Town of Shirley

Department of Public Works

INVITATION FOR BIDDERS (IFB)
WHITNEY ROAD OVER BEAVER POND BROOK CULVERT REPLACEMENT
IN SHIRLEY, MASSACHUSETTS

Notice is hereby given that the Town of Shirley is seeking sealed bids for Whitney Road Over Beaver Pond Brook Culvert Replacement in the Town of Shirley. Invitation for Bidders (IFB) Packages with specifications and a sample contract will be available on February 17, 2025. ***Request for bid documents can be emailed to Christopher Malsch at cmalsch@hshassoc.com.*** If you have any problems obtaining the IFB online, contact the Town of Shirley, 7 Keady Way, Shirley, MA 01464, during weekday business hours from 8:00 a.m. until 4:30 p.m. Monday through Thursday, or by calling (978) 425-2600.

All bidders must be prequalified by the Massachusetts Department of Transportation (MassDOT) Highway Division. All bids must conform to the specifications of the Town of Shirley and be submitted on the proper forms to be considered a valid bid. Sealed bids entitled "**Bid for Whitney Road Over Beaver Pond Brook Culvert Replacement**" will be accepted at the Town of Shirley Select Board Office, located on the second floor at the above address, until March 6, 2025, at 10:00 A.M., at which time the bids will be publicly opened and read.

All bids shall be in accordance with M.G.L. including but not limited to: Ch. 30, Section 39M (Bid Bond), Ch. 149, Sec. 26 to 27H (Prevailing Wage Rates Found in Appendix C), and Ch. 149, Sec. 29 (Payment and Performance Bonds as applicable). A bid deposit in the amount of 5% of the bid shall accompany every bid. The bid deposit shall be in the form of a bid bond, certified treasurer's check, or cashier's check made payable to the Town of Shirley. Upon award and signing of the contract, the bid deposit will be returned to the bidders. The Town of Shirley is exempt from sales and federal excise tax to the extent permitted under law; bidders should not include such taxes in figuring or in references to any bid.

Bids offering conditions or escalation clauses will be rejected. The Town of Shirley reserves the right to reject all bids, wholly or in part, or to accept any bid even if the bid is not the lowest cost, if it is deemed to be in the best interest of the municipality, to waive informalities deemed inconsequential and to make awards in a manner deemed to be in the town's best interest. Minority- and woman-owned businesses are encouraged to bid.

Bryan Sawyer
Town Administrator
Town of Shirley
February 17, 2025

Special Notice to Bidders

The bidder's attention is directed to the following:

The Town of Shirley has highlighted some of the more noteworthy requirements of this contract and placed them on the pages immediately following this notice.

The Town of Shirley reminds all bidders of their responsibility to review the entire contract to ensure a full understanding of the requirements and incorporate this into their bid prices.

Special Notice to Bidders

The bidder's attention is directed to the following:

PRE BID MEETING

None.

CONTRACTOR QUESTIONS AND ADDENDUM ACKNOWLEDGEMENTS

Prospective bidders are required to submit all questions in writing via email to the Christopher Malsch, P.E. by February 28, 2025. Any questions received after this time will not be considered for review. Only written questions received at the email address provided below by this deadline will be responded to.

Contractors should email questions and addendum acknowledgements to the following email address cmalsch@hshassoc.com. In the email title it is requested that "Whitney Road Over Beaver Pond Brook Culvert Replacement" be included for identification purposes.

BID OPENNING

The Town of Shirley will hold the bid opening in-person. You may join the bid opening at the designated date, time and location provided below.

Bid Opening Date, Time and Location:

March 6, 2025, at 10:00 A.M in Meeting Room A and B on the 1st Floor of the Shirley Town Offices located at 7 Keady Way, Shirley, MA 01464

Special Notice to Bidders

The bidder's attention is directed to the following:

Police Detail Procedures

- **The Contractor shall be always responsible for maintenance of traffic and protection of the work site.**
- **When Police Officers/Details are required by the Town's Police Chief or the Department of Public Works, they will be supplied and reimbursed through Contractor's invoice.**
- **Unless otherwise approved by the Department of Public Works, Police Details are required anytime the winning bidder occupies the streets or sidewalks in the Town of Shirley.**
- **The Contractor shall be responsible to schedule and/or cancel detail officers due to weather scheduling, conflicts, etc.**
- **Contractor shall not be reimbursed for police details at times where work has been postponed, cancelled, or otherwise not performed.**
- **The Town of Shirley's Police Department will invoice the Contractor directly.**
- **The Contractor will make payments to the Town of Shirley Police Department directly. All Police Detail costs must be paid in full by the Contractor prior the Town's approval of the final payment invoice under this contract. The Town shall have the right, at the Town's election, to deduct from any payment amounts past due to the Police Department to reimburse the Police Department directly.**
- **The scheduling and administering of police details shall be considered incidental to all associated work activity in this Contract with no additional compensation provided to the Contractor.**

Special Notice to Bidders

The bidder's attention is directed to the following:

Road / Sidewalk Occupancy and/or Opening Permit

- **As may be required by the Shirley Department of Public Works, the winning bidder shall obtain a Street Cut Permit for each work task(s) that will open or occupy any portion of Town owned street/sidewalk layout and/or right-of-way (ROW).**
- **All Shirley Street Cut Permit fees shall be waived for all work assignments under this contract.**
- **All permit fees, costs, and administration thereof shall be considered incidental to all associated work activity in this Contract with no additional compensation provided to the Contractor.**

TOWN OF SHIRLEY

Road Cut Permit

The Town of Shirley requires an application for Permit to Open Road or Sidewalk be obtained before construction is to commence. Applications are available at the Department of Public Works located at 158 Great Road, Shirley, MA 01464, Telephone: (978) 425-2628 or on the Shirley Department of Public Works website https://www.shirley-ma.gov/228/Public-Works.

The Department of Public Works Director and the Chief of Police are to be notified before any highway or sidewalk is opened and/or closed and when work has been completed.

Special Notice to Bidders

The bidder's attention is directed to the following:

M.G.L. CH. 131 ORDER OF CONDITIONS

This project is subject to the Massachusetts General laws, Chapter 131, Section 40 as amended, and has been issued an Order of Conditions by the Shirley Conservation Commission. The Order of Conditions shall be considered part of this contract and a copy and all attachments and references shall be on-site at all times while construction activities regulated by the Order of Conditions are being performed. The Contractor is hereby notified that s/he shall be responsible and held accountable for performing any/all work necessary to satisfy and comply with the entire Order of Conditions including but not limited to every Condition, Requirement, and all referenced plans or documents just though the "Contractor" were the "Applicant" named in the Order of Conditions. If the Contractor initiates any changes/modifications to the Notice of Intent or Order of Conditions for this project, s/he shall be responsible for obtaining any amended or additional environmental permits. The Town of Shirley shall not be responsible for any time delays or monetary claims associated with permit modifications initiated by the Contractor.

A complete copy of all the M.G.L. Ch. 131 Order of Conditions applicable to this project is included in this IFB for reference. All requirements shall be in full force and effect on the contractor and his construction activates as if they had been issued directly to the "Contractor" as the "Applicant" by the Shirley Conservation Commission.

The Contractor shall be required to notify the Conservation Agent at least 48 hours in advance, counting Mondays through Wednesdays only, of work at each location. Contractor shall be required to read and sign the Orders of Conditions included in APPENDIX B of this IFB. This work includes, but is not necessarily limited to, all aspects of the Order of Conditions provided in APPENDIX B of this IFB.

The Contractor is advised that no additional compensation will be allowed for work required to establish, achieve, and maintain compliance with the Order of Conditions, as payment for the work shall be included in the respective bid items.

Special Notice to Bidders

The bidder's attention is directed to the following:

All salvageable and reusable materials, as determined by the Town of Shirley, generated by the project and not otherwise used onsite by the contractor, as approved by the Town, including but not limited to pavement millings, reusable granite curb, and reusable gravel base materials, excavated from construction shall become the property of the Town of Shirley. The material shall be removed from the job site and delivered to the Shirley Department of Public Works facility located at 158 Great Road (approximately 4.0 miles from Shirley Town Hall via Front Street to Walker Road to Great Road).

The Contractor shall coordinate the delivery of these materials with David Schwartz, DPW Director at Shirley Department of Public Works.

No separate payment will be made for this work; all costs in connection therewith shall be included in the prices bid for this Contract item.

All other materials removed during excavation including, but not limited to, asphalt, concrete, stumps etc., shall become the property of the Contractor and shall be removed from the job site and legally disposed of by the Contractor. No separate payment will be made for this work; all costs in connection therewith shall be included in the respective unit bid prices under this Contract.

Special Notice to Bidders

The bidder's attention is directed to the following:

The Contractor shall be responsible for the installation of adequate safety precautions for the protection of the travelling public and his own personnel.

The Contractor shall provide, install, position, reposition, and maintain traffic cones for traffic control for the protection of the travelling public and working personnel during construction operations.

All work must conform to an approved traffic plan and the *Manual on Uniform Traffic Control Devices* **(MUTCD).**

Traffic cones shall be in good condition and sufficiently ballasted as determined by the Engineer. Any cones damaged by traffic shall be immediately replaced. The Contractor shall keep an adequate supply of spare cones on hand to replace any damaged cones.

Cones shall not be left in operating position in the Town operated ROW when the days operation have ceased. If it becomes necessary for the Town to remove any cones from the project due to negligence by the Contractor, all cost for this work will be charged to the Contractor.

The use of traffic cones for traffic control shall be considered incidental to all associated work activity in this Contract with no additional compensation provided to the Contractor.

Special Notice to Bidders

The bidder's attention is directed to the following:

In response to the uncertainty of liquid asphalt, Portland cement, diesel fuel, gasoline, structural steel, and reinforcing steel prices, and in accordance with the requirements of Chapter 303 of the Acts of 2008 in the state of Massachusetts, the Town of Shirley is including provisions to make adjustments accounting for the prices in effect at the time the work is performed. Please review *Items 999.2, 999.4 and 999.6* for the relevant details.

The base price for these items shall be set at the bid opening.

Special Notice to Bidders

ABUTTER NOTICES

All work assignments shall require 48-hour hour advance abutter notices. The contractor shall be required to distribute and post notices to all project or work task impacted abutters as directed by the Town during the course of work. The Town shall prepare and provide printed notices and copies to the contractor for distribution by the contractor.

ADDITIONAL ABUTTER NOTICES

Additional abutter notices may be required for work tasks taking greater than four (4) consecutive workdays and/or for each work week of traffic disturbance. As may be required by the Town, the contractor shall be required to distribute and post notices to all project or work task impacted abutters as directed by the Town during the course of work.

The Town shall prepare and provide printed notices and copies.

Where required, these notices shall be in addition to the 48-hour advance abutter notice defined above.

The cost of distributing and posting up to ten (10) separate notices shall be included and shall be incidental to the work and be provided at no additional cost to the Town.

TOWN OF SHIRLEY

Whitney Road Over Beaver Pond Brook Culvert Replacement

All work done under this contract shall be done in conformance with the *Commonwealth of Massachusetts Department of Transportation Standard Specifications for Highways and Bridges* dated 2024, and the *Interim Supplemental Specifications* dated March 31, 2021; the *2017 Construction Standard Details*; the *1996 Construction and Traffic Standard Details* (as relates to traffic standard details only); *The 2015 Overhead Signal Structure and Foundation Standard Drawings*, the *2009 Manual on Uniform Traffic Control Devices (MUTCD) with Massachusetts Amendments* and the *Standard Municipal Traffic Code*; The *1968 Standard Drawings for Traffic Signals and Highway Lighting*; the latest edition of *American Standard for Nursery Stock*; the Plans and these Special Provisions.

SCOPE OF WORK

The work under this Contract consists of replacing the existing 36-inch diameter by 38-foot long corrugated metal pipe culvert which crosses under Whitney Road and conveys Beaver Pond Brook in Shirley, MA. The proposed replacement culvert is a new 38-foot long, 66-inch by 51-inch corrugated metal pipe arch with adjoining reinforced precast concrete headwalls including precast splayed wingwalls. The project is located on Whitney Road approximately 1.1 miles west of the Shirley Center Common.

The work includes tree removal, earth excavation, compaction, hot mix asphalt pavement, erosion control, streambed restoration, landscaping, restoration of disturbed project areas and any incidental items required to complete the work. Whitney Road will be closed to thru traffic and a detour will be set up by the Town of Shirley Department of Public Works.

ENGINEERING DIRECTIVES

Contractors can access MassDOT, Highway Division Engineering Directives at:
http://www.mass.gov/massdot/highway
Select Doing business with us
Select Design/Engineering
Select Engineering & Policy Directives
Select Engineering Directives

PERSONAL PROTECTIVE SAFETY EQUIPMENT FOR CONTRACTOR PERSONNEL

The Contractor is responsible to ensure that all personnel, including all subcontractors, working on the project are issued and are wearing all necessary personal protective safety equipment while working within the project limits. This equipment shall include, as a minimum, a hardhat and a safety vest, regardless of the type of work being performed. Other safety equipment shall be added as required to perform the work in which they are engaged and in accordance with all local, state, and federal requirements in effect. Safety equipment shall be provided at no additional cost to the Town of Shirley.

CONTRACTOR/SUBCONTRACTOR CERTIFICATION – CONTRACT COMPLIANCE (Revision 03-23-10)

Pursuant to 23 C.F.R. § 633.101 *et seq.*, the Federal Highway Administration (FHWA) requires each contractor to "insert in each subcontract, except as excluded by law or regulation, the required contract provisions contained in Form FHWA–1273 and further requires their inclusion in any lower tier subcontract that may in turn be made. The required contract provisions of Form FHWA–1273 shall not be incorporated by reference in any case. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the requirements contained in the provisions of Form FHWA–1273." The prime contractor shall therefore comply with the reporting and certification requirements provided in MassDOT's CONTRACTOR/SUBCONTRACTOR CERTIFICATION Form (DOT-DIST-192) certifying compliance with 23 C.F.R. § 633.101 for each subcontract agreement entered into by the contractor. The contractor shall provide a fully executed original copy of said CONTRACTOR/SUBCONTRACTOR CERTIFICATION Form to MassDOT upon execution of any subcontract agreement. Failure to comply with the reporting and certification requirement of the CONTRACTOR/ SUBCONTRACTOR CERTIFICATION Form may result in action against the prequalification status of the prime contractor with MassDOT.

PROTECTION OF UNDERGROUND FACILITIES

The Contractor's attention is directed to the necessity of making his own investigation to assure that no damage to existing structures, drainage lines, traffic signal conduits, etcetera, will occur.

The Contractor shall notify Massachusetts DIG SAFE and procure a Dig Safe Number for each location prior to disturbing existing ground in any way. The telephone number of the Dig Safe Call Center is 1-888-344-7233.

DISPOSAL OF EXCESS MATERIAL

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. This shall include, but is not limited to, roadway asphalt, concrete, and stumps. All excess materials shall be removed by the end of each workday. Stockpiling of excess materials on Town property shall not be permitted.

DISPOSAL OF SURPLUS MATERIAL

All existing and other materials not required or needed for use on the project, and not required to be removed, stacked, and delivered to the Town of Shirley shall become the property of the Contractor and shall be removed from the site during the construction period and legally disposed of. No separate payment will be made for this work; all costs in connection therewith shall be included in the prices bid for various Contract items. All surplus materials shall be removed by the end of each workday. Stockpiling of surplus materials on Town property shall not be permitted.

ARCHITECTURAL ACCESS BOARD TOLERANCES

The Contractor is hereby notified that they are ultimately responsible for constructing all project elements in strict compliance with the current Architectural Access Board (AAB)/Americans with Disabilities Act (ADA) rules, regulations, and standards.

