach DP1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
26,924	98	Paved roads w/curbs & sewers, HSG A
866	68	<50% Grass cover, Poor, HSG A
27,790	97	Weighted Average
866		3.12% Pervious Area
26,924		96.88% Impervious Area

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

Summary for Subcatchment 2: EDA

Runoff = 1.57 cfs @ 12.09 hrs, Volume= 0.126 af, Depth> 5.80"
Routed to Reach DP2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
10,764	98	Paved roads w/curbs & sewers, HSG A
622	49	50-75% Grass cover, Fair, HSG A
11,386	95	Weighted Average
622		5.46% Pervious Area
10,764		94.54% Impervious Area

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

Summary for Subcatchment 3: EDA

Runoff = 6.75 cfs @ 12.09 hrs, Volume= 0.513 af, Depth> 5.11"
Routed to Reach DP3 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
42,583	98	Paved roads w/curbs & sewers, HSG A
6,681	49	50-75% Grass cover, Fair, HSG A
3,233	45	Woods, Poor, HSG A
52,497	89	Weighted Average
9,914		18.88% Pervious Area
42,583		81.12% Impervious Area

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

Summary for Subcatchment 4: EDA

Runoff = 12.93 cfs @ 12.18 hrs, Volume= 1.235 af, Depth> 5.22"
Routed to Reach DP4 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
103,725	98	Paved roads w/curbs & sewers, HSG A
18,190	49	50-75% Grass cover, Fair, HSG A
1,807	36	Woods, Fair, HSG A
123,722	90	Weighted Average
19,997		16.16% Pervious Area
103,725		83.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 5: EDA

Runoff = 2.06 cfs @ 12.13 hrs, Volume= 0.164 af, Depth> 3.82"
Routed to Reach DP5 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
13,579	98	Paved roads w/curbs & sewers, HSG A
1,652	49	50-75% Grass cover, Fair, HSG A
7,283	45	Woods, Poor, HSG A
22,514	77	Weighted Average
8,935		39.69% Pervious Area
13,579		60.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 6: EDA

Runoff = 3.55 cfs @ 12.09 hrs, Volume= 0.276 af, Depth> 5.45"
Routed to Reach DP6 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
21,227	98	Paved roads w/curbs & sewers, HSG B
2,835	69	50-75% Grass cover, Fair, HSG B
2,434	65	Woods/grass comb., Fair, HSG B
26,496	92	Weighted Average
5,269		19.89% Pervious Area
21,227		80.11% Impervious Area

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

Summary for Subcatchment 7A: EDA

Runoff = 4.49 cfs @ 12.10 hrs, Volume= 0.338 af, Depth> 4.34"
Routed to Reach DP7 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
26,629	98	Paved roads w/curbs & sewers, HSG A
2,718	49	50-75% Grass cover, Fair, HSG A
6,904	36	Woods, Fair, HSG A
4,429	76	Gravel roads, HSG A
40,680	82	Weighted Average
14,051		34.54% Pervious Area
26,629		65.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 7B: EDA

Runoff = 0.91 cfs @ 12.09 hrs, Volume= 0.066 af, Depth> 3.11"
Routed to Reach DP7 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
5,348	98	Paved roads w/curbs & sewers, HSG A
3,154	49	50-75% Grass cover, Fair, HSG A
2,614	36	Woods, Fair, HSG A
11,116	70	Weighted Average
5,768		51.89% Pervious Area
5,348		48.11% Impervious Area

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

Summary for Subcatchment 8A: EDA

Runoff = 4.17 cfs @ 12.12 hrs, Volume= 0.342 af, Depth> 4.78"
Routed to Reach DP8 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
25,023	98	Paved roads w/curbs & sewers, HSG B
4,412	69	50-75% Grass cover, Fair, HSG B
7,973	60	Woods, Fair, HSG B
37,408	86	Weighted Average
12,385		33.11% Pervious Area
25,023		66.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 8B: EDA

Runoff = 0.02 cfs @ 12.39 hrs, Volume= 0.004 af, Depth> 0.39"
Routed to Reach DP8 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
5,418	36	Woods, Fair, HSG A
5,418		100.00% Pervious Area

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

Summary for Subcatchment 9A: EDA

Runoff = 5.03 cfs @ 12.09 hrs, Volume= 0.366 af, Depth> 3.92"
Routed to Reach DP9 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
29,203	98	Paved roads w/curbs & sewers, HSG A
19,554	49	50-75% Grass cover, Fair, HSG A
48,757	78	Weighted Average
19,554		40.11% Pervious Area
29,203		59.89% Impervious Area

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

Summary for Subcatchment 9B: EDA

Runoff = 0.41 cfs @ 12.09 hrs, Volume= 0.030 af, Depth> 3.72"
Routed to Reach DP9 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
2,311	98	Paved roads w/curbs & sewers, HSG A
1,886	49	50-75% Grass cover, Fair, HSG A
4,197	76	Weighted Average
1,886		44.94% Pervious Area
2,311		55.06% Impervious Area

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

Summary for Subcatchment 10A: EDA

Runoff = 4.46 cfs @ 12.09 hrs, Volume= 0.330 af, Depth> 4.56"
Routed to Reach DP10 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
26,539	98	Paved roads w/curbs & sewers, HSG A
11,094	49	50-75% Grass cover, Fair, HSG A
208	76	Gravel roads, HSG A
37,841	84	Weighted Average
11,302		29.87% Pervious Area
26,539		70.13% Impervious Area

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

Summary for Subcatchment 10B: EDA

Runoff = 2.67 cfs @ 12.09 hrs, Volume= 0.195 af, Depth> 4.03"
Routed to Reach DP10 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
15,226	98	Paved roads w/curbs & sewers, HSG A
10,046	49	50-75% Grass cover, Fair, HSG A
25,272	79	Weighted Average
10,046		39.75% Pervious Area
15,226		60.25% Impervious Area

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

Summary for Subcatchment 11: EDA

Runoff = 2.86 cfs @ 12.09 hrs, Volume= 0.219 af, Depth> 5.22"
Routed to Reach DP11 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
16,677	98	Paved roads w/curbs & sewers, HSG B
3,572	69	50-75% Grass cover, Fair, HSG B
1,644	60	Woods, Fair, HSG B
21,893	90	Weighted Average
5,216		23.82% Pervious Area
16,677		76.18% Impervious Area

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

Summary for Subcatchment 12: EDA

Runoff = 1.59 cfs @ 12.09 hrs, Volume= 0.116 af, Depth> 4.24"
Routed to Reach DP12 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
9,288	98	Paved roads w/curbs & sewers, HSG A
5,079	49	50-75% Grass cover, Fair, HSG A
14,367	81	Weighted Average
5,079		35.35% Pervious Area
9,288		64.65% Impervious Area

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

Summary for Subcatchment 13: EDA

Runoff = 0.62 cfs @ 12.10 hrs, Volume= 0.046 af, Depth> 2.18"
Routed to Reach DP13 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
2,139	98	Paved roads w/curbs & sewers, HSG A
8,245	49	50-75% Grass cover, Fair, HSG A
764	76	Gravel roads, HSG A
11,148	60	Weighted Average
9,009		80.81% Pervious Area
2,139		19.19% Impervious Area

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

Summary for Subcatchment 14A: EDA

Runoff = 1.42 cfs @ 12.09 hrs, Volume= 0.106 af, Depth> 4.67"
Routed to Reach DP14 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
8,739	98	Paved roads w/curbs & sewers, HSG A
3,110	49	50-75% Grass cover, Fair, HSG A
11,849	85	Weighted Average
3,110		26.25% Pervious Area
8,739		73.75% Impervious Area

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

Summary for Subcatchment 14B: EDA

Runoff = 6.45 cfs @ 12.09 hrs, Volume= 0.472 af, Depth> 4.13"
Routed to Reach DP14 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
40,012	98	Paved roads w/curbs & sewers, HSG A
10,242	49	50-75% Grass cover, Fair, HSG A
9,431	36	Woods, Fair, HSG A
59,685	80	Weighted Average
19,673		32.96% Pervious Area
40,012		67.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 15: EDA

Runoff = 0.95 cfs @ 12.09 hrs, Volume= 0.069 af, Depth> 4.13"
Routed to Reach DP15 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
5,520	98	Paved roads w/curbs & sewers, HSG A
3,214	49	50-75% Grass cover, Fair, HSG A
8,734	80	Weighted Average
3,214		36.80% Pervious Area
5,520		63.20% Impervious Area

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

Summary for Subcatchment 16: EDA

Runoff = 1.07 cfs @ 12.09 hrs, Volume= 0.078 af, Depth> 3.51"
Routed to Reach DP16 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
6,107	98	Paved roads w/curbs & sewers, HSG A
4,630	49	50-75% Grass cover, Fair, HSG A
845	36	Woods, Fair, HSG A
11,582	74	Weighted Average
5,475		47.27% Pervious Area
6,107		52.73% Impervious Area

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

Summary for Subcatchment 17: EDA

Runoff = 1.99 cfs @ 12.09 hrs, Volume= 0.147 af, Depth> 4.56"
Routed to Reach DP17 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
10,716	98	Paved roads w/curbs & sewers, HSG A
3,641	49	50-75% Grass cover, Fair, HSG A
2,492	76	Gravel roads, HSG A
16,849	84	Weighted Average
6,133		36.40% Pervious Area
10,716		63.60% Impervious Area

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

Summary for Subcatchment 18A: EDA

Runoff = 13.52 cfs @ 12.45 hrs, Volume= 1.734 af, Depth> 3.39"
Routed to Reach DP18 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
99,544	98	Paved roads w/curbs & sewers, HSG A
37,004	49	50-75% Grass cover, Fair, HSG A
56,609	36	Woods, Fair, HSG A
31,170	79	Woods, Fair, HSG D
26,944	76	Gravel roads, HSG A
15,958	91	Gravel roads, HSG D
267,229	73	Weighted Average
167,685		62.75% Pervious Area
99,544		37.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.7					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 18B: EDA

AREA GOING TO THE EXISTING BMP

Runoff = 0.45 cfs @ 12.09 hrs, Volume= 0.033 af, Depth> 3.31"
Routed to Pond 2P : Existing Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
2,467	98	Paved roads w/curbs & sewers, HSG A
2,681	49	50-75% Grass cover, Fair, HSG A
5,148	72	Weighted Average
2,681		52.08% Pervious Area
2,467		47.92% Impervious Area

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

Summary for Subcatchment 19: EDA

Runoff = 0.56 cfs @ 12.10 hrs, Volume= 0.041 af, Depth> 2.73"
Routed to Reach DP19 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
3,787	98	Unconnected pavement, HSG A
4,075	36	Woods, Fair, HSG A
7,862	66	Weighted Average
4,075		51.83% Pervious Area
3,787		48.17% Impervious Area
3,787		100.00% Unconnected

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

Summary for Subcatchment 20: EDA

Runoff = 20.78 cfs @ 12.21 hrs, Volume= 2.074 af, Depth> 4.99"
Routed to Reach DP20 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

	Area (sf)	CN	Description
*	83,409	98	Impervious
	8,137	74	>75% Grass cover, Good, HSG C
	9,133	80	>75% Grass cover, Good, HSG D
	23,541	70	Woods, Good, HSG C
	41,329	77	Woods, Good, HSG D
	51,670	91	Gravel roads, HSG D
	217,219	88	Weighted Average
	133,810		61.60% Pervious Area
	83,409		38.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0900	0.07		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.30"
4.5	405	0.0900	1.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
16.1	455	Total			

Summary for Subcatchment 21: EDA

Runoff = 0.51 cfs @ 12.09 hrs, Volume= 0.037 af, Depth> 4.34"
Routed to Reach DP21 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
1,301	98	Paved roads w/curbs & sewers, HSG C
1,640	79	50-75% Grass cover, Fair, HSG C
1,548	73	Woods, Fair, HSG C
4,489	82	Weighted Average
3,188		71.02% Pervious Area
1,301		28.98% Impervious Area

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

Summary for Reach DP1:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.638 ac, 96.88% Impervious, Inflow Depth > 6.03" for 25y24h event
Inflow = 3.89 cfs @ 12.09 hrs, Volume= 0.321 af
Outflow = 3.89 cfs @ 12.09 hrs, Volume= 0.321 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP10:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.449 ac, 66.17% Impervious, Inflow Depth > 4.35" for 25y24h event
Inflow = 7.13 cfs @ 12.09 hrs, Volume= 0.525 af
Outflow = 7.13 cfs @ 12.09 hrs, Volume= 0.525 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-G : UPSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Sta253+74

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP11:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.503 ac, 76.18% Impervious, Inflow Depth > 5.22" for 25y24h event
Inflow = 2.86 cfs @ 12.09 hrs, Volume= 0.219 af
Outflow = 2.86 cfs @ 12.09 hrs, Volume= 0.219 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-I : Wetland I

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP12:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.330 ac, 64.65% Impervious, Inflow Depth > 4.24" for 25y24h event
Inflow = 1.59 cfs @ 12.09 hrs, Volume= 0.116 af
Outflow = 1.59 cfs @ 12.09 hrs, Volume= 0.116 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP13:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.256 ac, 19.19% Impervious, Inflow Depth > 2.18" for 25y24h event
Inflow = 0.62 cfs @ 12.10 hrs, Volume= 0.046 af
Outflow = 0.62 cfs @ 12.10 hrs, Volume= 0.046 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP14:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.642 ac, 68.15% Impervious, Inflow Depth > 4.22" for 25y24h event
Inflow = 7.87 cfs @ 12.09 hrs, Volume= 0.578 af
Outflow = 7.87 cfs @ 12.09 hrs, Volume= 0.578 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP15:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.201 ac, 63.20% Impervious, Inflow Depth > 4.13" for 25y24h event
Inflow = 0.95 cfs @ 12.09 hrs, Volume= 0.069 af
Outflow = 0.95 cfs @ 12.09 hrs, Volume= 0.069 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP16:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.266 ac, 52.73% Impervious, Inflow Depth > 3.51" for 25y24h event
Inflow = 1.07 cfs @ 12.09 hrs, Volume= 0.078 af
Outflow = 1.07 cfs @ 12.09 hrs, Volume= 0.078 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP17:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.387 ac, 63.60% Impervious, Inflow Depth > 4.56" for 25y24h event
Inflow = 1.99 cfs @ 12.09 hrs, Volume= 0.147 af
Outflow = 1.99 cfs @ 12.09 hrs, Volume= 0.147 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP18:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 6.135 ac, 37.25% Impervious, Inflow Depth > 3.39" for 25y24h event
Inflow = 13.52 cfs @ 12.45 hrs, Volume= 1.734 af
Outflow = 13.52 cfs @ 12.45 hrs, Volume= 1.734 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-H :

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP19:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.180 ac, 48.17% Impervious, Inflow Depth > 2.73" for 25y24h event
Inflow = 0.56 cfs @ 12.10 hrs, Volume= 0.041 af
Outflow = 0.56 cfs @ 12.10 hrs, Volume= 0.041 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP2:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.261 ac, 94.54% Impervious, Inflow Depth > 5.80" for 25y24h event
Inflow = 1.57 cfs @ 12.09 hrs, Volume= 0.126 af
Outflow = 1.57 cfs @ 12.09 hrs, Volume= 0.126 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP20:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.987 ac, 38.40% Impervious, Inflow Depth > 4.99" for 25y24h event
Inflow = 20.78 cfs @ 12.21 hrs, Volume= 2.074 af
Outflow = 20.78 cfs @ 12.21 hrs, Volume= 2.074 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP21:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.103 ac, 28.98% Impervious, Inflow Depth > 4.34" for 25y24h event
Inflow = 0.51 cfs @ 12.09 hrs, Volume= 0.037 af
Outflow = 0.51 cfs @ 12.09 hrs, Volume= 0.037 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP3:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.205 ac, 81.12% Impervious, Inflow Depth > 5.11" for 25y24h event
Inflow = 6.75 cfs @ 12.09 hrs, Volume= 0.513 af
Outflow = 6.75 cfs @ 12.09 hrs, Volume= 0.513 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-A : DOWNSTREAM OF 3.5X1.5 CULVERT @ STA219+90

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP4:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.840 ac, 83.84% Impervious, Inflow Depth > 5.22" for 25y24h event
Inflow = 12.93 cfs @ 12.18 hrs, Volume= 1.235 af
Outflow = 12.93 cfs @ 12.18 hrs, Volume= 1.235 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-A : DOWNSTREAM OF 3.5X1.5 CULVERT @ STA219+90

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP5:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.517 ac, 60.31% Impervious, Inflow Depth > 3.82" for 25y24h event
Inflow = 2.06 cfs @ 12.13 hrs, Volume= 0.164 af
Outflow = 2.06 cfs @ 12.13 hrs, Volume= 0.164 af, Atten= 0%, Lag= 0.0 min
Routed to Pond 1P : DEP WETLAND W/ VERNAL POOLS

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP6:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.608 ac, 80.11% Impervious, Inflow Depth > 5.45" for 25y24h event
Inflow = 3.55 cfs @ 12.09 hrs, Volume= 0.276 af
Outflow = 3.55 cfs @ 12.09 hrs, Volume= 0.276 af, Atten= 0%, Lag= 0.0 min
Routed to Pond 1W : DEP WETLAND AT UPSTREAM OF 3.5X1.5 CULVERT @ STA219+90

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP7:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.189 ac, 61.74% Impervious, Inflow Depth > 4.08" for 25y24h event
Inflow = 5.40 cfs @ 12.10 hrs, Volume= 0.404 af
Outflow = 5.40 cfs @ 12.10 hrs, Volume= 0.404 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-D : DOWNSTREAM OF 36"CULVERT @ 238+49

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP8:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.983 ac, 58.43% Impervious, Inflow Depth > 4.22" for 25y24h event
Inflow = 4.17 cfs @ 12.12 hrs, Volume= 0.346 af
Outflow = 4.17 cfs @ 12.12 hrs, Volume= 0.346 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-C : UPSTREAM OF 36"CULVERT @ 238+49

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP9:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.216 ac, 59.51% Impervious, Inflow Depth > 3.91" for 25y24h event
Inflow = 5.44 cfs @ 12.09 hrs, Volume= 0.396 af
Outflow = 5.44 cfs @ 12.09 hrs, Volume= 0.396 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-E : DOWNSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Sta253+74

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond 1P: DEP WETLAND W/ VERNAL POOLS

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.517 ac, 60.31% Impervious, Inflow Depth > 3.82" for 25y24h event
Inflow = 2.06 cfs @ 12.13 hrs, Volume= 0.164 af
Primary = 2.06 cfs @ 12.13 hrs, Volume= 0.164 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond 1W: DEP WETLAND AT UPSTREAM OF 3.5X1.5 CULVERT @ STA219+90

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.608 ac, 80.11% Impervious, Inflow Depth > 5.45" for 25y24h event
Inflow = 3.55 cfs @ 12.09 hrs, Volume= 0.276 af
Primary = 3.55 cfs @ 12.09 hrs, Volume= 0.276 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond 2P: Existing Basin

Inflow Area = 0.118 ac, 47.92% Impervious, Inflow Depth > 3.31" for 25y24h event
Inflow = 0.45 cfs @ 12.09 hrs, Volume= 0.033 af
Outflow = 0.02 cfs @ 15.31 hrs, Volume= 0.008 af, Atten= 95%, Lag= 193.0 min
Primary = 0.02 cfs @ 15.31 hrs, Volume= 0.008 af
Routed to Pond W-H :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond W-H :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 86.48' @ 15.31 hrs Surf.Area= 1,503 sf Storage= 1,079 cf

Plug-Flow detention time= 407.6 min calculated for 0.008 af (25% of inflow)
Center-of-Mass det. time= 271.8 min (1,101.8 - 830.0)

Volume	Invert	Avail.Storage	Storage Description
#1	85.50'	2,145 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
85.50	652	195.0	0	0	652
86.00	1,139	255.0	442	442	2,804
86.50	1,516	290.0	662	1,104	4,328
87.00	1,884	297.0	848	1,952	4,686
87.10	1,974	299.0	193	2,145	4,785

Device	Routing	Invert	Outlet Devices
#1	Secondary	86.90'	**20.0' long x 10.0' 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) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Primary	84.00'	**12.0" Round RCP_Round 12"** L= 100.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 84.00' / 83.50' S= 0.0050 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf
#3	Device 2	86.47'	**Custom Orifice, Cv= 3.20 (C= 4.00)** Head (feet) 0.00 0.50 Width (feet) 3.00 3.00

Primary OutFlow Max=0.02 cfs @ 15.31 hrs HW=86.48' (Free Discharge)
↑—**2=RCP_Round 12"** (Passes 0.02 cfs of 4.12 cfs potential flow)
↑—**3=Custom Orifice** (Weir Controls 0.02 cfs @ 0.46 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=85.50' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond W-A: DOWNSTREAM OF 3.5X1.5 CULVERT @ STA219+90

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.045 ac, 83.03% Impervious, Inflow Depth > 5.18" for 25y24h event
Inflow = 17.95 cfs @ 12.14 hrs, Volume= 1.748 af
Primary = 17.95 cfs @ 12.14 hrs, Volume= 1.748 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond W-C: UPSTREAM OF 36"CULVERT @ 238+49

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.983 ac, 58.43% Impervious, Inflow Depth > 4.22" for 25y24h event
Inflow = 4.17 cfs @ 12.12 hrs, Volume= 0.346 af
Primary = 4.17 cfs @ 12.12 hrs, Volume= 0.346 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-C/D : Wetland -C/D

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond W-C/D: Wetland -C/D

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.172 ac, 60.24% Impervious, Inflow Depth > 4.14" for 25y24h event
Inflow = 9.51 cfs @ 12.11 hrs, Volume= 0.750 af
Primary = 9.51 cfs @ 12.11 hrs, Volume= 0.750 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond W-D: DOWNSTREAM OF 36"CULVERT @ 238+49

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.189 ac, 61.74% Impervious, Inflow Depth > 4.08" for 25y24h event
Inflow = 5.40 cfs @ 12.10 hrs, Volume= 0.404 af
Primary = 5.40 cfs @ 12.10 hrs, Volume= 0.404 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-C/D : Wetland -C/D

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond W-E: DOWNSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Sta253+74

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.216 ac, 59.51% Impervious, Inflow Depth > 3.91" for 25y24h event
Inflow = 5.44 cfs @ 12.09 hrs, Volume= 0.396 af
Primary = 5.44 cfs @ 12.09 hrs, Volume= 0.396 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond W-G: UPSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Sta253+74

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.449 ac, 66.17% Impervious, Inflow Depth > 4.35" for 25y24h event
Inflow = 7.13 cfs @ 12.09 hrs, Volume= 0.525 af
Primary = 7.13 cfs @ 12.09 hrs, Volume= 0.525 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond W-H:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 6.253 ac, 37.45% Impervious, Inflow Depth > 3.34" for 25y24h event
Inflow = 13.52 cfs @ 12.45 hrs, Volume= 1.743 af
Primary = 13.52 cfs @ 12.45 hrs, Volume= 1.743 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond W-I: Wetland I

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.503 ac, 76.18% Impervious, Inflow Depth > 5.22" for 25y24h event
Inflow = 2.86 cfs @ 12.09 hrs, Volume= 0.219 af
Primary = 2.86 cfs @ 12.09 hrs, Volume= 0.219 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1: EDA Runoff Area=27,790 sf 96.88% Impervious Runoff Depth>7.87"
Tc=6.0 min CN=97 Runoff=5.02 cfs 0.418 af

Subcatchment 2: EDA Runoff Area=11,386 sf 94.54% Impervious Runoff Depth>7.63"
Tc=6.0 min CN=95 Runoff=2.04 cfs 0.166 af

Subcatchment 3: EDA Runoff Area=52,497 sf 81.12% Impervious Runoff Depth>6.91"
Tc=6.0 min CN=89 Runoff=8.97 cfs 0.694 af

Subcatchment 4: EDA Runoff Area=123,722 sf 83.84% Impervious Runoff Depth>7.02"
Tc=13.6 min CN=90 Runoff=17.12 cfs 1.661 af

Subcatchment 5: EDA Runoff Area=22,514 sf 60.31% Impervious Runoff Depth>5.48"
Tc=8.8 min CN=77 Runoff=2.95 cfs 0.236 af

Subcatchment 6: EDA Runoff Area=26,496 sf 80.11% Impervious Runoff Depth>7.27"
Tc=6.0 min CN=92 Runoff=4.65 cfs 0.368 af

Subcatchment 7A: EDA Runoff Area=40,680 sf 65.46% Impervious Runoff Depth>6.07"
Tc=7.0 min CN=82 Runoff=6.19 cfs 0.473 af

Subcatchment 7B: EDA Runoff Area=11,116 sf 48.11% Impervious Runoff Depth>4.66"
Tc=6.0 min CN=70 Runoff=1.37 cfs 0.099 af

Subcatchment 8A: EDA Runoff Area=37,408 sf 66.89% Impervious Runoff Depth>6.55"
Tc=9.0 min CN=86 Runoff=5.63 cfs 0.469 af

Subcatchment 8B: EDA Runoff Area=5,418 sf 0.00% Impervious Runoff Depth>0.97"
Tc=6.0 min CN=36 Runoff=0.07 cfs 0.010 af

Subcatchment 9A: EDA Runoff Area=48,757 sf 59.89% Impervious Runoff Depth>5.60"
Tc=6.0 min CN=78 Runoff=7.11 cfs 0.522 af

Subcatchment 9B: EDA Runoff Area=4,197 sf 55.06% Impervious Runoff Depth>5.36"
Tc=6.0 min CN=76 Runoff=0.59 cfs 0.043 af

Subcatchment 10A: EDA Runoff Area=37,841 sf 70.13% Impervious Runoff Depth>6.31"
Tc=6.0 min CN=84 Runoff=6.08 cfs 0.457 af

Subcatchment 10B: EDA Runoff Area=25,272 sf 60.25% Impervious Runoff Depth>5.72"
Tc=6.0 min CN=79 Runoff=3.75 cfs 0.276 af

Subcatchment 11: EDA Runoff Area=21,893 sf 76.18% Impervious Runoff Depth>7.03"
Tc=6.0 min CN=90 Runoff=3.78 cfs 0.294 af

Subcatchment 12: EDA Runoff Area=14,367 sf 64.65% Impervious Runoff Depth>5.96"
Tc=6.0 min CN=81 Runoff=2.21 cfs 0.164 af

Subcatchment 13: EDA Runoff Area=11,148 sf 19.19% Impervious Runoff Depth>3.50"
Tc=6.0 min CN=60 Runoff=1.02 cfs 0.075 af

Subcatchment 14A: EDA Runoff Area=11,849 sf 73.75% Impervious Runoff Depth>6.43"
Tc=6.0 min CN=85 Runoff=1.93 cfs 0.146 af

Subcatchment 14B: EDA Runoff Area=59,685 sf 67.04% Impervious Runoff Depth>5.84"
Tc=6.1 min CN=80 Runoff=9.00 cfs 0.666 af

Subcatchment 15: EDA Runoff Area=8,734 sf 63.20% Impervious Runoff Depth>5.84"
Tc=6.0 min CN=80 Runoff=1.32 cfs 0.098 af

Subcatchment 16: EDA Runoff Area=11,582 sf 52.73% Impervious Runoff Depth>5.13"
Tc=6.0 min CN=74 Runoff=1.56 cfs 0.114 af

Subcatchment 17: EDA Runoff Area=16,849 sf 63.60% Impervious Runoff Depth>6.31"
Tc=6.0 min CN=84 Runoff=2.71 cfs 0.203 af

Subcatchment 18A: EDA Runoff Area=267,229 sf 37.25% Impervious Runoff Depth>4.98"
Tc=31.7 min CN=73 Runoff=19.84 cfs 2.548 af

Subcatchment 18B: EDA Runoff Area=5,148 sf 47.92% Impervious Runoff Depth>4.89"
Tc=6.0 min CN=72 Runoff=0.66 cfs 0.048 af

Subcatchment 19: EDA Runoff Area=7,862 sf 48.17% Impervious Runoff Depth>4.19"
Tc=6.0 min CN=66 Runoff=0.87 cfs 0.063 af

Subcatchment 20: EDA Runoff Area=217,219 sf 38.40% Impervious Runoff Depth>6.78"
Flow Length=455' Slope=0.0900 '/' Tc=16.1 min CN=88 Runoff=27.78 cfs 2.816 af

Subcatchment 21: EDA Runoff Area=4,489 sf 28.98% Impervious Runoff Depth>6.07"
Tc=6.0 min CN=82 Runoff=0.70 cfs 0.052 af

Reach DP1: Inflow=5.02 cfs 0.418 af
Outflow=5.02 cfs 0.418 af

Reach DP10: Inflow=9.84 cfs 0.733 af
Outflow=9.84 cfs 0.733 af

Reach DP11: Inflow=3.78 cfs 0.294 af
Outflow=3.78 cfs 0.294 af

Reach DP12: Inflow=2.21 cfs 0.164 af
Outflow=2.21 cfs 0.164 af

Reach DP13: Inflow=1.02 cfs 0.075 af
Outflow=1.02 cfs 0.075 af

Reach DP14: Inflow=10.93 cfs 0.812 af
Outflow=10.93 cfs 0.812 af

Reach DP15: Inflow=1.32 cfs 0.098 af
Outflow=1.32 cfs 0.098 af

Reach DP16: Inflow=1.56 cfs 0.114 af
Outflow=1.56 cfs 0.114 af

Reach DP17: Inflow=2.71 cfs 0.203 af
Outflow=2.71 cfs 0.203 af

Reach DP18: Inflow=19.84 cfs 2.548 af
Outflow=19.84 cfs 2.548 af

Reach DP19: Inflow=0.87 cfs 0.063 af
Outflow=0.87 cfs 0.063 af

Reach DP2: Inflow=2.04 cfs 0.166 af
Outflow=2.04 cfs 0.166 af

Reach DP20: Inflow=27.78 cfs 2.816 af
Outflow=27.78 cfs 2.816 af

Reach DP21: Inflow=0.70 cfs 0.052 af
Outflow=0.70 cfs 0.052 af

Reach DP3: Inflow=8.97 cfs 0.694 af
Outflow=8.97 cfs 0.694 af

Reach DP4: Inflow=17.12 cfs 1.661 af
Outflow=17.12 cfs 1.661 af

Reach DP5: Inflow=2.95 cfs 0.236 af
Outflow=2.95 cfs 0.236 af

Reach DP6: Inflow=4.65 cfs 0.368 af
Outflow=4.65 cfs 0.368 af

Reach DP7: Inflow=7.55 cfs 0.572 af
Outflow=7.55 cfs 0.572 af

Reach DP8: Inflow=5.71 cfs 0.479 af
Outflow=5.71 cfs 0.479 af

Reach DP9: Inflow=7.70 cfs 0.565 af
Outflow=7.70 cfs 0.565 af

Pond 1P: DEP WETLAND W/ VERNAL POOLS Inflow=2.95 cfs 0.236 af
Primary=2.95 cfs 0.236 af

Pond 1W: DEP WETLAND AT UPSTREAM OF 3.5X1.5 CULVERT @ STA219+90 Inflow=4.65 cfs 0.368 af
Primary=4.65 cfs 0.368 af

Pond 2P: Existing Basin Peak Elev=86.52' Storage=1,131 cf Inflow=0.66 cfs 0.048 af
Primary=0.13 cfs 0.024 af Secondary=0.00 cfs 0.000 af Outflow=0.13 cfs 0.024 af

Pond W-A: DOWNSTREAM OF 3.5X1.5 CULVERT @ STA219+90 Inflow=23.80 cfs 2.355 af
Primary=23.80 cfs 2.355 af

Pond W-C: UPSTREAM OF 36"CULVERT @ 238+49 Inflow=5.71 cfs 0.479 af
Primary=5.71 cfs 0.479 af

Pond W-C/D: Wetland -C/D Inflow=13.16 cfs 1.050 af
Primary=13.16 cfs 1.050 af

Pond W-D: DOWNSTREAM OF 36"CULVERT @ 238+49 Inflow=7.55 cfs 0.572 af
Primary=7.55 cfs 0.572 af

Pond W-E: DOWNSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Inflow=7.70 cfs 0.565 af
Primary=7.70 cfs 0.565 af

Pond W-G: UPSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Inflow=9.84 cfs 0.733 af
Primary=9.84 cfs 0.733 af

Pond W-H: Inflow=19.92 cfs 2.572 af
Primary=19.92 cfs 2.572 af

Pond W-I: Wetland I Inflow=3.78 cfs 0.294 af
Primary=3.78 cfs 0.294 af

Total Runoff Area = 26.013 ac Runoff Volume = 13.180 af Average Runoff Depth = 6.08"
43.63% Pervious = 11.349 ac 56.37% Impervious = 14.665 ac

Summary for Subcatchment 1: EDA

Runoff = 5.02 cfs @ 12.09 hrs, Volume= 0.418 af, Depth> 7.87"
Routed to Reach DP1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
26,924	98	Paved roads w/curbs & sewers, HSG A
866	68	<50% Grass cover, Poor, HSG A
27,790	97	Weighted Average
866		3.12% Pervious Area
26,924		96.88% Impervious Area

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

Summary for Subcatchment 2: EDA

Runoff = 2.04 cfs @ 12.09 hrs, Volume= 0.166 af, Depth> 7.63"
Routed to Reach DP2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
10,764	98	Paved roads w/curbs & sewers, HSG A
622	49	50-75% Grass cover, Fair, HSG A
11,386	95	Weighted Average
622		5.46% Pervious Area
10,764		94.54% Impervious Area

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

Summary for Subcatchment 3: EDA

Runoff = 8.97 cfs @ 12.09 hrs, Volume= 0.694 af, Depth> 6.91"
Routed to Reach DP3 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
42,583	98	Paved roads w/curbs & sewers, HSG A
6,681	49	50-75% Grass cover, Fair, HSG A
3,233	45	Woods, Poor, HSG A
52,497	89	Weighted Average
9,914		18.88% Pervious Area
42,583		81.12% Impervious Area

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

Summary for Subcatchment 4: EDA

Runoff = 17.12 cfs @ 12.18 hrs, Volume= 1.661 af, Depth> 7.02"
Routed to Reach DP4 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
103,725	98	Paved roads w/curbs & sewers, HSG A
18,190	49	50-75% Grass cover, Fair, HSG A
1,807	36	Woods, Fair, HSG A
123,722	90	Weighted Average
19,997		16.16% Pervious Area
103,725		83.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 5: EDA

Runoff = 2.95 cfs @ 12.12 hrs, Volume= 0.236 af, Depth> 5.48"
Routed to Reach DP5 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
13,579	98	Paved roads w/curbs & sewers, HSG A
1,652	49	50-75% Grass cover, Fair, HSG A
7,283	45	Woods, Poor, HSG A
22,514	77	Weighted Average
8,935		39.69% Pervious Area
13,579		60.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 6: EDA

Runoff = 4.65 cfs @ 12.09 hrs, Volume= 0.368 af, Depth> 7.27"
Routed to Reach DP6 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
21,227	98	Paved roads w/curbs & sewers, HSG B
2,835	69	50-75% Grass cover, Fair, HSG B
2,434	65	Woods/grass comb., Fair, HSG B
26,496	92	Weighted Average
5,269		19.89% Pervious Area
21,227		80.11% Impervious Area

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

Summary for Subcatchment 7A: EDA

Runoff = 6.19 cfs @ 12.10 hrs, Volume= 0.473 af, Depth> 6.07"
Routed to Reach DP7 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
26,629	98	Paved roads w/curbs & sewers, HSG A
2,718	49	50-75% Grass cover, Fair, HSG A
6,904	36	Woods, Fair, HSG A
4,429	76	Gravel roads, HSG A
40,680	82	Weighted Average
14,051		34.54% Pervious Area
26,629		65.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 7B: EDA

Runoff = 1.37 cfs @ 12.09 hrs, Volume= 0.099 af, Depth> 4.66"
Routed to Reach DP7 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
5,348	98	Paved roads w/curbs & sewers, HSG A
3,154	49	50-75% Grass cover, Fair, HSG A
2,614	36	Woods, Fair, HSG A
11,116	70	Weighted Average
5,768		51.89% Pervious Area
5,348		48.11% Impervious Area

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

Summary for Subcatchment 8A: EDA

Runoff = 5.63 cfs @ 12.12 hrs, Volume= 0.469 af, Depth> 6.55"
Routed to Reach DP8 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
25,023	98	Paved roads w/curbs & sewers, HSG B
4,412	69	50-75% Grass cover, Fair, HSG B
7,973	60	Woods, Fair, HSG B
37,408	86	Weighted Average
12,385		33.11% Pervious Area
25,023		66.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 8B: EDA

Runoff = 0.07 cfs @ 12.15 hrs, Volume= 0.010 af, Depth> 0.97"
Routed to Reach DP8 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
5,418	36	Woods, Fair, HSG A
5,418		100.00% Pervious Area

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

Summary for Subcatchment 9A: EDA

Runoff = 7.11 cfs @ 12.09 hrs, Volume= 0.522 af, Depth> 5.60"
Routed to Reach DP9 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
29,203	98	Paved roads w/curbs & sewers, HSG A
19,554	49	50-75% Grass cover, Fair, HSG A
48,757	78	Weighted Average
19,554		40.11% Pervious Area
29,203		59.89% Impervious Area

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

Summary for Subcatchment 9B: EDA

Runoff = 0.59 cfs @ 12.09 hrs, Volume= 0.043 af, Depth> 5.36"
Routed to Reach DP9 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
2,311	98	Paved roads w/curbs & sewers, HSG A
1,886	49	50-75% Grass cover, Fair, HSG A
4,197	76	Weighted Average
1,886		44.94% Pervious Area
2,311		55.06% Impervious Area

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

Summary for Subcatchment 10A: EDA

Runoff = 6.08 cfs @ 12.09 hrs, Volume= 0.457 af, Depth> 6.31"
Routed to Reach DP10 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
26,539	98	Paved roads w/curbs & sewers, HSG A
11,094	49	50-75% Grass cover, Fair, HSG A
208	76	Gravel roads, HSG A
37,841	84	Weighted Average
11,302		29.87% Pervious Area
26,539		70.13% Impervious Area

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

Summary for Subcatchment 10B: EDA

Runoff = 3.75 cfs @ 12.09 hrs, Volume= 0.276 af, Depth> 5.72"
Routed to Reach DP10 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
15,226	98	Paved roads w/curbs & sewers, HSG A
10,046	49	50-75% Grass cover, Fair, HSG A
25,272	79	Weighted Average
10,046		39.75% Pervious Area
15,226		60.25% Impervious Area

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

Summary for Subcatchment 11: EDA

Runoff = 3.78 cfs @ 12.09 hrs, Volume= 0.294 af, Depth> 7.03"
Routed to Reach DP11 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
16,677	98	Paved roads w/curbs & sewers, HSG B
3,572	69	50-75% Grass cover, Fair, HSG B
1,644	60	Woods, Fair, HSG B
21,893	90	Weighted Average
5,216		23.82% Pervious Area
16,677		76.18% Impervious Area

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

Summary for Subcatchment 12: EDA

Runoff = 2.21 cfs @ 12.09 hrs, Volume= 0.164 af, Depth> 5.96"
Routed to Reach DP12 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
9,288	98	Paved roads w/curbs & sewers, HSG A
5,079	49	50-75% Grass cover, Fair, HSG A
14,367	81	Weighted Average
5,079		35.35% Pervious Area
9,288		64.65% Impervious Area

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

Summary for Subcatchment 13: EDA

Runoff = 1.02 cfs @ 12.10 hrs, Volume= 0.075 af, Depth> 3.50"
Routed to Reach DP13 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
2,139	98	Paved roads w/curbs & sewers, HSG A
8,245	49	50-75% Grass cover, Fair, HSG A
764	76	Gravel roads, HSG A
11,148	60	Weighted Average
9,009		80.81% Pervious Area
2,139		19.19% Impervious Area

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

Summary for Subcatchment 14A: EDA

Runoff = 1.93 cfs @ 12.09 hrs, Volume= 0.146 af, Depth> 6.43"
Routed to Reach DP14 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
8,739	98	Paved roads w/curbs & sewers, HSG A
3,110	49	50-75% Grass cover, Fair, HSG A
11,849	85	Weighted Average
3,110		26.25% Pervious Area
8,739		73.75% Impervious Area

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

Summary for Subcatchment 14B: EDA

Runoff = 9.00 cfs @ 12.09 hrs, Volume= 0.666 af, Depth> 5.84"
Routed to Reach DP14 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
40,012	98	Paved roads w/curbs & sewers, HSG A
10,242	49	50-75% Grass cover, Fair, HSG A
9,431	36	Woods, Fair, HSG A
59,685	80	Weighted Average
19,673		32.96% Pervious Area
40,012		67.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 15: EDA

Runoff = 1.32 cfs @ 12.09 hrs, Volume= 0.098 af, Depth> 5.84"
Routed to Reach DP15 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
5,520	98	Paved roads w/curbs & sewers, HSG A
3,214	49	50-75% Grass cover, Fair, HSG A
8,734	80	Weighted Average
3,214		36.80% Pervious Area
5,520		63.20% Impervious Area

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

Summary for Subcatchment 16: EDA

Runoff = 1.56 cfs @ 12.09 hrs, Volume= 0.114 af, Depth> 5.13"
Routed to Reach DP16 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
6,107	98	Paved roads w/curbs & sewers, HSG A
4,630	49	50-75% Grass cover, Fair, HSG A
845	36	Woods, Fair, HSG A
11,582	74	Weighted Average
5,475		47.27% Pervious Area
6,107		52.73% Impervious Area

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

Summary for Subcatchment 17: EDA

Runoff = 2.71 cfs @ 12.09 hrs, Volume= 0.203 af, Depth> 6.31"
Routed to Reach DP17 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
10,716	98	Paved roads w/curbs & sewers, HSG A
3,641	49	50-75% Grass cover, Fair, HSG A
2,492	76	Gravel roads, HSG A
16,849	84	Weighted Average
6,133		36.40% Pervious Area
10,716		63.60% Impervious Area

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

Summary for Subcatchment 18A: EDA

Runoff = 19.84 cfs @ 12.44 hrs, Volume= 2.548 af, Depth> 4.98"
Routed to Reach DP18 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
99,544	98	Paved roads w/curbs & sewers, HSG A
37,004	49	50-75% Grass cover, Fair, HSG A
56,609	36	Woods, Fair, HSG A
31,170	79	Woods, Fair, HSG D
26,944	76	Gravel roads, HSG A
15,958	91	Gravel roads, HSG D
267,229	73	Weighted Average
167,685		62.75% Pervious Area
99,544		37.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.7					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 18B: EDA

AREA GOING TO THE EXISTING BMP

Runoff = 0.66 cfs @ 12.09 hrs, Volume= 0.048 af, Depth> 4.89"
Routed to Pond 2P : Existing Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
2,467	98	Paved roads w/curbs & sewers, HSG A
2,681	49	50-75% Grass cover, Fair, HSG A
5,148	72	Weighted Average
2,681		52.08% Pervious Area
2,467		47.92% Impervious Area

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

Summary for Subcatchment 19: EDA

Runoff = 0.87 cfs @ 12.09 hrs, Volume= 0.063 af, Depth> 4.19"
Routed to Reach DP19 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
3,787	98	Unconnected pavement, HSG A
4,075	36	Woods, Fair, HSG A
7,862	66	Weighted Average
4,075		51.83% Pervious Area
3,787		48.17% Impervious Area
3,787		100.00% Unconnected

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

Summary for Subcatchment 20: EDA

Runoff = 27.78 cfs @ 12.21 hrs, Volume= 2.816 af, Depth> 6.78"
Routed to Reach DP20 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

	Area (sf)	CN	Description
*	83,409	98	Impervious
	8,137	74	>75% Grass cover, Good, HSG C
	9,133	80	>75% Grass cover, Good, HSG D
	23,541	70	Woods, Good, HSG C
	41,329	77	Woods, Good, HSG D
	51,670	91	Gravel roads, HSG D
	217,219	88	Weighted Average
	133,810		61.60% Pervious Area
	83,409		38.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0900	0.07		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.30"
4.5	405	0.0900	1.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
16.1	455	Total			

Summary for Subcatchment 21: EDA

Runoff = 0.70 cfs @ 12.09 hrs, Volume= 0.052 af, Depth> 6.07"
Routed to Reach DP21 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
1,301	98	Paved roads w/curbs & sewers, HSG C
1,640	79	50-75% Grass cover, Fair, HSG C
1,548	73	Woods, Fair, HSG C
4,489	82	Weighted Average
3,188		71.02% Pervious Area
1,301		28.98% Impervious Area

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

Summary for Reach DP1:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.638 ac, 96.88% Impervious, Inflow Depth > 7.87" for 100y24h event
Inflow = 5.02 cfs @ 12.09 hrs, Volume= 0.418 af
Outflow = 5.02 cfs @ 12.09 hrs, Volume= 0.418 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP10:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.449 ac, 66.17% Impervious, Inflow Depth > 6.07" for 100y24h event
Inflow = 9.84 cfs @ 12.09 hrs, Volume= 0.733 af
Outflow = 9.84 cfs @ 12.09 hrs, Volume= 0.733 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-G : UPSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Sta253+74

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP11:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.503 ac, 76.18% Impervious, Inflow Depth > 7.03" for 100y24h event
Inflow = 3.78 cfs @ 12.09 hrs, Volume= 0.294 af
Outflow = 3.78 cfs @ 12.09 hrs, Volume= 0.294 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-I : Wetland I

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP12:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.330 ac, 64.65% Impervious, Inflow Depth > 5.96" for 100y24h event
Inflow = 2.21 cfs @ 12.09 hrs, Volume= 0.164 af
Outflow = 2.21 cfs @ 12.09 hrs, Volume= 0.164 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP13:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.256 ac, 19.19% Impervious, Inflow Depth > 3.50" for 100y24h event
Inflow = 1.02 cfs @ 12.10 hrs, Volume= 0.075 af
Outflow = 1.02 cfs @ 12.10 hrs, Volume= 0.075 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP14:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.642 ac, 68.15% Impervious, Inflow Depth > 5.93" for 100y24h event
Inflow = 10.93 cfs @ 12.09 hrs, Volume= 0.812 af
Outflow = 10.93 cfs @ 12.09 hrs, Volume= 0.812 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP15:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.201 ac, 63.20% Impervious, Inflow Depth > 5.84" for 100y24h event
Inflow = 1.32 cfs @ 12.09 hrs, Volume= 0.098 af
Outflow = 1.32 cfs @ 12.09 hrs, Volume= 0.098 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP16:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.266 ac, 52.73% Impervious, Inflow Depth > 5.13" for 100y24h event
Inflow = 1.56 cfs @ 12.09 hrs, Volume= 0.114 af
Outflow = 1.56 cfs @ 12.09 hrs, Volume= 0.114 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP17:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.387 ac, 63.60% Impervious, Inflow Depth > 6.31" for 100y24h event
Inflow = 2.71 cfs @ 12.09 hrs, Volume= 0.203 af
Outflow = 2.71 cfs @ 12.09 hrs, Volume= 0.203 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP18:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 6.135 ac, 37.25% Impervious, Inflow Depth > 4.98" for 100y24h event
Inflow = 19.84 cfs @ 12.44 hrs, Volume= 2.548 af
Outflow = 19.84 cfs @ 12.44 hrs, Volume= 2.548 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-H :

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP19:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.180 ac, 48.17% Impervious, Inflow Depth > 4.19" for 100y24h event
Inflow = 0.87 cfs @ 12.09 hrs, Volume= 0.063 af
Outflow = 0.87 cfs @ 12.09 hrs, Volume= 0.063 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP2:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.261 ac, 94.54% Impervious, Inflow Depth > 7.63" for 100y24h event
Inflow = 2.04 cfs @ 12.09 hrs, Volume= 0.166 af
Outflow = 2.04 cfs @ 12.09 hrs, Volume= 0.166 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP20:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.987 ac, 38.40% Impervious, Inflow Depth > 6.78" for 100y24h event
Inflow = 27.78 cfs @ 12.21 hrs, Volume= 2.816 af
Outflow = 27.78 cfs @ 12.21 hrs, Volume= 2.816 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP21:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.103 ac, 28.98% Impervious, Inflow Depth > 6.07" for 100y24h event
Inflow = 0.70 cfs @ 12.09 hrs, Volume= 0.052 af
Outflow = 0.70 cfs @ 12.09 hrs, Volume= 0.052 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP3:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.205 ac, 81.12% Impervious, Inflow Depth > 6.91" for 100y24h event
Inflow = 8.97 cfs @ 12.09 hrs, Volume= 0.694 af
Outflow = 8.97 cfs @ 12.09 hrs, Volume= 0.694 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-A : DOWNSTREAM OF 3.5X1.5 CULVERT @ STA219+90

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP4:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.840 ac, 83.84% Impervious, Inflow Depth > 7.02" for 100y24h event
Inflow = 17.12 cfs @ 12.18 hrs, Volume= 1.661 af
Outflow = 17.12 cfs @ 12.18 hrs, Volume= 1.661 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-A : DOWNSTREAM OF 3.5X1.5 CULVERT @ STA219+90

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP5:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.517 ac, 60.31% Impervious, Inflow Depth > 5.48" for 100y24h event
Inflow = 2.95 cfs @ 12.12 hrs, Volume= 0.236 af
Outflow = 2.95 cfs @ 12.12 hrs, Volume= 0.236 af, Atten= 0%, Lag= 0.0 min
Routed to Pond 1P : DEP WETLAND W/ VERNAL POOLS

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP6:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.608 ac, 80.11% Impervious, Inflow Depth > 7.27" for 100y24h event
Inflow = 4.65 cfs @ 12.09 hrs, Volume= 0.368 af
Outflow = 4.65 cfs @ 12.09 hrs, Volume= 0.368 af, Atten= 0%, Lag= 0.0 min
Routed to Pond 1W : DEP WETLAND AT UPSTREAM OF 3.5X1.5 CULVERT @ STA219+90

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP7:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.189 ac, 61.74% Impervious, Inflow Depth > 5.77" for 100y24h event
Inflow = 7.55 cfs @ 12.10 hrs, Volume= 0.572 af
Outflow = 7.55 cfs @ 12.10 hrs, Volume= 0.572 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-D : DOWNSTREAM OF 36"CULVERT @ 238+49

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP8:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.983 ac, 58.43% Impervious, Inflow Depth > 5.84" for 100y24h event
Inflow = 5.71 cfs @ 12.12 hrs, Volume= 0.479 af
Outflow = 5.71 cfs @ 12.12 hrs, Volume= 0.479 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-C : UPSTREAM OF 36"CULVERT @ 238+49

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP9:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.216 ac, 59.51% Impervious, Inflow Depth > 5.58" for 100y24h event
Inflow = 7.70 cfs @ 12.09 hrs, Volume= 0.565 af
Outflow = 7.70 cfs @ 12.09 hrs, Volume= 0.565 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-E : DOWNSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Sta253+74

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond 1P: DEP WETLAND W/ VERNAL POOLS

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.517 ac, 60.31% Impervious, Inflow Depth > 5.48" for 100y24h event
Inflow = 2.95 cfs @ 12.12 hrs, Volume= 0.236 af
Primary = 2.95 cfs @ 12.12 hrs, Volume= 0.236 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond 1W: DEP WETLAND AT UPSTREAM OF 3.5X1.5 CULVERT @ STA219+90

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.608 ac, 80.11% Impervious, Inflow Depth > 7.27" for 100y24h event
Inflow = 4.65 cfs @ 12.09 hrs, Volume= 0.368 af
Primary = 4.65 cfs @ 12.09 hrs, Volume= 0.368 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond 2P: Existing Basin

Inflow Area = 0.118 ac, 47.92% Impervious, Inflow Depth > 4.89" for 100y24h event
Inflow = 0.66 cfs @ 12.09 hrs, Volume= 0.048 af
Outflow = 0.13 cfs @ 12.56 hrs, Volume= 0.024 af, Atten= 81%, Lag= 27.8 min
Primary = 0.13 cfs @ 12.56 hrs, Volume= 0.024 af
Routed to Pond W-H :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond W-H :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 86.52' @ 12.56 hrs Surf.Area= 1,529 sf Storage= 1,131 cf

Plug-Flow detention time= 238.3 min calculated for 0.024 af (49% of inflow)
Center-of-Mass det. time= 125.0 min (943.9 - 818.8)

Volume	Invert	Avail.Storage	Storage Description
#1	85.50'	2,145 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
85.50	652	195.0	0	0	652
86.00	1,139	255.0	442	442	2,804
86.50	1,516	290.0	662	1,104	4,328
87.00	1,884	297.0	848	1,952	4,686
87.10	1,974	299.0	193	2,145	4,785

Device	Routing	Invert	Outlet Devices
#1	Secondary	86.90'	**20.0' long x 10.0' 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) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Primary	84.00'	**12.0" Round RCP_Round 12"** L= 100.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 84.00' / 83.50' S= 0.0050 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf
#3	Device 2	86.47'	**Custom Orifice, Cv= 3.20 (C= 4.00)** Head (feet) 0.00 0.50 Width (feet) 3.00 3.00

Primary OutFlow Max=0.13 cfs @ 12.56 hrs HW=86.52' (Free Discharge)
↑—**2=RCP_Round 12"** (Passes 0.13 cfs of 4.16 cfs potential flow)
↑—**3=Custom Orifice** (Weir Controls 0.13 cfs @ 0.88 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=85.50' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond W-A: DOWNSTREAM OF 3.5X1.5 CULVERT @ STA219+90

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.045 ac, 83.03% Impervious, Inflow Depth > 6.99" for 100y24h event
Inflow = 23.80 cfs @ 12.14 hrs, Volume= 2.355 af
Primary = 23.80 cfs @ 12.14 hrs, Volume= 2.355 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond W-C: UPSTREAM OF 36"CULVERT @ 238+49

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.983 ac, 58.43% Impervious, Inflow Depth > 5.84" for 100y24h event
Inflow = 5.71 cfs @ 12.12 hrs, Volume= 0.479 af
Primary = 5.71 cfs @ 12.12 hrs, Volume= 0.479 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-C/D : Wetland -C/D

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond W-C/D: Wetland -C/D

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.172 ac, 60.24% Impervious, Inflow Depth > 5.80" for 100y24h event
Inflow = 13.16 cfs @ 12.11 hrs, Volume= 1.050 af
Primary = 13.16 cfs @ 12.11 hrs, Volume= 1.050 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond W-D: DOWNSTREAM OF 36"CULVERT @ 238+49

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.189 ac, 61.74% Impervious, Inflow Depth > 5.77" for 100y24h event
Inflow = 7.55 cfs @ 12.10 hrs, Volume= 0.572 af
Primary = 7.55 cfs @ 12.10 hrs, Volume= 0.572 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-C/D : Wetland -C/D

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond W-E: DOWNSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Sta253+74

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.216 ac, 59.51% Impervious, Inflow Depth > 5.58" for 100y24h event
Inflow = 7.70 cfs @ 12.09 hrs, Volume= 0.565 af
Primary = 7.70 cfs @ 12.09 hrs, Volume= 0.565 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond W-G: UPSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Sta253+74

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.449 ac, 66.17% Impervious, Inflow Depth > 6.07" for 100y24h event
Inflow = 9.84 cfs @ 12.09 hrs, Volume= 0.733 af
Primary = 9.84 cfs @ 12.09 hrs, Volume= 0.733 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond W-H:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 6.253 ac, 37.45% Impervious, Inflow Depth > 4.94" for 100y24h event
Inflow = 19.92 cfs @ 12.44 hrs, Volume= 2.572 af
Primary = 19.92 cfs @ 12.44 hrs, Volume= 2.572 af, Atten= 0%, Lag= 0.0 min

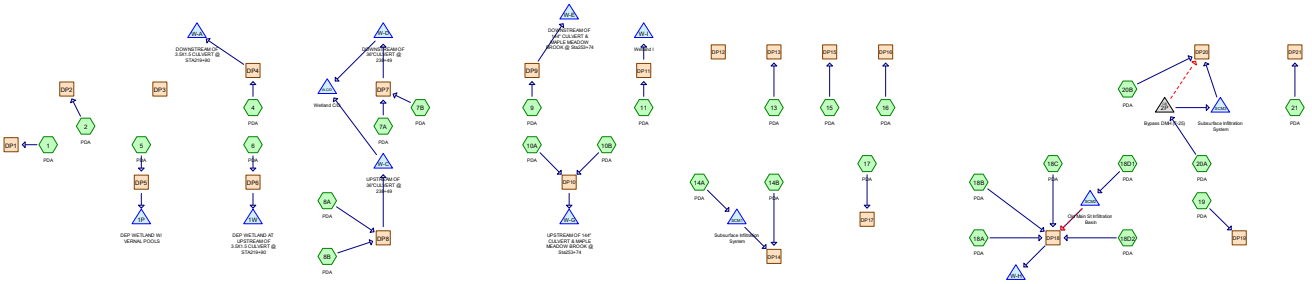
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond W-I: Wetland I

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.503 ac, 76.18% Impervious, Inflow Depth > 7.03" for 100y24h event
Inflow = 3.78 cfs @ 12.09 hrs, Volume= 0.294 af
Primary = 3.78 cfs @ 12.09 hrs, Volume= 0.294 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs



Subcat Reach Pond Link

Routing Diagram for Proposed Condition
Prepared by Green International Affiliates, Printed 2/25/2025
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Proposed Condition

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2y24h	Type III 24-hr		Default	24.00	1	3.30	2
2	10y24h	Type III 24-hr		Default	24.00	1	5.20	2
3	25y24h	Type III 24-hr		Default	24.00	1	6.39	2
4	100y24h	Type III 24-hr		Default	24.00	1	8.23	2

Proposed Condition

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.959	49	50-75% Grass cover, Fair, HSG A (2, 4, 5, 7A, 7B, 8A, 8B, 9, 10A, 10B, 13, 14B, 15, 16, 17, 18A, 18B, 18C, 18D2, 19)
0.188	69	50-75% Grass cover, Fair, HSG B (4, 8A, 11)
0.021	79	50-75% Grass cover, Fair, HSG C (21)
0.020	68	<50% Grass cover, Poor, HSG A (1)
0.303	39	>75% Grass cover, Good, HSG A (14A, 18D1)
0.193	74	>75% Grass cover, Good, HSG C (20B)
0.188	80	>75% Grass cover, Good, HSG D (20A, 20B)
0.737	76	Gravel roads, HSG A (7A, 9, 10B, 13, 14A, 18D1)
0.001	85	Gravel roads, HSG B (8A)
1.526	91	Gravel roads, HSG D (18D1, 20A)
4.332	98	Impervious (18B, 18C, 18D1, 20A, 20B)
11.121	98	Paved roads w/curbs & sewers, HSG A (1, 2, 4, 5, 7A, 7B, 8B, 9, 10A, 10B, 13, 14A, 14B, 15, 16, 17, 18A, 18D2)
0.530	98	Paved roads w/curbs & sewers, HSG B (6, 8A, 11)
0.035	98	Paved roads w/curbs & sewers, HSG C (21)
0.087	98	Unconnected pavement, HSG A (19)
1.099	36	Woods, Fair, HSG A (4, 7A, 8B, 18B, 18C, 18D1)
0.038	73	Woods, Fair, HSG C (21)
1.042	79	Woods, Fair, HSG D (18C, 18D1)
0.540	70	Woods, Good, HSG C (20B)
0.949	77	Woods, Good, HSG D (20A, 20B)
0.103	45	Woods, Poor, HSG A (5)
26.014	**85**	**TOTAL AREA**

Proposed Condition

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
16.430	HSG A	1, 2, 4, 5, 7A, 7B, 8A, 8B, 9, 10A, 10B, 13, 14A, 14B, 15, 16, 17, 18A, 18B, 18C, 18D1, 18D2, 19
0.719	HSG B	4, 6, 8A, 11
0.827	HSG C	20B, 21
3.705	HSG D	18C, 18D1, 20A, 20B
4.332	Other	18B, 18C, 18D1, 20A, 20B
26.014		**TOTAL AREA**

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1: PDA Runoff Area=27,674 sf 96.83% Impervious Runoff Depth=2.96"
Tc=6.0 min CN=97 Runoff=1.96 cfs 0.156 af

Subcatchment 2: PDA Runoff Area=11,386 sf 94.57% Impervious Runoff Depth=2.74"
Tc=6.0 min CN=95 Runoff=0.77 cfs 0.060 af

Subcatchment 4: PDA Runoff Area=211,460 sf 86.63% Impervious Runoff Depth=2.45"
Tc=13.6 min CN=92 Runoff=10.61 cfs 0.989 af

Subcatchment 5: PDA Runoff Area=14,264 sf 44.18% Impervious Runoff Depth=0.84"
Tc=8.8 min CN=69 Runoff=0.25 cfs 0.023 af

Subcatchment 6: PDA Runoff Area=422 sf 100.00% Impervious Runoff Depth=3.07"
Tc=6.0 min CN=98 Runoff=0.03 cfs 0.002 af

Subcatchment 7A: PDA Runoff Area=49,587 sf 89.44% Impervious Runoff Depth=2.64"
Tc=7.0 min CN=94 Runoff=3.21 cfs 0.251 af

Subcatchment 7B: PDA Runoff Area=15,958 sf 75.99% Impervious Runoff Depth=1.92"
Tc=6.0 min CN=86 Runoff=0.81 cfs 0.059 af

Subcatchment 8A: PDA Runoff Area=15,255 sf 17.73% Impervious Runoff Depth=0.56"
Tc=9.0 min CN=63 Runoff=0.15 cfs 0.016 af

Subcatchment 8B: PDA Runoff Area=12,986 sf 93.02% Impervious Runoff Depth=2.64"
Tc=0.0 min CN=94 Runoff=1.01 cfs 0.066 af

Subcatchment 9: PDA Runoff Area=91,916 sf 85.59% Impervious Runoff Depth=2.35"
Tc=7.8 min CN=91 Runoff=5.31 cfs 0.414 af

Subcatchment 10A: PDA Runoff Area=16,304 sf 37.19% Impervious Runoff Depth=0.74"
Tc=6.0 min CN=67 Runoff=0.27 cfs 0.023 af

Subcatchment 10B: PDA Runoff Area=7,913 sf 9.19% Impervious Runoff Depth=0.89"
Tc=6.0 min CN=70 Runoff=0.17 cfs 0.013 af

Subcatchment 11: PDA Runoff Area=21,783 sf 91.70% Impervious Runoff Depth=2.85"
Tc=6.0 min CN=96 Runoff=1.52 cfs 0.119 af

Subcatchment 13: PDA Runoff Area=10,374 sf 18.59% Impervious Runoff Depth=0.45"
Tc=6.0 min CN=60 Runoff=0.07 cfs 0.009 af

Subcatchment 14A: PDA Runoff Area=31,146 sf 74.91% Impervious Runoff Depth=1.84"
Tc=6.0 min CN=85 Runoff=1.51 cfs 0.110 af

Subcatchment 14B: PDA Runoff Area=68,323 sf 83.25% Impervious Runoff Depth=2.26"
Tc=12.0 min CN=90 Runoff=3.36 cfs 0.296 af

Subcatchment 15: PDA Runoff Area=8,441 sf 93.70% Impervious Runoff Depth=2.74"
Tc=6.0 min CN=95 Runoff=0.57 cfs 0.044 af

Subcatchment 16: PDA Runoff Area=10,846 sf 57.10% Impervious Runoff Depth=1.28"
Tc=6.0 min CN=77 Runoff=0.36 cfs 0.027 af

Subcatchment 17: PDA Runoff Area=4,936 sf 27.21% Impervious Runoff Depth=0.52"
Tc=6.0 min CN=62 Runoff=0.05 cfs 0.005 af

Subcatchment 18A: PDA Runoff Area=16,246 sf 29.48% Impervious Runoff Depth=0.56"
Tc=7.0 min CN=63 Runoff=0.17 cfs 0.018 af

Subcatchment 18B: PDA Runoff Area=95,678 sf 74.30% Impervious Runoff Depth=1.84"
Tc=7.8 min CN=85 Runoff=4.41 cfs 0.337 af

Subcatchment 18C: PDA Runoff Area=83,629 sf 26.75% Impervious Runoff Depth=0.99"
Tc=31.7 min CN=72 Runoff=1.14 cfs 0.159 af

Subcatchment 18D1: PDA Runoff Area=78,460 sf 11.48% Impervious Runoff Depth=0.84"
Flow Length=1,330' Slope=0.0410 '/' Tc=21.6 min CN=69 Runoff=1.02 cfs 0.126 af

Subcatchment 18D2: PDA Runoff Area=1,103 sf 91.12% Impervious Runoff Depth=2.64"
Tc=6.0 min CN=94 Runoff=0.07 cfs 0.006 af

Subcatchment 19: PDA Runoff Area=4,847 sf 78.54% Impervious Runoff Depth=2.00"
Tc=0.0 min CN=87 Runoff=0.30 cfs 0.019 af

Subcatchment 20A: PDA Runoff Area=83,763 sf 14.91% Impervious Runoff Depth=2.17"
Tc=6.0 min CN=89 Runoff=4.76 cfs 0.348 af

Subcatchment 20B: PDA Runoff Area=134,369 sf 54.88% Impervious Runoff Depth=2.00"
Flow Length=455' Slope=0.0900 '/' Tc=16.1 min CN=87 Runoff=5.32 cfs 0.515 af

Subcatchment 21: PDA Runoff Area=4,080 sf 37.13% Impervious Runoff Depth=1.77"
Tc=6.0 min CN=84 Runoff=0.19 cfs 0.014 af

Reach DP1: Inflow=1.96 cfs 0.156 af
Outflow=1.96 cfs 0.156 af

Reach DP10: Inflow=0.44 cfs 0.037 af
Outflow=0.44 cfs 0.037 af

Reach DP11: Inflow=1.52 cfs 0.119 af
Outflow=1.52 cfs 0.119 af

Reach DP12:

Reach DP13: Inflow=0.07 cfs 0.009 af
Outflow=0.07 cfs 0.009 af

Reach DP14: Inflow=3.36 cfs 0.325 af
Outflow=3.36 cfs 0.325 af

Reach DP15: Inflow=0.57 cfs 0.044 af
Outflow=0.57 cfs 0.044 af

Reach DP16: Inflow=0.36 cfs 0.027 af
Outflow=0.36 cfs 0.027 af

Reach DP17: Inflow=0.05 cfs 0.005 af
Outflow=0.05 cfs 0.005 af

Reach DP18: Inflow=5.00 cfs 0.623 af
Outflow=5.00 cfs 0.623 af

Reach DP19: Inflow=0.30 cfs 0.019 af
Outflow=0.30 cfs 0.019 af

Reach DP2: Inflow=0.77 cfs 0.060 af
Outflow=0.77 cfs 0.060 af

Reach DP20: Inflow=6.34 cfs 0.806 af
Outflow=6.34 cfs 0.806 af

Reach DP21: Inflow=0.19 cfs 0.014 af
Outflow=0.19 cfs 0.014 af

Reach DP3:

Reach DP4: Inflow=10.61 cfs 0.989 af
Outflow=10.61 cfs 0.989 af

Reach DP5: Inflow=0.25 cfs 0.023 af
Outflow=0.25 cfs 0.023 af

Reach DP6: Inflow=0.03 cfs 0.002 af
Outflow=0.03 cfs 0.002 af

Reach DP7: Inflow=4.02 cfs 0.309 af
Outflow=4.02 cfs 0.309 af

Reach DP8: Inflow=1.05 cfs 0.082 af
Outflow=1.05 cfs 0.082 af

Reach DP9: Inflow=5.31 cfs 0.414 af
Outflow=5.31 cfs 0.414 af

Pond 1P: DEP WETLAND W/ VERNAL POOLS Inflow=0.25 cfs 0.023 af
Primary=0.25 cfs 0.023 af

Pond 1W: DEP WETLAND AT UPSTREAM OF 3.5X1.5 CULVERT @ STA219+90 Inflow=0.03 cfs 0.002 af
Primary=0.03 cfs 0.002 af

Pond 2P: Bypass DMH (7-25) Peak Elev=86.49' Inflow=4.76 cfs 0.348 af
Primary=4.55 cfs 0.347 af Secondary=0.22 cfs 0.001 af Outflow=4.76 cfs 0.348 af

Pond SCM1: Subsurface Infiltration System Peak Elev=88.12' Storage=3,870 cf Inflow=1.51 cfs 0.110 af
Outflow=0.04 cfs 0.029 af

Pond SCM2: Old Main St Infiltration Basin Peak Elev=87.15' Storage=1,430 cf Inflow=1.02 cfs 0.126 af
Outflow=0.63 cfs 0.104 af

Pond SCM3: Subsurface Infiltration System Peak Elev=85.92' Storage=6,775 cf Inflow=4.55 cfs 0.347 af
Outflow=1.22 cfs 0.290 af

Pond W-A: DOWNSTREAM OF 3.5X1.5 CULVERT @ STA219+90 Inflow=10.61 cfs 0.989 af
Primary=10.61 cfs 0.989 af

Pond W-C: UPSTREAM OF 36"CULVERT @ 238+49 Inflow=1.05 cfs 0.082 af
Primary=1.05 cfs 0.082 af

Pond W-C/D: Wetland C/D Inflow=4.63 cfs 0.391 af
Primary=4.63 cfs 0.391 af

Pond W-D: DOWNSTREAM OF 36"CULVERT @ 238+49 Inflow=4.02 cfs 0.309 af
Primary=4.02 cfs 0.309 af

Pond W-E: DOWNSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Inflow=5.31 cfs 0.414 af
Primary=5.31 cfs 0.414 af

Pond W-G: UPSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Inflow=0.44 cfs 0.037 af
Primary=0.44 cfs 0.037 af

Pond W-H: Inflow=5.00 cfs 0.623 af
Primary=5.00 cfs 0.623 af

Pond W-I: Wetland I Inflow=1.52 cfs 0.119 af
Primary=1.52 cfs 0.119 af

Total Runoff Area = 26.014 ac Runoff Volume = 4.222 af Average Runoff Depth = 1.95"
38.09% Pervious = 9.908 ac 61.91% Impervious = 16.106 ac

Summary for Subcatchment 1: PDA

Runoff = 1.96 cfs @ 12.09 hrs, Volume= 0.156 af, Depth= 2.96"
Routed to Reach DP1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
26,797	98	Paved roads w/curbs & sewers, HSG A
877	68	<50% Grass cover, Poor, HSG A
27,674	97	Weighted Average
877		3.17% Pervious Area
26,797		96.83% Impervious Area

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

Summary for Subcatchment 2: PDA

Runoff = 0.77 cfs @ 12.09 hrs, Volume= 0.060 af, Depth= 2.74"
Routed to Reach DP2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
10,768	98	Paved roads w/curbs & sewers, HSG A
618	49	50-75% Grass cover, Fair, HSG A
11,386	95	Weighted Average
618		5.43% Pervious Area
10,768		94.57% Impervious Area

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

Summary for Subcatchment 4: PDA

Runoff = 10.61 cfs @ 12.18 hrs, Volume= 0.989 af, Depth= 2.45"
Routed to Reach DP4 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
183,183	98	Paved roads w/curbs & sewers, HSG A
23,753	49	50-75% Grass cover, Fair, HSG A
2,716	69	50-75% Grass cover, Fair, HSG B
1,808	36	Woods, Fair, HSG A
211,460	92	Weighted Average
28,277		13.37% Pervious Area
183,183		86.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 5: PDA

Runoff = 0.25 cfs @ 12.15 hrs, Volume= 0.023 af, Depth= 0.84"
Routed to Reach DP5 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
6,302	98	Paved roads w/curbs & sewers, HSG A
3,465	49	50-75% Grass cover, Fair, HSG A
4,497	45	Woods, Poor, HSG A
14,264	69	Weighted Average
7,962		55.82% Pervious Area
6,302		44.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 6: PDA

Runoff = 0.03 cfs @ 12.09 hrs, Volume= 0.002 af, Depth= 3.07"
Routed to Reach DP6 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
422	98	Paved roads w/curbs & sewers, HSG B
422		100.00% Impervious Area

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

Summary for Subcatchment 7A: PDA

Runoff = 3.21 cfs @ 12.10 hrs, Volume= 0.251 af, Depth= 2.64"
Routed to Reach DP7 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
44,349	98	Paved roads w/curbs & sewers, HSG A
2,465	49	50-75% Grass cover, Fair, HSG A
388	36	Woods, Fair, HSG A
2,385	76	Gravel roads, HSG A
49,587	94	Weighted Average
5,238		10.56% Pervious Area
44,349		89.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 7B: PDA

Runoff = 0.81 cfs @ 12.09 hrs, Volume= 0.059 af, Depth= 1.92"
Routed to Reach DP7 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
12,126	98	Paved roads w/curbs & sewers, HSG A
3,832	49	50-75% Grass cover, Fair, HSG A
15,958	86	Weighted Average
3,832		24.01% Pervious Area
12,126		75.99% Impervious Area

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

Summary for Subcatchment 8A: PDA

Runoff = 0.15 cfs @ 12.16 hrs, Volume= 0.016 af, Depth= 0.56"
Routed to Reach DP8 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
2,704	98	Paved roads w/curbs & sewers, HSG B
8,860	49	50-75% Grass cover, Fair, HSG A
3,647	69	50-75% Grass cover, Fair, HSG B
44	85	Gravel roads, HSG B
0	60	Woods, Fair, HSG B
15,255	63	Weighted Average
12,551		82.27% Pervious Area
2,704		17.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 8B: PDA

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 1.01 cfs @ 12.00 hrs, Volume= 0.066 af, Depth= 2.64"
Routed to Reach DP8 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
735	36	Woods, Fair, HSG A
172	49	50-75% Grass cover, Fair, HSG A
12,079	98	Paved roads w/curbs & sewers, HSG A
12,986	94	Weighted Average
907		6.98% Pervious Area
12,079		93.02% Impervious Area

Summary for Subcatchment 9: PDA

Runoff = 5.31 cfs @ 12.11 hrs, Volume= 0.414 af, Depth= 2.35"
Routed to Reach DP9 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
78,674	98	Paved roads w/curbs & sewers, HSG A
1,850	76	Gravel roads, HSG A
11,392	49	50-75% Grass cover, Fair, HSG A
91,916	91	Weighted Average
13,242		14.41% Pervious Area
78,674		85.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 10A: PDA

Runoff = 0.27 cfs @ 12.11 hrs, Volume= 0.023 af, Depth= 0.74"
Routed to Reach DP10 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
6,063	98	Paved roads w/curbs & sewers, HSG A
10,241	49	50-75% Grass cover, Fair, HSG A
16,304	67	Weighted Average
10,241		62.81% Pervious Area
6,063		37.19% Impervious Area