All construction elements in this project associated with sidewalks, walkways, wheelchair ramps and curb cuts are controlled by 521CMR – Rules and Regulations of the AAB.

The AAB Rules and Regulations specify maximum slopes and minimum dimensions required for construction acceptance. There is no tolerance allowed for slopes greater than the maximum slope nor for dimensions less than the minimum dimensions.

Contractors shall establish grade elevations at all wheel chair ramp locations and shall set transition lengths according to the appropriate table in the Construction Standards (or to the details shown on the plans).

All wheelchair ramp joints and transition sections which define grade changes shall be formed, staked, and checked prior to placing cement concrete. All grade changes are to be made at joints.

WHEELCHAIR RAMPS AND SIDEWALKS

Any wheelchair ramps and/or sidewalks not built to AAB/ADA specifications widths and slopes as directed by the Town shall be replaced at the contractor's expense at no additional cost to the Town. In addition, any wheelchair ramps found within the proposed limits found to be out-of-compliance after construction is complete, shall be the responsibility of the Contractor to correct with no additional charge to the Town.

ASPHALT BINDER

To allow an efficient transition from viscosity graded Asphalt Cement (AC) specifications to performance graded Superpave Binder (PG) specifications (non-modified binder), MassDOT is replacing AC graded products with PG binder as follows:

Projects requiring AC-20 will be constructed using PG 64-28
Projects requiring AC-5 will be constructed using PG 52-34

The Contractor shall follow existing mix design requirements and produce the hot-mix using the required grade of PG binder.

The binder supplier shall provide MassDOT with PG test results and a certification of the PG binder grade when PG binder is substituted for AC grade asphalt. This testing and certification shall be based on the existing lot numbering system.

The binder supplier shall not mix AC and PG binders in the same tank, unless tested and re-certified to meet the specified grade.

Performance-Graded asphalt shall not have a higher temperature grade than specified without prior approval.

LOCATION

The work referred herein consists of a installing a corrugated metal pipe culvert and concrete headwalls beneath and adjacent to Whitney Road which conveys Beaver Pond Brook that is approximately 1.1 miles west of Shirley Center Common in the Town of Shirley, MA.

TOWN OF SHIRLEY CONTACT

The contact person for this project is Bryan Sawyer, (978-425-2600 Ext. 200) Town of Shirley Town Administrator.

MATERIALS REMOVED AND STACKED

The Contractor shall carefully remove and deliver these materials to the Shirley Department of Public Works facility located at 158 Great Road. The Contractor shall coordinate the stacking of materials with David Schwartz, Shirley Department of Public Works Director (978) 425-2628.

All items delivered to the Shirley Department of Public Works shall be signed for by the Department of Public Works on delivery slips prepared by the contractor. The original, signed, delivery slip shall be provided to David Schwartz, Shirley Department of Public Works Director at 158 Great Road, Shirley, Massachusetts.

Payment for replacement items in this Contract shall be contingent upon the Town of Shirley taking acceptance of the old materials removed, stacked, and delivered with the original, signed, delivery slips.

The Contractor shall furnish all necessary equipment and labor for loading, transporting, unloading, and neatly stacking all materials as called for in the contract documents and as directed by the Shirley Department of Public Works.

ACCESSIBILITY DURING CONSTRUCTION

Only one side of a street may be excavated at any time and the wheelchair ramp/sidewalk shall be replaced prior to excavating the opposite wheelchair ramp/sidewalk.

The Contractor is required to keep all driveways and streets open and accessible at all time during construction.

The Contractor is required to provide safe access to all residences, stores, and business establishments during construction operations. Access must be provided in accordance with the ADA and always maintained. The Contractor is required to maintain a minimum four -foot (4') clear sidewalk. When work makes sidewalk closure unavoidable the sidewalk may be closed upon approval of the Town. During sidewalk closure two (2) "Sidewalk Closed – Use Other Side" signs, see MUTCD sign R9-10, must be posted on either side of the site at the nearest intersecting street corners. Signs shall be 48"x24" conforming to MUTCD requirements for signage. Failure to provide the required access could result in violations, fines, and project termination. All such violations and fines shall be the responsibility of the contractor.

The Contractor is required to place temporary hot mix asphalt (HMA) at all wheelchair ramps and driveways after cold plane operations. The HMA shall be placed and compacted to provide a temporary transition until permanent paving is placed at final grade. HMA for this purpose shall be incidental to the Contract with no additional compensation due to Contractor.

COMPLIANCE CERTIFICATION

The Shirley Department of Public Works will make sites visits, as necessary, to take measurements at each newly constructed wheelchair ramp under this contract to ensure compliance with AAB/ADA standards and for Town of Shirley acceptance.

PROVISIONS FOR TRAVEL AND PROSECUTION OF WORK

The Contractor shall prosecute his/her work such that all the work is completed within 90 calendar days of notification to begin construction unless notified in writing and accepted by the Town of Shirley.

The Contractor shall perform work such that both pedestrian and vehicular traffic will be maintained over and through the work site with a maximum of safety and convenience in accordance with the provisions of Section 7.09, Public Safety and Convenience of the MassDOT.

At the completion of each days work, the Contractor is to move all equipment and materials off the roadway and open it completely to traffic.

Traffic management control strategy is necessary for the safe, continuous movement of traffic during construction operations. During construction, traffic will be allowed to use at least one 11' lane in each direction, unless approved otherwise in writing, using signs, reflectorized drums and police officers. Minimum standards should be maintained, day and night, for signs, lighting devices, markings, barricades, and channelization as included in Part VI of the 2003 MUTCD.

The Contractor shall submit a work Progress Schedule to the Town, for review and approval, before any work is started. In preparing the Progress Schedule, the Contractor shall maintain two-way traffic on all roadways during non-work hours. The contractor as part of this requirement shall provide the Town of Shirley with an electronic copy of the schedule and a copy of the scheduling software used. The Contractor shall provide updated schedules as requested by the Town of Shirley, but not less than once a month, and includes providing an electronic update to the schedule.

The Contractor shall provide Traffic Management Plans for lane closures for the Town's review and approval. All traffic control devices shall be implemented in conformance with the 2003 MUTCD. Traffic Management Plan shall be prepared by a Registered Professional Engineer in the state of Massachusetts.

The Contractor is responsible to restore areas used for site access to their previous condition, which costs shall be considered incidental to the various Contract pay items, unless specific restoration work items are shown on the Contract Documents.

TRAFFIC CONTROL

Traffic control shall comply with the applicable sections of Part VI of the Manual on Uniform Traffic Control Devices. Sign placement shall conform to the applicable sketches herein and/or as shown in said Part VI.

Signs and supports used for traffic control near or on the traveled way shall meet the criteria set forth in the National Cooperative Highway Research Program (NCHRP) Report 350.

The Contractor shall provide and use the appropriate warning devices, barricades, drums, signs, special lighting units, special apparel, etc., in accordance with the provisions of Section 850, Traffic Controls for Construction and Maintenance Operations in the performance of the work and as directed by the Town of Shirley.

In general, work areas on this project shall not be left overnight without adequate protection. Enough traffic cones, drums, barricades, and hazard warning lighting devices shall be placed and maintained as necessary and approved, or where and when directed by the Town of Shirley.

Work hours are subject to revision by the Town of Shirley's Department of Public Works.

Typical traffic control and safety plans for each work site shall be submitted for approval at least seven (7) days in advance of proposed work. The cost of preparing traffic control and safety plans shall be incidental to the work and shall be provided at no additional cost to the Town. All construction/work zone signage shall be in place at least 48

hours prior to beginning work and shall be approved by the Shirley Department of Public Works Director at least 24 hours to beginning work.

The repair of any damage to the Town of Shirley's Traffic Signal Systems caused by the Contractor shall be the sole responsibility of the Contractor and must be reported immediately to the Town of Shirleys's Department of Public Works. Any repairs must be made by an approved Signal Contractor and **MUST BE** verified by the Town prior to backfilling. The repair shall be made at the sole expense of the Contractor with no additional cost to the Town of Shirley.

TRAFFIC MANAGEMENT PLANS

If the contractor's operations require work within the travel way or disturbances to traffic of any kind, Traffic Management Plans shall be prepared and submitted by the Contractor, without additional compensation. Where temporary full lane closures are needed on any roadway or if work on any roadway with greater than 3,000 vehicles per day is required, the Contractor, without additional compensation, shall provide a detailed Traffic Management Plan prepared by a Registered Professional Engineer in the state of Massachusetts. The plans shall be signed and stamped by a Massachusetts Registered Professional Engineer and delivered to the Town of Shirley Department of Public Works prior to the beginning of any construction.

At a minimum, the Contractor shall be required to submit his/her traffic management plan proposed for work along Whitney Road.

Traffic Management Plans must be approved by the Town prior to advance traffic construction/work zone signage setup.

All construction/work zone signage shall be in place at least 48 hours prior to beginning work and shall be approved by the Shirley Department of Public Works Director at least 24 hours to beginning work.

No separate payment will be made for this work; all costs in connection therewith shall be included in the prices bid for various Contract items.

PUBLIC CONVENIENCE AND SAFETY

When in the judgment of the Town of Shirley construction operations constitute a hazard to traffic in an area, the Contractor may be required to suspend operations during certain hours and remove their equipment from the roadways.

The Contractor, without additional compensations, shall be required to provide access to all abutters during the prosecution of the work, except for such periods and at such locations as authorized in writing by the Town of Shirley.

STREET OPENING PERMIT

The Contractor is required to obtain and secure road cut permit(s) from the Town of Shirley Department of Public Works for each street separately. Road Cut Permit fees shall be waived by the Town of Shirley for work under this contract.

RESIDENT ACCESS DURING CONSTRUCTION

The Contractor shall maintain access/egress for all abutters. Leaflets must be distributed to all property owners within the project limits. The contractor must contact the Shirley Department of Public Works 48 hours prior to commencing any work at any location.

WEEKLY CONSTRUCTION MEETING

The Town will schedule weekly meetings to be attended by the contractor and all subcontractor's foreman working on any particular week. The cost of attending meetings shall be incidental to the work and be provided at no additional cost to the Town.

PRICE ADJUSTMENT

Due to the uncertainty of liquid asphalt, Portland cement, diesel fuel, gasoline, structural steel, and reinforcing steel prices, and in accordance with the requirements of Chapter 303 of the Acts of 2008, this contract uses special provisions available at the links below.

https://www.mass.gov/info-details/massdot-current-contract-price-adjustments

ABUTTER NOTICES

The contractor shall be required to distribute and post up to four (4) notices to all project abutters as directed by the Town during the course of work. The Town shall provide necessary notices and copies. The cost of distributing and posting notices shall be incidental to the work and be provided at no additional cost to the Town.

The Contractor shall notify the Town at least 48 hours in advance of the beginning of any work at each location.

The Town will prepare a written notice for distribution by the Contractor to all abutters affected at each work area at least 48 hours in advance of the Contractor commencing work.

The cost of distributing and posting up to four (4) separate notices shall be included and shall be incidental to the work and be provided at no additional cost to the Town.

NOTICE TO OWNERS OF UTILITIES AND RELEVANT CONTACTS

Written notice shall be given by the Contractor to all public service corporations or officials owning or having charge of publicly or privately owned utilities of his intention to commence operations affecting such utilities at least one week in advance of such operations. The Contractor shall, at the same time, file a copy of each notice with the Town.

Before the Contractor begins on any work or operation that might damage subsurface structures, they shall carefully locate all such structures and conduct his operations to avoid any damage to them.

The following are the names and addresses of the utilities presumed to be affected and the relevant contacts, but the completeness of the list is not guaranteed:

OWNERS OF UTILITIES

The following are the names and addresses of the utilities presumed to be affected, but the completeness of the list is not guaranteed.

Electric
National Grid Electric
548 Haydenville Road
Leeds, MA 01053
Sandra Anniss
(413) 582-7424

Gas
National Grid Gas
170 Data Drive
Waltham, MA 02451
Melissa Owens
(781) 907-2845

Shirley Conservation Commission
Shirley Town Office
7 Keady Way
Shirley, MA 01464
Michael Fleming, Conservation Agent
(978) 425-2600 Ext. 245

Shirley Sewer Commission
Shirley Town Office
7 Keady Way
Shirley, MA 01464
Erin Deforge, Administrative Assistant
(978) 425-2600 Ext. 236

Telephone
Verizon
385 Myles Standish Boulevard
Taunton, MA 02780
Karen Mealey
(774) 409-3160

Railroad
MBTA Document Control Group
500 Arborway
Boston, MA 02130
Connor Campbell
ccampbell2@mbta.com

Fire
Shirley Fire Department
8 Leominster Road
Shirley, MA 01464
Troy Cooley, Chief

Shirley Department of Public Works
David Schwartz
158 Great Road
Shirley, MA 01464
(978) 425-2628

Cable
Comcast Cable Corporation
PO Box 6505, 5 Omni Way
Chelmsford, MA 01824
Wendy Brown
(978) 848-5163

Designer
Robbie Burgess, P.E., PTOE
11 Beacon Street
Boston, MA 02108
(617) 348-3311

SAFETY CONTROLS FOR CONSTRUCTION OPERATIONS

(Supplementing Subsections 850.21 and 850.61))

Safety controls for construction operations shall be done in accordance with the relevant provisions of Section 850 of the Standard Specifications, the Manual on Uniform Traffic Control Devices, the Traffic Management Plan, and the following:

The providing of safety controls for construction operations shall be considered incidental to this contract and the costs for safety controls shall be included in the unit bid price for those contract items requiring such controls.

Positioning, adjusting, and re-positioning of all devices such as traffic cones, high level warning devices, etc., not otherwise classified and paid for under other items in this contract, is considered incidental and no separate payment will be made.

ADJACENT CONTRACTS

The Contractor shall carry out his work concurrently with any other work being done on other contracts or work (if any) adjacent to or within the project limits. The Contractor must provide for all possible cooperation toward the satisfactory completion of the work with a minimum of delay and inconvenience. Where necessary and insofar as possible, the Contractor shall permit other Contractors free and unobstructed passage through the project area. He shall have no claim against the Town of Shirley or any of their officers, agents, or employees for delay during this work.

MISCELLANEOUS CEMENT CONCRETE WORK

Cement concrete placed for collars around drainage structures, gate boxes, for trench caps, or in conjunction with new or reset curb or edging shall be placed at the same grade and cross-slope as the adjacent pavement so that the hot mix asphalt will have full and uniform thickness. The surface of the cement concrete shall be given a wood float finish and shall be free of honeycomb or excessive roughness.

The cement concrete shall be cured according to the applicable provisions of the Standard Specifications, Section 476. Asphalt Emulsion shall be applied to cement concrete prior to paving.

SAWCUTS

Sawcuts shall be made in existing pavement in areas at proposed limits of cold plane and overlay areas, driveway aprons, and wheelchair ramps, and at all drainage or other utility trenches that are made in pavement areas.

The existing asphalt pavement shall be sawcut through its full depth unless otherwise directed. Sawcut edges shall be straight, vertical, and uniform.

TACK COAT & JOINT SEALANT REQUIREMENTS

Where paving operations are required tack coat shall be applied liberally on all milled and existing binder pavement surfaces. All vertical edges/joints shall have hot poured rubberized asphalt applied prior to new HMA inlay. This includes all saw cut joints, new pavement joints (i.e., the center of the road between pavement passes) and at the new bituminous curb joint. It is critical that these joint areas received specific detailed attention along their entire length as they are the first areas that will fail over time.

Tack coat shall be applied at a residual binder amount on the pavement between 0.05 to 0.07 gallons per square yard. Use the lower application rate between new lifts and the higher application rate on milled and existing binder surfaces. This amounts to a very thin application that needs to be carefully applied uniformly over all surfaces. Massachusetts uses RS-1 and CRS-1 type asphalt emulsions for tack coating. Tack coat shall be allowed to dry from a brown color to a black color prior to paving.

ENVIRONMENTAL PERMITTING

If field conditions and/or erection, demolition, storage, or other procedures not originally allowed by existing environmental permits require work to occur in or otherwise impact water or wetland resource areas, the Contractor is advised that no associated work can occur until all required environmental permits have been either amended or obtained allowing such work. The Contractor must notify the Town in writing at least 60 days prior to desired commencement of the proposed activity. All environmental submittals, including any contact with Local, State, or Federal environmental agencies, must be coordinated with the Town. The Contractor is expected to fully coordinate with requests for information and provide the same in a timely manner. The Contractor is further advised that the Town will not entertain a delay claim due to the time required to modify or obtain the environmental permits.

WORK SCHEDULE

All work shall be performed during hours of operation as determined by the Town. The work shall be performed during an 8-hour day, 5-day week according to Permit Requirements of the Town. All work shall include the prime Contractor and all subcontractors working on the same shift.

No work shall be done on this contract on Saturdays, Sundays, or Holidays. Work will not be allowed the day before or the day after a long weekend involving a holiday without prior approval by the Town.

The Town may impose peak hour work restrictions as determined to be necessary by the Town or the Police Department.

All lane closures must be approved, by the Town of Shirley, in advance. Set-up and removal of all equipment and materials for construction and / or traffic maintenance shall be done only during working hours for the work being done. The roadway shall be free of the Contractor's personnel and operations during non-work hours.

Before starting any work on this contract, the Contractor shall submit a schedule of operations.

For any work involving the displacement of parking the Contractor shall post the affected area with "Tow Zone" "No Stopping" Signs (T-23). **All signs must be posted 48 hours in advance of work on any street**.

Contractor shall be required to obtain permits from the Town of Shirley's Department of Public Works for each individual street prior to the commencement of work.

All Traffic Management, parking notices and permits required to complete the work shall be considered incidental to the work items. No separate payment will be made for this work; all costs in connection therewith shall be included in the prices bid for various Contract items.

PAVEMENT MARKINGS

The Town will not provide a line of reference for establishing the pavement markings except for crosswalks. Crosswalks will be shown on sketches. It shall be the responsibility of the Contractor to reference and record all existing pavement markings, their locations, and dimensions for reproduction after final paving. The recording shall be done prior to any other work on the project and copies given to the Town. The cost associated with recording the existing pavement markings shall be incidental to the work.

CONTRACT QUANTITIES

All quantities specified are estimated. Contractor shall be paid for the actual quantities of contract items complete, installed and approved and accepted in writing on delivery slips signed by the Department of Public Works.

Bid Preparation

The Bidder must satisfy himself by his own investigation and research regarding all conditions affecting the work to be done, and the labor and equipment needed to complete the work in accordance with these specifications.

Bid Forms
All bids shall be submitted on the Bid Form Sheet and signed correctly with ink and by the person having legal authority to do so. In addition, the person signing the proposal shall provide his title and the address and telephone number of the firm.

Addenda
If any changes are made to this IFB, an addendum will be issued. Addenda will be emailed electronically, mailed, or faxed to all bidders on record as having picked up the IFB from the Town. Contractor's shall be responsible for contacting the Town to verify that they have received all addenda issued, for familiarizing themselves with all addenda requirements and inclusion of all requirements into their bid prices.

Inspection of Equipment and Materials
The Owner / Town or his representative shall inspect all equipment and materials to be used in the performance of work prior to the contractor beginning work.

Inspection of Work
The Owner / Town or his representative shall inspect the work and give directions pertaining to the work or pertaining to the safety and convenience of the public. The Contractor shall notify the Town or their representative of the time of starting work, interruptions, and delays. If the work done or any part thereof is not acceptable, the DPW Director shall immediately notify the Contractor in order that it may be resolved as soon as possible.

Subletting or Assignment of Contract
The Contractor shall keep the work under his personal control and shall not assign by power of attorney or otherwise or sublet the work or any part thereof without written approval of the Town.

Right to Waive and Reject Defects in the Bids
The Town reserves the right to reject all bids, to waive any informality in the bids received and accept the bid, which it deems to be most favorable to the interest of the Town. Bids, which are not complete, clean, and concise, may be rejected as informal.

Qualifications of Bidders

The successful bidder must be pre-approved by the Massachusetts Department of Transportation Highway Division.

No bids will be accepted from any party which the Town suspects of being irresponsible or unreliable. The Town has the right to request any Bidder to supply proof that he is financially capable and thoroughly experienced to complete the proposed work according to the contract documents. The Town may make such investigation as deemed necessary to determine the ability of the Bidders to perform the work, and the Bidders shall furnish to the Town all such information and data for this purpose as the Town may request. No award will be made to any Bidder who cannot meet all the following requirements:

A. Contractor shall not have defaulted on any contract within three years prior to the bid date.
B. Contractor shall maintain a permanent place of business in Massachusetts.
C. Contractor shall have adequate personnel and equipment to perform the work expeditiously.
D. Contractor shall have suitable financial status to meet obligations incident to the work.
E. Contractor shall have appropriate technical experience satisfactory to the Town in the class of work involved.
F. Contractor shall be registered with the Secretary of State of the Commonwealth of Massachusetts to do business in Massachusetts.
G. Contractor shall not have failed to perform satisfactorily on contracts of a similar nature.
H. Contractor shall not have failed to complete previous contracts on time.

I. Contractor shall not have received any negative comments from prior work references contacted by the Town, or its agent deemed significant enough by the Town to not award the contract to said Contractor.

The Town reserves the right to reject any bid if the foregoing requirements are not satisfied or if any other evidence fails to satisfy the Town that such Bidder is properly qualified to carry out and to complete the work contemplated therein. Conditional or qualified bids will not be accepted.

The Bidder and his/her subcontractors shall also be required to meet the additional technical qualification requirements as specified in the specifications.

Quality

It is the contractor's responsibility to ensure that all materials for the Town of Shirley shall meet the appropriate industry standards and the "Standard Specifications for Road and Bridge Construction" of the Commonwealth of Massachusetts and the standards included in the Department of Public Works Standard Specifications.

Award

The Town reserves the right to reject any or all bids or to make such awards as it may deem necessary for the best interest of the Town and to award individual items to individual Bidders or the entire set of materials to any Bidder.

In the event of an equal bid the Town of Shirley reserves the right to divide the award among two or more in the best interest of the Town or select the most responsive and responsible bidder as determined by the Town to be in the best interests of the Town. All bids shall be good for the entire contract period inclusive of any contract period extensions as may be required.

In the event that the lowest responsible and responsive Bidder is unable to perform, the second lowest responsive and responsible Bidder would be called upon to continue contract. Bid prices are expected to be held or Bidder would hold price.

There will be one contract awarded based upon price. Contract will be awarded to the most responsive and responsible bidder offering the lowest price total for all items.

References

The lowest Bidder shall provide at least three municipal contract references. Failure to provide acceptable references will be grounds to reject the bid. The Town will research all references. Any "unfavorable" reference could be cause for disqualification.

BID BOND:

Bids shall be in accordance with Massachusetts General Laws Chapter 30, Section 39M. A bid deposit in the form of a bid bond, or cash, or a certified check, or a treasurers shall accompany each bid or cashier's check issued by a responsible bank or trust company payable to the Town of Shirley. Such bid deposit shall be not less than five **(5%) percent of the value of the proposed work**, as estimated by the awarding authority. If the lowest responsible and responsive Bidder is unable to perform, s/he shall forfeit the entire value of their bid deposit to the Town. The second lowest responsive and responsible Bidder would then be called upon to continue contract. Bid prices are expected to be held or Bidder would hold. Upon award and signing of the contract, the bid deposit will be returned to the Bidders.

LABOR AND MATERIAL BOND (PAYMENT BOND):

Bids shall be in accordance with Chapter 149, Section 29. The successful low Bidder upon award of the contract shall submit a Labor and Material "Payment Bond" for not less than fifty percent (50%) of the estimated contract amount.

LIQUIDATED DAMAGES:

Time is of the essence of this Contract. If the Contractor shall neglect, fail, or refuse to complete all work within the time specified for "The Final Completion Date", then the Contractor does hereby agree, as a part consideration for the awarding of this Contract, to pay to the Owner, as liquidated damages and not as a penalty, the sum of ***seven hundred and fifty dollars ($750)*** per day for each calendar day beyond: "The Final Completion Date" set forth in the Agreement that the Contractor fails to achieve Completion for the Project. The said amount is fixed and agreed on by and between the Contractor and the Owner because of the impracticability and extreme difficulty of fixing and ascertaining the true value of the damages which the Owner will sustain by failure of the Contractor to complete the Work on time, such as loss of revenue, service charges, interest charges, delays caused to other construction activities of Owner by failure to perform this Contract, and other damages, some of which are indefinite and not susceptible of easy proof, said amount is agreed to be a reasonable estimate of the amount of damages which the Owner will sustain and said amount shall be deducted from any monies due or that may become due to the Contractor, and if said monies are insufficient to cover said damages, then the Contractor shall pay the amount of the difference.

MassDOT Prequalification

MassDOT prequalification of the contractor in all required categories pursuant to MassDOT's Massachusetts General Laws Chapter 90 municipal funding and reimbursement requirements.

Project Funding

Contract award pending availability of Town funding.

Project Timeline

After the required legislative approval of funding is in place, a determination will be made, and the contract will be prepared and sent for signatures within 1 week of bid opening. Contracts shall be signed and returned to the Town as expeditiously as possible so that construction shall begin within 2 weeks after the contract has been sent for signatures. Construction shall commence within 3 weeks of the bid opening and shall be completed within ninety calendar days of contract award. If the contractor initially awarded the bid cannot meet this timeline the contract will be given to the next qualified bidder.

Insurance

Before starting the work, the Contractor shall supply the Town of Shirley with insurance certificates covering public liability, property damage and worker's compensation, which will protect the Contractor from claims for damages that may occur as a result of the performance of the work specified herein for the Town of Shirley. The limits of such insurance shall be as follows:

Bodily Injury &	$1,000,000 each occurrence
Property Damage	$2,000,000 general aggregate per project
Products & Completed Operations	$2,000,000 annual aggregate
Personal & Advertising Injury	$1,000,000 each occurrence
Medical Expenses	$10,000
Worker's compensation	Statutory

Plus any other insurance coverage noted in the sample contract provided in Attachment A.

Insurance certificates shall show the Town of Shirley to be an additionally named insured on all policies pertaining to the work to be performed. All policies shall be written by companies qualified to do business in Massachusetts.

PRE-CONSTRUCTION CONFERENCE

Following awarding of the contract, a pre-construction conference will be held at a location and on a date to be determined by the Town of Shirley. At the pre-construction conference the Contractor will be required to submit a proposed schedule of operations and equipment in writing to the Town for review and approval.

Public Convenience and Safety

The Contractor shall be responsible for the maintenance of traffic through and about the work included in the contract with the maximum of safety and practicable convenience to traffic. He shall take all precautions for property in or about the work. The convenience of the general public shall be provided for in an adequate and satisfactory manner. Both the Town of Shirley Department of Public Works and Police Departments shall be notified before the start of each day's work and as to its location.

Responsibility for Damage Claims

The Contractor shall indemnify and save harmless the Town of Shirely and all its officers, agents, and employees against all suits, claims or liabilities of every name and nature, for or on account of any injuries to persons or damage to property arising out of or in consequence of the acts or omissions of the Contractor in the performance of the work covered by the contract.

Wages and Labor

Attention is called to the requirement that all bids for Public Works must be made subject to the provision of the General Laws of the Commonwealth of Massachusetts, Chapter 149.

Contract Period

Bid price shall be in effect for the period of Fiscal Years 2024 and 2025, unless extended as per Massachusetts General Laws.

Certified Payroll

The Contractor shall submit certified payroll each week, and no payment under this contract is allowed without such certified payroll.

Guarantee

The contractor guarantees that the work and services to be performed under the contract, and all workmanship, materials and equipment performed, furnished, used or installed in the construction of the same, shall be free from defects and flaws, and shall be performed and furnished in strict accordance with the drawings, specifications, and contract, that the strength of all parts of all manufactured equipment shall be adequate and as specified and that the performance test requirements of the specifications shall be fulfilled. This guarantee shall be for a period of one year from the date of beneficial occupancy by the Town of Shirely. "Beneficial occupancy" is defined as the date in which the Town of Shirley begins usage of the systems after satisfactory testing of the systems and operator training and receipt by the Town of Shirley of all manuals and as built plans as required by the specifications.

If at any time within the said period of the guarantee, except for an emergency, any part of the work requires repairing, correction or replacement, the Town of Shirley may notify the contractor in writing to make the required repairs, correction, or replacements. If the contractor neglects to commence making such repairs, corrections, or replacements to the satisfaction of the owner within three (3) days from the date of receipt of such notice or having commenced fails to prosecute such work with diligence, the Town of Shirley may employ other persons to make the same, and all direct and indirect costs of making said repairs, corrections, or replacements, including compensation for additional professional services, shall be paid by the contractor.

ADDITIONAL REQUIREMENTS

All materials and equipment shall be pre-approved prior to installation or use of by the Shirley Department of Public Works Director or his/her authorized representative, under the specifications or a as noted herein.

Minimum wages to be paid shall be in accordance with schedule of wages submitted by the Department of Labor and Industry and can be found in Appendix C.

The Contractor shall carry insurance covering Workman's Compensation and Contractors Liability and furnish evidence of same when contract is awarded.

The Department of Public Works Director reserves the right to increase or decrease the quantities, as deemed necessary and to reject any or all bids received.

All damaged and altered areas disturbed by the Contractor's operations shall be restored to pre-existing conditions at no additional cost to the Town.

The Town shall be the sole judge of the fitness, experience, and reliability of the bidders.

The Town reserves the right to reject any or all bids, wholly or in part, and to make awards deemed to be in the best interest of the Town.

Violation by the contractor of any of the various provisions and specifications of the contract could result in immediate termination of the contract and seizure of all or portions of the payment and performance bonds, respectively, by the Town of Shirley.

Amounts of work given above are approximations only. The amount of work may be altered by the Town at any time.

Prevailing wages as provided under M.G.L. c. 149, s. 26-27D must be paid for all applicable work performed under this contract. Vendors are advised to refer to the attached Wage Rate sheets in Appendix C.

The Town reserves the right to terminate this contract at any time based upon the performance of the Contractor.

BITUMINOUS CONCRETE ITEMS:

This contract calls for the all pavement items to be MassDOT Approved Superpave HMA Mixtures.

CONTRACTOR RESPONSIBILITIES:

Contractor will provide Quality Control and Town will conduct independent Quality Assurance. Price in place per ton shall include:

1. **AUTOMATED BATCHING:**

Shall be required for all bituminous mix delivered to the job site and a computer print-out shall be supplied indicating the various components of the mixture by weight in the proper sequence and shall indicate the temperature and time of mixing. The successful Bidder must submit documented evidence from a plant owner of manufacturer of Bituminous Concrete stating the availability of product and miles from the plant to Shirley center. Prices shall be per ton in place as directed, including all work described above.

2. **SURFACE PREPARATION:**

The Contractor shall insure that no loose materials lie between the existing pavement and new pavement. This is to be done before the tack coat is applied.