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

Summary for Subcatchment 10B: PDA

Runoff = 0.17 cfs @ 12.10 hrs, Volume= 0.013 af, Depth= 0.89"
Routed to Reach DP10 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
727	98	Paved roads w/curbs & sewers, HSG A
2,461	49	50-75% Grass cover, Fair, HSG A
4,725	76	Gravel roads, HSG A
7,913	70	Weighted Average
7,186		90.81% Pervious Area
727		9.19% Impervious Area

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

Summary for Subcatchment 11: PDA

Runoff = 1.52 cfs @ 12.09 hrs, Volume= 0.119 af, Depth= 2.85"
Routed to Reach DP11 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
19,976	98	Paved roads w/curbs & sewers, HSG B
1,807	69	50-75% Grass cover, Fair, HSG B
21,783	96	Weighted Average
1,807		8.30% Pervious Area
19,976		91.70% Impervious Area

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

Summary for Subcatchment 13: PDA

Runoff = 0.07 cfs @ 12.13 hrs, Volume= 0.009 af, Depth= 0.45"
Routed to Reach DP13 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
1,929	98	Paved roads w/curbs & sewers, HSG A
7,698	49	50-75% Grass cover, Fair, HSG A
747	76	Gravel roads, HSG A
10,374	60	Weighted Average
8,445		81.41% Pervious Area
1,929		18.59% Impervious Area

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

Summary for Subcatchment 14A: PDA

Runoff = 1.51 cfs @ 12.09 hrs, Volume= 0.110 af, Depth= 1.84"
Routed to Pond SCM1 : Subsurface Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
23,330	98	Paved roads w/curbs & sewers, HSG A
6,350	39	>75% Grass cover, Good, HSG A
1,466	76	Gravel roads, HSG A
31,146	85	Weighted Average
7,816		25.09% Pervious Area
23,330		74.91% Impervious Area

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

Summary for Subcatchment 14B: PDA

Runoff = 3.36 cfs @ 12.16 hrs, Volume= 0.296 af, Depth= 2.26"
Routed to Reach DP14 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
56,877	98	Paved roads w/curbs & sewers, HSG A
11,446	49	50-75% Grass cover, Fair, HSG A
68,323	90	Weighted Average
11,446		16.75% Pervious Area
56,877		83.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 15: PDA

Runoff = 0.57 cfs @ 12.09 hrs, Volume= 0.044 af, Depth= 2.74"
Routed to Reach DP15 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
7,909	98	Paved roads w/curbs & sewers, HSG A
532	49	50-75% Grass cover, Fair, HSG A
8,441	95	Weighted Average
532		6.30% Pervious Area
7,909		93.70% Impervious Area

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

Summary for Subcatchment 16: PDA

Runoff = 0.36 cfs @ 12.10 hrs, Volume= 0.027 af, Depth= 1.28"
Routed to Reach DP16 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
6,193	98	Paved roads w/curbs & sewers, HSG A
4,653	49	50-75% Grass cover, Fair, HSG A
10,846	77	Weighted Average
4,653		42.90% Pervious Area
6,193		57.10% Impervious Area

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

Summary for Subcatchment 17: PDA

Runoff = 0.05 cfs @ 12.12 hrs, Volume= 0.005 af, Depth= 0.52"
Routed to Reach DP17 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
1,343	98	Paved roads w/curbs & sewers, HSG A
3,593	49	50-75% Grass cover, Fair, HSG A
0	76	Gravel roads, HSG A
4,936	62	Weighted Average
3,593		72.79% Pervious Area
1,343		27.21% Impervious Area

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

Summary for Subcatchment 18A: PDA

Runoff = 0.17 cfs @ 12.13 hrs, Volume= 0.018 af, Depth= 0.56"
Routed to Reach DP18 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
4,790	98	Paved roads w/curbs & sewers, HSG A
11,456	49	50-75% Grass cover, Fair, HSG A
16,246	63	Weighted Average
11,456		70.52% Pervious Area
4,790		29.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 18B: PDA

Runoff = 4.41 cfs @ 12.11 hrs, Volume= 0.337 af, Depth= 1.84"
Routed to Reach DP18 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

	Area (sf)	CN	Description
*	71,087	98	Impervious
	20,290	49	50-75% Grass cover, Fair, HSG A
	4,301	36	Woods, Fair, HSG A
	95,678	85	Weighted Average
	24,591		25.70% Pervious Area
	71,087		74.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 18C: PDA

Runoff = 1.14 cfs @ 12.49 hrs, Volume= 0.159 af, Depth= 0.99"
Routed to Reach DP18 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

	Area (sf)	CN	Description
*	22,372	98	Impervious
	850	49	50-75% Grass cover, Fair, HSG A
	22,494	36	Woods, Fair, HSG A
	37,913	79	Woods, Fair, HSG D
	83,629	72	Weighted Average
	61,257		73.25% Pervious Area
	22,372		26.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.7					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 18D1: PDA

Runoff = 1.02 cfs @ 12.34 hrs, Volume= 0.126 af, Depth= 0.84"
Routed to Pond SCM2 : Old Main St Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

	Area (sf)	CN	Description
*	9,006	98	Impervious
	6,850	39	>75% Grass cover, Good, HSG A
	18,155	36	Woods, Fair, HSG A
	7,463	79	Woods, Fair, HSG D
	20,912	76	Gravel roads, HSG A
	16,074	91	Gravel roads, HSG D
	78,460	69	Weighted Average
	69,454		88.52% Pervious Area
	9,006		11.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0410	1.62		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.30"
21.1	1,280	0.0410	1.01		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
21.6	1,330	Total			

Summary for Subcatchment 18D2: PDA

AREA GOING TO THE EXISTING BMP

Runoff = 0.07 cfs @ 12.09 hrs, Volume= 0.006 af, Depth= 2.64"
Routed to Reach DP18 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
1,005	98	Paved roads w/curbs & sewers, HSG A
98	49	50-75% Grass cover, Fair, HSG A
1,103	94	Weighted Average
98		8.88% Pervious Area
1,005		91.12% Impervious Area

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

Summary for Subcatchment 19: PDA

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.30 cfs @ 12.00 hrs, Volume= 0.019 af, Depth= 2.00"
Routed to Reach DP19 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
3,807	98	Unconnected pavement, HSG A
1,040	49	50-75% Grass cover, Fair, HSG A
4,847	87	Weighted Average
1,040		21.46% Pervious Area
3,807		78.54% Impervious Area
3,807		100.00% Unconnected

Summary for Subcatchment 20A: PDA

Runoff = 4.76 cfs @ 12.09 hrs, Volume= 0.348 af, Depth= 2.17"
Routed to Pond 2P : Bypass DMH (7-25)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

	Area (sf)	CN	Description
*	12,491	98	Impervious
	2,679	80	>75% Grass cover, Good, HSG D
	18,187	77	Woods, Good, HSG D
	50,406	91	Gravel roads, HSG D
	83,763	89	Weighted Average
	71,272		85.09% Pervious Area
	12,491		14.91% Impervious Area

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

Summary for Subcatchment 20B: PDA

Runoff = 5.32 cfs @ 12.22 hrs, Volume= 0.515 af, Depth= 2.00"
Routed to Reach DP20 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

	Area (sf)	CN	Description
*	73,748	98	Impervious
	8,414	74	>75% Grass cover, Good, HSG C
	5,511	80	>75% Grass cover, Good, HSG D
	23,542	70	Woods, Good, HSG C
	23,154	77	Woods, Good, HSG D
	0	91	Gravel roads, HSG D
	134,369	87	Weighted Average
	60,621		45.12% Pervious Area
	73,748		54.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0900	0.07		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.30"
4.5	405	0.0900	1.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
16.1	455	Total			

Summary for Subcatchment 21: PDA

Runoff = 0.19 cfs @ 12.09 hrs, Volume= 0.014 af, Depth= 1.77"
Routed to Reach DP21 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
1,515	98	Paved roads w/curbs & sewers, HSG C
917	79	50-75% Grass cover, Fair, HSG C
1,648	73	Woods, Fair, HSG C
4,080	84	Weighted Average
2,565		62.87% Pervious Area
1,515		37.13% Impervious Area

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

Summary for Reach DP1:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.635 ac, 96.83% Impervious, Inflow Depth = 2.96" for 2y24h event
Inflow = 1.96 cfs @ 12.09 hrs, Volume= 0.156 af
Outflow = 1.96 cfs @ 12.09 hrs, Volume= 0.156 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP10:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.556 ac, 28.04% Impervious, Inflow Depth = 0.79" for 2y24h event
Inflow = 0.44 cfs @ 12.11 hrs, Volume= 0.037 af
Outflow = 0.44 cfs @ 12.11 hrs, Volume= 0.037 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-G : UPSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Sta253+74

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

Summary for Reach DP11:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.500 ac, 91.70% Impervious, Inflow Depth = 2.85" for 2y24h event
Inflow = 1.52 cfs @ 12.09 hrs, Volume= 0.119 af
Outflow = 1.52 cfs @ 12.09 hrs, Volume= 0.119 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-I : Wetland I

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

Summary for Reach DP12:

[40] Hint: Not Described (Outflow=Inflow)

Summary for Reach DP13:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.238 ac, 18.59% Impervious, Inflow Depth = 0.45" for 2y24h event
Inflow = 0.07 cfs @ 12.13 hrs, Volume= 0.009 af
Outflow = 0.07 cfs @ 12.13 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP14:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.283 ac, 80.64% Impervious, Inflow Depth = 1.71" for 2y24h event
Inflow = 3.36 cfs @ 12.16 hrs, Volume= 0.325 af
Outflow = 3.36 cfs @ 12.16 hrs, Volume= 0.325 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP15:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.194 ac, 93.70% Impervious, Inflow Depth = 2.74" for 2y24h event
Inflow = 0.57 cfs @ 12.09 hrs, Volume= 0.044 af
Outflow = 0.57 cfs @ 12.09 hrs, Volume= 0.044 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP16:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.249 ac, 57.10% Impervious, Inflow Depth = 1.28" for 2y24h event
Inflow = 0.36 cfs @ 12.10 hrs, Volume= 0.027 af
Outflow = 0.36 cfs @ 12.10 hrs, Volume= 0.027 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP17:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.113 ac, 27.21% Impervious, Inflow Depth = 0.52" for 2y24h event
Inflow = 0.05 cfs @ 12.12 hrs, Volume= 0.005 af
Outflow = 0.05 cfs @ 12.12 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP18:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 6.316 ac, 39.35% Impervious, Inflow Depth = 1.18" for 2y24h event
Inflow = 5.00 cfs @ 12.12 hrs, Volume= 0.623 af
Outflow = 5.00 cfs @ 12.12 hrs, Volume= 0.623 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-H :

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

Summary for Reach DP19:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.111 ac, 78.54% Impervious, Inflow Depth = 2.00" for 2y24h event
Inflow = 0.30 cfs @ 12.00 hrs, Volume= 0.019 af
Outflow = 0.30 cfs @ 12.00 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP2:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.261 ac, 94.57% Impervious, Inflow Depth = 2.74" for 2y24h event
Inflow = 0.77 cfs @ 12.09 hrs, Volume= 0.060 af
Outflow = 0.77 cfs @ 12.09 hrs, Volume= 0.060 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP20:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 5.008 ac, 39.54% Impervious, Inflow Depth = 1.93" for 2y24h event
Inflow = 6.34 cfs @ 12.23 hrs, Volume= 0.806 af
Outflow = 6.34 cfs @ 12.23 hrs, Volume= 0.806 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP21:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.094 ac, 37.13% Impervious, Inflow Depth = 1.77" for 2y24h event
Inflow = 0.19 cfs @ 12.09 hrs, Volume= 0.014 af
Outflow = 0.19 cfs @ 12.09 hrs, Volume= 0.014 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP3:

[40] Hint: Not Described (Outflow=Inflow)

Summary for Reach DP4:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.854 ac, 86.63% Impervious, Inflow Depth = 2.45" for 2y24h event
Inflow = 10.61 cfs @ 12.18 hrs, Volume= 0.989 af
Outflow = 10.61 cfs @ 12.18 hrs, Volume= 0.989 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-A : DOWNSTREAM OF 3.5X1.5 CULVERT @ STA219+90

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

Summary for Reach DP5:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.327 ac, 44.18% Impervious, Inflow Depth = 0.84" for 2y24h event
Inflow = 0.25 cfs @ 12.15 hrs, Volume= 0.023 af
Outflow = 0.25 cfs @ 12.15 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min
Routed to Pond 1P : DEP WETLAND W/ VERNAL POOLS

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

Summary for Reach DP6:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.010 ac,100.00% Impervious, Inflow Depth = 3.07" for 2y24h event
Inflow = 0.03 cfs @ 12.09 hrs, Volume= 0.002 af
Outflow = 0.03 cfs @ 12.09 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min
Routed to Pond 1W : DEP WETLAND AT UPSTREAM OF 3.5X1.5 CULVERT @ STA219+90

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

Summary for Reach DP7:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.505 ac, 86.16% Impervious, Inflow Depth = 2.47" for 2y24h event
Inflow = 4.02 cfs @ 12.10 hrs, Volume= 0.309 af
Outflow = 4.02 cfs @ 12.10 hrs, Volume= 0.309 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-D : DOWNSTREAM OF 36"CULVERT @ 238+49

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

Summary for Reach DP8:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.648 ac, 52.35% Impervious, Inflow Depth = 1.52" for 2y24h event
Inflow = 1.05 cfs @ 12.00 hrs, Volume= 0.082 af
Outflow = 1.05 cfs @ 12.00 hrs, Volume= 0.082 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-C : UPSTREAM OF 36"CULVERT @ 238+49

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

Summary for Reach DP9:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.110 ac, 85.59% Impervious, Inflow Depth = 2.35" for 2y24h event
Inflow = 5.31 cfs @ 12.11 hrs, Volume= 0.414 af
Outflow = 5.31 cfs @ 12.11 hrs, Volume= 0.414 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-E : DOWNSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Sta253+74

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

Summary for Pond 1P: DEP WETLAND W/ VERNAL POOLS

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.327 ac, 44.18% Impervious, Inflow Depth = 0.84" for 2y24h event
Inflow = 0.25 cfs @ 12.15 hrs, Volume= 0.023 af
Primary = 0.25 cfs @ 12.15 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min

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

Summary for Pond 1W: DEP WETLAND AT UPSTREAM OF 3.5X1.5 CULVERT @ STA219+90

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.010 ac,100.00% Impervious, Inflow Depth = 3.07" for 2y24h event
Inflow = 0.03 cfs @ 12.09 hrs, Volume= 0.002 af
Primary = 0.03 cfs @ 12.09 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min

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

Summary for Pond 2P: Bypass DMH (7-25)

Inflow Area = 1.923 ac, 14.91% Impervious, Inflow Depth = 2.17" for 2y24h event
Inflow = 4.76 cfs @ 12.09 hrs, Volume= 0.348 af
Outflow = 4.76 cfs @ 12.09 hrs, Volume= 0.348 af, Atten= 0%, Lag= 0.0 min
Primary = 4.55 cfs @ 12.09 hrs, Volume= 0.347 af
Routed to Pond SCM3 : Subsurface Infiltration System
Secondary = 0.22 cfs @ 12.10 hrs, Volume= 0.001 af
Routed to Reach DP20 :

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 86.49' @ 12.09 hrs
Flood Elev= 89.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	84.00'	**12.0" Round Culvert** L= 104.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 84.00' / 83.42' S= 0.0056 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Secondary	85.00'	**18.0" Round Culvert** L= 114.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 85.00' / 84.45' S= 0.0048 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.77 sf
#3	Device 2	86.40'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Primary OutFlow Max=4.46 cfs @ 12.09 hrs HW=86.41' (Free Discharge)
└**1=Culvert** (Barrel Controls 4.46 cfs @ 5.68 fps)

Secondary OutFlow Max=0.21 cfs @ 12.10 hrs HW=86.46' (Free Discharge)
└**2=Culvert** (Passes 0.21 cfs of 6.25 cfs potential flow)
└**3=Sharp-Crested Rectangular Weir** (Weir Controls 0.21 cfs @ 0.83 fps)

Summary for Pond SCM1: Subsurface Infiltration System

Inflow Area = 0.715 ac, 74.91% Impervious, Inflow Depth = 1.84" for 2y24h event
Inflow = 1.51 cfs @ 12.09 hrs, Volume= 0.110 af
Outflow = 0.04 cfs @ 17.13 hrs, Volume= 0.029 af, Atten= 97%, Lag= 302.5 min
Primary = 0.04 cfs @ 17.13 hrs, Volume= 0.029 af
Routed to Reach DP14 :

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 88.12' @ 17.13 hrs Surf.Area= 3,941 sf Storage= 3,870 cf

Plug-Flow detention time= 594.5 min calculated for 0.029 af (27% of inflow)
Center-of-Mass det. time= 459.2 min (1,283.9 - 824.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	86.55'	3,240 cf	**44.25'W x 89.06'L x 4.00'H Field A** 15,763 cf Overall - 4,962 cf Embedded = 10,802 cf x 30.0% Voids
#2A	87.05'	4,962 cf	**ADS_StormTech SC-740 +Cap** x 108 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 108 Chambers in 9 Rows
		8,202 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	87.50'	**15.0" Round Culvert** L= 150.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 87.50' / 86.10' S= 0.0093 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.23 sf
#2	Device 1	89.85'	**3.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#3	Device 1	88.00'	**5.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.04 cfs @ 17.13 hrs HW=88.12' (Free Discharge)
└**1=Culvert** (Passes 0.04 cfs of 1.65 cfs potential flow)
  ├**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**3=Orifice** (Orifice Controls 0.04 cfs @ 1.20 fps)

Summary for Pond SCM2: Old Main St Infiltration Basin

Inflow Area = 1.801 ac, 11.48% Impervious, Inflow Depth = 0.84" for 2y24h event
Inflow = 1.02 cfs @ 12.34 hrs, Volume= 0.126 af
Outflow = 0.63 cfs @ 12.66 hrs, Volume= 0.104 af, Atten= 38%, Lag= 19.0 min
Primary = 0.63 cfs @ 12.66 hrs, Volume= 0.104 af
Routed to Reach DP18 :

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 87.15' @ 12.66 hrs Surf.Area= 1,175 sf Storage= 1,430 cf

Plug-Flow detention time= 134.6 min calculated for 0.104 af (82% of inflow)
Center-of-Mass det. time= 59.9 min (951.4 - 891.4)

Volume	Invert	Avail.Storage	Storage Description
#1	85.00'	4,546 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
85.00	235	113.0	0	0	235
86.00	620	160.0	412	412	1,265
87.00	1,100	201.0	849	1,261	2,457
88.00	1,651	240.0	1,366	2,627	3,843
89.00	2,200	259.0	1,919	4,546	4,638

Device	Routing	Invert	Outlet Devices
#1	Primary	84.75'	**12.0" Round RCP_Round 12"** L= 24.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 84.75' / 84.50' S= 0.0104 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf
#2	Device 1	88.30'	**2.0" x 2.0" Horiz. Inlet Grate X 6.00 columns** X 6 rows C= 0.600 in 24.0" x 24.0" Grate (25% open area) Limited to weir flow at low heads
#3	Device 1	86.70'	**9.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.63 cfs @ 12.66 hrs HW=87.15' (Free Discharge)
└**1=RCP_Round 12"** (Passes 0.63 cfs of 5.21 cfs potential flow)
  ├**2=Inlet Grate** (Controls 0.00 cfs)
  └**3=Orifice** (Orifice Controls 0.63 cfs @ 2.28 fps)

Summary for Pond SCM3: Subsurface Infiltration System

[81] Warning: Exceeded Pond 2P by 1.36' @ 12.55 hrs

Inflow Area = 1.923 ac, 14.91% Impervious, Inflow Depth = 2.17" for 2y24h event
Inflow = 4.55 cfs @ 12.09 hrs, Volume= 0.347 af
Outflow = 1.22 cfs @ 12.47 hrs, Volume= 0.290 af, Atten= 73%, Lag= 23.3 min
Primary = 1.22 cfs @ 12.47 hrs, Volume= 0.290 af
Routed to Reach DP20 :

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 85.92' @ 12.47 hrs Surf.Area= 3,740 sf Storage= 6,775 cf

Plug-Flow detention time= 171.1 min calculated for 0.290 af (84% of inflow)
Center-of-Mass det. time= 103.1 min (913.1 - 810.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	82.80'	3,175 cf	**30.00'W x 124.66'L x 4.08'H Field A** 15,270 cf Overall - 4,686 cf Embedded = 10,585 cf x 30.0% Voids
#2A	83.38'	4,686 cf	**ADS_StormTech SC-740 +Cap** x 102 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 102 Chambers in 6 Rows
		7,861 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	83.94'	**12.0" Round Culvert** L= 31.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 83.94' / 83.77' S= 0.0055 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Device 1	86.40'	**3.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#3	Device 1	84.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.22 cfs @ 12.47 hrs HW=85.91' (Free Discharge)
└**1=Culvert** (Passes 1.22 cfs of 4.41 cfs potential flow)
  ├**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**3=Orifice** (Orifice Controls 1.22 cfs @ 6.20 fps)

Summary for Pond W-A: DOWNSTREAM OF 3.5X1.5 CULVERT @ STA219+90

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.854 ac, 86.63% Impervious, Inflow Depth = 2.45" for 2y24h event
Inflow = 10.61 cfs @ 12.18 hrs, Volume= 0.989 af
Primary = 10.61 cfs @ 12.18 hrs, Volume= 0.989 af, Atten= 0%, Lag= 0.0 min

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

Summary for Pond W-C: UPSTREAM OF 36"CULVERT @ 238+49

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.648 ac, 52.35% Impervious, Inflow Depth = 1.52" for 2y24h event
Inflow = 1.05 cfs @ 12.00 hrs, Volume= 0.082 af
Primary = 1.05 cfs @ 12.00 hrs, Volume= 0.082 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-C/D : Wetland C/D

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

Summary for Pond W-C/D: Wetland C/D

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.153 ac, 75.98% Impervious, Inflow Depth = 2.18" for 2y24h event
Inflow = 4.63 cfs @ 12.09 hrs, Volume= 0.391 af
Primary = 4.63 cfs @ 12.09 hrs, Volume= 0.391 af, Atten= 0%, Lag= 0.0 min

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

Summary for Pond W-D: DOWNSTREAM OF 36"CULVERT @ 238+49

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.505 ac, 86.16% Impervious, Inflow Depth = 2.47" for 2y24h event
Inflow = 4.02 cfs @ 12.10 hrs, Volume= 0.309 af
Primary = 4.02 cfs @ 12.10 hrs, Volume= 0.309 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-C/D : Wetland C/D

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

Summary for Pond W-E: DOWNSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Sta253+74

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.110 ac, 85.59% Impervious, Inflow Depth = 2.35" for 2y24h event
Inflow = 5.31 cfs @ 12.11 hrs, Volume= 0.414 af
Primary = 5.31 cfs @ 12.11 hrs, Volume= 0.414 af, Atten= 0%, Lag= 0.0 min

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

Summary for Pond W-G: UPSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Sta253+74

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.556 ac, 28.04% Impervious, Inflow Depth = 0.79" for 2y24h event
Inflow = 0.44 cfs @ 12.11 hrs, Volume= 0.037 af
Primary = 0.44 cfs @ 12.11 hrs, Volume= 0.037 af, Atten= 0%, Lag= 0.0 min

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

Summary for Pond W-H:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 6.316 ac, 39.35% Impervious, Inflow Depth = 1.18" for 2y24h event
Inflow = 5.00 cfs @ 12.12 hrs, Volume= 0.623 af
Primary = 5.00 cfs @ 12.12 hrs, Volume= 0.623 af, Atten= 0%, Lag= 0.0 min

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

Summary for Pond W-I: Wetland I

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.500 ac, 91.70% Impervious, Inflow Depth = 2.85" for 2y24h event
Inflow = 1.52 cfs @ 12.09 hrs, Volume= 0.119 af
Primary = 1.52 cfs @ 12.09 hrs, Volume= 0.119 af, Atten= 0%, Lag= 0.0 min

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

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1: PDA Runoff Area=27,674 sf 96.83% Impervious Runoff Depth=4.85"
Tc=6.0 min CN=97 Runoff=3.14 cfs 0.257 af

Subcatchment 2: PDA Runoff Area=11,386 sf 94.57% Impervious Runoff Depth=4.62"
Tc=6.0 min CN=95 Runoff=1.27 cfs 0.101 af

Subcatchment 4: PDA Runoff Area=211,460 sf 86.63% Impervious Runoff Depth=4.28"
Tc=13.6 min CN=92 Runoff=18.07 cfs 1.733 af

Subcatchment 5: PDA Runoff Area=14,264 sf 44.18% Impervious Runoff Depth=2.10"
Tc=8.8 min CN=69 Runoff=0.70 cfs 0.057 af

Subcatchment 6: PDA Runoff Area=422 sf 100.00% Impervious Runoff Depth=4.96"
Tc=6.0 min CN=98 Runoff=0.05 cfs 0.004 af

Subcatchment 7A: PDA Runoff Area=49,587 sf 89.44% Impervious Runoff Depth=4.51"
Tc=7.0 min CN=94 Runoff=5.32 cfs 0.427 af

Subcatchment 7B: PDA Runoff Area=15,958 sf 75.99% Impervious Runoff Depth=3.65"
Tc=6.0 min CN=86 Runoff=1.51 cfs 0.112 af

Subcatchment 8A: PDA Runoff Area=15,255 sf 17.73% Impervious Runoff Depth=1.64"
Tc=9.0 min CN=63 Runoff=0.56 cfs 0.048 af

Subcatchment 8B: PDA Runoff Area=12,986 sf 93.02% Impervious Runoff Depth=4.51"
Tc=0.0 min CN=94 Runoff=1.67 cfs 0.112 af

Subcatchment 9: PDA Runoff Area=91,916 sf 85.59% Impervious Runoff Depth=4.18"
Tc=7.8 min CN=91 Runoff=9.17 cfs 0.734 af

Subcatchment 10A: PDA Runoff Area=16,304 sf 37.19% Impervious Runoff Depth=1.94"
Tc=6.0 min CN=67 Runoff=0.81 cfs 0.061 af

Subcatchment 10B: PDA Runoff Area=7,913 sf 9.19% Impervious Runoff Depth=2.19"
Tc=6.0 min CN=70 Runoff=0.45 cfs 0.033 af

Subcatchment 11: PDA Runoff Area=21,783 sf 91.70% Impervious Runoff Depth=4.73"
Tc=6.0 min CN=96 Runoff=2.45 cfs 0.197 af

Subcatchment 13: PDA Runoff Area=10,374 sf 18.59% Impervious Runoff Depth=1.42"
Tc=6.0 min CN=60 Runoff=0.36 cfs 0.028 af

Subcatchment 14A: PDA Runoff Area=31,146 sf 74.91% Impervious Runoff Depth=3.55"
Tc=6.0 min CN=85 Runoff=2.88 cfs 0.212 af

Subcatchment 14B: PDA Runoff Area=68,323 sf 83.25% Impervious Runoff Depth=4.07"
Tc=12.0 min CN=90 Runoff=5.90 cfs 0.532 af

Subcatchment 15: PDA Runoff Area=8,441 sf 93.70% Impervious Runoff Depth=4.62"
Tc=6.0 min CN=95 Runoff=0.94 cfs 0.075 af

Subcatchment 16: PDA Runoff Area=10,846 sf 57.10% Impervious Runoff Depth=2.79"
Tc=6.0 min CN=77 Runoff=0.80 cfs 0.058 af

Subcatchment 17: PDA Runoff Area=4,936 sf 27.21% Impervious Runoff Depth=1.56"
Tc=6.0 min CN=62 Runoff=0.19 cfs 0.015 af

Subcatchment 18A: PDA Runoff Area=16,246 sf 29.48% Impervious Runoff Depth=1.64"
Tc=7.0 min CN=63 Runoff=0.64 cfs 0.051 af

Subcatchment 18B: PDA Runoff Area=95,678 sf 74.30% Impervious Runoff Depth=3.55"
Tc=7.8 min CN=85 Runoff=8.40 cfs 0.650 af

Subcatchment 18C: PDA Runoff Area=83,629 sf 26.75% Impervious Runoff Depth=2.35"
Tc=31.7 min CN=72 Runoff=2.89 cfs 0.376 af

Subcatchment 18D1: PDA Runoff Area=78,460 sf 11.48% Impervious Runoff Depth=2.10"
Flow Length=1,330' Slope=0.0410 '/' Tc=21.6 min CN=69 Runoff=2.83 cfs 0.316 af

Subcatchment 18D2: PDA Runoff Area=1,103 sf 91.12% Impervious Runoff Depth=4.51"
Tc=6.0 min CN=94 Runoff=0.12 cfs 0.010 af

Subcatchment 19: PDA Runoff Area=4,847 sf 78.54% Impervious Runoff Depth=3.76"
Tc=0.0 min CN=87 Runoff=0.55 cfs 0.035 af

Subcatchment 20A: PDA Runoff Area=83,763 sf 14.91% Impervious Runoff Depth=3.96"
Tc=6.0 min CN=89 Runoff=8.46 cfs 0.635 af

Subcatchment 20B: PDA Runoff Area=134,369 sf 54.88% Impervious Runoff Depth=3.76"
Flow Length=455' Slope=0.0900 '/' Tc=16.1 min CN=87 Runoff=9.81 cfs 0.966 af

Subcatchment 21: PDA Runoff Area=4,080 sf 37.13% Impervious Runoff Depth=3.45"
Tc=6.0 min CN=84 Runoff=0.37 cfs 0.027 af

Reach DP1: Inflow=3.14 cfs 0.257 af
Outflow=3.14 cfs 0.257 af

Reach DP10: Inflow=1.27 cfs 0.094 af
Outflow=1.27 cfs 0.094 af

Reach DP11: Inflow=2.45 cfs 0.197 af
Outflow=2.45 cfs 0.197 af

Reach DP12:

Reach DP13: Inflow=0.36 cfs 0.028 af
Outflow=0.36 cfs 0.028 af

Reach DP14: Inflow=5.96 cfs 0.663 af
Outflow=5.96 cfs 0.663 af

Reach DP15: Inflow=0.94 cfs 0.075 af
Outflow=0.94 cfs 0.075 af

Reach DP16: Inflow=0.80 cfs 0.058 af
Outflow=0.80 cfs 0.058 af

Reach DP17: Inflow=0.19 cfs 0.015 af
Outflow=0.19 cfs 0.015 af

Reach DP18: Inflow=10.82 cfs 1.381 af
Outflow=10.82 cfs 1.381 af

Reach DP19: Inflow=0.55 cfs 0.035 af
Outflow=0.55 cfs 0.035 af

Reach DP2: Inflow=1.27 cfs 0.101 af
Outflow=1.27 cfs 0.101 af

Reach DP20: Inflow=15.42 cfs 1.544 af
Outflow=15.42 cfs 1.544 af

Reach DP21: Inflow=0.37 cfs 0.027 af
Outflow=0.37 cfs 0.027 af

Reach DP3:

Reach DP4: Inflow=18.07 cfs 1.733 af
Outflow=18.07 cfs 1.733 af

Reach DP5: Inflow=0.70 cfs 0.057 af
Outflow=0.70 cfs 0.057 af

Reach DP6: Inflow=0.05 cfs 0.004 af
Outflow=0.05 cfs 0.004 af

Reach DP7: Inflow=6.82 cfs 0.539 af
Outflow=6.82 cfs 0.539 af

Reach DP8: Inflow=1.91 cfs 0.160 af
Outflow=1.91 cfs 0.160 af

Reach DP9: Inflow=9.17 cfs 0.734 af
Outflow=9.17 cfs 0.734 af

Pond 1P: DEP WETLAND W/ VERNAL POOLS Inflow=0.70 cfs 0.057 af
Primary=0.70 cfs 0.057 af

Pond 1W: DEP WETLAND AT UPSTREAM OF 3.5X1.5 CULVERT @ STA219+90 Inflow=0.05 cfs 0.004 af
Primary=0.05 cfs 0.004 af

Pond 2P: Bypass DMH (7-25) Peak Elev=86.80' Inflow=8.46 cfs 0.635 af
Primary=4.88 cfs 0.596 af Secondary=3.59 cfs 0.040 af Outflow=8.46 cfs 0.635 af

Pond SCM1: Subsurface Infiltration System Peak Elev=88.58' Storage=5,095 cf Inflow=2.88 cfs 0.212 af
Outflow=0.40 cfs 0.131 af

Pond SCM2: Old Main St Infiltration Basin Peak Elev=88.01' Storage=2,639 cf Inflow=2.83 cfs 0.316 af
Outflow=2.05 cfs 0.294 af

Pond SCM3: Subsurface Infiltration System Peak Elev=86.80' Storage=7,770 cf Inflow=4.88 cfs 0.596 af
Outflow=4.65 cfs 0.539 af

Pond W-A: DOWNSTREAM OF 3.5X1.5 CULVERT @ STA219+90 Inflow=18.07 cfs 1.733 af
Primary=18.07 cfs 1.733 af

Pond W-C: UPSTREAM OF 36"CULVERT @ 238+49 Inflow=1.91 cfs 0.160 af
Primary=1.91 cfs 0.160 af

Pond W-C/D: Wetland C/D Inflow=8.14 cfs 0.699 af
Primary=8.14 cfs 0.699 af

Pond W-D: DOWNSTREAM OF 36"CULVERT @ 238+49 Inflow=6.82 cfs 0.539 af
Primary=6.82 cfs 0.539 af

Pond W-E: DOWNSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Inflow=9.17 cfs 0.734 af
Primary=9.17 cfs 0.734 af

Pond W-G: UPSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Inflow=1.27 cfs 0.094 af
Primary=1.27 cfs 0.094 af

Pond W-H: Inflow=10.82 cfs 1.381 af
Primary=10.82 cfs 1.381 af

Pond W-I: Wetland I Inflow=2.45 cfs 0.197 af
Primary=2.45 cfs 0.197 af

Total Runoff Area = 26.014 ac Runoff Volume = 7.860 af Average Runoff Depth = 3.63"
38.09% Pervious = 9.908 ac 61.91% Impervious = 16.106 ac

Summary for Subcatchment 1: PDA

Runoff = 3.14 cfs @ 12.09 hrs, Volume= 0.257 af, Depth= 4.85"
Routed to Reach DP1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
26,797	98	Paved roads w/curbs & sewers, HSG A
877	68	<50% Grass cover, Poor, HSG A
27,674	97	Weighted Average
877		3.17% Pervious Area
26,797		96.83% Impervious Area

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

Summary for Subcatchment 2: PDA

Runoff = 1.27 cfs @ 12.09 hrs, Volume= 0.101 af, Depth= 4.62"
Routed to Reach DP2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
10,768	98	Paved roads w/curbs & sewers, HSG A
618	49	50-75% Grass cover, Fair, HSG A
11,386	95	Weighted Average
618		5.43% Pervious Area
10,768		94.57% Impervious Area

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

Summary for Subcatchment 4: PDA

Runoff = 18.07 cfs @ 12.18 hrs, Volume= 1.733 af, Depth= 4.28"
Routed to Reach DP4 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
183,183	98	Paved roads w/curbs & sewers, HSG A
23,753	49	50-75% Grass cover, Fair, HSG A
2,716	69	50-75% Grass cover, Fair, HSG B
1,808	36	Woods, Fair, HSG A
211,460	92	Weighted Average
28,277		13.37% Pervious Area
183,183		86.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 5: PDA

Runoff = 0.70 cfs @ 12.13 hrs, Volume= 0.057 af, Depth= 2.10"
Routed to Reach DP5 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
6,302	98	Paved roads w/curbs & sewers, HSG A
3,465	49	50-75% Grass cover, Fair, HSG A
4,497	45	Woods, Poor, HSG A
14,264	69	Weighted Average
7,962		55.82% Pervious Area
6,302		44.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 6: PDA

Runoff = 0.05 cfs @ 12.09 hrs, Volume= 0.004 af, Depth= 4.96"
Routed to Reach DP6 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
422	98	Paved roads w/curbs & sewers, HSG B
422		100.00% Impervious Area

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

Summary for Subcatchment 7A: PDA

Runoff = 5.32 cfs @ 12.10 hrs, Volume= 0.427 af, Depth= 4.51"
Routed to Reach DP7 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
44,349	98	Paved roads w/curbs & sewers, HSG A
2,465	49	50-75% Grass cover, Fair, HSG A
388	36	Woods, Fair, HSG A
2,385	76	Gravel roads, HSG A
49,587	94	Weighted Average
5,238		10.56% Pervious Area
44,349		89.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 7B: PDA

Runoff = 1.51 cfs @ 12.09 hrs, Volume= 0.112 af, Depth= 3.65"
Routed to Reach DP7 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
12,126	98	Paved roads w/curbs & sewers, HSG A
3,832	49	50-75% Grass cover, Fair, HSG A
15,958	86	Weighted Average
3,832		24.01% Pervious Area
12,126		75.99% Impervious Area

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

Summary for Subcatchment 8A: PDA

Runoff = 0.56 cfs @ 12.14 hrs, Volume= 0.048 af, Depth= 1.64"
Routed to Reach DP8 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
2,704	98	Paved roads w/curbs & sewers, HSG B
8,860	49	50-75% Grass cover, Fair, HSG A
3,647	69	50-75% Grass cover, Fair, HSG B
44	85	Gravel roads, HSG B
0	60	Woods, Fair, HSG B
15,255	63	Weighted Average
12,551		82.27% Pervious Area
2,704		17.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 8B: PDA

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 1.67 cfs @ 12.00 hrs, Volume= 0.112 af, Depth= 4.51"
Routed to Reach DP8 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
735	36	Woods, Fair, HSG A
172	49	50-75% Grass cover, Fair, HSG A
12,079	98	Paved roads w/curbs & sewers, HSG A
12,986	94	Weighted Average
907		6.98% Pervious Area
12,079		93.02% Impervious Area

Summary for Subcatchment 9: PDA

Runoff = 9.17 cfs @ 12.11 hrs, Volume= 0.734 af, Depth= 4.18"
Routed to Reach DP9 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
78,674	98	Paved roads w/curbs & sewers, HSG A
1,850	76	Gravel roads, HSG A
11,392	49	50-75% Grass cover, Fair, HSG A
91,916	91	Weighted Average
13,242		14.41% Pervious Area
78,674		85.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 10A: PDA

Runoff = 0.81 cfs @ 12.10 hrs, Volume= 0.061 af, Depth= 1.94"
Routed to Reach DP10 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
6,063	98	Paved roads w/curbs & sewers, HSG A
10,241	49	50-75% Grass cover, Fair, HSG A
16,304	67	Weighted Average
10,241		62.81% Pervious Area
6,063		37.19% Impervious Area

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

Summary for Subcatchment 10B: PDA

Runoff = 0.45 cfs @ 12.10 hrs, Volume= 0.033 af, Depth= 2.19"
Routed to Reach DP10 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
727	98	Paved roads w/curbs & sewers, HSG A
2,461	49	50-75% Grass cover, Fair, HSG A
4,725	76	Gravel roads, HSG A
7,913	70	Weighted Average
7,186		90.81% Pervious Area
727		9.19% Impervious Area

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

Summary for Subcatchment 11: PDA

Runoff = 2.45 cfs @ 12.09 hrs, Volume= 0.197 af, Depth= 4.73"
Routed to Reach DP11 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
19,976	98	Paved roads w/curbs & sewers, HSG B
1,807	69	50-75% Grass cover, Fair, HSG B
21,783	96	Weighted Average
1,807		8.30% Pervious Area
19,976		91.70% Impervious Area

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

Summary for Subcatchment 13: PDA

Runoff = 0.36 cfs @ 12.10 hrs, Volume= 0.028 af, Depth= 1.42"
Routed to Reach DP13 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
1,929	98	Paved roads w/curbs & sewers, HSG A
7,698	49	50-75% Grass cover, Fair, HSG A
747	76	Gravel roads, HSG A
10,374	60	Weighted Average
8,445		81.41% Pervious Area
1,929		18.59% Impervious Area

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

Summary for Subcatchment 14A: PDA

Runoff = 2.88 cfs @ 12.09 hrs, Volume= 0.212 af, Depth= 3.55"
Routed to Pond SCM1 : Subsurface Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
23,330	98	Paved roads w/curbs & sewers, HSG A
6,350	39	>75% Grass cover, Good, HSG A
1,466	76	Gravel roads, HSG A
31,146	85	Weighted Average
7,816		25.09% Pervious Area
23,330		74.91% Impervious Area

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

Summary for Subcatchment 14B: PDA

Runoff = 5.90 cfs @ 12.16 hrs, Volume= 0.532 af, Depth= 4.07"
Routed to Reach DP14 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
56,877	98	Paved roads w/curbs & sewers, HSG A
11,446	49	50-75% Grass cover, Fair, HSG A
68,323	90	Weighted Average
11,446		16.75% Pervious Area
56,877		83.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 15: PDA

Runoff = 0.94 cfs @ 12.09 hrs, Volume= 0.075 af, Depth= 4.62"
Routed to Reach DP15 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
7,909	98	Paved roads w/curbs & sewers, HSG A
532	49	50-75% Grass cover, Fair, HSG A
8,441	95	Weighted Average
532		6.30% Pervious Area
7,909		93.70% Impervious Area

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

Summary for Subcatchment 16: PDA

Runoff = 0.80 cfs @ 12.09 hrs, Volume= 0.058 af, Depth= 2.79"
Routed to Reach DP16 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
6,193	98	Paved roads w/curbs & sewers, HSG A
4,653	49	50-75% Grass cover, Fair, HSG A
10,846	77	Weighted Average
4,653		42.90% Pervious Area
6,193		57.10% Impervious Area

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

Summary for Subcatchment 17: PDA

Runoff = 0.19 cfs @ 12.10 hrs, Volume= 0.015 af, Depth= 1.56"
Routed to Reach DP17 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
1,343	98	Paved roads w/curbs & sewers, HSG A
3,593	49	50-75% Grass cover, Fair, HSG A
0	76	Gravel roads, HSG A
4,936	62	Weighted Average
3,593		72.79% Pervious Area
1,343		27.21% Impervious Area

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

Summary for Subcatchment 18A: PDA

Runoff = 0.64 cfs @ 12.11 hrs, Volume= 0.051 af, Depth= 1.64"
Routed to Reach DP18 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
4,790	98	Paved roads w/curbs & sewers, HSG A
11,456	49	50-75% Grass cover, Fair, HSG A
16,246	63	Weighted Average
11,456		70.52% Pervious Area
4,790		29.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 18B: PDA

Runoff = 8.40 cfs @ 12.11 hrs, Volume= 0.650 af, Depth= 3.55"
Routed to Reach DP18 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

	Area (sf)	CN	Description
*	71,087	98	Impervious
	20,290	49	50-75% Grass cover, Fair, HSG A
	4,301	36	Woods, Fair, HSG A
	95,678	85	Weighted Average
	24,591		25.70% Pervious Area
	71,087		74.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 18C: PDA

Runoff = 2.89 cfs @ 12.46 hrs, Volume= 0.376 af, Depth= 2.35"
Routed to Reach DP18 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

	Area (sf)	CN	Description
*	22,372	98	Impervious
	850	49	50-75% Grass cover, Fair, HSG A
	22,494	36	Woods, Fair, HSG A
	37,913	79	Woods, Fair, HSG D
	83,629	72	Weighted Average
	61,257		73.25% Pervious Area
	22,372		26.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.7					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 18D1: PDA

Runoff = 2.83 cfs @ 12.31 hrs, Volume= 0.316 af, Depth= 2.10"
Routed to Pond SCM2 : Old Main St Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

	Area (sf)	CN	Description
*	9,006	98	Impervious
	6,850	39	>75% Grass cover, Good, HSG A
	18,155	36	Woods, Fair, HSG A
	7,463	79	Woods, Fair, HSG D
	20,912	76	Gravel roads, HSG A
	16,074	91	Gravel roads, HSG D
	78,460	69	Weighted Average
	69,454		88.52% Pervious Area
	9,006		11.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0410	1.62		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.30"
21.1	1,280	0.0410	1.01		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
21.6	1,330	Total			

Summary for Subcatchment 18D2: PDA

AREA GOING TO THE EXISTING BMP

Runoff = 0.12 cfs @ 12.09 hrs, Volume= 0.010 af, Depth= 4.51"
Routed to Reach DP18 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
1,005	98	Paved roads w/curbs & sewers, HSG A
98	49	50-75% Grass cover, Fair, HSG A
1,103	94	Weighted Average
98		8.88% Pervious Area
1,005		91.12% Impervious Area

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

Summary for Subcatchment 19: PDA

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.55 cfs @ 12.00 hrs, Volume= 0.035 af, Depth= 3.76"
Routed to Reach DP19 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
3,807	98	Unconnected pavement, HSG A
1,040	49	50-75% Grass cover, Fair, HSG A
4,847	87	Weighted Average
1,040		21.46% Pervious Area
3,807		78.54% Impervious Area
3,807		100.00% Unconnected

Summary for Subcatchment 20A: PDA

Runoff = 8.46 cfs @ 12.09 hrs, Volume= 0.635 af, Depth= 3.96"
Routed to Pond 2P : Bypass DMH (7-25)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

	Area (sf)	CN	Description
*	12,491	98	Impervious
	2,679	80	>75% Grass cover, Good, HSG D
	18,187	77	Woods, Good, HSG D
	50,406	91	Gravel roads, HSG D
	83,763	89	Weighted Average
	71,272		85.09% Pervious Area
	12,491		14.91% Impervious Area

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

Summary for Subcatchment 20B: PDA

Runoff = 9.81 cfs @ 12.22 hrs, Volume= 0.966 af, Depth= 3.76"
Routed to Reach DP20 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

	Area (sf)	CN	Description
*	73,748	98	Impervious
	8,414	74	>75% Grass cover, Good, HSG C
	5,511	80	>75% Grass cover, Good, HSG D
	23,542	70	Woods, Good, HSG C
	23,154	77	Woods, Good, HSG D
	0	91	Gravel roads, HSG D
	134,369	87	Weighted Average
	60,621		45.12% Pervious Area
	73,748		54.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0900	0.07		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.30"
4.5	405	0.0900	1.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
16.1	455	Total			

Summary for Subcatchment 21: PDA

Runoff = 0.37 cfs @ 12.09 hrs, Volume= 0.027 af, Depth= 3.45"
Routed to Reach DP21 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
1,515	98	Paved roads w/curbs & sewers, HSG C
917	79	50-75% Grass cover, Fair, HSG C
1,648	73	Woods, Fair, HSG C
4,080	84	Weighted Average
2,565		62.87% Pervious Area
1,515		37.13% Impervious Area

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

Summary for Reach DP1:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.635 ac, 96.83% Impervious, Inflow Depth = 4.85" for 10y24h event
Inflow = 3.14 cfs @ 12.09 hrs, Volume= 0.257 af
Outflow = 3.14 cfs @ 12.09 hrs, Volume= 0.257 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP10:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.556 ac, 28.04% Impervious, Inflow Depth = 2.02" for 10y24h event
Inflow = 1.27 cfs @ 12.10 hrs, Volume= 0.094 af
Outflow = 1.27 cfs @ 12.10 hrs, Volume= 0.094 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-G : UPSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Sta253+74

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

Summary for Reach DP11:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.500 ac, 91.70% Impervious, Inflow Depth = 4.73" for 10y24h event
Inflow = 2.45 cfs @ 12.09 hrs, Volume= 0.197 af
Outflow = 2.45 cfs @ 12.09 hrs, Volume= 0.197 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-I : Wetland I

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

Summary for Reach DP12:

[40] Hint: Not Described (Outflow=Inflow)

Summary for Reach DP13:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.238 ac, 18.59% Impervious, Inflow Depth = 1.42" for 10y24h event
Inflow = 0.36 cfs @ 12.10 hrs, Volume= 0.028 af
Outflow = 0.36 cfs @ 12.10 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP14:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.283 ac, 80.64% Impervious, Inflow Depth = 3.48" for 10y24h event
Inflow = 5.96 cfs @ 12.17 hrs, Volume= 0.663 af
Outflow = 5.96 cfs @ 12.17 hrs, Volume= 0.663 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP15:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.194 ac, 93.70% Impervious, Inflow Depth = 4.62" for 10y24h event
Inflow = 0.94 cfs @ 12.09 hrs, Volume= 0.075 af
Outflow = 0.94 cfs @ 12.09 hrs, Volume= 0.075 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP16:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.249 ac, 57.10% Impervious, Inflow Depth = 2.79" for 10y24h event
Inflow = 0.80 cfs @ 12.09 hrs, Volume= 0.058 af
Outflow = 0.80 cfs @ 12.09 hrs, Volume= 0.058 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP17:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.113 ac, 27.21% Impervious, Inflow Depth = 1.56" for 10y24h event
Inflow = 0.19 cfs @ 12.10 hrs, Volume= 0.015 af
Outflow = 0.19 cfs @ 12.10 hrs, Volume= 0.015 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP18:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 6.316 ac, 39.35% Impervious, Inflow Depth = 2.62" for 10y24h event
Inflow = 10.82 cfs @ 12.12 hrs, Volume= 1.381 af
Outflow = 10.82 cfs @ 12.12 hrs, Volume= 1.381 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-H :

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

Summary for Reach DP19:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.111 ac, 78.54% Impervious, Inflow Depth = 3.76" for 10y24h event
Inflow = 0.55 cfs @ 12.00 hrs, Volume= 0.035 af
Outflow = 0.55 cfs @ 12.00 hrs, Volume= 0.035 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP2:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.261 ac, 94.57% Impervious, Inflow Depth = 4.62" for 10y24h event
Inflow = 1.27 cfs @ 12.09 hrs, Volume= 0.101 af
Outflow = 1.27 cfs @ 12.09 hrs, Volume= 0.101 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP20:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 5.008 ac, 39.54% Impervious, Inflow Depth = 3.70" for 10y24h event
Inflow = 15.42 cfs @ 12.16 hrs, Volume= 1.544 af
Outflow = 15.42 cfs @ 12.16 hrs, Volume= 1.544 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP21:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.094 ac, 37.13% Impervious, Inflow Depth = 3.45" for 10y24h event
Inflow = 0.37 cfs @ 12.09 hrs, Volume= 0.027 af
Outflow = 0.37 cfs @ 12.09 hrs, Volume= 0.027 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP3:

[40] Hint: Not Described (Outflow=Inflow)

Summary for Reach DP4:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.854 ac, 86.63% Impervious, Inflow Depth = 4.28" for 10y24h event
Inflow = 18.07 cfs @ 12.18 hrs, Volume= 1.733 af
Outflow = 18.07 cfs @ 12.18 hrs, Volume= 1.733 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-A : DOWNSTREAM OF 3.5X1.5 CULVERT @ STA219+90

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

Summary for Reach DP5:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.327 ac, 44.18% Impervious, Inflow Depth = 2.10" for 10y24h event
Inflow = 0.70 cfs @ 12.13 hrs, Volume= 0.057 af
Outflow = 0.70 cfs @ 12.13 hrs, Volume= 0.057 af, Atten= 0%, Lag= 0.0 min
Routed to Pond 1P : DEP WETLAND W/ VERNAL POOLS

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

Summary for Reach DP6:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.010 ac,100.00% Impervious, Inflow Depth = 4.96" for 10y24h event
Inflow = 0.05 cfs @ 12.09 hrs, Volume= 0.004 af
Outflow = 0.05 cfs @ 12.09 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min
Routed to Pond 1W : DEP WETLAND AT UPSTREAM OF 3.5X1.5 CULVERT @ STA219+90

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

Summary for Reach DP7:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.505 ac, 86.16% Impervious, Inflow Depth = 4.30" for 10y24h event
Inflow = 6.82 cfs @ 12.10 hrs, Volume= 0.539 af
Outflow = 6.82 cfs @ 12.10 hrs, Volume= 0.539 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-D : DOWNSTREAM OF 36"CULVERT @ 238+49

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

Summary for Reach DP8:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.648 ac, 52.35% Impervious, Inflow Depth = 2.96" for 10y24h event
Inflow = 1.91 cfs @ 12.01 hrs, Volume= 0.160 af
Outflow = 1.91 cfs @ 12.01 hrs, Volume= 0.160 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-C : UPSTREAM OF 36"CULVERT @ 238+49

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

Summary for Reach DP9:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.110 ac, 85.59% Impervious, Inflow Depth = 4.18" for 10y24h event
Inflow = 9.17 cfs @ 12.11 hrs, Volume= 0.734 af
Outflow = 9.17 cfs @ 12.11 hrs, Volume= 0.734 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-E : DOWNSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Sta253+74

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

Summary for Pond 1P: DEP WETLAND W/ VERNAL POOLS

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.327 ac, 44.18% Impervious, Inflow Depth = 2.10" for 10y24h event
Inflow = 0.70 cfs @ 12.13 hrs, Volume= 0.057 af
Primary = 0.70 cfs @ 12.13 hrs, Volume= 0.057 af, Atten= 0%, Lag= 0.0 min

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

Summary for Pond 1W: DEP WETLAND AT UPSTREAM OF 3.5X1.5 CULVERT @ STA219+90

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.010 ac,100.00% Impervious, Inflow Depth = 4.96" for 10y24h event
Inflow = 0.05 cfs @ 12.09 hrs, Volume= 0.004 af
Primary = 0.05 cfs @ 12.09 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min

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

Summary for Pond 2P: Bypass DMH (7-25)

Inflow Area = 1.923 ac, 14.91% Impervious, Inflow Depth = 3.96" for 10y24h event
Inflow = 8.46 cfs @ 12.09 hrs, Volume= 0.635 af
Outflow = 8.46 cfs @ 12.09 hrs, Volume= 0.635 af, Atten= 0%, Lag= 0.0 min
Primary = 4.88 cfs @ 12.09 hrs, Volume= 0.596 af
Routed to Pond SCM3 : Subsurface Infiltration System
Secondary = 3.59 cfs @ 12.09 hrs, Volume= 0.040 af
Routed to Reach DP20 :

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 86.80' @ 12.09 hrs
Flood Elev= 89.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	84.00'	**12.0" Round Culvert** L= 104.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 84.00' / 83.42' S= 0.0056 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Secondary	85.00'	**18.0" Round Culvert** L= 114.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 85.00' / 84.45' S= 0.0048 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.77 sf
#3	Device 2	86.40'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Primary OutFlow Max=4.86 cfs @ 12.09 hrs HW=86.79' (Free Discharge)
└**1=Culvert** (Barrel Controls 4.86 cfs @ 6.19 fps)

Secondary OutFlow Max=3.39 cfs @ 12.09 hrs HW=86.79' (Free Discharge)
└**2=Culvert** (Passes 3.39 cfs of 7.84 cfs potential flow)
└**3=Sharp-Crested Rectangular Weir** (Weir Controls 3.39 cfs @ 2.23 fps)

Summary for Pond SCM1: Subsurface Infiltration System

Inflow Area = 0.715 ac, 74.91% Impervious, Inflow Depth = 3.55" for 10y24h event
Inflow = 2.88 cfs @ 12.09 hrs, Volume= 0.212 af
Outflow = 0.40 cfs @ 12.64 hrs, Volume= 0.131 af, Atten= 86%, Lag= 33.0 min
Primary = 0.40 cfs @ 12.64 hrs, Volume= 0.131 af
Routed to Reach DP14 :

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 88.58' @ 12.64 hrs Surf.Area= 3,941 sf Storage= 5,095 cf

Plug-Flow detention time= 276.4 min calculated for 0.131 af (62% of inflow)
Center-of-Mass det. time= 175.9 min (981.9 - 806.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	86.55'	3,240 cf	**44.25'W x 89.06'L x 4.00'H Field A** 15,763 cf Overall - 4,962 cf Embedded = 10,802 cf x 30.0% Voids
#2A	87.05'	4,962 cf	**ADS_StormTech SC-740 +Cap** x 108 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 108 Chambers in 9 Rows
		8,202 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	87.50'	**15.0" Round Culvert** L= 150.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 87.50' / 86.10' S= 0.0093 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.23 sf
#2	Device 1	89.85'	**3.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#3	Device 1	88.00'	**5.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.40 cfs @ 12.64 hrs HW=88.58' (Free Discharge)
└**1=Culvert** (Passes 0.40 cfs of 3.97 cfs potential flow)
  ├**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**3=Orifice** (Orifice Controls 0.40 cfs @ 2.92 fps)

Summary for Pond SCM2: Old Main St Infiltration Basin

Inflow Area = 1.801 ac, 11.48% Impervious, Inflow Depth = 2.10" for 10y24h event
Inflow = 2.83 cfs @ 12.31 hrs, Volume= 0.316 af
Outflow = 2.05 cfs @ 12.54 hrs, Volume= 0.294 af, Atten= 27%, Lag= 13.3 min
Primary = 2.05 cfs @ 12.54 hrs, Volume= 0.294 af
Routed to Reach DP18 :

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 88.01' @ 12.54 hrs Surf.Area= 1,655 sf Storage= 2,639 cf

Plug-Flow detention time= 66.6 min calculated for 0.294 af (93% of inflow)
Center-of-Mass det. time= 29.9 min (892.5 - 862.6)

Volume	Invert	Avail.Storage	Storage Description
#1	85.00'	4,546 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
85.00	235	113.0	0	0	235
86.00	620	160.0	412	412	1,265
87.00	1,100	201.0	849	1,261	2,457
88.00	1,651	240.0	1,366	2,627	3,843
89.00	2,200	259.0	1,919	4,546	4,638

Device	Routing	Invert	Outlet Devices
#1	Primary	84.75'	**12.0" Round RCP_Round 12"** L= 24.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 84.75' / 84.50' S= 0.0104 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf
#2	Device 1	88.30'	**2.0" x 2.0" Horiz. Inlet Grate X 6.00 columns** X 6 rows C= 0.600 in 24.0" x 24.0" Grate (25% open area) Limited to weir flow at low heads
#3	Device 1	86.70'	**9.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.05 cfs @ 12.54 hrs HW=88.01' (Free Discharge)
└**1=RCP_Round 12"** (Passes 2.05 cfs of 6.28 cfs potential flow)
  └**2=Inlet Grate** (Controls 0.00 cfs)
  └**3=Orifice** (Orifice Controls 2.05 cfs @ 4.64 fps)

Summary for Pond SCM3: Subsurface Infiltration System

[81] Warning: Exceeded Pond 2P by 1.83' @ 12.60 hrs

Inflow Area = 1.923 ac, 14.91% Impervious, Inflow Depth = 3.72" for 10y24h event
Inflow = 4.88 cfs @ 12.09 hrs, Volume= 0.596 af
Outflow = 4.65 cfs @ 12.18 hrs, Volume= 0.539 af, Atten= 5%, Lag= 5.5 min
Primary = 4.65 cfs @ 12.18 hrs, Volume= 0.539 af
Routed to Reach DP20 :

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 86.80' @ 12.18 hrs Surf.Area= 3,740 sf Storage= 7,770 cf

Plug-Flow detention time= 127.5 min calculated for 0.539 af (90% of inflow)
Center-of-Mass det. time= 81.6 min (879.1 - 797.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	82.80'	3,175 cf	**30.00'W x 124.66'L x 4.08'H Field A** 15,270 cf Overall - 4,686 cf Embedded = 10,585 cf x 30.0% Voids
#2A	83.38'	4,686 cf	**ADS_StormTech SC-740 +Cap** x 102 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 102 Chambers in 6 Rows
		7,861 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	83.94'	**12.0" Round Culvert** L= 31.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 83.94' / 83.77' S= 0.0055 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Device 1	86.40'	**3.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#3	Device 1	84.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=4.60 cfs @ 12.18 hrs HW=86.80' (Free Discharge)
└**1=Culvert** (Passes 4.60 cfs of 5.81 cfs potential flow)
  ├**2=Sharp-Crested Rectangular Weir** (Weir Controls 3.09 cfs @ 2.27 fps)
  └**3=Orifice** (Orifice Controls 1.51 cfs @ 7.69 fps)

Summary for Pond W-A: DOWNSTREAM OF 3.5X1.5 CULVERT @ STA219+90

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.854 ac, 86.63% Impervious, Inflow Depth = 4.28" for 10y24h event
Inflow = 18.07 cfs @ 12.18 hrs, Volume= 1.733 af
Primary = 18.07 cfs @ 12.18 hrs, Volume= 1.733 af, Atten= 0%, Lag= 0.0 min

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

Summary for Pond W-C: UPSTREAM OF 36"CULVERT @ 238+49

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.648 ac, 52.35% Impervious, Inflow Depth = 2.96" for 10y24h event
Inflow = 1.91 cfs @ 12.01 hrs, Volume= 0.160 af
Primary = 1.91 cfs @ 12.01 hrs, Volume= 0.160 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-C/D : Wetland C/D

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

Summary for Pond W-C/D: Wetland C/D

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.153 ac, 75.98% Impervious, Inflow Depth = 3.89" for 10y24h event
Inflow = 8.14 cfs @ 12.09 hrs, Volume= 0.699 af
Primary = 8.14 cfs @ 12.09 hrs, Volume= 0.699 af, Atten= 0%, Lag= 0.0 min

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

Summary for Pond W-D: DOWNSTREAM OF 36"CULVERT @ 238+49

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.505 ac, 86.16% Impervious, Inflow Depth = 4.30" for 10y24h event
Inflow = 6.82 cfs @ 12.10 hrs, Volume= 0.539 af
Primary = 6.82 cfs @ 12.10 hrs, Volume= 0.539 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-C/D : Wetland C/D

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

Summary for Pond W-E: DOWNSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Sta253+74

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.110 ac, 85.59% Impervious, Inflow Depth = 4.18" for 10y24h event
Inflow = 9.17 cfs @ 12.11 hrs, Volume= 0.734 af
Primary = 9.17 cfs @ 12.11 hrs, Volume= 0.734 af, Atten= 0%, Lag= 0.0 min

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

Summary for Pond W-G: UPSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Sta253+74

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.556 ac, 28.04% Impervious, Inflow Depth = 2.02" for 10y24h event
Inflow = 1.27 cfs @ 12.10 hrs, Volume= 0.094 af
Primary = 1.27 cfs @ 12.10 hrs, Volume= 0.094 af, Atten= 0%, Lag= 0.0 min

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

Summary for Pond W-H:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 6.316 ac, 39.35% Impervious, Inflow Depth = 2.62" for 10y24h event
Inflow = 10.82 cfs @ 12.12 hrs, Volume= 1.381 af
Primary = 10.82 cfs @ 12.12 hrs, Volume= 1.381 af, Atten= 0%, Lag= 0.0 min

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

Summary for Pond W-I: Wetland I

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.500 ac, 91.70% Impervious, Inflow Depth = 4.73" for 10y24h event
Inflow = 2.45 cfs @ 12.09 hrs, Volume= 0.197 af
Primary = 2.45 cfs @ 12.09 hrs, Volume= 0.197 af, Atten= 0%, Lag= 0.0 min

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

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1: PDA Runoff Area=27,674 sf 96.83% Impervious Runoff Depth=6.03"
Tc=6.0 min CN=97 Runoff=3.87 cfs 0.319 af

Subcatchment 2: PDA Runoff Area=11,386 sf 94.57% Impervious Runoff Depth=5.80"
Tc=6.0 min CN=95 Runoff=1.57 cfs 0.126 af

Subcatchment 4: PDA Runoff Area=211,460 sf 86.63% Impervious Runoff Depth=5.45"
Tc=13.6 min CN=92 Runoff=22.70 cfs 2.206 af

Subcatchment 5: PDA Runoff Area=14,264 sf 44.18% Impervious Runoff Depth=3.02"
Tc=8.8 min CN=69 Runoff=1.03 cfs 0.082 af

Subcatchment 6: PDA Runoff Area=422 sf 100.00% Impervious Runoff Depth=6.15"
Tc=6.0 min CN=98 Runoff=0.06 cfs 0.005 af

Subcatchment 7A: PDA Runoff Area=49,587 sf 89.44% Impervious Runoff Depth=5.68"
Tc=7.0 min CN=94 Runoff=6.62 cfs 0.539 af

Subcatchment 7B: PDA Runoff Area=15,958 sf 75.99% Impervious Runoff Depth=4.78"
Tc=6.0 min CN=86 Runoff=1.95 cfs 0.146 af

Subcatchment 8A: PDA Runoff Area=15,255 sf 17.73% Impervious Runoff Depth=2.45"
Tc=9.0 min CN=63 Runoff=0.87 cfs 0.072 af

Subcatchment 8B: PDA Runoff Area=12,986 sf 93.02% Impervious Runoff Depth=5.68"
Tc=0.0 min CN=94 Runoff=2.08 cfs 0.141 af

Subcatchment 9: PDA Runoff Area=91,916 sf 85.59% Impervious Runoff Depth=5.34"
Tc=7.8 min CN=91 Runoff=11.56 cfs 0.939 af

Subcatchment 10A: PDA Runoff Area=16,304 sf 37.19% Impervious Runoff Depth=2.83"
Tc=6.0 min CN=67 Runoff=1.21 cfs 0.088 af

Subcatchment 10B: PDA Runoff Area=7,913 sf 9.19% Impervious Runoff Depth=3.12"
Tc=6.0 min CN=70 Runoff=0.65 cfs 0.047 af

Subcatchment 11: PDA Runoff Area=21,783 sf 91.70% Impervious Runoff Depth=5.92"
Tc=6.0 min CN=96 Runoff=3.03 cfs 0.247 af

Subcatchment 13: PDA Runoff Area=10,374 sf 18.59% Impervious Runoff Depth=2.18"
Tc=6.0 min CN=60 Runoff=0.57 cfs 0.043 af

Subcatchment 14A: PDA Runoff Area=31,146 sf 74.91% Impervious Runoff Depth=4.67"
Tc=6.0 min CN=85 Runoff=3.74 cfs 0.278 af

Subcatchment 14B: PDA Runoff Area=68,323 sf 83.25% Impervious Runoff Depth=5.23"
Tc=12.0 min CN=90 Runoff=7.48 cfs 0.683 af

Subcatchment 15: PDA Runoff Area=8,441 sf 93.70% Impervious Runoff Depth=5.80"
Tc=6.0 min CN=95 Runoff=1.16 cfs 0.094 af

Subcatchment 16: PDA Runoff Area=10,846 sf 57.10% Impervious Runoff Depth=3.82"
Tc=6.0 min CN=77 Runoff=1.09 cfs 0.079 af

Subcatchment 17: PDA Runoff Area=4,936 sf 27.21% Impervious Runoff Depth=2.36"
Tc=6.0 min CN=62 Runoff=0.30 cfs 0.022 af

Subcatchment 18A: PDA Runoff Area=16,246 sf 29.48% Impervious Runoff Depth=2.45"
Tc=7.0 min CN=63 Runoff=1.00 cfs 0.076 af

Subcatchment 18B: PDA Runoff Area=95,678 sf 74.30% Impervious Runoff Depth=4.67"
Tc=7.8 min CN=85 Runoff=10.93 cfs 0.855 af

Subcatchment 18C: PDA Runoff Area=83,629 sf 26.75% Impervious Runoff Depth=3.32"
Tc=31.7 min CN=72 Runoff=4.10 cfs 0.530 af

Subcatchment 18D1: PDA Runoff Area=78,460 sf 11.48% Impervious Runoff Depth=3.02"
Flow Length=1,330' Slope=0.0410 '/' Tc=21.6 min CN=69 Runoff=4.12 cfs 0.453 af

Subcatchment 18D2: PDA Runoff Area=1,103 sf 91.12% Impervious Runoff Depth=5.68"
Tc=6.0 min CN=94 Runoff=0.15 cfs 0.012 af

Subcatchment 19: PDA Runoff Area=4,847 sf 78.54% Impervious Runoff Depth=4.89"
Tc=0.0 min CN=87 Runoff=0.71 cfs 0.045 af

Subcatchment 20A: PDA Runoff Area=83,763 sf 14.91% Impervious Runoff Depth=5.11"
Tc=6.0 min CN=89 Runoff=10.77 cfs 0.819 af

Subcatchment 20B: PDA Runoff Area=134,369 sf 54.88% Impervious Runoff Depth=4.89"
Flow Length=455' Slope=0.0900 '/' Tc=16.1 min CN=87 Runoff=12.64 cfs 1.257 af

Subcatchment 21: PDA Runoff Area=4,080 sf 37.13% Impervious Runoff Depth=4.56"
Tc=6.0 min CN=84 Runoff=0.48 cfs 0.036 af

Reach DP1: Inflow=3.87 cfs 0.319 af
Outflow=3.87 cfs 0.319 af

Reach DP10: Inflow=1.86 cfs 0.135 af
Outflow=1.86 cfs 0.135 af

Reach DP11: Inflow=3.03 cfs 0.247 af
Outflow=3.03 cfs 0.247 af

Reach DP12:

Reach DP13: Inflow=0.57 cfs 0.043 af
Outflow=0.57 cfs 0.043 af

Reach DP14: Inflow=7.92 cfs 0.881 af
Outflow=7.92 cfs 0.881 af

Reach DP15: Inflow=1.16 cfs 0.094 af
Outflow=1.16 cfs 0.094 af

Reach DP16: Inflow=1.09 cfs 0.079 af
Outflow=1.09 cfs 0.079 af

Reach DP17: Inflow=0.30 cfs 0.022 af
Outflow=0.30 cfs 0.022 af

Reach DP18: Inflow=15.13 cfs 1.905 af
Outflow=15.13 cfs 1.905 af

Reach DP19: Inflow=0.71 cfs 0.045 af
Outflow=0.71 cfs 0.045 af

Reach DP2: Inflow=1.57 cfs 0.126 af
Outflow=1.57 cfs 0.126 af

Reach DP20: Inflow=20.09 cfs 2.020 af
Outflow=20.09 cfs 2.020 af

Reach DP21: Inflow=0.48 cfs 0.036 af
Outflow=0.48 cfs 0.036 af

Reach DP3:

Reach DP4: Inflow=22.70 cfs 2.206 af
Outflow=22.70 cfs 2.206 af

Reach DP5: Inflow=1.03 cfs 0.082 af
Outflow=1.03 cfs 0.082 af

Reach DP6: Inflow=0.06 cfs 0.005 af
Outflow=0.06 cfs 0.005 af

Reach DP7: Inflow=8.56 cfs 0.685 af
Outflow=8.56 cfs 0.685 af

Reach DP8: Inflow=2.49 cfs 0.213 af
Outflow=2.49 cfs 0.213 af

Reach DP9: Inflow=11.56 cfs 0.939 af
Outflow=11.56 cfs 0.939 af

Pond 1P: DEP WETLAND W/ VERNAL POOLS Inflow=1.03 cfs 0.082 af
Primary=1.03 cfs 0.082 af

Pond 1W: DEP WETLAND AT UPSTREAM OF 3.5X1.5 CULVERT @ STA219+90 Inflow=0.06 cfs 0.005 af
Primary=0.06 cfs 0.005 af

Pond 2P: Bypass DMH (7-25) Peak Elev=86.94' Inflow=10.77 cfs 0.819 af
Primary=5.02 cfs 0.742 af Secondary=5.75 cfs 0.078 af Outflow=10.77 cfs 0.819 af

Pond SCM1: Subsurface Infiltration System Peak Elev=89.18' Storage=6,475 cf Inflow=3.74 cfs 0.278 af
Outflow=0.65 cfs 0.198 af

Pond SCM2: Old Main St Infiltration Basin Peak Elev=88.43' Storage=3,376 cf Inflow=4.12 cfs 0.453 af
Outflow=3.64 cfs 0.431 af

Pond SCM3: Subsurface Infiltration System Peak Elev=86.83' Storage=7,800 cf Inflow=5.02 cfs 0.742 af
Outflow=4.99 cfs 0.685 af

Pond W-A: DOWNSTREAM OF 3.5X1.5 CULVERT @ STA219+90 Inflow=22.70 cfs 2.206 af
Primary=22.70 cfs 2.206 af

Pond W-C: UPSTREAM OF 36"CULVERT @ 238+49 Inflow=2.49 cfs 0.213 af
Primary=2.49 cfs 0.213 af

Pond W-C/D: Wetland C/D Inflow=10.38 cfs 0.898 af
Primary=10.38 cfs 0.898 af

Pond W-D: DOWNSTREAM OF 36"CULVERT @ 238+49 Inflow=8.56 cfs 0.685 af
Primary=8.56 cfs 0.685 af

Pond W-E: DOWNSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK Inflow=11.56 cfs 0.939 af
Primary=11.56 cfs 0.939 af

Pond W-G: UPSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Inflow=1.86 cfs 0.135 af
Primary=1.86 cfs 0.135 af

Pond W-H: Inflow=15.13 cfs 1.905 af
Primary=15.13 cfs 1.905 af

Pond W-I: Wetland I Inflow=3.03 cfs 0.247 af
Primary=3.03 cfs 0.247 af

Total Runoff Area = 26.014 ac Runoff Volume = 10.243 af Average Runoff Depth = 4.72"
38.09% Pervious = 9.908 ac 61.91% Impervious = 16.106 ac

Summary for Subcatchment 1: PDA

Runoff = 3.87 cfs @ 12.09 hrs, Volume= 0.319 af, Depth= 6.03"
Routed to Reach DP1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
26,797	98	Paved roads w/curbs & sewers, HSG A
877	68	<50% Grass cover, Poor, HSG A
27,674	97	Weighted Average
877		3.17% Pervious Area
26,797		96.83% Impervious Area

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

Summary for Subcatchment 2: PDA

Runoff = 1.57 cfs @ 12.09 hrs, Volume= 0.126 af, Depth= 5.80"
Routed to Reach DP2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
10,768	98	Paved roads w/curbs & sewers, HSG A
618	49	50-75% Grass cover, Fair, HSG A
11,386	95	Weighted Average
618		5.43% Pervious Area
10,768		94.57% Impervious Area

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

Summary for Subcatchment 4: PDA

Runoff = 22.70 cfs @ 12.18 hrs, Volume= 2.206 af, Depth= 5.45"
Routed to Reach DP4 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
183,183	98	Paved roads w/curbs & sewers, HSG A
23,753	49	50-75% Grass cover, Fair, HSG A
2,716	69	50-75% Grass cover, Fair, HSG B
1,808	36	Woods, Fair, HSG A
211,460	92	Weighted Average
28,277		13.37% Pervious Area
183,183		86.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 5: PDA

Runoff = 1.03 cfs @ 12.13 hrs, Volume= 0.082 af, Depth= 3.02"
Routed to Reach DP5 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
6,302	98	Paved roads w/curbs & sewers, HSG A
3,465	49	50-75% Grass cover, Fair, HSG A
4,497	45	Woods, Poor, HSG A
14,264	69	Weighted Average
7,962		55.82% Pervious Area
6,302		44.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 6: PDA

Runoff = 0.06 cfs @ 12.09 hrs, Volume= 0.005 af, Depth= 6.15"
Routed to Reach DP6 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
422	98	Paved roads w/curbs & sewers, HSG B
422		100.00% Impervious Area