3. **TACK COAT:**
All bituminous concrete overlays shall have a tack coat of RS-1 applied to the existing surfaces prior to the application. The asphalt emulsion shall be diluted with equal parts of water to ensure a light even coverage and shall be applied by a self-propelled asphalt distributor, with recirculating bars, at a rate and method not to exceed 0.05 gallons per square yard, and the ENTIRE surface to be overlayed SHALL BE covered. The asphalt distributor shall be kept on the job site during the entire period of placing the overlays or until dismissed by the Highway Foreman.

4. **KEYWAYS:**
At all major locations where new pavement meets existing pavements, straight lines will be marked and the asphalt shall be milled. The last 36" of the asphalt to be overlaid shall taper down to a sufficient depth, below the matching grade as to make for the smoothest transition. In "tough to get" areas saw cutting shall be the method of choice. A tack coat shall be applied at all joints.

5. **GATES AND SERVICES:**
The Contractor shall be responsible to raise existing gas gates.

6. **STRUCTURES:**
All cast structures shall be coated with an approved release-agent to prevent the adhesion of asphalt. Each structure shall then be cleaned by the Contractor to expose the structure.

7. **HANDWORK:**
All minor handwork, i.e. driveway entrances, walk entrances, minor patchwork, shall be included in the per ton in place price and shall be performed within the same application as the street overlay.

8. **SUPERVISION:**
Contractor to have supervisor at job site at all times.

9. **TECHNICAL:**
A. Certified payroll must be submitted with each invoice, typically monthly. Failure to submit will delay payments (no payment without Certified Payroll).

B. **The Contractor shall have, on hand**, the equipment, skilled manpower, and facilities to furnish prompt delivery of material when required.

C. **The Contractor can** certify that all materials we propose to furnish will conform strictly to the Massachusetts Department of Public Works Specifications.

INSPECTION AND ACCEPTANCE: All work done and all materials furnished are to meet with the approval of the Department of Public Works Director.

INSTRUCTIONS TO BIDDERS: The Bidder shall sign his proposal correctly. If made by a firm with a partnership, the name of each member must be given. The Town of Shirley reserves the right to accept or reject any or all bids or to make an award deemed to be in the best interest of the Town.

MINIMUM WAGES: The minimum wages to be paid by the Contractor shall be in accordance with the schedule of wages submitted by the Department of Labor and Industry said schedule being a part of this contract and shall continue to be the rate or rates of wages for all employees during the life of the contract. The prevailing wages can be found in Appendix C.

HOURS OF WORK: In the employment of mechanics, teamsters and laborers in the construction of this public work, the Contractor shall give performance to first citizens of the Commonwealth, who have served in the Army or Navy of the United States of America in time of war, and have been honorably discharged there from or released from active duty therein, and who are qualified to perform the work to which the employment relates, and secondly, to citizens of the Commonwealth generally, and if they cannot be obtained in sufficient numbers, then to citizens of the United States of America. No laborer, workman or mechanic working within this Commonwealth, in the employ of the

Contractor, subcontractor, or other person doing or contracting to do the whole or part of the work contemplated by the Contract, shall be required or permitted to work more than forty-eight hours in any one week, except in cases of extra-ordinary emergency. Every employee in the work covered by this contract shall lodge, board or trade where and with whom he elects, and neither the Contractor nor his agent or employees shall, directly or indirectly require, as a condition of employment therein, that an employee shall lodge, board or trade at a particular place or with a particular person. Citizens of the Town shall be given preference in employment in this work.

PAYMENT: When items of work have been completed and accepted by the Town, as being done according to specification, full payment will be made for each individual item
.
The Town reserves the right to increase or decrease the estimated quantities of the resurfacing contract, depending on the available funds and scheduling.

The undersigned, as Bidder or Bidders, declare that they are the only persons or parties interested in this proposal as principals; that this proposal is made without collusion with any other person, firm or corporation, that he has carefully examined the location of the proposed work, and the annexed form of contract therein referred to and that he proposes and agrees that he will contract with the Town to provide all the necessary labor, machinery, tools, apparatus, material and other means of construction and to do all the work in the manner prescribed and according to the requirements of the Town as therein set forth, and that he will take, in full payment thereof, the lump sum for items of work approved by the Town.

Town of Shirley

Department of Public Works

WHITNEY ROAD OVER BEAVER POND BROOK CULVERT REPLACEMENT
BID TABULATION

Item	Description	Unit	Quantity	Unit Price	Extended Price
102.511	Tree Protection – Armoring and Pruning	EA	2	$	$
	102.511 Extended Price in Words:				
141.	Class A Trench Excavation	CY	155	$	$
	141. Extended Price in Words:				
151.	Gravel Borrow	CY	13	$	$
	151. Extended Price in Words:				
151.2	Gravel Borrow for Backfilling Structures and Pipes	CY	95	$	$
	151.2 Extended Price in Words:				
156.	Crushed Stone	TON	48	$	$
	156. Extended Price in Words:				
170.	Fine Grading and Compaction - Subgrade Area	SY	59	$	$
	170. Extended Price in Words:				
230.355	66 Inch X 51 Inch Corrugated Metal Pipe-Arch 12 Gage	FT	40	$	$
	230.355 Extended Price in Words:				
258.	Stone for Pipe Ends	SY	7	$	$
	258. Extended Price in Words:				
402.	Dense Graded Crushed Stone for Sub-Base	CY	7	$	$

402. Extended Price in Words: _____

Bidder Company Name

_____

WHITNEY ROAD OVER BEAVER POND BROOK CULVERT REPLACEMENT
BID TABULATION

Item	Description	Unit	Quantity	Unit Price	Extended Price
450.231	Superpave Surface Course - 12.5 Polymer (SSC - 12.5 - P)	TON	7	$	$
	450.231 Extended Price in Words: _____				
450.311	Superpave Intermediate Course – 12.5 Polymer (SIC – 12.5 – P)	TON	7	$	$
	450.311 Extended Price in Words: _____				
450.42	Superpave Base Course – 37.5 (SBC – 37.5)	TON	16	$	$
	450.42 Extended Price in Words: _____				
452.	Asphalt Emulsion for Tack Coat	GAL	9	$	$
	452. Extended Price in Words: _____				
453.	HMA Joint Adhesive	FT	41	$	$
	453. Extended Price in Words: _____				
697.2	Floating Silt Fence	FT	6	$	$
	697.2 Extended Price in Words: _____				
698.3	Geotextile Fabric for Separation	SY	50	$	$
	698.3 Extended Price in Words: _____				
748.	Mobilization	LS	1	$	$
	748. Extended Price in Words: _____				

751.	Loam for Roadsides	CY	15	$	$

751. Extended Price in Words: _____

Bidder Company Name

_____

WHITNEY ROAD OVER BEAVER POND BROOK CULVERT REPLACEMENT
BID TABULATION

Item	Description	Unit	Quantity	Unit Price	Extended Price
755.855	Streambed Restoration	LS	1	$	$

755.855 Extended Price in Words: _____

765.	Seeding	SY	90	$	$

765. Extended Price in Words: _____

767.121	Sediment Control Barrier	FT	110	$	$

767.121 Extended Price in Words: _____

767.91	Matting for Erosion Control	SY	90	$	$

767.9 Extended Price in Words: _____

832.	Warning-Regulatory and Route Marker – Aluminum Panel (Type A)	SF	12	$	$

832. Extended Price in Words: _____

847.1	Sign SUP (N/Guide)+Rte Mkr W/1 Brkway Post Assembly – Steel	EA	4	$	$

847.1 Extended Price in Words: _____

852.1	Safety Signing for Traffic Management	LS	1	$	$

852.1 Extended Price in Words: _____

901.	4000 PSI, 1.5 In., 565 Cement Concrete	CY	18	$	$

901. Extended Price in Words: _____

Bidder Company Name

_____

WHITNEY ROAD OVER BEAVER POND BROOK CULVERT REPLACEMENT
BID TABULATION

Item	Description	Unit	Quantity	Unit Price	Extended Price
910.1	Steel Reinforcement for Structures – Epoxy Coated	LB	400	$	$

910.1 Extended Price in Words: _____

991.11	Control of Water	LS	1	$	$

991.11 Extended Price in Words: _____

_____

TOTAL EXTENDED PART ONE BID PRICE: $ _____

TOTAL EXTENDED PART ONE BID PRICE IN WORDS: _____

In case of conflict between words and numbers, words shall control.

This bid includes addenda numbered: _____

Bidder Company Name

_____

WHITNEY ROAD OVER BEAVER POND BROOK CULVERT REPLACEMENT
BID TABULATION

All Bidders must be prequalified with Massachusetts Department of Transportation Highway Division. All Bidders must comply with the provisions under MGL, c. 90, Section 34, 720 CMR 5.00 which are subject to MassDOT's contractor prequalification requirements.

Quantity amounts are for comparing and evaluating bid prices only. It is specifically understood that the Town does not agree to purchase any specific quantity, and purchases will be made for actual requirements of the Town, only. The Town may increase or decrease the quantity of any item specified without change in price per unit of quantity as stated in the Contractor's Bid Response.

Bids must remain firm throughout the contract term, unless otherwise specified. No increase in the unit price bid, once accepted and awarded will be permitted.

BID PRICE

(Copy from Bid Tabulation Final Page above)

Total Extended Part One Bid Price: $_____

Total Extended Part One Bid Price in Words: _____

ADDENDA

This bid includes addenda(s) numbered _____ (List all Addenda).

CONTRACTOR INFORMATION AND CERTIFICATION OF BID

The undersigned certifies under penalties of perjury that this bid is in all respects bona fide, fair, and made without collusion or fraud with any other person. As used in this paragraph the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity.

COMPANY NAME: _____

ADDRESS: _____

_____

AUTHORIZED SIGNATURE _____

NAME AND TITLE (print): _____

PHONE: _____

DATE: _____

BID BOND REQUIRED

The undersigned, as bidder, declares that all persons or parties interested in this Proposal as principals are named herein; that this Proposal is made without collusion with any person, firm or corporation; that no official, employee or agent of the Town has a direct or indirect pecuniary interest in this bid; that he has carefully examined the location of the proposed work, read the contract documents, and that he proposes and agrees to contract with the Town of Shirley, in the form of a contract to be deposited with the Town, to provide all necessary machinery, tools, apparatus and other means of construction, and to do all the work and furnish all materials and labor, specified in the contract, in the manner and time therein prescribed, and according to the requirements of the Department of Public Works Director, as therein set forth, and that he will take in full payment therefore, the amounts resulting from the prices for items of the work as specified.

The Town does not expressly or by implication agree that the actual quantities of work to be done will correspond thereto, and the Town reserves the right to increase or diminish the quantity of work, or to omit items of work, as required to keep the work within the limits of available funds.

Total Contract:

_____ ($_____)
(written) (Numerals)

5% of Contract Amount:

_____ ($_____)
(written) (Numerals)

_____
Signature of Bidder

The above price is to include and cover the furnishing of all the materials (except as herein otherwise specified), the performing of all the labor requisite or proper, and the providing of all necessary machinery, tools, apparatus, and other means of operation; and the doing of all the above-mentioned work in the manner set forth, described and shown in the specifications, and in the form of the contract.

Quantity amounts provided herein are for developing, comparing, and evaluating bid prices only. It is specifically understood that the Town does not agree to purchase any specific quantity, and purchases will be made for actual requirements of the Town, only. The Town may increase or decrease the quantity of any item specified without change in price per unit of quantity as stated in the Contractor's Bid Response.

This proposal is accompanied by a bid deposit as defined herein and the bidder agrees that if the proposal is accepted by the Town of Shirley, and if the undersigned as bidder shall fail to execute a contract at the bid security forfeited to the Town of Shirley as liquidated damages; otherwise, the bid security will be returned to the bidder.

Town of Shirley Department of Public Works

PAYMENT BOND REQUIRED

Know All Men By These Presents:

That we, _____ , as PRINCIPAL, and _____ , as SURETY, are held and firmly bound unto the Town of Shirley as Obligee, in the sum of _____ _____ dollars ($_____) to be paid to the Obligee, for which payments well and truly to be made, we bind ourselves, our respective heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

Whereas, the said PRINCIPAL has made a contract with the Obligee, bearing the date of _____ ___, 2021, for the construction of Whitney Road Over Beaver Pond Brook Culvert Replacement in Shirley, Massachusetts.

Now, the conditions of this obligation are such that if the PRINCIPAL and all Sub-contractors under said contract shall pay for all labor performed or furnished and for all materials used or employed in said contract and in any and all duly authorized modifications, alterations, extensions of time, changes or additions to said contract that may hereafter be made, notice to the SURETY of such modifications, alterations, extensions of time, changes or additions being hereby waived, the foregoing to include any other purposes or items set out in, and to be subject to, provisions of M.G.L. c.30, §39A, and M.G.L. c.149, §29, as amended, then this obligation shall become null and void; otherwise it shall remain in full force, virtue and effect.

In Witness Whereof, the PRINCIPAL and SURETY have hereto set their hands and seals this ___ day of _____ , 2021.

PRINCIPAL	SURETY
_____	_____
BY _____	BY _____
(SEAL)	(ATTORNEY-IN-FACT) (SEAL)
_____ (Title)	
ATTEST: _____	ATTEST: _____

TOWN OF SHIRLEY

CERTIFICATE OF NONCOLLUSION

The undersigned certifies under penalties of perjury that this bid or proposal has been made and submitted in good faith and without collusion or fraud with any other person. As used in this certification the word "person" shall mean any natural person, business, partnership, corporation, union, committee, club or other organization, entity, or group of individuals.

COMPANY NAME: _____

ADDRESS: _____

_____

AUTHORIZED SIGNATURE (sign): _____

NAME AND TITLE (print): _____

PHONE: _____

DATE: _____

CERTIFICATION OF COMPLIANCE WITH FEDERAL IMMIGRATION LAW

The undersigned hereby certifies under the penalties of perjury that the contractor named below is in compliance with the Immigration Reform and Control Act of 1986, as amended, and with all regulations adopted there under, with respect to all of its employees who will be performing work under this contract and further certifies that said contractor does not knowingly employ any person in violation of the United States immigration laws.

The undersigned further certifies that said contractor will require this same form of certification to be executed by any subcontractor who will perform work under this contract and will maintain subcontractor certifications for inspection by the Town if such inspection is requested.

_____, Duly Authorized Signatory
Name:
Title:

_____
Contractor Company Name

_____
Date

NOTE: All certificates must be signed by the individual submitting the bid or proposal.

Town of Shirley

Department of Public Works

TOWN OF SHIRLEY

STATE TAXES CERTIFICATION CLAUSE

I certify under the penalties of perjury that I, to my best knowledge and belief, have filed all state tax returns and paid all state taxes under law.

_____ By: _____

* Signature of individual or Corporate Name (Mandatory)	Corporate Officer (Mandatory, if applicable)

_____

**Social Security # (Voluntary) or Federal Identification #

* Approval of a contract or other agreement will not be granted unless this certification clause is signed by the applicant.

** Your Social Security Number will be furnished to the Massachusetts Department of Revenue to determine whether you have met tax filing or tax payment obligations. Providers who fail to correct their non-filing or delinquency will not have a contract or other agreement issued, renewed, or extended. This request is made under the authority of Mass. G.L.62C s. 49.A.

Town of Shirley Department of Public Works

BIDDER REFERENCE FORM

Bidder Name: _____

Please provide a list of references on the firm's performance of similar work as required by this IFB within the required time period designated in Section A, under the Item entitled "Bidder Prerequisites", including all current contracts. Use additional sheets as necessary. Include the following information for each reference:

Reference One

Customer Name: _____

Address: _____

Contact Name and Title: _____

Phone and Fax/E-Mail of Contact: _____

Contract date(s): _____

Contract cost: _____

Description of Work: _____

_____

Reference Two

Customer Name: _____

Address: _____

Contact Name and Title: _____

Phone and Fax/E-Mail of Contact: _____

Contract date(s): _____

Contract cost: _____

Description of Work: _____

_____

BIDDER REFERENCE FORM (Cont'd)

Reference Three

Customer Name: _____

Address: _____

Contact Name and Title: _____

Phone and Fax/E-Mail of Contact: _____

Contract date(s): _____

Contract cost: _____

Description of Work: _____

_____

_____

Reference Four

Customer Name: _____

Address: _____

Contact Name and Title: _____

Phone and Fax/E-Mail of Contact: _____

Contract date(s): _____

Contract cost: _____

Description of Work: _____

_____

_____

Attachment A

SHORT FORM OF AGREEMENT FOR CONSTRUCTION BETWEEN TOWN AND CONTRACTOR

THIS AGREEMENT for the **WHITNEY ROAD OVER BEAVER POND BROOK CULVERT REPLACEMENT** (hereinafter referred to as the "Project"), is made this _____**,** by and between , a corporation duly organized under the laws of the Commonwealth of Massachusetts, with a usual place of business at , (hereinafter referred to as the "CONTRACTOR"), and the Town of Shirley a municipal corporation duly organized under the laws of the Commonwealth of Massachusetts, (hereinafter referred to as the "TOWN").

WITNESSETH that the CONTRACTOR and the TOWN, for the consideration hereinafter named, agree as follows:

ARTICLE 1: Contract Documents

The Contract Documents consist of the following, and in the event of conflicts or discrepancies among them, they shall be interpreted on the basis of the following priorities and in the manner most favorable to the Town:

A. This Short Form of Agreement for Construction between Town and Contractor
B. General Conditions, as modified by the Supplementary Conditions, if any
C. Project Specifications
D. Invitation for bids, bid specifications, request for proposals or purchase description
E. Drawings required for the project
F. Performance bond in the form attached hereto as **Exhibit A (Not Applicable)**
G. Payment bond in the form attached hereto as **Exhibit B**
H. Addenda issued prior to execution of the Agreement
I. Contractor's bid or proposal
J. Modifications issued after execution of the Agreement, which are not attached hereto, including the following:
    a. Work Order issued by the Town
    b. Written amendment to the Agreement signed by both parties
    c. Change Order
K. Copies of all required bonds, certificates of insurance and licenses required under the Agreement
L. Notice to Proceed, which may be delivered or issued on or after the Effective Date of this Agreement and may not be attached hereto, and
M. The Summary of Conflict of Interest Law for Municipal Employees attached hereto as **Exhibit C**, as well as the acknowledgement of receipt of summary attached hereto as **Exhibit D** and confirmation of completion of online training; and any Statement of Compliance required pursuant to G.L. c, 149, § 27B. EACH OF WHICH IS ATTACHED

HERETO except as otherwise provided. These documents form the entire Agreement between the parties and there are no other agreements between the parties. Any amendment or modification to this Agreement must be in writing and signed by an official with the authority to bind the Town. Such amendment or modification shall be incorporated into and made part of this Agreement.

ARTICLE 2: Scope of Work

The CONTRACTOR shall furnish all materials, labor and equipment, and perform all work shown on the Contract Documents, and the CONTRACTOR agrees to do everything required by this Agreement and the Contract Documents.

ARTICLE 3: Term of Agreement

(a) **This Agreement shall be for a term of 90 calendar days, commencing on October 16, 2024 and ending on _____** subject to annual appropriation as described in Article 7, "Termination." This Agreement may be renewed in writing at the sole option of the TOWN, and upon the terms described in writing.

(b) All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Agreement. The Contractor shall meet the following Project Milestones:

1. **Full Beneficial Use/Substantial Completion of Construction on The Shirley Whitney Road Over Beaver Pond Brook Culvert Replacement shall be complete no later than _____.**

(c) The Work will be substantially completed within 90 days after the date when the Contract Times commence to run as provided in Article 2 of the General Conditions and completed and ready for final payment within 90 days after the date when the Contract Times commence to run.

(d) If the CONTRACTOR fails to substantially or finally complete the work or achieve any Milestone by the date specified in the Contract Documents, or an extended completion date which is mutually agreed upon by the TOWN and the CONTRACTOR, the CONTRACTOR shall pay to the TOWN not as a penalty but as liquidated damages the sum of $2,000.00 (Two Thousand and 00/100 Dollars) per day for each and every calendar day beyond the date on which completion was required. This amount is fixed and agreed upon by and between the TOWN and CONTRACTOR to be the amount of damages which the TOWN would sustain and is based upon the parties' agreed upon reasonable estimate of those actual damages likely to result from the Contractor's breach hereunder. The TOWN's right to assess liquidated damages shall not preclude the TOWN from the exercise of any other rights to recover damages on account of the CONTRACTOR's failure to achieve substantial or final completion within the time required.

ARTICLE 4: Contract Sum

This is a unit price contract. The CONTRACTOR agrees to provide to the TOWN items at the specific price points listed in the CONTRACTOR'S bid submission, for the duration of the contract. The TOWN makes no guarantee to purchase any minimum or specific quantity of goods or services under the provisions of this contract. The total value of the goods and services will not exceed the sum of _____ without the issuance of a change order agreed to in writing by all parties.

ARTICLE 5: PAYMENT

(a) CONTRACTOR shall submit Applications for Payment in accordance with Paragraph 14.02 of the General Conditions. Applications for Payment will be processed as provided in the General Conditions.

(b) Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Engineer may determine or Owner may withhold, including but not limited to liquidated damages, in accordance with Article 3 of this Agreement.

1. 95% of Work completed (with the balance being retainage).

2. 95% percent of cost of materials and equipment not incorporated in the Work but which satisfies the requirements of Paragraph 14.02.A of the General Conditions (with the balance being retainage).

(c) Upon satisfaction of the Substantial Completion procedures sent forth in Paragraph 14.04 of the General Conditions, the Town shall pay an amount sufficient to increase total payments to CONTRACTOR to 99% of the Work completed, less such amounts as Owner may determine or withhold in accordance with Article 3 of this Agreement and Paragraph 14.04 of the General Conditions.

(d) Upon final completion and acceptance of the Work and satisfaction of the procedures set forth in Paragraph 14.06 of the General Conditions, the Town shall pay the remainder of the Contract Price as provided in Paragraph 14.07 of the General Conditions.

ARTICLE 6: CONTRACTOR'S REPRESENTATIONS

In order to induce the Town to enter into this Agreement, CONTRACTOR makes the following representations:

A. CONTRACTOR has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.

B. CONTRACTOR has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. CONTRACTOR is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.

D. Not Applicable

E. CONTRACTOR has considered information known to CONTRACTOR; information commonly known to CONTRACTORs doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; discussion with the Superintendent, the means, methods, techniques, sequences, and procedures of construction to be employed by CONTRACTOR, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Contract Documents; and CONTRACTOR's safety precautions and programs.

F. Based on the information and observations referred to in Paragraphs A through E above, CONTRACTOR does not consider that further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.

G. CONTRACTOR is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.

H. CONTRACTOR has given Owner written notice of all conflicts, errors, ambiguities, or discrepancies that CONTRACTOR has discovered in the Contract Documents, and the written resolution thereof by Owner is acceptable to CONTRACTOR.

I. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

ARTICLE 7: TERMINATION

In addition to the provisions of Article 15 of the General Conditions, the Town shall have the right to terminate this Agreement if funds are not appropriated or otherwise made available to support the continuation of this Agreement after the first year.

ARTICLE 8: NOTICE

All notices required to be given under this Agreement shall be in writing and shall be effective upon receipt by hand delivery or by registered or certified mail to:

Town of Shirley:	**Contractor:**
Bryan Sawyer, Town Administrator and Contract Administrator 7 Keady Way, Shirley, MA 01464 Phone: (978) 425-2600 Ext. 200 Fax: (978) 425-2602 Email: **bsawyer@shirley-ma.gov**	**Name** **Title** **Company** **Address** **Phone** **Fax** **Email**

ARTICLE 9: PERFORMANCE AND PAYMENT BONDS

When CONTRACTOR delivers the executed counterparts of the Agreement to Owner, CONTRACTOR shall also deliver performance and payment bonds as follows, subject to the additional requirements set forth in Paragraph 5.01 of the General Conditions:

(a) The CONTRACTOR shall furnish a **100% Performance Bond** from a surety company qualified to do business under the laws of the Commonwealth of Massachusetts which is satisfactory to the Town in the full amount of the Contract Price and in the form attached hereto as **Exhibit A**. – **Note: This requirement is waived**

(b) The CONTRACTOR shall furnish a **50% Payment Bond** from a surety company qualified to do business under the laws of the Commonwealth of Massachusetts which is satisfactory to the Town in the full amount of the Contract Price and in the form attached hereto as **Exhibit B**.

ARTICLE 10: INSURANCE

A. Insurance Generally

1. The CONTRACTOR shall purchase and maintain insurance of the type and limits listed in this Article with respect to the operations as well as the completed operations of this Contract. This insurance shall be provided at the CONTRACTOR's expense and shall be in full force and effect for the full term of the Contract or for such longer period as this Article requires.

2. All policies shall be written on an occurrence basis and be issued by companies lawfully authorized to write that type of insurance under the laws of the Commonwealth with a financial strength rating of A- or better as assigned by AM Best Company, or an equivalent rating assigned by a similar rating agency acceptable to the Town, or otherwise acceptable to the Town.

3. CONTRACTOR shall submit three originals of each certificate of insurance, acceptable to the Town, simultaneously with the execution of this Contract. Certificates shall show each type of insurance, insurance company, policy number, amount of insurance, deductibles and/or self-insured retentions, and policy effective and expiration dates. Certificates shall show the Town and anyone else the Town requests as an additional insured as to all policies of liability insurance. Certificates shall specifically note the following:
   - that the General Liability policy includes contractual liability
   - that the General Liability policy includes the Town as additional insureds for ongoing operations (CG 20 10) and for completed operations (CG 20 37) or equivalent endorsements.
   - that the automobile liability, umbrella liability and pollution liability policies include the Town as additional insureds
   - that the General Liability policy includes endorsement CG 24 04 or equivalent, a Waiver of Subrogation in favor of the Town
   - that the Builders' Risk or Installation Floater is on an all risk basis including earthquake and flood, and includes the Town, CONTRACTOR, subcontractors and suppliers of any tier as named insureds or loss payees as their interests may appear.
   - that the policies have been endorsed such that none of the coverages shall be cancelled, terminated, or materially modified unless and until 30 days prior notice is given in writing to the Town.
   -
4. CONTRACTOR shall submit updated certificates prior to the expiration of any of the policies referenced in the certificates so that the Town shall at all times possess certificates indicating current coverage.

5. If the Town requests, the CONTRACTOR shall file one certified complete copy of all policies and endorsements with the Town. If the Town is damaged by the CONTRACTOR's failure to maintain such insurance and to comply with the terms of this Article, then the CONTRACTOR shall be responsible for all costs and damages to the Town attributable thereto.

6. Termination, cancellation, or material modification of any insurance required by this Contract, whether by the insurer or the insured, shall not be valid unless written notice thereof is given to the Town at least thirty days prior to the effective date thereof, which shall be expressed in said notice.

7. The CONTRACTOR is responsible for the payment of any and all deductibles under all of the insurance required below. The Town shall not in any instance be responsible for the payment of deductibles, self-insured retentions, or any portion thereof.

B. **Commercial General Liability.**

1. The CONTRACTOR shall purchase and maintain broad form general liability coverage on the ISO form CG 00 01 or equivalent, including products and completed operations, on an occurrence basis. The form must be amended to state that the aggregate limit applies on a per location/project basis. The policy shall provide the following minimum coverage to protect

the CONTRACTOR from claims with respect to the operations performed by CONTRACTOR and any employee, subcontractor, or supplier, or by anyone for whose acts they may be liable:

Bodily Injury &	$1,000,000 each occurrence
Property Damage	$2,000,000 general aggregate per project
Products & Completed Operations	$2,000,000 annual aggregate
Personal & Advertising Injury	$1,000,000 each occurrence
Medical Expenses	$10,000
Worker's Compensation	Statutory

2. This policy shall include coverage relating to explosion, collapse, and underground property damage.

3. This policy shall include contractual liability coverage.

4. The completed operations coverage shall be maintained for a period of three (3) years after Substantial Completion and acceptance by the Town. The CONTRACTOR shall provide renewal certificates of insurance to the Town as evidence that this coverage is being maintained.

5. If the Work includes work to be performed within 50 feet of a railroad, any exclusion for liability assumed under contract for work within 50 feet of a railroad shall be deleted.
6. This policy shall include the Town and anyone else requested by the Town as an additional insured via endorsements CG 20 10 for ongoing operations and CG 20 37 for completed operations This policy shall be primary and non-contributory with respect to any other insurance available to additional insureds.

7. The policy shall include endorsement CG 24 04, a Waiver of Subrogation in favor of the Town.

C. <u>Automobile Liability.</u>

1. The CONTRACTOR shall purchase and maintain the following minimum coverage with respect to the operations of any owned, non-owned, and hired vehicles including trailers used in the performance of the work:

Bodily Injury &	$1,000,000 each occurrence
Property Damage	$2,000,000 general aggregate per project

2. The policy shall include a CA 99 48 Broadened Pollution Endorsement. If specified in Exhibit A to the Owner – CONTRACTOR Agreement, the CONTRACTOR, if hauling contaminants and/or pollutants, must adhere to Sections 29 and 30 of the Motor Carrier Act of 1980, which shall include coverage Form MCS-90.

3. The policy shall include the Town as an additional insured.

4. The policy shall contain a Waiver of Subrogation in favor of the Town.

D. Contractor's Pollution Liability.

The CONTRACTOR shall purchase and maintain coverage for bodily injury and property damage resulting from liability arising out of pollution related exposures such as asbestos abatement, lead paint abatement, tank removal, removal of contaminated soil, etc. The insurance policy shall cover the liability of the CONTRACTOR during the process of removal, storage, transport and disposal of hazardous waste and contaminated soil and/or asbestos abatement. The policy shall include coverage for on-Site and off-Site bodily injury and loss of, damage to, or loss of use of property, directly or indirectly arising out of the discharge, dispersal, release or escape of smoke, vapors, soot, fumes, acids, alkalis, toxic chemicals, liquids or gas, waste materials or other irritants, contaminants or pollutants into or upon the land, the atmosphere or any water course or body of water, whether it be gradual or sudden and accidental. The policy shall also include defense and clean-up costs. The Town shall be named as an additional insureds and coverage must be on an occurrence basis. The amount of coverage shall be as follows:

Limit of liability	$1,000,000 per occurrence
	$3,000,000 aggregate

E. Worker's Compensation.

1. The CONTRACTOR shall provide the following coverage in accordance with M.G.L. c.149 §34A and c.152 as amended:

Worker's Compensation	Statutory limits
Employer's Liability	Statutory limits

2. If specified in Article 5 of the General Conditions, the policy must be endorsed to cover United States Longshoremen & Harborworkers Act (USLHW), or Maritime Liability.