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

Summary for Subcatchment 7A: PDA

Runoff = 6.62 cfs @ 12.10 hrs, Volume= 0.539 af, Depth= 5.68"
Routed to Reach DP7 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
44,349	98	Paved roads w/curbs & sewers, HSG A
2,465	49	50-75% Grass cover, Fair, HSG A
388	36	Woods, Fair, HSG A
2,385	76	Gravel roads, HSG A
49,587	94	Weighted Average
5,238		10.56% Pervious Area
44,349		89.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 7B: PDA

Runoff = 1.95 cfs @ 12.09 hrs, Volume= 0.146 af, Depth= 4.78"
Routed to Reach DP7 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
12,126	98	Paved roads w/curbs & sewers, HSG A
3,832	49	50-75% Grass cover, Fair, HSG A
15,958	86	Weighted Average
3,832		24.01% Pervious Area
12,126		75.99% Impervious Area

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

Summary for Subcatchment 8A: PDA

Runoff = 0.87 cfs @ 12.14 hrs, Volume= 0.072 af, Depth= 2.45"
Routed to Reach DP8 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
2,704	98	Paved roads w/curbs & sewers, HSG B
8,860	49	50-75% Grass cover, Fair, HSG A
3,647	69	50-75% Grass cover, Fair, HSG B
44	85	Gravel roads, HSG B
0	60	Woods, Fair, HSG B
15,255	63	Weighted Average
12,551		82.27% Pervious Area
2,704		17.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 8B: PDA

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 2.08 cfs @ 12.00 hrs, Volume= 0.141 af, Depth= 5.68"
Routed to Reach DP8 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
735	36	Woods, Fair, HSG A
172	49	50-75% Grass cover, Fair, HSG A
12,079	98	Paved roads w/curbs & sewers, HSG A
12,986	94	Weighted Average
907		6.98% Pervious Area
12,079		93.02% Impervious Area

Summary for Subcatchment 9: PDA

Runoff = 11.56 cfs @ 12.11 hrs, Volume= 0.939 af, Depth= 5.34"
Routed to Reach DP9 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
78,674	98	Paved roads w/curbs & sewers, HSG A
1,850	76	Gravel roads, HSG A
11,392	49	50-75% Grass cover, Fair, HSG A
91,916	91	Weighted Average
13,242		14.41% Pervious Area
78,674		85.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 10A: PDA

Runoff = 1.21 cfs @ 12.10 hrs, Volume= 0.088 af, Depth= 2.83"
Routed to Reach DP10 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
6,063	98	Paved roads w/curbs & sewers, HSG A
10,241	49	50-75% Grass cover, Fair, HSG A
16,304	67	Weighted Average
10,241		62.81% Pervious Area
6,063		37.19% Impervious Area

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

Summary for Subcatchment 10B: PDA

Runoff = 0.65 cfs @ 12.09 hrs, Volume= 0.047 af, Depth= 3.12"
Routed to Reach DP10 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
727	98	Paved roads w/curbs & sewers, HSG A
2,461	49	50-75% Grass cover, Fair, HSG A
4,725	76	Gravel roads, HSG A
7,913	70	Weighted Average
7,186		90.81% Pervious Area
727		9.19% Impervious Area

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

Summary for Subcatchment 11: PDA

Runoff = 3.03 cfs @ 12.09 hrs, Volume= 0.247 af, Depth= 5.92"
Routed to Reach DP11 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
19,976	98	Paved roads w/curbs & sewers, HSG B
1,807	69	50-75% Grass cover, Fair, HSG B
21,783	96	Weighted Average
1,807		8.30% Pervious Area
19,976		91.70% Impervious Area

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

Summary for Subcatchment 13: PDA

Runoff = 0.57 cfs @ 12.10 hrs, Volume= 0.043 af, Depth= 2.18"
Routed to Reach DP13 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
1,929	98	Paved roads w/curbs & sewers, HSG A
7,698	49	50-75% Grass cover, Fair, HSG A
747	76	Gravel roads, HSG A
10,374	60	Weighted Average
8,445		81.41% Pervious Area
1,929		18.59% Impervious Area

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

Summary for Subcatchment 14A: PDA

Runoff = 3.74 cfs @ 12.09 hrs, Volume= 0.278 af, Depth= 4.67"
Routed to Pond SCM1 : Subsurface Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
23,330	98	Paved roads w/curbs & sewers, HSG A
6,350	39	>75% Grass cover, Good, HSG A
1,466	76	Gravel roads, HSG A
31,146	85	Weighted Average
7,816		25.09% Pervious Area
23,330		74.91% Impervious Area

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

Summary for Subcatchment 14B: PDA

Runoff = 7.48 cfs @ 12.16 hrs, Volume= 0.683 af, Depth= 5.23"
Routed to Reach DP14 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
56,877	98	Paved roads w/curbs & sewers, HSG A
11,446	49	50-75% Grass cover, Fair, HSG A
68,323	90	Weighted Average
11,446		16.75% Pervious Area
56,877		83.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 15: PDA

Runoff = 1.16 cfs @ 12.09 hrs, Volume= 0.094 af, Depth= 5.80"
Routed to Reach DP15 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
7,909	98	Paved roads w/curbs & sewers, HSG A
532	49	50-75% Grass cover, Fair, HSG A
8,441	95	Weighted Average
532		6.30% Pervious Area
7,909		93.70% Impervious Area

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

Summary for Subcatchment 16: PDA

Runoff = 1.09 cfs @ 12.09 hrs, Volume= 0.079 af, Depth= 3.82"
Routed to Reach DP16 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
6,193	98	Paved roads w/curbs & sewers, HSG A
4,653	49	50-75% Grass cover, Fair, HSG A
10,846	77	Weighted Average
4,653		42.90% Pervious Area
6,193		57.10% Impervious Area

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

Summary for Subcatchment 17: PDA

Runoff = 0.30 cfs @ 12.10 hrs, Volume= 0.022 af, Depth= 2.36"
Routed to Reach DP17 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
1,343	98	Paved roads w/curbs & sewers, HSG A
3,593	49	50-75% Grass cover, Fair, HSG A
0	76	Gravel roads, HSG A
4,936	62	Weighted Average
3,593		72.79% Pervious Area
1,343		27.21% Impervious Area

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

Summary for Subcatchment 18A: PDA

Runoff = 1.00 cfs @ 12.11 hrs, Volume= 0.076 af, Depth= 2.45"
Routed to Reach DP18 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
4,790	98	Paved roads w/curbs & sewers, HSG A
11,456	49	50-75% Grass cover, Fair, HSG A
16,246	63	Weighted Average
11,456		70.52% Pervious Area
4,790		29.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 18B: PDA

Runoff = 10.93 cfs @ 12.11 hrs, Volume= 0.855 af, Depth= 4.67"
Routed to Reach DP18 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

	Area (sf)	CN	Description
*	71,087	98	Impervious
	20,290	49	50-75% Grass cover, Fair, HSG A
	4,301	36	Woods, Fair, HSG A
	95,678	85	Weighted Average
	24,591		25.70% Pervious Area
	71,087		74.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 18C: PDA

Runoff = 4.10 cfs @ 12.45 hrs, Volume= 0.530 af, Depth= 3.32"
Routed to Reach DP18 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

	Area (sf)	CN	Description
*	22,372	98	Impervious
	850	49	50-75% Grass cover, Fair, HSG A
	22,494	36	Woods, Fair, HSG A
	37,913	79	Woods, Fair, HSG D
	83,629	72	Weighted Average
	61,257		73.25% Pervious Area
	22,372		26.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.7					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 18D1: PDA

Runoff = 4.12 cfs @ 12.31 hrs, Volume= 0.453 af, Depth= 3.02"
Routed to Pond SCM2 : Old Main St Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

	Area (sf)	CN	Description
*	9,006	98	Impervious
	6,850	39	>75% Grass cover, Good, HSG A
	18,155	36	Woods, Fair, HSG A
	7,463	79	Woods, Fair, HSG D
	20,912	76	Gravel roads, HSG A
	16,074	91	Gravel roads, HSG D
	78,460	69	Weighted Average
	69,454		88.52% Pervious Area
	9,006		11.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0410	1.62		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.30"
21.1	1,280	0.0410	1.01		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
21.6	1,330	Total			

Summary for Subcatchment 18D2: PDA

AREA GOING TO THE EXISTING BMP

Runoff = 0.15 cfs @ 12.09 hrs, Volume= 0.012 af, Depth= 5.68"
Routed to Reach DP18 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
1,005	98	Paved roads w/curbs & sewers, HSG A
98	49	50-75% Grass cover, Fair, HSG A
1,103	94	Weighted Average
98		8.88% Pervious Area
1,005		91.12% Impervious Area

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

Summary for Subcatchment 19: PDA

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.71 cfs @ 12.00 hrs, Volume= 0.045 af, Depth= 4.89"
Routed to Reach DP19 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
3,807	98	Unconnected pavement, HSG A
1,040	49	50-75% Grass cover, Fair, HSG A
4,847	87	Weighted Average
1,040		21.46% Pervious Area
3,807		78.54% Impervious Area
3,807		100.00% Unconnected

Summary for Subcatchment 20A: PDA

Runoff = 10.77 cfs @ 12.09 hrs, Volume= 0.819 af, Depth= 5.11"
Routed to Pond 2P : Bypass DMH (7-25)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

	Area (sf)	CN	Description
*	12,491	98	Impervious
	2,679	80	>75% Grass cover, Good, HSG D
	18,187	77	Woods, Good, HSG D
	50,406	91	Gravel roads, HSG D
	83,763	89	Weighted Average
	71,272		85.09% Pervious Area
	12,491		14.91% Impervious Area

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

Summary for Subcatchment 20B: PDA

Runoff = 12.64 cfs @ 12.22 hrs, Volume= 1.257 af, Depth= 4.89"
Routed to Reach DP20 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

	Area (sf)	CN	Description
*	73,748	98	Impervious
	8,414	74	>75% Grass cover, Good, HSG C
	5,511	80	>75% Grass cover, Good, HSG D
	23,542	70	Woods, Good, HSG C
	23,154	77	Woods, Good, HSG D
	0	91	Gravel roads, HSG D
	134,369	87	Weighted Average
	60,621		45.12% Pervious Area
	73,748		54.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0900	0.07		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.30"
4.5	405	0.0900	1.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
16.1	455	Total			

Summary for Subcatchment 21: PDA

Runoff = 0.48 cfs @ 12.09 hrs, Volume= 0.036 af, Depth= 4.56"
Routed to Reach DP21 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25y24h Rainfall=6.39"

Area (sf)	CN	Description
1,515	98	Paved roads w/curbs & sewers, HSG C
917	79	50-75% Grass cover, Fair, HSG C
1,648	73	Woods, Fair, HSG C
4,080	84	Weighted Average
2,565		62.87% Pervious Area
1,515		37.13% Impervious Area

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

Summary for Reach DP1:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.635 ac, 96.83% Impervious, Inflow Depth = 6.03" for 25y24h event
Inflow = 3.87 cfs @ 12.09 hrs, Volume= 0.319 af
Outflow = 3.87 cfs @ 12.09 hrs, Volume= 0.319 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP10:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.556 ac, 28.04% Impervious, Inflow Depth = 2.92" for 25y24h event
Inflow = 1.86 cfs @ 12.10 hrs, Volume= 0.135 af
Outflow = 1.86 cfs @ 12.10 hrs, Volume= 0.135 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-G : UPSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Sta253+74

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

Summary for Reach DP11:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.500 ac, 91.70% Impervious, Inflow Depth = 5.92" for 25y24h event
Inflow = 3.03 cfs @ 12.09 hrs, Volume= 0.247 af
Outflow = 3.03 cfs @ 12.09 hrs, Volume= 0.247 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-I : Wetland I

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

Summary for Reach DP12:

[40] Hint: Not Described (Outflow=Inflow)

Summary for Reach DP13:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.238 ac, 18.59% Impervious, Inflow Depth = 2.18" for 25y24h event
Inflow = 0.57 cfs @ 12.10 hrs, Volume= 0.043 af
Outflow = 0.57 cfs @ 12.10 hrs, Volume= 0.043 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP14:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.283 ac, 80.64% Impervious, Inflow Depth = 4.63" for 25y24h event
Inflow = 7.92 cfs @ 12.16 hrs, Volume= 0.881 af
Outflow = 7.92 cfs @ 12.16 hrs, Volume= 0.881 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP15:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.194 ac, 93.70% Impervious, Inflow Depth = 5.80" for 25y24h event
Inflow = 1.16 cfs @ 12.09 hrs, Volume= 0.094 af
Outflow = 1.16 cfs @ 12.09 hrs, Volume= 0.094 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP16:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.249 ac, 57.10% Impervious, Inflow Depth = 3.82" for 25y24h event
Inflow = 1.09 cfs @ 12.09 hrs, Volume= 0.079 af
Outflow = 1.09 cfs @ 12.09 hrs, Volume= 0.079 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP17:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.113 ac, 27.21% Impervious, Inflow Depth = 2.36" for 25y24h event
Inflow = 0.30 cfs @ 12.10 hrs, Volume= 0.022 af
Outflow = 0.30 cfs @ 12.10 hrs, Volume= 0.022 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP18:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 6.316 ac, 39.35% Impervious, Inflow Depth = 3.62" for 25y24h event
Inflow = 15.13 cfs @ 12.12 hrs, Volume= 1.905 af
Outflow = 15.13 cfs @ 12.12 hrs, Volume= 1.905 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-H :

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

Summary for Reach DP19:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.111 ac, 78.54% Impervious, Inflow Depth = 4.89" for 25y24h event
Inflow = 0.71 cfs @ 12.00 hrs, Volume= 0.045 af
Outflow = 0.71 cfs @ 12.00 hrs, Volume= 0.045 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP2:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.261 ac, 94.57% Impervious, Inflow Depth = 5.80" for 25y24h event
Inflow = 1.57 cfs @ 12.09 hrs, Volume= 0.126 af
Outflow = 1.57 cfs @ 12.09 hrs, Volume= 0.126 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP20:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 5.008 ac, 39.54% Impervious, Inflow Depth = 4.84" for 25y24h event
Inflow = 20.09 cfs @ 12.13 hrs, Volume= 2.020 af
Outflow = 20.09 cfs @ 12.13 hrs, Volume= 2.020 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP21:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.094 ac, 37.13% Impervious, Inflow Depth = 4.56" for 25y24h event
Inflow = 0.48 cfs @ 12.09 hrs, Volume= 0.036 af
Outflow = 0.48 cfs @ 12.09 hrs, Volume= 0.036 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP3:

[40] Hint: Not Described (Outflow=Inflow)

Summary for Reach DP4:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.854 ac, 86.63% Impervious, Inflow Depth = 5.45" for 25y24h event
Inflow = 22.70 cfs @ 12.18 hrs, Volume= 2.206 af
Outflow = 22.70 cfs @ 12.18 hrs, Volume= 2.206 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-A : DOWNSTREAM OF 3.5X1.5 CULVERT @ STA219+90

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

Summary for Reach DP5:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.327 ac, 44.18% Impervious, Inflow Depth = 3.02" for 25y24h event
Inflow = 1.03 cfs @ 12.13 hrs, Volume= 0.082 af
Outflow = 1.03 cfs @ 12.13 hrs, Volume= 0.082 af, Atten= 0%, Lag= 0.0 min
Routed to Pond 1P : DEP WETLAND W/ VERNAL POOLS

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

Summary for Reach DP6:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.010 ac,100.00% Impervious, Inflow Depth = 6.15" for 25y24h event
Inflow = 0.06 cfs @ 12.09 hrs, Volume= 0.005 af
Outflow = 0.06 cfs @ 12.09 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min
Routed to Pond 1W : DEP WETLAND AT UPSTREAM OF 3.5X1.5 CULVERT @ STA219+90

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

Summary for Reach DP7:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.505 ac, 86.16% Impervious, Inflow Depth = 5.46" for 25y24h event
Inflow = 8.56 cfs @ 12.10 hrs, Volume= 0.685 af
Outflow = 8.56 cfs @ 12.10 hrs, Volume= 0.685 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-D : DOWNSTREAM OF 36"CULVERT @ 238+49

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

Summary for Reach DP8:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.648 ac, 52.35% Impervious, Inflow Depth = 3.94" for 25y24h event
Inflow = 2.49 cfs @ 12.01 hrs, Volume= 0.213 af
Outflow = 2.49 cfs @ 12.01 hrs, Volume= 0.213 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-C : UPSTREAM OF 36"CULVERT @ 238+49

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

Summary for Reach DP9:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.110 ac, 85.59% Impervious, Inflow Depth = 5.34" for 25y24h event
Inflow = 11.56 cfs @ 12.11 hrs, Volume= 0.939 af
Outflow = 11.56 cfs @ 12.11 hrs, Volume= 0.939 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-E : DOWNSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Sta253+74

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

Summary for Pond 1P: DEP WETLAND W/ VERNAL POOLS

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.327 ac, 44.18% Impervious, Inflow Depth = 3.02" for 25y24h event
Inflow = 1.03 cfs @ 12.13 hrs, Volume= 0.082 af
Primary = 1.03 cfs @ 12.13 hrs, Volume= 0.082 af, Atten= 0%, Lag= 0.0 min

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

Summary for Pond 1W: DEP WETLAND AT UPSTREAM OF 3.5X1.5 CULVERT @ STA219+90

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.010 ac,100.00% Impervious, Inflow Depth = 6.15" for 25y24h event
Inflow = 0.06 cfs @ 12.09 hrs, Volume= 0.005 af
Primary = 0.06 cfs @ 12.09 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min

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

Summary for Pond 2P: Bypass DMH (7-25)

Inflow Area = 1.923 ac, 14.91% Impervious, Inflow Depth = 5.11" for 25y24h event
Inflow = 10.77 cfs @ 12.09 hrs, Volume= 0.819 af
Outflow = 10.77 cfs @ 12.09 hrs, Volume= 0.819 af, Atten= 0%, Lag= 0.0 min
Primary = 5.02 cfs @ 12.09 hrs, Volume= 0.742 af
Routed to Pond SCM3 : Subsurface Infiltration System
Secondary = 5.75 cfs @ 12.09 hrs, Volume= 0.078 af
Routed to Reach DP20 :

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 86.94' @ 12.09 hrs
Flood Elev= 89.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	84.00'	**12.0" Round Culvert** L= 104.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 84.00' / 83.42' S= 0.0056 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Secondary	85.00'	**18.0" Round Culvert** L= 114.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 85.00' / 84.45' S= 0.0048 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.77 sf
#3	Device 2	86.40'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Primary OutFlow Max=5.00 cfs @ 12.09 hrs HW=86.93' (Free Discharge)
└**1=Culvert** (Barrel Controls 5.00 cfs @ 6.37 fps)

Secondary OutFlow Max=5.49 cfs @ 12.09 hrs HW=86.93' (Free Discharge)
└**2=Culvert** (Passes 5.49 cfs of 8.20 cfs potential flow)
└**3=Sharp-Crested Rectangular Weir** (Weir Controls 5.49 cfs @ 2.68 fps)

Summary for Pond SCM1: Subsurface Infiltration System

Inflow Area = 0.715 ac, 74.91% Impervious, Inflow Depth = 4.67" for 25y24h event
Inflow = 3.74 cfs @ 12.09 hrs, Volume= 0.278 af
Outflow = 0.65 cfs @ 12.56 hrs, Volume= 0.198 af, Atten= 83%, Lag= 28.3 min
Primary = 0.65 cfs @ 12.56 hrs, Volume= 0.198 af
Routed to Reach DP14 :

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 89.18' @ 12.56 hrs Surf.Area= 3,941 sf Storage= 6,475 cf

Plug-Flow detention time= 239.6 min calculated for 0.198 af (71% of inflow)
Center-of-Mass det. time= 148.4 min (946.7 - 798.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	86.55'	3,240 cf	**44.25'W x 89.06'L x 4.00'H Field A** 15,763 cf Overall - 4,962 cf Embedded = 10,802 cf x 30.0% Voids
#2A	87.05'	4,962 cf	**ADS_StormTech SC-740 +Cap** x 108 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 108 Chambers in 9 Rows
		8,202 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	87.50'	**15.0" Round Culvert** L= 150.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 87.50' / 86.10' S= 0.0093 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.23 sf
#2	Device 1	89.85'	**3.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#3	Device 1	88.00'	**5.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.65 cfs @ 12.56 hrs HW=89.18' (Free Discharge)
└**1=Culvert** (Passes 0.65 cfs of 5.96 cfs potential flow)
  ├**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**3=Orifice** (Orifice Controls 0.65 cfs @ 4.75 fps)

Summary for Pond SCM2: Old Main St Infiltration Basin

Inflow Area = 1.801 ac, 11.48% Impervious, Inflow Depth = 3.02" for 25y24h event
Inflow = 4.12 cfs @ 12.31 hrs, Volume= 0.453 af
Outflow = 3.64 cfs @ 12.43 hrs, Volume= 0.431 af, Atten= 12%, Lag= 7.4 min
Primary = 3.64 cfs @ 12.43 hrs, Volume= 0.431 af
Routed to Reach DP18 :

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 88.43' @ 12.43 hrs Surf.Area= 1,875 sf Storage= 3,376 cf

Plug-Flow detention time= 52.8 min calculated for 0.431 af (95% of inflow)
Center-of-Mass det. time= 25.7 min (877.7 - 851.9)

Volume	Invert	Avail.Storage	Storage Description
#1	85.00'	4,546 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
85.00	235	113.0	0	0	235
86.00	620	160.0	412	412	1,265
87.00	1,100	201.0	849	1,261	2,457
88.00	1,651	240.0	1,366	2,627	3,843
89.00	2,200	259.0	1,919	4,546	4,638

Device	Routing	Invert	Outlet Devices
#1	Primary	84.75'	**12.0" Round RCP_Round 12"** L= 24.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 84.75' / 84.50' S= 0.0104 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf
#2	Device 1	88.30'	**2.0" x 2.0" Horiz. Inlet Grate X 6.00 columns** X 6 rows C= 0.600 in 24.0" x 24.0" Grate (25% open area) Limited to weir flow at low heads
#3	Device 1	86.70'	**9.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=3.59 cfs @ 12.43 hrs HW=88.42' (Free Discharge)
└**1=RCP_Round 12"** (Passes 3.59 cfs of 6.74 cfs potential flow)
  ├**2=Inlet Grate** (Weir Controls 1.12 cfs @ 1.15 fps)
  └**3=Orifice** (Orifice Controls 2.47 cfs @ 5.59 fps)

Summary for Pond SCM3: Subsurface Infiltration System

[81] Warning: Exceeded Pond 2P by 1.80' @ 12.65 hrs

Inflow Area = 1.923 ac, 14.91% Impervious, Inflow Depth = 4.63" for 25y24h event
Inflow = 5.02 cfs @ 12.09 hrs, Volume= 0.742 af
Outflow = 4.99 cfs @ 12.12 hrs, Volume= 0.685 af, Atten= 1%, Lag= 2.0 min
Primary = 4.99 cfs @ 12.12 hrs, Volume= 0.685 af
Routed to Reach DP20 :

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 86.83' @ 12.12 hrs Surf.Area= 3,740 sf Storage= 7,800 cf

Plug-Flow detention time= 114.5 min calculated for 0.685 af (92% of inflow)
Center-of-Mass det. time= 75.5 min (867.9 - 792.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	82.80'	3,175 cf	**30.00'W x 124.66'L x 4.08'H Field A** 15,270 cf Overall - 4,686 cf Embedded = 10,585 cf x 30.0% Voids
#2A	83.38'	4,686 cf	**ADS_StormTech SC-740 +Cap** x 102 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 102 Chambers in 6 Rows
		7,861 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	83.94'	**12.0" Round Culvert** L= 31.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 83.94' / 83.77' S= 0.0055 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Device 1	86.40'	**3.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#3	Device 1	84.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=4.94 cfs @ 12.12 hrs HW=86.83' (Free Discharge)
└**1=Culvert** (Passes 4.94 cfs of 5.84 cfs potential flow)
  ├**2=Sharp-Crested Rectangular Weir** (Weir Controls 3.43 cfs @ 2.36 fps)
  └**3=Orifice** (Orifice Controls 1.52 cfs @ 7.73 fps)

Summary for Pond W-A: DOWNSTREAM OF 3.5X1.5 CULVERT @ STA219+90

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.854 ac, 86.63% Impervious, Inflow Depth = 5.45" for 25y24h event
Inflow = 22.70 cfs @ 12.18 hrs, Volume= 2.206 af
Primary = 22.70 cfs @ 12.18 hrs, Volume= 2.206 af, Atten= 0%, Lag= 0.0 min

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

Summary for Pond W-C: UPSTREAM OF 36"CULVERT @ 238+49

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.648 ac, 52.35% Impervious, Inflow Depth = 3.94" for 25y24h event
Inflow = 2.49 cfs @ 12.01 hrs, Volume= 0.213 af
Primary = 2.49 cfs @ 12.01 hrs, Volume= 0.213 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-C/D : Wetland C/D

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

Summary for Pond W-C/D: Wetland C/D

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.153 ac, 75.98% Impervious, Inflow Depth = 5.00" for 25y24h event
Inflow = 10.38 cfs @ 12.09 hrs, Volume= 0.898 af
Primary = 10.38 cfs @ 12.09 hrs, Volume= 0.898 af, Atten= 0%, Lag= 0.0 min

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

Summary for Pond W-D: DOWNSTREAM OF 36"CULVERT @ 238+49

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.505 ac, 86.16% Impervious, Inflow Depth = 5.46" for 25y24h event
Inflow = 8.56 cfs @ 12.10 hrs, Volume= 0.685 af
Primary = 8.56 cfs @ 12.10 hrs, Volume= 0.685 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-C/D : Wetland C/D

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

Summary for Pond W-E: DOWNSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Sta253+74

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.110 ac, 85.59% Impervious, Inflow Depth = 5.34" for 25y24h event
Inflow = 11.56 cfs @ 12.11 hrs, Volume= 0.939 af
Primary = 11.56 cfs @ 12.11 hrs, Volume= 0.939 af, Atten= 0%, Lag= 0.0 min

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

Summary for Pond W-G: UPSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Sta253+74

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.556 ac, 28.04% Impervious, Inflow Depth = 2.92" for 25y24h event
Inflow = 1.86 cfs @ 12.10 hrs, Volume= 0.135 af
Primary = 1.86 cfs @ 12.10 hrs, Volume= 0.135 af, Atten= 0%, Lag= 0.0 min

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

Summary for Pond W-H:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 6.316 ac, 39.35% Impervious, Inflow Depth = 3.62" for 25y24h event
Inflow = 15.13 cfs @ 12.12 hrs, Volume= 1.905 af
Primary = 15.13 cfs @ 12.12 hrs, Volume= 1.905 af, Atten= 0%, Lag= 0.0 min

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

Summary for Pond W-I: Wetland I

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.500 ac, 91.70% Impervious, Inflow Depth = 5.92" for 25y24h event
Inflow = 3.03 cfs @ 12.09 hrs, Volume= 0.247 af
Primary = 3.03 cfs @ 12.09 hrs, Volume= 0.247 af, Atten= 0%, Lag= 0.0 min

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

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1: PDA Runoff Area=27,674 sf 96.83% Impervious Runoff Depth=7.87"
Tc=6.0 min CN=97 Runoff=5.00 cfs 0.417 af

Subcatchment 2: PDA Runoff Area=11,386 sf 94.57% Impervious Runoff Depth=7.63"
Tc=6.0 min CN=95 Runoff=2.04 cfs 0.166 af

Subcatchment 4: PDA Runoff Area=211,460 sf 86.63% Impervious Runoff Depth=7.27"
Tc=13.6 min CN=92 Runoff=29.79 cfs 2.941 af

Subcatchment 5: PDA Runoff Area=14,264 sf 44.18% Impervious Runoff Depth=4.55"
Tc=8.8 min CN=69 Runoff=1.55 cfs 0.124 af

Subcatchment 6: PDA Runoff Area=422 sf 100.00% Impervious Runoff Depth=7.99"
Tc=6.0 min CN=98 Runoff=0.08 cfs 0.006 af

Subcatchment 7A: PDA Runoff Area=49,587 sf 89.44% Impervious Runoff Depth=7.51"
Tc=7.0 min CN=94 Runoff=8.62 cfs 0.712 af

Subcatchment 7B: PDA Runoff Area=15,958 sf 75.99% Impervious Runoff Depth=6.55"
Tc=6.0 min CN=86 Runoff=2.63 cfs 0.200 af

Subcatchment 8A: PDA Runoff Area=15,255 sf 17.73% Impervious Runoff Depth=3.85"
Tc=9.0 min CN=63 Runoff=1.39 cfs 0.112 af

Subcatchment 8B: PDA Runoff Area=12,986 sf 93.02% Impervious Runoff Depth=7.51"
Tc=0.0 min CN=94 Runoff=2.71 cfs 0.187 af

Subcatchment 9: PDA Runoff Area=91,916 sf 85.59% Impervious Runoff Depth=7.15"
Tc=7.8 min CN=91 Runoff=15.24 cfs 1.258 af

Subcatchment 10A: PDA Runoff Area=16,304 sf 37.19% Impervious Runoff Depth=4.31"
Tc=6.0 min CN=67 Runoff=1.86 cfs 0.135 af

Subcatchment 10B: PDA Runoff Area=7,913 sf 9.19% Impervious Runoff Depth=4.66"
Tc=6.0 min CN=70 Runoff=0.97 cfs 0.071 af

Subcatchment 11: PDA Runoff Area=21,783 sf 91.70% Impervious Runoff Depth=7.75"
Tc=6.0 min CN=96 Runoff=3.92 cfs 0.323 af

Subcatchment 13: PDA Runoff Area=10,374 sf 18.59% Impervious Runoff Depth=3.51"
Tc=6.0 min CN=60 Runoff=0.95 cfs 0.070 af

Subcatchment 14A: PDA Runoff Area=31,146 sf 74.91% Impervious Runoff Depth=6.44"
Tc=6.0 min CN=85 Runoff=5.08 cfs 0.383 af

Subcatchment 14B: PDA Runoff Area=68,323 sf 83.25% Impervious Runoff Depth=7.03"
Tc=12.0 min CN=90 Runoff=9.91 cfs 0.919 af

Subcatchment 15: PDA Runoff Area=8,441 sf 93.70% Impervious Runoff Depth=7.63"
Tc=6.0 min CN=95 Runoff=1.51 cfs 0.123 af

Subcatchment 16: PDA Runoff Area=10,846 sf 57.10% Impervious Runoff Depth=5.49"
Tc=6.0 min CN=77 Runoff=1.55 cfs 0.114 af

Subcatchment 17: PDA Runoff Area=4,936 sf 27.21% Impervious Runoff Depth=3.74"
Tc=6.0 min CN=62 Runoff=0.48 cfs 0.035 af

Subcatchment 18A: PDA Runoff Area=16,246 sf 29.48% Impervious Runoff Depth=3.85"
Tc=7.0 min CN=63 Runoff=1.60 cfs 0.120 af

Subcatchment 18B: PDA Runoff Area=95,678 sf 74.30% Impervious Runoff Depth=6.44"
Tc=7.8 min CN=85 Runoff=14.82 cfs 1.178 af

Subcatchment 18C: PDA Runoff Area=83,629 sf 26.75% Impervious Runoff Depth=4.90"
Tc=31.7 min CN=72 Runoff=6.07 cfs 0.783 af

Subcatchment 18D1: PDA Runoff Area=78,460 sf 11.48% Impervious Runoff Depth=4.55"
Flow Length=1,330' Slope=0.0410 '/' Tc=21.6 min CN=69 Runoff=6.25 cfs 0.682 af

Subcatchment 18D2: PDA Runoff Area=1,103 sf 91.12% Impervious Runoff Depth=7.51"
Tc=6.0 min CN=94 Runoff=0.20 cfs 0.016 af

Subcatchment 19: PDA Runoff Area=4,847 sf 78.54% Impervious Runoff Depth=6.67"
Tc=0.0 min CN=87 Runoff=0.95 cfs 0.062 af

Subcatchment 20A: PDA Runoff Area=83,763 sf 14.91% Impervious Runoff Depth=6.91"
Tc=6.0 min CN=89 Runoff=14.31 cfs 1.108 af

Subcatchment 20B: PDA Runoff Area=134,369 sf 54.88% Impervious Runoff Depth=6.67"
Flow Length=455' Slope=0.0900 '/' Tc=16.1 min CN=87 Runoff=16.98 cfs 1.716 af

Subcatchment 21: PDA Runoff Area=4,080 sf 37.13% Impervious Runoff Depth=6.32"
Tc=6.0 min CN=84 Runoff=0.66 cfs 0.049 af

Reach DP1: Inflow=5.00 cfs 0.417 af
Outflow=5.00 cfs 0.417 af

Reach DP10: Inflow=2.83 cfs 0.205 af
Outflow=2.83 cfs 0.205 af

Reach DP11: Inflow=3.92 cfs 0.323 af
Outflow=3.92 cfs 0.323 af

Reach DP12:

Reach DP13: Inflow=0.95 cfs 0.070 af
Outflow=0.95 cfs 0.070 af

Reach DP14: Inflow=11.03 cfs 1.222 af
Outflow=11.03 cfs 1.222 af

Reach DP15: Inflow=1.51 cfs 0.123 af
Outflow=1.51 cfs 0.123 af

Reach DP16: Inflow=1.55 cfs 0.114 af
Outflow=1.55 cfs 0.114 af

Reach DP17: Inflow=0.48 cfs 0.035 af
Outflow=0.48 cfs 0.035 af

Reach DP18: Inflow=21.18 cfs 2.757 af
Outflow=21.18 cfs 2.757 af

Reach DP19: Inflow=0.95 cfs 0.062 af
Outflow=0.95 cfs 0.062 af

Reach DP2: Inflow=2.04 cfs 0.166 af
Outflow=2.04 cfs 0.166 af

Reach DP20: Inflow=26.94 cfs 2.766 af
Outflow=26.94 cfs 2.766 af

Reach DP21: Inflow=0.66 cfs 0.049 af
Outflow=0.66 cfs 0.049 af

Reach DP3:

Reach DP4: Inflow=29.79 cfs 2.941 af
Outflow=29.79 cfs 2.941 af

Reach DP5: Inflow=1.55 cfs 0.124 af
Outflow=1.55 cfs 0.124 af

Reach DP6: Inflow=0.08 cfs 0.006 af
Outflow=0.08 cfs 0.006 af

Reach DP7: Inflow=11.24 cfs 0.913 af
Outflow=11.24 cfs 0.913 af

Reach DP8: Inflow=3.41 cfs 0.299 af
Outflow=3.41 cfs 0.299 af

Reach DP9: Inflow=15.24 cfs 1.258 af
Outflow=15.24 cfs 1.258 af

Pond 1P: DEP WETLAND W/ VERNAL POOLS Inflow=1.55 cfs 0.124 af
Primary=1.55 cfs 0.124 af

Pond 1W: DEP WETLAND AT UPSTREAM OF 3.5X1.5 CULVERT @ STA219+90 Inflow=0.08 cfs 0.006 af
Primary=0.08 cfs 0.006 af

Pond 2P: Bypass DMH (7-25) Peak Elev=87.24' Inflow=14.31 cfs 1.108 af
Primary=5.30 cfs 0.951 af Secondary=9.01 cfs 0.156 af Outflow=14.31 cfs 1.108 af

Pond SCM1: Subsurface Infiltration System Peak Elev=90.14' Storage=7,713 cf Inflow=5.08 cfs 0.383 af
Outflow=2.48 cfs 0.303 af

Pond SCM2: Old Main St Infiltration Basin Peak Elev=88.69' Storage=3,898 cf Inflow=6.25 cfs 0.682 af
Outflow=5.72 cfs 0.660 af

Pond SCM3: Subsurface Infiltration System Peak Elev=86.85' Storage=7,821 cf Inflow=5.30 cfs 0.951 af
Outflow=5.23 cfs 0.894 af

Pond W-A: DOWNSTREAM OF 3.5X1.5 CULVERT @ STA219+90 Inflow=29.79 cfs 2.941 af
Primary=29.79 cfs 2.941 af

Pond W-C: UPSTREAM OF 36"CULVERT @ 238+49 Inflow=3.41 cfs 0.299 af
Primary=3.41 cfs 0.299 af

Pond W-C/D: Wetland C/D Inflow=13.87 cfs 1.212 af
Primary=13.87 cfs 1.212 af

Pond W-D: DOWNSTREAM OF 36"CULVERT @ 238+49 Inflow=11.24 cfs 0.913 af
Primary=11.24 cfs 0.913 af

Pond W-E: DOWNSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK Inflow=15.24 cfs 1.258 af
Primary=15.24 cfs 1.258 af

Pond W-G: UPSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Inflow=2.83 cfs 0.205 af
Primary=2.83 cfs 0.205 af

Pond W-H: Inflow=21.18 cfs 2.757 af
Primary=21.18 cfs 2.757 af

Pond W-I: Wetland I Inflow=3.92 cfs 0.323 af
Primary=3.92 cfs 0.323 af

Total Runoff Area = 26.014 ac Runoff Volume = 14.010 af Average Runoff Depth = 6.46"
38.09% Pervious = 9.908 ac 61.91% Impervious = 16.106 ac

Summary for Subcatchment 1: PDA

Runoff = 5.00 cfs @ 12.09 hrs, Volume= 0.417 af, Depth= 7.87"
Routed to Reach DP1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
26,797	98	Paved roads w/curbs & sewers, HSG A
877	68	<50% Grass cover, Poor, HSG A
27,674	97	Weighted Average
877		3.17% Pervious Area
26,797		96.83% Impervious Area

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

Summary for Subcatchment 2: PDA

Runoff = 2.04 cfs @ 12.09 hrs, Volume= 0.166 af, Depth= 7.63"
Routed to Reach DP2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
10,768	98	Paved roads w/curbs & sewers, HSG A
618	49	50-75% Grass cover, Fair, HSG A
11,386	95	Weighted Average
618		5.43% Pervious Area
10,768		94.57% Impervious Area

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

Summary for Subcatchment 4: PDA

Runoff = 29.79 cfs @ 12.18 hrs, Volume= 2.941 af, Depth= 7.27"
Routed to Reach DP4 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
183,183	98	Paved roads w/curbs & sewers, HSG A
23,753	49	50-75% Grass cover, Fair, HSG A
2,716	69	50-75% Grass cover, Fair, HSG B
1,808	36	Woods, Fair, HSG A
211,460	92	Weighted Average
28,277		13.37% Pervious Area
183,183		86.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 5: PDA

Runoff = 1.55 cfs @ 12.13 hrs, Volume= 0.124 af, Depth= 4.55"
Routed to Reach DP5 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
6,302	98	Paved roads w/curbs & sewers, HSG A
3,465	49	50-75% Grass cover, Fair, HSG A
4,497	45	Woods, Poor, HSG A
14,264	69	Weighted Average
7,962		55.82% Pervious Area
6,302		44.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 6: PDA

Runoff = 0.08 cfs @ 12.09 hrs, Volume= 0.006 af, Depth= 7.99"
Routed to Reach DP6 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
422	98	Paved roads w/curbs & sewers, HSG B
422		100.00% Impervious Area

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

Summary for Subcatchment 7A: PDA

Runoff = 8.62 cfs @ 12.10 hrs, Volume= 0.712 af, Depth= 7.51"
Routed to Reach DP7 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
44,349	98	Paved roads w/curbs & sewers, HSG A
2,465	49	50-75% Grass cover, Fair, HSG A
388	36	Woods, Fair, HSG A
2,385	76	Gravel roads, HSG A
49,587	94	Weighted Average
5,238		10.56% Pervious Area
44,349		89.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 7B: PDA

Runoff = 2.63 cfs @ 12.09 hrs, Volume= 0.200 af, Depth= 6.55"
Routed to Reach DP7 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
12,126	98	Paved roads w/curbs & sewers, HSG A
3,832	49	50-75% Grass cover, Fair, HSG A
15,958	86	Weighted Average
3,832		24.01% Pervious Area
12,126		75.99% Impervious Area

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

Summary for Subcatchment 8A: PDA

Runoff = 1.39 cfs @ 12.13 hrs, Volume= 0.112 af, Depth= 3.85"
Routed to Reach DP8 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
2,704	98	Paved roads w/curbs & sewers, HSG B
8,860	49	50-75% Grass cover, Fair, HSG A
3,647	69	50-75% Grass cover, Fair, HSG B
44	85	Gravel roads, HSG B
0	60	Woods, Fair, HSG B
15,255	63	Weighted Average
12,551		82.27% Pervious Area
2,704		17.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 8B: PDA

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 2.71 cfs @ 12.00 hrs, Volume= 0.187 af, Depth= 7.51"
Routed to Reach DP8 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
735	36	Woods, Fair, HSG A
172	49	50-75% Grass cover, Fair, HSG A
12,079	98	Paved roads w/curbs & sewers, HSG A
12,986	94	Weighted Average
907		6.98% Pervious Area
12,079		93.02% Impervious Area

Summary for Subcatchment 9: PDA

Runoff = 15.24 cfs @ 12.11 hrs, Volume= 1.258 af, Depth= 7.15"
Routed to Reach DP9 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
78,674	98	Paved roads w/curbs & sewers, HSG A
1,850	76	Gravel roads, HSG A
11,392	49	50-75% Grass cover, Fair, HSG A
91,916	91	Weighted Average
13,242		14.41% Pervious Area
78,674		85.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 10A: PDA

Runoff = 1.86 cfs @ 12.09 hrs, Volume= 0.135 af, Depth= 4.31"
Routed to Reach DP10 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
6,063	98	Paved roads w/curbs & sewers, HSG A
10,241	49	50-75% Grass cover, Fair, HSG A
16,304	67	Weighted Average
10,241		62.81% Pervious Area
6,063		37.19% Impervious Area

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

Summary for Subcatchment 10B: PDA

Runoff = 0.97 cfs @ 12.09 hrs, Volume= 0.071 af, Depth= 4.66"
Routed to Reach DP10 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
727	98	Paved roads w/curbs & sewers, HSG A
2,461	49	50-75% Grass cover, Fair, HSG A
4,725	76	Gravel roads, HSG A
7,913	70	Weighted Average
7,186		90.81% Pervious Area
727		9.19% Impervious Area

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

Summary for Subcatchment 11: PDA

Runoff = 3.92 cfs @ 12.09 hrs, Volume= 0.323 af, Depth= 7.75"
Routed to Reach DP11 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
19,976	98	Paved roads w/curbs & sewers, HSG B
1,807	69	50-75% Grass cover, Fair, HSG B
21,783	96	Weighted Average
1,807		8.30% Pervious Area
19,976		91.70% Impervious Area

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

Summary for Subcatchment 13: PDA

Runoff = 0.95 cfs @ 12.10 hrs, Volume= 0.070 af, Depth= 3.51"
Routed to Reach DP13 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
1,929	98	Paved roads w/curbs & sewers, HSG A
7,698	49	50-75% Grass cover, Fair, HSG A
747	76	Gravel roads, HSG A
10,374	60	Weighted Average
8,445		81.41% Pervious Area
1,929		18.59% Impervious Area

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

Summary for Subcatchment 14A: PDA

Runoff = 5.08 cfs @ 12.09 hrs, Volume= 0.383 af, Depth= 6.44"
Routed to Pond SCM1 : Subsurface Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
23,330	98	Paved roads w/curbs & sewers, HSG A
6,350	39	>75% Grass cover, Good, HSG A
1,466	76	Gravel roads, HSG A
31,146	85	Weighted Average
7,816		25.09% Pervious Area
23,330		74.91% Impervious Area

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

Summary for Subcatchment 14B: PDA

Runoff = 9.91 cfs @ 12.16 hrs, Volume= 0.919 af, Depth= 7.03"
Routed to Reach DP14 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
56,877	98	Paved roads w/curbs & sewers, HSG A
11,446	49	50-75% Grass cover, Fair, HSG A
68,323	90	Weighted Average
11,446		16.75% Pervious Area
56,877		83.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 15: PDA

Runoff = 1.51 cfs @ 12.09 hrs, Volume= 0.123 af, Depth= 7.63"
Routed to Reach DP15 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
7,909	98	Paved roads w/curbs & sewers, HSG A
532	49	50-75% Grass cover, Fair, HSG A
8,441	95	Weighted Average
532		6.30% Pervious Area
7,909		93.70% Impervious Area

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

Summary for Subcatchment 16: PDA

Runoff = 1.55 cfs @ 12.09 hrs, Volume= 0.114 af, Depth= 5.49"
Routed to Reach DP16 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
6,193	98	Paved roads w/curbs & sewers, HSG A
4,653	49	50-75% Grass cover, Fair, HSG A
10,846	77	Weighted Average
4,653		42.90% Pervious Area
6,193		57.10% Impervious Area

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

Summary for Subcatchment 17: PDA

Runoff = 0.48 cfs @ 12.10 hrs, Volume= 0.035 af, Depth= 3.74"
Routed to Reach DP17 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
1,343	98	Paved roads w/curbs & sewers, HSG A
3,593	49	50-75% Grass cover, Fair, HSG A
0	76	Gravel roads, HSG A
4,936	62	Weighted Average
3,593		72.79% Pervious Area
1,343		27.21% Impervious Area

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

Summary for Subcatchment 18A: PDA

Runoff = 1.60 cfs @ 12.11 hrs, Volume= 0.120 af, Depth= 3.85"
Routed to Reach DP18 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
4,790	98	Paved roads w/curbs & sewers, HSG A
11,456	49	50-75% Grass cover, Fair, HSG A
16,246	63	Weighted Average
11,456		70.52% Pervious Area
4,790		29.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 18B: PDA

Runoff = 14.82 cfs @ 12.11 hrs, Volume= 1.178 af, Depth= 6.44"
Routed to Reach DP18 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

	Area (sf)	CN	Description
*	71,087	98	Impervious
	20,290	49	50-75% Grass cover, Fair, HSG A
	4,301	36	Woods, Fair, HSG A
	95,678	85	Weighted Average
	24,591		25.70% Pervious Area
	71,087		74.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 18C: PDA

Runoff = 6.07 cfs @ 12.44 hrs, Volume= 0.783 af, Depth= 4.90"
Routed to Reach DP18 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

	Area (sf)	CN	Description
*	22,372	98	Impervious
	850	49	50-75% Grass cover, Fair, HSG A
	22,494	36	Woods, Fair, HSG A
	37,913	79	Woods, Fair, HSG D
	83,629	72	Weighted Average
	61,257		73.25% Pervious Area
	22,372		26.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.7					**Direct Entry, calcs in spreadsheet**

Summary for Subcatchment 18D1: PDA

Runoff = 6.25 cfs @ 12.30 hrs, Volume= 0.682 af, Depth= 4.55"
Routed to Pond SCM2 : Old Main St Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

	Area (sf)	CN	Description
*	9,006	98	Impervious
	6,850	39	>75% Grass cover, Good, HSG A
	18,155	36	Woods, Fair, HSG A
	7,463	79	Woods, Fair, HSG D
	20,912	76	Gravel roads, HSG A
	16,074	91	Gravel roads, HSG D
	78,460	69	Weighted Average
	69,454		88.52% Pervious Area
	9,006		11.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0410	1.62		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.30"
21.1	1,280	0.0410	1.01		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
21.6	1,330	Total			

Summary for Subcatchment 18D2: PDA

AREA GOING TO THE EXISTING BMP

Runoff = 0.20 cfs @ 12.09 hrs, Volume= 0.016 af, Depth= 7.51"
Routed to Reach DP18 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
1,005	98	Paved roads w/curbs & sewers, HSG A
98	49	50-75% Grass cover, Fair, HSG A
1,103	94	Weighted Average
98		8.88% Pervious Area
1,005		91.12% Impervious Area

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

Summary for Subcatchment 19: PDA

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.95 cfs @ 12.00 hrs, Volume= 0.062 af, Depth= 6.67"
Routed to Reach DP19 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
3,807	98	Unconnected pavement, HSG A
1,040	49	50-75% Grass cover, Fair, HSG A
4,847	87	Weighted Average
1,040		21.46% Pervious Area
3,807		78.54% Impervious Area
3,807		100.00% Unconnected

Summary for Subcatchment 20A: PDA

Runoff = 14.31 cfs @ 12.09 hrs, Volume= 1.108 af, Depth= 6.91"
Routed to Pond 2P : Bypass DMH (7-25)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

	Area (sf)	CN	Description
*	12,491	98	Impervious
	2,679	80	>75% Grass cover, Good, HSG D
	18,187	77	Woods, Good, HSG D
	50,406	91	Gravel roads, HSG D
	83,763	89	Weighted Average
	71,272		85.09% Pervious Area
	12,491		14.91% Impervious Area

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

Summary for Subcatchment 20B: PDA

Runoff = 16.98 cfs @ 12.21 hrs, Volume= 1.716 af, Depth= 6.67"
Routed to Reach DP20 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

	Area (sf)	CN	Description
*	73,748	98	Impervious
	8,414	74	>75% Grass cover, Good, HSG C
	5,511	80	>75% Grass cover, Good, HSG D
	23,542	70	Woods, Good, HSG C
	23,154	77	Woods, Good, HSG D
	0	91	Gravel roads, HSG D
	134,369	87	Weighted Average
	60,621		45.12% Pervious Area
	73,748		54.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0900	0.07		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.30"
4.5	405	0.0900	1.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
16.1	455	Total			

Summary for Subcatchment 21: PDA

Runoff = 0.66 cfs @ 12.09 hrs, Volume= 0.049 af, Depth= 6.32"
Routed to Reach DP21 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
1,515	98	Paved roads w/curbs & sewers, HSG C
917	79	50-75% Grass cover, Fair, HSG C
1,648	73	Woods, Fair, HSG C
4,080	84	Weighted Average
2,565		62.87% Pervious Area
1,515		37.13% Impervious Area

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

Summary for Reach DP1:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.635 ac, 96.83% Impervious, Inflow Depth = 7.87" for 100y24h event
Inflow = 5.00 cfs @ 12.09 hrs, Volume= 0.417 af
Outflow = 5.00 cfs @ 12.09 hrs, Volume= 0.417 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP10:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.556 ac, 28.04% Impervious, Inflow Depth = 4.43" for 100y24h event
Inflow = 2.83 cfs @ 12.09 hrs, Volume= 0.205 af
Outflow = 2.83 cfs @ 12.09 hrs, Volume= 0.205 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-G : UPSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Sta253+74

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

Summary for Reach DP11:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.500 ac, 91.70% Impervious, Inflow Depth = 7.75" for 100y24h event
Inflow = 3.92 cfs @ 12.09 hrs, Volume= 0.323 af
Outflow = 3.92 cfs @ 12.09 hrs, Volume= 0.323 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-I : Wetland I

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

Summary for Reach DP12:

[40] Hint: Not Described (Outflow=Inflow)

Summary for Reach DP13:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.238 ac, 18.59% Impervious, Inflow Depth = 3.51" for 100y24h event
Inflow = 0.95 cfs @ 12.10 hrs, Volume= 0.070 af
Outflow = 0.95 cfs @ 12.10 hrs, Volume= 0.070 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP14:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.283 ac, 80.64% Impervious, Inflow Depth = 6.42" for 100y24h event
Inflow = 11.03 cfs @ 12.19 hrs, Volume= 1.222 af
Outflow = 11.03 cfs @ 12.19 hrs, Volume= 1.222 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP15:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.194 ac, 93.70% Impervious, Inflow Depth = 7.63" for 100y24h event
Inflow = 1.51 cfs @ 12.09 hrs, Volume= 0.123 af
Outflow = 1.51 cfs @ 12.09 hrs, Volume= 0.123 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP16:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.249 ac, 57.10% Impervious, Inflow Depth = 5.49" for 100y24h event
Inflow = 1.55 cfs @ 12.09 hrs, Volume= 0.114 af
Outflow = 1.55 cfs @ 12.09 hrs, Volume= 0.114 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP17:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.113 ac, 27.21% Impervious, Inflow Depth = 3.74" for 100y24h event
Inflow = 0.48 cfs @ 12.10 hrs, Volume= 0.035 af
Outflow = 0.48 cfs @ 12.10 hrs, Volume= 0.035 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP18:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 6.316 ac, 39.35% Impervious, Inflow Depth = 5.24" for 100y24h event
Inflow = 21.18 cfs @ 12.12 hrs, Volume= 2.757 af
Outflow = 21.18 cfs @ 12.12 hrs, Volume= 2.757 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-H :

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

Summary for Reach DP19:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.111 ac, 78.54% Impervious, Inflow Depth = 6.67" for 100y24h event
Inflow = 0.95 cfs @ 12.00 hrs, Volume= 0.062 af
Outflow = 0.95 cfs @ 12.00 hrs, Volume= 0.062 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP2:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.261 ac, 94.57% Impervious, Inflow Depth = 7.63" for 100y24h event
Inflow = 2.04 cfs @ 12.09 hrs, Volume= 0.166 af
Outflow = 2.04 cfs @ 12.09 hrs, Volume= 0.166 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP20:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 5.008 ac, 39.54% Impervious, Inflow Depth = 6.63" for 100y24h event
Inflow = 26.94 cfs @ 12.13 hrs, Volume= 2.766 af
Outflow = 26.94 cfs @ 12.13 hrs, Volume= 2.766 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP21:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.094 ac, 37.13% Impervious, Inflow Depth = 6.32" for 100y24h event
Inflow = 0.66 cfs @ 12.09 hrs, Volume= 0.049 af
Outflow = 0.66 cfs @ 12.09 hrs, Volume= 0.049 af, Atten= 0%, Lag= 0.0 min

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

Summary for Reach DP3:

[40] Hint: Not Described (Outflow=Inflow)

Summary for Reach DP4:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.854 ac, 86.63% Impervious, Inflow Depth = 7.27" for 100y24h event
Inflow = 29.79 cfs @ 12.18 hrs, Volume= 2.941 af
Outflow = 29.79 cfs @ 12.18 hrs, Volume= 2.941 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-A : DOWNSTREAM OF 3.5X1.5 CULVERT @ STA219+90

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

Summary for Reach DP5:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.327 ac, 44.18% Impervious, Inflow Depth = 4.55" for 100y24h event
Inflow = 1.55 cfs @ 12.13 hrs, Volume= 0.124 af
Outflow = 1.55 cfs @ 12.13 hrs, Volume= 0.124 af, Atten= 0%, Lag= 0.0 min
Routed to Pond 1P : DEP WETLAND W/ VERNAL POOLS

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

Summary for Reach DP6:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.010 ac,100.00% Impervious, Inflow Depth = 7.99" for 100y24h event
Inflow = 0.08 cfs @ 12.09 hrs, Volume= 0.006 af
Outflow = 0.08 cfs @ 12.09 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.0 min
Routed to Pond 1W : DEP WETLAND AT UPSTREAM OF 3.5X1.5 CULVERT @ STA219+90

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

Summary for Reach DP7:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.505 ac, 86.16% Impervious, Inflow Depth = 7.28" for 100y24h event
Inflow = 11.24 cfs @ 12.10 hrs, Volume= 0.913 af
Outflow = 11.24 cfs @ 12.10 hrs, Volume= 0.913 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-D : DOWNSTREAM OF 36"CULVERT @ 238+49

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

Summary for Reach DP8:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.648 ac, 52.35% Impervious, Inflow Depth = 5.53" for 100y24h event
Inflow = 3.41 cfs @ 12.01 hrs, Volume= 0.299 af
Outflow = 3.41 cfs @ 12.01 hrs, Volume= 0.299 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-C : UPSTREAM OF 36"CULVERT @ 238+49

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

Summary for Reach DP9:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.110 ac, 85.59% Impervious, Inflow Depth = 7.15" for 100y24h event
Inflow = 15.24 cfs @ 12.11 hrs, Volume= 1.258 af
Outflow = 15.24 cfs @ 12.11 hrs, Volume= 1.258 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-E : DOWNSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Sta253+74

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

Summary for Pond 1P: DEP WETLAND W/ VERNAL POOLS

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.327 ac, 44.18% Impervious, Inflow Depth = 4.55" for 100y24h event
Inflow = 1.55 cfs @ 12.13 hrs, Volume= 0.124 af
Primary = 1.55 cfs @ 12.13 hrs, Volume= 0.124 af, Atten= 0%, Lag= 0.0 min

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

Summary for Pond 1W: DEP WETLAND AT UPSTREAM OF 3.5X1.5 CULVERT @ STA219+90

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.010 ac,100.00% Impervious, Inflow Depth = 7.99" for 100y24h event
Inflow = 0.08 cfs @ 12.09 hrs, Volume= 0.006 af
Primary = 0.08 cfs @ 12.09 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.0 min

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

Summary for Pond 2P: Bypass DMH (7-25)

Inflow Area = 1.923 ac, 14.91% Impervious, Inflow Depth = 6.91" for 100y24h event
Inflow = 14.31 cfs @ 12.09 hrs, Volume= 1.108 af
Outflow = 14.31 cfs @ 12.09 hrs, Volume= 1.108 af, Atten= 0%, Lag= 0.0 min
Primary = 5.30 cfs @ 12.09 hrs, Volume= 0.951 af
Routed to Pond SCM3 : Subsurface Infiltration System
Secondary = 9.01 cfs @ 12.09 hrs, Volume= 0.156 af
Routed to Reach DP20 :

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 87.24' @ 12.09 hrs
Flood Elev= 89.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	84.00'	**12.0" Round Culvert** L= 104.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 84.00' / 83.42' S= 0.0056 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Secondary	85.00'	**18.0" Round Culvert** L= 114.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 85.00' / 84.45' S= 0.0048 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.77 sf
#3	Device 2	86.40'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Primary OutFlow Max=5.28 cfs @ 12.09 hrs HW=87.22' (Free Discharge)
└**1=Culvert** (Barrel Controls 5.28 cfs @ 6.72 fps)

Secondary OutFlow Max=8.73 cfs @ 12.09 hrs HW=87.19' (Free Discharge)
└**2=Culvert** (Barrel Controls 8.73 cfs @ 4.94 fps)
└**3=Sharp-Crested Rectangular Weir** (Passes 8.73 cfs of 10.57 cfs potential flow)

Summary for Pond SCM1: Subsurface Infiltration System

Inflow Area = 0.715 ac, 74.91% Impervious, Inflow Depth = 6.44" for 100y24h event
Inflow = 5.08 cfs @ 12.09 hrs, Volume= 0.383 af
Outflow = 2.48 cfs @ 12.27 hrs, Volume= 0.303 af, Atten= 51%, Lag= 10.8 min
Primary = 2.48 cfs @ 12.27 hrs, Volume= 0.303 af
Routed to Reach DP14 :

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 90.14' @ 12.27 hrs Surf.Area= 3,941 sf Storage= 7,713 cf

Plug-Flow detention time= 201.8 min calculated for 0.303 af (79% of inflow)
Center-of-Mass det. time= 124.2 min (913.8 - 789.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	86.55'	3,240 cf	**44.25'W x 89.06'L x 4.00'H Field A** 15,763 cf Overall - 4,962 cf Embedded = 10,802 cf x 30.0% Voids
#2A	87.05'	4,962 cf	**ADS_StormTech SC-740 +Cap** x 108 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 108 Chambers in 9 Rows
		8,202 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	87.50'	**15.0" Round Culvert** L= 150.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 87.50' / 86.10' S= 0.0093 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.23 sf
#2	Device 1	89.85'	**3.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#3	Device 1	88.00'	**5.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.37 cfs @ 12.27 hrs HW=90.12' (Free Discharge)
└**1=Culvert** (Passes 2.37 cfs of 7.34 cfs potential flow)
  ├**2=Sharp-Crested Rectangular Weir** (Weir Controls 1.46 cfs @ 1.82 fps)
  └**3=Orifice** (Orifice Controls 0.91 cfs @ 6.66 fps)

Summary for Pond SCM2: Old Main St Infiltration Basin

Inflow Area = 1.801 ac, 11.48% Impervious, Inflow Depth = 4.55" for 100y24h event
Inflow = 6.25 cfs @ 12.30 hrs, Volume= 0.682 af
Outflow = 5.72 cfs @ 12.40 hrs, Volume= 0.660 af, Atten= 8%, Lag= 5.6 min
Primary = 5.72 cfs @ 12.40 hrs, Volume= 0.660 af
Routed to Reach DP18 :

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 88.69' @ 12.40 hrs Surf.Area= 2,023 sf Storage= 3,898 cf

Plug-Flow detention time= 40.6 min calculated for 0.660 af (97% of inflow)
Center-of-Mass det. time= 21.5 min (861.6 - 840.1)

Volume	Invert	Avail.Storage	Storage Description
#1	85.00'	4,546 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
85.00	235	113.0	0	0	235
86.00	620	160.0	412	412	1,265
87.00	1,100	201.0	849	1,261	2,457
88.00	1,651	240.0	1,366	2,627	3,843
89.00	2,200	259.0	1,919	4,546	4,638

Device	Routing	Invert	Outlet Devices
#1	Primary	84.75'	**12.0" Round RCP_Round 12"** L= 24.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 84.75' / 84.50' S= 0.0104 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf
#2	Device 1	88.30'	**2.0" x 2.0" Horiz. Inlet Grate X 6.00 columns** X 6 rows C= 0.600 in 24.0" x 24.0" Grate (25% open area) Limited to weir flow at low heads
#3	Device 1	86.70'	**9.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=5.72 cfs @ 12.40 hrs HW=88.69' (Free Discharge)
└**1=RCP_Round 12"** (Passes 5.72 cfs of 7.02 cfs potential flow)
  └**2=Inlet Grate** (Orifice Controls 3.01 cfs @ 3.01 fps)
  └**3=Orifice** (Orifice Controls 2.70 cfs @ 6.12 fps)

Summary for Pond SCM3: Subsurface Infiltration System

[81] Warning: Exceeded Pond 2P by 1.77' @ 13.00 hrs

Inflow Area = 1.923 ac, 14.91% Impervious, Inflow Depth = 5.94" for 100y24h event
Inflow = 5.30 cfs @ 12.09 hrs, Volume= 0.951 af
Outflow = 5.23 cfs @ 12.11 hrs, Volume= 0.894 af, Atten= 1%, Lag= 1.0 min
Primary = 5.23 cfs @ 12.11 hrs, Volume= 0.894 af
Routed to Reach DP20 :

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 86.85' @ 12.11 hrs Surf.Area= 3,740 sf Storage= 7,821 cf

Plug-Flow detention time= 103.9 min calculated for 0.894 af (94% of inflow)
Center-of-Mass det. time= 70.1 min (857.0 - 786.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	82.80'	3,175 cf	**30.00'W x 124.66'L x 4.08'H Field A** 15,270 cf Overall - 4,686 cf Embedded = 10,585 cf x 30.0% Voids
#2A	83.38'	4,686 cf	**ADS_StormTech SC-740 +Cap** x 102 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 102 Chambers in 6 Rows
		7,861 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	83.94'	**12.0" Round Culvert** L= 31.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 83.94' / 83.77' S= 0.0055 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Device 1	86.40'	**3.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#3	Device 1	84.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=5.20 cfs @ 12.11 hrs HW=86.85' (Free Discharge)
└**1=Culvert** (Passes 5.20 cfs of 5.87 cfs potential flow)
  ├**2=Sharp-Crested Rectangular Weir** (Weir Controls 3.68 cfs @ 2.42 fps)
  └**3=Orifice** (Orifice Controls 1.52 cfs @ 7.76 fps)

Summary for Pond W-A: DOWNSTREAM OF 3.5X1.5 CULVERT @ STA219+90

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.854 ac, 86.63% Impervious, Inflow Depth = 7.27" for 100y24h event
Inflow = 29.79 cfs @ 12.18 hrs, Volume= 2.941 af
Primary = 29.79 cfs @ 12.18 hrs, Volume= 2.941 af, Atten= 0%, Lag= 0.0 min

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

Summary for Pond W-C: UPSTREAM OF 36"CULVERT @ 238+49

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.648 ac, 52.35% Impervious, Inflow Depth = 5.53" for 100y24h event
Inflow = 3.41 cfs @ 12.01 hrs, Volume= 0.299 af
Primary = 3.41 cfs @ 12.01 hrs, Volume= 0.299 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-C/D : Wetland C/D

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

Summary for Pond W-C/D: Wetland C/D

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.153 ac, 75.98% Impervious, Inflow Depth = 6.75" for 100y24h event
Inflow = 13.87 cfs @ 12.09 hrs, Volume= 1.212 af
Primary = 13.87 cfs @ 12.09 hrs, Volume= 1.212 af, Atten= 0%, Lag= 0.0 min

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

Summary for Pond W-D: DOWNSTREAM OF 36"CULVERT @ 238+49

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.505 ac, 86.16% Impervious, Inflow Depth = 7.28" for 100y24h event
Inflow = 11.24 cfs @ 12.10 hrs, Volume= 0.913 af
Primary = 11.24 cfs @ 12.10 hrs, Volume= 0.913 af, Atten= 0%, Lag= 0.0 min
Routed to Pond W-C/D : Wetland C/D

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

Summary for Pond W-E: DOWNSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Sta253+74

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.110 ac, 85.59% Impervious, Inflow Depth = 7.15" for 100y24h event
Inflow = 15.24 cfs @ 12.11 hrs, Volume= 1.258 af
Primary = 15.24 cfs @ 12.11 hrs, Volume= 1.258 af, Atten= 0%, Lag= 0.0 min

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

Summary for Pond W-G: UPSTREAM OF 144" CULVERT & MAPLE MEADOW BROOK @ Sta253+74

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.556 ac, 28.04% Impervious, Inflow Depth = 4.43" for 100y24h event
Inflow = 2.83 cfs @ 12.09 hrs, Volume= 0.205 af
Primary = 2.83 cfs @ 12.09 hrs, Volume= 0.205 af, Atten= 0%, Lag= 0.0 min

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

Summary for Pond W-H:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 6.316 ac, 39.35% Impervious, Inflow Depth = 5.24" for 100y24h event
Inflow = 21.18 cfs @ 12.12 hrs, Volume= 2.757 af
Primary = 21.18 cfs @ 12.12 hrs, Volume= 2.757 af, Atten= 0%, Lag= 0.0 min

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

Summary for Pond W-I: Wetland I

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.500 ac, 91.70% Impervious, Inflow Depth = 7.75" for 100y24h event
Inflow = 3.92 cfs @ 12.09 hrs, Volume= 0.323 af
Primary = 3.92 cfs @ 12.09 hrs, Volume= 0.323 af, Atten= 0%, Lag= 0.0 min

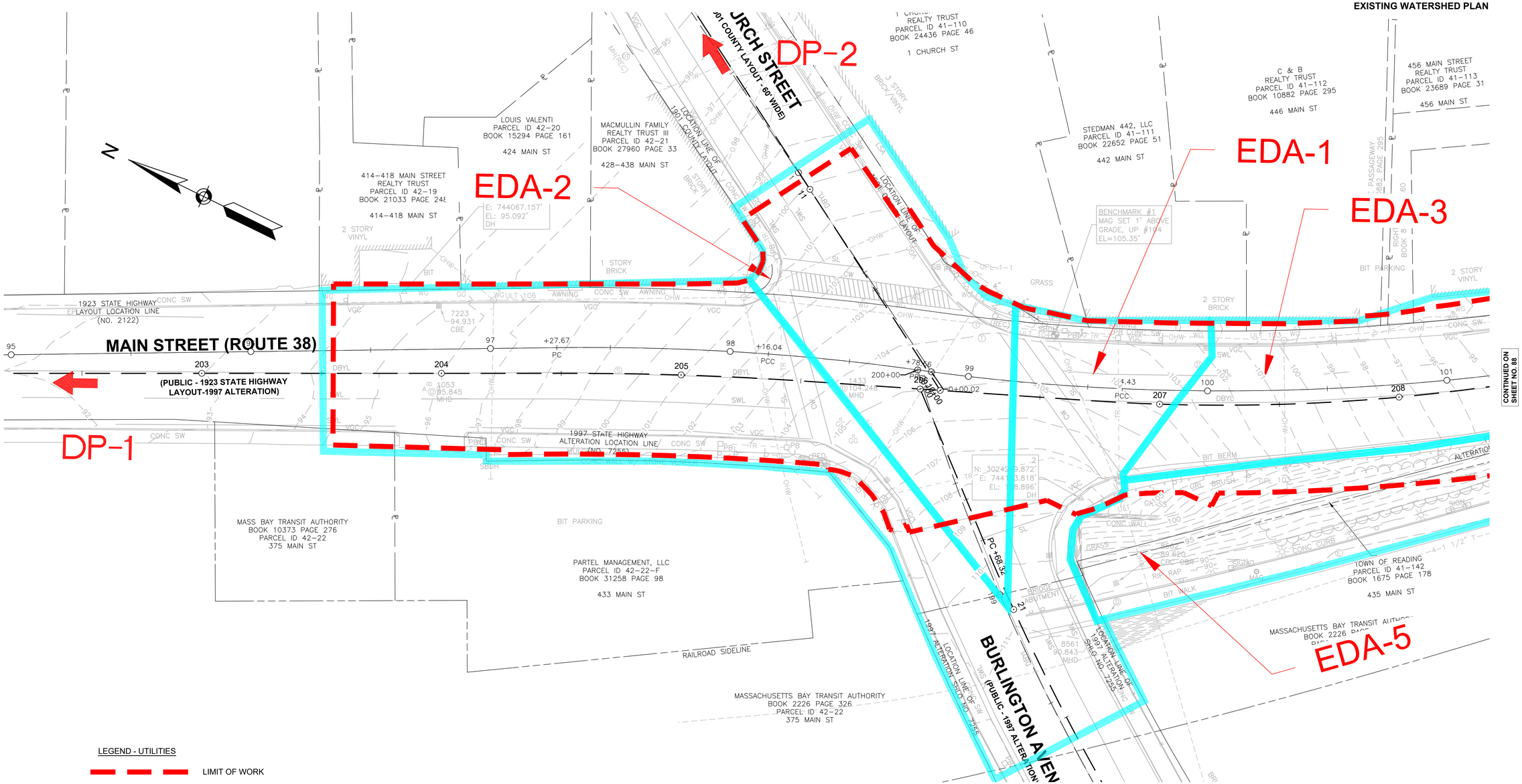
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	1	21
PROJECT FILE NO.	608051		

EXISTING WATERSHED PLAN

EXISTING WATERSHED PLAN.DWG Plotted on 20-Jan-2025 12:58 PM



LEGEND - UTILITIES

- LIMIT OF WORK
- EXISTING WATERSHED BOUNDARY
- EDA-1 EXISTING WATERSHED NUMBER
- DP-1 DESIGN POINT

0 20 50 100

SCALE: 1" = 20'

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	2	21
PROJECT FILE NO.	608051		

EXISTING WATERSHED PLAN

EDA-1

EDA-3

EDA-5

DP-5

STEDMAN 442, LLC
PARCEL ID 41-111
BOOK 22652 PAGE 51
442 MAIN ST

C & B
REALTY TRUST
PARCEL ID 41-112
BOOK 10882 PAGE 295
446 MAIN ST

456 MAIN STREET
REALTY TRUST
PARCEL ID 41-113
BOOK 23689 PAGE 31
456 MAIN ST

CORREIA VENTURES, LLC
PARCEL ID 41-114
BOOK 31739 PAGE 40
458 MAIN ST

ROSKI TRUST
PARCEL ID 41-120
BOOK 26613 PAGE 99
470 MAIN ST

SUPALI PROPERTIES, LLC
PARCEL ID 41-121
BOOK 30730 PAGE 247
474 MAIN ST

TOWN OF READING
PARCEL ID 41-142
BOOK 1675 PAGE 178
435 MAIN ST

MASSACHUSETTS BAY TRANSIT AUTHOR...
BOOK 2226 PAGE ...