3. The policy shall contain a Waiver of Subrogation in favor of the Town.

F. Umbrella Coverage

The CONTRACTOR shall provide Umbrella Coverage in a form at least as broad as primary coverages required by Sections 2, 3 and 5 of this Article in the following amount:

Contract Price:	Limit of Liability:
Under $150,000	$1,000,000 per occurrence
$150,000 -- $1,000,000	$2,000,000 per occurrence
$1,000,001 -- $5,000,000	$5,000,000 per occurrence
$5,000,001-- $10,000,000	$10,000,000 per occurrence
$10,000,001 and over	$25,000,000 per occurrence

G. Additional Types of Insurance

The CONTRACTOR shall provide such other types of insurance as may be required by Article 5 of the General Conditions.

ARTICLE 11: INDEMNIFICATION

A. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify, defend, and hold harmless Owner and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or other dispute resolution costs) for or on account of or relating to any act, omission, or negligence of the CONTRACTOR, Subcontractors, or its or their agents or employees in the performance of the Work and/or their failure to comply with the terms and conditions of this Agreement. The foregoing provision shall not be deemed to be released, waived, or modified in any respect by reason of any surety or insurance provided by CONTRACTOR.

B. In any and all claims against Owner or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of CONTRACTOR, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under this Agreement shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for CONTRACTOR or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

ARTICLE 12: MANDATORY ETHICS TRAINING

A summary of the Conflict of Interest Law is attached hereto as **Exhibit C** and must be distributed to all key employees of the Contractor pursuant to G.L. c. 268A. Questions regarding whether any of the Contractor's employees are considered "key employees" should be directed to the Legal Division of the State Ethics Commission at (617) 371-9500. Pursuant to Chapter 28 of the Acts of 2009, as amended, all key employees must complete online ethics training on the State Ethics Commission's website, www.mass.gov/ethics. Within thirty days of the date of this Agreement, each key employee must provide to the Town a signed acknowledgment of receipt of the summary of the Conflict of Interest Law, in the form attached hereto as **Exhibit D,** and a certificate of completion of the online training which must be printed at the completion of the training. In the event that the term of this Agreement extends for more than two years, all continuously employed key employees shall repeat the online training and provide the Town with a new certificate of completion within ninety days before or ninety days after the two-year anniversary of the date of this Agreement. Any new key employee who becomes employed by the Contractor after the date of this Agreement and whose services are specifically required by this Agreement must complete the online training and provide the Town with a certificate of completion within thirty days of the

date on which his services commence pursuant to this Agreement. Satisfaction of these requirements is the sole responsibility of the Contractor and its key employees, and the Town shall have no liability for the Contractor's or its key employees' failure to meet these requirements.

ARTICLE 13: AFFIRMATIVE ACTION AND EQUAL EMPLOYMENT OPPORTUNITY

CONTRACTOR shall comply with the requirements of G.L. c. 151 governing non-discrimination in employment**.**

ARTICLE 14: MISCELLANEOUS

A. This Agreement shall be binding upon the Town and the CONTRACTOR and the partners, successors, heirs, executors, administrators, assigns and legal representatives of the Town and the CONTRACTOR. Neither the Town nor the CONTRACTOR shall assign, subcontract, sublet or transfer any interest in this Agreement without the written consent of each other, and such consent shall not be unreasonably withheld.

B. Terms used in this Agreement will have the meanings stated in the General Conditions and the Supplementary Conditions.

C. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Town and CONTRACTOR, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

THE REMAINDER OF THIS PAGE IS LEFT BLANK INTENTIONALLY

IN WITNESS WHEREOF the parties hereto have executed copies of this Agreement the day and year first above written. *

*If a Corporation, attach to each signed copy of this Contract an attested copy of the vote of the Corporation on authorizing the said signing and sealing.

CONTRACTOR: _____

BY: _____

TITLE: _____

Corporate Seal:

TOWN OF SHIRLEY

_____
Bryan Sawyer, Town Administrator

Dated: _____

Approved as to Funds Availability Pursuant to M.G.L. c. 44, §31C, I certify that an appropriation has been made in the total amount of the contract.

_____
Town Accountant

Dated: _____

Funding Source:
Requisition Number: _____
Org: _____ Obj: _____ Project: _____

Procurement Source:

State Contract #
MHEC Contract #
Other

SPECIAL PROVISIONS

Unless otherwise amended by Special Provisions or Contract Drawings, all work and all contract bid items shall conform to the requirements of the applicable "Sections" of the *Commonwealth of Massachusetts Department of Transportation Standard Specifications for Highways and Bridges* dated 2021, and including any and all amendment's or addenda thereto, hereinafter referred to as the "Standard Specifications".

ITEM 102.511 TREE PROTECTION – ARMORING & PRUNING EACH

The work under this item shall conform to the relevant provisions of Subsection 771 of the Standard Specifications and shall be for furnishing and installing temporary tree trunk protection and for minor limb pruning or removal of lower tree limbs to prevent injury to the tree from construction equipment and activities.

Trunk armoring is for instances where construction activity (the use of heavy equipment) comes close enough to potentially damage the tree trunk or limbs. It is to be used where shown on the plans and as directed by the Engineer.

REFERENCES

If requested, the Contractor shall provide to the Engineer one copy of the latest edition of the American National Standards Institute (ANSI) A300 Standard Practices for Tree, Shrub, and Other Woody Plant Maintenance: Part 1-Pruning and Part 5-Construction Management Standard. Provision of reference shall be incidental to this item.

MATERIALS

Trunk armoring shall be such that it prevents damage to the trunk from construction equipment. Selected material shall be such that installation and removal will not damage the trunk.

Acceptable materials include 2x4 wood cladding with wire or metal strapping, or, for instances when duration of construction activities is less than three months, corrugated plastic pipe mounted with duct tape. Height of cladding shall be from base of tree (including root flare) to the bottom of the first branch, eight feet above the ground, or as required by the Engineer. Material and methods shall be approved by the Engineer.

METHODS OF WORK

Prior to construction activities, the Engineer, the Contractor, and the Town Tree Warden shall review trees noted on the plans to be protected. Final decision as to trees armored and/or pruned shall be per the Engineer.

Care shall be taken to avoid damage to the bark during installation and removal of armoring. Trunk armoring shall be replaced and maintained such that it is effective for as long as required and shall be removed immediately upon completion of work activities adjacent to trees.

ITEM 102.511 (Continued)

Pruning of limbs shall conform to the techniques and standards of the most recent ANSI A300 standards.

DAMAGES & PENALTIES

In the event that trees designated for protection under this item are damaged, including root damage from unapproved trespassing onto the root zone, the Contractor shall, at their own expense obtain an Arborist. The Arborist shall be approved by MassDOT.

If, based on the recommendations of the Arborist, the Engineer determines that damages can be remedied by corrective measures, such as repairing trunk or limb injury, soil compaction remediation, pruning, and/or watering, the damage will be repaired as soon as possible within the appropriate season for such work and according to industry standards.

If the Engineer determines that damages are irreparable, the Contractor shall pay for the damages in the amount of $500.00 per diameter inch at breast height (DBH) per tree.

Additionally, if the Engineer determines that the damages are such that the tree is sufficiently compromised as to pose a future safety hazard, the tree shall be removed. Tree removal will include clean up of all wood parts, grinding of the stump to a depth sufficient to plant a replacement tree or plant, removal of all chips from the stump site, and filling the resulting hole with topsoil.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 102.511 will be measured and paid at the contract unit price per each. This will include full compensation for all labor, equipment, materials, and incidentals for the satisfactory completion of the work and the subsequent removal and satisfactory disposal of the protective materials upon completion of the contract.

In the event of tree damage, cost of Arborist services, of remediation measures, and/or tree removal will be borne by the Contractor.

Payment under this item will be scheduled throughout the length of contract:

- 40% of value shall be paid upon installation of trunk armoring and completion of pruning work, if required.
- 60% shall be paid at the end of construction operations that would damage the tree and after protection materials have been removed and properly disposed of by the Contractor. In the event of repairable damages, payment shall be made after the completion of remediation measures.

In the event of irreparable damage due to lack of proper protective measures being take there will be no compensation in addition to the $500.00 per diameter inch penalty.

ITEM 230.355 66 INCH X 51 INCH CORRUGATED METAL PIPE-ARCH 12 GAGE FOOT

GENERAL

The work under this item shall conform to the relevant provisions of Subsection 230 of the Standard Specifications and the following:

The work shall consist of furnishing and installing the proposed 66-inch by 51-inch Corrugated Metal Pipe Arch with 3" x 1" Corrugation as shown on the plans.

MATERIAL

The Corrugated Metal Pipe Arch shall be Aluminized Type 2 Steel and conform to the applicable requirements of AASHTO M274 or ASTM A929. The Corrugated Metal Pipe Arch shall be manufactured in accordance with the applicable requirements of AASHTO M36 or ASTM A760. All fabrication shall occur within the United States.

METHOD OF MEASUREMENT

66-Inch x 51-Inch Corrugated Metal Pipe-Arch 12 Gage will be measured for payment by the foot, complete in place.

BASIS OF PAYMENT

66-Inch x 51-Inch Corrugated Metal Pipe-Arch 12 Gage will be paid for at the Contract unit price per foot, which price shall include all labor, materials, equipment and incidental costs required to complete the work.

ITEM 697.2 **FLOATING SILT FENCE** **FOOT**

The work to be done under this item shall consist of installation of floating silt fence to prevent silt from polluting the waterway during construction. The floating silt fence shall be placed as indicated on the plans or as directed by the Engineer. The floating silt fence myabe have to be adjusted, relocated or removed and reset to accommodate construction operations. No additional compensation will be made for adjustments, relocations or resetting of the floating silt fence.

Installation shall be in accordance with the manufacturer's instructions. The Contractor shall submit the product data sheet and manufacturer's instructions to the Engineer for approval prior to any work in the waterway is to commence.

The Contractor shall check the floating silt fence daily and shall clear accumulated silt and debris as needed. The floating silt fence shall be in good working condition and shall be repaired or replaced if found not in good working condition, at the Contractors own expense. The Contractor shall properly dispose of any accumulated silt and debris.

COMPENSATION

Floating Silt Fence will be measured by the Foot and will be paid for at the Contract unit price per Foot, which shall include all labor, materials, equipment, and incidental costs necessary to complete the work including any adjustments, removal at the completion of work and disposal of any debris.

ITEM 698.3 GEOTEXTILE FABRIC FOR SEPARATION SQUARE YARD

The work under this item shall consist of furnishing and installing geotextile fabric between the gravel borrow and crushed stone and underneath the proposed culvert as shown on the plans.

The geotextile fabric shall conform to Department Material Specification M9.50.0 Geotextile Fabrics.

Geotextile fabric shall be on the approved MassDOT materials list for the prescribed application.

CONSTRUCTION

Fabric shall be placed in intimate contact with the crushed stone. Seams shall be overlapped by at least two feet. If the Contractor elects to sew seams instead of overlap, colored thread must be used. The Contractor shall take care not to allow more than two weeks of exposure to direct sunlight. Fabric rolls shall not be dropped more than two feet.

METHOD OF MEASUREMENT

Geotextile fabric for separation will be measured for payment by the Square Yard, complete in place. No additional payment will be made for overlapping material.

BASIS OF PAYMENT

Geotextile fabric for separation will be paid for at the Contract unit price per Square Yard, which price shall include all labor, materials, equipment and incidental costs required to complete the work.

ITEM 755.855 STREAMBED RESTORATION LUMP SUM

GENERAL

This work shall consist of removing, stockpiling and replacing river bed material in the culverts to be replaced and the upstream and downstream approaches in the limits of work. The streambed restoration shall replicate the existing natural channel bed outside the work area in terms of material, rougness, shape, profile, and appearance. The ultimate product will, to the extent possible, replicate the function and appearance of the natural stream channel.

The Contractor shall coordinate with his/her sub-contractors to ensure all required equipment is available on-site to complete the work in this manner. The streambed restoration is required to comply with environmental permits issued for the project. The streambed restoration material and construction must be performed as shown on plans including but not limited to the installation of streambed materials within the culvert pipe and and the pipe inlet and outlet and in accordance with permit requirements.

At least 14 days prior to the commencement of construction, the Contractor shall coordinate with the Town to set up a meeting with the Town of Shirley DPW. At this meeting, the Contractor will provide an overview of the restoration work and will discuss the Contractor's anticipated means, methods, and schedule. The Contractor shall provide the Town of Shirley adequate access to observe, direct, and inspect the channel restoration work throughout the duration of the removal, stockpile, and reinstallation of the existing streambed material.

STREAMBED MATERIAL

The top 15 inches of stremabed material excavated from the existing streambed shall be removed and stockpiled to facilitiate reinstallation and replication of the natural streambed. In the unlikely event that the excavated material is not suitable or there is not enough available suitable material, additional streambed restoration material shall be locally sourced that matches the composition of the existing native river bed. The size distribution of the streambed restoration material shall conform to the following gradation specification:

	PERCENT BY WEIGHT PASSING THROUGH	
SIEVE	MINIMUM	MAXIMUM
1-1/2 in.	100	100
1/2 in.	93	96
3/8 in.	85	90
No. 4	75	80
No. 10	60	65
No. 40	20	25
No. 50	13	17
No. 60	10	14
No. 100	5	8
No. 200	3	5

ITEM 755.855 (Continued)

Related Items

Crushed Stone. Shall conform to the requirements of Item 156. Crushed Stone and will be paid for under that item.

CONSTRUCTION

Channel

The stockpiled streambed material shall be reinstalled over crushed stone, as depicted on the plans, to an average thickness of 15 inches, with variations in thickness as necessarily to replicate existing channel conditions. The final streambed shape and appearance shall be finalized in the field as required by the Town.

Reinstallation of the stockpiled streambed material shall be placed on top of the crushed stone to restore streambed habitat and fish passage. The streambed materials shall be installed during normal low water conditions behind cofferdams in accordance with the environmental permits.

Completion

Once all material has been placed in the stream channel and approved by the Town, the Contractor shall remove the cofferdams, or other control of water utilized, if needed, in such a way as to slowly wet the stream to minimize the initial sediment pulse. Every attempt shall be made to minimize the downstream movement of sediment.

The final streambed shall maintain the general configuration of the existing streambed bedform and there shall be minimal to no subsurface flow upon final inspection by the Town. The project must be passable by fish and other aquatic organims following construction.

The streambed restoration to be measured for payment will be the complete and accepted work for restoration of the streambed within the limits shown on the Plans as approved by the Town.

COMPENSATION

The accepted streambed restoration will be paid for on a lump sum basis. Payment will be full compensation for excavating, stockpiling, furnishing additional streambed restoration material as may be required, transporting, and placing the material specified and for furnishing all labor, tools, equipment, testing, and incidentals necessary to complete the work.

ITEM 767.121 SEDIMENT CONTROL BARRIER FOOT

GENERAL

The work under this item shall conform to the relevant provisions of Subsections 670, 751 and 767 of the Standard Specifications and shall include the furnishing and placement of a sediment control barrier. Sediment Control Barrier shall be installed prior to disturbing upslope soil.

The purpose of the sediment control barrier is to slow runoff velocity and filter suspended sediments from storm water flow. Sediment barrier may be used to contain stockpile sediments, to break slope length, and to slow or prevent upgradient water or water off road surfaces from flowing into a work zone. Contractor shall be responsible for ensuring that barriers fulfill the intent of adequately controlling siltation and runoff.

Twelve-inch diameter (after installation) straw tubes/wattles are intended to be the primary sedimentation control barrier.

For small areas of disturbance with minimal slope and slope length, the Engineer may approve the following sediment control methods;

- Compost filter tubes which shall be trenched
- Straw bales which shall be trenched

Additional barriers (adding depth or height) shall be used at specific locations of concentrated flow such as at gully points, steep slopes, or identified failure points in the sediment capture line.

Where specified or required by permits, silt fence shall be used in addition to compost filter tubes or straw bales and shall be incidental to the item.

CONSTRUCTION METHODS

Prior to initial placement of barriers, the Contractor and the Engineer shall review locations specified on the plans to ensure that the placement will provide maximum effectiveness.

Barriers shall be staked, trenched and/or wedged as specified herein and shall be securely in contact with existing soil such that there is no flow beneath the barrier.

Straw Wattle

Straw wattle shall be a minimum of 12 inches in diameter. Straw filling shall conform to the requirements of Section M6.04.3, shall be encased in durable netting, and shall have a density of 3 lb/foot.

ITEM 767.121 (CONTINUED)

Compost Filter Tube

Compost material inside the filter tube shall meet M1.06.0, except for the following: no manure or bio-solids shall be used; no kiln-dried wood or construction debris shall be allowed; material shall pass through a 2-inch sieve; and the C:N ratio shall be disregarded.

Outer tube fabric shall be a knitted mesh with 1/8 - 3/8" openings and made of 100% biodegradable materials (i.e., cotton, hemp or jute).

Compost filter tubes shall be a minimum of 12 inches in diameter installed. Tubes shall be placed, filled, and staked in place as required to ensure stability against water flows. All tubes shall be tamped, but not trenched, to ensure good contact with soil.

Where reinforcement is necessary, additional tubes shall be installed as shown on the plans.

Straw Bales

Straw bales shall conform to the requirements of Section M6.04.3 of the Standard Specifications and the following:

- Bales should be a minimum size of 12 x 16 x 36 inches and shall be placed in a single row, lengthwise on the contour, with ends of adjacent bales tightly abutting one another.

The bales shall be trenched and backfilled. The trench shall be excavated the width of the bale and the length of the proposed barrier to a depth of 4 inches. After the bales are staked, the excavated soil shall be backfilled against the barrier. Backfill soil shall conform to the ground level on the downhill side and shall be built up to 4 inches against the uphill side of the barrier.

Straw wattle shall be trenched in 3 inches deep and staked according to the plans. The wattles shall be sufficiently secure on the upstream side to prevent water flowing underneath the wattle.

Silt Fence

Materials and Installation shall be per Section 670.40 of the Standard Specifications and the following:

- Silt fence shall be used when specified by Orders of Condition or other permitting.

When used with compost filter tubes, the tube shall be placed on a minimum of 8 inches of folded fabric on the upslope side of the fence. Fabric does not need to be trenched.

When used with straw bales, an 8-inch deep and 4-inch-wide trench or V-trench shall be dug on the upslope side of the fence line. One foot of fabric shall be placed in the bottom of the trench followed by backfilling with compacted earth or gravel. Stakes shall be driven 16 inches into the

ground on the down slope side of the trench and shall be spaced such that the fence remains vertical and effective.

ITEM 767.121 (CONTINUED)

Width of fabric shall be sufficient to provide a 36-inch high barrier after fabric is folded or trenched. Sagging fabric will require additional staking or other anchoring.

Stakes

Stakes for anchoring Straw Wattles, Compost Filter Tubes, and Straw Bales shall be as shown on the plans and shall be a minimum of 1x1 inch diameter x 4 feet hardwood stakes.

When used with Silt Fence, stakes for Compost Filter Tubes shall be driven 12 inches into the ground, Stakes for Straw Bales shall be driven 16 inches into the ground.

Stakes of other material of equivalent strength may be used if approved by the Engineer.

MAINTENANCE

Maintenance of Sediment Control Barriers shall be per Section 670.60 of the Standard Specifications.

The contractor shall inspect the sediment barrier after each rain event and as specified in relevant permits to ensure that they are working effectively and as intended. Contractor shall be responsible for ensuring that an effective barrier is in place for all phases of the contract.

Barriers that decompose naturally due to weatherization over time such that they no longer provide the function required shall be repaired or replaced as directed. If the resulting berm of compost within the fabric tube is sufficiently intact and continues to provide water and sediment control, barrier does not necessarily require replacement.

DISMANTLING & REMOVING

Barriers shall be dismantled and/or removed when construction work is complete and when site conditions are sufficiently stable to prevent surface erosion and after receiving permission to do so from the Engineer.

For all instances, all nonbiodegradable material, including photo-biodegradable fabric, plastic netting, nylon twine, and silt fence, shall be removed and disposed off-site by the Contractor regardless of site context.

For naturalized areas, biodegradable, natural fabric and material may be left in place to decompose on-site. Compost filter tubes may be left as they are with stakes removed. Straw bales shall be broken down and spread evenly. All nylon or nonbiodegradable twine shall be removed along with silt fence. Wooden stakes may be left on site, placed neatly and discretely.

In urban, residential, and other locations where aesthetics is a concern, the following shall apply:

- Filter tube fabric shall be cut and removed, and compost shall be raked to blend evenly (similar to a soil amendment or mulch). Not more than a 2-inch depth shall be left on soil substrate.

ITEM 767.121 (CONTINUED)

- Straw bales shall be removed and disposed off-site by the Contractor. Areas of trenching shall be raked smooth and disturbed soils stabilized with a seed mix matching adjacent grasses (i.e., lawn or native grass mix).
- Silt fence, stakes, and other debris shall be removed and disposed off-site. Site shall look neat and clean upon completion.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 767.121 will be measured and paid for at the contract unit price per foot of sediment control barrier which price shall include all labor, equipment, materials, maintenance, dismantling, removal, restoration of soil, and all incidental costs required to complete the work.

Silt fence, when used in conjunction with compost filter tubes or straw bales, will be incidental to this item.

Additional barrier, such as double or triple stacking of compost filter tubes, shall be paid for per foot of tube installed.

Barriers that have been driven over or otherwise damage by construction activities shall be repaired or replaced as directed by the Engineer at the Contractors expense.

ITEM 767.91 MATTING FOR EROSION CONTROL SQUARE YARD

GENERAL

This Item shall be used for providing reinforcement of all disturbed embankments as shown on the plans or as required, complete in place.

The erosion control matting shall be an ADS Geosynthetic 00S2TT erosion control blanket or approved equal. ADS Geosynthetic 00S2TT temporary erosion control blanket is composed of 100% certified weed free agricultural straw matrix mechanically (stitch) bound on two inch centers between photodegradable, synthetic nets. ADS Geosynthetic 00S2TT is intended for use in channels or on slopes requiring erosion protection for a period up to twelve months. Actual field longevity is dependent upon soil and climatic conditions.

The Contractor shall submit design datasheets to the Engineer for approval.

Installation shall be in accordance with the manufacturer's specifications.

COMPENSATION

Matting for Erosion Control shall be paid for by the Square Yard installed, complete in place. The price shall include all the necessary materials, tools, equipment, labor and incidentals required to complete the work.

ITEM 852.1 SAFETY SIGNING FOR TRAFFIC MANAGEMENT LUMP SUM

GENERAL

The work under this Item shall conform to the applicable provisions of Subsection 850 of the Standard Specifications, except for payment.

Work under this Item shall include all materials, equipment and labor required to safely demarcate the work zone. The work zone shall not block off access to any of the adjacent properties or points of ingress/egress throughout the duration of the project.

COMPENSATION

Safety Signing for Traffic Management will be paid for at the Contract unit price per lump sum, which price shall include all labor materials, equipment and incidental costs required to complete the work.

ITEM 991.11 CONTROL OF WATER LUMP SUM

GENERAL

Work under this item includes all dewatering and stream diversions necessary to accomplish the construction of the culvert, headwalls, stone for pipe ends construction, the floodplain replication, and wetland mitigation areas located on the north and south side of Whitney Road. The Work under this Item shall conform to the relevant provisions of Section 140 of the Standard Specifications and these Special Provisions.

Stream diversions and dewatering of excavation shall be conducted to ensure that the construction and placement of the culverts, drainage pipes, headwalls and replication areas occur "in the dry."

A turbidity curtain shall be installed downstream of the project site prior to installation of the cofferdams, as shown on the plans.

As part of the work under this Item, it is the responsibility of the Contractor to determine the need and extent of sedimentation basins and dewatering techniques and sedimentation controls needed to control water and sediment at the site. Prior to starting the actual process of executing the excavation operations, the Contractor shall submit the methods and materials it proposes to use for the Engineer's approval.

SUBMITTALS

Plans and Calculations for water retaining and dewatering measures shall be developed by the Contractor for this Item, prepared, and stamped by a Professional Engineer Registered in the Commonwealth of Massachusetts and submitted for the review of the Engineer prior to the start of construction.

CONSTRUCTION METHODS

Stream diversions shall be conducted in such a manner as to minimize siltation and prevent contamination of the waterway.

Maximum screen sizes on the inlet side of all pumps shall not exceed 0.5 inch.

Recommended devices to control water at the site include (and may include multiple methods), but are not limited to:

- Installation of precast concrete median barriers or blocks covered with polyethylene sheeting and sandbags to reduce water infiltration.
- Sandbag dams installed at the top of the excavation to provide temporary control of water.
- Portable cofferdam system comprised of steel frames covered by an impervious fabric membrane.

The Contractor is advised that the effectiveness of the water control method used will vary based on the field conditions and the time at which the actual excavation work is being performed. The Engineer has the right to order the Contractor to stop all excavation operations when in his

ITEM 991.11 (CONTINUED)

judgment the Contractor's water control operations are failing to produce adequate results or are posing a threat to the environment.

The Contractor shall provide the means of removing all sediment from water pumped from the excavation areas; this shall include the use of sedimentation basins, silt bags, check dams, sedimentation fences or tanks as directed in the Special Provisions under Sedimentation and Erosion Controls.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Payment for all water control work, including design for the stream diversion system and dewatering operations, sedimentation basins, all necessary equipment, materials and installation and removal, piping, pumping, placing and/or removal of temporary dikes or other retaining structures, strawbales, silt fence and pipes all as outlined above shall be included in the Lump Sum Contract Price for this Item.

The turbidity curtain shall be paid for under Floating Silt Fence, Item 697.2.

APPENDIX A

PLANS, NOTES AND DETAILS

DESIGN PLANS FOR
WHITNEY ROAD OVER BEAVER POND BROOK TRIBUTARY
CULVERT REPLACEMENT
SHIRLEY, MA

GENERAL NOTES:

1. EXISTING SURVEY INFORMATION SHOWN IS BASED UPON A PLAN TITLED "EXISTING CONDITIONS PLAN WHITNEY ROAD CULVERT SHIRLEY, MASSACHUSETTS PREPARED FOR HOWARD STEIN HUDSON" DATED SEPTEMBER 6, 2022 PREPARED BY A-PLUS CONSTRUCTION SERVICES CORPORATION.
2. VERTICAL DATUM IS BASED ON NAVD 88 AND HORIZONTAL CONTROL IS BASED ON NAD 83.
3. WETLAND DELINEATION AND FLAGGING WAS PERFORMED BY ECOTEC, INC. ON JULY 20, 2022.
4. "A" AND "B" SERIES FLAGS REFER TO THE BOUNDARY OF THE BORDERING VEGETATED WETLANDS ON THE NORTH AND SOUTH SIDE OF WHITNEY ROAD. THE "MA" SERIES FLAGS REFER TO MEAN ANNUAL HIGH-WATER LINE (MAHWL) OF BEAVER POND BROOK.
5. THE ACCURACY AND COMPLETENESS OF THE UNDERGROUND UTILITIES AS SHOWN ON THE PLANS ARE NOT GUARANTEED. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE LOCATION AND SIZE OF ALL UNDERGROUND UTILITIES THAT MAY BE AFFECTED BY THE WORK. THE CONTRACTOR SHALL CONTACT DIGSAFE AT LEAST 72 HOURS BEFORE COMMENCING THE WORK.
6. WHERE AN EXISTING UTILITY IS FOUND TO CONFLICT WITH THE PROPOSED WORK, THE LOCATION, ELEVATION, AND SIZE OF THE UTILITY SHALL BE APPROPRIATELY DETERMINED WITHOUT DELAY BY THE CONTRACTOR AND THE INFORMATION FURNISHED TO THE ENGINEER FOR RESOLUTION.
7. ALL UTILITY ENTITIES MUST BE NOTIFIED PRIOR TO EXCAVATION, INSTALLATION, BACKFILLING AND REPAVING OPERATIONS.
8. THE CONTRACTOR SHALL PROTECT AND MAINTAIN ALL EXISTING UTILITIES.
9. THE CONTRACTOR SHALL DISPOSE ALL WASTE MATERIAL IN ACCORDANCE WITH ALL FEDERAL, STATE, AND LOCAL REQUIREMENTS AT THEIR OWN EXPENSE OUTSIDE OF THE PROJECT LIMITS.

SITE PREPARATION NOTES:

1. THE CONTRACTOR SHALL VERIFY EXISTING CONDITIONS IN THE FIELD AND REPORT ANY DISCREPANCIES BETWEEN PLANS AND ACTUAL CONDITIONS TO THE ENGINEER PRIOR TO COMMENCING ANY WORK.
2. THE CONTRACTOR SHALL PROVIDE ONE (1) WEEKS NOTICE TO THE SHIRLEY DEPARTMENT OF PUBLIC WORKS PRIOR MOBILIZING TO THE SITE AND COMMENCING ANY WORK.
3. THE CONTRACTOR SHALL SECURE THE WORK AREA BY USE OF TEMPORARY CONCRETE BARRIERS OR CONSTRUCTION FENCING, BUT SHALL NOT BLOCK OFF ANY RESIDENTIAL DRIVEWAYS AT ANY TIME. DAMAGE TO ANY EXISTING PAVEMENT, OTHER THAN IN THE DIRECT AREA OF WORK, IS NOT PERMITTED AND SHALL BE REPAIRED AT THE CONTRACTORS OWN EXPENSE.
4. THE CONTRACTOR SHALL PLAN THE TIMING OF WORK SO THAT WORK IS BEING PERFORMED IN THE DRY.
5. REMOVAL OF PAVEMENT, UNSATISFACTORY BASE MATERIAL, ROCKS, CORRUGATED METAL CULVERT, CONCRETE AND OTHER MISCELLANEOUS MATERIALS SHALL BE SATISFACTORILY REMOVED OFF-SITE.
6. TREES TO BE REMOVED SHALL INCLUDE STUMP REMOVAL, GRUBBING OF ROOTS AND SATISFACTORY OFF-SITE REMOVAL.
7. EXISTING TREES TO REMAIN SHALL NOT BE ALTERED AND MUST REMAIN IN THE SAME CONDITION AS OBSERVED PRIOR TO CONSTRUCTION.
8. DAMAGED ITEMS DESIGNATED TO REMAIN UNALTERED SHALL BE REPLACED OR REPAIRED AT THE CONTRACTORS EXPENSE.
9. AREAS FOR STOCKPILING SHALL BE LOCATED BY THE CONTRACTOR AND SUBMITTED FOR APPROVAL.
10. ALL STOCKPILE AREAS SHALL BE LOCATED OUTSIDE OF ALL RESOURCE AREAS, THEIR ASSOCIATED BUFFERS AND BE ON PUBLIC PROPERTY.
11. THE CONTRACTOR SHALL LEAVE THE WORK SITE FREE OF DEBRIS AT THE END OF EACH DAYS OPERATIONS.