KIRK STREET (PUBLIC)

BENCHMARK #1
MAG SET 1' ABOVE GRADE, UP #104
EL=105.35'

BENCHMARK #2
MAG SET 1' ABOVE GRADE, UP #12-100
EL=89.72'

4
N: 3024051.072'
E: 744310.983'
EL: 90.100'
DH

5
N: 3023819.93...
E: 744521.42...
EL: 87.639'
MAG

1951 TOWN LAYOUT

1910 STATE HIGHWAY LAYOUT LOCATION LINE (NO. 1315)

1997 STATE HIGHWAY ALTERATION LOCATION LINE (NO. 7255)

1910 STATE HIGHWAY LAYOUT LOCATION LINE (NO. 8515)

MAIN STREET (ROUTE 38)

(PUBLIC - 1923 STATE HIGHWAY LAYOUT-1997 ALTERATION)

APPROXIMATE RAILROAD SIDELINE

RR TRACK TIE LINE

PT +90 35 103

207 208 209 210 211 212

100 101 102 103 104 105

14.43 PCC

BIT PARKING

BIT BERM

BIT WALK

CONC CURB

CONC SW

GRASS

GRAVEL

TREES

2 STORY BRICK

2 STORY VINYL

RIP RAP

BROOK (REC)

CONC RET WALL

6'CLF

MAHW 1-1
MAHW 1-2
MAHW 1-3
MAHW 1-4
MAHW 1-5
MAHW 1-6
MAHW 1-7
MAHW 1-8

CONTINUED ON SHEET NO. 87

CONTINUED ON SHEET NO. 89

0 20 50 100

SCALE: 1" = 20'

EXISTING WATERSHED PLAN.DWG Plotted on 20-Jan-2025 12:58 PM

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	3	21
PROJECT FILE NO.	608051		

EXISTING WATERSHED PLAN

EXISTING WATERSHED PLAN.DWG Plotted on 20-Jan-2025 12:58 PM

DP-3

DP-4

DP-6

EDA-3

EDA-4

EDA-6

N

SUPALI PROPERTIES, LLC
PARCEL ID 41–121
BOOK 30730 PAGE 247

474 MAIN ST

S AND S REALTY TRUST
MOHAMADSHAFI MALEK, TRUSTEE
L.C.C. 6462 B
L.C.C. 6462 E
CERT. NO. 29030
DOC. NO. 128871
PACEL 41–122

496 MAIN ST

EMILY A. LAZURE AND
JEANNE E. FICOCIELLO, TRUSTEES OF
500 MAIN STREET REALTY TRUST
L.C.C. 6462 E
CERT. NO. 37865
DOC. NO. 230907
PARCEL ID 41–123

500 MAIN ST

DANA KIKLIS
L.C.C. 6462 B
CERT. NO. 36223
DOC. NO. 206007
PARCEL ID 41–128–A

508 MAIN ST

MASSACHUSETTS BAY
TRANSIT AUTHORITY
BOOK 2226 PAGE 326
PARCEL ID 41–141

MAIN STREET (ROUTE 38)
(PUBLIC - 1910 STATE HIGHWAY LAYOUT)

1910 STATE HIGHWAY LAYOUT
LOCATION LINE (NO. 1315)

DUBLIN AVENUE
(PUBLIC)

APPROXIMATE RAILROAD SIDELINE

BENCHMARK #3
MAG SET 1' ABOVE
GRADE, UP #96
EL=89.45'

5
N: 3023819.930'
E: 744521.429'
EL: 87.639'
MAG

CONTINUED ON SHEET NO.88

CONTINUED ON SHEET NO. 90

0 20 50 100

SCALE: 1" = 20'

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	4	21
PROJECT FILE NO.	608051		

EXISTING WATERSHED PLAN

EXISTING WATERSHED PLAN.DWG Plotted on 20-Jan-2025 12:59 PM

DP-4

DP-6

EDA-4

N

MONTROSE AVENUE (PRIVATE) (PAPER STREET)

RANCH ROAD (PRIVATE) (PAPER STREET)

MAIN STREET (ROUTE 38)

(PUBLIC - 1910 STATE HIGHWAY LAYOUT)

1910 STATE HIGHWAY LAYOUT LOCATION LINE (NO. 1315)

DANA KIKLIS
L.C.C. 6462 B
CERT. NO. 36223
DOC. NO. 206007
PARCEL ID 41-128-A

508 MAIN ST

DEREK LEIDER PROPERTY, LLC
L.C.C. 6462 B
CERT. NO. 45467
DOC. NO. 312075
PARCEL ID 41-129

510 MAIN ST

THE 520 MAIN STREET CONDOMINIUM
L.C.C. 6462 C-35
CERT. NO. C-35
DOC. NO. 233854
PARCEL ID 41-130-CM

520 MAIN ST

SUBJECT TO VERIZON EASEMENT
DOC. NO. 227331
(NOT PLOTTABLE)

PR356, LLC
PARCEL ID 41-131
L.C.C. 6462 C
CERT. NO. 40114
DOC. NO. 257307

580 MAIN ST

STEDMAN 555, LLC
PARCEL ID 41-140
BOOK 22652 PAGE 49

555 MAIN ST

STEDMAN 555, LLC
PARCEL ID 41-139
BOOK 24082 PAGE 158

563 MAIN ST

MASSACHUSETTS BAY TRANSIT AUTHORITY
BOOK 2226 PAGE 326
PARCEL ID 41-141

FRED F. CAIN, INC.
PARCEL ID 41-138
BOOK 2469 PAGE 363

579 MAIN ST

TOWN OF WILMINGTON UTILITY EASEMENT BOOK 5145 PAGE 34

BENCHMARK #4
MAG SET 1' ABOVE GRADE, UP #92
EL=89.23'

N: 953,152.354'
E: 745194.287'
EL: 88.805'
MAG

BIT PARKING
BIT BERM
BIT CURB
GRASS
CONC BLOCK WALL
STONE RET WALL
LSA
CONC SW
ULP 92
ULP 12-90 CONC SW
ULT 91
ULT 89
VGC
GRATE
1 STORY BRICK
6' VINYL FENCE
6" PVC FNC
ROAMING WALL (PVC)
BILL BOARD
RR TRACK TIE LINE
APPROXIMATE RAILROAD SIDELINE
MULCH

WF#A-10 WF#A-11 WF#A-12 WF#A-13 WF#A-14 WF#A-15 WF#A-16 WF#A-17 WF#A-18 WF#A-19 WF#A-20
WF#B-1 WF#B-2 WF#B-3 WF#B-5 WF#B-6 WF#B-7 WF#B-8
BF#1-200 BF#1-201 BF#1-202 BF#1-203

218 219 220 221 222 223 224
111 112 113 114 115 116

CONTINUED ON SHEET NO. 89

CONTINUED ON SHEET NO. 91

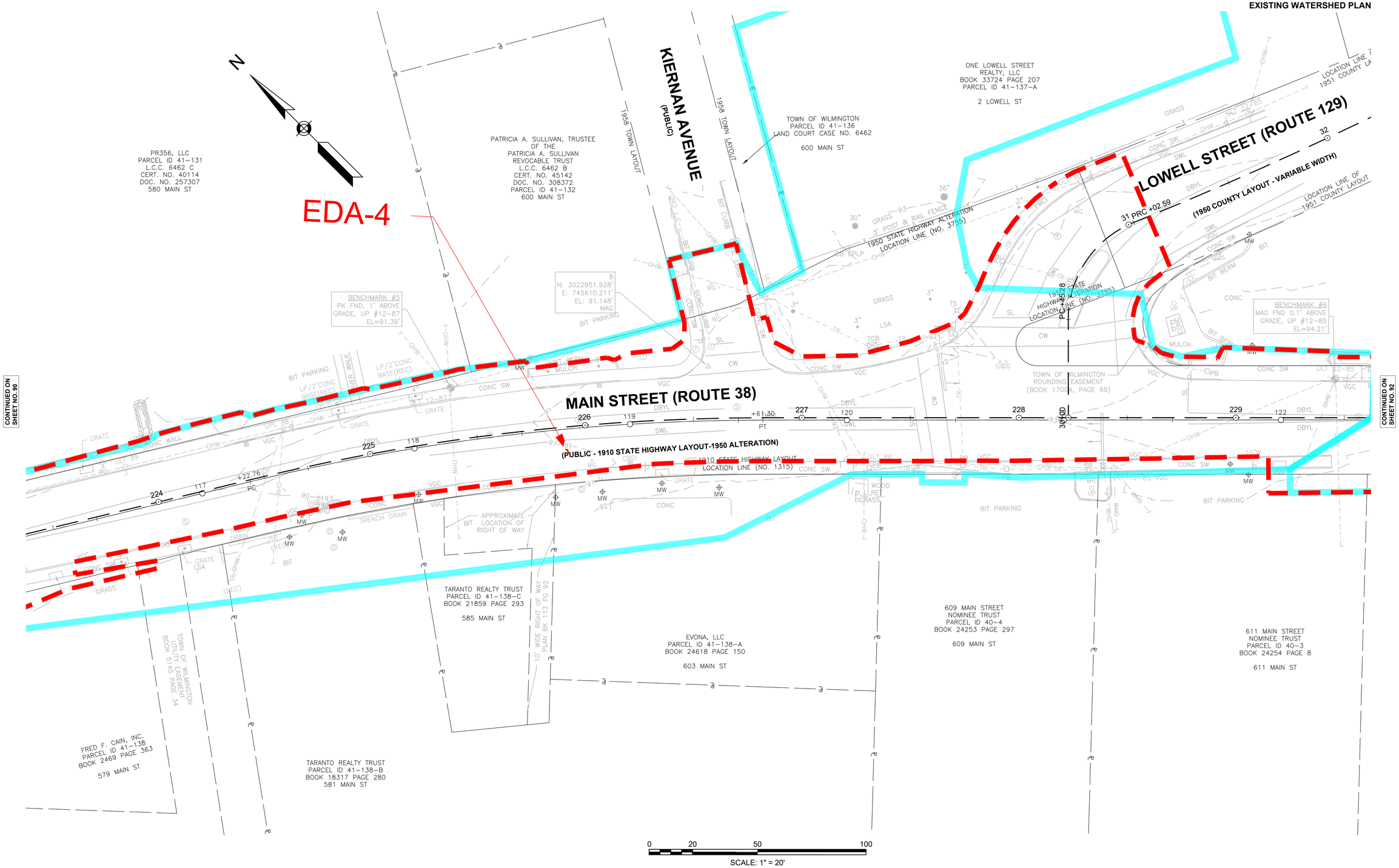
0 20 50 100
SCALE: 1" = 20'

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	5	21
PROJECT FILE NO.	608051		

EXISTING WATERSHED PLAN

EXISTING WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:02 PM



WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	6	21
PROJECT FILE NO.	608051		

EXISTING WATERSHED PLAN

EXISTING WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:04 PM

EDA-7A

EDA-8A

N

SUBJECT TO VERIZON EASEMENT
BOOK 11541 PAGE 327
(NOT PLOTTABLE)

GTY MA/NH LEASING, INC.
PARCEL ID 40-5
BOOK 24895 PAGE 204

586 MAIN ST

COLONIAL PARK
MALL CONDOMINIUM
PARCEL ID 40-6-A
L.C.C. 29466 B
CERT. NO. C-20
DOC. NO. 120308

25 LOWELL ST

GLOBE REALTY TRUST
PARCEL ID 40-6
L.C.C. 29466 B
CERT. NO. 34101
DOC. NO. 181185

35 LOWELL ST

REGISTERED L
RECORDED LA

REGISTERED LAND
RECORDED LAND

CONTINUED ON SHEET NO.91

CONTINUED ON SHEET NO.93

1910 STATE HIGHWAY LAYOUT
LOCATION LINE (NO. 1315)

MAIN STREET (ROUTE 38)

(PUBLIC - 1910 STATE HIGHWAY LAYOUT)

230 123 231 124 232 125 233 126 234 127 235 128

BENCHMARK #6
0.1' ABOVE
UP #12-85
EL=94.21'

BENCHMARK #7
MAG SET 1' ABOVE
GRADE, UP #12-82X
EL=92.95'

9
N: 3022475.270'
E: 746026.564'
EL: 91.479'
MAG

51
N: 3022614.920'
E: 746124.577'
EL: 92.768'
MAG

615 MAIN STREET NOMINEE TRUST
AKA THE 615 MAIN STREET NOMINEE TRUST
PARCEL ID 40-2-C
BOOK 24254 PAGE 17

615 MAIN ST

WILMINGTON PROPERTY
MANAGEMENT LLC
PARCEL ID 40-2-B
BOOK 37684 PAGE 48
619 MAIN ST

MMJMJ LLC
BOOK 36016 PAGE 250
PARCEL ID 40-2-A

625 MAIN ST

635 MAIN STREET OWNER LLC
AKA 635 MAIN STREET OWNER, LLC
BOOK 34786 PAGE 182
PARCEL ID 40-1

635 MAIN ST

ACCESS EASEMENT
BOOK 2517 PAGE 128

DRIVEWAY EASEMENT
BOOK 34278 PAGE 198

SIGN EASEMENT
BOOK 34278 PAGE 198

0 20 50 100

SCALE: 1" = 20'

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	7	21
PROJECT FILE NO.	608051		

EXISTING WATERSHED PLAN

EDA-7A

DP-7

DP-8

EDA-8A

REGISTERED LAND
RECORDED LAND

GLOBE REALTY TRUST
PARCEL ID 40-6
BOOK 29264 PAGE 30

35 LOWELL ST

ONE CROSS LLC
BOOK 35186 PAGE 80
PARCEL ID 40-11

CROSS ST

NEW ENGLAND TELEPHONE
H COMPANY
40-12
PAGE 352

MAIN ST

10
N: 3022170.417'
E: 746379.357'
EL: 88.668'
RB CAP

29
N: 3022075.113'
E: 746474.403'
EL: 88.233'
MAG

BENCHMARK #8
MAG SET 1' ABOVE
GRADE, UP #77
EL=89.33'

1 STORY
BRICK

2023 TOWN ALTERATION
SECTION 3
(DEED BK 37867 PG 1)

PT +54.62
(2023 TOWN ALTERA

1910 STATE HIGHWAY LAYOUT
LOCATION LINE (NO. 1315)

MAIN STREET (ROUTE 38)
(PUBLIC - 1910 STATE HIGHWAY LAYOUT)

MAIN STREET
(PUBLIC - 1
HIGHWAY

LOCATION LINE OF 1910 STATE
HIGHWAY LAYOUT
(SHLO NO. 1315)

CONTINUED ON
SHEET NO. 92

CONTINUED ON
SHEET NO. 94

WETLANDS

TREES

STONE HEADWALL

CONC RET WALL

INV 6" PVC
EL=87.15

INV 12" HDPE
EL=88.23

SUBJECT TO VERIZON EASEMENT
BOOK 36483 PAGE 73
(NOT PLOTTABLE)

635 MAIN STREET OWNER LLC
AKA 635 MAIN STREET OWNER, LLC
BOOK 34786 PAGE 182
PARCEL ID 40-1

635 MAIN ST

0 20 50 100
SCALE: 1" = 20'

EXISTING WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:04 PM

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	8	21
PROJECT FILE NO.	608051		

EXISTING WATERSHED PLAN

EXISTING WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:05 PM

EDA-7B

EDA-7A

EDA-9A

EDA-8B

EDA-8A

MIDDLESEX COUNTY EASEMENT FOR HIGHWAY PURPOSES (BOOK 1178 PAGE 237)

ONE CROSS LLC
BOOK 35186 PAGE 80
PARCEL ID 40-11
CROSS ST

TOWN OF WILMINGTON
PARCEL ID 40-13-A
BOOK 35162 PAGE 138
CROSS ST

DIAMOND PROPERTIES TRUST
BOOK 33133 PAGE 123
PARCEL ID 39-6
668 MAIN ST

TOWN OF WILMINGTON
PARCEL ID 39-5
BOOK 26062 PAGE 215
9 CROSS ST

YENTILE FARM
RECREATIONAL FACILITY

CROSS STREET

PT +54.62
(2023 TOWN ALTERATION - VARIABLE WIDTH)

1894 TOWN LAYOUT

2023 TOWN ALTERATION
SECTION 3
(DEED BK 37867 PG 1)
(PLAN BK 251 PG 51)

MAIN STREET (ROUTE 38)
(PUBLIC - 19[illegible]) STATE
HIGHWAY LAYOUT)

PC +02+21.12
50+00

LOCATION LINE OF 1910 STATE
HIGHWAY LAYOUT
(SHLO NO. 1315)

1910 STATE HIGHWAY LAYOUT
LOCATION LINE (NO. 1315)

1911 STATE HIGHWAY LAYOUT
LOCATION LINE (NO. 1352)

END OF
1910 LAYOUT

BEGINNING OF
1911 LAYOUT

NON TANGENT
AT PC

N44°52'23"W (BACK)
S44°55'34"E (AHEAD)

BENCHMARK #9
MAG SET 1' ABOVE
GRADE, UP #72
EL=96.26'

11
N: 3021816.421'
E: 746732.398'
EL: 96.276'
MAG

JOHN C. OLSON
PARCEL ID 39-14
BOOK 23310 PAGE 186
673 MAIN ST

2.5 STORY
VINYL

BUTTERS ROW

(2023 TOWN ALTERATION - VARIABLE WIDTH)

1894 TOWN LAYOUT

2023 TOWN ALTERATION, SECTION
(DEED BK 37867 PG 1)
(PLAN BK 251 PG 51)

PT +42.19

PC +03.96

ANDREA J. DELUCA
PARCEL ID 39-16
BOOK 18231 PAGE 111
665 MAIN ST

JARID POLLEY AND
MARY POLLEY
BOOK 37173 PAGE 123
PARCEL ID 39-15
669 MAIN ST

35 MAIN STREET OWNER LLC
635 MAIN STREET OWNER, LLC
BOOK 34786 PAGE 182
PARCEL ID 40-1
635 MAIN ST

CONTINUED
LEFT

PT +96.48

2023 STATE HIGHWAY
ALTERATION NO. 6078
(DEED BK 37867 PG 1)
(PLAN BK 251 PG 51)

CONTINUED ON
SHEET NO. 93

CONTINUED ON
SHEET NO. 95

CONTINUED
RIGHT

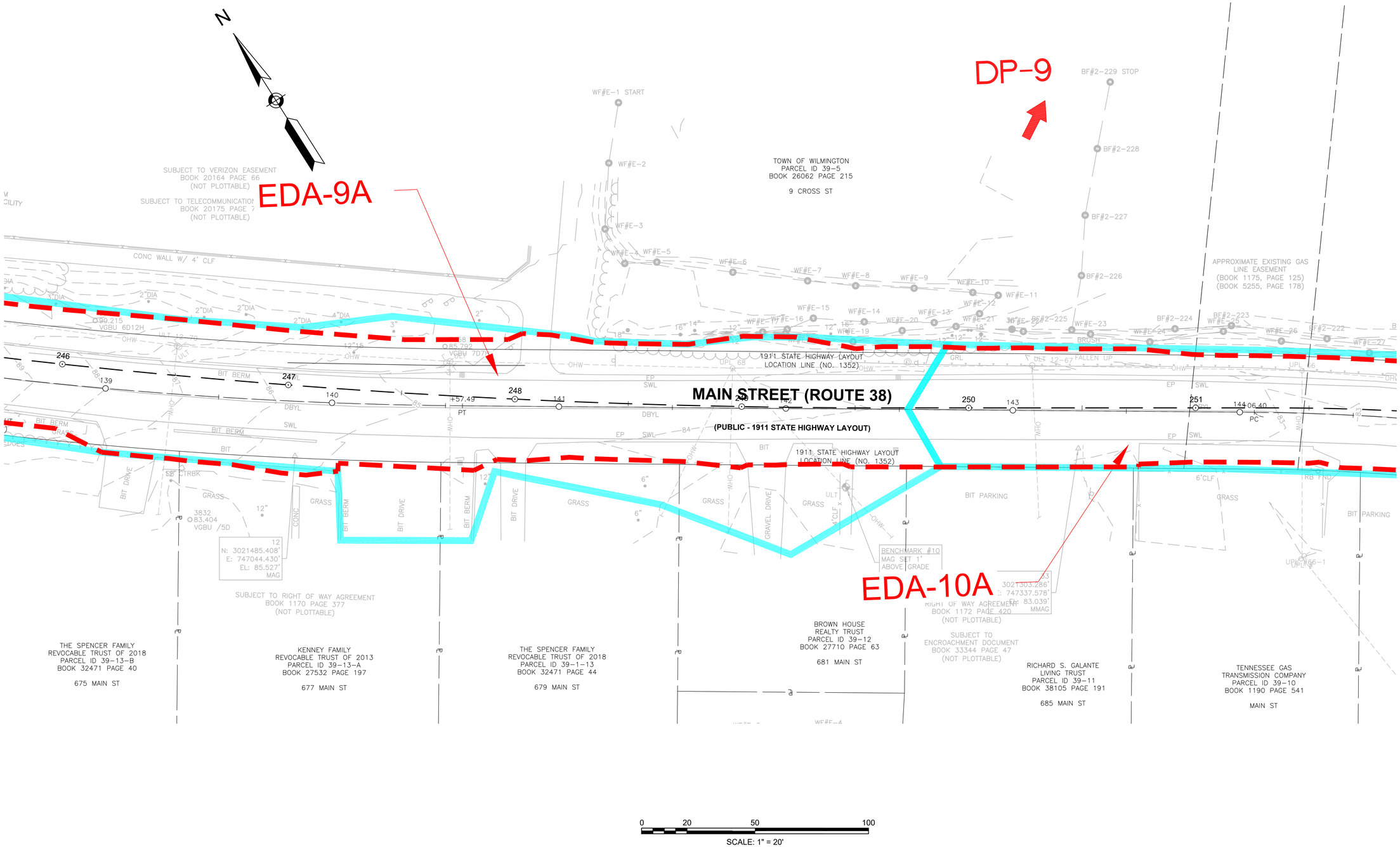
0 20 50 100
SCALE: 1" = 20'

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	9	21
PROJECT FILE NO.	608051		

EXISTING WATERSHED PLAN

EXISTING WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:05 PM



WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	10	21
PROJECT FILE NO.	608051		

EXISTING WATERSHED PLAN

EXISTING WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:06 PM

TOWN OF WILMINGTON
PARCEL ID 39-5
BOOK 26062 PAGE 215

9 CROSS ST

TEXTRON SYSTEMS
CORPORATION
PARCEL ID 48-73-A
BOOK 24103 PAGE 25
BOOK 35305 PAGE 130
BOOK 35305 PAGE 132

201 LOWELL ST

SUBJECT TO RECIPROCAL EASEMENTS
BOOK 37155 PAGE 258
(NOT PLOTTABLE)

EDA-9B

EDA-10A

DP-10

MAIN STREET (ROUTE 38)

(PUBLIC - 1911 STATE HIGHWAY LAYOUT)

1911 STATE HIGHWAY LAYOUT
LOCATION LINE (NO. 1352)

BENCHMARK #11
MAG SET 2' ABOVE
GRADE, UP #12-64
EL=85.19'

32
N: 3021190.077'
E: 747495.492'
EL: 82.076'
MMAG

13
N: 3021211.735'
E: 747...

EL: 83.788'
RB CAP

EL: 83.776'
RB CAP 14

100 YEAR FLOODPLAIN (81.5')

GRASS AREA
BOOK 12943 PAGE 96

SEDIMENT
BOOK 26 PAGE 145
PAGE 82
PAGE 33

SIGNAGE
BOOK 12943 PAGE 96

BIT DRIVE

BIT PARKING

TENNESSEE GAS
TRANSMISSION COMPANY
PARCEL ID 39-10
BOOK 1190 PAGE 541

MAIN ST

AMERCO REAL
ESTATE COMPANY
PARCEL ID 39-11-A
BOOK 5015 PAGE 103

687 MAIN ST

TOWN OF WILMINGTON
BOOK 2299 PAGE 288
PARCEL ID 39-9
MAIN ST

CONTINUED ON SHEET NO.9S

CONTINUED ON SHEET NO. S7

0 20 50 100

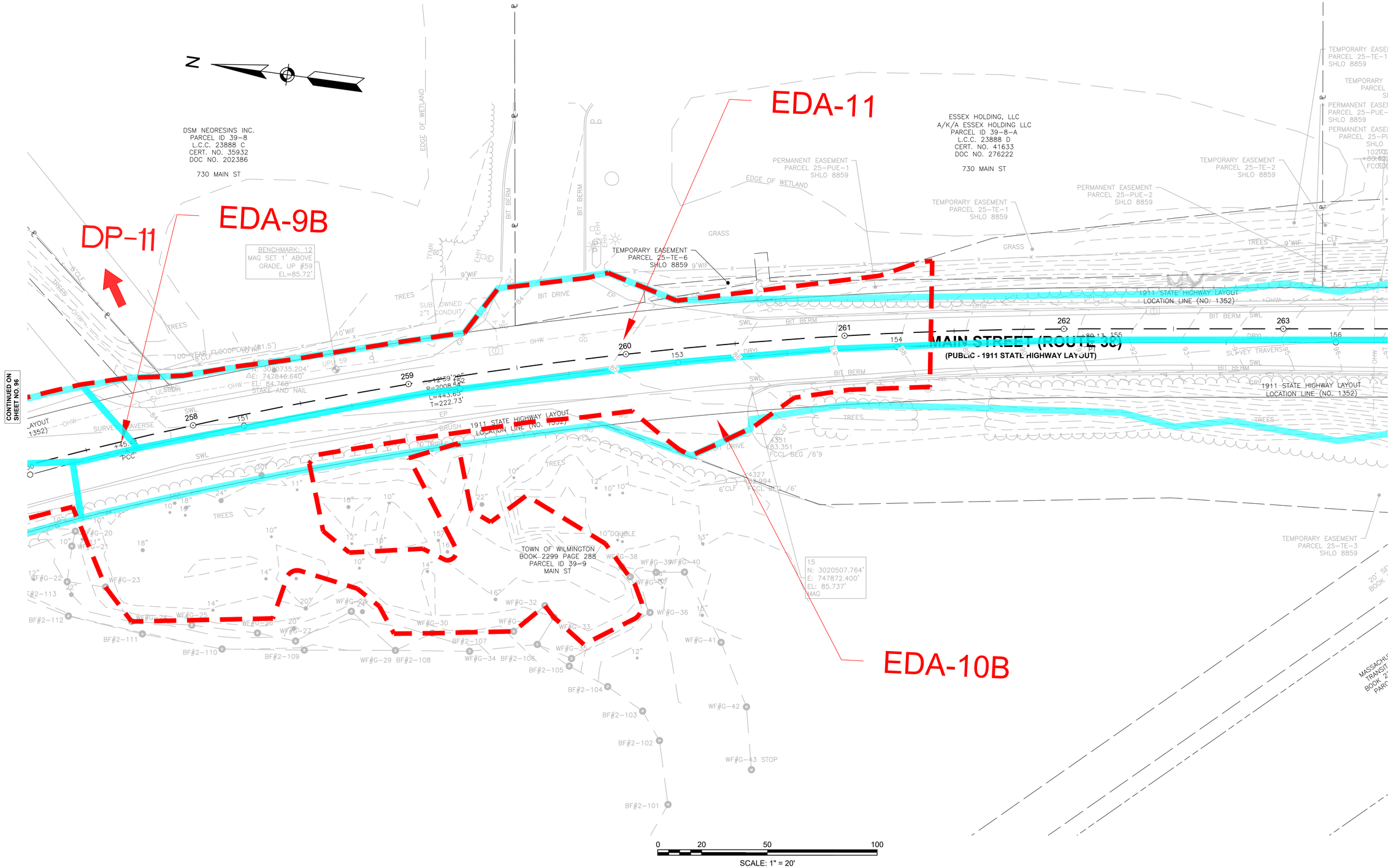
SCALE: 1" = 20'

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	11	21
PROJECT FILE NO.	608051		

EXISTING WATERSHED PLAN

EXISTING WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:07 PM



CONTINUED ON SHEET NO. 96

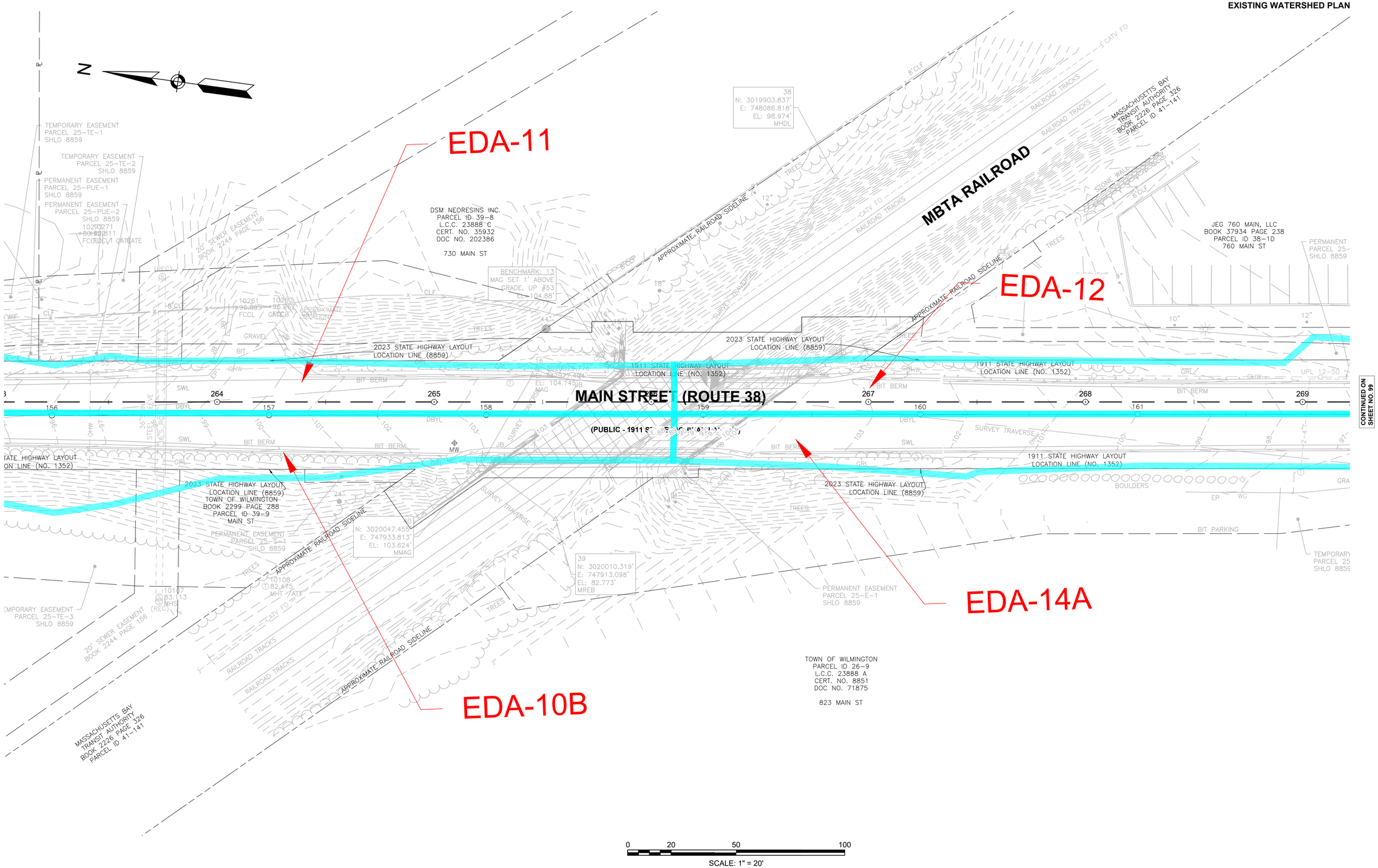
CONTINUED ON SHEET NO. 98

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	12	21
PROJECT FILE NO.	608051		

EXISTING WATERSHED PLAN

EXISTING WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:07 PM

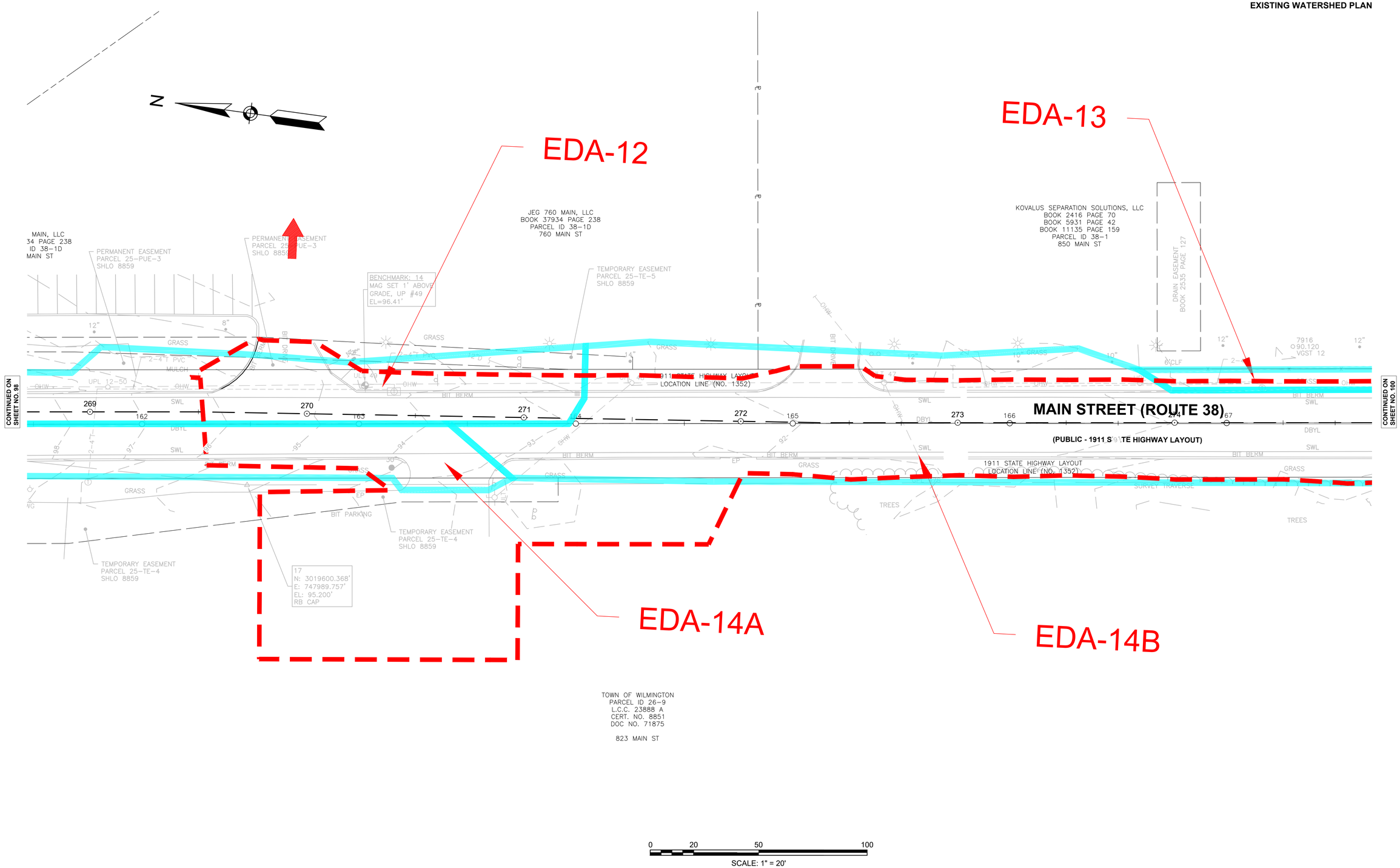


WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	13	21
PROJECT FILE NO.	608051		

EXISTING WATERSHED PLAN

EXISTING WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:08 PM

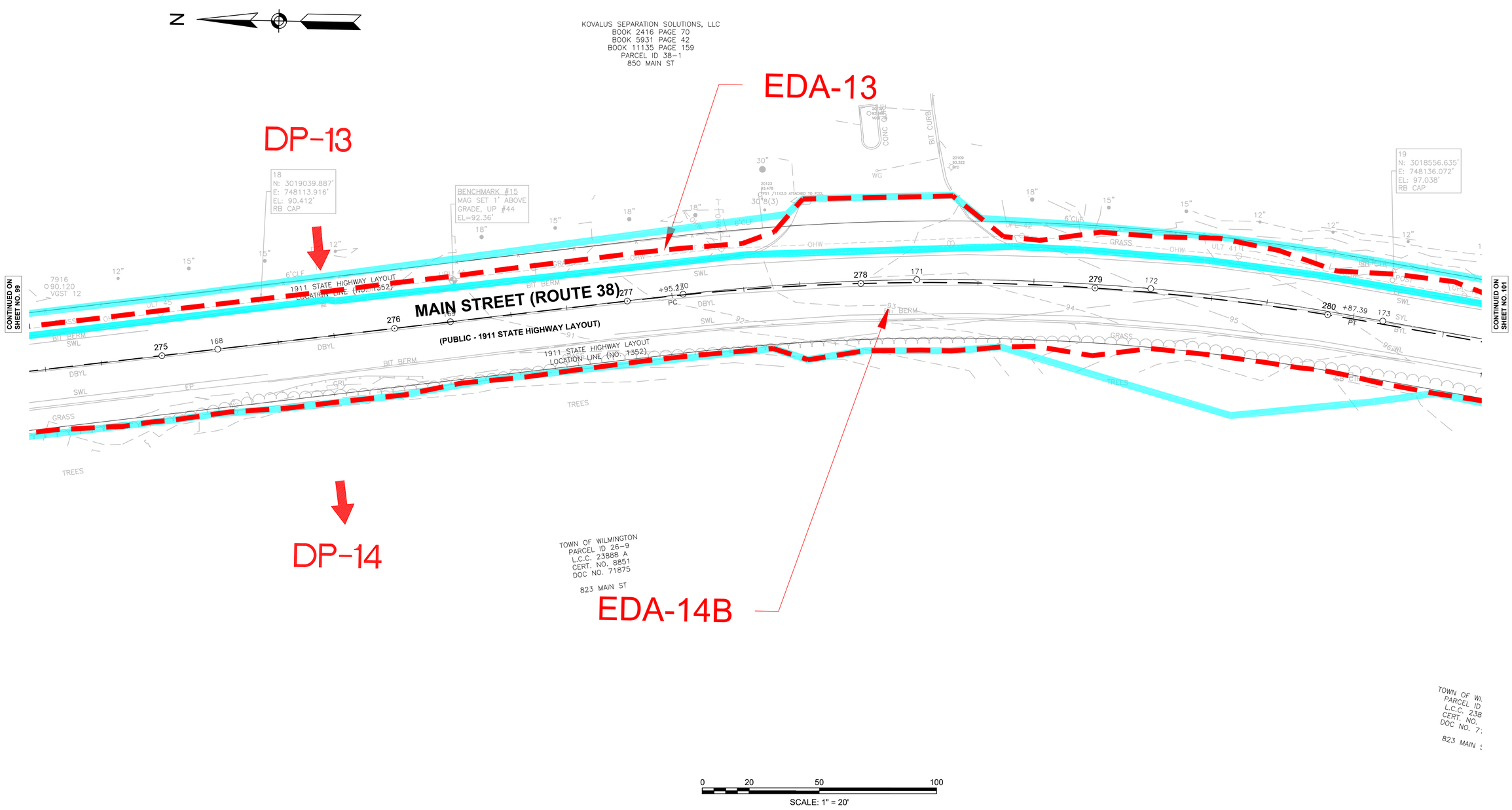


WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	14	21
PROJECT FILE NO.	608051		

EXISTING WATERSHED PLAN

EXISTING WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:08 PM

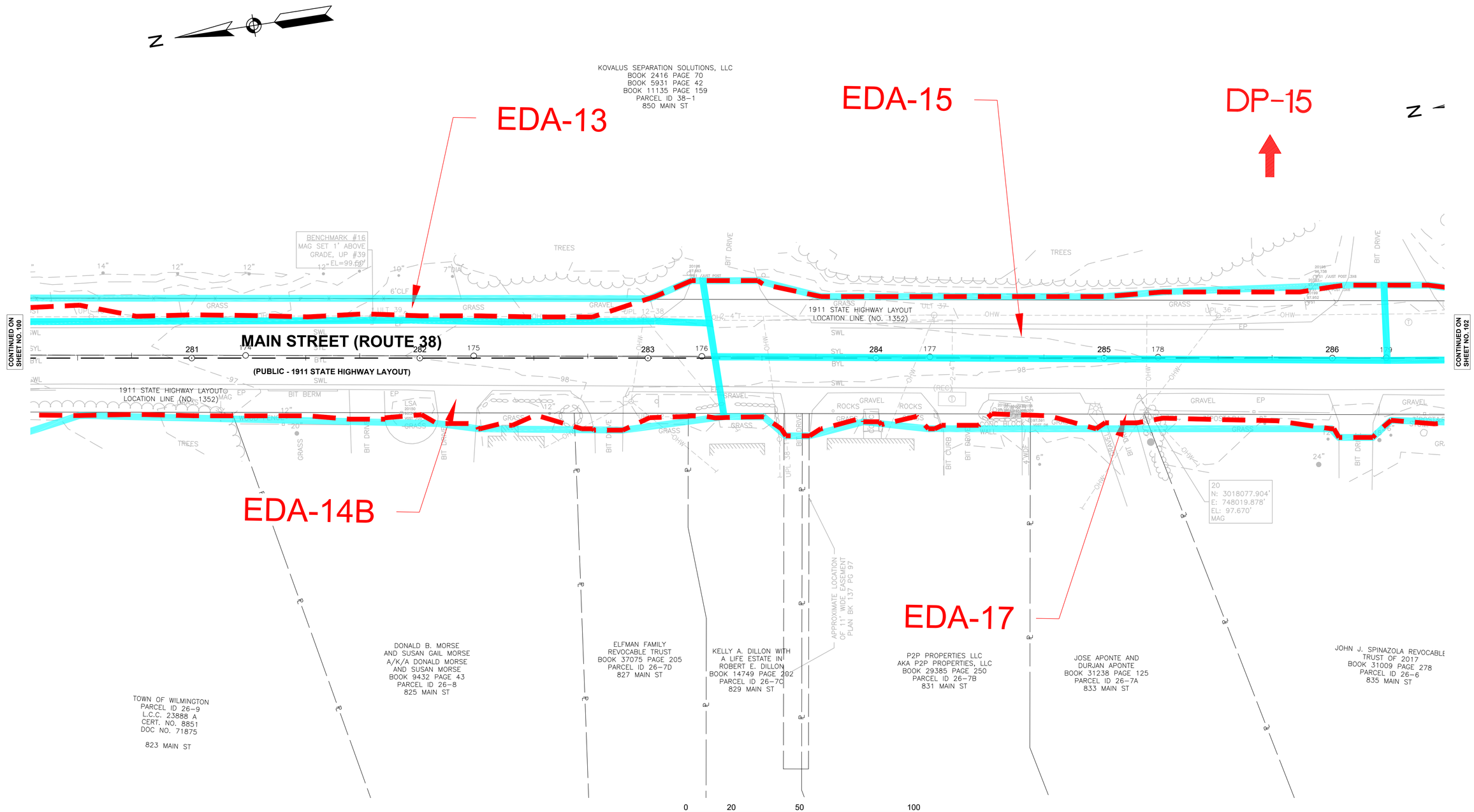


WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	15	21
PROJECT FILE NO.	608051		

EXISTING WATERSHED PLAN

EXISTING WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:09 PM



WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	16	21
PROJECT FILE NO.	608051		

EXISTING WATERSHED PLAN

EXISTING WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:09 PM

N

KOVALUS SEPARATION SOLUTIONS, LLC
BOOK 2416 PAGE 70
BOOK 5931 PAGE 42
BOOK 11135 PAGE 159
PARCEL ID 38-1
850 MAIN ST

THE BULLDOG REALTY TRUST
BOOK 21358 PAGE 63
PARCEL ID 38-2
880 MAIN ST

EDA-16

DP-16

DP-17

EDA-17

EDA-18A

BENCHMARK #17
MAG SET 1' ABOVE GRADE, UP #34
EL=98.62'

1911 STATE HIGHWAY LAYOUT
LOCATION LINE (NO. 1352)

MAIN STREET (ROUTE 38)
(PUBLIC - 1911 STATE HIGHWAY LAYOUT)

21
N. 3017566.539'
ΔE. 747941.777'
EL: 98.419'
MA

SUBJECT TO LOADING EASEMENT
BOOK 17139 PAGE 99
(NOT PLOTTABLE)

40' WIDE ACCESS EASEMENT
BOOK 18057 PAGE 193

JOHN J. SPINAZOLA REVOCABLE TRUST OF 2017
BOOK 31009 PAGE 278
PARCEL ID 26-6
835 MAIN ST

DENNIS A. SULLIVAN AND LEIGH A. CATALOGNA
BOOK 24786 PAGE 64
PARCEL ID 26-5
841 MAIN ST

EDWARD P. SHINE
BOOK 24974 PAGE 162
PARCEL ID 26-4
849 MAIN ST

KIRK A. POST
BOOK 33448 PAGE 287
PARCEL ID 26-3
851 MAIN ST

PAUL BIMBO
BOOK 18057 PAGE 195
PARCEL ID 26-2
855 MAIN ST

RUTLAND CORPORATION
BOOK 6090 PAGE 213
PARCEL ID 26-2A
853 MAIN ST

RUTLAND CORPORATIC
BOOK 6158 PAGE 9
PARCEL ID 26-2B
855R MAIN ST

CONTINUED ON SHEET NO. 101

CONTINUED ON SHEET NO. 103

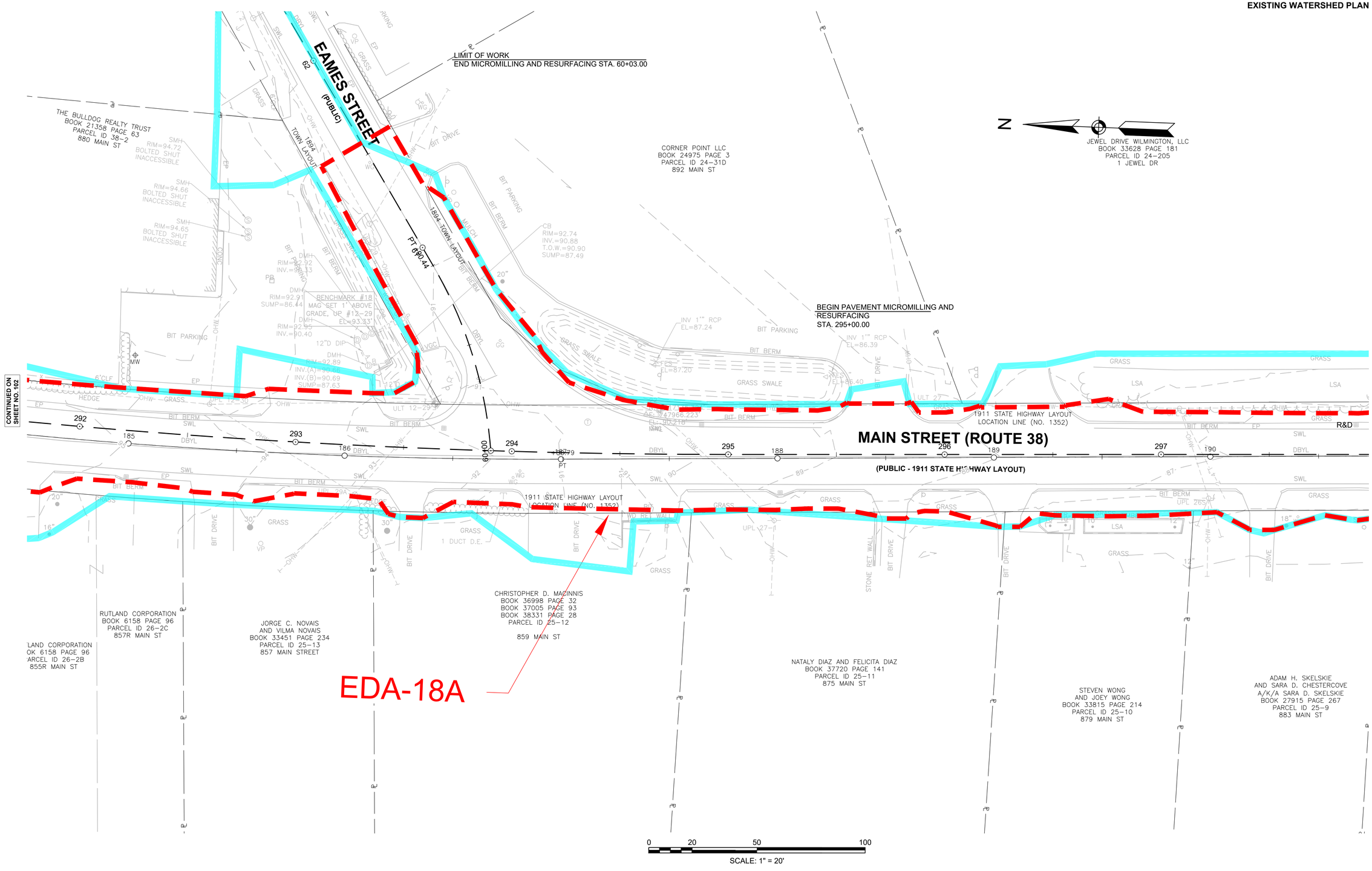
0 20 50 100
SCALE: 1" = 20'

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	17	21
PROJECT FILE NO.		608051	

EXISTING WATERSHED PLAN

EXISTING WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:10 PM

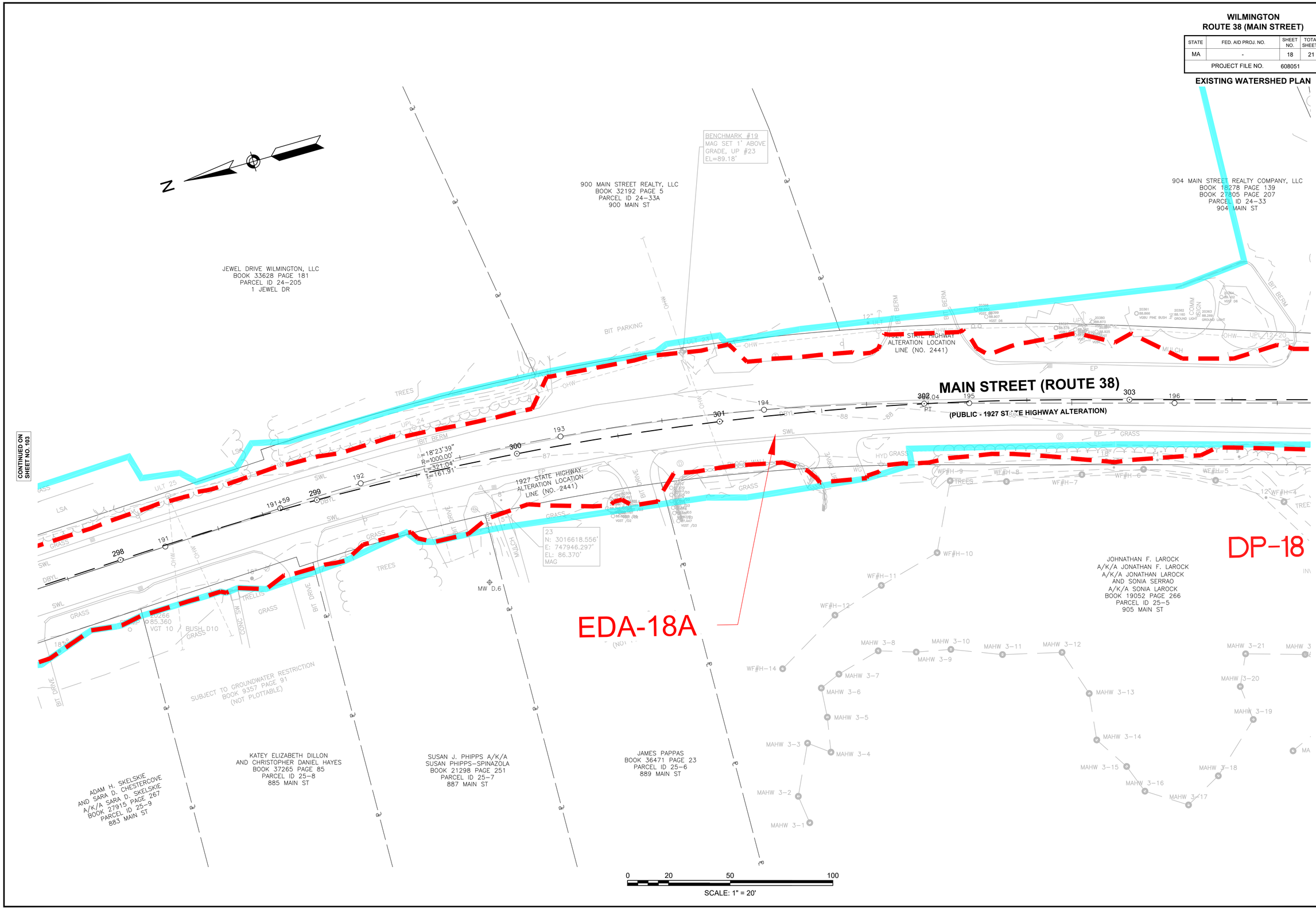


WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	18	21
PROJECT FILE NO.	608051		

EXISTING WATERSHED PLAN

EXISTING WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:10 PM

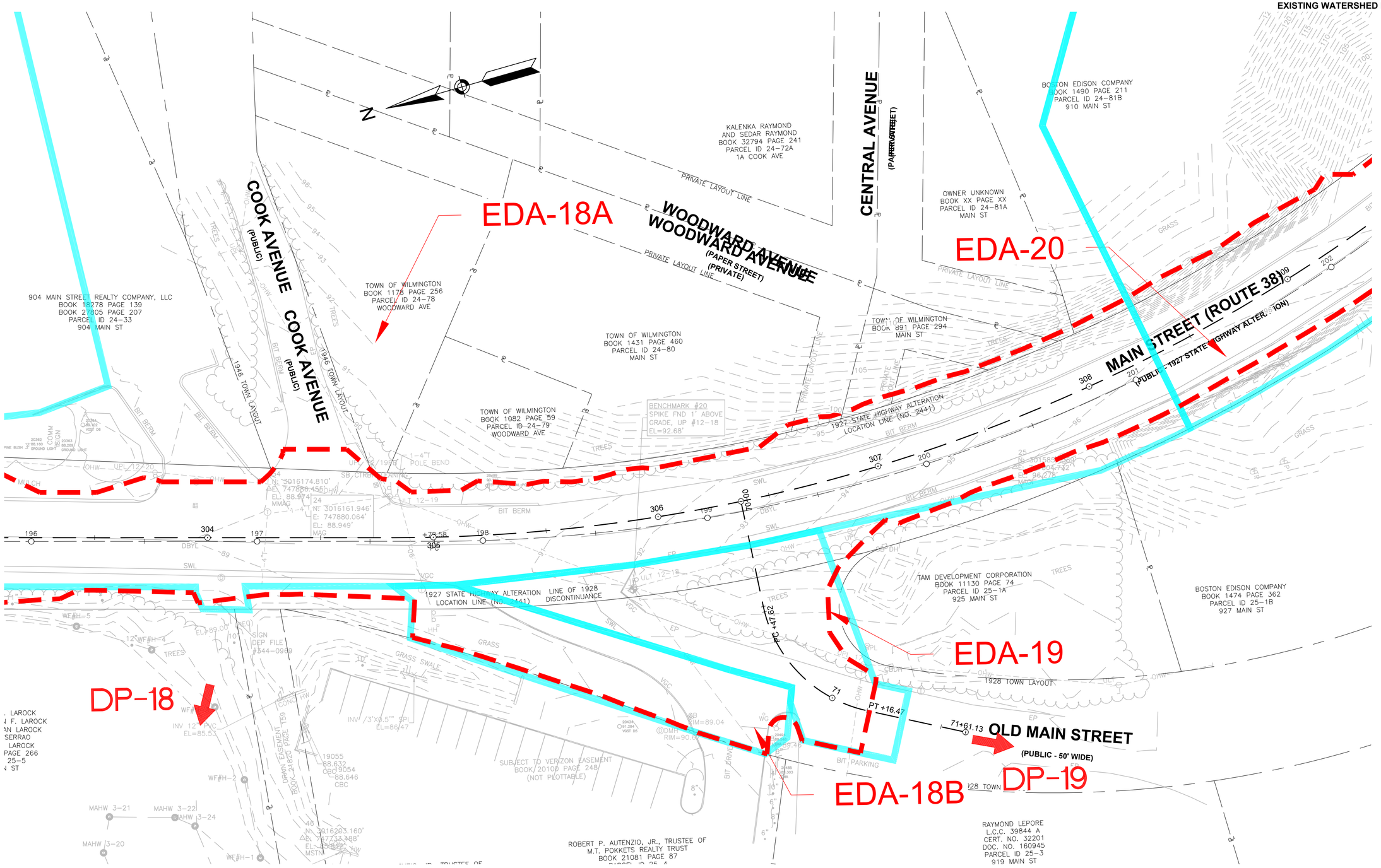


WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	19	21
PROJECT FILE NO.	608051		

EXISTING WATERSHED PLAN

EXISTING WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:11 PM



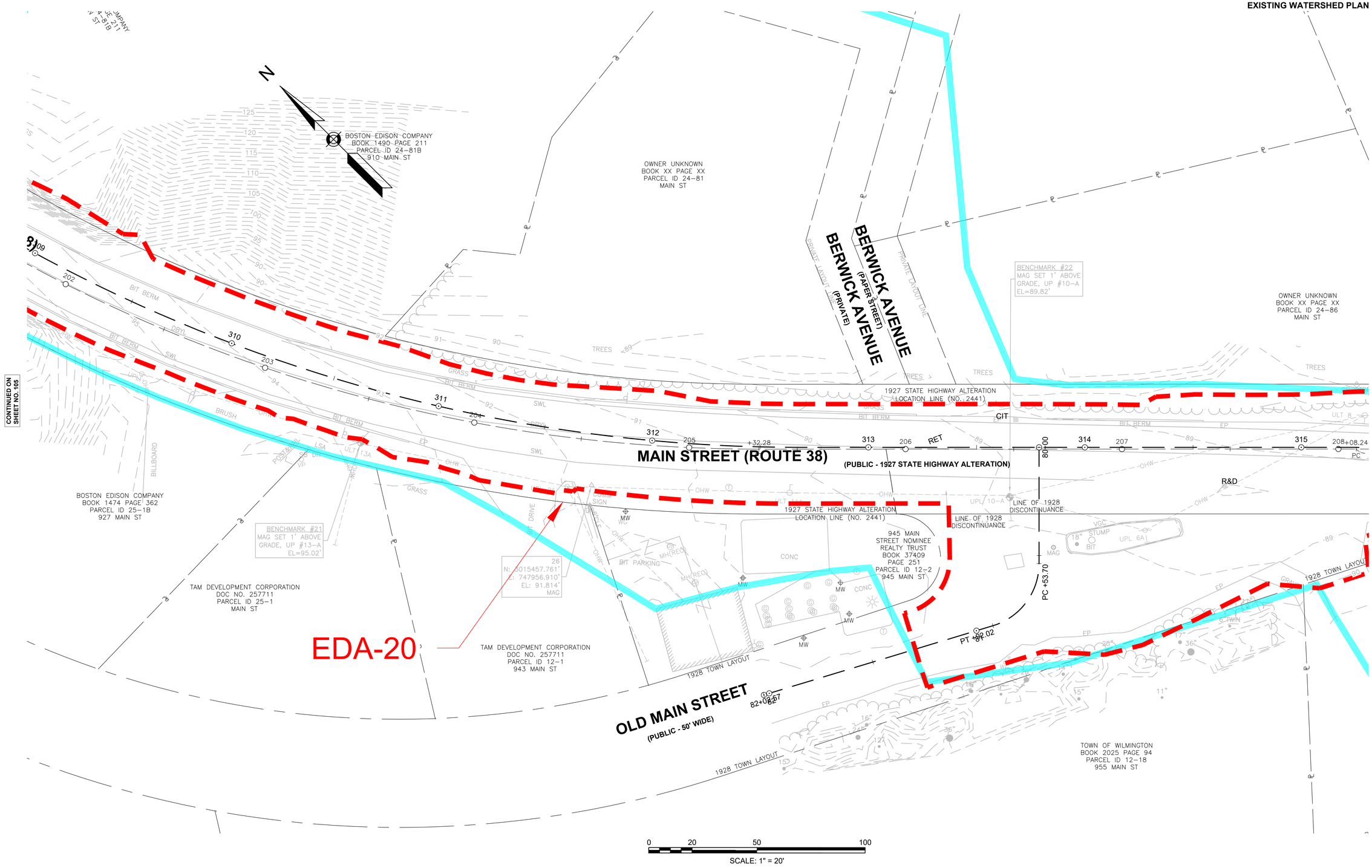
0 20 50 100
SCALE: 1" = 20'

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	20	21
PROJECT FILE NO.	608051		

EXISTING WATERSHED PLAN

EXISTING WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:11 PM



WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	21	21
PROJECT FILE NO.	608051		

EXISTING WATERSHED PLAN

DP-21

EDA-21

DP-20

EDA-20

BORDER AVENUE (PRIVATE)

FLORENCE AVENUE (PRIVATE)

WOBURN WILMINGTON

BREED AVENUE (PRIVATE)

MAIN STREET (ROUTE 38)
(PUBLIC - 1927 STATE HIGHWAY ALTERATION)

MAIN STREET (ROUTE 38)
(PUBLIC - 1912 STATE HIGHWAY LAYOUT)

1927 STATE HIGHWAY ALTERATION LOCATION LINE (NO. 2441)

1912 STATE HIGHWAY LAYOUT LOCATION LINE (NO. 1403)

1928 TOWN LAYOUT

CITY LINE
TOWN LINE

PRIVATE LAYOUT LINE

END OF 1927 ALTERATION

NON TANGENT AT POC

PC

SKYE GRAMS AND VALERIE GRAMS
BOOK 29847 PAGE 270
PARCEL ID 24-117
1 BORDER AVE

ROBERT HOLMES AND
LAURA HOLMES
L.C.C. 22159 B
CERT. NO. 41929
DOC NO. 278979
PARCEL ID 24-87
9 BORDER AVE

OWNER UNKNOWN
BOOK XX PAGE XX
PARCEL ID 24-86
MAIN ST

959 MAIN STREET REALTY, LLC
A/K/A MAIN STREET REALTY LLC
BOOK 33724 PAGE 209
PARCEL ID 12-4
959 MAIN ST

HENRY P. GARDNER
BOOK 37422 PAGE 274
PARCEL ID 12-3
967 MAIN ST

HENRY P. GARDNER
BOOK 80792 PAGE 409
PARCEL ID 03-03-03
MAIN ST

LORRAINE A. MACARIO
BOOK 66087 PAGE 128
PARCEL ID 03-03-02
1100 MAIN ST

DARWIN T. CIAVARDONE AND
KIMBERLY GRIFFITHS
BOOK 58169 PAGE 211
PARCEL ID 03-07-02
1091 MAIN ST

DARWIN T. CIAVARDONE AND
KIMBERLY GRIFFITHS
BOOK 58169 PAGE 211
PARCEL ID 03-07-03
1091 MAIN ST

P.J.K. REALTY CORP.
BOOK 5202 PAGE 87
PARCEL ID 03-03-01
3 BREED AVE

BENCHMARK #23
MAG SET 1' ABOVE
GRADE, UP #138-195
EL=92.51'

27
N: 3015158.146'
E: 748290.554'
EL: 90.073'
MAG

28
N: 3014918.915'
E: 748357.253'
EL: 91.352'
MAG

Δ=50°36'03"
R=425.00'
L=375.34'
T=200.90'

208+08.24 PC

211+83.58

0 20 50 100
SCALE: 1" = 20'

CONTINUED ON SHEET NO. 106

EXISTING WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:12 PM

##########
##########

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	1	21
PROJECT FILE NO.	######		

PROPOSED WATERSHED PLAN

PROPOSED WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:12 PM

BEGIN PROJECT
STA. 203+55.00
MEET EXISTING
N3024552.8585
E744023.6687

N

DP-2

DP-1

PDA-1

PDA-2

PDA-5

MAIN STREET (ROUTE 38)

(PUBLIC - 1923 STATE HIGHWAY LAYOUT-1997 ALTERATION)

ROUTE 38 (MAIN STREET)

(PUBLIC - 1923 STATE HIGHWAY LAYOUT-1997 ALTERATION)

BURLINGTON AVENUE

(PUBLIC - 1997 ALTERATION)

1923 STATE HIGHWAY LAYOUT LOCATION LINE (NO. 2122)

1997 STATE HIGHWAY ALTERATION LOCATION LINE (NO. 7755)

LOCATION LINE OF 1901 COUNTY LAYOUT

LOCATION LINE OF 1997 ALTERATION SHLO NO. 7255

RAILROAD SIDELINE

LOUIS VALENTI
PARCEL ID 42-20
BOOK 15294 PAGE 161
424 MAIN ST

MACMULLIN FAMILY REALTY TRUST III
PARCEL ID 42-21
BOOK 27960 PAGE 33
428-438 MAIN ST

414-418 MAIN STREET REALTY TRUST
PARCEL ID 42-19
BOOK 21033 PAGE 248
414-418 MAIN ST

1 CHURCH REALTY TRUST
PARCEL ID 41-110
BOOK 24436 PAGE 46
1 CHURCH ST

STEDMAN 442, LLC
PARCEL ID 41-111
BOOK 22652 PAGE 51
442 MAIN ST

C & B REALTY TRUST
PARCEL ID 41-112
BOOK 10882 PAGE 295
446 MAIN ST

456 MAIN STREET REALTY TRUST
PARCEL ID 41-113
BOOK 23689 PAGE 31
456 MAIN ST

MASS BAY TRANSIT AUTHORITY
BOOK 10373 PAGE 276
PARCEL ID 42-22
375 MAIN ST

PARTEL MANAGEMENT, LLC
PARCEL ID 42-22-F
BOOK 31258 PAGE 98
433 MAIN ST

MASSACHUSETTS BAY TRANSIT AUTHORITY
BOOK 2226 PAGE 326
PARCEL ID 42-22
375 MAIN ST

TOWN OF READING
PARCEL ID 41-142
BOOK 1675 PAGE 178
435 MAIN ST

4 LF - 12" DRAINAGE PIPE - OPTION @ 1.7%

PROP. GI (0-01)

PC +57.68

PT +49.62

PC +72.00

PC +68.32

0 20 50 100

SCALE: 1" = 20'

LEGEND - UTILITIES

PROPOSED WATERSHED BOUNDARY

PDA-1 PROPOSED WATERSHED NUMBER

DP-1 DESIGN POINT

CONTINUED ON SHEET NO. ##

WILMINGTON
##########################

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	2	21
PROJECT FILE NO.	######		

PROPOSED WATERSHED PLAN

PDA-1

PDA-5

DP-5

4 LF - 12" DRAINAGE PIPE - OPTION @ 1.7%

PROP. CI (0-01)

PROP. CBCI (1-07)

17 LF - 12" DIP @ 0.7%

PROP. DMH (1-08)

113 LF - 12" CLASS V RCP @ 1.5%

23 LF - 12" DIP @ 0.4%

PROP. CBCI (1-10)

27 LF - 12" DIP @ 0.5%

PROP. ECC. CBCI (1-14)

PROP. ECC. CB (1-03)

10 LF - 12" CLASS V RCP @ 1.0%

PROP. CBCI (1-11)

8 LF - 12" DIP @ 0.7%

PROP. DMH (1-12)

PROP. DMH (1-02)

11 LF - 15" DRAINAGE PIPE - OPTION @ 2.7%

PROP. DMH (1-04)

10 LF - 12" CLASS V RCP @ 0.5%

142 LF - 12" DRAINAGE PIPE - OPTION @ 0.2%

PROP. DMH (1-05)

18 LF - 12" DIP @ 2.8%

PROP. ECC. CBCI (1-06)

34 LF - 15" CLASS V RCP @ 2.9%

ROUTE 38 (MAIN STREET)

MAIN STREET (ROUTE 38)

KIRK STREET (PUBLIC)

1951 TOWN LAYOUT

(PUBLIC - 1923 STATE HIGHWAY LAYOUT-1997 ALTERATION)

1997 STATE HIGHWAY ALTERATION LOCATION LINE (NO. 7258)

1910 STATE HIGHWAY LAYOUT LOCATION LINE (NO. 1315)

STEDMAN 442, LLC
PARCEL ID 41-111
BOOK 22652 PAGE 51
442 MAIN ST

C & B REALTY TRUST
PARCEL ID 41-112
BOOK 10882 PAGE 295
446 MAIN ST

456 MAIN STREET REALTY TRUST
PARCEL ID 41-113
BOOK 23689 PAGE 31
456 MAIN ST

CORREIA VENTURES, LLC
PARCEL ID 41-114
BOOK 31739 PAGE 40
458 MAIN ST

ROSKI TRUST
PARCEL ID 41-120
BOOK 26613 PAGE 99
470 MAIN ST

SUPALI PROPERTIES, LLC
PARCEL ID 41-121
BOOK 30730 PAGE 247
474 MAIN ST

TOWN OF READING
PARCEL ID 41-142
BOOK 1675 PAGE 178
435 MAIN ST

MASSACHUSETTS BAY TRANSIT AUTHORITY
BOOK 2226 PAGE

BENCHMARK #1
MAG SET 1" ABOVE GRADE, UP #104
EL=105.35'

BENCHMARK #2
MAG SET 1" ABOVE GRADE, UP #103

PC +72.09

PT +60.55

CONTINUED ON SHEET NO.##

CONTINUED ON SHEET NO.##

0 20 50 100

SCALE: 1" = 20'

PROPOSED WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:13 PM

WILMINGTON
##########################

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	3	21
PROJECT FILE NO.	######		

PROPOSED WATERSHED PLAN

PROPOSED WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:14 PM

DP-3

DP-4

DP-6

PDA-4

PDA-6

SUPALI PROPERTIES, LLC
PARCEL ID 41-121
BOOK 30730 PAGE 247

474 MAIN ST

S AND S REALTY TRUST
MOHAMADSHAFI MALEK, TRUSTEE
L.C.C. 6462 B
L.C.C. 6462 E
CERT. NO. 29030
DOC. NO. 128871
PACEL 41-122

496 MAIN ST

EMILY A. LAZURE AND
JEANNE E. FICOCIELLO, TRUSTEES OF
500 MAIN STREET REALTY TRUST
L.C.C. 6462 E
CERT. NO. 37865
DOC. NO. 230907
PARCEL ID 41-123

500 MAIN ST

DANA KIKLIS
L.C.C. 6462 B
CERT. NO. 36223
DOC. NO. 206007
PARCEL ID 41-128-A

508 MAIN ST

MASSACHUSETTS BAY
TRANSIT AUTHORITY
BOOK 2226 PAGE 326
PARCEL ID 41-141

BENCHMARK #3
MAG. SET 1' ABOVE
GRADE, UP #96
EL=89.45'

MAIN STREET (ROUTE 38)
(PUBLIC - 1910 STATE HIGHWAY LAYOUT)

DUBLIN AVENUE
(PUBLIC)

1910 STATE HIGHWAY LAYOUT
LOCATION LINE (NO. 1315)

APPROXIMATE RAILROAD SIDELINE

RR TRACK TIE LINE

PROP. ECC. CB (1-03)
10" PVC
10 LF - 12" CLASS V RCP @ 1.0%
PROP. DMH (1-02)
11 LF - 15" CLASS V RCP @ 2.7%
76 LF - 15" CLASS V RCP @ 0.3%
PROP. DMH (1-04)
10 LF - 12" CLASS V RCP @ 0.5%
34 LF - 15" CLASS V RCP @ 2.9%
PROP. CB (1-15)
10 LF - 12" DIP @ 0.5%
PROP. DMH (1-16)
27 LF - 15" CLASS V RCP @ 0.3%
PROP. DMH (1-20)
PROP. ECC. CBCI (1-23)
11 LF - 12" DIP @ 0.9%
PROP. DMH (1-24)
PROP. DMH (1-19)
20 LF - 15" DRAINAGE PIPE - OPTION @ 0.3%
PROP. CB (1-19)
10 LF - 12" CLASS V RCP @ 0.7%
PROP. DMH (1-27)
20 LF - 15" DRAINAGE PIPE - OPTION @ 0.3%
28 LF - 12" DIP @ 0.4%
PROP. CBCI (1-22)
29 LF - 12" DIP @ 0.3%
PROP. CBCI (1-18)
28 LF - 12" DIP @ 0.5%
PROP. CBCI (1-26)
73 LF - 18" CLASS V RCP @ 0.3%
PROP. CB (2-05)
241 LF - 18" DRAINAGE PIPE - OPTION @ 0.3%
17 LF - 2" DIP @ 0.4%
PROP. DMH (2-03)
20 LF - 12" DIP @ 0.8%
PROP. CBCI (2-06)
PROP. CBCI (2-11)
21 LF - 18" DRAINAGE PIPE - OPTION @ 0.3%
35 LF - 18" DRAINAGE PIPE - OPTION @ 0.5%
PROP. SPECIAL DRAINAGE STRUCTURE NO. 1
PROP. HW (2-01)
PROP. STONE FOR PIPE ENDS TO A DEPTH OF 1'
36'X22.5' AREA = 90 SY
27 LF - 18" DRAINAGE PIPE - OPTION @ 0.2%
PROP. DMH (2-02)
PROP. HW (2-02)
PROP. STONE FOR PIPE ENDS TO A DEPTH OF 1'
AREA = 10 SY
10 LF - 12" DIP @ 1.0%
PROP. DMH (2-09)
21 LF - 12" DIP @ 0.9%
PROP. CBCI (2-10)
7 LF - 12" DIP @ 1.3%
PROP. DMH (2-12)
21 LF - 12" CLASS V RCP @ 0.7%
PROP. ECC. CBCI (2-13)

CONTINUED ON SHEET NO.##

CONTINUED ON SHEET NO. ##

0 20 50 100
SCALE: 1" = 20'

PROPOSED WATERSHED PLAN

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	4	21
PROJECT FILE NO.	######		

PROPOSED WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:14 PM

DP-4

DP-6

PDA-4

PROP. CBCI (2-08)
10 LF - 12" DIP @ 1.0%
PROP. DMH (2-09)
21 LF - 12" DIP @ 0.9%
21 LF - 18" DRAINAGE PIPE - OPTION @ 0.3%
PROP. CBCI (2-11)
7 LF - 12" DRAINAGE PIPE - OPTION @ 1.3%

PROP. CBCI (2-14) ABOVE GRADE, UP #92
11 LF - 12" DIP @ 0.9%
PROP. DMH (2-15)

18 LF - 12" DIP @ 1.1%

94 LF - 18" DRAINAGE PIPE - OPTION @ 0.4%

107 LF - 18" DRAINAGE PIPE - OPTION @ 0.4%

19 LF - 42" DIP @ 1.8%
PROP. CBCI (2-16)

PROP. ECC. CBCI (2-13)
21 LF - 12" CLASS V RCP @ 0.7%
PROP. DMH (2-12)
PROP. CBCI (2-10)
35 LF - 18" DRAINAGE PIPE - OPTION @ 0.5%

PROP. DMH (2-18)
12 LF - 12" DIP @ 0.8%
PROP. CBCI (2-19)

195 LF - 18" DRAINAGE PIPE - OPTION @ 0.4%
PROP. DMH (2-29)

15 LF - 12" DIP @ 0.7%

122 LF - 15" DRAINAGE PIPE - OPTION @ 0.4%

MONTROSE AVENUE (PAPER STREET)

RANCH ROAD (PAPER STREET)

MAIN STREET (ROUTE 38)
(PUBLIC - 1910 STATE HIGHWAY LAYOUT)

1910 STATE HIGHWAY LAYOUT LOCATION LINE (NO. 1315)

APPROX LOCATION BOSTON & NORTHERN STREET RAILWAY (BURIED)

APPROXIMATE RAILROAD SIDELINE

DANA KIKLIS
L.C.C. 6462 B
CERT. NO. 36223
DOC. NO. 206007
PARCEL ID 41-128-A
508 MAIN ST

DEREK LEIDER PROPERTY, LLC
L.C.C. 6462 B
CERT. NO. 45467
DOC. NO. 312075
PARCEL ID 41-129
510 MAIN ST

THE 520 MAIN STREET CONDOMINIUM
L.C.C. 6462 C-35
CERT. NO. C-35
DOC. NO. 233854
PARCEL ID 41-130-CM
520 MAIN ST

SUBJECT TO VERIZON EASEMENT
DOC. NO. 227331
(NOT PLOTTABLE)

PR356, LLC
PARCEL ID 41-131
L.C.C. 6462 C
CERT. NO. 40114
DOC. NO. 257307
580 MAIN ST

STEDMAN 555, LLC
PARCEL ID 41-140
BOOK 22652 PAGE 49
555 MAIN ST

STEDMAN 555, LLC
PARCEL ID 41-139
BOOK 24082 PAGE 158
563 MAIN ST

TOWN OF WILMINGTON
PARCEL ID 41-138
BOOK 2469 PAGE 363
579 MAIN ST

MASSACHUSETTS BAY TRANSIT AUTHORITY
BOOK 2226 PAGE 326
PARCEL D 41-147

TOWN OF WILMINGTON UTILITY EASEMENT BOOK 5145 PAGE 34

CONTINUED ON SHEET NO. ##

CONTINUED ON SHEET NO. ##

0 20 50 100
SCALE: 1" = 20'

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	5	21
PROJECT FILE NO.	######		

PROPOSED WATERSHED PLAN

PROPOSED WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:15 PM

PDA-4

KIERNAN AVENUE (PUBLIC)

MAIN STREET (ROUTE 38)

LOWELL STREET (ROUTE 129)

(1950 COUNTY LAYOUT - VARIABLE WIDTH)

(PUBLIC - 1910 STATE HIGHWAY LAYOUT-1950 ALTERATION)

1950 STATE HIGHWAY ALTERATION LOCATION LINE (NO. 3755)

1910 STATE HIGHWAY LAYOUT LOCATION LINE (NO. 1315)

1955 TOWN LAYOUT

1958 TOWN LAYOUT

LOCATION LINE OF 1951 COUNTY LAYOUT

PR356, LLC
PARCEL ID 41–131
L.C.C. 6462 C
CERT. NO. 40114
DOC. NO. 257307
580 MAIN ST

PATRICIA A. SULLIVAN, TRUSTEE
OF THE
PATRICIA A. SULLIVAN
REVOCABLE TRUST
L.C.C. 6462 B
CERT. NO. 45142
DOC. NO. 308372
PARCEL ID 41–132
600 MAIN ST

TOWN OF WILMINGTON
PARCEL ID 41–136
LAND COURT CASE NO. 6462
600 MAIN ST

ONE LOWELL STREET
REALTY, LLC
BOOK 33724 PAGE 207
PARCEL ID 41–137–A
2 LOWELL ST

TARANTO REALTY TRUST
PARCEL ID 41–138–C
BOOK 21859 PAGE 293
585 MAIN ST

EVONA, LLC
PARCEL ID 41–138–A
BOOK 24618 PAGE 150
603 MAIN ST

609 MAIN STREET
NOMINEE TRUST
PARCEL ID 40–4
BOOK 24253 PAGE 297
609 MAIN ST

611 MAIN STREET
NOMINEE TRUST
PARCEL ID 40–3
BOOK 24254 PAGE 8
611 MAIN ST

FRED F. CAIN, INC.
PARCEL ID 41–138
BOOK 2469 PAGE 363
579 MAIN ST

TARANTO REALTY TRUST
PARCEL ID 41–138–B
BOOK 18317 PAGE 280
581 MAIN ST

TOWN OF WILMINGTON UTILITY EASEMENT BOOK 5145 PAGE 34

10' WIDE RIGHT OF WAY PLAN BK 113 PG 92

17 LF - 12" CLASS V RCP @ 0.7%
PROP. CIT (2-30)
PROP. GI (2-23)
PROP. CB (2-21)
15 LF - 12" DIP @ 0.7%
PROP. DMH (2-28)
PROP. DMH (2-24)
17 LF - 12" DIP @ 0.6%
PROP. CBCI (2-25)
88 LF - 12" CLASS V RCP @ 0.8%
12" DIP @ 0.7%
101 LF - 12" DRAINAGE PIPE - OPTION @ 0.7%
40 LF - 12" DRAINAGE PIPE - OPTION @ 0.8%
9 LF - 12" DIP @ 0.9%
PROP. DMH (2-27)
30 LF - 12" DRAINAGE PIPE - OPTION @ 0.7%
PROP. ECC. CB (2-26)
122 LF - 15" DRAINAGE PIPE - OPTION @ 0.4%

PT +83.22
PRO +49.56
31 PRO +02.59

BENCHMARK #6
MAG FND 0.1' ABOVE GRADE, UP #12–85
EL=94.21'

CONTINUED ON SHEET NO. ##

0 20 50 100
SCALE: 1" = 20'

PROPOSED WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:15 PM

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STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	6	21
PROJECT FILE NO.	######		

PROPOSED WATERSHED PLAN

PDA-7A

PDA-8A

CONTINUED ON SHEET NO.##

CONTINUED ON SHEET NO.##

COLONIAL PARK MALL CONDOMINIUM
PARCEL ID 40-6-A
L.C.C. 29466 B
CERT. NO. C-20
DOC. NO. 120308

25 LOWELL ST

GTY MA/NH LEASING, INC.
PARCEL ID 40-5
BOOK 24895 PAGE 204

586 MAIN ST

GLOBE REALTY TRUST
PARCEL ID 40-6
L.C.C. 29466 B
CERT. NO. 34101
DOC. NO. 181185

35 LOWELL ST

SUBJECT TO VERIZON EASEMENT
BOOK 11541 PAGE 327
(NOT PLOTTABLE)

REGISTERED L
RECORDED LA

REGISTERED LAND
RECORDED LAND

SMH
RIM=93.72
INV.(A)=80.42
INV.(B)=80.54
SUMP=80.50

CHMARK #6
0.1' ABOVE
UP #12-85
EL=94.21'

SMH
RIM=92.05
INV.(A)=81.66
INV.(B)=81.84
SUMP=81.26

DMH
RIM=90.99
INV.(A)=88.17
INV.(B)=88.29
SUMP=88.17

CB
RIM=91.22
INV.=89.06
SUMP=83.14

PROP. GI (3-17)

19 LF - 12" DIP @ 1.6%

1910 STATE HIGHWAY LAYOUT
LOCATION LINE (NO. 1315)

MAIN STREET (ROUTE 38)

(PUBLIC - 1910 STATE HIGHWAY LAYOUT)

PROP. CB W/F&C (3-18)

10 LF - 12" DIP @ 3.1%

PROP. GI (3-19)

242 LF - 12" CLASS V RCP @ 0.7%

PROP. CBCI (3-12)

19 LF - 12" DIP @ 1.1%

219 LF - 12" CLASS V RCP @ 0.7%

PROP. DMH (3-14)

11 LF - 12" DIP @ 0.9%

PROP. CBCI (3-16)

BENCHMARK #7
MAG SET 1' ABOVE
GRADE, UP #12-82X
EL=92.95'

615 MAIN STREET NOMINEE TRUST
AKA THE 615 MAIN STREET NOMINEE TRUST
PARCEL ID 40-2-C
BOOK 24254 PAGE 17

615 MAIN ST

WILMINGTON PROPERTY MANAGEMENT LLC
PARCEL ID 40-2-B
BOOK 37684 PAGE 48
619 MAIN ST

MMJMJ LLC
BOOK 36016 PAGE 250
PARCEL ID 40-2-A

625 MAIN ST

635 MAIN STREET OWNER LLC
AKA 635 MAIN STREET OWNER, LLC
BOOK 34786 PAGE 182
PARCEL ID 40-1

635 MAIN ST

ACCESS EASEMENT
BOOK 24278 PAGE 198

DRIVEWAY EASEMENT
BOOK 24278 PAGE 198

SIGN EASEMENT
BOOK 24278 PAGE 198

0 20 50 100

SCALE: 1" = 20'

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	7	21
PROJECT FILE NO.	######		

PROPOSED WATERSHED PLAN

PROPOSED WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:16 PM

PDA-7A

DP-7

PDA-8C

PDA-8A

DP-8

PDA-8A

PROP. FES (3-01)
45 LF - 15" CLASS V RCP @ 0.1%
PROP. CB (3-20)
PROP. STONE FOR PIPE ENDS
17 LF - 15" CLASS V RCP @ 0.3%
PROP. CB (3-06)
16 LF - 12" DIP @ 0.6%
PROP. DMH (3-04)
9 LF - 12" DIP @ 0.2%
PROP. CBCI (3-08)
20 LF - 12" DIP @ 0.5%
PROP. DMH (3-09)
11 LF - 12" DIP @ 1.0%
PROP. CB (3-11)
219 LF - 12" CLASS V RCP @ 0.7%
222 LF - 12" CLASS V RCP @ 0.7%
PROP. ECC. CB (3-07)
PROP. 5' DIA. DMH (3-02)
7 LF - 12" DIP @ 0.7%
6 LF - 15" CLASS V RCP @ 0.8%
PROP. CBCI (3-03)
8 LF - 36" RCP @ 0.2%
PROP. HW-01
PROP. STONE FOR PIPE ENDS
16 LF - 12" DIP @ 0.3%
PROP. DMH (3-22)
PROP. ECC. CB (3-33)
19 LF - 12" DIP @ 1.4%
PROP. 5' DIA. DMH (3-35)
57 LF - 12" CLASS V RCP @ 0.4%
8 LF - 12" DIP @ 0.9%
PROP. ECC. CB (3-36)
PROP. DMH (3-39)
17 LF - 12" CLASS V RCP @ 2.4%
PROP. HW (3-01)
PROP. STONE FOR PIPE ENDS
PROP. ECC. CB (3-23)
25 LF - 12" CLASS V RCP @ 0.4%
PROP. DMH (3-24)
134 LF - 12" CLASS V RCP @ 1.8%
5 LF - 12" CLASS V RCP @ 1.7%
STA 240+06.88
N 3021978.5094
E 746545.4280
PROP. ECC. CB (3-25)
PROP. FES (2-8)
4 LF - 12" CLASS V
PROP. DMH (2-5)

MAIN STREET (ROUTE 38)
(PUBLIC - 1910 STATE HIGHWAY LAYOUT)
MAIN STREET
(PUBLIC - 1 HIGHWAY

1910 STATE HIGHWAY LAYOUT
LOCATION LINE (NO. 1315)
APPROX. LOCATION BOSTON & NORTHERN STREET RAILWAY (ABD.)
LIMIT OF WORK
CONTINUED ON SHEET NO. ##

GLOBE REALTY TRUST
PARCEL ID 40-6
BOOK 29264 PAGE 30
35 LOWELL ST

ONE CROSS LLC
BOOK 35186 PAGE 80
PARCEL ID 40-11
CROSS ST

NEW ENGLAND TELEPHONE H COMPANY
40-12
PAGE 352
MAIN ST

BENCHMARK #8
MAG SET 1' ABOVE GRADE, UP #77
EL=88

1 STORY BRICK

2023 TOWN ALTERATION SECTION - 2
RECORD BK 37867 PG 1
(PLAN BOOK 37867 PAGE 1)

SUBJECT TO VERIZON EASEMENT
BOOK 36483 PAGE 73
(NOT PLOTTABLE)

635 MAIN STREET OWNER LLC
AKA 635 MAIN STREET OWNER, LLC
BOOK 34786 PAGE 182
PARCEL ID 40-1

635 MAIN ST

0 20 50 100
SCALE: 1" = 20'

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STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	8	21
PROJECT FILE NO.	######		

PROPOSED WATERSHED PLAN

PROPOSED WATERSHED PLAN.DWG Plotted on 12-Mar-2025 10:33 AM

PDA-7B

PDA-8C

PDA-9

PDA-10A

PDA-8A

CONTINUED ON SHEET NO. ##

CONTINUED RIGHT

CONTINUED LEFT

CONTINUED ON SHEET NO. ##

MAIN STREET (ROUTE 38)

CROSS STREET

(PUBLIC - 1910 STATE HIGHWAY LAYOUT)

PROP. ECC. CB (3-23)
25 LF - 12" CLASS V RCP @ 0.4%
PROP. DMH (3-24)
134 LF - 12" CLASS V RCP @ 1.8%
15 LF - 12" CLASS V RCP @ 1.7%
PROP. ECC. CB (3-25)
PROP. FES (2-8)
4 LF - 12" CLASS V RCP
PROP. DMH (2-5)
PROP. CB (2-6)
26 LF - 12" CLASS V RCP
108 LF - 12" CLASS V RCP
PROP. OCS (2-1)
93.5 BMP
BUTTERS ROW
PROPOSED BUTTERS ROW WORK
PERMITTED UNDER DEP WQC
FILE NO. 23-WW11-0002-APP
PROP. FES (2-7)
21 LF - 12" CLASS V RCP
PROP. CB (2-3)
61 LF - 12" CLASS III RCP
PROP. CBCI (4-14)
22 LF - 12" DIP @ 0.9%
PROP. DMH (2-2)
PROP. CB (2-1)
17 LF - 12" CLASS III RCP

PC +20.12
PT +54.62
PT +96.89
PC +40.00
PC +02.27
PC +06.25
PT +42.19
PC +03.96
PT +95.54
PC +89.91
PT +96.48
PT +90.41

50+00
57+92.10

241 242 243 244 245 246

N44°52'23"W (BACK)=
S44°55'34"E (AHEAD)

0 20 50 100
SCALE: 1" = 20'

MIDDLESEX COUNTY EASEMENT FOR HIGHWAY PURPOSES (BOOK 1178 PAGE 237)

TOWN OF WILMINGTON PARCEL ID 40-13-A BOOK 35162 PAGE 138 CROSS ST

DIAMOND PROPERTIES TRUST BOOK 33133 PAGE 1 PARCEL ID 39-6 668 MAIN ST

TOWN OF WILMINGTON PARCEL ID 39-5 BOOK 26062 PAGE 215 9 CROSS ST

JOHN C. OLSON PARCEL ID 39-14 BOOK 23310 PAGE 186 673 MAIN ST

JARID POLLEY AND MARY POLLEY BOOK 37173 PAGE 123 PARCEL ID 39-15 669 MAIN ST

ANDREA J. DELUCA PARCEL ID 39-16 BOOK 18231 PAGE 111 665 MAIN ST

35 MAIN STREET OWNER LLC
635 MAIN STREET OWNER, LLC
BOOK 34786 PAGE 182
PARCEL ID 40-1
635 MAIN ST

BENCHMARK #9
MAG SET 1' ABOVE GRADE, UP 1/2"
EL=96.26'

YENTILE FARM RECREATIONAL FACILITY

8" PVC SEWER - TOWN OF WILMINGTON

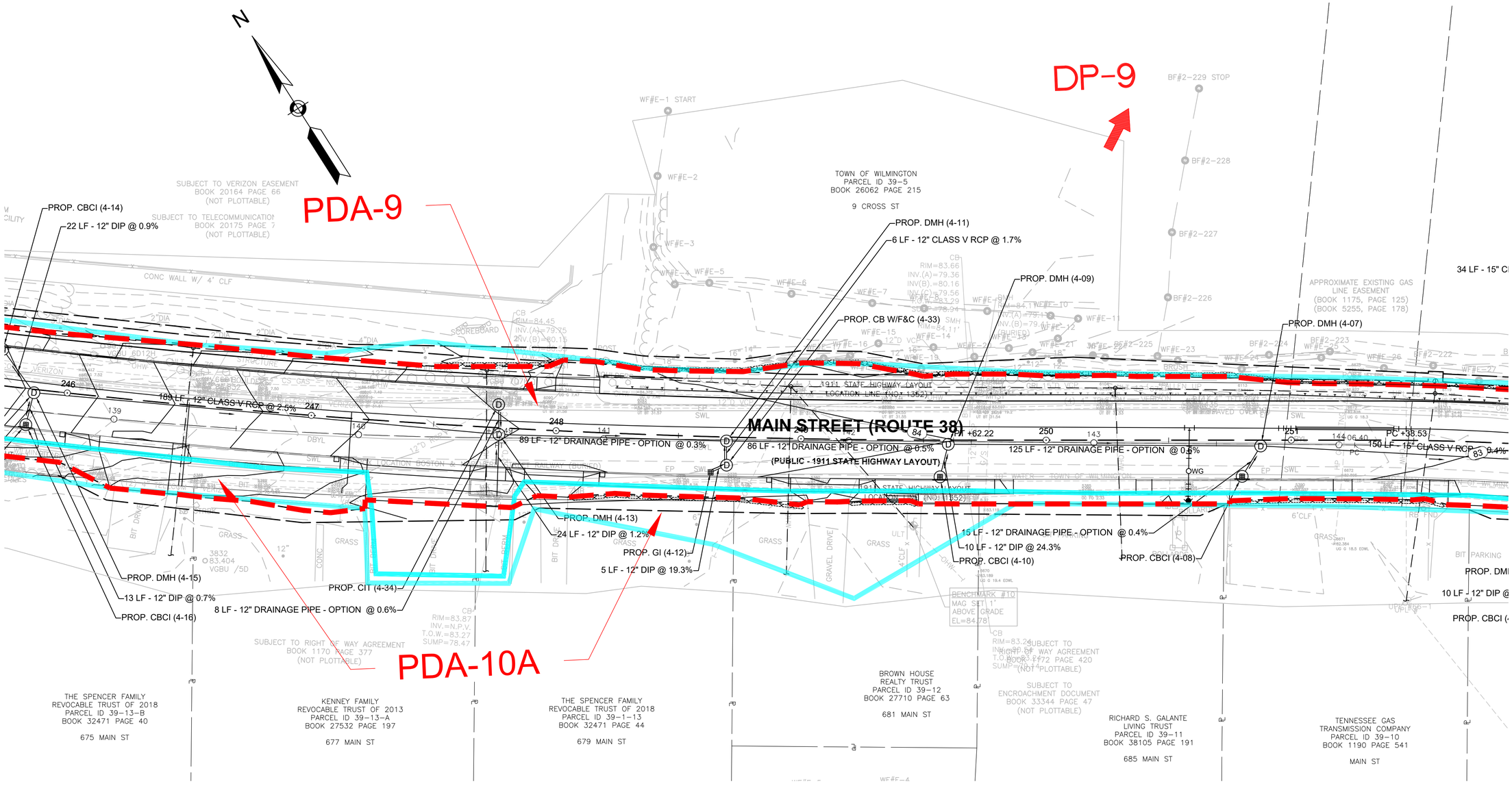
APPROX LOCATION BOSTON & NORTHERN STREET RAILWAY COMPANY

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STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	9	21
PROJECT FILE NO.	######		

PROPOSED WATERSHED PLAN

PROPOSED WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:17 PM



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STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	10	21
PROJECT FILE NO.	######		

PROPOSED WATERSHED PLAN

PROPOSED WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:18 PM

CONTINUED ON SHEET NO.##

CONTINUED ON SHEET NO. ##

PDA-9

PDA-10A

DP-10

MAIN STREET (ROUTE 38)

(PUBLIC - 1911 STATE HIGHWAY LAYOUT)

1911 STATE HIGHWAY LAYOUT LOCATION LINE (NO. 1352)

TOWN OF WILMINGTON
PARCEL ID 39-5
BOOK 26062 PAGE 215

9 CROSS ST

TEXTRON SYSTEMS CORPORATION
PARCEL ID 48-73-A
BOOK 24103 PAGE 25
BOOK 35305 PAGE 130
BOOK 35305 PAGE 132

201 LOWELL ST

SUBJECT TO RECIPROCAL EASEMENTS
BOOK 37155 PAGE 258
(NOT PLOTTABLE)

BENCHMARK #11
MAG SET 2' ABOVE GRADE, UP #12-64
EL=85.19'

TENNESSEE GAS TRANSMISSION COMPANY
PARCEL ID 39-10
BOOK 1190 PAGE 541

MAIN ST

AMERCO REAL ESTATE COMPANY
PARCEL ID 39-11-A
BOOK 5015 PAGE 103

687 MAIN ST

TOWN OF WILMINGTON
BOOK 2299 PAGE 288
PARCEL ID 39-9
MAIN ST

15 LF - 18" DRAINAGE PIPE - OPTION @ 0.7%

PROP. DMH (4-37)

5 LF - 18" CLASS V RCP @ 2.1%

PROP. DMH (4-35)

8 LF - 12" HDPE @ 16.2%

28 LF - 18" CLASS V RCP @ 0.4%

PROP. CB (4-03)

PROP. HW (4-01)

PROP. STONE FOR PIPE ENDS

PROP. HW (4-02)

34 LF - 15" CLASS V RCP @ 0.6%

PROP. CB (4-17)

7 LF - 12" DIP @ 18.6%

112 LF - 15" CLASS V RCP @ 0.2%

PROP. DMH (4-20)

PROP. DMH (4-21)

115 LF - 15" CLASS V RCP @ 0.2%

PCC +35.53

150 LF - 15" CLASS V RCP @ 9.4%

PCC +18.67

PROP. CBCI (4-19)

6 LF - 12" DIP @ 0.8%

PROP. DMH (4-36)

5 LF - 18" CLASS V RCP @ 1.0%

PROP. DMH (4-18)

5 LF - 12" DIP @ 0.9%

PROP. CBCI (4-05)

7 LF - 12" DIP @ 0.7%

PROP. CBCI (4-22)

179 LF - 15" CLASS V RCP @ 0.8%

PROP. DMH (4-06)

10 LF - 12" DIP @ 1.0%

PROP. CBCI (4-33)

PROP. RIPRAP TO A DEPTH OF 3' TOTAL VOLUME = 700 TONS (EXTEND RIPRAP THROUGH CULVERT, NOT SHOWN FOR CLARITY)

0 20 50 100

SCALE: 1" = 20'

##########
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STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	11	21
PROJECT FILE NO.	######		

PROPOSED WATERSHED PLAN

PROPOSED WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:18 PM

N

DP-11

PDA-11

PDA-9

PDA-10B

MATCH PROJECT
PROJECT NO. 607327
STA 261+38.00

DSM NEORESINS INC.
PARCEL ID 39-8
L.C.C. 23888 C
CERT. NO. 35932
DOC NO. 202386

730 MAIN ST

ESSEX HOLDING, LLC
A/K/A ESSEX HOLDING LLC
PARCEL ID 39-8-A
L.C.C. 23888 D
CERT. NO. 41633
DOC NO. 276222

730 MAIN ST

MAIN STREET (ROUTE 38)
(PUBLIC - 1911 STATE HIGHWAY LAYOUT)

1911 STATE HIGHWAY LAYOUT
LOCATION LINE (NO. 1352)

179 LF - 15" CLASS V RCP @ 0.8%
PROP. DMH (4-24)
6 LF - 12" CLASS V RCP @ 0.8%
PROP. CBGI (4-25)
PROP. DMH (4-26)
116 LF - 12" CLASS V RCP @ 1.4%
143 LF - 12" CLASS V RCP @ 0.7%

R&S FRAME AND COVER
PROP. FRAME AND GRATE

TEMPORARY EASEMENT
PARCEL 25-TE-6
SHLO 8859

TEMPORARY EASEMENT
PARCEL 25-TE-1
SHLO 8859

TEMPORARY EASEMENT
PARCEL 25-TE-2
SHLO 8859

PERMANENT EASEMENT
PARCEL 25-PUE-2
SHLO 8859

TEMPORARY EASEMENT
PARCEL 25-TE-3
SHLO 8859

TOWN OF WILMINGTON
BOOK- 2299 PAGE 285
PARCEL ID 39-9
MAIN ST

BENCHMARK: 12
MAG SET 1' ABOVE
GRADE, UP #39
EL=85.72'

APPROX LOCATION BOSTON & NORTHERN STREET RAILWAY (ABANDONED)

PT +09.65

CONTINUED ON SHEET NO. ##

CONTINUED ON SHEET NO. ##

0 20 50 100
SCALE: 1" = 20'

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	12	21
PROJECT FILE NO.	######		

PROPOSED WATERSHED PLAN

PROPOSED WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:19 PM

PDA-11

PDA-14A

PDA-10B

MBTA RAILROAD

MAIN STREET (ROUTE 38)

(PUBLIC - 1911 STATE HIGHWAY LAYOUT)

DSM NEORESINS INC.
PARCEL ID 39-8
L.C.C. 23888 C
CERT. NO. 35932
DOC NO. 202386

730 MAIN ST

JEG 760 MAIN, LLC
BOOK 37934 PAGE 238
PARCEL ID 38-1D
760 MAIN ST

TOWN OF WILMINGTON
PARCEL ID 26-9
L.C.C. 23888 A
CERT. NO. 8851
DOC NO. 71875

823 MAIN ST

MASSACHUSETTS BAY TRANSIT AUTHORITY
BOOK 2226 PAGE 326
PARCEL ID 41-141

2023 STATE HIGHWAY LAYOUT
LOCATION LINE (8859)
TOWN OF WILMINGTON
BOOK 2299 PAGE 288
PARCEL ID 39-9
MAIN ST

1911 STATE HIGHWAY LAYOUT
LOCATION LINE (NO. 1352)

TEMPORARY EASEMENT
PARCEL 25-TE-1
SHLO 8859

TEMPORARY EASEMENT
PARCEL 25-TE-2
SHLO 8859

PERMANENT EASEMENT
PARCEL 25-PUE-1
SHLO 8859

PERMANENT EASEMENT
PARCEL 25-PUE-2
SHLO 8859

TEMPORARY EASEMENT
PARCEL 25-TE-3
SHLO 8859

TEMPORARY EASEMENT
PARCEL 25-TE-5
SHLO 8859

PERMANENT EASEMENT
PARCEL 25-E-1
SHLO 8859

20' SEWER EASEMENT
BOOK 2244 PAGE 156

APPROXIMATE RAILROAD SIDELINE

47 LF - 12" DR

6'x12' BT STRUCTURE

CONTINUED ON SHEET NO. ##

0 20 50 100

SCALE: 1" = 20'

PROPOSED WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:21 PM

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STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	13	21
PROJECT FILE NO.	######		

PROPOSED WATERSHED PLAN

PDA-13

PDA-14B

PDA-14A

MATCH PROJECT
PROJECT NO. 607327
STA 269+50.85

ND COVER
ND GRATE

MAIN, LLC
34 PAGE 238
ID 38-1D
MAIN ST

PERMANENT EASEMENT
PARCEL 25-PUE-3
SHLO 8859

PERMANENT EASEMENT
PARCEL 25-PUE-3
SHLO 8859

R&S FRAME AND COVER
PROP. FRAME AND GRATE

BENCHMARK: 14
MAG SET 1' ABOVE
GRADE, UP #49
EL=96.41'

JEG 760 MAIN, LLC
BOOK 37934 PAGE 238
PARCEL ID 38-1D
760 MAIN ST

PROP. CB (5-38)

11 LF - 12" CLASS V RCP @ 0.9%

TEMPORARY EASEMENT
PARCEL 25-TE-5
SHLO 8859

CB
RIM=92.65
INV.=89.92
SUMP=89.84

PROP. DMH (5-37)

PROP. DMH (5-36)

KOVALUS SEPARATION SOLUTIONS, LLC
BOOK 2416 PAGE 70
BOOK 5931 PAGE 42
BOOK 11135 PAGE 159
PARCEL ID 38-1
850 MAIN ST

DRAIN EASEMENT
BOOK 2535 PAGE 127

PROP. CB (5-46)

13 LF - 12" CLASS V RCP @ 0.8%

PROP. DMH (5-48)

CONTINUED ON SHEET NO. ##

CONTINUED ON SHEET NO. ##

LOCATION LINE

PI +50.85

PI +37.34

180 LF - 12" CLASS V RCP @ 0.7%

MAIN STREET (ROUTE 38)

(PUBLIC - 1911 STATE HIGHWAY LAYOUT)

1911 STATE HIGHWAY LAYOUT

47 LF - 12" DRAINAGE PIPE - OPTION @ 0.7%

15 LF - 12" CLASS V RCP @ 0.7%

PROP. CBCI (5-46)

PROP. CBCI (5-49)

147 LF - 12" DRAINAGE PIPE - OPTION @ 0.8%

17 LF - 12" CLASS V RCP @ 1.8%

93 LF - 12" CLASS V RCP @ 0.5%

141 LF - 12" DRAINAGE PIPE - OPTION @ 0.7%

63 LF - 12" DRAINAGE PIPE - OPTION @ 0.6%

PROP. DMH (5-52)

PROP. DMH (5-40)

SCM1

PROP. OCS-1

8 LF - 12" DRAINAGE PIPE - OPTION @ 0.5%

TEMPORARY EASEMENT
PARCEL 25-TE-4
SHLO 8859

TOWN OF WILMINGTON
PARCEL ID 26-9
L.C.C. 2388 A
CERT. NO. 8851
DOC NO. 71875

823 MAIN ST

0 20 50 100

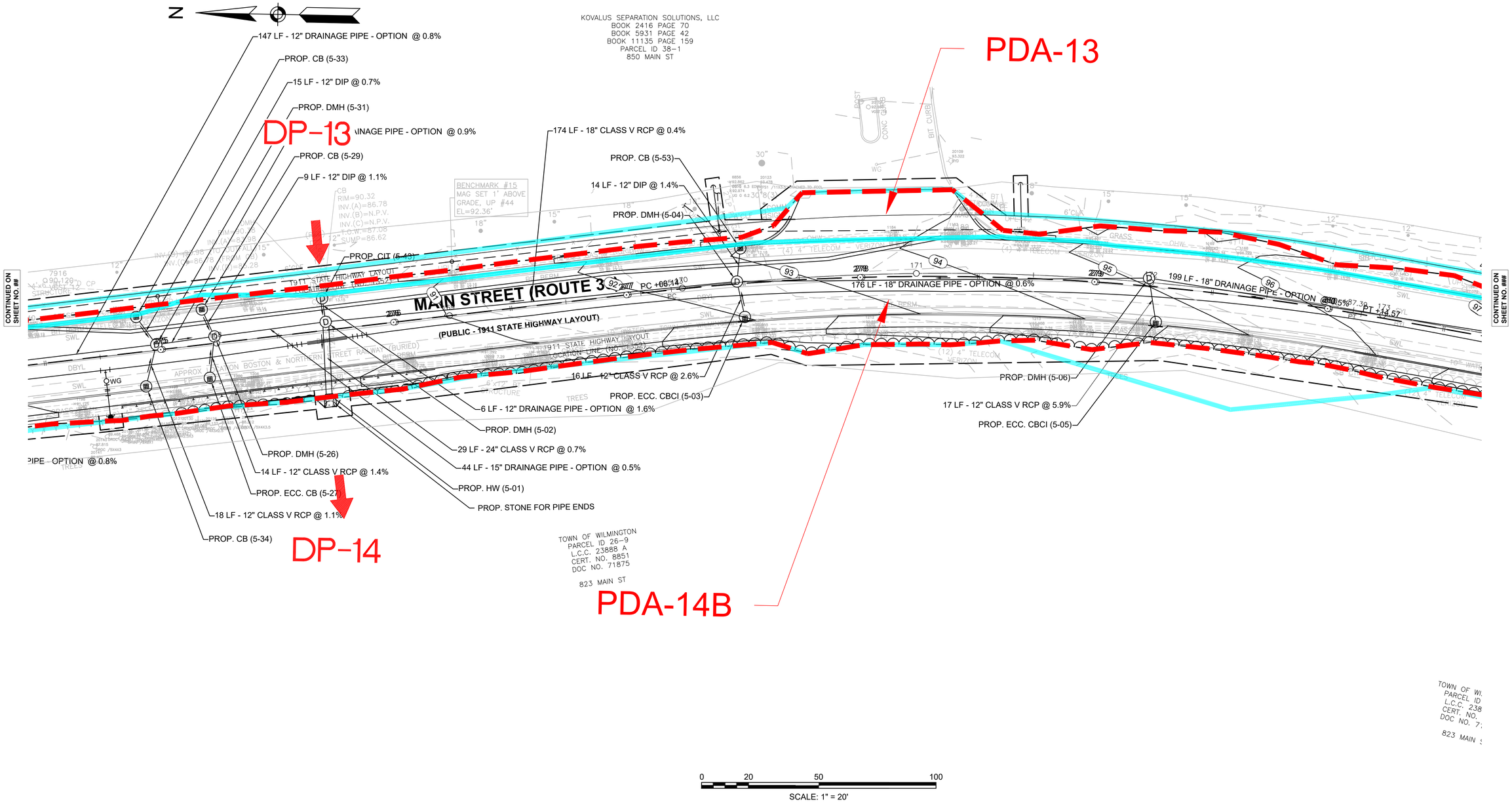
SCALE: 1" = 20'

PROPOSED WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:22 PM

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STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	14	21
PROJECT FILE NO.	######		

PROPOSED WATERSHED PLAN



STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	15	21
PROJECT FILE NO.	######		

PROPOSED WATERSHED PLAN

PROPOSED WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:23 PM

PDA-13

PDA-14B

PDA-15

PDA-17

DP-15

KOVALUS SEPARATION SOLUTIONS, LLC
BOOK 2416 PAGE 70
BOOK 5931 PAGE 42
BOOK 11135 PAGE 159
PARCEL ID 38-1
850 MAIN ST

PROP. CB W/F&C (5-51)
5 LF - 12" DIP @ 17.2%
PROP. GI (5-50)
10 LF - 12" CLASS V RCP @ 4.0%
4 LF - 12" RCP @ 2.5%
PROP. DMH (5-10)
PROP. DMH (5-11)
127 LF - 12" DRAINAGE PIPE - OPTION @ 0.8%
113 LF - 12" DRAINAGE PIPE - OPTION @ 0.7%
8 LF - 12
117 LF - 15" DRAINAGE PIPE - OPTION @ 0.5%
MAIN STREET (ROUTE 38)
(PUBLIC - 1911 STATE HIGHWAY LAYOUT)
1911 STATE HIGHWAY LAYOUT
LOCATION LINE (NO. 1352)
PROP. CB W/F&C (5-09)
7 LF - 12" DIP @ 9.8%
PROP. GI (5-08)
ION @ 0.5%
PROP. DMH (5-12)
18 LF - 12" CLASS V RCP @ 1.6%
PROP. DMH (5-15)
16 LF - 12" CLASS V RCP @ 2.2%
PROP. ECC. CBCI (5-14)
PROP. ECC. CBCI (5-17)

TOWN OF WILMINGTON
PARCEL ID 26-9
L.C.C. 23888 A
CERT. NO. 8851
DOC NO. 71875
823 MAIN ST

DONALD B. MORSE
AND SUSAN GAIL MORSE
A/K/A DONALD MORSE
AND SUSAN MORSE
BOOK 9432 PAGE 43
PARCEL ID 26-8
825 MAIN ST

ELFMAN FAMILY
REVOCABLE TRUST
BOOK 37075 PAGE 205
PARCEL ID 26-7D
827 MAIN ST

KELLY A. DILLON WITH
A LIFE ESTATE IN
ROBERT E. DILLON
BOOK 14749 PAGE 202
PARCEL ID 26-7C
829 MAIN ST

APPROXIMATE LOCATION
OF 11' WIDE EASEMENT
PLAN BK 137 PG 97

P2P PROPERTIES LLC
AKA P2P PROPERTIES, LLC
BOOK 29385 PAGE 250
PARCEL ID 26-7B
831 MAIN ST

JOSE APONTE AND
DURJAN APONTE
BOOK 31238 PAGE 125
PARCEL ID 26-7A
833 MAIN ST

JOHN J. SPINAZOLA REVOCABLE
TRUST OF 2017
BOOK 31009 PAGE 278
PARCEL ID 26-6
835 MAIN ST

CONTINUED ON SHEET NO. ###

CONTINUED ON SHEET NO. ###

0 20 50 100
SCALE: 1" = 20'

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	16	21
PROJECT FILE NO.	######		

PROPOSED WATERSHED PLAN

PROPOSED WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:23 PM

PDA-18B

PDA-16

DP-16

PDA-17

DP-17

PDA-18A

KOVALUS SEPARATION SOLUTIONS, LLC
BOOK 2416 PAGE 70
BOOK 5931 PAGE 42
BOOK 11135 PAGE 159
PARCEL ID 38–1
850 MAIN ST

THE BULLDOG REALTY TRUST
BOOK 21358 PAGE 63
PARCEL ID 38–2
880 MAIN ST

JOHN J. SPINAZOLA REVOCABLE TRUST OF 2017
BOOK 31009 PAGE 278
PARCEL ID 26–6
835 MAIN ST

DENNIS A. SULLIVAN AND LEIGH A. CATALOGNA
BOOK 24786 PAGE 64
PARCEL ID 26–5
841 MAIN ST

EDWARD P. SHINE
BOOK 24974 PAGE 162
PARCEL ID 26–4
849 MAIN ST

KIRK A. POST
BOOK 33448 PAGE 287
PARCEL ID 26–3
851 MAIN ST

PAUL BIMBO
BOOK 18057 PAGE 195
PARCEL ID 26–2
855 MAIN ST

RUTLAND CORPORATION
BOOK 6090 PAGE 213
PARCEL ID 26–2A
853 MAIN ST

RUTLAND CORPORATIC
BOOK 6158 PAGE 9
PARCEL ID 26–2B
855R MAIN ST

MAIN STREET (ROUTE 35)

(PUBLIC - 1911 STATE HIGHWAY LAYOUT)

1911 STATE HIGHWAY LAYOUT
LOCATION LINE (NO. 1352)

APPROX. LOCATION BOSTON & NORTHERN STREET RAILWAY (BURIED)

27 LF - 12" CLASS V RCP @ 1.1%

PROP. CB (5-18)

8 LF - 12" CLASS V RCP @ 1.2%

@ 0.7%

PROP. DMH (5-19)

PROP. CB (5-25)

12 LF - 12" CLASS V RCP @ 2.6%

PROP. DMH (5-24)

16 LF - 12" CLASS V RCP @ 1.9%

PC +23.20

PC

14 LF - 12" CLASS V RCP @ 0.4%

PROP. ECC. CBCI (5-20)

PROP. ECC. CBCI (5-22)

113 LF - 12" DRAINAGE PIPE - OPTION @ 0.7%

104 LF - 12" CLASS V RCP @ 0.7%

PROP. CB (6-03)

16 LF - 12"

16 LF - 12" DRAINAGE PIPE - OPTION @ 0.6%

PROP. CB (6-02)

34 LF - 12" DIP @ 0.7%

PROP. DMH (6-04)

40' WIDE ACCESS EASEMENT BOOK 18057 PAGE 193

SUBJECT TO LOADING EASEMENT BOOK 17139 PAGE 99 (NOT PLOTTABLE)

SUBJECT TO LOADING EASEMENT
BOOK 17139 PAGE 99
(NOT PLOTTABLE)

CONTINUED ON SHEET NO. ###

CONTINUED ON SHEET NO. ###

0 20 50 100

SCALE: 1" = 20'

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##########

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	17	21
PROJECT FILE NO.	######		

PROPOSED WATERSHED PLAN

PROPOSED WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:24 PM

CONTINUED ON SHEET NO. ###

CONTINUED ON SHEET NO. ###

EAMES STREET (PUBLIC)

MAIN STREET (ROUTE 38)

1911 STATE HIGHWAY LAYOUT LOCATION LINE (NO. 1352)

(PUBLIC - 1911 STATE HIGHWAY LAYOUT)

1894 TOWN LAYOUT

LIMIT OF WORK
END MICROMILLING AND RESURFACING STA. 60+03.00

BEGIN PAVEMENT MICROMILLING AND RESURFACING
STA. 295+00.00

PDA-18A

PDA-18B

19 LF - 12" DIP @ 0.8%
PROP. DMH (6-32)
13 LF - 12" DIP @ 0.6%
PROP. ECC. CB (6-31)
61 LF - 12" DRAINAGE PIPE - OPTION @ 0.8%
PROP. 5' DIA. DMH (6-33)
76 LF - 12" CLASS V RCP @ 0.7%
PROP. CB (6-34)
21 LF - 12" DIP @ 4.5%
PROP. CB (6-09)
8 LF - 12" DIP @ 8.0%
PROP. CB W/FSC (6-10)
10 LF - 12" CLASS V RCP @ 1.1%
PROP. CB (6-03)
16 LF - 12" DRAINAGE PIPE - OPTION @ 0.6%
PROP. CB (6-30)
PROP. CB (6-06)
18 LF - 12" DIP @ 1.1%
104 LF - 12" CLASS V RCP @ 0.7%
122 LF - 12" DIP @ 1.0%
PROP. DMH (6-07)
PROP. DMH (6-04)
12 LF - 12" CLASS V RCP @ 0.8%
PROP. CBCI (6-05)
PROP. DMH (6-11)
12 LF - 12" DIP @ 0.8%
PROP. CBCI (6-08)
PROP. CBCI (6-36)
14 LF - 12" CLASS V RCP @ 0.7%
PROP. CB (6-13)
14 LF - 12" DIP @ 0.5%
PROP. DMH (6-15)
8 LF - 12" DIP @ 0.9%
PROP. CBCI (6-12)
115 LF - 15" CLASS V RCP @ 0.4%
PROP. DMH (6-37)

THE BULLDOG REALTY TRUST
BOOK 21358 PAGE 63
PARCEL ID 38-2
880 MAIN ST

CORNER POINT LLC
BOOK 24975 PAGE 3
PARCEL ID 24-31D
892 MAIN ST

JEWEL DRIVE WILMINGTON, LLC
BOOK 33628 PAGE 181
PARCEL ID 24-205
1 JEWEL DR

RUTLAND CORPORATION
BOOK 6158 PAGE 96
PARCEL ID 26-2C
857R MAIN ST

LAND CORPORATION
OK 6158 PAGE 96
ARCEL ID 26-2B
856R MAIN ST

JORGE C. NOVAIS
AND VILMA NOVAIS
BOOK 33451 PAGE 234
PARCEL ID 25-13
857 MAIN STREET

CHRISTOPHER D. MACINNIS
BOOK 36998 PAGE 32
BOOK 37005 PAGE 93
BOOK 38331 PAGE 28
PARCEL ID 25-12
859 MAIN ST

NATALY DIAZ AND FELICITA DIAZ
BOOK 37720 PAGE 141
PARCEL ID 25-11
875 MAIN ST

STEVEN WONG
AND JOEY WONG
BOOK 33815 PAGE 214
PARCEL ID 25-10
879 MAIN ST

ADAM H. SKELSKIE
AND SARA D. CHESTERCOVE
A/K/A SARA D. SKELSKIE
BOOK 27915 PAGE 267
PARCEL ID 25-9
883 MAIN ST

N

0 20 50 100
SCALE: 1" = 20'

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	18	21
PROJECT FILE NO.	######		

PROPOSED WATERSHED PLAN

PROPOSED WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:25 PM

PDA-18B

PDA-18A

DP-18

BENCHMARK #19
MAG SET 1' ABOVE GRADE, UP #23
EL=89.18'

900 MAIN STREET REALTY, LLC
BOOK 32192 PAGE 5
PARCEL ID 24-33A
900 MAIN ST

904 MAIN STREET REALTY COMPANY, LLC
BOOK 15278 PAGE 139
BOOK 27805 PAGE 207
PARCEL ID 24-33
904 MAIN ST

JEWEL DRIVE WILMINGTON, LLC
BOOK 33628 PAGE 181
PARCEL ID 24-205
1 JEWEL DR

ADAM H. SKELSKIE
AND SARA D. CHESTERCOVE
A/K/A SARA D. SKELSKIE
BOOK 27915 PAGE 267
PARCEL ID 25-9
883 MAIN ST

KATEY ELIZABETH DILLON
AND CHRISTOPHER DANIEL HAYES
BOOK 37265 PAGE 85
PARCEL ID 25-8
885 MAIN ST

SUSAN J. PHIPPS A/K/A
SUSAN PHIPPS-SPINAZOLA
BOOK 21298 PAGE 251
PARCEL ID 25-7
887 MAIN ST

JAMES PAPPAS
BOOK 36471 PAGE 23
PARCEL ID 25-6
889 MAIN ST

JOHNATHAN F. LAROCK
A/K/A JONATHAN F. LAROCK
A/K/A JONATHAN LAROCK
AND SONIA SERRAO
A/K/A SONIA LAROCK
BOOK 19052 PAGE 266
PARCEL ID 25-5
905 MAIN ST

MAIN STREET (ROUTE 38)
(PUBLIC - 1927 STATE HIGHWAY ALTERATION)

1927 STATE HIGHWAY ALTERATION LOCATION LINE (NO. 2441)

PROP. CBCI (6-36)
14 LF - 12" CLASS V RCP @ 0.7%
PROP. CB (6-17)
14 LF - 12" DIP @ 3.6%
PROP. CB (6-20)
13 LF - 12" CLASS V RCP @ 0.7%
PROP. CB (6-25)
11 LF - 12" DIP @ 2.7%
PROP. DMH (6-26)
PROP. CBCI (6-28)
13 LF - 12" DIP @ 0.7%
PROP. DMH (6-29)
183 LF - 18" DRAINAGE PIPE - OPTION @ 0.3%
226 LF - 18" CLASS V RCP @ 0.3%
124 LF - 15" CLASS V RCP @ 0.4%
11 LF - 12" DIP @ 0.9%
PROP. CB (6-49)
10 LF - 12" DIP @ 1.0%
PROP. CB (6-23)
PROP. DMH (6-21)
8 LF - 12" CLASS V RCP @ 1.2%
PROP. CBCI (6-19)
32 LF - 15" CLASS V RCP @ 0.4%
PROP. DMH (6-18)
8 LF - 12" CLASS V RCP @ 1.2%
PROP. CBCI (6-16)
24 LF - 15" CLASS V RCP @ 0.4%
PROP. DMH (6-37)
115 LF - 15" CLASS V RCP @ 0.4%

PC +21.90
PT +74.15

CONTINUED ON SHEET NO. ###

0 20 50 100
SCALE: 1" = 20'

PROPOSED WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:25 PM

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STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	19	21
PROJECT FILE NO.	######		

PROPOSED WATERSHED PLAN

PDA-18C

PDA-20A

PDA-18D1

PDA-19

PDA-18D2

DP-18

DP-19

SCM2

COOK AVENUE (PUBLIC)

WOODWARD AVENUE (PAPER STREET) (PRIVATE)

CENTRAL AVENUE (PAPER STREET)

MAIN STREET (ROUTE 38) PUBLIC - 1927 STATE HIGHWAY ALTERATION

OLD MAIN STREET (PUBLIC - 50' WIDE)

1928 TOWN LAYOUT

1946 TOWN LAYOUT

PRIVATE LAYOUT LINE

904 MAIN STREET REALTY COMPANY, LLC
BOOK 18278 PAGE 139
BOOK 27805 PAGE 207
PARCEL ID 24-33
904 MAIN ST

TOWN OF WILMINGTON
BOOK 1178 PAGE 256
PARCEL ID 24-78
WOODWARD AVE

KALENKA RAYMOND
AND SEDAR RAYMOND
BOOK 32794 PAGE 241
PARCEL ID 24-72A
1A COOK AVE

OWNER UNKNOWN
BOOK XX PAGE XX
PARCEL ID 24-81A
MAIN ST

BOSTON EDISON COMPANY
BOOK 1490 PAGE 211
PARCEL ID 24-81B
910 MAIN ST

TOWN OF WILMINGTON
BOOK 1431 PAGE 460
PARCEL ID 24-80
MAIN ST

TOWN OF WILMINGTON
BOOK 891 PAGE 294
MAIN ST

TOWN OF WILMINGTON
BOOK 1082 PAGE 59
PARCEL ID 24-79
WOODWARD AVE

TAM DEVELOPMENT CORPORATION
BOOK 11130 PAGE 7
PARCEL ID 25-1A
925 MAIN ST

BOSTON EDISON COMPANY
BOOK 1474 PAGE 362
PARCEL ID 25-1B
927 MAIN ST

ROBERT P. AUTENZIO, JR., TRUSTEE OF
M.T. POKKETS REALTY TRUST
BOOK 21081 PAGE 87

RAYMOND LEPORE
L.C.C. 39844 A
CERT. NO. 32201
DOC. NO. 160945
PARCEL ID 25-3
919 MAIN ST

PROP. CB (7-02)

PROP. CB (6-46)
19 LF - 12" CLASS V RCP @ 0.5%

PROP. DMH (6-47)

PROP. CB (6-44)
17 LF - 12" CLASS V RCP @ 2.4%
PROP. DMH (6-43)

22 LF - 12" DRAINAGE PIPE - OPTION @ 1.4%
PROP. DMH (6-45)

4 LF - 12" DRAINAGE PIPE - OPTION @ 1.5%

7 LF - 12" DIP @ 1.5%
PROP. CBCI (6-42)

PROP. DMH (6-38)

6 LF - 24" DRAINAGE PIPE - OPTION @ 0.6%
PROP. DMH (6-41)

155 LF - 12" CLASS V RCP @ 1.6%

121 LF - 12" CLASS V RCP @ 0.8%

PROP. 5' DIA. DMH (6-40)
5 LF - 12" DIP @ 3.8%
PROP. CBCI (6-39)
24 LF - 12" CLASS V RCP @ 1.1%

54 LF - 15" CLASS V RCP @ 2.3%

PROP. OCS-2

SPILLWAY
ELEV=86.50

PROP. FES (6-01)

FOREBAY PAVERS

161 LF - 24" CLASS V RCP @ 0.2%

PC +82.08

PT +16.47

71+61.13

CONTINUED ON SHEET NO. ###

CONTINUED ON SHEET NO. ###

0 20 50 100

SCALE: 1" = 20'

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	20	21
PROJECT FILE NO.	######		

PROPOSED WATERSHED PLAN

PROPOSED WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:26 PM

PDA-20A

PDA-20B

SCM3

N

BOSTON EDISON COMPANY
BOOK 1490 PAGE 211
PARCEL ID 24-81B
910 MAIN ST

OWNER UNKNOWN
BOOK XX PAGE XX
PARCEL ID 24-81
MAIN ST

BOSTON EDISON COMPANY
BOOK 1474 PAGE 362
PARCEL ID 25-1B
927 MAIN ST

TAM DEVELOPMENT CORPORATION
DOC NO. 257711
PARCEL ID 12-1
943 MAIN ST

945 MAIN STREET NOMINEE REALTY TRUST
BOOK 37409 PAGE 251
PARCEL ID 12-2
945 MAIN ST

OWNER UNKNOWN
BOOK XX PAGE XX
PARCEL ID 24-86
MAIN ST

TOWN OF WILMINGTON
BOOK 2025 PAGE 94
PARCEL ID 12-18
955 MAIN ST

BENCHMARK #21
MAG SET 1' ABOVE GRADE, UP #13-A
EL=95.02'

BENCHMARK #22
MAG SET 1' ABOVE GRADE, UP #10-A
EL=89.88

MAIN STREET (ROUTE 38)
(PUBLIC - 1927 STATE HIGHWAY ALTERATION)

OLD MAIN STREET
(PUBLIC - 50' WIDE)

BERWICK AVENUE
(PAPER STREET)

BERWICK AVENUE
(PRIVATE)

1927 STATE HIGHWAY ALTERATION LOCATION LINE (NO. 2441)

1928 TOWN LAYOUT

LINE OF 1928 DISCONTINUANCE

PROP. CB (7-02)
169 LF - 12" DIP @ 1.2%
PROP. DGCB (7-06)
4 LF - 12" DIP @ 2.5%
PROP. DMH (7-07)
PROP. CB (7-03)
6 LF - 12" DIP @ 1.6%
PROP. DMH (7-05)
98 LF - 12" CLASS V RCP @ 0.9%
17 LF - 12" DIP @ 1.2%
PROP. CBCI (7-04)
90 LF - 12" CLASS V RCP @ 1.3%
21 LF - 18" DRAINAGE PIPE - OPTION @ 0.7%
PROP. DGCB (7-11)
6 LF - 12" DIP @ 1.7%
PROP. 5' DIA DMH (7-10)
15 LF - 12" CLASS V RCP @ 1.3%
23 LF - 12" CLASS V RCP @ 0.9%
PROP. DGCB (7-12)
PROP. CB W/F&C (7-25)
109 LF - 18" DRAINAGE PIPE - OPTION @ 0.5%
68 LF - 12" DIP @ 2.7%
PROP. 5' DIA. BYPASS DMH W/ WEIR (7-25)
PROP. CB (7-26)
102 LF - 12" CLASS V RCP @ 0.6%
11 LF - 12" DIP @ 1.3%
PROP. GI (7-24)
PROP. DMH (7-30)
23 LF - 12" DRAINAGE PIPE - OPTION @ 0.4%
PROP. DMH (7-31)
PROP. DGCB (7-14)
PROP. CBCI (7-13)
6 LF - 12" DIP @ 6.3%
PROP. DMH (7-15)
15 LF - 12" DIP @ 1.4%
PROP. DMH (7-16)
85 LF - 12
45 LF - 18" DRAINAGE PIPE - OPTION @ 1.2%
31 LF - 24" DRAINAGE PIPE - OPTION @ 0.6%
1 LF - 12" DRAINAGE PIPE - OPTION @ 0.0%
PROP. OCS-3

PT 68.23
PT 82.02
PC 53.70
82+08.27
+32.28

CONTINUED ON SHEET NO. ###

CONTINUED ON SHEET NO. ###

0 20 50 100
SCALE: 1" = 20'

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	21	21
PROJECT FILE NO.	######		

PROPOSED WATERSHED PLAN

PROPOSED WATERSHED PLAN.DWG Plotted on 20-Jan-2025 1:26 PM

DP-21

PDA-21

DP-20

PDA-20B

BORDER AVENUE (PRIVATE)

FLORENCE AVENUE (PRIVATE)

BREED AVENUE (PRIVATE)

MAIN STREET (ROUTE 38)

(PUBLIC - 1927 STATE HIGHWAY ALTERATION)

(PUBLIC - 1912 STATE HIGHWAY LAYOUT)

SKYE GRAMS AND VALERIE GRAMS
BOOK 29847 PAGE 270
PARCEL ID 24-117
1 BORDER AVE

ROBERT HOLMES AND
LAURA HOLMES
L.C.C. 22159 B
CERT. NO. 41929
DOC NO. 278979
PARCEL ID 24-87
9 BORDER AVE

959 MAIN STREET REALTY, LLC
A/K/A MAIN STREET REALTY LLC
BOOK 33724 PAGE 209
PARCEL ID 12-4
959 MAIN ST

PARCEL ID 24-120
960 MAIN ST

PJM REALTY CORP.
BOOK 52021 PAGE 87
PARCEL ID 03-03-01
3 BREED AVE

DARWIN T. CIAVARDONE AND
KIMBERLY GRIFFITHS
BOOK 58169 PAGE 211
PARCEL ID 03-07-02
1091 MAIN ST

DARWIN T. CIAVARDONE AND
KIMBERLY GRIFFITHS
BOOK 58169 PAGE 211
PARCEL ID 03-07-03
1091 MAIN ST

HENRY P. GARDNER
BOOK 37422 PAGE 274
PARCEL ID 12-3
967 MAIN ST

HENRY P. GARDNER
BOOK 80792 PAGE 409
PARCEL ID 03-03-03
MAIN ST

LORRAINE A. MACARIO
BOOK 66087 PAGE 128
PARCEL ID 03-03-02
1100 MAIN ST

OWNER UNKNOWN
BOOK XX PAGE XX
PARCEL ID 24-86
MAIN ST

CONTINUED ON SHEET NO. ###

PROP. CBCI (7-13)
6 LF - 12" DIP @ 6.3%
PROP. DMH (7-15)
15 LF - 12" DIP @ 1.4%
PROP. DGCB (7-14)
85 LF - 24" DRAINAGE PIPE - OPTION @ 0.6%
PROP. DMH (7-22)
11 LF - 12" DRAINAGE PIPE - OPTION @ 24.9%
PROP. CBCI (7-21)
80 LF - 24" DRAINAGE PIPE - OPTION @ 0.7%
PROP. DMH (7-09)
188 LF - (2)12" CLASS V RCP @ 0.8%
PROP. DMH (7-32)
72 LF - (2)12" CLASS V RCP @ 1.39%
15 LF - 12" CLASS V RCP @ 3.4%
PROP. CBCI (7-23)
14 LF - 12" CLASS V RCP @ 0.7%
PROP. CBCI (7-20)
144 LF - 24" DRAINAGE PIPE - OPTION @ 0.5%
PROP. DMH (7-19)
17 LF - 12" DRAINAGE PIPE - OPTION @ 0.9%
PROP. CBCI (7-18)
55 LF - 24" DRAINAGE PIPE - OPTION @ 0.7%
27 LF - 12" CLASS V RCP @ 0.8%
PROP. CB (7-33)
PROP. DMH (7-16)
31 LF - 24" DRAINAGE PIPE - OPTION @ 0.6%
PROP. OCS-3
1 LF - 12" DRAINAGE PIPE - OPTION @ 0.0%
PROP. 5' DIA. DMH (7-27)

END PROJECT
STA. 319+20.77
MEET EXISTING
N3014857.1242
E748337.3382

BENCHMARK #23
MAG SET 1' ABOVE
GRADE, UP #138-195
EL=92.51'

SCM3

CITY LINE
TOWN LINE

0 20 50 100
SCALE: 1" = 20'

Appendix E: O&M Plan and LTPPP

- Stormwater Management System Operation and Maintenance (O&M) Plan
- Long-Term Pollution Prevention Plan (LTPPP)
- Illicit Discharge Compliance Statement (IDCS)

Reconstruction of Route 38 (Main Street)
Stormwater Management System

Wilmington, MA

Operation and Maintenance Plan
and
Long-Term Pollution Prevention Plan

March 2025

Reconstruction of Route 38 (Main Street)
Stormwater Management System Operation and Maintenance (O&M) Plan

This Stormwater Management System Operation and Maintenance (O&M) Plan provides for the inspection and maintenance of catch basins and structural Stormwater Control Measures (SCMs) and for measures to prevent pollution associated with the Route 38 roadway improvements in Wilmington, MA.

This document has been prepared per the requirements of Massachusetts Department of Environmental Protection (MassDEP) Regulations 310 CMR 10.05 (6)(k)(9) for the O&M Plan. This O&M Plan satisfies the requirements of Massachusetts Stormwater Standard 9.

Responsible Party

In accordance with Massachusetts Department of Transportation (MassDOT) standards, the MassDOT District 4 office located in Arlington, MA, is responsible for the maintenance of all stormwater management features on roads within the project area.

MassDOT will be responsible for the maintenance of the proposed subsurface infiltration systems, infiltration basin, and closed drainage system.

Questions or concerns regarding activities associated with the O&M Plan should be addressed to MassDOT's District 4 office located at 519 Appleton Street, Arlington, MA 02476, phone (857) 368-4000, Fax (781) 646-5115 during regular weekday hours, or to MassDOT's Highway Command Center (HCC) located in South Boston, MA at (800) 227-0608 during all other times and days, including weekends and holidays.

Maintenance Measures and Record-Keeping

See Figure 7

Figure 3: Proposed Watershed Plan
of the Stormwater Management Report for the proposed stormwater system within the project limits. The stormwater management system covered by this O&M Plan consists of the following components:

- *Deep Sump Catch Basins with Hoods*
- *1 Infiltration Basin*
- *2 Subsurface Infiltration Systems*

MassDOT is working toward a performance-based maintenance program for SCMs and catch basins. For SCMs, MassDOT's overall approach will be to inspect SCMs, and based on the results of the inspections, perform inspections and maintenance to maintain functionality. For catch basins, MassDOT's overall approach will be to perform maintenance at an interval that maintains the functionality of the catch basin (e.g. sump less than 50% full). Catch basin inspections, including documentation of sediment accumulation, and maintenance will generally occur simultaneously. Until MassDOT's maintenance program is fully developed, MassDOT inspects 15% of SCMs and 10% of catch basins annually and performs maintenance as needed.

MassDOT's maintenance program is data driven. Inspection and maintenance will be recorded by MassDOT personnel using hand-held tablets in the field to document sediment accumulation and other maintenance issues. Data will be recorded in MassDOT's asset management system which is accessible in the field or the office. The data will support the determination of optimal maintenance frequency for each asset.

Inspection and maintenance records will be made available through the asset management system through request with the MassDOT District 4 Environmental Engineer. Records will be kept for at least three years. Representatives of the Wilmington Conservation Commission, MassDEP, and US EPA may obtain access to these records during normal business hours, upon request.

Data to be collected during inspections includes the following:

For catch basins:

- Action performed (none, inspection, inspection and repair, inspection and cleaning)
- Overall condition
- Condition of grate opening (clogged or not)
- Level of sediment accumulation
- Follow-up action (none, rebuild, frame and grate replacement, structure cleaning, piping cleaning, other)

For SCMs:

- Overall condition
- Level of erosion
- Vegetative health
- Level of sediment accumulation

- Level of trash accumulation
- SCM accessibility
- Presence of standing water
- Emergency spillway condition
- Presence of woody vegetation
- Maintenance action needed

Maintenance actions will not occur at any set frequency, but rather will be based on condition and impact to functionality. Based on the results of the inspection, repairs will be made in accordance with MassDOT standard practices. Maintenance will be prioritized given the urgency of the required maintenance and availability of staff, contracts, etc. Maintenance may require contracting if existing contracts are unavailable to perform the work. More intensive remedial activities may require permitting and/or an engineering solution.

Erosion and Sediment Control Measures during Maintenance Activities

For maintenance activities that could result in discharges of sediments or other contaminants into wetlands, waterways, or other resource areas regulated under 310 CMR 10.00, the responsible maintenance personnel will employ measures to prevent migration of these sediments/contaminants. Such temporary measures may include, but are not necessarily limited to, the use of siltation barriers, catch basin covers, pipe plugs, cofferdams deployed within the stormwater structure, turbidity curtains, or other practices designed to prevent such discharges.

Where maintenance occurs in areas that are confined, with a low risk of discharge to adjacent water bodies, no special measures may be needed. Examples include, but are not limited to: (1) cleaning of a forebay under dry conditions when the work can be completed and exposed surfaces stabilized prior to placing it back into service; and (2) catch basin cleaning where the activity is limited to removing material from a sump below the elevation of the outlet pipe.

Access for Environmental Agency Inspection

Representatives of the MassDEP and US EPA may obtain access to observe and inspect roadway and associated stormwater management system components upon request to the District 4 Environmental Engineer. For non-emergency access, representatives of the agency should contact the District 4 Environmental Engineer at least 48 hours prior to the visit, to allow adequate safety protection to be provided during the visit. Representatives of the Lexington Conservation Commission also may obtain access to inspect the site upon request.

Under emergency conditions, agency representatives should contact the 24-Hour Transportation Operation Center at 800-227-0608.

Reconstruction of Route 38 (Main Street)

Long-Term Pollution Prevention Plan

In general, long-term pollution prevention and related maintenance activities will be conducted consistent with MassDOT Highway Division's National Pollutant Discharge Elimination System (NPDES) Transportation Separate Storm Sewer System (TS4) Permit and the measures outlined in MassDOT's Stormwater Management Plan (SWMP).

This LTPPP satisfies the requirements related to pollution prevention under Massachusetts Stormwater Standards 4, 5, 6, and 10.

Practices for Long-Term Pollution Prevention

For the facilities covered, long-term pollution prevention includes the following measures:

Litter Pick-up

MassDOT will conduct litter pick-up from the stormwater management facilities in conjunction with routine road maintenance activities.

Routine Inspection and Maintenance of SCMs

MassDOT will conduct inspection and maintenance of the stormwater control measures in accordance with the Project's O&M plan.

Maintenance of Landscaped Areas

Routine mowing will be conducted according to standard MassDOT practices. Embankments designed to impound water should be mowed as required to prevent establishment of woody vegetation.

Except in rare circumstances, MassDOT does not use fertilizers, herbicides, and pesticides for the maintenance of facilities. Exceptions include using fertilizer to ensure the survival of new plantings and herbicides to control invasive plants. Use of fertilizers and herbicides shall be reviewed and approved by the applicable MassDOT District Environmental Engineer and Landscape Division prior to application. Local Conservation Commission review may also be required.

Snow and Ice Management

Snow and Ice Management will be conducted consistent with the practices outlined in the MassDOT Snow and Ice Control Program Environmental Status and Planning Report (ESPR), formerly known as the Snow and Ice Control Generic Environmental Impact Report (GEIR).

In accordance with the Snow and Ice Control ESPR, no sand is used on MassDOT properties for snow and ice control. The exception to this rule is within reduced salt areas where high sodium levels have been found in drinking water sources.

Street Sweeping

Routine highway cleaning, with a brush-type street sweeper, will be conducted in accordance with standard MassDOT practices. Sweeping will occur annually in the Spring.

Prohibition of Illicit Discharges

The MassDEP Stormwater Management Standards prohibit illicit discharges to the stormwater management system. Illicit discharges are discharges that do not consist entirely of stormwater, except for certain specified non-stormwater discharges.

Examples of discharges from the following sources are not considered illicit discharges:

- Firefighting activities*
- Foundation drains
- Water line flushing
- Footing drains
- Landscape irrigation
- Residential car washing
- Uncontaminated groundwater
- Rising groundwater
- Riparian habitats/wetlands
- Potable water sources
- Dechlorinated swimming pool water
- Street sweeping
- Wash water from buildings (without detergents)
- Condensation from air conditioning units
- Run-on from private driveways caused by precipitation
- Lawn watering

*Water from firefighting activities is allowed under this permit and need only be addressed where they are identified as significant sources of pollutants to waters of the United States.

There are no known or proposed illicit connections associated with the Route 38 roadway improvements. Should an illicit discharge (e.g., evidence of contamination of surface water discharge by non-stormwater sources) be detected, MassDOT's District 4 Maintenance Engineer and/or Environmental Engineer will be notified to assist in determining the nature and source of the discharge for the purpose of eliminating the illicit discharge.

Invasive Species Management

If the stormwater facility inspector observes the presence of invasive species within the stormwater control measure, the inspector will notify the District Environmental Engineer, who will coordinate with the District 4 maintenance personnel and if applicable, the Landscape Division, to initiate corrective action. Control of invasive plants will be conducted in accordance with MassDOT standard specifications for this practice and will be in compliance with all state and federal regulatory requirements for such practices.

Spill Prevention and Response

This project does not discharge to a Zone I, Zone A, or Outstanding Resource Water (ORW). The project is located within Zone II surface water supply protection area.

Response procedures will be implemented at the proposed subsurface infiltration systems and infiltration basin for any significant release of hazardous materials such as fuels, oils, or chemical materials that have the potential of discharging to Zone II.

Reportable quantities will immediately be reported to the applicable Federal, State, and local agencies as required by law. Reportable quantities of chemical, fuels, or oils are established under the Clean Water Act and enforced through MassDEP. The MassDEP Emergency Response Program shall be immediately notified in accordance with required procedures for the report of a release (telephone 888-304-1133).

In the case of a spill, applicable containment and clean-up procedures will be performed immediately. The Wilmington Fire Department will be the first responders. MassDOT will provide the Wilmington Fire Department with a plan delineating the drainage system discharging to Zone II. MassDOT will be on-site to aid with traffic control and to provide clean-up supplies as necessary. Spill material collected during the response will be promptly removed and disposed of in accordance with Federal, State, and local requirements. If necessary, a licensed emergency response contractor will assist in cleanup of releases depending on the amount of the release and the ability of the responsible party to perform the required response.

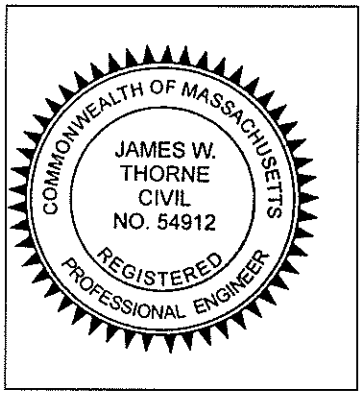
Illicit Discharge Compliance Statement

Per Standard 10 of the Massachusetts Stormwater Handbook, the following is an Illicit Discharge Compliance Statement:

The design plans submitted for the Notice of Intent have been designed in full compliance with current standards.

The Long-Term Pollution Prevention Plan is part of the Operation and Maintenance Plan and includes measures to prevent illicit discharges. There are no known combined sewer outfalls and to the best of our knowledge all closed stormwater systems discharge per Massachusetts DEP requirements. Based on observations during a site visit in October 2020 the site does not contain any known existing illicit discharges.

Registered Professional Engineer Block and Signature



3/11/2025

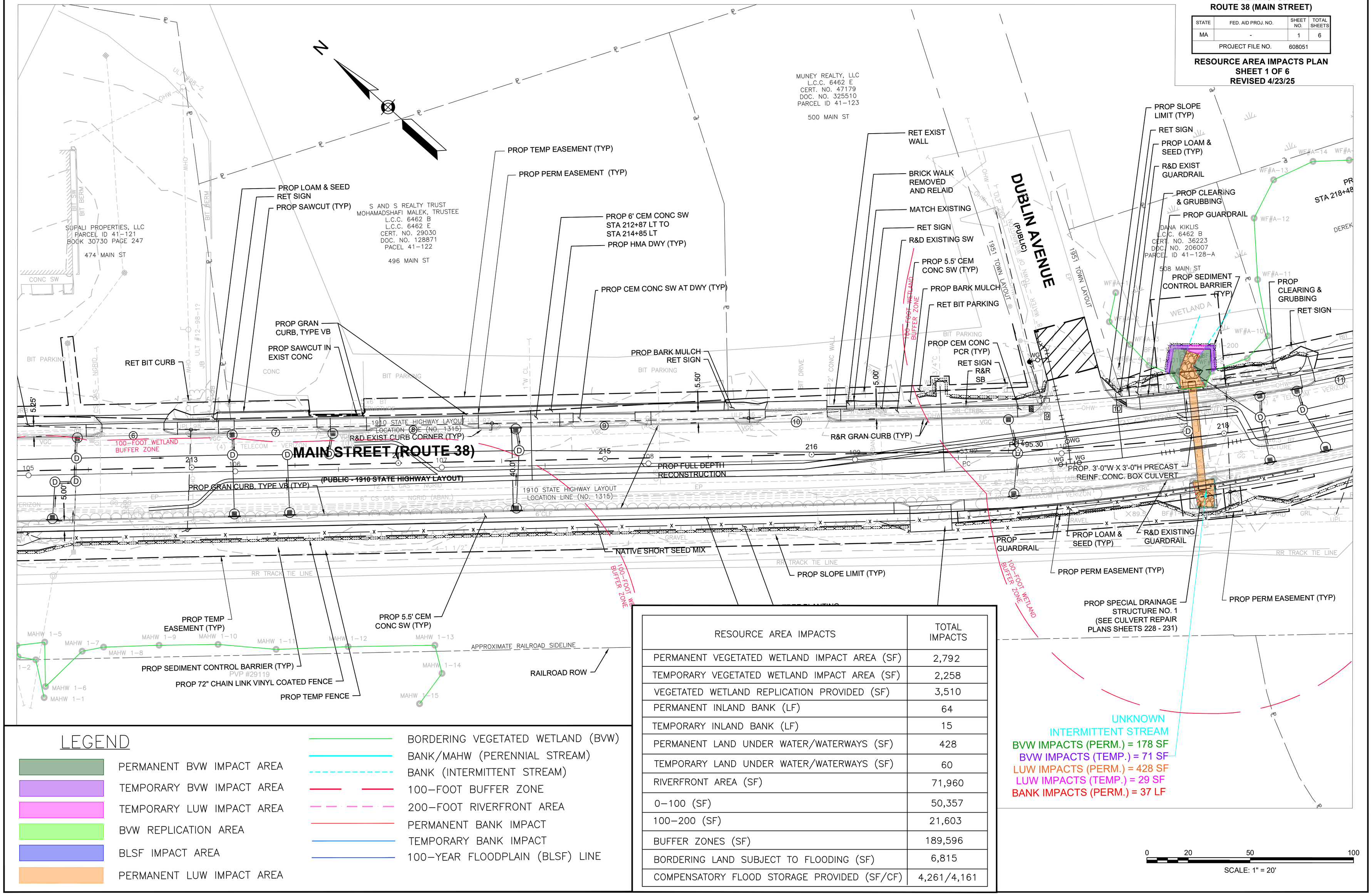
Signature and Date

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WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	1	6
PROJECT FILE NO.	608051		

RESOURCE AREA IMPACTS PLAN
SHEET 1 OF 6
REVISED 4/23/25



LEGEND

- PERMANENT BVW IMPACT AREA
- TEMPORARY BVW IMPACT AREA
- TEMPORARY LUW IMPACT AREA
- BVW REPLICATION AREA
- BLSF IMPACT AREA
- PERMANENT LUW IMPACT AREA
- BORDERING VEGETATED WETLAND (BVW)
- BANK/MAHW (PERENNIAL STREAM)
- BANK (INTERMITTENT STREAM)
- 100-FOOT BUFFER ZONE
- 200-FOOT RIVERFRONT AREA
- PERMANENT BANK IMPACT
- TEMPORARY BANK IMPACT
- 100-YEAR FLOODPLAIN (BLSF) LINE

RESOURCE AREA IMPACTS	TOTAL IMPACTS
PERMANENT VEGETATED WETLAND IMPACT AREA (SF)	2,792
TEMPORARY VEGETATED WETLAND IMPACT AREA (SF)	2,258
VEGETATED WETLAND REPLICATION PROVIDED (SF)	3,510
PERMANENT INLAND BANK (LF)	64
TEMPORARY INLAND BANK (LF)	15
PERMANENT LAND UNDER WATER/WATERWAYS (SF)	428
TEMPORARY LAND UNDER WATER/WATERWAYS (SF)	60
RIVERFRONT AREA (SF)	71,960
0-100 (SF)	50,357
100-200 (SF)	21,603
BUFFER ZONES (SF)	189,596
BORDERING LAND SUBJECT TO FLOODING (SF)	6,815
COMPENSATORY FLOOD STORAGE PROVIDED (SF/CF)	4,261/4,161

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608051_EV(IMPACT-PLANS).DWG Plotted on 23-Apr-2025 3:33 PM
Proposal No. 608051 - 132406

WILMINGTON
ROUTE 38 (MAIN STREET)

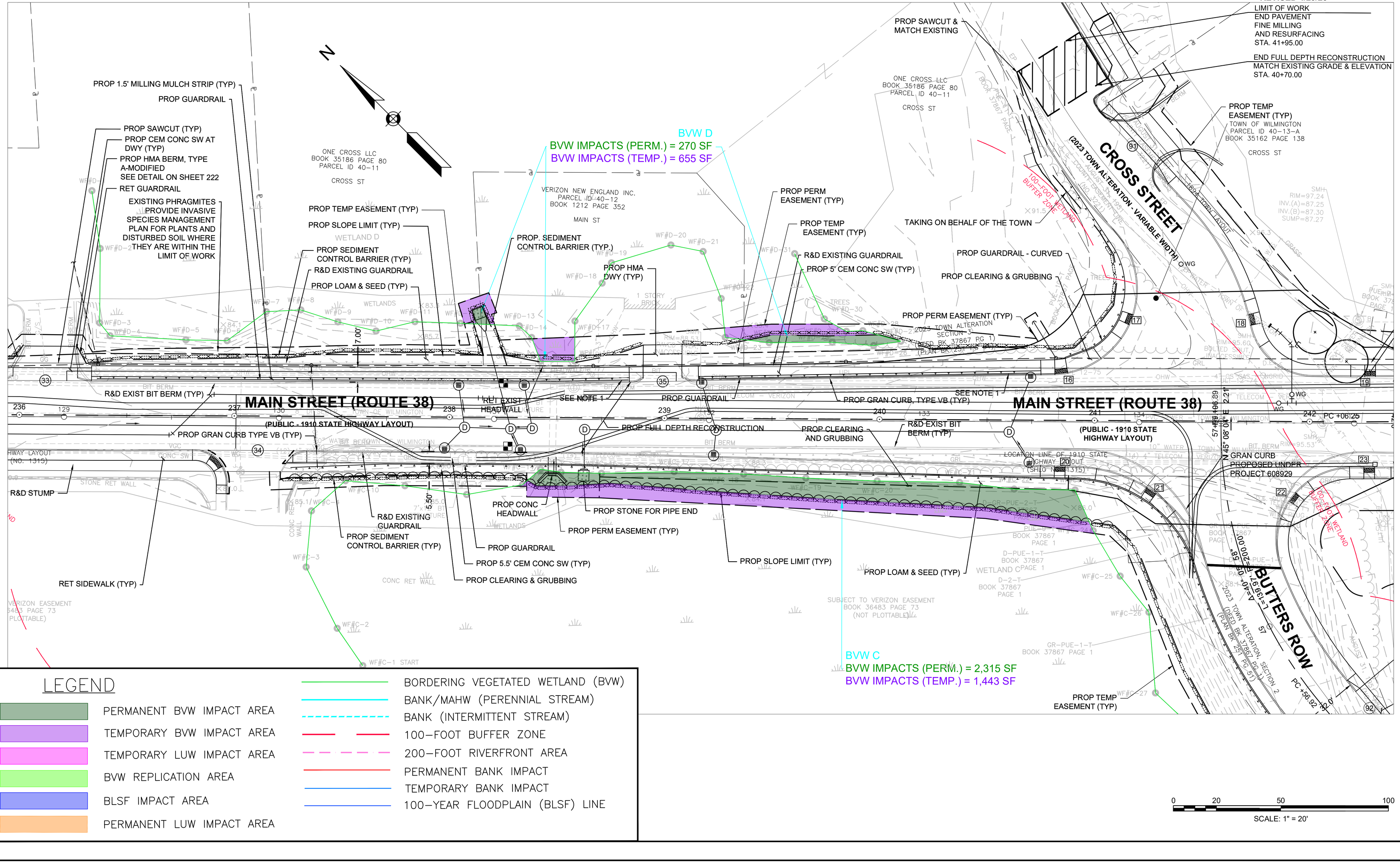
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	2	6
PROJECT FILE NO.	608051		

RESOURCE AREA IMPACTS PLAN
SHEET 2 OF 6
REVISED 4/23/25

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Proposal No. 608051 - 132406

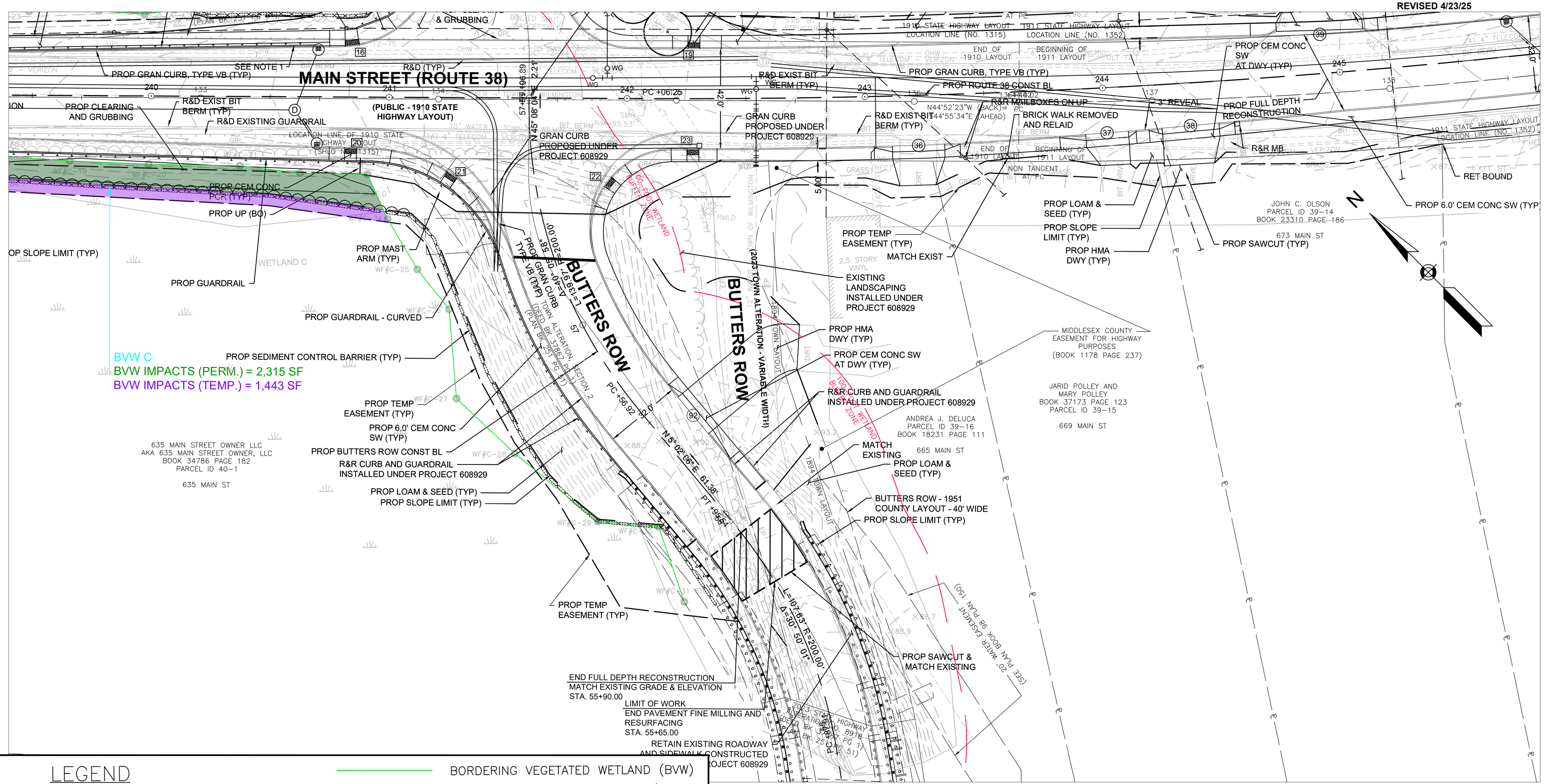
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WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	3	6
PROJECT FILE NO.	608051		

RESOURCE AREA IMPACTS PLAN
SHEET 3 OF 6
REVISED 4/23/25



LEGEND

- PERMANENT BVW IMPACT AREA
- TEMPORARY BVW IMPACT AREA
- TEMPORARY LUW IMPACT AREA
- BVW REPLICATION AREA
- BLSF IMPACT AREA
- PERMANENT LUW IMPACT AREA
- BORDERING VEGETATED WETLAND (BVW)
- BANK/MAHW (PERENNIAL STREAM)
- BANK (INTERMITTENT STREAM)
- 100-FOOT BUFFER ZONE
- 200-FOOT RIVERFRONT AREA
- PERMANENT BANK IMPACT
- TEMPORARY BANK IMPACT
- 100-YEAR FLOODPLAIN (BLSF) LINE

608051_EW(IMPACT-PLANS).DWG Plotted on 23-Apr-2025 3:36 PM
Proposal No. 608051 - 132406
A008600 - 595

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	4	6
PROJECT FILE NO.	608051		

RESOURCE AREA IMPACTS PLAN
SHEET 4 OF 6
REVISED 4/23/25

608051_EV(IMPACT-PLANS).DWG Plotted on 23-Apr-2025 3:41 PM

Proposal No. 608051 - 132406

A008600 - 696

BVW E
BVW IMPACTS (PERM.) = 29 SF
BVW IMPACTS (TEMP.) = 89 SF
LUW (TEMP.) = 31 SF
BANK IMPACTS (TEMP.) = 15 LF

BLSF IMPACT
BELOW EL. 81.5' = 47 SF

BLSF IMPACT
BELOW EL. 82.9' = 2,473 SF

PROP. STONE
FOR PIPE ENDS (TYP.)

PROP 5.5' CEM CONC SW (TYP)

PROP FULL DEPTH
RECONSTRUCTION

PROP GRAN CURB
TYPE VB (TYP)

MAIN STREET (ROUTE 38)
(PUBLIC 1911 STATE HIGHWAY LAYOUT)

MAPLE MEADOW BROOK

N/F
TOWN OF WILMINGTON
PARCEL ID 39-5
BOOK 26062 PAGE 215
9 CROSS ST

APPROXIMATE EXISTING GAS
LINE EASEMENT
(BOOK 1175, PAGE 125)
(BOOK 5255, PAGE 178)

SUBJECT TO
RIGHT OF WAY AGREEMENT
BOOK 1172 PAGE 420
(NOT PLOTTABLE)

SUBJECT TO
ENCROACHMENT DOCUMENT
BOOK 33344 PAGE 47
(NOT PLOTTABLE)

SUBJECT TO RECIPROCAL EASEMENTS
BOOK 37155 PAGE 258
(NOT PLOTTABLE)

WPA JURISDICTION

WQC JURISDICTION
STA 252+50 TO STA 255+00

LEGEND

- PERMANENT BVW IMPACT AREA
- TEMPORARY BVW IMPACT AREA
- TEMPORARY LUW IMPACT AREA
- BVW REPLICATION AREA
- BLSF IMPACT AREA
- PERMANENT LUW IMPACT AREA
- BORDERING VEGETATED WETLAND (BVW)
- BANK/MAHW (PERENNIAL STREAM)
- BANK (INTERMITTENT STREAM)
- 100-FOOT BUFFER ZONE
- 200-FOOT RIVERFRONT AREA
- PERMANENT BANK IMPACT
- TEMPORARY BANK IMPACT
- 100-YEAR FLOODPLAIN (BLSF) LINE

0 20 50 100
SCALE: 1" = 20'

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	5	6
PROJECT FILE NO.	608051		

RESOURCE AREA IMPACTS PLAN
SHEET 5 OF 6
REVISED 4/23/25

608051_EV(IMPACT-PLANS).DWG Plotted on 23-Apr-2025 3:41 PM

Proposal No. 608051 - 132406

A000960 - 597

TABLE 1 - UPSTREAM COMPENSATORY FLOOD STORAGE VOLUME TO BE COMPENSATED (100-YR FLOOD ELEVATION = 82.9)			
Elevation	**Cut Volume (CF)**	**Fill Volume (CF)**	**Incremental Net Cut/Fill Volume (CF)**
79-80	0	0	0
80-81	147	7	-140
81-82	1,804	925	-879
82-82.9	2,210	1,222	-988
Total	**4,161**	**2,155**	**-2,007**

PROP WETLAND REPLICATION AREA - 3,510 SF (SEE SHEET 212)

LIMIT OF REPLICATION AREA

PROP HMA DWY (TYP)

100-YEAR FLOODPLAIN DOWNSTREAM EL. 81.5'

PROP LOAM & SEED (TYP)

PROP GUARDRAIL

BLSF IMPACT BELOW EL. 82.9 = 4,295 SF

REM TREE

COMPENSATORY FLOOD STORAGE AREA SEE SHEET: 219

R&D EXISTING GUARDRAIL

PROP COMPENSATORY FLOOD STORAGE AREA - 4,261 SF (SEE SHEET 213)

100-FOOT WETLAND BUFFER ZONE

200-FOOT RIVERFRONT AREA

WETLAND I

WETLAND J

WETLAND E

MAIN STREET (ROUTE 38)

1911 STATE HIGHWAY LAYOUT

N/F TOWN OF WILMINGTON BOOK 2299 PAGE 288 PARCEL ID 39-9 MAIN ST

TOWN OF WILMINGTON BOOK 2299 PAGE 288

ACCESS EASEMENT BOOK 8868 PAGE 82 BOOK 36733 PAGE 145 BOOK 37155 PAGE 255

TO RECIPROCAL EASEMENTS BOOK 37155 PAGE 258 (NOT PLOTTABLE)

LEGEND

- PERMANENT BVW IMPACT AREA
- TEMPORARY BVW IMPACT AREA
- TEMPORARY LUW IMPACT AREA
- BVW REPLICATION AREA
- BLSF IMPACT AREA
- PERMANENT LUW IMPACT AREA
- AREAS TO BE EXCAVATED
- BORDERING VEGETATED WETLAND (BVW)
- BANK/MAHW (PERENNIAL STREAM)
- BANK (INTERMITTENT STREAM)
- 100-FOOT BUFFER ZONE
- 200-FOOT RIVERFRONT AREA
- PERMANENT BANK IMPACT
- TEMPORARY BANK IMPACT
- 100-YEAR FLOODPLAIN (BLSF) LINE
- COMPOST BLANKET AND WETLAND SEASONALLY FLOODED MIX
- 4" LOAM AND COMPOST BLANKET & SHORT GRASSLAND MIX

0 20 50 100

SCALE: 1" = 20'

WILMINGTON
ROUTE 38 (MAIN STREET)

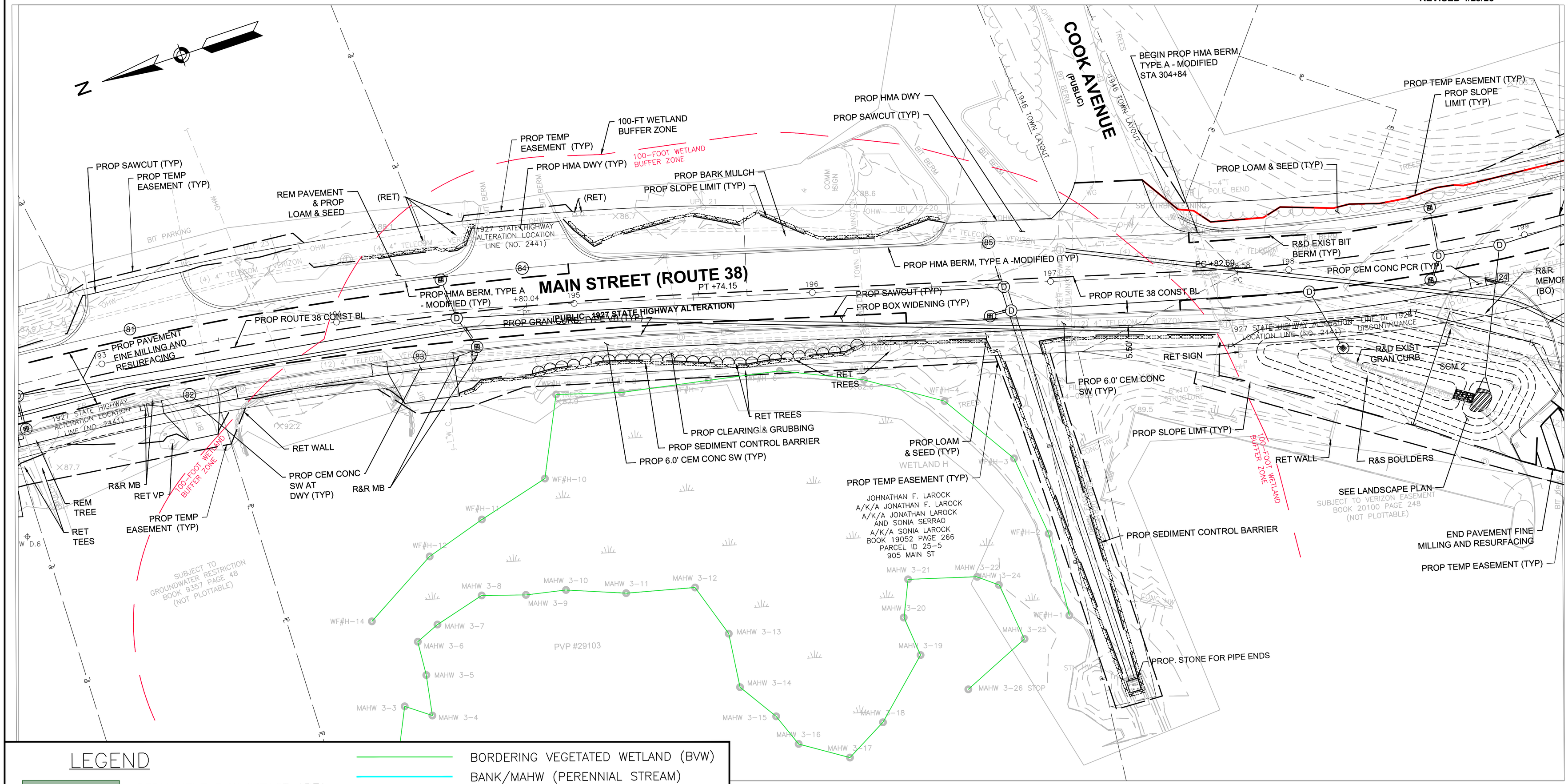
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	6	6
PROJECT FILE NO.	608051		

RESOURCE AREA IMPACTS PLAN
SHEET 6 OF 6
REVISED 4/23/25

608051_EW(IMPACT-PLANS).DWG Plotted on 23-Apr-2025 3:42 PM

Proposal No. 608051 - 132406

A008360 - 598



LEGEND

- PERMANENT BVW IMPACT AREA
- TEMPORARY BVW IMPACT AREA
- TEMPORARY LUW IMPACT AREA
- BVW REPLICATION AREA
- BLSF IMPACT AREA
- PERMANENT LUW IMPACT AREA
- BORDERING VEGETATED WETLAND (BVW)
- BANK/MAHW (PERENNIAL STREAM)
- BANK (INTERMITTENT STREAM)
- 100-FOOT BUFFER ZONE
- 200-FOOT RIVERFRONT AREA
- PERMANENT BANK IMPACT
- TEMPORARY BANK IMPACT
- 100-YEAR FLOODPLAIN (BLSF) LINE

GREEN
A Lochner Company

MEMORANDUM

April 25, 2025

To:	Amina Miliani, EEA (via Amina.Miliani@mass.gov) Cameron Lynch, Wilmington Conservation Commission (via clynch@wilmingtonma.gov) Heidi Davis, MassDEP (via heidi.davis@mass.gov) Ryan Hale, MassDEP(via ryan.hale@mass.gov)
Cc:	Noah Boland, MassDOT (via noah.m.boland@dot.state.ma.us) Anne Canaday, MassDOT (via anne.c.canaday@dot.state.ma.us) Kevin Thompson, MassDOT (via kevin.s.thompson@dot.state.ma.us) Erica Larner, MassDOT (via erica.n.larner@dot.state.ma.us) Melissa Lenker, MassDOT (via melissa.lenker@dot.state.ma.us) Eamon Kernan, MassDOT (via eamon.kernan@dot.state.ma.us) Dennis Vertiyev, Green International Affiliates, Inc. (via dvertiyev@greenintl.com)
From:	Oxana Fartushnaya, Green International Affiliates, Inc. (via ofartushnaya@greenintl.com)
Date:	April 25, 2025
Project Name:	MassDOT (608051) Reconstruction of Route 38 (Main Street) Project in Wilmington, MA
Project Number:	Green Project No. 21058.01XX
Subject:	**Minor Revisions to Wetland Resource Area Impacts at Dublin Avenue Culvert (approx. STA. 218) [EEA File No. 16942, Wetland DEP File No. 344-1566, WQC Application No. 25-WW26-0013-APP, NAE-2016-02681]**

This memorandum provides the summary of minor revisions to the protected resource area impacts associated with the Reconstruction of Route 38 (Main Street) Project in Wilmington, MA. This project was submitted to multiple agencies/permitting authorities as noted in the MEPA Submission documents filed on April 15, 2025 (EEA File No. 16942).

The project team received the initial comments from the Unites States Army Corps of Engineers (USACE) on our 404 Pre-Construction Notification (PCN) filing on 4/17/2025. As a result of addressing these comments, minor changes to the impacts to resource areas were required at the Dublin Avenue culvert conveying the Unnamed Intermittent Stream beneath Route 38. These changes were requested based on the federal Section 404 of the Clean Water Act (CWA) interpretation of “permanent discharge of fill” in Waters of the United States as well as based on the classification of impacts within Land Under Water versus Vegetated Wetland impacts in areas where the intermittent stream flows through a wetland. To be consistent between all permit filings, the project team would like to accord the impacts between all permit applications with involved regulatory agencies/permitting authorities.

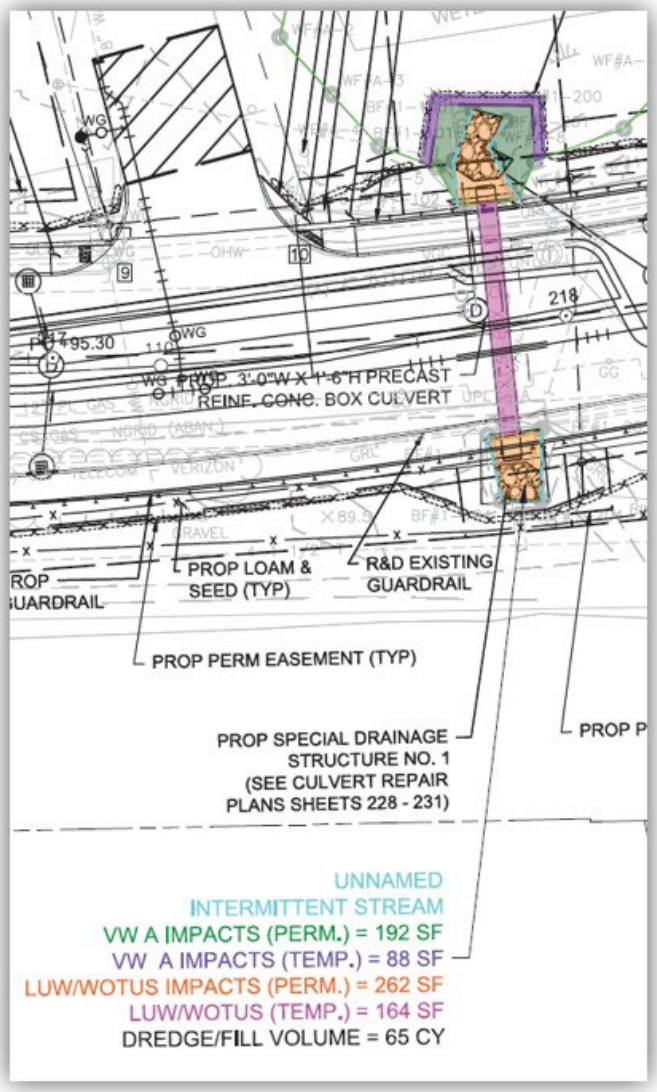
Below please find the table comparing the impacts at the subject culvert based on the original Joint Section 401/404 permit application submission to Massachusetts Department of Transportation (MassDEP) and the Unites States Army Corps of Engineers (USACE) and the revised impacts at this location to address the USACE comments:

Minor Revisions to Wetland Resource Area Impacts at Dublin Avenue Culvert (approx. STA. 218) [EEA File No. 16942, Wetland DEP File No. 344-1566, WQC Application No. 25-WW26-0013-APP, NAE-2016-02681]
April 25, 2025

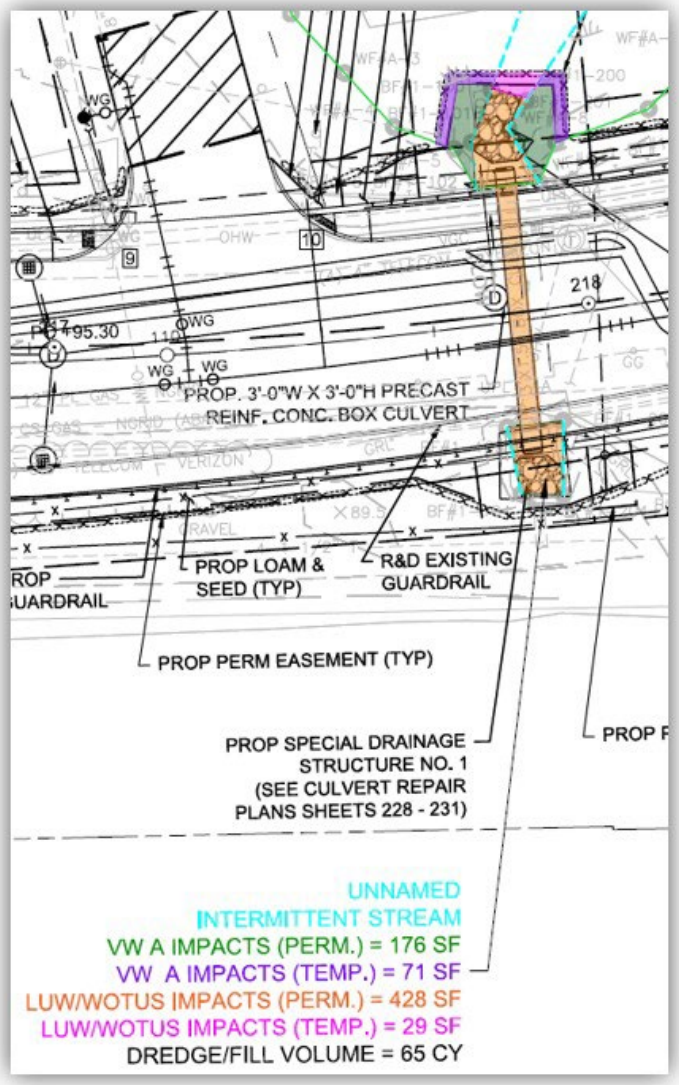
Project Component: Dublin Ave Culvert (STA. #218)	Original Impacts Submitted to Agencies (SF)	Revised Impacts based on 404 PCN Comments (SF)
Land Under Water (LUW) – permanent impacts	262	428
Land Under Water (LUW) – temporary impacts	164	29
Vegetated Vetland (VW) - permanent impacts	192	178
Vegetated Vetland (VW) - temporary impacts	88	71
TOTAL (CUMULATIVE IMPACTS)	**706**	**706**

The following screenshots depict the impacts and changes, as discussed above:

Original submission Impacts



Revised Impacts to address 404 comments



As demonstrated above, the total cumulative impacts at the Dublin Avenue culvert (VW + LUW, both temporary and permanent) remain at 706 square feet (SF). The minor "redistribution" of impacts between the resource areas and between temporary versus permanent impacts will not necessitate any changes to mitigation measures, as proposed:

- All Land Under Water areas will be restored regardless of the impacts being interpreted as "permanent" or "temporary"; the natural streambed is proposed within the culvert body and at the inlet and outlet areas.
- Vegetated Wetland (VW) impacts are being replicated in excess of what's being impacted by the proposed project; and the VW impacts actually experienced a minor reduction based on the requested changes.
- The minor changes to impacts at the Dublin Avenue culvert (approximate STA. 218) do not result in an overall increase of impacts throughout the project.

As a result, the Resource Area Impacts plan sheets were revised to reflect the changes discussed above (sheet 1 of 6 of the MEPA Plans, NOI Plans, and sheet 1 of the WQC/ACOE Plans).

Attachments:

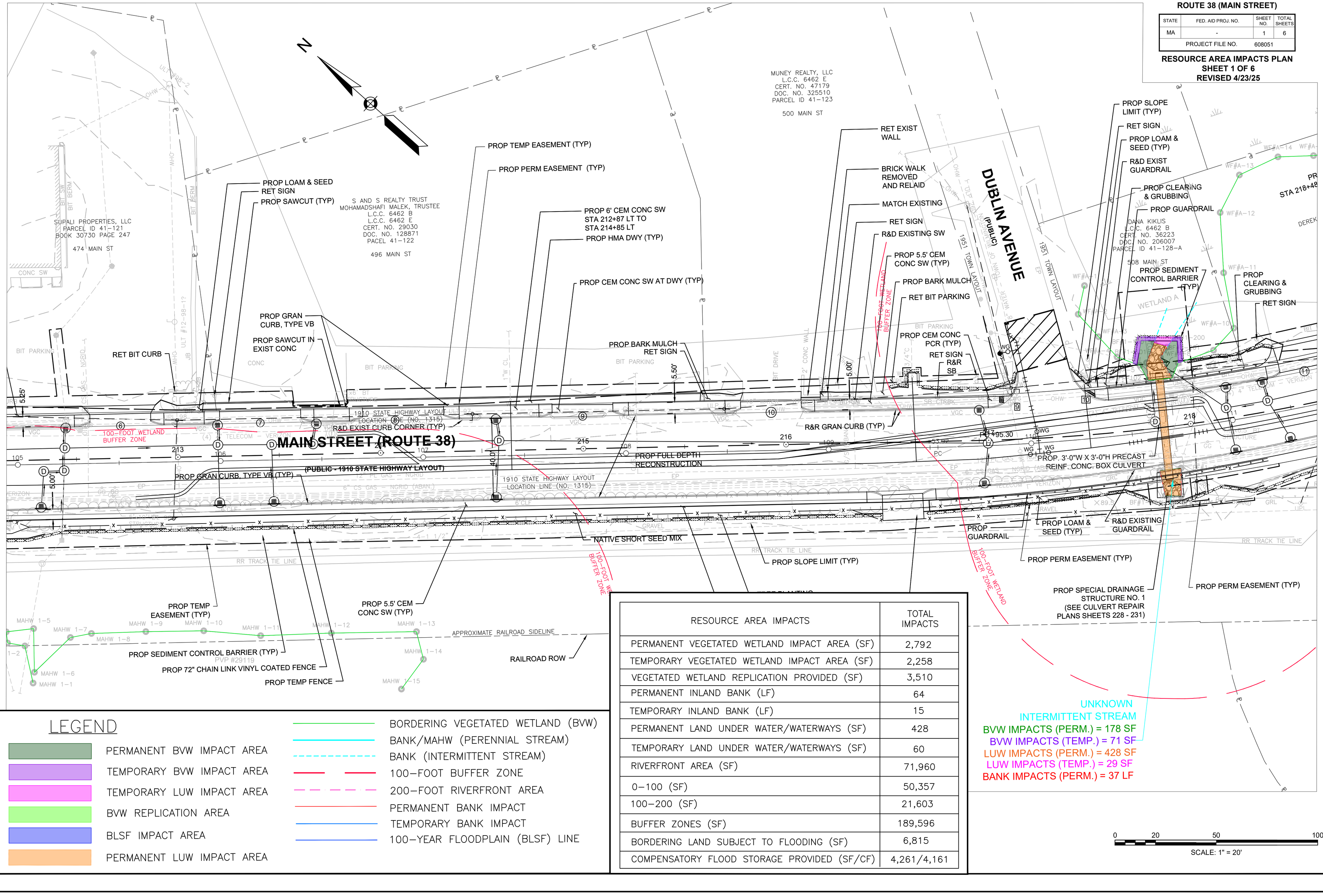
- Updated Resource Area Impacts Plans-1, dated 4/24/2024
- Updated WQC/ACOE Impacts Plans-1, dated 4/24/2024

\\Egnytedrive\Greenintl\Shared\Engineering\Projects\2013\13033\13033.19X - Wilmington Route 38\608051\DOCS\PERMITS\MEPA\MEPA Coordination\MEMO_Summary Of Minor Revisions To EEA# 16942_2025.04.25.Docx

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	1	6
PROJECT FILE NO.	608051		

RESOURCE AREA IMPACTS PLAN
SHEET 1 OF 6
REVISED 4/23/25



LEGEND

- PERMANENT BVW IMPACT AREA
- TEMPORARY BVW IMPACT AREA
- TEMPORARY LUW IMPACT AREA
- BVW REPLICATION AREA
- BLSF IMPACT AREA
- PERMANENT LUW IMPACT AREA
- BORDERING VEGETATED WETLAND (BVW)
- BANK/MAHW (PERENNIAL STREAM)
- BANK (INTERMITTENT STREAM)
- 100-FOOT BUFFER ZONE
- 200-FOOT RIVERFRONT AREA
- PERMANENT BANK IMPACT
- TEMPORARY BANK IMPACT
- 100-YEAR FLOODPLAIN (BLSF) LINE

RESOURCE AREA IMPACTS	TOTAL IMPACTS
PERMANENT VEGETATED WETLAND IMPACT AREA (SF)	2,792
TEMPORARY VEGETATED WETLAND IMPACT AREA (SF)	2,258
VEGETATED WETLAND REPLICATION PROVIDED (SF)	3,510
PERMANENT INLAND BANK (LF)	64
TEMPORARY INLAND BANK (LF)	15
PERMANENT LAND UNDER WATER/WATERWAYS (SF)	428
TEMPORARY LAND UNDER WATER/WATERWAYS (SF)	60
RIVERFRONT AREA (SF)	71,960
0-100 (SF)	50,357
100-200 (SF)	21,603
BUFFER ZONES (SF)	189,596
BORDERING LAND SUBJECT TO FLOODING (SF)	6,815
COMPENSATORY FLOOD STORAGE PROVIDED (SF/CF)	4,261/4,161

AVO8040 - 602
608051_EV(IMPACT-PLANS).DWG Plotted on 23-Apr-2025 3:33 PM
Proposal No. 608051 - 132406

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-		
PROJECT FILE NO.	608051		

IMPACT PLANS
SHEET 1 OF 3
REVISED 4/23/25

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Proposal No. 608051 - 132406

A00860 - 603

SUPALI PROPERTIES, LLC
PARCEL ID 41–121
BOOK 30730 PAGE 247
474 MAIN ST

S AND S REALTY TRUST
MOHAMADSHAFI MALEK, TRUSTEE
L.C.C. 6462 B
L.C.C. 6462 E
CERT. NO. 29030
DOC. NO. 128871
PACEL 41–122
496 MAIN ST

MUNEY REALTY, LLC
L.C.C. 6462 E
CERT. NO. 47179
DOC. NO. 325510
PARCEL ID 41–123
500 MAIN ST

DANA KIKLIS
L.C.C. 6462 B
CERT. NO. 36223
DOC. NO. 206007
PARCEL ID 41–128–A
508 MAIN ST

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
BOOK 2226 PAGE 326
PARCEL ID 41–141

MAIN STREET (ROUTE 38)
(PUBLIC - 1910 STATE HIGHWAY LAYOUT)

DUBLIN AVENUE
(PUBLIC)

PROP TEMP EASEMENT (TYP)
PROP PERM EASEMENT (TYP)
PROP LOAM & SEED
RET SIGN
PROP SAWCUT (TYP)
PROP 6' CEM CONC SW STA 212+87 LT TO STA 214+85 LT
PROP HMA DWY (TYP)
PROP CEM CONC SW AT DWY (TYP)
PROP GRAN CURB, TYPE VB
PROP SAWCUT IN EXIST CONC
RET BIT CURB
PROP BARK MULCH
RET SIGN
1910 STATE HIGHWAY LAYOUT LOCATION LINE (NO. 1315)
R&D EXIST CURB CORNER (TYP)
PROP GRAN CURB, TYPE VB (TYP)
PROP FULL DEPTH RECONSTRUCTION
1910 STATE HIGHWAY LAYOUT LOCATION LINE (NO. 1315)
NATIVE SHORT SEED MIX
RET EXIST WALL
BRICK WALK REMOVED AND RELAID
MATCH EXISTING
RET SIGN
R&D EXISTING SW
PROP 5.5' CEM CONC SW (TYP)
PROP BARK MULCH
RET BIT PARKING
PROP CEM CONC PCR (TYP)
RET SIGN
R&R SB
R&R GRAN CURB (TYP)
PROP SLOPE LIMIT (TYP)
RET SIGN
PROP LOAM & SEED (TYP)
R&D EXIST GUARDRAIL
PROP CLEARING & GRUBBING
PROP GUARDRAIL
PROP SEDIMENT CONTROL BARRIER (TYP)
PROP CLEARING & GRUBBING
RET SIGN
PROP. 3'-0"W X 3'-0"H PRECAST REINF. CONC. BOX CULVERT
PROP GUARDRAIL
PROP LOAM & SEED (TYP)
R&D EXISTING GUARDRAIL
PROP PERM EASEMENT (TYP)
PROP SPECIAL DRAINAGE STRUCTURE NO. 1 (SEE CULVERT REPAIR PLANS SHEETS 228 - 231)
PROP PERM EASEMENT (TYP)
PROP TEMP EASEMENT (TYP)
PROP 5.5' CEM CONC SW (TYP)
PROP SEDIMENT CONTROL BARRIER (TYP)
PROP 72" CHAIN LINK VINYL COATED FENCE
PROP TEMP FENCE
TREE PLANTING TRENCH (TYP)
PROP 72" CHAIN LINK GATE AND GATE POSTS STA 211+40 RT TO STA 211+60 RT
PROP CLEARING & GRUBBING
RAILROAD ROW
APPROXIMATE RAILROAD SIDELINE
PROP SLOPE LIMIT (TYP)
PROP PERM EASEMENT (TYP)
STA 218+48
DEREK

WETLAND A
UNNAMED
INTERMITTENT STREAM
VW A IMPACTS (PERM.) = 178 SF
VW A IMPACTS (TEMP.) = 71 SF
LUW/WOTUS IMPACTS (PERM.) = 428 SF
LUW/WOTUS IMPACTS (TEMP.) = 29 SF
DREDGE/FILL VOLUME = 65 CY

PERMANENT VW IMPACT AREA = 3,278 SF ±
PERMANENT LUW/WOTUS IMPACT AREA = 2,394 SF ±
TOTAL PERMANENT IMPACT AREA = 5,670 SF ±
TEMPORARY VW IMPACT AREA = 2,825 SF ±
TEMPORARY LUW/WOTUS IMPACT AREA = 575 SF ±
TOTAL TEMPORARY IMPACT AREA = 3,400 SF ±

VEGETATED WETLAND (VW)
BANK/OHW (PERENNIAL STREAM)
BANK/OHW (INTERMITTENT STREAM)
TOTAL DREDGE/FILL WITHIN LUW/WOTUS VOLUME = 715 CY

WQC PLANS SHEET 10 OF XX

0 20 50 100
SCALE: 1" = 40'

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

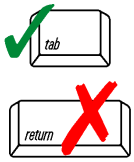
Provided by MassDEP:

MassDEP File Number

Document Transaction Number

Wilmington
City/Town

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



Note: Before completing this form consult your local Conservation Commission regarding any municipal bylaw or ordinance.

A. General Information

1. Project Location (**Note:** electronic filers will click on button to locate project site):

Routh 38 (Main Street) from Route 62 (Church Street / Burlington Avenue) to Woburn City Line
a. Street Address

Wilmington
b. City/Town

01887
c. Zip Code

Latitude and Longitude:
42°32'47"N-42°31'16"N

71°10'25"W-71°9'30"W

N/A
f. Assessors Map/Plat Number

N/A
g. Parcel /Lot Number

2. Applicant:

Erica
a. First Name

Larner
b. Last Name

Massachusetts Department of Transportation Highway Division
c. Organization

10 Park Plaza, Room 7360
d. Street Address

Boston
e. City/Town

MA
f. State

02116
g. Zip Code

857-268-1729
h. Phone Number

i. Fax Number

erica.n.larner@dot.state.ma.us
j. Email Address

3. Property owner (required if different from applicant): ☐ Check if more than one owner

a. First Name

b. Last Name

Massachusetts Department of Transportation - Highway Division
c. Organization

10 Park Plaza
d. Street Address

Boston
e. City/Town

MA
f. State

02116
g. Zip Code

h. Phone Number

i. Fax Number

j. Email address

4. Representative (if any):

Oxana
a. First Name

Fartushnaya
b. Last Name

Green International Affiliates, Inc
c. Company

100 Ames Pond Drive, Suite 200
d. Street Address

Tewksbury
e. City/Town

MA
f. State

01876
g. Zip Code

978-923-0400
h. Phone Number

978-399-0033
i. Fax Number

ofartushnaya@greenintl.com
j. Email address

5. Total WPA Fee Paid (from NOI Wetland Fee Transmittal Form):

$750
a. Total Fee Paid

$362.50
b. State Fee Paid

$376.50
c. City/Town Fee Paid

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Bureau of Resource Protection - Wetlands

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Provided by MassDEP:

MassDEP File Number

Document Transaction Number

Wilmington
City/Town

A. General Information (continued)

6. General Project Description:

(see Narrative for more information)

7a. Project Type Checklist: (Limited Project Types see Section A. 7b.)

1. ☐ Single Family Home
2. ☐ Residential Subdivision
3. ☐ Commercial/Industrial
4. ☐ Dock/Pier
5. ☐ Utilities
6. ☐ Coastal engineering Structure
7. ☐ Agriculture (e.g., cranberries, forestry)
8. ☒ Transportation
9. ☐ Other

7b. Is any portion of the proposed activity eligible to be treated as a limited project (including Ecological Restoration Limited Project) subject to 310 CMR 10.24 (coastal) or 310 CMR 10.53 (inland)?

1. ☒ Yes ☐ No

If yes, describe which limited project applies to this project. (See 310 CMR 10.24 and 10.53 for a complete list and description of limited project types)

310 CMR 10.53(3)(f) - See Narrative for full description.

2. Limited Project Type

If the proposed activity is eligible to be treated as an Ecological Restoration Limited Project (310 CMR10.24(8), 310 CMR 10.53(4)), complete and attach Appendix A: Ecological Restoration Limited Project Checklist and Signed Certification.

8. Property recorded at the Registry of Deeds for:

Middlesex North	
a. County	b. Certificate # (if registered land)
N/A - roadway	N/A - roadway
c. Book	d. Page Number

B. Buffer Zone & Resource Area Impacts (temporary & permanent)

1. ☐ Buffer Zone Only – Check if the project is located only in the Buffer Zone of a Bordering Vegetated Wetland, Inland Bank, or Coastal Resource Area.
2. ☒ Inland Resource Areas (see 310 CMR 10.54-10.58; if not applicable, go to Section B.3, Coastal Resource Areas).

Check all that apply below. Attach narrative and any supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

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Bureau of Resource Protection - Wetlands

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City/Town

B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

For all projects affecting other Resource Areas, please attach a narrative explaining how the resource area was delineated.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☒ Bank	64 (perm); 15 (temp) (1. linear feet)	to be restored (2. linear feet)
b. ☒ Bordering Vegetated Wetland	2,792 (perm); 2,258 (temp) (1. square feet)	3,510 (2. square feet)
c. ☒ Land Under Waterbodies and Waterways	428 (perm); 60 (temp) (1. square feet)	to be restored (2. square feet)
	(3. cubic yards dredged)	

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
d. ☒ Bordering Land Subject to Flooding	6,815 (1. square feet)	4,261 (2. square feet)
	2,155 (3. cubic feet of flood storage lost)	4,161 (4. cubic feet replaced)
e. ☐ Isolated Land Subject to Flooding	(1. square feet)	
	(2. cubic feet of flood storage lost)	(3. cubic feet replaced)
f. ☒ Riverfront Area	Maple Meadow Brook (inland) (1. Name of Waterway (if available) - **specify coastal or inland**)	

2. Width of Riverfront Area (check one):

☐ 25 ft. - Designated Densely Developed Areas only

☐ 100 ft. - New agricultural projects only

☒ 200 ft. - All other projects

3. Total area of Riverfront Area on the site of the proposed project: 86,013 square feet

4. Proposed alteration of the Riverfront Area:

a. total square feet	b. square feet within 100 ft.	c. square feet between 100 ft. and 200 ft.
71,960	50,357	21,603

5. Has an alternatives analysis been done and is it attached to this NOI? ☐ Yes ☒ No

6. Was the lot where the activity is proposed created prior to August 1, 1996? ☒ Yes ☐ No

3. ☐ Coastal Resource Areas: (See 310 CMR 10.25-10.35)

Note: for coastal riverfront areas, please complete **Section B.2.f**. above.

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Provided by MassDEP:
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Document Transaction Number
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City/Town

B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

Check all that apply below. Attach narrative and supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

Online Users: Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☐ Designated Port Areas	Indicate size under Land Under the Ocean, below	
b. ☐ Land Under the Ocean	1. square feet 2. cubic yards dredged	
c. ☐ Barrier Beach	Indicate size under Coastal Beaches and/or Coastal Dunes below	
d. ☐ Coastal Beaches	1. square feet	2. cubic yards beach nourishment
e. ☐ Coastal Dunes	1. square feet	2. cubic yards dune nourishment

	Size of Proposed Alteration	Proposed Replacement (if any)
f. ☐ Coastal Banks	1. linear feet	
g. ☐ Rocky Intertidal Shores	1. square feet	
h. ☐ Salt Marshes	1. square feet	2. sq ft restoration, rehab., creation
i. ☐ Land Under Salt Ponds	1. square feet 2. cubic yards dredged	
j. ☐ Land Containing Shellfish	1. square feet	
k. ☐ Fish Runs	Indicate size under Coastal Banks, inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above 1. cubic yards dredged	
l. ☐ Land Subject to Coastal Storm Flowage	1. square feet	

4. ☐ Restoration/Enhancement

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.2.b or B.3.h above, please enter the additional amount here.

a. square feet of BVW | b. square feet of Salt Marsh

5. ☒ Project Involves Stream Crossings

0 a. number of new stream crossings | 1 b. number of replacement stream crossings

Massachusetts Department of Environmental Protection
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Provided by MassDEP:

MassDEP File Number

Document Transaction Number

Wilmington
City/Town

C. Other Applicable Standards and Requirements

☐ This is a proposal for an Ecological Restoration Limited Project. Skip Section C and complete Appendix A: Ecological Restoration Limited Project Checklists – Required Actions (310 CMR 10.11).

Streamlined Massachusetts Endangered Species Act/Wetlands Protection Act Review

1. Is any portion of the proposed project located in **Estimated Habitat of Rare Wildlife** as indicated on the most recent Estimated Habitat Map of State-Listed Rare Wetland Wildlife published by the Natural Heritage and Endangered Species Program (NHESP)? To view habitat maps, see the *Massachusetts Natural Heritage Atlas* or go to http://maps.massgis.state.ma.us/PRI_EST_HAB/viewer.htm.

   a. ☐ Yes ☒ No

   If yes, include proof of mailing or hand delivery of NOI to:

   Natural Heritage and Endangered Species Program
   Division of Fisheries and Wildlife
   1 Rabbit Hill Road
   Westborough, MA 01581

   2021
   b. Date of map

   If *yes*, the project is also subject to Massachusetts Endangered Species Act (MESA) review (321 CMR 10.18). To qualify for a streamlined, 30-day, MESA/Wetlands Protection Act review, please complete Section C.1.c, and include requested materials with this Notice of Intent (NOI); *OR* complete Section C.2.f, if applicable. *If MESA supplemental information is not included with the NOI, by completing Section 1 of this form, the NHESP will require a separate MESA filing which may take up to 90 days to review (unless noted exceptions in Section 2 apply, see below).*

   c. Submit Supplemental Information for Endangered Species Review*

      1. ☐ Percentage/acreage of property to be altered:

         (a) within wetland Resource Area _____ percentage/acreage

         (b) outside Resource Area _____ percentage/acreage

      2. ☐ Assessor's Map or right-of-way plan of site

2. ☐ Project plans for entire project site, including wetland resource areas and areas outside of wetlands jurisdiction, showing existing and proposed conditions, existing and proposed tree/vegetation clearing line, and clearly demarcated limits of work **

   (a) ☐ Project description (including description of impacts outside of wetland resource area & buffer zone)

   (b) ☐ Photographs representative of the site

* Some projects **not** in Estimated Habitat may be located in Priority Habitat, and require NHESP review (see https://www.mass.gov/ma-endangered-species-act-mesa-regulatory-review).
Priority Habitat includes habitat for state-listed plants and strictly upland species not protected by the Wetlands Protection Act.

** MESA projects may not be segmented (321 CMR 10.16). The applicant must disclose full development plans even if such plans are not required as part of the Notice of Intent process.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
MassDEP File Number
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Wilmington
City/Town

C. Other Applicable Standards and Requirements (cont'd)

(c) ☐ MESA filing fee (fee information available at https://www.mass.gov/how-to/how-to-file-for-a-mesa-project-review).
Make check payable to "Commonwealth of Massachusetts - NHESP" and ***mail to NHESP*** at above address

*Projects altering **10 or more acres** of land, also submit:*

(d) ☐ Vegetation cover type map of site

(e) ☐ Project plans showing Priority & Estimated Habitat boundaries

(f) OR Check One of the Following

1. ☐ Project is exempt from MESA review.
Attach applicant letter indicating which MESA exemption applies. (See 321 CMR 10.14, https://www.mass.gov/service-details/exemptions-from-review-for-projectsactivities-in-priority-habitat; the NOI must still be sent to NHESP if the project is within estimated habitat pursuant to 310 CMR 10.37 and 10.59.)

2. ☐ Separate MESA review ongoing. a. NHESP Tracking # b. Date submitted to NHESP

3. ☐ Separate MESA review completed.
Include copy of NHESP "no Take" determination or valid Conservation & Management Permit with approved plan.

3. For coastal projects only, is any portion of the proposed project located below the mean high water line or in a fish run?

a. ☒ Not applicable – project is in inland resource area only b. ☐ Yes ☐ No

If yes, include proof of mailing, hand delivery, or electronic delivery of NOI to either:

South Shore - Cohasset to Rhode Island border, and the Cape & Islands:

Division of Marine Fisheries -
Southeast Marine Fisheries Station
Attn: Environmental Reviewer
836 South Rodney French Blvd.
New Bedford, MA 02744
Email: dmf.envreview-south@mass.gov

North Shore - Hull to New Hampshire border:

Division of Marine Fisheries -
North Shore Office
Attn: Environmental Reviewer
30 Emerson Avenue
Gloucester, MA 01930
Email: dmf.envreview-north@mass.gov

Also if yes, the project may require a Chapter 91 license. For coastal towns in the Northeast Region, please contact MassDEP's Boston Office. For coastal towns in the Southeast Region, please contact MassDEP's Southeast Regional Office.

c. ☐ Is this an aquaculture project? d. ☐ Yes ☐ No

If yes, include a copy of the Division of Marine Fisheries Certification Letter (M.G.L. c. 130, § 57).

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
MassDEP File Number
Document Transaction Number
Wilmington
City/Town

C. Other Applicable Standards and Requirements (cont'd)

Online Users: Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

4. Is any portion of the proposed project within an Area of Critical Environmental Concern (ACEC)?

   a. ☐ Yes ☒ No If yes, provide name of ACEC (see instructions to WPA Form 3 or MassDEP Website for ACEC locations). **Note:** electronic filers click on Website.

   b. ACEC

5. Is any portion of the proposed project within an area designated as an Outstanding Resource Water (ORW) as designated in the Massachusetts Surface Water Quality Standards, 314 CMR 4.00?

   a. ☐ Yes ☒ No

6. Is any portion of the site subject to a Wetlands Restriction Order under the Inland Wetlands Restriction Act (M.G.L. c. 131, § 40A) or the Coastal Wetlands Restriction Act (M.G.L. c. 130, § 105)?

   a. ☐ Yes ☒ No

7. Is this project subject to provisions of the MassDEP Stormwater Management Standards?

   a. ☒ Yes. Attach a copy of the Stormwater Report as required by the Stormwater Management Standards per 310 CMR 10.05(6)(k)-(q) and check if:
      1. ☐ Applying for Low Impact Development (LID) site design credits (as described in Stormwater Management Handbook Vol. 2, Chapter 3)
      2. ☒ A portion of the site constitutes redevelopment
      3. ☒ Proprietary BMPs are included in the Stormwater Management System.

   b. ☐ No. Check why the project is exempt:
      1. ☐ Single-family house
      2. ☐ Emergency road repair
      3. ☐ Small Residential Subdivision (less than or equal to 4 single-family houses or less than or equal to 4 units in multi-family housing project) with no discharge to Critical Areas.

D. Additional Information

☐ This is a proposal for an Ecological Restoration Limited Project. Skip Section D and complete Appendix A: Ecological Restoration Notice of Intent – Minimum Required Documents (310 CMR 10.12).

Applicants must include the following with this Notice of Intent (NOI). See instructions for details.

Online Users: Attach the document transaction number (provided on your receipt page) for any of the following information you submit to the Department.

1. ☒ USGS or other map of the area (along with a narrative description, if necessary) containing sufficient information for the Conservation Commission and the Department to locate the site. (Electronic filers may omit this item.)

2. ☒ Plans identifying the location of proposed activities (including activities proposed to serve as a Bordering Vegetated Wetland [BVW] replication area or other mitigating measure) relative to the boundaries of each affected resource area.

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D. Additional Information (cont'd)

3. ☒ Identify the method for BVW and other resource area boundary delineations (MassDEP BVW Field Data Form(s), Determination of Applicability, Order of Resource Area Delineation, etc.), and attach documentation of the methodology.

4. ☒ List the titles and dates for all plans and other materials submitted with this NOI.

See Attached Plan List in NOI Report
a. Plan Title

Green International Affiliates, Inc.
b. Prepared By

c. Signed and Stamped by

3/13/2025
d. Final Revision Date

As shown on each plan
e. Scale

f. Additional Plan or Document Title

g. Date

5. ☐ If there is more than one property owner, please attach a list of these property owners not listed on this form.

6. ☐ Attach proof of mailing for Natural Heritage and Endangered Species Program, if needed.

7. ☐ Attach proof of mailing for Massachusetts Division of Marine Fisheries, if needed.

8. ☒ Attach NOI Wetland Fee Transmittal Form

9. ☒ Attach Stormwater Report, if needed.

E. Fees

1. ☐ Fee Exempt: No filing fee shall be assessed for projects of any city, town, county, or district of the Commonwealth, federally recognized Indian tribe housing authority, municipal housing authority, or the Massachusetts Bay Transportation Authority.

Applicants must submit the following information (in addition to pages 1 and 2 of the NOI Wetland Fee Transmittal Form) to confirm fee payment:

16964
2. Municipal Check Number

3/12/2025
3. Check date

16966
4. State Check Number

3/12/2025
5. Check date

Green International Affiliates, Inc.
6. Payor name on check: First Name

7. Payor name on check: Last Name

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F. Signatures and Submittal Requirements

I hereby certify under the penalties of perjury that the foregoing Notice of Intent and accompanying plans, documents, and supporting data are true and complete to the best of my knowledge. I understand that the Conservation Commission will place notification of this Notice in a local newspaper at the expense of the applicant in accordance with the wetlands regulations, 310 CMR 10.05(5)(a).

I further certify under penalties of perjury that all abutters were notified of this application, pursuant to the requirements of M.G.L. c. 131, § 40. Notice must be made by Certificate of Mailing or in writing by hand delivery or certified mail (return receipt requested) to all abutters within 100 feet of the property line of the project location.

1. Signature of Applicant	2. Date: 03/04/2025
3. Signature of Property Owner (if different)	4. Date
5. Signature of Representative (if any): *Oxana Fartushnaya*	6. Date: *3/10/2025*

For Conservation Commission:
Two copies of the completed Notice of Intent (Form 3), including supporting plans and documents, two copies of the NOI Wetland Fee Transmittal Form, and the city/town fee payment, to the Conservation Commission by certified mail or hand delivery.

For MassDEP:
One copy of the completed Notice of Intent (Form 3), including supporting plans and documents, one copy of the NOI Wetland Fee Transmittal Form, and a **copy** of the state fee payment to the MassDEP Regional Office (see Instructions) by certified mail or hand delivery.

Other:
If the applicant has checked the “yes” box in any part of Section C, Item 3, above, refer to that section and the Instructions for additional submittal requirements.

The original and copies must be sent simultaneously. Failure by the applicant to send copies in a timely manner may result in dismissal of the Notice of Intent.

GREEN
A Lochner Company

MEMORANDUM

May 22, 2025

To:	Alicia Geilen, MassDEP Northeast Regional Office (via alicia.geilen@mass.gov)
Cc:	Cameron Lynch, Wilmington (via clynch@wilmingtonma.gov) Valerie Gingrich, Wilmington (via vgingrich@wilmingtonma.gov) Heidi Davis, MassDEP (via heidi.davis@mass.gov) Ryan Hale, MassDEP (via ryan.hale@mass.gov) Erica Larner, MassDOT (via melissa.lenker@dot.state.ma.us) Kevin Thompson, MAssDOT (via kevin.s.thompson@dot.state.ma.us) Melissa Lenker, MassDOT (via melissa.lenker@dot.state.ma.us) Eamon Kernan, MassDOT (via eamon.kernan@dot.state.ma.us)
From:	Oxana Fartushnaya, Green International Affiliates, Inc. (via ofartushnaya@greenintl.com)
Date:	May 22, 2025
Project Name:	Reconstruction of Route 38 (Main Street) from Route 62 to the Woburn City Line in Wilmington, MA
Project Number:	Green No. 21058.16XX
Subject:	**Response to MassDEP Technical Comments on WPA Notice of Intent filing (DEP File No. 344-1566)**

This memorandum provides the responses to MassDEP Northeastern Regional Office (NERO) Technical Comment on the Notice of Intent filing, DEP File No. 344-1566).

Responses to each technical review comment are noted below in **Bold**.

1. Please note it does not appear that all work within the Riverfront Area (RFA) is grandfathered or exempted per 10.58(6)(a) as portions will occur within other wetland resource areas (Bordering Land Subject to Flooding) and 100-foot Buffer Zone. Similarly, the minor activity exemption at 310 CMR 10.02(2)(b)2.p. does not apply to portions of the project where the roadway will be slightly widened in the RFA and a new drainage system will be installed as the exemption is only applicable to adjustments and/or repairs to respective structures within the roadway.

The original NOI and MEPA filings conservatively accounted for the entire limit of work within the RFA as "impact". As a result of this comment, we have re-reviewed the proposed work within the RFA to determine the correct area of impact within the Riverfront Area.

We agree that the proposed work is not Grandfathered or Exempt from Requirements for the Riverfront Area under provision of 310 CMR 10.58(6) due to the Riverfront Area overlapping with other protected wetland resource areas - Bordering Land Subject to Flooding (BLSF) and Bordering Vegetated Wetlands.

It is also our understanding that due to BLSF and BVW impacts within the Riverfront Area where work is proposed, we cannot exempt any minor activities per 310 CMR 10.02(2)(b)2.

The updated compliance with Performance Standards for the Riverfront Area, as set forth in 310 CMR 10.58(4), are addressed as described below:

Riverfront Area associated with Maple Meadow Brook extends over 86,013 square feet of the project area on Route 38. However, the work within WPA jurisdiction will occur within approximately 63,963 square feet of Riverfront Area.

The Riverfront Area within the project area consists of existing paved roadway and adjacent shoulders. Majority of the proposed work within this area is located within the limits of existing pavement, which is considered to be "degraded" Riverfront Area, therefore, the majority of the proposed work is considered Redevelopment.

Minor portion of the proposed box widening to accommodate roadway improvements required to provide safety accommodations for all roadway users as well as the drainage improvements (proposed outfall on the east side of Route 38 north of the bridge (STA 252+40)) are located within the non-degraded Riverfront Area and, therefore, is not considered Redevelopment, therefore alternatives were evaluated for this work per 310 CMR 10.58(4).

General Performance Standards for Riverfront Area, as set forth in 310 CMR 10.58(4), are addressed as described below:

a) ***Protection of other Resource Areas*:**

The affected Riverfront Area includes BVWs, BLSF and Buffer Zones. The project will comply with the performance standards as described in the Notice of Intent narrative for each area. Therefore, the proposed work within BVW and BLSF fully meets the performance standards for these resource areas within the Riverfront Area, as identified in 310 CMR 10.53 and 310 CMR 10.57. Since the proposed work the Riverfront Area is also within the Buffer Zone to Inland Bank, the performance standards for the riverfront area shall contribute to the protection of the interests of M.G.L. c. 131, § 40. Due to the nature of the project, the impacts to Buffer Zones are unavoidable; however, they were minimized to the maximum extent feasible. Erosion and sediment control Best Management Practices (BMPs) will be installed during construction to protect adjacent resource areas. The Buffer Zone areas impacted by the temporary work associated with regrading and placement of the erosion and sediments controls will be stabilized, and the natural cover will be restored after completion of work. These measures will ensure the land disturbance within the Buffer Zone does not negatively impact resource areas and will secure the protection of the interests of M.G.L. c. 131, § 40.

b) ***Protection of Rare Species:***

As indicated previously in the NOI Narrative, there are no threatened or endangered species, or species of concern, in the project area.

c) ***Practicable and Substantially Equivalent Economic Alternative:*** **Majority of the proposed work within the Riverfront Area on site will redevelop a previously developed Riverfront Area, as demonstrated in the table below. This redevelopment work is associated with the replacement of existing structure and improvement of existing roadway, and will reuse the previously developed Riverfront Area which contains areas degraded prior to August 7, 1996 by impervious surfaces from existing Route 38 roadway pavement.**

The table below summarizes impacts as noted in the NOI to the Riverfront Area:

Riverfront Area	Total area on Site of the Proposed Project (sf)	Impact Area (sf)	% Disturbed from Total on Site
Degraded (Redevelopment of existing impervious)	**86,013**	**63,980**	**74.4**
Undeveloped (minor box widening)		**4,097**	**4.8**
Undeveloped (proposed outfall at STA. 252+40)		**455**	**0.5**
	TOTAL	**68,532**	**79.7**

While the majority of the work within the riverfront area is within degraded RA (74.4 %), there is a small portion (5.3 %) of it that is considered new development and is regulated by 310 CMR 10.58(4), which provides that there are no practicable and substantially equivalent economic alternatives with less adverse effects and there will be no significant adverse impact on the riverfront area. The following section describes how the proposed work within the Riverfront Area meets general performance standards for 10.58(4)(c) Alternatives Analysis:

The "*No-Build Alternative*" was dismissed as it fails to meet the project's purpose and need. The purpose of this project is to provide safety enhancements along the Route 38 corridor in Wilmington for drivers and bicyclists, to promote improved flow of traffic, and to address drainage issues at various locations within a project segment. The corridor currently does not provide sufficient bicycle and pedestrian facilities. Pedestrian accommodations are limited to specific areas, and existing sidewalks are substandard, often failing to meet ADA/AAB requirements. Cyclists must either share vehicle lanes or use sidewalks, creating safety concerns. To comply with MassDOT's Healthy Transportation Policy, the project must include compliant sidewalks and bicycle facilities. The proposed section of Reconstruction of Route 38 is designed with safety as a top priority. Many of the features evaluated impact multiple locations throughout the entire corridor and a preferred/compromised alternative was selected to reduce impacts on private properties and environmentally sensitive areas.

Alternative 1 (Preferred): Eleven-foot travel lanes, five-foot shoulders, five-foot sidewalks

The preferred alternative proposes reconstruction of Route 38 (Main Street) to include eleven-foot travel lanes and five-foot sidewalks on both sides within urbanized areas. Between STA. 248+25 and STA. 314+25, sidewalks will be installed only on the west side to serve residential neighborhoods and public parks. This approach minimizes impacts to wetlands and existing utility infrastructure. The east side, which is a mix of wooded and industrial areas, will not include sidewalks. A design exception was requested and approved by MassDOT for this modification. This was necessary due to the narrower width of the roadway in this area.

As part of the selection process that lead to this Preferred Design Alternative, multiple aspects of the design were reviewed and evaluated to provide a balance between the anticipated wetland impacts and achieving the project purpose of providing increased safety for roadway users by improving the roadway infrastructure and geometry, reducing traffic back-ups on entering side streets and improving the existing drainage system. The option to install a retaining wall along

the west side of Route 38 (Main Street) from STA. 238+50 to STA. 241+00 was evaluated and determined to be impractical. This was due to the proximity of the wetlands within three feet from the back of sidewalk and the placement of the wall footing in poor soil conditions within the wetland. Additionally, the retaining wall would need to extend an additional 177 feet into Butters Row from STA. 241+00 to avoid a short gap between the two walls. This wall extension would result in increases to temporary and permanent wetland impacts of 117 square feet and 68 square feet, respectively. The alternative option to use a 1.5:1 slope with modified rockfill was also considered to reduce wetland impacts. However, this option did not offer significant improvements over the 2:1 slope. While using a steeper slope can typically reduce impacts, this case would have required us to install standard post guardrail with a level 3'-7" bench beyond the back of sidewalk for safety and constructability reasons per the latest edition of the AASHTO Roadside Design Guide. With a 2:1 slope, we were able to propose a deep post guardrail option, which eliminated the need for the 3'-7" bench behind the sidewalk. Because deep post guardrail cannot be embedded into modified rockfill, this was not an option with the 1.5:1 slope. Therefore, the 2:1 slope with a deep post guardrail was selected as the preferred alternative to avoid the additional 125 square feet of wetland impacts present in the 1.5:1 slope option.

The Preferred Alternative enhances pedestrian safety by separating foot traffic from both bicyclists and vehicles. However, bicyclists would still share the roadway with motor vehicles. Overall, this alternative minimizes impacts to environmental resource areas while providing an adequate level of pedestrian and bicycle accommodations throughout the urbanized section of the corridor. It also requires the least amount of utility relocations to support these facilities, thereby limiting wetland impacts. Therefore, this alternative limits the permanent wetland impacts to the maximum extent practicable.

Alternative 2: Twelve-foot-wide travel lanes, eight-foot shoulders, five-foot sidewalks

Alternative 2 proposes to restripe Route 38 (Main Street) with twelve-foot travel lanes with eight-foot shoulders lane and a five-foot sidewalk for the entire corridor. The "Design Criteria for Arterial Travel Lanes and Shoulder" table from MassDOT's Engineering Directive E-14-006 (dated December 19, 2014) indicates that for NHS Non-Freeway roadways (which includes Route 38 (Main Street)) being reconstructed requires the minimum travel lane and right shoulder widths shall be 12 feet and 8 feet, respectively. Designing the corridor to meet these minimum criteria would result in significantly greater impacts to wetlands, public shade trees, MBTA train tracks, and adjacent private properties. Additional geometric roadway adjustments would be required to accommodate the wider lanes and shoulders. This would also complicate the utility relocations and trigger additional impacts to provide the minimum safety clearance required by the utility companies.

Compared to the preferred alternative, Alternative 2 would result in a substantial increase in roadway widening with an increase in impervious area, railroad impacts, and utility pole relocations, along with over 2,000 additional square feet of wetland impacts as well as additional significant impacts to Bank, LUW, BLSF and Riverfront Area to meet the required design standards.

Below please also find a summary of mitigation measures for each impacted resource area in compliance with performance standards set forth for each area under 310 CMR 10.00:

Resource Area	Mitigation Measures
BVW	**A 3,510 SF wetland replication area has been designed to mitigate permanent BVW impacts. Temporarily disturbed wetlands will be restored.** **Erosion and sediment control (ESC) measures will be installed during construction to protect adjacent resource areas.**
LUW	**Streambed Restoration: natural streambed material proposed in areas where riprap is installed for scour countermeasures.**
Bank	**Riprap placed for scour countermeasures and bank stabilization will be vegetated with compost and seed mix to mitigate exposed riprap within resource areas.**
BLSF	**Compensatory flood storage of 4,161 CF is proposed to mitigate the 2,155 CF of fill within the floodplain in access of the required volume to comply with the WPA regulatory requirements. The 2,007 CF net cut will provide additional flood storage beneficial for the long-term climate adaptation/future flood mitigation.**
Riverfront Area	**Disturbances associated with this work and regrading have been minimized to the maximum extent practicable Disturbed previously degraded areas will be stabilized/loam and seed upon completion of construction.** **Restoration of disturbed area is proposed and will include but will not be limited to tree replanting, retaining any mature trees when feasible, invasive plant control, removal of all debris, grading to a topography which reduces runoff and increases infiltration, coverage by topsoil at a depth consistent with natural conditions at the site. The areas of proposed restoration within Riverfront Area on site exceed the amount of impacted undeveloped Riverfront Area at a ratio greater than 1:1.** **Minimal space is present where improvements to the Riverfront Area could be realized due to the corridor within the Riverfront Area being fairly developed.**

d) ***No Significant Adverse Impact:***

As shown in the table above, majority of work within Riverfront Area will occur within previously developed paved areas which are considered "degraded". Only a small portion of work (approx. 5.3%) will occur within the undeveloped Riverfront Area. As noted earlier, this work is associated with minor box widening to accommodate roadway improvements required to provide safety accommodations for all roadway users as well as the drainage improvements (proposed outfall on the east side of Route 38 north of the bridge (STA 252+40). No significant adverse impacts are anticipated, since all impacts have been minimized to the maximum extent practicable and the area will be stabilized upon completion of construction. The performance standards within BLSF overlapping the Riverfront Area and the BVWs within RFA are fully met for the project as a whole. Adjacent resource areas and their Buffer Zones will be protected by installation of **erosion and sediment control Best Management Practices (BMPs). The Buffer Zone areas impacted by the temporary work associated with regrading and placement of the**

erosion and sediments controls will be stabilized, and the natural cover will be restored after completion of work. Treatment of stormwater runoff from the proposed roadway will be improved over existing conditions. Therefore, the project is not expected to result in any significant adverse Impacts to resource areas.

2. Project plans indicate the bankfull width of Maple Meadow Brook, used to offset the RFA boundary, is approximately 500 feet wide on the downstream end of the Route 38 crossing. Please note the landward extent of the surface water of Maple Meadow Brook is not necessarily representative of bankfull width. StreamStats indicates a bankfull width of approximately 25 feet, which should be used as a starting point to determine an approximate bankfull width. Representative upstream or downstream reference reaches should also be used, if present, along with field indicators such as changes in vegetational community and depositional features to determine a more accurate bankfull width.

The project plans indicate that bank flags (BFs) were used to offset the RFA boundary. These bank flags are equivalent to Mean Annual Highwater (MAHW) flags used to delineate the inner boundary of the RFA. Due to significant ponding upstream and downstream of the bridge, the bank flags should not be used to determine bankfull width. However, these flags do accurately represent the mean annual highwater line (I.E. "the line that is apparent from visible markings or changes in the character of soils or vegetation due to the prolonged presence of water and that distinguishes between predominantly aquatic and predominantly terrestrial land").

3. All plan sheets depicting 100-foot Buffer Zones throughout the project should be provided.

Addressed – see attached Resource Area Impacts Sheets, revised on 5/22/2025.

4. Relative to USACE Comment 5, it is not clear why the permanent Bordering Vegetated Wetland (BVW) impacts at the intermittent stream culvert replacement (approximate Station 218+00) could not be temporary and the BVW restored. Please clarify the proposed final condition of this area and demonstrate the permanent BVW impacts are required, if applicable.

The area of BVW permanent impacts was considered to be up to the "slope limits" which was assumed to have involved minor regrading around the proposed riprap within this BVW, therefore, it was considered as a "permanent" impact. However, the comment prompted us to further evaluate these impacts, and it was determined that most of this area outside of the riprap placed in the stream for scour protection will remain a BVW upon completion of work with restoration measures performed to reestablish the natural wetland conditions in accordance with the MassDOT Special Provisions for Wetlands Restoration. In addition, the impacts at this culvert were revised based on the response to comment #4 below. All impact areas were revised accordingly (see attached Resource Area impacts Plan-1 and Special Drainage Structure No. 1 sheets, last revised 5/22/2025).

5. Please evaluate installation of a retaining wall along the west side of Route 38 from approximate Stations 138+50 to 241+00 to avoid or minimize permanent BVW impacts. If a retaining wall is not practicable, please evaluate a steeper slope (i.e., 1.5:1 as opposed to 2:1).

The option to install a retaining wall along the west side of Route 38 from STA. 238+50 to STA. 241+00 was previously evaluated and determined to be impractical. This was due to the proximity of the wetlands within 3 feet from the back of sidewalk and the placement of the wall footing in poor soil conditions within the wetland. Additionally, the retaining wall would need to extend an additional 177 feet into Butters Row from STA. 241+00 to avoid a short gap between the two walls. This wall extension

would result in increases to temporary and permanent wetland impacts of 117 SF and 68 SF, respectively. An alternative using a 1.5:1 slope with modified rockfill was also considered to reduce wetland impacts. However, this option did not offer significant improvements over the 2:1 slope. While using a steeper slope can typically reduce impacts, this case would've required us to install standard post guardrail with a level 3'-7" bench beyond the back of sidewalk for safety and constructability reasons per the latest edition of the AASHTO Roadside Design Guide. With a 2:1 slope, we were able to propose a deep post guardrail option, which eliminated the need for the 3'-7" bench behind the sidewalk. Because deep post guardrail cannot be embedded into modified rockfill, this was not an option with the 1.5:1 slope. Therefore, the 2:1 slope with a deep post guardrail was selected as the preferred alternative to avoid the additional 125 SF of wetland impacts present in the 1.5:1 slope option.

Additional minimization strategies were applied to all areas of impact along the entire Route 38 project area. As a result of this coordination, the Impacts Plans were revised throughout all permit applications to address the changes to the proposed structure as discussed above and other areas where impacts were reduced. The updated cumulative impacts subject to Section 401 of the Clean Water Act (CWA) Water Quality Certification application will be shared with MassDEP as part of the Responses to MassDEP Administrative Completeness and Technical Deficiency Review letter for 401 WQC Transmittal No. 25-WW26-0013-APP.

The revised NOI Resource Area Impacts Plans are attached to these Responses. The following table provides the updated Impacts for the Route 38 project subject to the DEP File No. 344-1566:

Resource Area	Permanent Impacts (SF)	Temporary Impacts (SF)	Total Per Area
VW	2,625	2,204	4,829
LUW	400	61	461
Total	**3,025**	**2,265**	**5,290**

Applying multiple avoidance and minimization strategies, the overall permanent impacts to BVWs subject to the Noice of Intent filing (DEP File No. 344-1566) were reduced from 2,806 SF to 2,625 SF, while the temporary impacts to BVWs were also slightly reduced; the cumulative BVW impacts no longer exceed 5,000 square feet. The LUW impacts at the Dublin Avenue were also slightly reduced. The revised p.3 of 9 of the WPA Form 3 reflecting the impact changes also accompanies these Responses.

6. The application states that the culvert at the intermittent stream at STA 218+00 is 3.5 feet wide and the proposed culvert is 3.0 feet wide. Please provide the measured bankfull width and evaluation of how the proposed 3-foot-wide culvert meets the MA Stream Crossing Standards to the Maximum Extent Practicable. In addition, please provide an evaluation of whether the culvert may be further widened to better meet Stream Crossing Standard 3. Note the width of the culvert beneath the railroad tracks upstream of this crossing does not preclude and has no bearing on the potential widening of this structure.

The existing culvert is 3' W by 1.5' D as shown on the plans and confirmed during the field check on 5/6/2025. The permit reports and hydraulic analysis inadvertently used the incorrect width of the existing culvert based on the old record plans.

We have reevaluated the opportunities to improve the crossing in order to comply with the State Stream Crossing Standards to the Maximum Extent Practicable (MEP) as discussed below. As a result, the Hydraulic Analysis Memo was revised to address the proposed widened box culvert on 5/21/2025 and is attached to these Responses.

Below please find the revised compliance discussion for the replacement of the subject stream crossing at STA. 218+00 with the Massachusetts River and Stream Crossing Standards:

Stream Crossing (Sta. #)	SCGS #1	SCGS #2	SCGS #3	SCGS #4	SCGS #5	SCGS #6
Culvert Replacement at Sta. 218+00	MEP	MEP	Met	Met	Met	MEP

SCGS #1 posits that "*Spans (bridges, 3-sided box culverts, open-bottom culverts or arches) that preserve the natural stream channel are strongly preferred*."

- **The existing 3'x1.5' obstructed culvert is not an open bottom structure and will be replaced with the proposed 4'x3' precast concrete box culvert. This culvert conveys an intermittent stream that does not have a year-round flow and it outfalls into a Vegetated Wetland (VW) (A-series). There is another culvert upstream of the culvert inlet conveying this intermittent stream beneath the MBTA railroad tracks, which is not being replaced as part of this project. Both of the existing culverts beneath the MBTA railroad tracks and Route 38 are not an open bottom structure, and replacement of the culverts with open bottom structures is not feasible due to constructability constraints related to existing utilities and will cause more impacts to the surrounding VWs. However, despite it not being an open bottom crossing, the proposed 4'W x 3'D box culvert will still be embedded and have natural streambed materials restored to effectively have a natural bottom. Therefore, <u>this standard is met to the maximum extent practicable.</u>**

SCGS #2 provides recommendations for a culverted crossing to be embedded a minimum of 2 feet.

- **The existing culvert is not embedded 2 feet or more. The proposed replacement culvert will be embedded less than 2 feet (approximately 18") due to the distance needed to be maintained for the existing utilities while the trenching for the culvert and the proposed utilities that will pass below the culvert are installed. Natural streambed material proposed at the bottom of the proposed culvert will be at the same elevation as the existing surface. <u>Therefore, this standard is met to the maximum extent practicable.</u>**

SCGS #3 calls for a new span to incorporate a width that, at a minimum, equals 1.2 times bankfull width of the stream.

- **The existing structure does not comply with the SCGS #3. We have reevaluated the opportunities to improve the crossing in order to comply with the State Stream Crossing Standards to the Maximum Extent Practicable (MEP). Since the unnamed intermittent stream flows north of the culvert into a small phragmites marsh (Wetland Series "A"), where standing water is present, there are no clearly defined bankfull indicators for this intermittent stream. The soils are predominantly histosols, and the vegetation is primarily non-woody (consisting mainly of phragmites). Under these conditions, the banks of the stream would be interpreted as the edge of the marsh itself. However, measuring the width from the edges of the marsh would not provide representative measurements of the stream's bankfull width. Instead,**

measurements should be taken further downstream, where the stream exits the phragmites marsh and clearly defined banks are present. The bankfull width for this stream can only be estimated using StreamStats approximately 700 feet northwest of the crossing, where the stream is within the extensive marsh area. The bankfull width (BFW) is 3.14 ft (based on the Bankfull Statistics Parameters [USA Bieger 2015], Bankfull Statistics Flow Report [Area-Averaged]). Based on the constraints imposed by the crossing telephone, water and gas utilities, the maximum practicable size of the proposed culvert is a 4'-wide and 3'-deep structure. Because the existing utilities need to be maintained while the trenching for the culvert and the proposed utilities that will pass below the culvert are installed, the maximum size of this culvert is 4'x3'. Widths over 4' require different strategies for the support of excavation which will be disruptive to critical utilities.

Considering the observed existing conditions and hydraulic calculations for this site as discussed above, widening the proposed crossing to 4' would slightly exceed the 1.2 x BWF measurement and will provide the improved crossing for wildlife under proposed conditions. This standard is fully met.

SCGS #4 calls for placement of natural substrate within the structure.

- **As shown in the plans, the proposed replacement of the culvert at Sta. 218+00 will incorporate natural substrate as part of the streambed restoration. In addition, rip rap placed at the inlet and outlet for scour protection will be fully covered in a layer of natural streambed material. This standard is fully met.**

SCGS #5 calls for "*… bed forms and streambed characteristics so that water depths and velocities are comparable to those found in the natural channel at a variety of flows*."

- **The proposed replacement of the culvert at Sta. 218+00 will maintain bed forms and streambed characteristics comparable to those found in the natural channel at a variety of flows. Natural streambed materials will be placed at the same elevation to match the existing streambeds which will allow for a smooth transition from upstream to downstream of the crossing upon completion of construction. This standard is fully met.**

SCGS #6 provides a desired level of "*openness*" for stream crossings so that wildlife will utilize the crossing for passage beneath a roadway. The desired ratio of cross-sectional area of opening to passage length is a minimum value of 0.82 feet.

- **The existing cross-sectional area is 4.5 square feet divided by the existing passage length of 47.65 feet, yields a value of 0.09 feet, therefore, the existing culvert does not meet Standard #6 by providing a minimum level of openness of 0.82 feet. However, the project proposes the replacement of the existing 3'x1.5' obstructed culvert with a 4'x3' precast concrete box culvert. The size of the opening will be increased under the proposed conditions with a 12" layer of natural stream bottom placed in the culvert body. The proposed cross-sectional area of 8 square feet divided by a proposed passage length of 55.32 feet, both as shown in the Plans, yields a value of 0.14 feet, which is an improvement from the existing conditions. Substantial enlargement of the structure is not feasible due to constructability constraints discussed above under SCGS #3 and additional impacts to adjacent protected resource areas (VW A-series). Therefore, this standard is met to the maximum extent practicable.**

7. The amount of proposed riprap within and adjacent to the Maple Meadow Brook crossing appears excessive for this type of headwater low energy system. Potential solutions that have been incorporated into previous projects include reshaping the riprap fill areas to follow more natural drainage patterns and removing riprap from adjacent BVWs to the extent practicable. Please evaluate these measures, and any other practicable measures, to reduce the footprint of riprap within and adjacent to Maple Meadow Brook. A reduction in BVW alteration may result in a commensurate reduction in the required BVW replication.

The hydraulic requirements to mitigate scour were reevaluated and the amount of riprap on the downstream side was reduced outside of the area of the channel's flow. The reduction of riprap on the upstream side is not recommended in order to protect against contraction scour through the bridge opening. The limit of the scour protection is designed in accordance with FHWA HEC-23 guidelines and limited to the area of the flow as it approaches the bridge opening.

After further evaluation, additional reduction of impacts was achieved at the Maple Meadow Brook crossing, which will be shared as part of Responses to MassDEP comments on the Section 401 of the Clean Water Act (CWA) Water Quality Certification application (WQC Application No. 25-WW26-0013-APP).

8. The narrative states there will be two 11-foot-wide southbound travel lanes for 900 feet south of the intersection of Route 62 and Route 38. Please clarify whether the roadway will be widened a lane width or more in this area, and if so, full compliance with the Stormwater Management Standards is required for that portion of the project.

The proposed two (2) 11-foot-wide southbound travel lanes extending for 900 feet just south of the intersection of Route 62 and Route 38 consist of a combination of box-widening and restriping of the existing paved roadway. Therefore, the proposed shoulder widening between 6'-6" and 7'-6" does not constitute an addition of a new single lane. Throughout this segment of roadway, the existing lane and shoulder widths are approximately 12'-6" and 2'-6", respectively. The proposed widening between 6'-6" and 7'-6" aims to achieve the goal of creating adequate shoulder and buffer width for safe bicycle accommodations. Therefore, it is our understanding that the proposed widening at this segment does not constitute an addition of a new single lane, and the project meets the definition of both the "Limited Project" under the WPA and the "Redevelopment" project under the MA Stormwater Management Standards.

9. Please evaluate installing a Stormwater Control Measure (SCM) within the proposed compensatory flood storage area to better meet the Stormwater Management Standards to the maximum extent practicable.

The goal of the proposed design for the Compensatory Flood Storage Area is to protect/retain the existing mature trees in this area as much as feasible, which is why the limit of work is irregular. This floodplain mitigation measure is located within a 0-100ft segment of the vegetated Riverfront Area. The mature vegetation within Riverfront Areas is known to provide a natural buffer for stormwater discharging into this area to go through prior to reaching the surface waters. Groundwater is typically high in such areas due to close proximity to Wetland "G", therefore surface SCM is likely not feasible. Subsurface SCM would likely require removal of trees. Compensatory flood storage area was designed to provide compensation on a foot-by-foot basis as well as to minimize impacts adjacent to wetland. Therefore, SCM is not feasible.

10. It appears Stormwater Management Standard 3 has been met using the macro approach, rather than met to the maximum extent practicable. Standard 3 requires the annual recharge from the

post-development site to approximate the annual recharge from pre-development conditions. MassDEP notes that providing the required recharge for the net increase in impervious surface meets Standard 3.

Correct. The standard 3 is met to the MEP by providing (and exceeding) recharge volume for the net increase in impervious area.

11. MassDEP requests a meeting to discuss how the Estimated Seasonal High Groundwater (ESHGW) was determined for the infiltration SCMs, as well as to discuss the conclusions regarding ESHGW for SCM-2. Redoximorphic features used to identify ESHGW were not identified in the test pits or boring logs. Additional investigation may be needed to establish ESHGW at the infiltration SCMs.

The ESHGW for SCMs was determined through observations of the moisture content in the borings, which were analyzed the same day as they were performed (as indicated in the boring logs). In addition, the geotechnical team confirmed through the site photos that redox features were not present in the test pits or boring samples that were used to analyze ESHGW below the proposed SCMs.

For SCM-1, boring hole BH #2 from Lamson's Geotechnical report was used to determine the ESHGW elevation. BH #2 extended 15’ below the surface at elevation 79.4’ and no groundwater was encountered, which is more than 2’ below the bottom of SCM-1. Based on engineering judgement, we believe SCM-1 has more than 2’ of separation to ESHGW.

For SCM-3, boring hole BH #3 from Lamson's Geotechnical report was used to determine the ESHGW elevation. Groundwater was encountered 9’ below the surface in BH #3, which is more than 2’ below the bottom of SCM-3. Based on engineering judgement, we believe SCM-1 has more than 2’ of separation to ESHGW.

For SCM-2, the test pit TP #4 and boring hole BH #3 from Lamson's Geotechnical report were used to determine the ESHGW elevation. TP #4 was located within proposed SCM-2 and did not encounter ESHGW (bottom of test pit was at 83.8', bottom of SCM-2 is at elevation 85.0'). TP #4 located within the proposed SCM-2 did not have any indication of moisture content. BH #3, though it is outside of the immediate area of SCM-2, is within the same watershed and ground elevation. It was used to demonstrate more than 2' separation to groundwater from the bottom elevation of the infiltration basin (GW is at 80.7' per BH #3), since TP #4 was 1.2' below the bottom of the proposed basin. The grade difference between the existing surface elevation at SCM-2 and BH #3 surface elevation are close (89.7' versus ~90'), which is why proceeded with this approach.

See photos BH #3 (Sample 4) and TP #4 below:



Picture 1 *– Boring # 3 (Sample 4)*



Picture 2 *– Test Pit # 4*

Due to the accelerated project schedule and the anticipated advertisement date in August 2025, if DEP finds that a new test pit at SCM-2 is required, we request this to be added as a special permit condition for this work to be completed. If acceptable, we will perform the test pit before advertising the project in order to adjust the depth of the basin as needed, based on the observed groundwater table

12. SCM inspection and maintenance frequencies need to be in accordance with Volume 2, Chapter 2 of the Massachusetts Stormwater Handbook.

We have revised the O&M Plan to include DEP maintenance frequencies. MassDOT strives to achieve maintenance frequencies outlined in MassDEP's Stormwater Handbook for the inspection and maintenance of their SCMs as listed in the table below. However, it is a challenge for MassDOT to meet the stated frequencies set forth by MassDEP as a statewide agency. As a result of this, MassDOT is in the process of developing a Programmatic Operation and Maintenance Plan (POMP) which will allow for the O&M of the stormwater assets to be executed using a data driven approach. Once established, the POMP will supersede the project-specific O&M plan.

Activity	Frequency
Subsurface Chamber System: Inspect inlets (SCM-1 and SCM-3)	**Twice a year. Remove any debris that might clog the system.**
Inspect sediment forebays (SCM-2)	**Monthly**
Clean sediment forebays (SCM-2)	**Four times per year and when sediment depth is between 3 to 6 feet.**
Infiltration Basin: Preventative maintenance (SCM-2)	**Twice a year**
Infiltration Basin: Inspect to ensure proper functioning (SCM-2)	**After every major storm during first 3 months of operation and twice a year thereafter and when there are discharges through the high outlet orifice.**

Infiltration Basin: Mow the buffer area, side slopes, and basin bottom if grassed floor; rake if stone bottom; remove trash and debris; remove grass clippings and accumulated organic matter (SCM-2)	**Twice a year**
Infiltration Basin: Inspect and clean pretreatment devices (SCM-2)	**Every other month recommended and at least twice a year and after every major storm event.**

13. Please sign and date the Illicit Discharge Compliance Statement at the end of the Stormwater Management Report.

While the unsigned version of the Stormwater Report was inadvertently sent with WQC submission, the correct versions of the Stormwater Report, dated March 2025 which includes signed IDCS was submitted with the Notice of Intent submission to MassDEP NERO and Wilmington Conservation Commission on 3/13/2025.

Enclosed with this letter response are the following documents:

- MassDEP Comment letter and Technical Comments for DEP File # 344-1566, received on 5/6/20265
- p.3 of 9 of the WPA Form 3
- Hydraulic Memo for Culvert Structure No. 1, dated 5/20/2025
- Revised NOI Resource Area Impact Plans, dated 5/22/2025
- Revised Drainage and Utility Plan (selected sheets), dated 5/22/2025
- Revised Special Drainage Structure No. 1 Sheets, dated 5/22/2025

ATTACHMENTS

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY & ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NORTHEAST REGIONAL OFFICE
150 PRESIDENTIAL WAY, WOBURN, MA 01801 978-694-3200

MAURA T. HEALEY
Governor

KIMBERLEY DRISCOLL
Lieutenant Governor

REBECCA L. TEPPER
Secretary

BONNIE HEIPLE
Commissioner

DATE: May 6, 2025

Municipality WILMINGTON
(city/town)

RE: NOTIFICATION OF WETLANDS PROTECTION ACT FILE NUMBER

The Department of Environmental Protection has received a Notice of Intent filed in accordance with the Wetlands Protection Act (M.G.L. c. 131, §40):

Applicant:	MASS DOT HIGHWAY DIVISION	Owner:	
Address:	10 PARK PLAZA, ROOM 7360 BOSTON, MA 02116	Address:	
LOCUS:	ROUTE 38 RECONSTRUCTION		

This project has been assigned the following file # : NE 344-1566

A FILE NUMBER ONLY INDICATES THAT THE APPLICATION CONTAINS THE MINIMAL SUBMITTAL REQUIREMENTS AND IS ADMINISTRATIVELY COMPLETE - NOT THAT THE INFORMATION IN THE APPLICATION IS ADEQUATE FOR ISSUANCE OF AN ORDER OF CONDITIONS.

Although a file # is being issued, please note the following:

In brief, technical comments address the applicability of minor project status and exemptions, bankfull width designation, wetland impact minimization, the MA Stream Crossing Standards, extent of scour protection, and stormwater.

Please request full comments by emailing Alicia.Geilen@mass.gov.

ADDITIONAL REQUIREMENTS:
A 401 Water Quality Certification (WQC) (314 CMR 9.00) may be required for this project. The project qualifies for 401 Certification under the Army Corps of Engineers General Permit for Massachusetts (MAGP), provided that the project meets certain conditions outlined in 314 CMR 9.03 and 9.04, and the conditions under MAGP. WQC information is available at https://www.mass.gov/regulations/314-CMR-9-401-water-quality-certification and MAGP information is available at http://www.nae.usace.army.mil/Missions/Regulatory/StateGeneralPermits/MassachusettsGeneralPermit.aspx.

401 WQC applications must now be submitted electronically through EEA's ePLACE online tool at https://www.mass.gov/lists/water-quality-certification-forms-massdep. MASSDEP WILL NO LONGER ACCEPT

MASS DOT HIGHWAY DIVISION
10 PARK PLAZA, ROOM 7360
BOSTON, MA 02116

PAPER APPLICATIONS FOR THESE FILINGS. General instructions and visual EEA ePLACE step-by-step instructions to assist in submitting your application are available online at https://www.mass.gov/how-to/ww-10-11-majorminor-fill-and-excavation-projects. and https://www.mass.gov/how-to/ww-07-08-09-water-quality-certifications-dredging-projects

Review under Section 404 may be required. (Call 1-800-362-4367 for information).

If you have any questions regarding this letter, please contact: ALICIA GEILEN @ alicia.geilen@mass.gov

Cc: Wilmington Conservation Commission, Town Hall 121 Glen Rd, Wilmington, MA, 01887

This information is available in alternate format. Call Donald M. Gomes, ADA Coordinator at 617-556-1057. TDD# 1-866-539-7622 or 1-617-574-6868.
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Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

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Governor

Kimberley Driscoll
Lieutenant Governor

Rebecca L. Tepper
Secretary

Bonnie Heiple
Commissioner

MassDEP Northeast Regional Office, Wetlands Program
Technical Comments for DEP File# 344-1566
Route 38 Reconstruction in Wilmington, MA

1. Please note it does not appear that all work within the Riverfront Area (RFA) is grandfathered or exempted per 10.58(6)(a) as portions will occur within other wetland resource areas (Bordering Land Subject to Flooding) and 100-foot Buffer Zone. Similarly, the minor activity exemption at 310 CMR 10.02(2)(b)2.p. does not apply to portions of the project where the roadway will be slightly widened in the RFA and a new drainage system will be installed as the exemption is only applicable to adjustments and/or repairs to respective structures within the roadway.
2. Project plans indicate the bankfull width of Maple Meadow Brook, used to offset the RFA boundary, is approximately 500 feet wide on the downstream end of the Route 38 crossing. Please note the landward extent of the surface water of Maple Meadow Brook is not necessarily representative of bankfull width. StreamStats indicates a bankfull width of approximately 25 feet, which should be used as a starting point to determine an approximate bankfull width. Representative upstream or downstream reference reaches should also be used, if present, along with field indicators such as changes in vegetational community and depositional features to determine a more accurate bankfull width.
3. All plan sheets depicting 100-foot Buffer Zones throughout the project should be provided.
4. Relative to USACE Comment 5, it is not clear why the permanent Bordering Vegetated Wetland (BVW) impacts at the intermittent stream culvert replacement (approximate Station 218+00) could not be temporary and the BVW restored. The proposed final condition of this area should be clarified and demonstrate the permanent BVW impacts are required, if applicable.
5. Installation of a retaining wall along the west side of Route 38 from approximate Stations 138+50 to 241+00 should be evaluated to avoid or minimize permanent BVW impacts. If a retaining wall is not practicable, a steeper slope (i.e., 1.5:1 as opposed to 2:1) may be possible.

This information is available in alternate format. Please contact Melixza Esenyie at 617-626-1282.
TTY# MassRelay Service 1-800-439-2370
MassDEP Website: www.mass.gov/dep

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6. The application states that the culvert at the intermittent stream at STA 218+00 is 3.5 feet wide and the proposed culvert is 3.0 feet wide. The measured bankfull width and evaluation of how the proposed 3-foot-wide culvert meets the Massachusetts Stream Crossing Standards to the Maximum Extent Practicable should be provided. An evaluation of whether the culvert may be further widened to better meet Stream Crossing Standard 3 should also be provided. Note the width of the culvert beneath the railroad tracks upstream of this crossing does not preclude and has no bearing on the potential widening of this structure.

7. The amount of proposed riprap within and adjacent to the Maple Meadow Brook crossing appears excessive for this type of headwater low energy system. Potential solutions that have been incorporated into previous projects include reshaping the riprap fill areas to follow more natural drainage patterns and removing riprap from adjacent BVWs to the extent practicable. These measures, and any other practicable measures, should be evaluated to reduce the footprint of riprap within and adjacent to Maple Meadow Brook. A reduction in BVW alteration may result in a commensurate reduction in the required BVW replication.

8. The narrative states there will be two 11-foot-wide southbound travel lanes for 900 feet south of the intersection of Route 62 and Route 38. Whether the roadway will be widened a lane width or more in this area should be clarified. If so, that portion of the project would not meet the limited project status at 310 CMR 10.53(3)(f), and full compliance with the Stormwater Management Standards is required for that portion of the project.

9. Installing a Stormwater Control Measure (SCM) within the proposed compensatory flood storage area to better meet the Stormwater Management Standards to the maximum extent practicable should be evaluated.

10. It appears Stormwater Management Standard 3 has been met using the macro approach, rather than met to the maximum extent practicable. Standard 3 requires the annual recharge from the post-development site to approximate the annual recharge from pre-development conditions. MassDEP notes that providing the required recharge for the net increase in impervious surface meets Standard 3.

11. Please note MassDEP has requested a meeting with MassDOT and their consultant to discuss how the Estimated Seasonal High Groundwater (ESHGW) was determined for the infiltration SCMs, as well as to discuss the conclusions regarding ESHGW for SCM-2. Redoximorphic features used to identify ESHGW were not identified in the test pits or boring logs. Additional investigation may be needed to establish ESHGW at the infiltration SCMs.

12. SCM inspection and maintenance frequencies need to be in accordance with Volume 2, Chapter 2 of the Massachusetts Stormwater Handbook.

13. The Illicit Discharge Compliance Statement at the end of the Stormwater Management Report should be signed and dated.

For questions of clarification, please contact Alicia.Geilen@mass.gov.

Revised p.3 of 9 of the WPA Form 3

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
MassDEP File Number
Document Transaction Number
Wilmington
City/Town

B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

For all projects affecting other Resource Areas, please attach a narrative explaining how the resource area was delineated.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☒ Bank	64 (perm); 15 (temp) 1. linear feet	to be restored 2. linear feet
b. ☒ Bordering Vegetated Wetland	2,625 (perm); 2,204 (temp) 1. square feet	3,510 2. square feet
c. ☒ Land Under Waterbodies and Waterways	400 (perm); 61 (temp) 1. square feet	to be restored 2. square feet
	3. cubic yards dredged	

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
d. ☒ Bordering Land Subject to Flooding	6,815 1. square feet	4,261 2. square feet
	2,155 3. cubic feet of flood storage lost	4,161 4. cubic feet replaced
e. ☐ Isolated Land Subject to Flooding	1. square feet	
	2. cubic feet of flood storage lost	3. cubic feet replaced
f. ☒ Riverfront Area	Maple Meadow Brook (inland) 1. Name of Waterway (if available) - **specify coastal or inland**	

2. Width of Riverfront Area (check one):

☐ 25 ft. - Designated Densely Developed Areas only

☐ 100 ft. - New agricultural projects only

☒ 200 ft. - All other projects

3. Total area of Riverfront Area on the site of the proposed project: 86,013 square feet

4. Proposed alteration of the Riverfront Area:

a. total square feet	b. square feet within 100 ft.	c. square feet between 100 ft. and 200 ft.
68,532	46,929	21,603

5. Has an alternatives analysis been done and is it attached to this NOI? ☒ Yes ☐ No

6. Was the lot where the activity is proposed created prior to August 1, 1996? ☒ Yes ☐ No

3. ☐ Coastal Resource Areas: (See 310 CMR 10.25-10.35)

Note: for coastal riverfront areas, please complete **Section B.2.f**. above.

Hydraulic Memo for Culvert Structure No. 1

GREEN
A Lochner Company

MEMORANDUM

To:	Eamon Kernan P.E.
Cc:	Hanan Fouad, P.E.
From:	Andrew Feingold, P.E.
Date:	May 21, 2025
Project Name:	Reconstruction on Route 38 (Main Street)
Project Number:	MassDOT Project No. 608051
Subject:	Dublin Avenue Hydraulic Memo

The project MassDOT Project No. 608051 consists of the reconstruction/rehabilitation of Route 38 (Main Street) from the Woburn Town Line to the Route 62 (Burlington Avenue/Church Street) intersection (approximately 2.2 miles). The proposed roadway curb to curb width is 32 feet with sidewalk(s) along the project corridor. The proposed improvements consist of maintenance and improvement of the existing roadway. The work includes improving existing drainage systems, improving existing water system, constructing sidewalks, repaving, and minor sewer improvements.

As part of the drainage improvements, the existing 3' x 1.5' box culvert crossing Main Street between Dublin Avenue and Montrose Avenue will be replaced by a 36-inch diameter reinforced concrete culvert. The purpose of this report is to present the results of a capacity and scour analysis study analyzing both the existing and proposed conditions at this crossing.

PROJECT DESCRIPTION

EXISTING CONDITIONS

The existing culvert is nearly 46 feet long, with a 3-foot wide and 1.5-foot tall rectangular cross section. It is oriented south to north and is downstream of a 2.5' x 2.5' box culvert that crosses the MBTA tracks that run parallel to Main Street on the southwestern side. The MBTA culvert acts as a control structure from a wetland storage area *P-1* to the southwest of the train tracks. There are three additional culverts attached to the same wetland storage area *P-1*. Two of the additional culverts discharge to the same wetland *W-1* as the Dublin Avenue culvert, and the third discharges to a separate wetland *W-2*. The locations of the culverts and wetlands are shown in Figure 1.

PROPOSED CONDITIONS

Under proposed conditions, the existing 3' x 1.5' box culvert will be replaced with a 56-foot long 4'x3' reinforced concrete culvert. The proposed 4'x3' box culvert will have 1' of fill comprised of natural stream bed material and stone for pipe end, resulting in a hydraulic opening of 4'x2'.



Figure 1– Box culvert outlet under railroad tracks west of Route



Figure 2– Box culvert inlet on the western side of Route 38

ENGINEERING METHODS

GENERAL

Topographic survey data and MassMapper GIS Contour Lines were used to determine catchment and wetland areas. A summary of the watershed area is provided in Table 1.

Table 1: Summary of Watershed Area

Ground Cover Type	Area (Acres)	CN
Water Surface	33.46	98
Impervious	44.96	98
Forested	47.21	77
Total	**125.63**	**90**

The contours and topographic data were used to model the wetland storage area in HydroCAD, and the model used to calculate the peak flow through the four outlet culverts (Appendix A). Record plans provided by the Town of Wilmington were used to model the three additional culverts outside of the project area. Based on the record information, the invert of the Dublin Avenue culvert is higher than the other three culverts. For the purposes of the model, the inverts of all the culverts were assumed to be equal in order to model the worst-case scenario. The peak flows through the Dublin Avenue culvert are shown in Table 2.

Table 2: Summary of Peak Flows Through Dublin Avenue Culvert

Design Storm	Peak Flow
25-yr	39.4 cfs
50-yr	41.1 cfs
100-yr	43.2 cfs

Hydraflow Express Extension for Autodesk was used to model the culvert under existing and proposed conditions. For the purposes of the hydraulic model, it was assumed that the culvert is free of sediment and obstructions, other than the 1' of material placed at the bottom. The water surface elevation is calculated to be 85.48', with 2.52' of freeboard remaining to the roadway surface. This meets the requirements of the MassDOT Project Development Design Guide.

SCOUR/STABILITY ANALYSIS

We calculated the scour hole dimensions (length, width, and depth) using the Hydraulic Engineering Circular (HEC) No. 14; "Hydraulic Design of Energy Dissipators for Culverts and Channels" Chapter 5:

"Estimating Scour at Culvert Outlets" and using equation 5.1 for cohesionless soils shown below:

$$\left[\frac{h_s}{R_c}, \frac{W_s}{R_c}, \frac{L_s}{R_c}, \frac{V_s}{R_c^3}\right] = C_s C_h \left(\frac{\alpha}{\sigma^{1/3}}\right) \left(\frac{Q}{\sqrt{g}(R_c^{2.5})}\right)^{\beta} \left(\frac{t}{316}\right)^{\theta}$$

The equations are based on tests that were conducted to determine the maximum scour for the given

condition and therefore represent what might be termed worst case scour geometries.

We utilized the flows with the highest exit velocities for analyzing the scour hole dimensions of each culvert. No scour potential under current conditions was calculated although the site conditions were reviewed to assess the current scour conditions.

The scour calculations were performed with the understanding that the channel downstream of the culvert will be lined with Type I Riprap. The results of the scour analyses are shown in Table 5.1.

Table 5.1 – Summary of Calculated Scour

Alternative	Return Frequency	Scour Hole Depth (Feet)	Scour Hole Width (Feet)	Scour Hole Length (Feet)	Scour Hole Volume (Cubic Feet)	Location of Maximum Scour (Feet)
Dublin Avenue	Peak Velocity Flow (43.2 cfs during a 100-year event)	3.95	17.1	33.8	1,103	13.5

The values shown in the table above are not supported by the field observation. The observed scour hole measures approximately 10' wide by 10' long by 2' deep. The likely reason that Equation 5.1 is calculating a higher amount of scour is that the tailwater depth is not directly considered by the equation. The culvert at this location is regularly submerged after smaller storm events. A higher tailwater condition will reduce the velocity and the amount of scour within the channel. In order to minimize impacts within the wetland the area that is protected by the scour mitigation will be limited to the area of observed scour in the existing conditions.

Scour Countermeasures

The scour/stability analyses were performed using Hydraulic Engineering Circular (HEC) No. 14; "Hydraulic Design of Energy Dissipators for Culverts and Channels" Chapter 10: "Riprap Basins and Aprons" and using equation 10.4 shown below:

$$D_{50} = 0.2\,D\left(\frac{Q}{\sqrt{g}D^{2.5}}\right)^{4/3}\left(\frac{D}{TW}\right)$$

Table 5.2 displays dimensions for riprap apron at the proposed culverts.

Table 5.2 – Summary of Countermeasure Design

Alternative	Riprap Size D_{50} (Inches)	Riprap Class	Riprap Apron Length-Upstream (Feet)	Riprap Apron Length-Downstream (Feet)	Riprap Apron Depth (Feet)	Riprap Apron Width (Feet)
Dublin Avenue	6.5	Class 1	10*	10.7	1.9	15.1

*Channel is only open 10’ upstream before the next culvert opening.

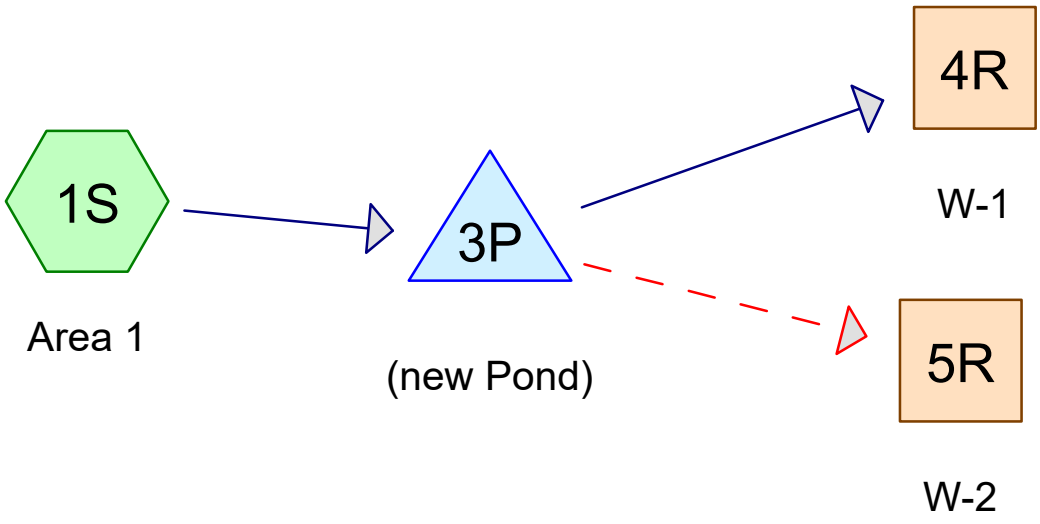
In order to minimize impacts on the wetland the area the scour mitigation will be limited to the area of observed scour. The proposed hydraulic opening of the culvert is larger than the existing hydraulic opening, therefore, discharge velocities and scour will be reduced at the culvert outlet, and protecting the area of observed scour will be sufficient.

CONCLUSIONS

- The project hydraulic model indicates that the proposed culvert replacement will safely convey the 50-year design flood event.
- By increasing the hydraulic opening of the culvert the scour potential at the outlet is reduced.
- The scour protection apron at the eastern embankment must be 14 feet length to protect against the Design Scour event. However, in order to minimize permanent impacts to the wetland the protection will be limited to the area of observed scour.
- The design incorporates the scour countermeasures, as described above.

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HYDRAULICS
HYDRAFLOW EXPRESS
MODEL



Subcat Reach Pond Link

Routing Diagram for Wilmington Culvert 1
Prepared by Green International Affiliates, Inc.. by V. Palma, Printed 10/26/2023
HydroCAD® 10.00-24 s/n 06415 © 2018 HydroCAD Software Solutions LLC

Wilmington Culvert 1
Prepared by Green International Affiliates, Inc.. by V. Palma Printed 10/26/2023
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Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
33.455	98	Paved parking, HSG D (1S)
44.958	98	Water Surface, HSG D (1S)
47.212	77	Woods, Good, HSG D (1S)
125.625	**90**	**TOTAL AREA**

Wilmington Culvert 1
Prepared by Green International Affiliates, Inc.. by V. Palma Printed 10/26/2023
HydroCAD® 10.00-24 s/n 06415 © 2018 HydroCAD Software Solutions LLC

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
125.625	HSG D	1S
0.000	Other	
125.625		**TOTAL AREA**

Wilmington Culvert 1

Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	3P	83.00	82.52	10.0	0.0480	0.014	36.0	36.0	0.0
2	3P	83.00	82.52	54.8	0.0088	0.014	24.0	24.0	0.0
3	3P	83.00	82.52	54.8	0.0088	0.014	24.0	24.0	0.0
4	3P	83.00	82.52	54.8	0.0088	0.014	12.0	0.0	0.0

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

Subcatchment1S: Area 1 Runoff Area=5,472,214 sf 62.42% Impervious Runoff Depth>4.28"
Flow Length=2,880' Slope=0.0512 '/' Tc=23.0 min CN=90 Runoff=372.78 cfs 44.801 af

Reach 4R: W-1 Inflow=105.73 cfs 41.558 af
Outflow=105.73 cfs 41.558 af

Reach 5R: W-2 Inflow=5.65 cfs 3.169 af
Outflow=5.65 cfs 3.169 af

Pond 3P: (new Pond) Peak Elev=86.49' Storage=417,777 cf Inflow=372.78 cfs 44.801 af
Primary=105.73 cfs 41.558 af Secondary=5.65 cfs 3.169 af Outflow=111.38 cfs 44.726 af

Total Runoff Area = 125.625 ac Runoff Volume = 44.801 af Average Runoff Depth = 4.28"
37.58% Pervious = 47.212 ac 62.42% Impervious = 78.413 ac

Summary for Subcatchment 1S: Area 1

Runoff = 372.78 cfs @ 12.32 hrs, Volume= 44.801 af, Depth> 4.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=5.87"

Area (sf)	CN	Description
1,958,378	98	Water Surface, HSG D
1,457,297	98	Paved parking, HSG D
2,056,539	77	Woods, Good, HSG D
5,472,214	90	Weighted Average
2,056,539		37.58% Pervious Area
3,415,675		62.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.0	2,880	0.0512	2.09		**Lag/CN Method,**

Summary for Reach 4R: W-1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 125.625 ac, 62.42% Impervious, Inflow Depth > 3.97" for 25-Year event
Inflow = 105.73 cfs @ 12.85 hrs, Volume= 41.558 af
Outflow = 105.73 cfs @ 12.85 hrs, Volume= 41.558 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Reach 5R: W-2

[40] Hint: Not Described (Outflow=Inflow)

Inflow = 5.65 cfs @ 12.85 hrs, Volume= 3.169 af
Outflow = 5.65 cfs @ 12.85 hrs, Volume= 3.169 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Pond 3P: (new Pond)

[82] Warning: Early inflow requires earlier time span

Inflow Area = 125.625 ac, 62.42% Impervious, Inflow Depth > 4.28" for 25-Year event
Inflow = 372.78 cfs @ 12.32 hrs, Volume= 44.801 af
Outflow = 111.38 cfs @ 12.85 hrs, Volume= 44.726 af, Atten= 70%, Lag= 31.7 min
Primary = 105.73 cfs @ 12.85 hrs, Volume= 41.558 af
Secondary = 5.65 cfs @ 12.85 hrs, Volume= 3.169 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Peak Elev= 86.49' @ 12.85 hrs Surf.Area= 0 sf Storage= 417,777 cf

Plug-Flow detention time= 23.5 min calculated for 44.570 af (99% of inflow)
Center-of-Mass det. time= 22.5 min (791.5 - 768.9)

Volume	Invert	Avail.Storage	Storage Description
#1	83.00'	7,386,022 cf	**Custom Stage Data**Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
83.00	0	0
86.00	13,729	13,729
87.00	825,465	839,194
88.00	1,738,264	2,577,458
89.00	2,221,557	4,799,015
90.00	2,587,007	7,386,022

Device	Routing	Invert	Outlet Devices
#1	Primary	83.00'	**36.0" W x 36.0" H Box Culvert** L= 10.0' Box, 0° wingwalls, square crown edge, Ke= 0.700 Inlet / Outlet Invert= 83.00' / 82.52' S= 0.0480 '/' Cc= 0.900 n= 0.014 Concrete pipe, finished, Flow Area= 9.00 sf
#2	Primary	83.00'	**24.0" W x 24.0" H Box Culvert** L= 54.8' Box, 0° wingwalls, square crown edge, Ke= 0.700 Inlet / Outlet Invert= 83.00' / 82.52' S= 0.0088 '/' Cc= 0.900 n= 0.014 Concrete pipe, finished, Flow Area= 4.00 sf
#3	Primary	83.00'	**24.0" W x 24.0" H Box Culvert** L= 54.8' Box, 0° wingwalls, square crown edge, Ke= 0.700 Inlet / Outlet Invert= 83.00' / 82.52' S= 0.0088 '/' Cc= 0.900 n= 0.014 Concrete pipe, finished, Flow Area= 4.00 sf
#4	Secondary	83.00'	**12.0" Round Culvert** L= 54.8' Box, 0° wingwalls, square crown edge, Ke= 0.700 Inlet / Outlet Invert= 83.00' / 82.52' S= 0.0088 '/' Cc= 0.900 n= 0.014 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=105.73 cfs @ 12.85 hrs HW=86.49' (Free Discharge)
- **1=Culvert** (Inlet Controls 52.48 cfs @ 5.83 fps)
- **2=Culvert** (Inlet Controls 26.63 cfs @ 6.66 fps)
- **3=Culvert** (Inlet Controls 26.63 cfs @ 6.66 fps)

Secondary OutFlow Max=5.65 cfs @ 12.85 hrs HW=86.49' (Free Discharge)
- **4=Culvert** (Barrel Controls 5.65 cfs @ 7.19 fps)

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

Subcatchment1S: Area 1 Runoff Area=5,472,214 sf 62.42% Impervious Runoff Depth>5.27"
Flow Length=2,880' Slope=0.0512 '/' Tc=23.0 min CN=90 Runoff=454.67 cfs 55.193 af

Reach 4R: W-1 Inflow=110.77 cfs 51.385 af
Outflow=110.77 cfs 51.385 af

Reach 5R: W-2 Inflow=5.84 cfs 3.724 af
Outflow=5.84 cfs 3.724 af

Pond 3P: (new Pond) Peak Elev=86.69' Storage=583,418 cf Inflow=454.67 cfs 55.193 af
Primary=110.77 cfs 51.385 af Secondary=5.84 cfs 3.724 af Outflow=116.61 cfs 55.108 af

Total Runoff Area = 125.625 ac Runoff Volume = 55.193 af Average Runoff Depth = 5.27"
37.58% Pervious = 47.212 ac 62.42% Impervious = 78.413 ac

Summary for Subcatchment 1S: Area 1

Runoff = 454.67 cfs @ 12.32 hrs, Volume= 55.193 af, Depth> 5.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 50-Year Rainfall=7.00"

Area (sf)	CN	Description
1,958,378	98	Water Surface, HSG D
1,457,297	98	Paved parking, HSG D
2,056,539	77	Woods, Good, HSG D
5,472,214	90	Weighted Average
2,056,539		37.58% Pervious Area
3,415,675		62.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.0	2,880	0.0512	2.09		**Lag/CN Method,**

Summary for Reach 4R: W-1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 125.625 ac, 62.42% Impervious, Inflow Depth > 4.91" for 50-Year event
Inflow = 110.77 cfs @ 12.93 hrs, Volume= 51.385 af
Outflow = 110.77 cfs @ 12.93 hrs, Volume= 51.385 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Reach 5R: W-2

[40] Hint: Not Described (Outflow=Inflow)

Inflow = 5.84 cfs @ 12.93 hrs, Volume= 3.724 af
Outflow = 5.84 cfs @ 12.93 hrs, Volume= 3.724 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Pond 3P: (new Pond)

[82] Warning: Early inflow requires earlier time span

Inflow Area = 125.625 ac, 62.42% Impervious, Inflow Depth > 5.27" for 50-Year event
Inflow = 454.67 cfs @ 12.32 hrs, Volume= 55.193 af
Outflow = 116.61 cfs @ 12.93 hrs, Volume= 55.108 af, Atten= 74%, Lag= 36.7 min
Primary = 110.77 cfs @ 12.93 hrs, Volume= 51.385 af
Secondary = 5.84 cfs @ 12.93 hrs, Volume= 3.724 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Peak Elev= 86.69' @ 12.93 hrs Surf.Area= 0 sf Storage= 583,418 cf

Plug-Flow detention time= 32.8 min calculated for 54.914 af (99% of inflow)
Center-of-Mass det. time= 31.8 min (796.5 - 764.7)

Volume	Invert	Avail.Storage	Storage Description
#1	83.00'	7,386,022 cf	**Custom Stage Data**Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
83.00	0	0
86.00	13,729	13,729
87.00	825,465	839,194
88.00	1,738,264	2,577,458
89.00	2,221,557	4,799,015
90.00	2,587,007	7,386,022

Device	Routing	Invert	Outlet Devices
#1	Primary	83.00'	**36.0" W x 36.0" H Box Culvert** L= 10.0' Box, 0° wingwalls, square crown edge, Ke= 0.700 Inlet / Outlet Invert= 83.00' / 82.52' S= 0.0480 '/' Cc= 0.900 n= 0.014 Concrete pipe, finished, Flow Area= 9.00 sf
#2	Primary	83.00'	**24.0" W x 24.0" H Box Culvert** L= 54.8' Box, 0° wingwalls, square crown edge, Ke= 0.700 Inlet / Outlet Invert= 83.00' / 82.52' S= 0.0088 '/' Cc= 0.900 n= 0.014 Concrete pipe, finished, Flow Area= 4.00 sf
#3	Primary	83.00'	**24.0" W x 24.0" H Box Culvert** L= 54.8' Box, 0° wingwalls, square crown edge, Ke= 0.700 Inlet / Outlet Invert= 83.00' / 82.52' S= 0.0088 '/' Cc= 0.900 n= 0.014 Concrete pipe, finished, Flow Area= 4.00 sf
#4	Secondary	83.00'	**12.0" Round Culvert** L= 54.8' Box, 0° wingwalls, square crown edge, Ke= 0.700 Inlet / Outlet Invert= 83.00' / 82.52' S= 0.0088 '/' Cc= 0.900 n= 0.014 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=110.77 cfs @ 12.93 hrs HW=86.69' (Free Discharge)
- **1=Culvert** (Inlet Controls 55.36 cfs @ 6.15 fps)
- **2=Culvert** (Inlet Controls 27.71 cfs @ 6.93 fps)
- **3=Culvert** (Inlet Controls 27.71 cfs @ 6.93 fps)

Secondary OutFlow Max=5.84 cfs @ 12.93 hrs HW=86.69' (Free Discharge)
- **4=Culvert** (Barrel Controls 5.84 cfs @ 7.43 fps)

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

Subcatchment1S: Area 1 Runoff Area=5,472,214 sf 62.42% Impervious Runoff Depth>6.47"
Flow Length=2,880' Slope=0.0512 '/' Tc=23.0 min CN=90 Runoff=552.59 cfs 67.706 af

Reach 4R: W-1 Inflow=116.94 cfs 63.280 af
Outflow=116.94 cfs 63.280 af

Reach 5R: W-2 Inflow=6.07 cfs 4.330 af
Outflow=6.07 cfs 4.330 af

Pond 3P: (new Pond) Peak Elev=86.95' Storage=798,303 cf Inflow=552.59 cfs 67.706 af
Primary=116.94 cfs 63.280 af Secondary=6.07 cfs 4.330 af Outflow=123.01 cfs 67.610 af

Total Runoff Area = 125.625 ac Runoff Volume = 67.706 af Average Runoff Depth = 6.47"
37.58% Pervious = 47.212 ac 62.42% Impervious = 78.413 ac

Summary for Subcatchment 1S: Area 1

Runoff = 552.59 cfs @ 12.32 hrs, Volume= 67.706 af, Depth> 6.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.36"

Area (sf)	CN	Description
1,958,378	98	Water Surface, HSG D
1,457,297	98	Paved parking, HSG D
2,056,539	77	Woods, Good, HSG D
5,472,214	90	Weighted Average
2,056,539		37.58% Pervious Area
3,415,675		62.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.0	2,880	0.0512	2.09		**Lag/CN Method,**

Summary for Reach 4R: W-1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 125.625 ac, 62.42% Impervious, Inflow Depth > 6.04" for 100-Year event
Inflow = 116.94 cfs @ 13.03 hrs, Volume= 63.280 af
Outflow = 116.94 cfs @ 13.03 hrs, Volume= 63.280 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Reach 5R: W-2

[40] Hint: Not Described (Outflow=Inflow)

Inflow = 6.07 cfs @ 13.03 hrs, Volume= 4.330 af
Outflow = 6.07 cfs @ 13.03 hrs, Volume= 4.330 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Pond 3P: (new Pond)

[82] Warning: Early inflow requires earlier time span

Inflow Area = 125.625 ac, 62.42% Impervious, Inflow Depth > 6.47" for 100-Year event
Inflow = 552.59 cfs @ 12.32 hrs, Volume= 67.706 af
Outflow = 123.01 cfs @ 13.03 hrs, Volume= 67.610 af, Atten= 78%, Lag= 42.5 min
Primary = 116.94 cfs @ 13.03 hrs, Volume= 63.280 af
Secondary = 6.07 cfs @ 13.03 hrs, Volume= 4.330 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Peak Elev= 86.95' @ 13.03 hrs Surf.Area= 0 sf Storage= 798,303 cf

Plug-Flow detention time= 45.0 min calculated for 67.369 af (100% of inflow)
Center-of-Mass det. time= 44.0 min (805.0 - 761.0)

Volume	Invert	Avail.Storage	Storage Description
#1	83.00'	7,386,022 cf	**Custom Stage Data**Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
83.00	0	0
86.00	13,729	13,729
87.00	825,465	839,194
88.00	1,738,264	2,577,458
89.00	2,221,557	4,799,015
90.00	2,587,007	7,386,022

Device	Routing	Invert	Outlet Devices
#1	Primary	83.00'	**36.0" W x 36.0" H Box Culvert** L= 10.0' Box, 0° wingwalls, square crown edge, Ke= 0.700 Inlet / Outlet Invert= 83.00' / 82.52' S= 0.0480 '/' Cc= 0.900 n= 0.014 Concrete pipe, finished, Flow Area= 9.00 sf
#2	Primary	83.00'	**24.0" W x 24.0" H Box Culvert** L= 54.8' Box, 0° wingwalls, square crown edge, Ke= 0.700 Inlet / Outlet Invert= 83.00' / 82.52' S= 0.0088 '/' Cc= 0.900 n= 0.014 Concrete pipe, finished, Flow Area= 4.00 sf
#3	Primary	83.00'	**24.0" W x 24.0" H Box Culvert** L= 54.8' Box, 0° wingwalls, square crown edge, Ke= 0.700 Inlet / Outlet Invert= 83.00' / 82.52' S= 0.0088 '/' Cc= 0.900 n= 0.014 Concrete pipe, finished, Flow Area= 4.00 sf
#4	Secondary	83.00'	**12.0" Round Culvert** L= 54.8' Box, 0° wingwalls, square crown edge, Ke= 0.700 Inlet / Outlet Invert= 83.00' / 82.52' S= 0.0088 '/' Cc= 0.900 n= 0.014 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=116.93 cfs @ 13.03 hrs HW=86.95' (Free Discharge)
- **1=Culvert** (Inlet Controls 58.84 cfs @ 6.54 fps)
- **2=Culvert** (Inlet Controls 29.05 cfs @ 7.26 fps)
- **3=Culvert** (Inlet Controls 29.05 cfs @ 7.26 fps)

Secondary OutFlow Max=6.07 cfs @ 13.03 hrs HW=86.95' (Free Discharge)
- **4=Culvert** (Barrel Controls 6.07 cfs @ 7.73 fps)

HYDROLOGY
HYDROCAD MODEL

Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Wednesday, May 21 2025

Box Culvert

Invert Elev Dn (ft)	=	82.12
Pipe Length (ft)	=	46.00
Slope (%)	=	0.26
Invert Elev Up (ft)	=	82.24
Rise (in)	=	24.0
Shape	=	Box
Span (in)	=	48.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Flared Wingwalls
Culvert Entrance	=	30D to 75D wingwall flares
Coeff. K,M,c,Y,k	=	0.026, 1, 0.0347, 0.81, 0.4

Embankment

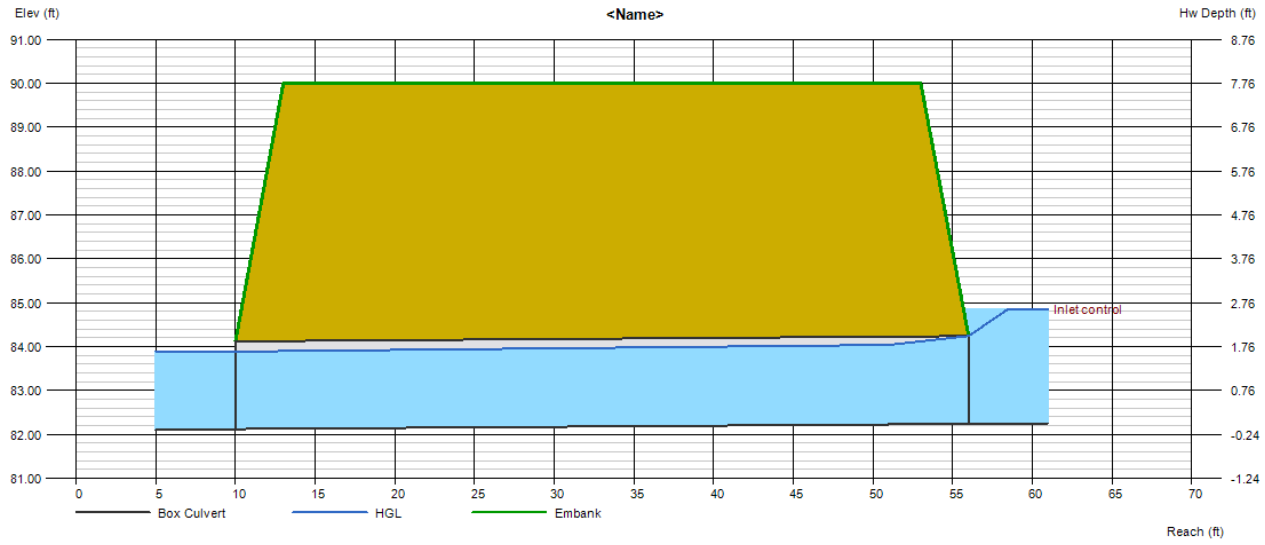
Top Elevation (ft)	=	90.00
Top Width (ft)	=	40.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	43.00
Qmax (cfs)	=	43.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	43.00
Qpipe (cfs)	=	43.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	6.09
Veloc Up (ft/s)	=	5.92
HGL Dn (ft)	=	83.89
HGL Up (ft)	=	84.06
Hw Elev (ft)	=	84.86
Hw/D (ft)	=	1.31
Flow Regime	=	Inlet Control



HEC-14
EQUATION 5.1
SCOUR LIMITS

GREEN
A Lochner Company
Green International Affiliates, Inc.
100 Ames Pond Drive, Suite 200, Tewksbury, MA 01876
T: (978) 923-0400 | www.greenintl.com

JOB	16043		
SHEET NO.	1	OF	1
CALCULATED BY	AF	DATE	5/21/2025
CHECKED BY		DATE	
DESCRIPTION	Culvert near Dublin Avenue		
SCALE			

U.S. Department of Transportation

Federal Highway Administration

Hydraulic Engineering Circular No. 14 - Estimating Scour at Culvert Outlets

5.1 COHESIONLESS SOILS

The general expression for determining scour geometry in a cohesionless soil at the culvert outlet is:

$$\left[\frac{h_s}{R_c}, \frac{W_s}{R_c}, \frac{L_s}{R_c}, \frac{V_s}{R_c^3}\right] = C_s C_h \left(\frac{\alpha}{\sigma^{1/3}}\right)\left(\frac{Q}{\sqrt{g(R_c^{2.5})}}\right)^{\beta}\left(\frac{t}{316}\right)^{\theta} \quad (5.1)$$

where,

- h_s = depth of scour, m (ft)
- W_s = width of scour, m (ft)
- L_s = length of scour, m (ft)
- V_s = volume of scour, m^3 (ft^3)
- R_c = hydraulic radius at the end of the culvert (assuming full flow)
- Q = discharge, m^3/s (ft^3/s)
- g = acceleration of gravity, 9.81 m/s^2 (32.2 ft/s^2)
- t = time in minutes
- σ = $(D_{84}/D_{16})^{0.5}$, material standard deviation
- α, β, θ are coefficients, see Table 5.1
- C_s = slope correction coefficient, see Table 5.2
- C_h = drop height adjustment coefficient, see Table 5.3

Input:

Q (cfs)	43.2
Slope (%)	0.27
Time (min)	23
Dia (ft)	2.67
R_c *(ft)*	1.33
g (ft/s^2)	32.2
D_{84}	0.75
D_{16}	0.37
σ	1.42

Output:

Depth, h_s *(ft)*	3.95
Width, W_s *(ft)*	17.10
Length, L_s *(ft)*	33.79
Volume, V_s (ft^3)	1103.29
Location of maximum scour ($L_m = 0.4L_s$) *(ft)*	13.51

Table 5.1. Coefficients for Culvert Outlet Scour in Cohesionless Soils

	α	β	θ
Depth, h_S	2.27	0.39	0.06
Width, W_S	6.94	0.53	0.08
Length, L_S	17.10	0.47	0.10
Volume, V_S	127.08	1.24	0.18

Table 5.2. Coefficient C_h for Outlets above the Bed

H_d[1]	Depth	Width	Length	Volume
0	1.00	1.00	1.00	1.00
1	1.22	1.51	0.73	1.28
2	1.26	1.54	0.73	1.47
4	1.34	1.66	0.73	1.55

[1] H_d is the height above bed in pipe diameters.

Table 5.3. Coefficient C_s for Culvert Slope

Slope %	Depth	Width	Length	Volume
0	1.00	1.00	1.00	1.00
2	1.03	1.28	1.17	1.30
5	1.08	1.28	1.17	1.30
>7	1.12	1.28	1.17	1.30

HYDRAULIC TOOLBOX
CULVERT OUTLET PROTECTION

Hydraulic Analysis Report

Project Data

Project Title:

Designer:

Project Date: Tuesday, May 20, 2025

Project Units: U.S. Customary Units

Notes:

Riprap Analysis: Riprap Analysis

Notes:

Input Parameters

Riprap Type: Culvert Outlet Protection

Flow: 43.2 cfs

Culvert Diameter: 2.67 ft

Normal Depth in Culvert: 1.29721 ft

Tailwater Depth: 3 ft

If tailwater is unknown, use 0.4D

flow is sbcritical

Result Parameters

Tailwater Depth Used in Computations: 3 ft

Culvert Diameter Used in Computations: 2.67 ft

Computed D50: 81.6952 mm

Riprap Class

Riprap shape should be angular

Riprap Class Name:CLASS I

Riprap Class Order:1

The following values are an 'average' of the size fraction range for the selected riprap class.

D100: 304.80 mm

D85: 228.60 mm

D50: 165.10 mm

D15: 114.30 mm

Layout Recommendations

Apron Length: 10.68 ft

Apron Depth: 1.89583 ft

Apron Width (at end): 15.13 ft

Report for channel

Channel Analysis: Channel Analysis

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 2.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Channel Width 10.00 ft

Longitudinal Slope: 0.0027 ft/ft

Manning's n: 0.0300

Flow 43.0000 cfs

Result Parameters

Depth 1.2972 ft

Area of Flow 16.3376 ft^2

Wetted Perimeter 15.8013 ft

Hydraulic Radius 1.0339 ft

Average Velocity 2.6320 ft/s

Top Width 15.1888 ft

Froude Number: 0.4472

Critical Depth 0.7868 ft

Critical Velocity 4.7223 ft/s

Critical Slope: 0.0154 ft/ft

Critical Top Width 13.15 ft

Calculated Max Shear Stress 0.2186 lb/ft^2

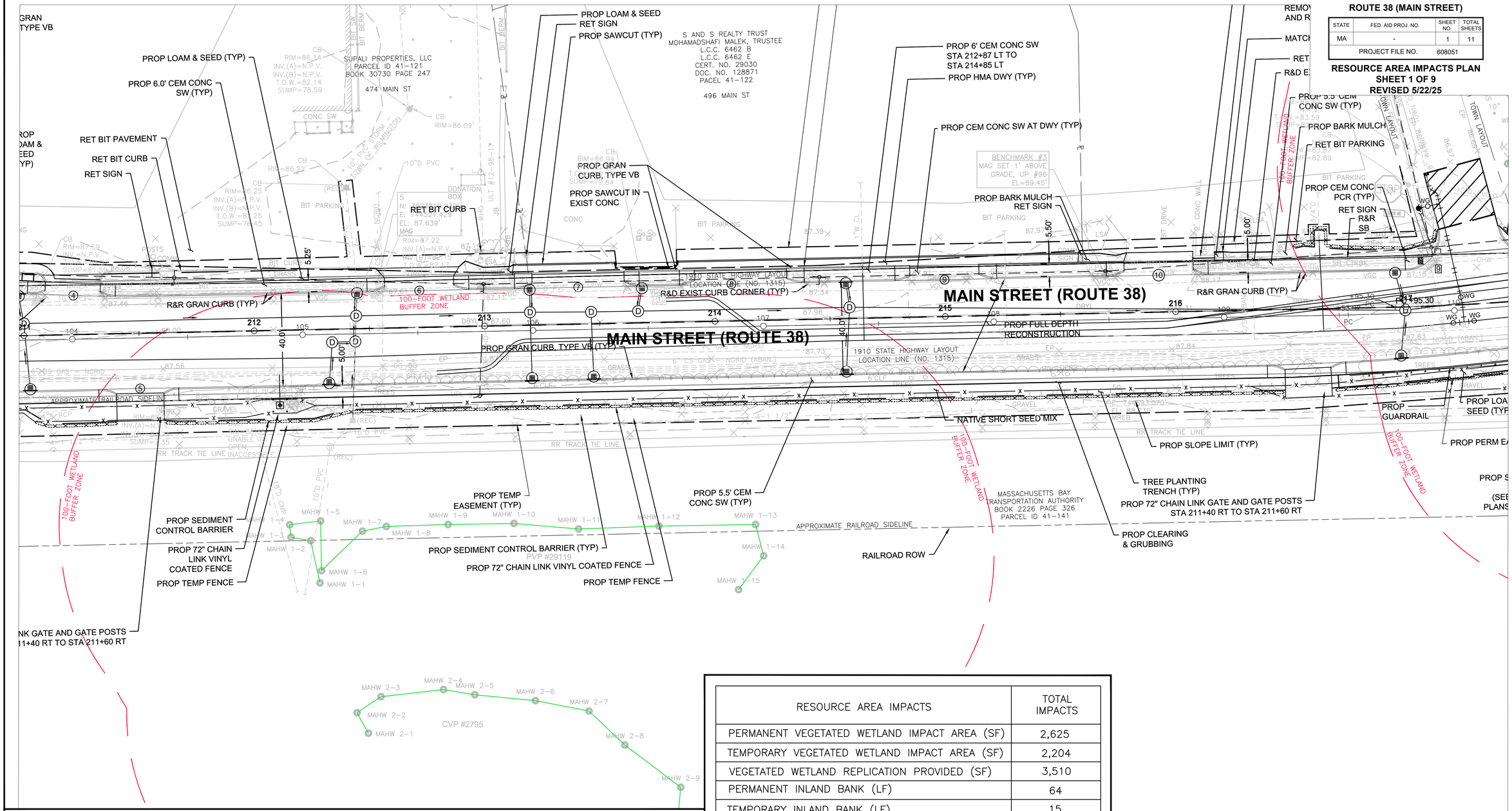
Calculated Avg Shear Stress 0.1742 lb/ft^2

Revised NOI Plan Sheets, dated 5/22/2025

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	1	11
PROJECT FILE NO.	608051		

RESOURCE AREA IMPACTS PLAN
SHEET 1 OF 9
REVISED 5/22/25



LEGEND

- PERMANENT BVW IMPACT AREA
- TEMPORARY BVW IMPACT AREA
- TEMPORARY LUW IMPACT AREA
- BVW REPLICATION AREA
- BLSF IMPACT AREA
- PERMANENT LUW IMPACT AREA
- BANK/MAHW (PERENNIAL STREAM)
- BANK (INTERMITTENT STREAM)
- 100–FOOT BUFFER ZONE
- 200–FOOT RIVERFRONT AREA
- PERMANENT BANK IMPACT
- TEMPORARY BANK IMPACT
- 100–YEAR FLOODPLAIN (BLSF) LINE

RESOURCE AREA IMPACTS	TOTAL IMPACTS
PERMANENT VEGETATED WETLAND IMPACT AREA (SF)	2,625
TEMPORARY VEGETATED WETLAND IMPACT AREA (SF)	2,204
VEGETATED WETLAND REPLICATION PROVIDED (SF)	3,510
PERMANENT INLAND BANK (LF)	64
TEMPORARY INLAND BANK (LF)	15
PERMANENT LAND UNDER WATER/WATERWAYS (SF)	400
TEMPORARY LAND UNDER WATER/WATERWAYS (SF)	61
RIVERFRONT AREA (SF)	68.532
RIVERFRONT AREA – DEGRADED (SF)	63,980
RIVERFRONT AREA – UNDEVELOPED (SF)	4,552
BUFFER ZONES (SF)	189,596
BORDERING LAND SUBJECT TO FLOODING (SF)	6,815
COMPENSATORY FLOOD STORAGE PROVIDED (SF/CF)	4,261/4,161

0 20 50 100

SCALE: 1" = 20'

608051_EV(IMPACT-PLANS).DWG Plotted on 22-May-2025 5:15 PM

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	2	11
PROJECT FILE NO.	608051		

RESOURCE AREA IMPACTS PLAN
SHEET 2 OF 9
REVISED 5/21/25

608051_EV(IMPACT-PLANS).DWG Plotted on 22-May-2025 3:25 PM

PROP SLOPE LIMIT (TYP)
RET SIGN
PROP LOAM & SEED (TYP)
R&D EXIST GUARDRAIL
PROP CLEARING & GRUBBING
PROP GUARDRAIL
WETLAND RESTORATION AREA (FACW MEADOW WETLAND SEED MIX)
PROP SEDIMENT CONTROL BARRIER (TYP)
PROP CLEARING & GRUBBING
RET SIGN
PROP HMA DWY (TYP)
PROP 6' CEM CONC SW STA 218+48 LT TO STA 219+74 LT
RET EXIST WALL
PROP LOAM & SEED
RET EXIST WALL
RET SIGN
PROP 7.5' CEM CONC SW STA 219+74 LT TO STA 222+20 LT
RET BIT BERM
RET TREE
RET VGC
RET EXIST WALL
RET
R&R CURB
(RET)
PROP ROUTE 38 CONST BL
PROP GRAN CURB, TYPE VB (TYP)
R&R CURB
RET CURB
PROP BARK MULCH
PROP 6.0' CEM CONC SW (TYP)
RET MULCH
R&R CURB
RET CURB
PROP HMA DWY (TYP)
R&R SIGN (BO)
RET CURB
PROP. 4'-0"W X 3'-0"H PRECAST REINF. CONC. BOX CULVERT
PROP GUARDRAIL
PROP LOAM & SEED (TYP)
R&D EXISTING GUARDRAIL
PROP PERM EASEMENT (TYP)
PROP SPECIAL DRAINAGE STRUCTURE NO. 1 (SEE CULVERT REPAIR PLANS SHEETS 228 - 231)
PROP PERM EASEMENT (TYP)
APPROXIMATE RAILROAD SIDELINE
RAILROAD ROW
100-FOOT WETLAND BUFFER ZONE
100-FOOT WETLAND BUFFER ZONE
100-FOOT WETLAND BUFFER ZONE
100-FOOT WETLAND BUFFER ZONE
100-FOOT WETLAND BUFFER ZONE
WETLAND A
WETLAND B
BENCHMARK #4
MAG SET 1' ABOVE GRADE, UP #92
EL=89.23'
DEREK LEIDER PROPERTY, LLC
L.C.C. 6462 B
CERT. NO. 45467
DOC. NO. 312075
PARCEL ID 41-129
510 MAIN ST
DANA KIKLIS
L.C.C. 6462 B
CERT. NO. 36223
DOC. NO. 206007
PARCEL ID 41-128-A
508 MAIN ST
STEDMAN 555, LLC
PARCEL ID 41-140
BOOK 22652 PAGE 49
555 MAIN ST
STEDMAN 555, LLC
PARCEL ID 41-139
BOOK 24082 PAGE 158
563 MAIN ST
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
BOOK 2226 PAGE 326
PARCEL ID 41-141
1910 STATE HIGHWAY LAYOUT LOCATION LINE (NO. 1315)
1951 TOWN LAYOUT
129 EAST READING WAKEFIELD LEFT LANE
38 SOUTH WOBURN KEEP RIGHT
STOP
1 STORY BRICK
BOULDER
PICNIC TABLE
BIT BERM
BIT PARKING
STONE RET WALL
CONC BLOCK WALL
GRASS
MULCH
RR TRACK TIE LINE
4-1 1/2" T

UNNAMED
INTERMITTENT STREAM
BVW IMPACTS (PERM.) = 11 SF
BVW IMPACTS (TEMP.) = 235 SF
LUW IMPACTS (PERM.) = 400 SF
LUW IMPACTS (TEMP.) = 30 SF
BANK IMPACTS (PERM.) = 64 LF

LEGEND

- PERMANENT BVW IMPACT AREA
- TEMPORARY BVW IMPACT AREA
- TEMPORARY LUW IMPACT AREA
- BVW REPLICATION AREA
- BLSF IMPACT AREA
- PERMANENT LUW IMPACT AREA
- BORDERING VEGETATED WETLAND (BVW)
- BANK/MAHW (PERENNIAL STREAM)
- BANK (INTERMITTENT STREAM)
- 100-FOOT BUFFER ZONE
- 200-FOOT RIVERFRONT AREA
- PERMANENT BANK IMPACT
- TEMPORARY BANK IMPACT
- 100-YEAR FLOODPLAIN (BLSF) LINE

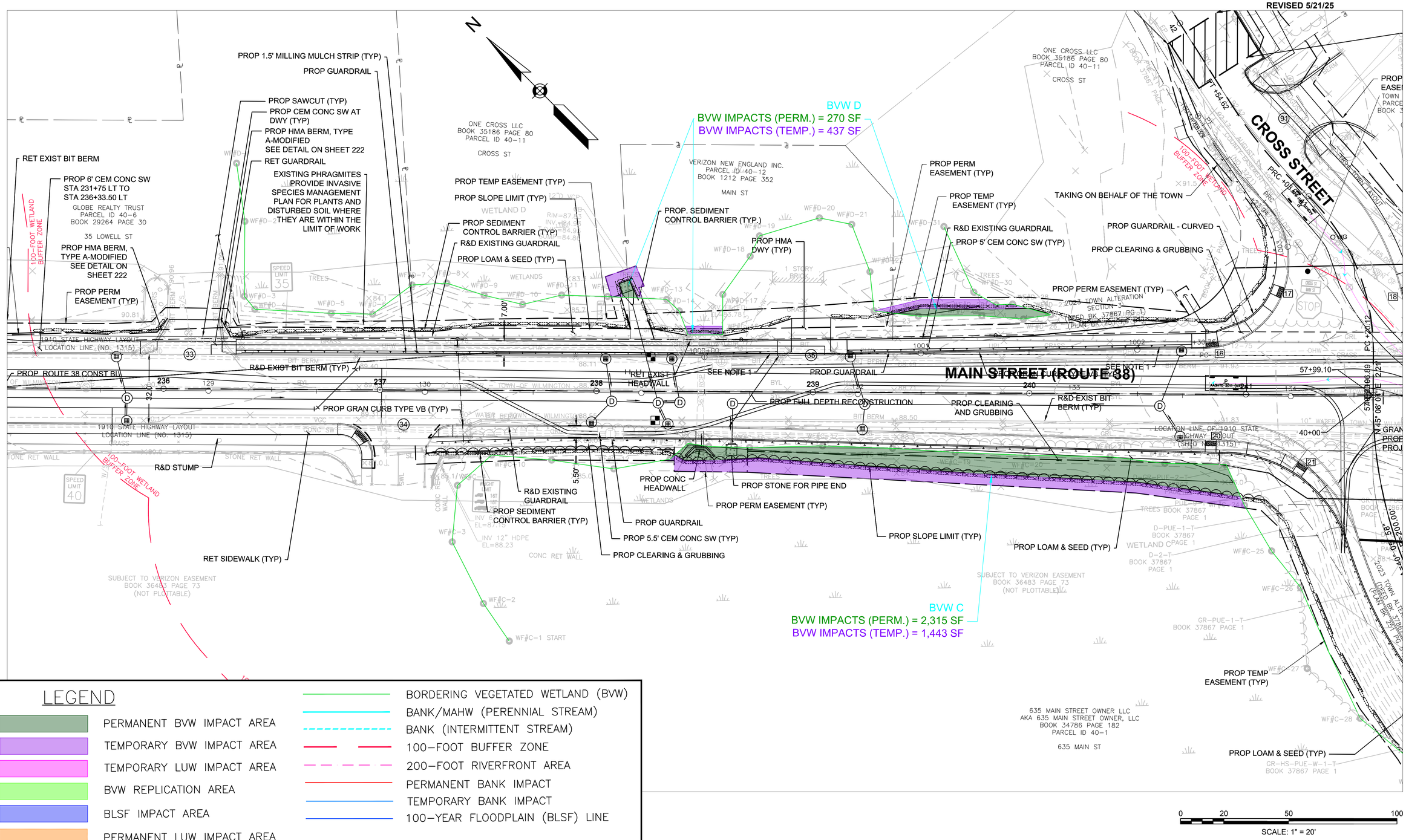
0 20 50 100
SCALE: 1" = 20'

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	3	11
PROJECT FILE NO.	608051		

RESOURCE AREA IMPACTS PLAN
SHEET 3 OF 9
REVISED 5/21/25

608051_EV(IMPACT-PLANS).DWG Plotted on 22-May-2025 5:09 PM



LEGEND

- PERMANENT BVW IMPACT AREA
- TEMPORARY BVW IMPACT AREA
- TEMPORARY LUW IMPACT AREA
- BVW REPLICATION AREA
- BLSF IMPACT AREA
- PERMANENT LUW IMPACT AREA
- BORDERING VEGETATED WETLAND (BVW)
- BANK/MAHW (PERENNIAL STREAM)
- BANK (INTERMITTENT STREAM)
- 100-FOOT BUFFER ZONE
- 200-FOOT RIVERFRONT AREA
- PERMANENT BANK IMPACT
- TEMPORARY BANK IMPACT
- 100-YEAR FLOODPLAIN (BLSF) LINE

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	5	11
PROJECT FILE NO.	608051		

RESOURCE AREA IMPACTS PLAN
SHEET 4 OF 9
REVISED 5/21/25

608051_EV(IMPACT-PLANS).DWG Plotted on 22-May-2025 3:04 PM

MATCH EXIST HMA SIDEWALK
LIMIT OF WORK
END PAVEMENT FINE MILLING AND RESURFACING STA. 41+95.00
END FULL DEPTH RECONSTRUCTION MATCH EXISTING GRADE & ELEVATION STA. 40+70.00
RET BERM
R&R FENCE
REM EXIST TREES
REM EXIST TREE
PROP TEMP EASEMENT (TYP)
TOWN OF WILMINGTON PARCEL ID 40-13-A BOOK 35162 PAGE 138
CROSS ST
MIDDLESEX COUNTY EASEMENT FOR HIGHWAY PURPOSES (BOOK 1178 PAGE 237)
STA. 241+58.84 ROUTE 38 (MAIN STREET) ℄= STA 40+00.00 CROSS STREET ℄= STA 57+99.10 BUTTERS ROW ℄
R&S FENCE
DIAMOND PROPERTIES TRI BOOK 33133 PAGE 12 PARCEL ID 39-6
668 MAIN ST
R&R BOULDERS (BO)
R&D TREE
PUBLIC - 1951 COUNTY LAYOUT
PROP PED POLE (TYP)
PROP CEM CONC PCR (TYP)
PROP SLOPE LIMIT (TYP)
PROP LOAM & SEED (TYP)
PROP 6.0' CEM CONC SW (TYP)
PROP CROSS STREET CONST BL
L=51.60' R=200.00' Δ=14° 46' 58"
PT +54.62
PRC +03.02
PRC +23.94
100-FOOT WETLAND BUFFER ZONE
R&S BOULDERS (TYP)
ON BEHALF OF THE TOWN
PROP GRAN CURB TYPE VB (TYP)
PROP GUARDRAIL - CURVED
PROP GUARDRAIL
PROP CLEARING & GRUBBING
R&D EXISTING GUARDRAIL
ERM EASEMENT (TYP)
TOWN ALTERATION SECTION 3
BK 37867 PG 1)
PROP CLEARING & GRUBBING
TOWN OF WILMINGTON PARCEL ID 39-5 BOOK 26062 PAGE 215 9 CROSS ST
REM FENCE
PROP SAWCUT (TYP)
PROP HMA DWY (TYP)
R&D BERM & SGE
PROP CEM CONC SW AT DWY (TYP)
RET BUSH
RET TREE
RET TREE
RET TREE
YENTILE FARM RECREATIONAL FACILITY
CONC WALL W/ 4'
PROP PERM EASEMENT (TYP)
RET SIGN
5.00'
1910 STATE HIGHWAY LAYOUT LOCATION LINE (NO. 1315)
1911 STATE HIGHWAY LAYOUT LOCATION LINE (NO. 1352)
NON TANGENT AT PC
END OF 1910 LAYOUT
BEGINNING OF 1911 LAYOUT
PROP CEM CONC SW AT DWY (TYP)
3" REVEAL
PROP FULL DEPTH RECONSTRUCTION
MAIN STREET (ROUTE 38)
R&D EXIST BERM (TYP)
SEE NOTE 1
R&D (TYP) 57+99.10
PROP GRAN CURB, TYPE VB (TYP)
PROP ROUTE 38 CONST BL
R&R MAILBOXES ON UP
BRICK WALK REMOVED AND RELAID
N44°52'23"W (BACK) 45°
N44°55'34"E (AHEAD)
R&R MB
R&D EXIST BIT (TYP)
R&D EXISTING GUARDRAIL
LOCATION LINE OF 1910 STATE HIGHWAY LAYOUT (SHTO 1315)
GRAN CURB PROPOSED UNDER PROJECT 608929
N 45° 08' 02" E 42.21'
PC +06.25
PC +20.12
PT +54.62
L=139.97' R=200.00' Δ=40° 05' 58"
BUTTERS ROW
PROP GRAN CURB TYPE VB (TYP)
TOWN ALTERATION SECTION 2 (DEED BK 37868 PG 1) (PLAN BK 257 PG 1)
PC +56.92
N 5° 02' 06" E 61.38'
PT +95.54
PROP CEM CONC PCR (TYP)
PROP UP (BO)
PROP MAST ARM (TYP)
WETLAND C
PROP GUARDRAIL - CURVED
PROP SEDIMENT CONTROL BARRIER (TYP)
PROP TEMP EASEMENT (TYP)
PROP 6.0' CEM CONC SW (TYP)
PROP BUTTERS ROW CONST BL
R&R CURB AND GUARDRAIL INSTALLED UNDER PROJECT 608929
PROP LOAM & SEED (TYP)
PROP SLOPE LIMIT (TYP)
R&R EXISTING GUARDRAIL
PROP TEMP EASEMENT (TYP)
MATCH EXIST
EXISTING LANDSCAPING INSTALLED UNDER PROJECT 608929
PROP HMA DWY (TYP)
PROP CEM CONC SW AT DWY (TYP)
R&R CURB AND GUARDRAIL INSTALLED UNDER PROJECT 608929
MATCH EXISTING
PROP LOAM & SEED (TYP)
RET
BUTTERS ROW - 1951 COUNTY LAYOUT - 40' WIDE
PROP SLOPE LIMIT (TYP)
EXISTING GUARDRAIL REMOVED UNDER PROJECT 608929
PROP LOAM & SEED (TYP)
PROP SLOPE LIMIT (TYP)
PROP HMA DWY (TYP)
PROP SAWCUT (TYP)
PROP 6.0' CEM CONC SW (TYP)
JOHN C. OLSON PARCEL ID 39-14 BOOK 23310 PAGE 186
673 MAIN ST
MIDDLESEX COUNTY EASEMENT FOR HIGHWAY PURPOSES (BOOK 1178 PAGE 237)
JARID POLLEY AND MARY POLLEY BOOK 37173 PAGE 123 PARCEL ID 39-15
669 MAIN ST
ANDREA J. DELUCA PARCEL ID 39-16 BOOK 18231 PAGE 111
665 MAIN ST
1910 STATE L.O. No. 1315
1911 STATE L.O. No. 1352
WETLAND
100-FOOT BUFFER ZONE
200-FOOT RIVERFRONT AREA
R&R EXISTING GUARDRAIL
MATCH EXISTING
RET
PROP TEMP EASEMENT (TYP)
L=107.83' R=200.00' Δ=30° 50' 01"
PROP SAWCUT & MATCH EXISTING
RET BUTTERS ROW - 1951 COUNTY LAYOUT - 40' WIDE
PROP SLOPE LIMIT (TYP)
EXISTING GUARDRAIL REMOVED UNDER PROJECT 608929
20' WATER EASEMENT (SEE PLAN BOOK 98 PLAN 130)
END FULL DEPTH RECONSTRUCTION MATCH EXISTING GRADE & ELEVATION STA. 55+90.00
LIMIT OF WORK END PAVEMENT FINE MILLING AND RESURFACING STA. 55+65.00
RETAIN EXISTING ROADWAY AND SIDEWALK CONSTRUCTED UNDER PROJECT 608929

NOTES:
1. REFER TO MASSDOT CONSTRUCTION STANDARD DETAILS 400.2.2 CONTRACTOR SHALL ENSURE A MINIMUM OF 5'-0" SIDEWALK IS PROVIDED AT THE BACK OF GUARDRAIL.
2. IT IS ASSUMED THE SEPARATE BRIDGE REPLACEMENT PROJECT (PROJECT NO. 608929) WILL BE COMPLETED AND IN PLACE IN 2028 AND WILL BE ONGOING DURING CONSTRUCTION OF PROJECT NO. 608051.

0 20 50 100
SCALE: 1" = 20'

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	6	11
PROJECT FILE NO.	608051		

RESOURCE AREA IMPACTS PLAN
SHEET 5 OF 9
REVISED 5/21/25

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BVW E
BVW IMPACTS (PERM.) = 29 SF
BVW IMPACTS (TEMP.) = 89 SF
LUW (TEMP.) = 31 SF
BANK IMPACTS (TEMP.) = 15 LF

BLSF IMPACT
BELOW EL. 81.5' = 47 SF

BLSF IMPACT
BELOW EL. 82.9' = 2,473 SF

MAIN STREET (ROUTE 38)

TOWN OF WILMINGTON
PARCEL ID 39-5
BOOK 26062 PAGE 215
9 CROSS ST

THE SPENCER FAMILY
REVOCABLE TRUST OF 2018
PARCEL ID 39-13-B
BOOK 32471 PAGE 40

KENNEY FAMILY
REVOCABLE TRUST OF 2013
PARCEL ID 39-13-A
BOOK 27532 PAGE 197

THE SPENCER FAMILY
REVOCABLE TRUST OF 2018
PARCEL ID 39-1-13
BOOK 32471 PAGE 44
679 MAIN ST

BROWN HOUSE
REALTY TRUST
PARCEL ID 39-12
BOOK 27710 PAGE 63
681 MAIN ST

SE WRIGHT PROPERTIES LLC
PARCEL ID 39-11
BOOK 38678 PAGE 89
685 MAIN ST

TENNESSEE GAS
TRANSMISSION COMPANY
PARCEL ID 39-10
BOOK 1190 PAGE 541
MAIN ST

LEGEND

- PERMANENT BVW IMPACT AREA
- TEMPORARY BVW IMPACT AREA
- TEMPORARY LUW IMPACT AREA
- BVW REPLICATION AREA
- BLSF IMPACT AREA
- PERMANENT LUW IMPACT AREA
- BORDERING VEGETATED WETLAND (BVW)
- BANK/MAHW (PERENNIAL STREAM)
- BANK (INTERMITTENT STREAM)
- 100-FOOT BUFFER ZONE
- 200-FOOT RIVERFRONT AREA
- PERMANENT BANK IMPACT
- TEMPORARY BANK IMPACT
- 100-YEAR FLOODPLAIN (BLSF) LINE

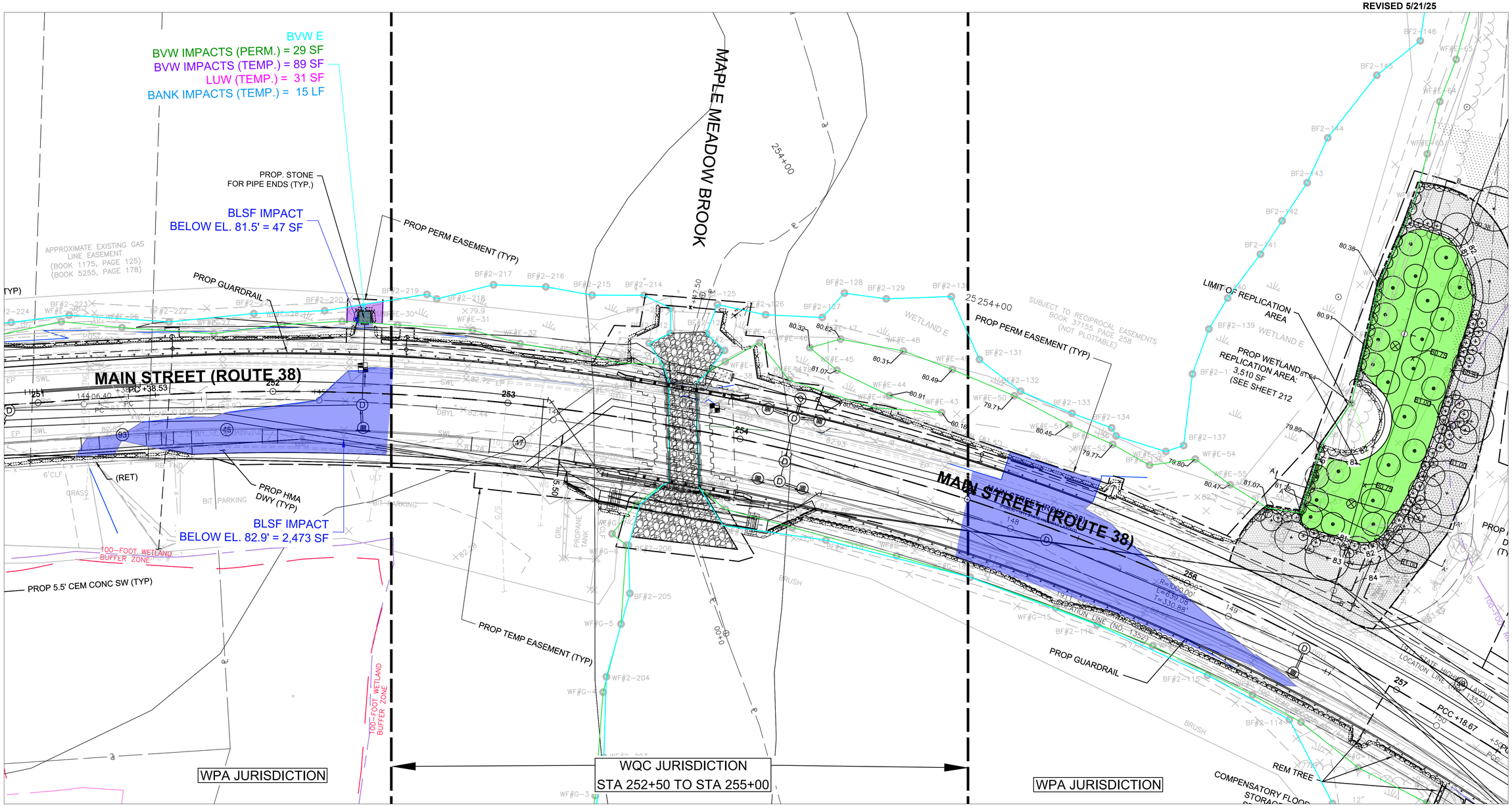
0 20 50 100
SCALE: 1" = 20'

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	7	11
PROJECT FILE NO.	608051		

RESOURCE AREA IMPACTS PLAN
SHEET 6 OF 9
REVISED 5/21/25

608051_EV(IMPACT-PLANS).DWG Plotted on 22-May-2025 3:33 PM



WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	8	11
PROJECT FILE NO.	608051		

RESOURCE AREA IMPACTS PLAN
SHEET 7 OF 9
REVISED 5/21/25

608051_EV(IMPACT-PLANS).DWG Plotted on 22-May-2025 3:06 PM

TABLE 1 - UPSTREAM COMPENSATORY FLOOD STORAGE
VOLUME TO BE COMPENSATED (100-YR FLOOD ELEVATION = 82.9)

Elevation	Cut Volume (CF)	Fill Volume (CF)	Incremental Net Cut/Fill Volume (CF)
79-80	0	0	0
80-81	147	7	-140
81-82	1,804	925	-879
82-82.9	2,210	1,222	-988
Total	**4,161**	**2,155**	**-2,007**

LIMIT OF REPLICATION AREA
PROP WETLAND REPLICATION AREA: 3,510 SF (SEE SHEET 212
PROP HMA DWY (TYP)
100-YEAR FLOODPLAIN DOWNSTREAM EL. 81.5'
PROP LOAM & SEED (TYP)
PROP GUARDRAIL
BLSF IMPACT BELOW EL. 82.9' = 4,295 SF
REM TREE
COMPENSATORY FLOOD STORAGE AREA SEE SHEET: 219
R&D EXISTING GUARDRAIL
PROP COMPENSATORY FLOOD STORAGE AREA - 4,261 SF (SEE SHEET 213)
100-YEAR FLOOD ZONE
100-FOOT WETLAND BUFFER ZONE
200-FOOT RIVERFRONT AREA
1911 STATE HIGHWAY LAYOUT LOCATION LINE (NO. 1352)
MAIN STREET (ROUTE 38)
WETLAND E
WETLAND I
TOWN OF WILMINGTON BOOK 2299 PAGE 288 PARCEL ID 39-9
ACCESS EASEMENT BOOK 8666 PAGE 82 BOOK 38733 PAGE 145 BOOK 37155 PAGE 255
SUBJECT TO RECIPROCAL EASEMENTS BOOK 37155 PAGE 258 (NOT PLOTTABLE)
PERMANENT EASEMENT PARCEL 25-PUE-1 SHLO 8859
TEMPORARY EASEMENT PARCEL 25-TE-6 SHLO 8859
EDGE OF WETLAND
ROAD NARROWS

LEGEND

- PERMANENT BVW IMPACT AREA
- TEMPORARY BVW IMPACT AREA
- TEMPORARY LUW IMPACT AREA
- BVW REPLICATION AREA
- BLSF IMPACT AREA
- PERMANENT LUW IMPACT AREA
- AREAS TO BE EXCAVATED
- BORDERING VEGETATED WETLAND (BVW)
- BANK/MAHW (PERENNIAL STREAM)
- BANK (INTERMITTENT STREAM)
- 100-FOOT BUFFER ZONE
- 200-FOOT RIVERFRONT AREA
- PERMANENT BANK IMPACT
- TEMPORARY BANK IMPACT
- 100-YEAR FLOODPLAIN (BLSF) LINE
- COMPOST BLANKET AND WETLAND SEASONALLY FLOODED MIX
- 4" LOAM AND COMPOST BLANKET & SHORT GRASSLAND MIX

0 20 50 100
SCALE: 1" = 20'

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	9	11
PROJECT FILE NO.	608051		

RESOURCE AREA IMPACTS PLAN
SHEET 8 OF 9
REVISED 5/21/25

608051_EV(IMPACT-PLANS).DWG Plotted on 22-May-2025 3:36 PM

P TEMP
EMENT (TYP)
PROP HMA
DWY(TYP)
PROP SAWCUT (TYP)
EXIST GUARDRAIL REMOVED UNDER PROJECT 607327
PROP GUARDRAIL
PROP CLEARING & GRUBBING
R&R GUARDRAIL INSTALLED
UNDER PROJECT 607327
MATCH PROJECT
PROJECT NO. 607327
STA 261+38.00
RET GUARDRAIL INSTALLED
UNDER PROJECT 607327
RET FENCE
PROP EOP (TYP)
EXIST BIT BERM REMOVED UNDER PROJECT 607327
RET LARGE
TREE
R&R CURB AND GUARDRAIL INSTALLED
UNDER PROJECT 607327
REM SW INSTALLED UNDER PROJECT 607327
PROP HMA DWY (TYP)
PROP CEM CONC SW AT DWY (TYP)
PROP SAWCUT (TYP)
RET CURB AND GUARDRAIL INSTALLED
UNDER PROJECT 607327
RET SW INSTALLED UNDER PROJECT 607327
R&S FRAME AND COVER
PROP FRAME AND GRATE
RAILROAD ROV

ESSEX HOLDING, LLC
A/K/A ESSEX HOLDING LLC
PARCEL ID 39-8-A
L.C.C. 23888 D
CERT. NO. 41633
DOC NO. 276222
730 MAIN ST

DSM NEORESINS INC.
PARCEL ID 39-8
L.C.C. 23888 C
CERT. NO. 35932
DOC NO. 202386
730 MAIN ST

WETLAND J
EDGE OF WETLAND
200-FOOT RIVERFRONT AREA
100-FOOT BUFFER ZONE
RIVERFRONT AREA
TEMPORARY EASEMENT
PARCEL 25-TE-6
SHLO 8859
TEMPORARY EASEMENT
PARCEL 25-TE-1
SHLO 8859
TEMPORARY EASEMENT
PARCEL 25-TE-2
SHLO 8859
PERMANENT EASEMENT
PARCEL 25-PUE-1
SHLO 8859
PERMANENT EASEMENT
PARCEL 25-PUE-2
SHLO 8859
TEMPORARY EASEMENT
PARCEL 25-TE-3
SHLO 8859
PERMANENT EASEMENT
PARCEL 25-S-1
SHLO 8859
20' SEWER EASEMENT
BOOK 2244 PAGE 156
20' SEWER EASEMENT (REC)
BOOK 2244 PAGE 156
1911 STATE HIGHWAY LAYOUT
LOCATION LINE (NO. 1352)
2023 STATE HIGHWAY LAYOUT
LOCATION LINE (8859)
2023 STATE HIGHWAY LAYOUT
LOCATION LINE (8859)
TOWN OF WILMINGTON
BOOK 2299 PAGE 288
PARCEL ID 39-9
MAIN ST
APPROXIMATE RAILROAD SIDELINE
RAILROAD SIDELINE
PT +09.65
+89.13
PT
BENCHMARK 13
MAG NAIL 1' ABOVE
GRADE, EL. 104.88'
N: 3020047.455
E: 747933.813'
EL: 103.624'
MMAG
N: 3020010.3
E: 747913.09
MREB
TREES
GRASS
GRAVEL
CLF
BIT BERM
SWL
DBYL
DBUL
SURVEY TRAVERSE
10" WATER
TOWN OF WILMINGTON
5.50'
260
261
262
263
264
265
747
748
153
155
156
157
158

LEGEND

- PERMANENT BVW IMPACT AREA
- TEMPORARY BVW IMPACT AREA
- TEMPORARY LUW IMPACT AREA
- BVW REPLICATION AREA
- BLSF IMPACT AREA
- PERMANENT LUW IMPACT AREA
- BORDERING VEGETATED WETLAND (BVW)
- BANK/MAHW (PERENNIAL STREAM)
- BANK (INTERMITTENT STREAM)
- 100-FOOT BUFFER ZONE
- 200-FOOT RIVERFRONT AREA
- PERMANENT BANK IMPACT
- TEMPORARY BANK IMPACT
- 100-YEAR FLOODPLAIN (BLSF) LINE

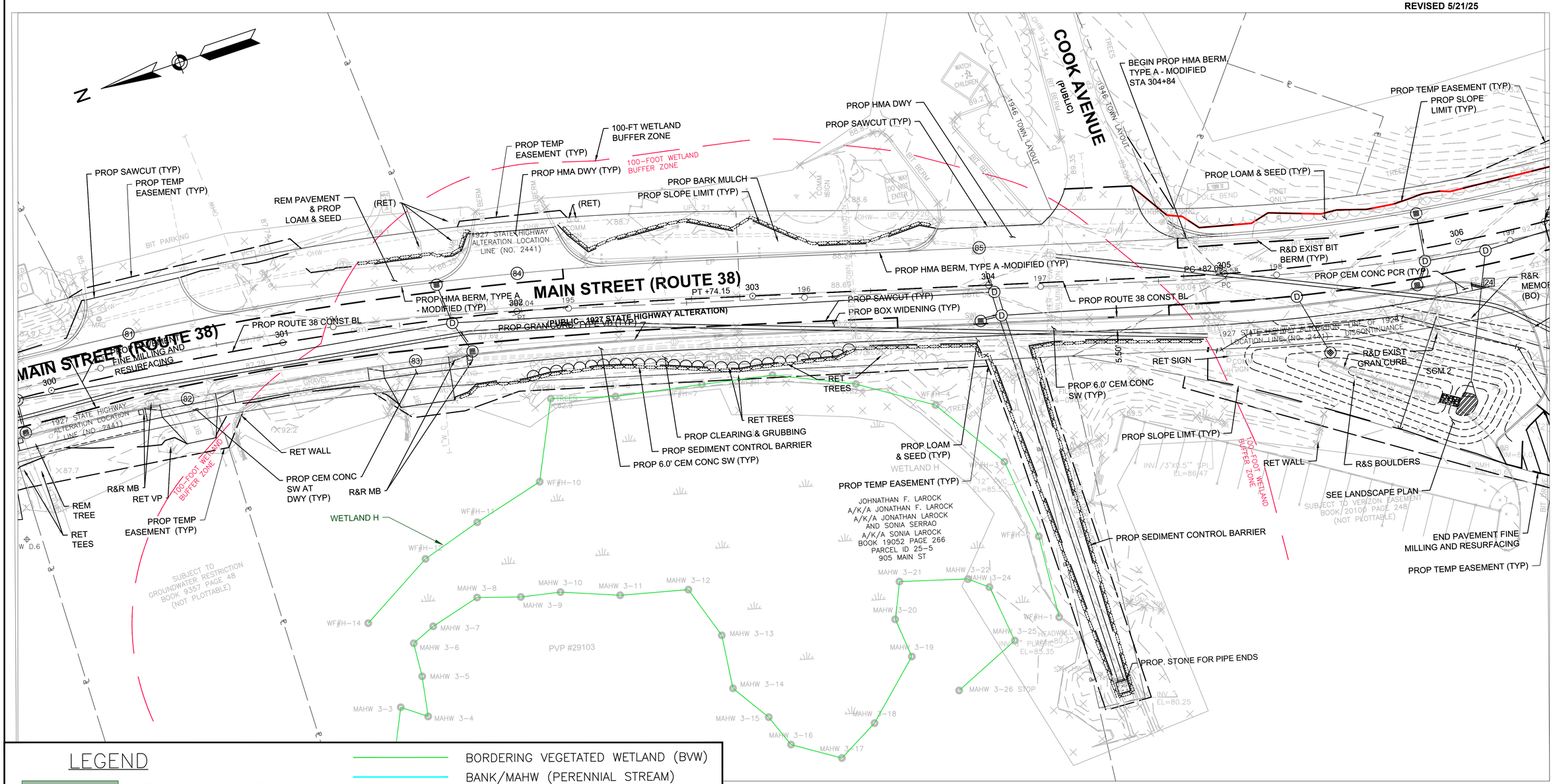
0 20 50 100
SCALE: 1" = 20'

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	10	11
PROJECT FILE NO.	608051		

RESOURCE AREA IMPACTS PLAN
SHEET 9 OF 9
REVISED 5/21/25

Plotted on 22-May-2025 3:39 PM
608051_EV(IMPACT-PLANS).DWG



LEGEND

- PERMANENT BVW IMPACT AREA
- TEMPORARY BVW IMPACT AREA
- TEMPORARY LUW IMPACT AREA
- BVW REPLICATION AREA
- BLSF IMPACT AREA
- PERMANENT LUW IMPACT AREA
- BORDERING VEGETATED WETLAND (BVW)
- BANK/MAHW (PERENNIAL STREAM)
- BANK (INTERMITTENT STREAM)
- 100-FOOT BUFFER ZONE
- 200-FOOT RIVERFRONT AREA
- PERMANENT BANK IMPACT
- TEMPORARY BANK IMPACT
- 100-YEAR FLOODPLAIN (BLSF) LINE

HIGHWAY GUARD DETAILS

SEE SHEET 33

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

SEE SHEET 133

DRAINAGE DETAILS

SEE BELOW

UTILITY PLAN

SEE SHEET 111

DRAINAGE PLANS
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	96	391
PROJECT FILE NO.	608051		

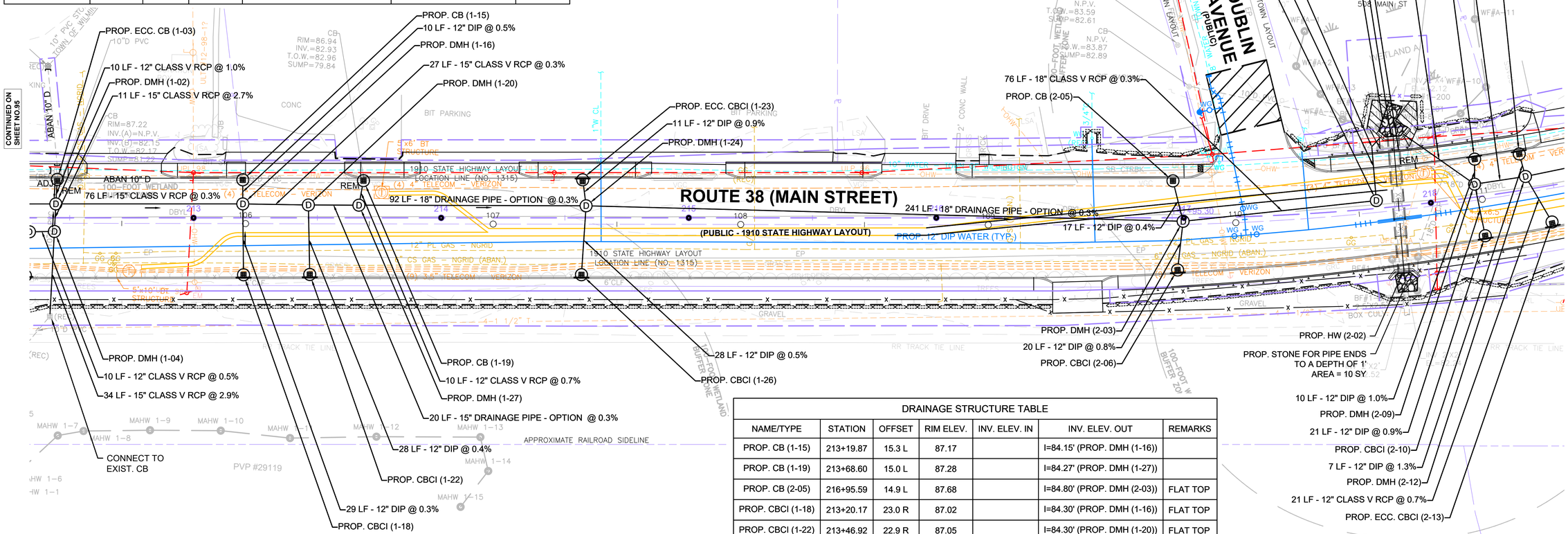
DRAINAGE PLANS - 3
REVISED 5/22/2025

DRAINAGE STRUCTURE TABLE

NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
PROP. DMH (1-02)	212+44.37	5.6 L	87.60	I=83.76' (PROP. DMH (1-12)) I=84.15' (PROP. DMH (1-04)) I=83.86' (PROP. ECC. CB (1-03))	I=83.76' (PROP. DMH (1-16))	
PROP. DMH (1-04)	212+43.79	5.5 R	87.60	I=84.60' (EXIST. CB (212+42 R)) I=84.45' (PROP. DMH (1-05))	I=84.45' (PROP. DMH (1-02))	
PROP. DMH (1-05)	212+33.70	5.6 R	87.65	I=84.50' (PROP. ECC. CBCI (1-06))	I=84.50' (PROP. DMH (1-04))	
PROP. DMH (1-16)	213+19.88	5.6 L	87.36	I=83.54' (PROP. DMH (1-02)) I=84.10' (PROP. CB (1-15)) I=84.20' (PROP. CBCI (1-18))	I=83.54' (PROP. DMH (1-20))	
PROP. DMH (1-20)	213+46.38	5.2 L	87.40	I=83.47' (PROP. DMH (1-16)) I=84.20' (PROP. CBCI (1-22))	I=83.47' (PROP. DMH (1-27))	
PROP. DMH (1-24)	214+58.54	4.9 L	87.92	I=84.75' (PROP. CBCI (1-26)) I=83.12' (PROP. DMH (1-27)) I=84.64' (PROP. ECC. CBCI (1-23))	I=83.12' (PROP. DMH (2-03))	
PROP. DMH (1-27)	213+66.78	5.1 L	87.47	I=83.41' (PROP. DMH (1-20)) I=84.20' (PROP. CB (1-19))	I=83.41' (PROP. DMH (1-24))	
PROP. DMH (2-02)	217+78.14	3.2 L	87.53	I=82.17' (PROP. DMH (2-03))	I=82.17' ()	
PROP. DMH (2-03)	216+99.68	1.4 R	87.93	I=84.74' (PROP. CB (2-05)) I=82.39' (PROP. DMH (1-24)) I=82.95' (PROP. CBCI (2-06))	I=82.39' (PROP. DMH (2-02))	
PROP. DMH (2-12)	218+39.42	5.2 L	87.45	I=84.00' (PROP. ECC. CBCI (2-13)) I=83.40' (PROP. CBCI (2-11)) I=82.36' (PROP. DMH (2-15))	I=82.36' (PROP. DMH (2-09))	

DRAINAGE STRUCTURE TABLE

NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
PROP. ECC. CB (1-03)	212+44.94	15.5 L	87.40		I=83.96' (PROP. DMH (1-02))	
PROP. ECC. CBCI (1-06)	212+32.11	24.0 R	87.29		I=85.01' (PROP. DMH (1-05))	FLAT TOP
PROP. ECC. CBCI (1-23)	214+57.13	16.0 L	87.69		I=84.74' (PROP. DMH (1-24))	FLAT TOP
PROP. ECC. CBCI (2-13)	218+46.95	14.6 R	87.26		I=84.15' (PROP. DMH (2-12))	
PROP. HW (2-01)	217+87.51	26.9 L	85.95	I=82.12' ()		
PROP. HW (2-02)	217+86.35	26.1 R	0.00			



NOTES:
1. CONTRACTOR SHALL FIELD VERIFY GUARDRAIL POST SPACING CAN ACCOMMODATE PROPOSED AND EXISTING DRAINAGE.
2. EXCAVATE TO DEPTH OF RIPRAP AND MATCH EXISTING SURFACE. FINAL GRADE SHALL MATCH EXISTING GRADE.

0 20 50 100
SCALE: 1" = 20'

DRAINAGE STRUCTURE TABLE

NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
PROP. CB (1-15)	213+19.87	15.3 L	87.17		I=84.15' (PROP. DMH (1-16))	
PROP. CB (1-19)	213+68.60	15.0 L	87.28		I=84.27' (PROP. DMH (1-27))	
PROP. CB (2-05)	216+95.59	14.9 L	87.68		I=84.80' (PROP. DMH (2-03))	FLAT TOP
PROP. CBCI (1-18)	213+20.17	23.0 R	87.02		I=84.30' (PROP. DMH (1-16))	FLAT TOP
PROP. CBCI (1-22)	213+46.92	22.9 R	87.05		I=84.30' (PROP. DMH (1-20))	FLAT TOP
PROP. CBCI (1-26)	214+56.66	23.0 R	87.55		I=84.90' (PROP. DMH (1-24))	FLAT TOP
PROP. CBCI (2-06)	216+97.41	21.0 R	87.55		I=83.10' (PROP. DMH (2-03))	
PROP. CBCI (2-08)	218+19.93	15.2 L	87.22		I=84.10' (PROP. DMH (2-09))	
PROP. CBCI (2-10)	218+19.91	16.0 R	87.21		I=84.10' (PROP. DMH (2-09))	
PROP. CBCI (2-11)	218+38.37	14.6 L	86.61		I=83.50' (PROP. DMH (2-12))	

FOR UTILITY PLAN:
SEE SHEET NO. 109

608051_UT03(DRAINAGE-PLANS).DWG Plotted on 22-May-2025 3:26 PM

HIGHWAY GUARD DETAILS

SEE SHEET 33

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

SEE SHEET 133

DRAINAGE DETAILS

SEE BELOW

UTILITY PLAN

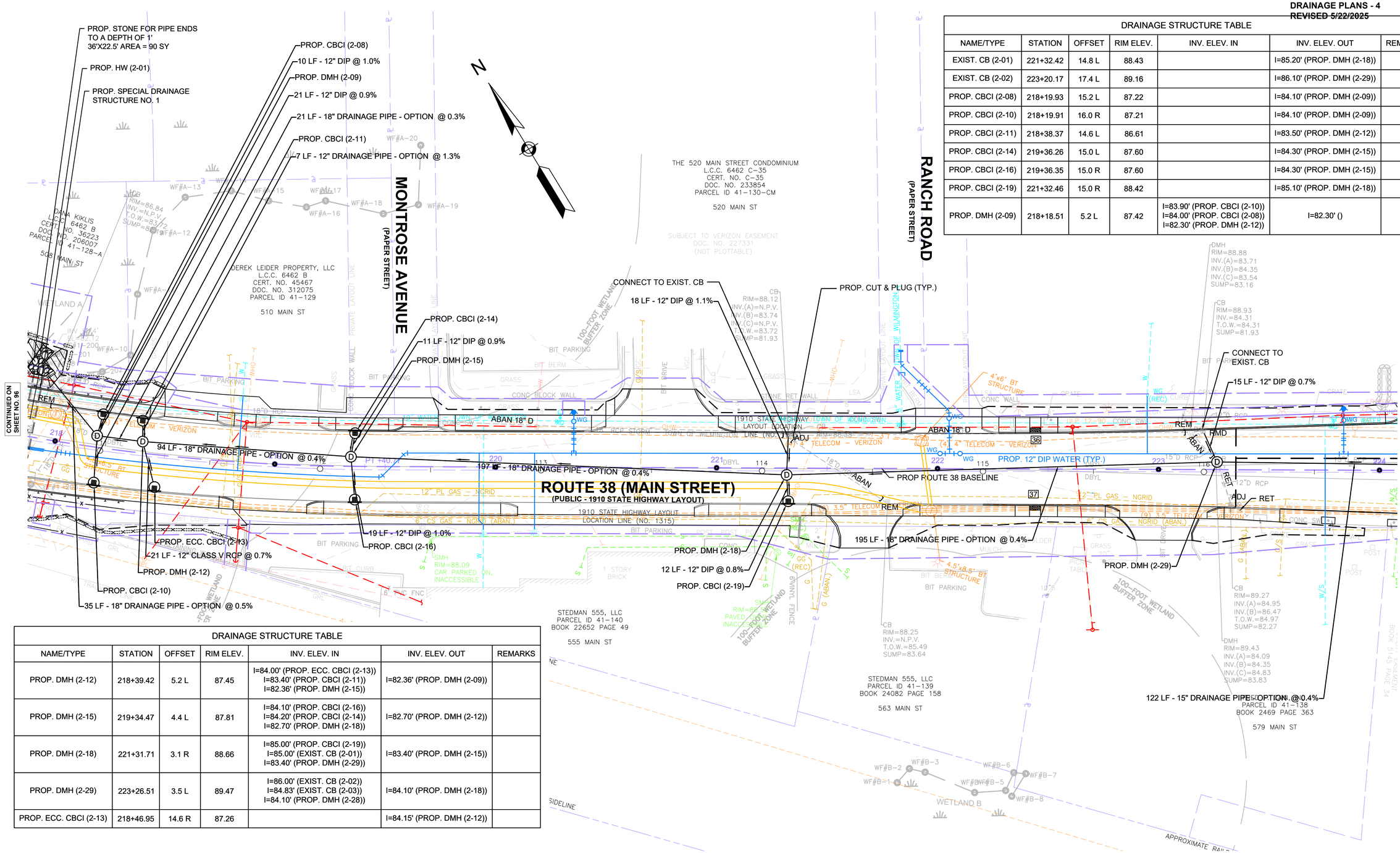
SEE SHEET 112

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	97	391
PROJECT FILE NO.	608051		

DRAINAGE PLANS - 4
~~REVISED 5/22/2025~~

608051_UT03\DRAINAGE-PLANS\.DWG Plotted on 22-May-2025 3:27 PM



DRAINAGE STRUCTURE TABLE

NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
EXIST. CB (2-01)	221+32.42	14.8 L	88.43		I=85.20' (PROP. DMH (2-18))	
EXIST. CB (2-02)	223+20.17	17.4 L	89.16		I=86.10' (PROP. DMH (2-29))	
PROP. CBCI (2-08)	218+19.93	15.2 L	87.22		I=84.10' (PROP. DMH (2-09))	
PROP. CBCI (2-10)	218+19.91	16.0 R	87.21		I=84.10' (PROP. DMH (2-09))	
PROP. CBCI (2-11)	218+38.37	14.6 L	86.61		I=83.50' (PROP. DMH (2-12))	
PROP. CBCI (2-14)	219+36.26	15.0 L	87.60		I=84.30' (PROP. DMH (2-15))	
PROP. CBCI (2-16)	219+36.35	15.0 R	87.60		I=84.30' (PROP. DMH (2-15))	
PROP. CBCI (2-19)	221+32.46	15.0 R	88.42		I=85.10' (PROP. DMH (2-18))	
PROP. DMH (2-09)	218+18.51	5.2 L	87.42	I=83.90' (PROP. CBCI (2-10)) I=84.00' (PROP. CBCI (2-08)) I=82.30' (PROP. DMH (2-12))	I=82.30' ()	

DRAINAGE STRUCTURE TABLE

NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
PROP. DMH (2-12)	218+39.42	5.2 L	87.45	I=84.00' (PROP. ECC. CBCI (2-13)) I=83.40' (PROP. CBCI (2-11)) I=82.36' (PROP. DMH (2-15))	I=82.36' (PROP. DMH (2-09))	
PROP. DMH (2-15)	219+34.47	4.4 L	87.81	I=84.10' (PROP. CBCI (2-16)) I=84.20' (PROP. CBCI (2-14)) I=82.70' (PROP. DMH (2-18))	I=82.70' (PROP. DMH (2-12))	
PROP. DMH (2-18)	221+31.71	3.1 R	88.66	I=85.00' (PROP. CBCI (2-19)) I=85.00' (EXIST. CB (2-01)) I=83.40' (PROP. DMH (2-29))	I=83.40' (PROP. DMH (2-15))	
PROP. DMH (2-29)	223+26.51	3.5 L	89.47	I=86.00' (EXIST. CB (2-02)) I=84.83' (EXIST. CB (2-03)) I=84.10' (PROP. DMH (2-28))	I=84.10' (PROP. DMH (2-18))	
PROP. ECC. CBCI (2-13)	218+46.95	14.6 R	87.26		I=84.15' (PROP. DMH (2-12))	

NOTES:
1. CONTRACTOR SHALL FIELD VERIFY GUARDRAIL POST SPACING CAN ACCOMMODATE PROPOSED AND EXISTING DRAINAGE.
2. EXCAVATE TO DEPTH OF RIPRAP AND MATCH EXISTING SURFACE. FINAL GRADE SHALL MATCH EXISTING GRADE.

FOR UTILITY PLAN:
SEE SHEET NO. 109

HIGHWAY GUARD DETAILS

SEE SHEET 33

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

SEE SHEET 133

DRAINAGE DETAILS

SEE BELOW

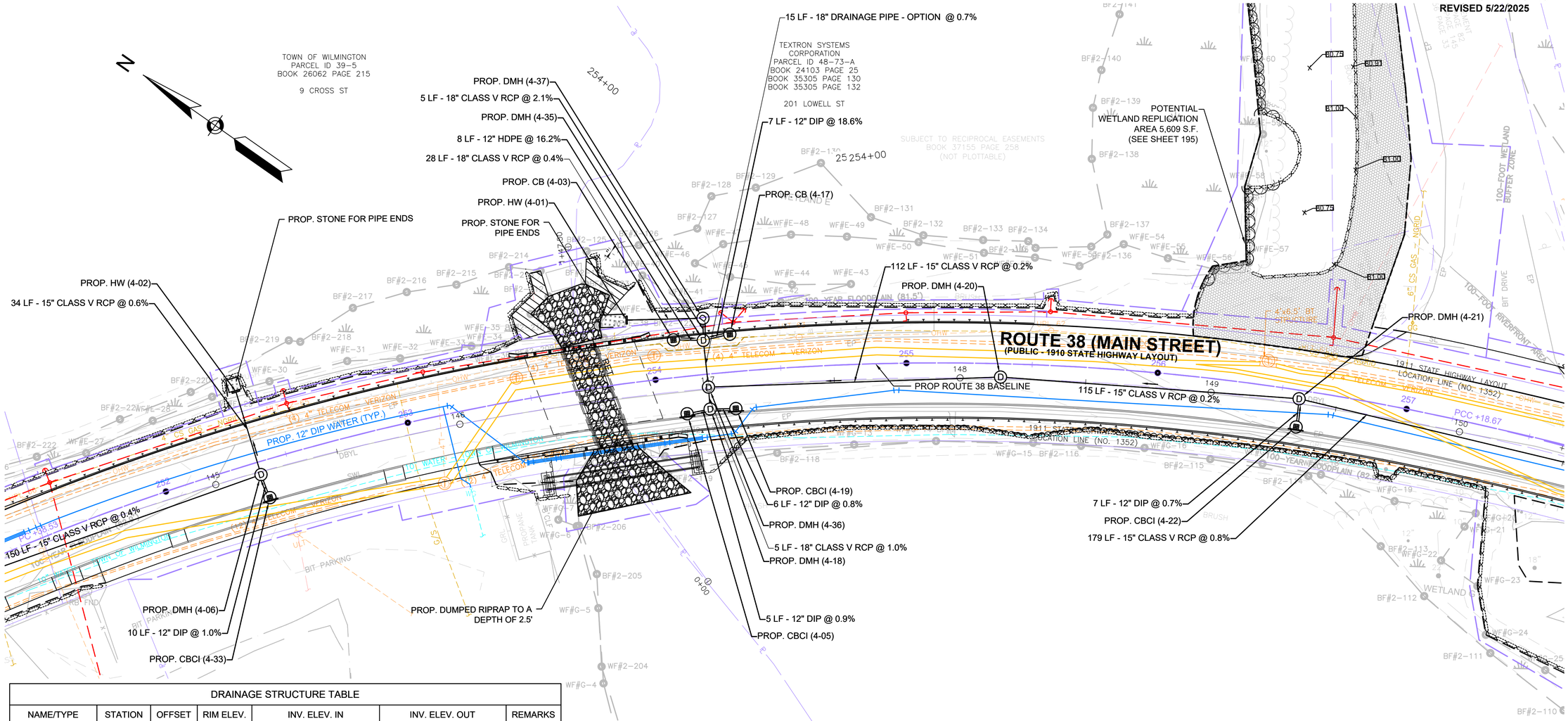
UTILITY PLAN

SEE SHEET 118

WILMINGTON
ROUTE 38 (MAIN STREET)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	103	391
PROJECT FILE NO.	608051		

DRAINAGE PLANS - 10
REVISED 5/22/2025



DRAINAGE STRUCTURE TABLE						
NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
PROP. DMH (4-20)	255+37.54	5.3 R	82.38	I=78.92' (PROP. DMH (4-21))	I=78.92' (PROP. DMH (4-36))	
PROP. DMH (4-21)	256+57.15	3.4 R	83.10	I=79.10' (PROP. CBCI (4-22)) I=79.26' (PROP. DMH (4-24))	I=79.10' (PROP. DMH (4-20))	
PROP. DMH (4-35)	254+20.43	13.5 L	82.69	I=78.20' (PROP. DMH (4-36)) I=78.10' (PROP. CB (4-03)) I=78.10' (PROP. CB (4-17))	I=78.20' (PROP. DMH (4-37))	
PROP. DMH (4-36)	254+20.67	5.2 R	82.12	I=78.40' (PROP. DMH (4-18)) I=78.67' (PROP. DMH (4-20))	I=78.30' (PROP. DMH (4-35))	
PROP. DMH (4-37)	254+21.11	22.3 L	82.40	I=78.10' (PROP. DMH (4-35))	I=79.44' (PROP. HW (4-01)) I=78.10' ()	
PROP. HW (4-01)	253+91.64	25.0 L	81.07	I=79.40' (PROP. DMH (4-37))		
PROP. HW (4-02)	252+38	29.3 L	80.14	I=78.20' (PROP. DMH (4-06))		

DRAINAGE STRUCTURE TABLE						
NAME/TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
PROP. CB (4-03)	254+08.81	14.9 L	82.67		I=79.40' (PROP. DMH (4-35))	
PROP. CB (4-17)	254+30.98	15.0 L	82.65		I=79.40' (PROP. DMH (4-35))	
PROP. CBCI (4-05)	254+11.04	14.8 R	81.79		I=78.50' (PROP. DMH (4-18))	
PROP. CBCI (4-19)	254+30.81	14.7 R	81.78		I=78.58' (PROP. DMH (4-18))	
PROP. CBCI (4-22)	256+57.67	14.7 R	82.71		I=79.15' (PROP. DMH (4-21))	
PROP. CBCI (4-33)	252+38.95	14.9 R	82.37		I=79.30' (PROP. DMH (4-06))	
PROP. DMH (4-06)	252+38.17	5.1 R	82.72	I=78.40' (PROP. DMH (4-07)) I=79.20' (PROP. CBCI (4-33))	I=78.40' (PROP. HW (4-02))	
PROP. DMH (4-18)	254+20.47	13.9 R	81.81	I=78.53' (PROP. CBCI (4-19)) I=78.45' (PROP. CBCI (4-05))	I=78.45' (PROP. DMH (4-36))	

NOTES:
1. CONTRACTOR SHALL FIELD VERIFY GUARDRAIL POST SPACING CAN ACCOMMODATE PROPOSED AND EXISTING DRAINAGE.
2. EXCAVATE TO DEPTH OF RIPRAP AND MATCH EXISTING SURFACE. FINAL GRADE SHALL MATCH EXISTING GRADE.

0 20 50 100
SCALE: 1" = 20'

FOR UTILITY PLAN:
SEE SHEET NO. 109

608051_UT103(DRAINAGE-PLANS).DWG Plotted on 22-May-2025 3:27 PM

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From:	Bryan Vachon
To:	Briones, Maria B. (DOT)
Cc:	Lenker, Melissa (DOT); Thompson, Kevin S. (DOT); Larner, Erica N. (DOT); Carney, James N. (DOT); Canaday, Anne C. (DOT); Kernan, Eamon (DOT); Boland, Noah M. (DOT); Dennis Vertiyev; Tsoukalas, Alexander (EXT); James Thorne; Oxana Fartushnaya; 1303319X MassDOT Wilmington Rte 38; Fallon, Brian M. (DOT); Sprague, Sandra J. (DOT); Fleury, Daniel (DOT); Loosian, Brett S. (DOT)
Subject:	Re: 608051 Wilmington Route 38 - ENV - Draft ExENF and NOI
Date:	Tuesday, March 4, 2025 5:35:23 PM
Attachments:	image004.png image005.png image006.png image007.png Outlook-eqzpqdt4.png Outlook-wofhfc1p.png Pages from 11081 StormTech Isolator Row PLUS Manual POD 7-24.pdf

CAUTION: This email originated from a sender outside of the Commonwealth of Massachusetts mail system. Do not click on links or open attachments unless you recognize the sender and know the content is safe.

Hi Maria,

Please see Green's responses below in red.

(1) For SCM-1, we recognize there is a significant increase in peak rates here without this system and it is likely necessary. To make maintenance easier, could Green please consider adding in more points of access?

1. Yes, Green will add four inspection ports to SCM-1 at each corner of the subsurface system. We currently provide a manhole structure at one end of the isolator row to increase ease of maintenance. We could provide a second manhole at the far end of the isolator row, please advise if this is preferred. Also, see attached excerpt from the manufacturer's O&M manual for additional information regarding maintenance access.

(2) For SCM-3 we would like to see what the improvement in peak rates would be if we were to do some offline leaching basins instead of this subsurface system. The increase increase in peak rates here is nearly negligible, so we are curious to see if a handful of leaching basins could still improve things while being more maintainable.

2. While leaching basins ("LBs") provide minor water quality and recharge volume and are more easily maintained, this type of SCM is not typically used to control peak rates due to its limit storage capacity. The MassDOT Stormwater Design Guide (2023) indicates that leaching basins are SCMs that do not control peak rates. While the LBs could provide a minor decrease in peak rates, due to the limitations of HydroCAD, surcharges from the LB cannot be accurately modelled since there would be only one pipe connecting the LB to the catch basin. In addition, test pits have not been excavated at all potential LB locations, so exact soil types, seasonal high groundwater, and bedrock elevation have not been identified at these locations. There are four (4) catch basins upstream of the current SCM-3 location, which would provide an approximate LB

volume of 320 CF (~80 CF times four LBs). SCM-3 provides 2,453 CF of volume, which currently peaks near the top of the system for the 100-year storm (approximately 8 times the volume or 31 LBs). This also shows the limited capacity of the LB and how the model would not be able to work for large storm events to confirm any peak rate decrease. We therefore recommend keeping subsurface SCM-3, since it provides a reduction in peak rates at 5 Breed Avenue which has existing flooding issues.

3. Green will add four inspection ports to SCM-3 at each corner of the subsurface system. Additionally, we will include one inspection port at each end of the isolator row within SCM-3, since it is near the middle of the system. We currently provide a manhole structure at one end of the isolator row to increase ease of maintenance. We could provide a second manhole at the far end of the isolator row, please advise if this is preferred. Also, see attached excerpt from the manufacturer's O&M manual for additional information regarding maintenance access.

Please let us know if you have any questions or concerns.

Thank you,
Bryan

Bryan Vachon *(He/Him/His)*
Business Manager II

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Green International Affiliates, Inc.
Tewksbury, MA and Lincoln, RI

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From: Briones, Maria B. (DOT) <maria.b.briones@dot.state.ma.us>
Sent: Monday, March 3, 2025 9:00 AM
To: Bryan Vachon <bvachon@greenintl.com>
Cc: Lenker, Melissa (DOT) <Melissa.Lenker@dot.state.ma.us>; Thompson, Kevin S. (DOT) <kevin.s.thompson@dot.state.ma.us>; Larner, Erica N. (DOT) <erica.n.larner@dot.state.ma.us>; Carney, James N. (DOT) <James.N.Carney@dot.state.ma.us>; Canaday, Anne C. (DOT) <Anne.C.Canaday@dot.state.ma.us>; Kernan, Eamon (DOT) <Eamon.Kernan@dot.state.ma.us>; Boland, Noah M. (DOT) <Noah.M.Boland@dot.state.ma.us>; Dennis Vertiyev <dvertiyev@greenintl.com>; Alexander Tsoukalas <atsoukalas@greenintl.com>; James Thorne <jthorne@greenintl.com>; Oxana Fartushnaya <ofartushnaya@greenintl.com>; 1303319X MassDOT Wilmington Rte 38 <1303319XMassDOTWilmingtonRte38@GreenIntl.com>; Fallon, Brian M. (DOT) <Brian.Fallon@dot.state.ma.us>; Sprague, Sandra J. (DOT) <Sandra.J.Sprague@dot.state.ma.us>; Fleury, Daniel (DOT) <Daniel.Fleury@dot.state.ma.us>; Loosian, Brett S. (DOT)

<Brett.Loosian@dot.state.ma.us>
Subject: Re: 608051 Wilmington Route 38 - ENV - Draft ExENF and NOI

Hi Bryan,
After reviewing the peak rates and speaking with District we have a couple of suggestions/requests: (1) For SCM-1, we recognize there is a significant increase in peak rates here without this system and it is likely necessary. To make maintenance easier, could Green please consider adding in more points of access? (2) For SCM-3 we would like to see what the improvement in peak rates would be if we were to do some offline leaching basins instead of this subsurface system. The increase increase in peak rates here is nearly negligible, so we are curious to see if a handful of leaching basins could still improve things while being more maintainable.

Maria

Maria Briones, PE *(she/her)*
MassDOT – **Highway Division**
Stormwater Management Unit Supervisor
maria.b.briones@dot.state.ma.us
(857)-275-7253

From: Bryan Vachon <bvachon@greenintl.com>
Sent: Wednesday, February 19, 2025 2:44 PM
To: Briones, Maria B. (DOT) <maria.b.briones@dot.state.ma.us>
Cc: Lenker, Melissa (DOT) <Melissa.Lenker@dot.state.ma.us>; Thompson, Kevin S. (DOT) <kevin.s.thompson@dot.state.ma.us>; Larner, Erica N. (DOT) <erica.n.larner@dot.state.ma.us>; Carney, James N. (DOT) <James.N.Carney@dot.state.ma.us>; Canaday, Anne C. (DOT) <Anne.C.Canaday@dot.state.ma.us>; Kernan, Eamon (DOT) <Eamon.Kernan@dot.state.ma.us>; Boland, Noah M. (DOT) <Noah.M.Boland@dot.state.ma.us>; Dennis Vertiyev <dvertiyev@greenintl.com>; Tsoukalas, Alexander (EXT) <atsoukalas@greenintl.com>; James Thorne <jthorne@greenintl.com>; Oxana Fartushnaya <ofartushnaya@greenintl.com>; 1303319X MassDOT Wilmington Rte 38 <1303319XMassDOTWilmingtonRte38@GreenIntl.com>
Subject: Re: 608051 Wilmington Route 38 - ENV - Draft ExENF and NOI

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Hi Maria,

As a follow up to our stormwater discussion on 2/14/25, please see below for a breakdown of design criteria for subsurface SCM-1 and SCM-3.

SCM-1 (DP-14) - This location sees an increase in peak rates to DP-14 due to a new impervious area along the project corridor from shoulder widening and the addition of new sidewalk. This area also includes a new closed drainage system that captures stormwater from both lanes of Main Street (Route 38) under proposed conditions and discharges at DP-14 versus existing conditions, which sheet flows away from the site at DP-12 and DP-14. Stormwater runoff from the roadway is captured from a high point at approximately STA. 266+00 to 272+00. See the following for breakdown of peak rate and peak volume deltas:

Peak Rates (2,10,100-year)
- Existing = 2.88, 5.91, 10.93 cfs
- Proposed (with SCM-1) = 3.36, 5.96, 11.03 cfs
- Proposed (no SCM) = 4.58, 8.23, 14.01 cfs

Peak Volumes (CF) (2,10,100-year)
- Existing = 9,148 / 18,731 / 35,371 cf
- Proposed (with SCM-1) = 14,157 / 28,880 / 53,230 cf
- Proposed (no SCM) = 17,642 / 32,409 / 56,759 cf

Green recommends keeping SCM-1 since utilizing a SCM at this location reduces the increase in peak rates to below 1 CFS at DP-14, which is considered negligible. Without a SCM at this location, the increase in peak rates would exceed 1 CFS, which would likely be a concern for DEP.

SCM-3 (DP-20) – An abutting property owner has expressed concerns about existing flooding at this outfall location. The property in question is located at 5 Breed Avenue and contains an outfall with direct discharge from the State ROW to this private property at DP-20. New sidewalks and curbs in this area necessitate gutter flow under proposed conditions versus a mix of gutter flow and country drainage under existing conditions. The existing outfall will be upsized from one 12" pipe to two 12" pipes. There is a net increase in impervious area and an increase in peak rates at this concentrated point source discharge, which could exacerbate existing drainage concerns. We reviewed the watershed areas under existing and proposed conditions to refine our calculations since our last submission. See the following for peak rate and peak volume deltas:

Peak Rates (CFS) (2,10,100-year)
- Existing = 8.94, 16.22, 27.78 cfs
- Proposed (with SCM-3) = 6.34, 15.42, 26.94 cfs
- Proposed (no SCM) = 8.97, 16.29, 27.90 cfs

Peak Volumes (CF) (2,10,100-year)
- Existing = 37,679 / 69,696 / 122,665 cf
- Proposed (with SCM-3) = 35,109 / 67,257 / 120,487 cf
- Proposed (no SCM) = 37,941 / 70,132 / 123,493 cf

Green recommends keeping the proposed SCM-3 to provide peak rate & volume reduction to improve the existing drainage issue. In addition, the SCM will provide additional water quality and recharge volume, which are highlighted in the stormwater report.

Thanks,

Bryan Vachon *(He/Him/His)*
Business Manager II

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Direct (978) 843-5208
Website www.greenintl.com

Green International Affiliates, Inc.
Tewksbury, MA and Lincoln, RI

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From: Briones, Maria B. (DOT) <maria.b.briones@dot.state.ma.us>
Sent: Thursday, February 13, 2025 1:10 PM
To: Bryan Vachon <bvachon@greenintl.com>; Thompson, Kevin S. (DOT) <kevin.s.thompson@dot.state.ma.us>; Oxana Fartushnaya <ofartushnaya@greenintl.com>; Lenker, Melissa (DOT) <Melissa.Lenker@dot.state.ma.us>
Cc: Larner, Erica N. (DOT) <erica.n.larner@dot.state.ma.us>; Carney, James N. (DOT) <James.N.Carney@dot.state.ma.us>; Canaday, Anne C. (DOT) <Anne.C.Canaday@dot.state.ma.us>; Kernan, Eamon (DOT) <Eamon.Kernan@dot.state.ma.us>; Boland, Noah M. (DOT) <Noah.M.Boland@dot.state.ma.us>; Dennis Vertiyev <dvertiyev@greenintl.com>; Alexander Tsoukalas <atsoukalas@greenintl.com>; 1303319X MassDOT Wilmington Rte 38 <1303319XMassDOTWilmingtonRte38@GreenIntl.com>; James Thorne <jthorne@greenintl.com>
Subject: RE: 608051 Wilmington Route 38 - ENV - Draft ExENF and NOI

Hi Bryan,
The main things that stormwater wanted to discuss was whether the subsurface infiltration structures are necessary. If we feel they are absolutely necessary, I'd like to discuss the sizing/whether we need both. We'd also like to discuss removing the hydrodynamic separators. We normally do not promote subsurface infiltration structures or hydrodynamics separators but with this being at 100% design and the first time I am seeing this project, I recognize there may be more to the story which is easier to chat about in a call.

Maria Briones, PE *(she/her)*
MassDOT **– Highway Division**
Stormwater Management Unit Supervisor
maria.b.briones@dot.state.ma.us
(857)-275-7253

From: Bryan Vachon <bvachon@greenintl.com>
Sent: Thursday, February 13, 2025 12:47 PM
To: Thompson, Kevin S. (DOT) <kevin.s.thompson@dot.state.ma.us>; Oxana Fartushnaya <ofartushnaya@greenintl.com>; Lenker, Melissa (DOT) <Melissa.Lenker@dot.state.ma.us>
Cc: Larner, Erica N. (DOT) <erica.n.larner@dot.state.ma.us>; Carney, James N. (DOT)

<James.N.Carney@dot.state.ma.us>; Canaday, Anne C. (DOT) <Anne.C.Canaday@dot.state.ma.us>; Kernan, Eamon (DOT) <Eamon.Kernan@dot.state.ma.us>; Boland, Noah M. (DOT) <Noah.M.Boland@dot.state.ma.us>; Dennis Vertiyev <dvertiyev@greenintl.com>; Tsoukalas, Alexander (EXT) <atsoukalas@greenintl.com>; 1303319X MassDOT Wilmington Rte 38 <1303319XMassDOTWilmingtonRte38@GreenIntl.com>; Briones, Maria B. (DOT) <maria.b.briones@dot.state.ma.us>; James Thorne <jthorne@greenintl.com>
Subject: Re: 608051 Wilmington Route 38 - ENV - Draft ExENF and NOI

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Hi Kevin,

Just wanted follow up on this, are you able to provide preliminary stormwater comments to aid in our discussion tomorrow?

Thanks,
Bryan

Bryan Vachon *(He/Him/His)*
Business Manager II

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Direct (978) 843-5208
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Green International Affiliates, Inc.
Tewksbury, MA and Lincoln, RI

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From: Thompson, Kevin S. (DOT) <kevin.s.thompson@dot.state.ma.us>
Sent: Tuesday, February 11, 2025 4:29 PM
To: Oxana Fartushnaya <ofartushnaya@greenintl.com>; Lenker, Melissa (DOT) <Melissa.Lenker@dot.state.ma.us>
Cc: Larner, Erica N. (DOT) <erica.n.larner@dot.state.ma.us>; Carney, James N. (DOT) <James.N.Carney@dot.state.ma.us>; Canaday, Anne C. (DOT) <Anne.C.Canaday@dot.state.ma.us>; Kernan, Eamon (DOT) <Eamon.Kernan@dot.state.ma.us>; Boland, Noah M. (DOT) <Noah.M.Boland@dot.state.ma.us>; Dennis Vertiyev <dvertiyev@greenintl.com>; Alexander Tsoukalas <atsoukalas@greenintl.com>; 1303319X MassDOT Wilmington Rte 38

<1303319XMassDOTWilmingtonRte38@GreenIntl.com>; Briones, Maria B. (DOT) <maria.b.briones@dot.state.ma.us>; Bryan Vachon <bvachon@greenintl.com>; James Thorne <jthorne@greenintl.com>
Subject: RE: 608051 Wilmington Route 38 - ENV - Draft ExENF and NOI

Thanks Oxana, I will send out the invite. I already have one drafted. I will follow up with Maria to get you some comments ahead of time.

Thanks,
Kevin

From: Oxana Fartushnaya <ofartushnaya@greenintl.com>
Sent: Tuesday, February 11, 2025 4:26 PM
To: Thompson, Kevin S. (DOT) <kevin.s.thompson@dot.state.ma.us>; Lenker, Melissa (DOT) <Melissa.Lenker@dot.state.ma.us>
Cc: Larner, Erica N. (DOT) <erica.n.larner@dot.state.ma.us>; Carney, James N. (DOT) <James.N.Carney@dot.state.ma.us>; Canaday, Anne C. (DOT) <Anne.C.Canaday@dot.state.ma.us>; Kernan, Eamon (DOT) <Eamon.Kernan@dot.state.ma.us>; Boland, Noah M. (DOT) <Noah.M.Boland@dot.state.ma.us>; Dennis Vertiyev <dvertiyev@greenintl.com>; Tsoukalas, Alexander (EXT) <atsoukalas@greenintl.com>; 1303319X MassDOT Wilmington Rte 38 <1303319XMassDOTWilmingtonRte38@GreenIntl.com>; Briones, Maria B. (DOT) <maria.b.briones@dot.state.ma.us>; Bryan Vachon <bvachon@greenintl.com>; James Thorne <jthorne@greenintl.com>
Subject: Re: 608051 Wilmington Route 38 - ENV - Draft ExENF and NOI

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Hi Kevin,

10 am on 2/14 works for me and Bryan (SW). Would you like us to send an invite to the group or you can do it?

We would also like to request the comments ahead of time so we can review them prior to this meeting. Please let us know when you plan to send them to us.

Thank you,
Oxana

From: Thompson, Kevin S. (DOT) <kevin.s.thompson@dot.state.ma.us>
Sent: Tuesday, February 11, 2025 3:34:08 PM
To: Oxana Fartushnaya <ofartushnaya@greenintl.com>; Lenker, Melissa (DOT) <Melissa.Lenker@dot.state.ma.us>
Cc: Larner, Erica N. (DOT) <erica.n.larner@dot.state.ma.us>; Carney, James N. (DOT) <James.N.Carney@dot.state.ma.us>; Canaday, Anne C. (DOT) <Anne.C.Canaday@dot.state.ma.us>; Kernan, Eamon (DOT) <Eamon.Kernan@dot.state.ma.us>; Boland, Noah M. (DOT) <Noah.M.Boland@dot.state.ma.us>; Dennis Vertiyev <dvertiyev@greenintl.com>; Alexander Tsoukalas <atsoukalas@greenintl.com>; 1303319X MassDOT Wilmington Rte 38 <1303319XMassDOTWilmingtonRte38@GreenIntl.com>; Briones, Maria B. (DOT) <maria.b.briones@dot.state.ma.us>; Bryan Vachon <bvachon@greenintl.com>; James Thorne <jthorne@greenintl.com>
Subject: RE: 608051 Wilmington Route 38 - ENV - Draft ExENF and NOI

Thanks Oxana. Looking at schedules for Maria, Noah, and myself I am seeing Friday 2/14 at 10am ET. If it is okay with everyone, I will send out an invite for that time and anyone else who can attend is welcome to.

Thank you,
Kevin

From: Oxana Fartushnaya <ofartushnaya@greenintl.com>
Sent: Tuesday, February 11, 2025 3:30 PM
To: Thompson, Kevin S. (DOT) <kevin.s.thompson@dot.state.ma.us>; Lenker, Melissa (DOT) <Melissa.Lenker@dot.state.ma.us>
Cc: Larner, Erica N. (DOT) <erica.n.larner@dot.state.ma.us>; Carney, James N. (DOT) <James.N.Carney@dot.state.ma.us>; Canaday, Anne C. (DOT) <Anne.C.Canaday@dot.state.ma.us>; Kernan, Eamon (DOT) <Eamon.Kernan@dot.state.ma.us>; Boland, Noah M. (DOT) <Noah.M.Boland@dot.state.ma.us>; Dennis Vertiyev <dvertiyev@greenintl.com>; Tsoukalas, Alexander (EXT) <atsoukalas@greenintl.com>; 1303319X MassDOT Wilmington Rte 38 <1303319XMassDOTWilmingtonRte38@GreenIntl.com>; Briones, Maria B. (DOT) <maria.b.briones@dot.state.ma.us>; Bryan Vachon <bvachon@greenintl.com>; James Thorne <jthorne@greenintl.com>; Oxana Fartushnaya <ofartushnaya@greenintl.com>
Subject: RE: 608051 Wilmington Route 38 - ENV - Draft ExENF and NOI

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SW & Permitting Call (View/vote in browser)

Forgot to attach a poll – please see attached.

Hi Kevin,

Please see the attached poll for my availability this week. I added our SW team to this chain since one of them needs to attend it. If everyone who needs to attend this call enters their availability there, it will be easier to schedule it. I don't believe MEPA unit needs to be there, but feel free to attend if needed.

I also wanted to ask Environmental a few NOI questions. I will still send a separate email with them, but now that we plan to have a call, it may save us a lot of time to go over some of them then.

Thanks,
Oxana

Oxana Fartushnaya
Client Manager II

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Tewksbury, MA and Lincoln, RI

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From: Thompson, Kevin S. (DOT) <kevin.s.thompson@dot.state.ma.us>
Sent: Tuesday, February 11, 2025 1:29 PM
To: Oxana Fartushnaya <ofartushnaya@greenintl.com>; Lenker, Melissa (DOT) <Melissa.Lenker@dot.state.ma.us>
Cc: Larner, Erica N. (DOT) <erica.n.larner@dot.state.ma.us>; Carney, James N. (DOT) <James.N.Carney@dot.state.ma.us>; Canaday, Anne C. (DOT) <Anne.C.Canaday@dot.state.ma.us>; Kernan, Eamon (DOT) <Eamon.Kernan@dot.state.ma.us>; Boland, Noah M. (DOT) <Noah.M.Boland@dot.state.ma.us>; Dennis Vertiyev <dvertiyev@greenintl.com>; Alexander Tsoukalas <atsoukalas@greenintl.com>; 1303319X MassDOT Wilmington Rte 38 <1303319XMassDOTWilmingtonRte38@GreenIntl.com>; Briones, Maria B. (DOT) <maria.b.briones@dot.state.ma.us>
Subject: RE: 608051 Wilmington Route 38 - ENV - Draft ExENF and NOI

Hi all,

Maria Briones, copied, has reviewed the Stormwater Report and the plans. We have a few points we would like to discuss, mainly regarding the subsurface SCM. We think this would be easier to do on a call than via email. Do you all have 30-60 minutes available this week?

Thank you,
Kevin

Kevin Thompson
Environmental Analyst
Wetlands Unit
(781) 879 - 6797
MassDOT – Highway ***Division***

From: Thompson, Kevin S. (DOT)
Sent: Monday, February 10, 2025 12:37 PM
To: Oxana Fartushnaya <ofartushnaya@greenintl.com>; Lenker, Melissa (DOT) <Melissa.Lenker@dot.state.ma.us>
Cc: Larner, Erica N. (DOT) <erica.n.larner@dot.state.ma.us>; Carney, James N. (DOT) <James.N.Carney@dot.state.ma.us>; Canaday, Anne C. (DOT) <Anne.C.Canaday@dot.state.ma.us>; Kernan, Eamon (DOT) <Eamon.Kernan@dot.state.ma.us>; Boland, Noah M. (DOT) <Noah.M.Boland@dot.state.ma.us>; Dennis Vertiyev <dvertiyev@greenintl.com>; Tsoukalas, Alexander (EXT) <atsoukalas@greenintl.com>; 1303319X MassDOT Wilmington Rte 38 <1303319XMassDOTWilmingtonRte38@GreenIntl.com>
Subject: RE: 608051 Wilmington Route 38 - ENV - Draft ExENF and NOI

Hi Oxana,

Apologies for the delay. We have quite a few comments for this NOI and it has taken a while to compile. Our Stormwater unit is still looking over the Stormwater Report and the plans, so I will send those over as soon as possible.

I am attaching the marked up NOI along with our Checklist for the NOI. The Checklist shows all of the various elements we are looking for in the NOI and will hopefully help you address some of our comments. We will need to see another draft before we are able to submit. Here is the NOI narrative: https://acrobat.adobe.com/id/urn:aaid:sc:VA6C2:d98dd933-27db-442d-9797-dee38fb5c552 and the plan set is attached.

If you have any questions about the comments or our checklist, feel free to reach out. If we can turnaround the revisions within the next 2 weeks, we should be able to review the next draft quickly and get this submitted by 3/13.

Thank you for your patience,

Kevin

Kevin Thompson
Environmental Analyst
Wetlands Unit
(781) 879 - 6797
MassDOT – Highway ***Division***

From: Oxana Fartushnaya <ofartushnaya@greenintl.com>
Sent: Monday, February 10, 2025 12:24 PM
To: Lenker, Melissa (DOT) <Melissa.Lenker@dot.state.ma.us>
Cc: Larner, Erica N. (DOT) <erica.n.larner@dot.state.ma.us>; Thompson, Kevin S. (DOT) <kevin.s.thompson@dot.state.ma.us>; Carney, James N. (DOT) <James.N.Carney@dot.state.ma.us>; Canaday, Anne C. (DOT) <Anne.C.Canaday@dot.state.ma.us>; Kernan, Eamon (DOT) <Eamon.Kernan@dot.state.ma.us>; Boland, Noah M. (DOT) <Noah.M.Boland@dot.state.ma.us>; Dennis Vertiyev <dvertiyev@greenintl.com>; Tsoukalas, Alexander (EXT) <atsoukalas@greenintl.com>; 1303319X MassDOT Wilmington Rte 38 <1303319XMassDOTWilmingtonRte38@GreenIntl.com>
Subject: RE: 608051 Wilmington Route 38 - ENV - Draft ExENF and NOI

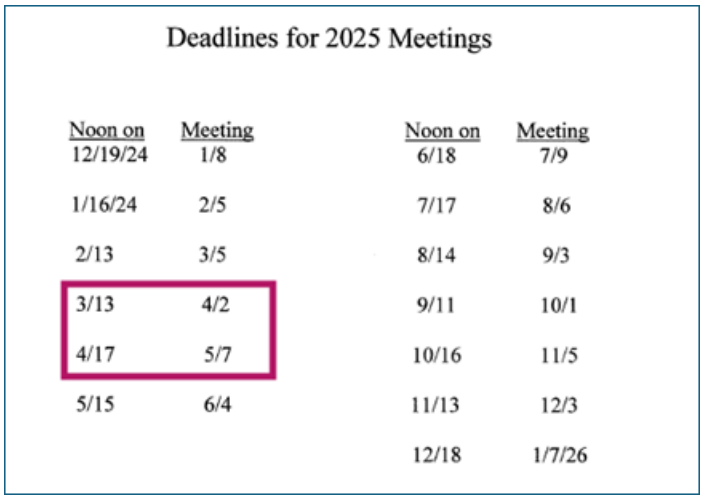
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Hi Melissa,

I wanted to do a quick check-in to see when we can expect to receive the comments on the NOI and the Stormwater Report. While we are working on incorporating the MEPA unit's comments into our MEPA documents, it would be beneficial to incorporate the Wetlands unit's comments (if there will be any) into the MEPA filing as well.

Also, it would be best if we can aim to submit the NOI on 3/13 (by noon) so that both the NOI filing and the MEPA filing can be initiated around the same time, and we will be able to work on NERO's concerns/comments (if they will have any) before they issue an ENF certificte. We plan to submit MEPA EENF and REIR packages on 3/17.

Wilmington Conservation Commission's 2025 schedule:



Deadlines for 2025 Meetings

Noon on	Meeting	Noon on	Meeting
12/19/24	1/8	6/18	7/9
1/16/24	2/5	7/17	8/6
2/13	3/5	8/14	9/3
3/13	4/2	9/11	10/1
4/17	5/7	10/16	11/5
5/15	6/4	11/13	12/3
		12/18	1/7/26

Please let me know. Thank you,
Oxana

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From: Lenker, Melissa (DOT) <Melissa.Lenker@dot.state.ma.us>
Sent: Friday, January 24, 2025 12:56 PM
To: Oxana Fartushnaya <ofartushnaya@greenintl.com>; Carney, James N. (DOT) <James.N.Carney@dot.state.ma.us>; Larner, Erica N. (DOT) <erica.n.larner@dot.state.ma.us>
Cc: Canaday, Anne C. (DOT) <Anne.C.Canaday@dot.state.ma.us>; Kernan, Eamon (DOT) <Eamon.Kernan@dot.state.ma.us>; Boland, Noah M. (DOT) <Noah.M.Boland@dot.state.ma.us>; Dennis Vertiyev <dvertiyev@greenintl.com>; Alexander Tsoukalas <atsoukalas@greenintl.com>; 1303319X MassDOT Wilmington Rte 38 <1303319XMassDOTWilmingtonRte38@GreenIntl.com>; Thompson, Kevin S. (DOT) <kevin.s.thompson@dot.state.ma.us>
Subject: RE: 608051 Wilmington Route 38 - ENV - Draft ExENF and NOI

Hi Oxana,

We will aim to return comments as soon as possible on the NOI.

Thanks,

Melissa

Melissa Lenker
Massachusetts Department of Transportation – Highway Division
Wetlands & Water Resources Supervisor
10 Park Plaza, Boston, MA 02116
Mobile (978) 429-1772

From: Oxana Fartushnaya <ofartushnaya@greenintl.com>
Sent: Thursday, January 23, 2025 5:10 PM
To: Carney, James N. (DOT) <James.N.Carney@dot.state.ma.us>; Larner, Erica N. (DOT) <erica.n.larner@dot.state.ma.us>
Cc: Lenker, Melissa (DOT) <Melissa.Lenker@dot.state.ma.us>; Canaday, Anne C. (DOT) <Anne.C.Canaday@dot.state.ma.us>; Kernan, Eamon (DOT) <Eamon.Kernan@dot.state.ma.us>; Boland, Noah M. (DOT) <Noah.M.Boland@dot.state.ma.us>; Dennis Vertiyev <dvertiyev@greenintl.com>; Tsoukalas, Alexander (EXT) <atsoukalas@greenintl.com>; 1303319X MassDOT Wilmington Rte 38 <1303319XMassDOTWilmingtonRte38@GreenIntl.com>
Subject: 608051 Wilmington Route 38 - ENV - Draft ExENF and NOI

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Good afternoon, Everyone -

Below please find a link to the revised drafts of the ExENF and NOI as well as Permit Plans and a Stormwater Report (attachments to both submittals).

20250123 Revised ENV Submission - ExENF and NOI
Password: 9Cq20t0n
https://greenintl.egnyte.com/fl/IsMirDUiXS
Note: the link expires on 1/30/2025

We are hoping to initiate your review process ahead of time so we can submit both as soon as we can considering this project's schedule:

- MEPAExENF filing – the next submission deadline for MEPA filings we are eligible for based on the advanced notifications sent out today is **3/17/25**.
- WPA/NOI filing – Wilmington Conservation Commission meets once a month on the first Wednesday of the month. If we shoot for the 3/5/25 hearing, we will need to submit by **2/13/25** (by noon).

Please let us know if you have any questions.

Thank you,
Oxana

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Client Manager II

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