LOCUS

SCALE: 1" = 1000'

INDEX

ALL WORK UNDER THIS CONTRACT SHALL BE DONE IN CONFORMANCE WITH THE MASSACHUSETTS HIGHWAY DEPARTMENT 2022 STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES, THE CURRENT INTERIM SUPPLEMENTAL SUPPLEMENTAL SPECIFICATIONS, THE 2017 CONSTRUCTION STANDARD DETAILS, THE 2015 OVERHEAD SIGNAL STRUCTURE AND FOUNDATION STANDARD DRAWINGS, THE 1990 STANDARD DRAWINGS FOR SIGNS AND SUPPORTS, THE 2009 MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) WITH MASSACHUSETTS AMENDMENTS AND THE STANDARD MUNICIPAL TRAFFIC CODE, THE 1968 STANDARD DRAWINGS FOR TRAFFIC SIGNALS AND HIGHWAY LIGHTING AND THE LATEST EDITION OF AMERICAN STANDARD FOR NURSERY STOCK.

EROSION & SEDIMENT CONTROL NOTES:

1. EROSION AND SEDIMENT CONTROL MEASURES MUST BE INSTALLED PRIOR TO THE START OF CONSTRUCTION AND MAINTAINED AND UPGRADED AS NECESSARY DURING CONSTRUCTION BY THE CONTRACTOR. IT IS THE CONTRACTORS RESPONSIBILITY TO INSPECT AND INSTALL ADDITIONAL CONTROL MEASURES AS NEEDED DURING CONSTRUCTION.
2. STABILIZATION OF ALL RE-GRADED AND SOIL STOCKPILE AREAS MUST BE MAINTAINED DURING ALL PHASES OF CONSTRUCTION.
3. SEDIMENT REMOVED FROM EROSION AND SEDIMENT CONTROL DEVICES MUST BE PROPERLY REMOVED AND DISPOSED. ALL DAMAGED CONTROLS MUST BE REMOVED AND REPLACED.
4. THE CONTRACTOR IS RESPONSIBLE FOR IMPLEMENTING THE EROSION AND SEDIMENT CONTROL PLAN. THIS INCLUDES INSTALLATION AND MAINTENANCE OF CONTROL MEASURES, INFORMING ALL PARTIES ENGAGED ON THE CONSTRUCTION SITE OF THE REQUIREMENTS AND OBJECTIVES OF THE PLAN, AND NOTIFYING THE PROPER AGENCY OF ANY TRANSFER OF RESPONSIBILITY.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTROLLING WIND EROSION AND DUST THROUGHOUT THE DURATION OF THE PROJECT. DUST CONTROL MAY INCLUDE, BUT IS NOT LIMITED TO, SPRINKLING OF WATER ON EXPOSED SOILS AND STREET SWEEPING ADJACENT ROADWAYS.
6. THE CONTRACTOR MUST KEEP ON-SITE AT ALL TIMES ADDITIONAL STRAW WATTLES FOR INSTALLATION AT THE DIRECTION OF THE ENGINEER OR CONSERVATION COMMISSION TO MITIGATE ANY EMERGENCY CONDITION.
7. EARTHWORK ACTIVITY ON-SITE MUST BE DONE IN A MANNER SUCH THAT RUNOFF IS DIRECTED TO A SEDIMENT CONTROL DEVICE OR INFILTRATED TO THE GROUND.
8. DEMOLITION AND CONSTRUCTION DEBRIS MUST BE PROPERLY CONTAINED AND DISPOSED OF.

HOWARD STEIN HUDSON
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Boston, MA 02108
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PREPARED FOR:

TOWN OF SHIRLEY
DEPARTMENT OF PUBLIC WORKS
158 GREAT ROAD
SHIRLEY, MA 01464

BEAVER POND BROOK TRIBUTARY
CULVERT REPLACEMENT
WHITNEY ROAD
SHIRLEY, MA 01464
MIDDLESEX COUNTY

REVISIONS:

NO	BY	DATE	DESCRIPTION

COMMONWEALTH OF MASSACHUSETTS
PAUL W. BERTHIAUME
CIVIL
No. 50513
REGISTERED PROFESSIONAL ENGINEER

Digitally signed by Paul W. Berthiaume, P.E.
Date: 2024.09.16 15:13:19-04'00'

DESIGN PLANS

TITLE SHEET & INDEX

DATE:	9/16/2024
PROJECT NUMBER:	2022048.00
DESIGNED BY:	RSG
DRAWN BY:	RSG
CHECKED BY:	PWB

C000

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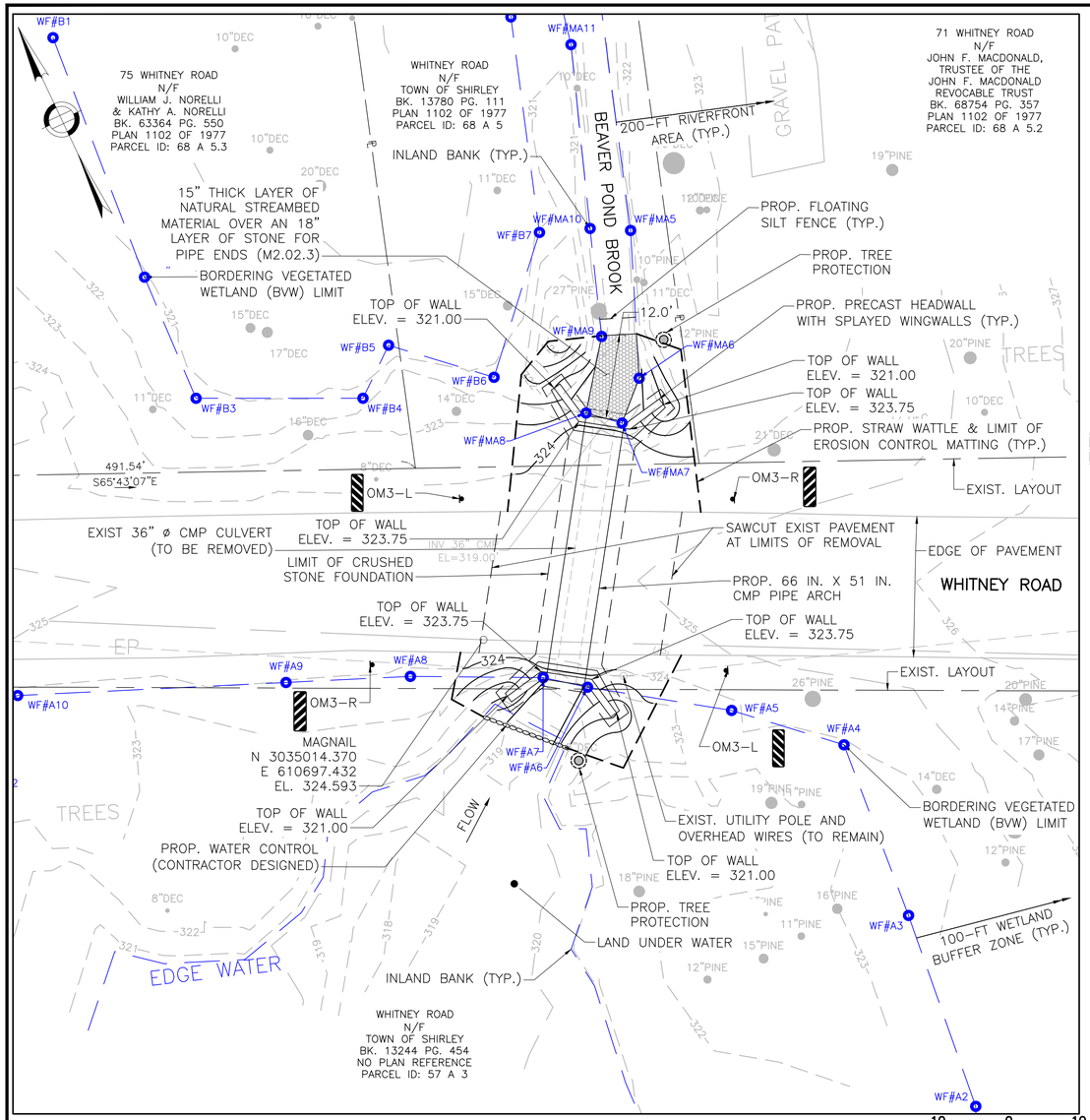
Printed by: Bob Gibson



SITE PLAN

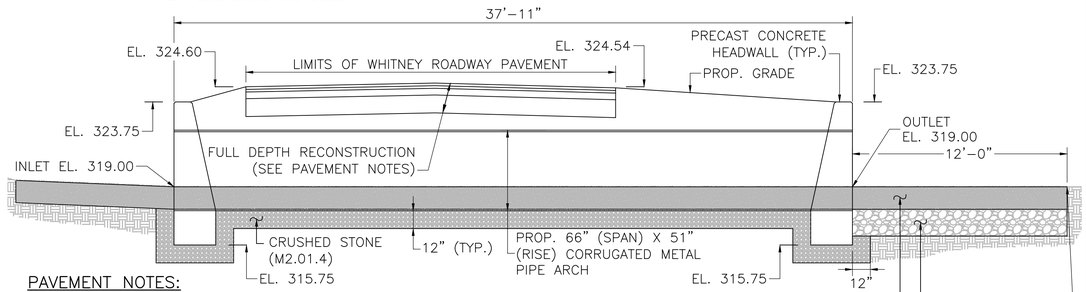
SCALE: 1" = 10'

SCALE IN FEET: 10 0 10 20

TRAFFIC SIGN SUMMARY

IDENTIFICATION NUMBER	SIZE OF SIGN		TEXT	TEXT DIMENSIONS (INCHES)			NUMBER OF SIGNS REQUIRED	COLOR			POST SIZE AND NUMBER REQUIRED	UNIT AREA (S.F.)	AREA IN SQUARE FEET
	WIDTH	HEIGHT		LETTER HEIGHT	VERTICAL SPACING	ARROW RTE. MKR.		BACK-GROUND	LEGEND	BORDER			
OM3-L	12"	36"		(1)			2	YELLOW (REF)	BLACK	-	P5 (2)	3.00	6.00
OM3-R	12"	36"		(1)			2	YELLOW (REF)	BLACK	-	P5 (2)	3.00	6.00

1. SEE MUTCD 2009 EDITION, 2004/2012 STD. HWY. SIGNS AND SECTION M9.30.0. TYPE III OF THE MASSDOT STANDARD SPECIFICATION FOR TEXT DIMENSIONS AND COLOR.



LONGITUDINAL SECTION

SCALE: 1/4" = 1'-0"

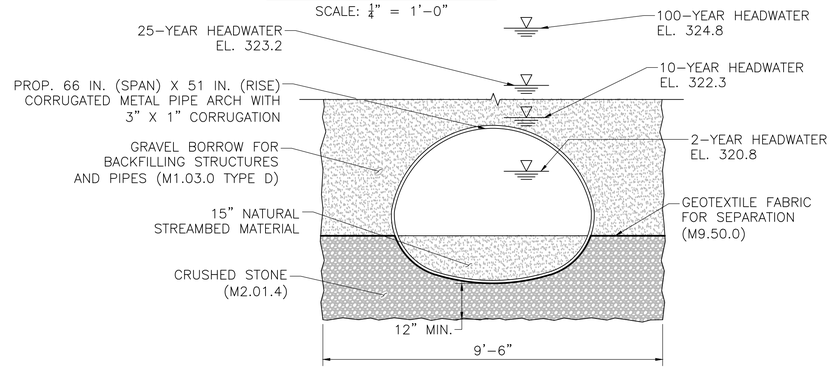
PAVEMENT NOTES:

SURFACE COURSE: 1.75" SUPERPAVE SURFACE COURSE 12.5 POLYMER (SSC-12.5-P) OVER ASPHALT EMULSION FOR TACK COAT OVER

INTERMEDIATE COURSE: 1.75" SUPERPAVE INTERMEDIATE COURSE 12.5 POLYMER (SIC-12.5-P) OVER ASPHALT EMULSION FOR TACK COAT OVER

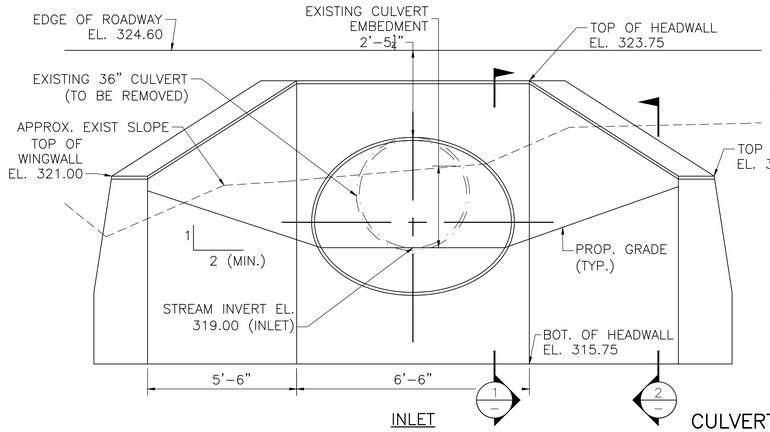
BASE COURSE: 4.5" SUPERPAVE BASE COURSE 37.5 (SBC-37.5) OVER

SUB-BASE: 4" DENSE GRADED CRUSHED STONE OVER 8" GRAVEL BORROW TYPE "B"

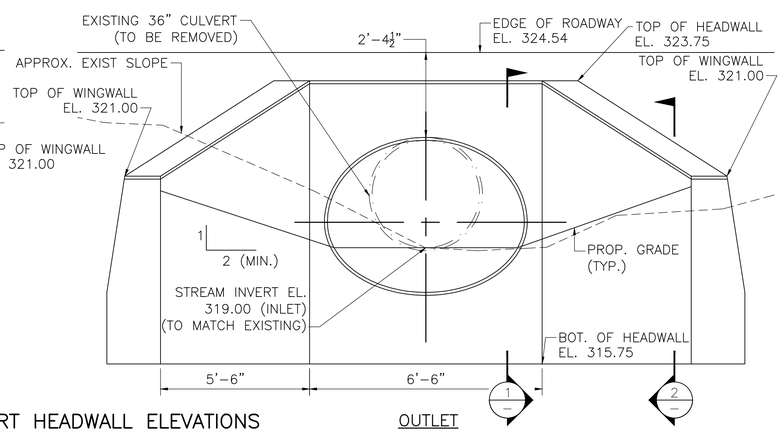


TRENCH DETAIL

SCALE: 1/2" = 1'-0"



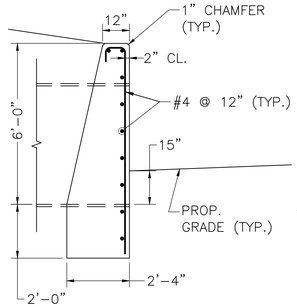
INLET



OUTLET

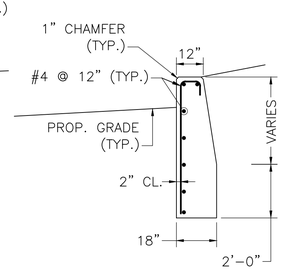
CULVERT HEADWALL ELEVATIONS

SCALE: 1/2" = 1'-0"



SECTION 1

SCALE: 3/8" = 1'-0"



SECTION 2

SCALE: 3/8" = 1'-0"

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REVISIONS:

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COMMONWEALTH OF MASSACHUSETTS
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REGISTERED
PROFESSIONAL ENGINEER

Digitally signed by Paul W. Berthiaume, P.E.
Date: 2024.09.16 15:13:43-04'00'

DESIGN PLANS

SITE PLAN & DETAILS

DATE:	9/16/2024
PROJECT NUMBER:	2022048.00
DESIGNED BY:	RSG
DRAWN BY:	RSG
CHECKED BY:	PWB

C100

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Last Saved by: BGIBSON
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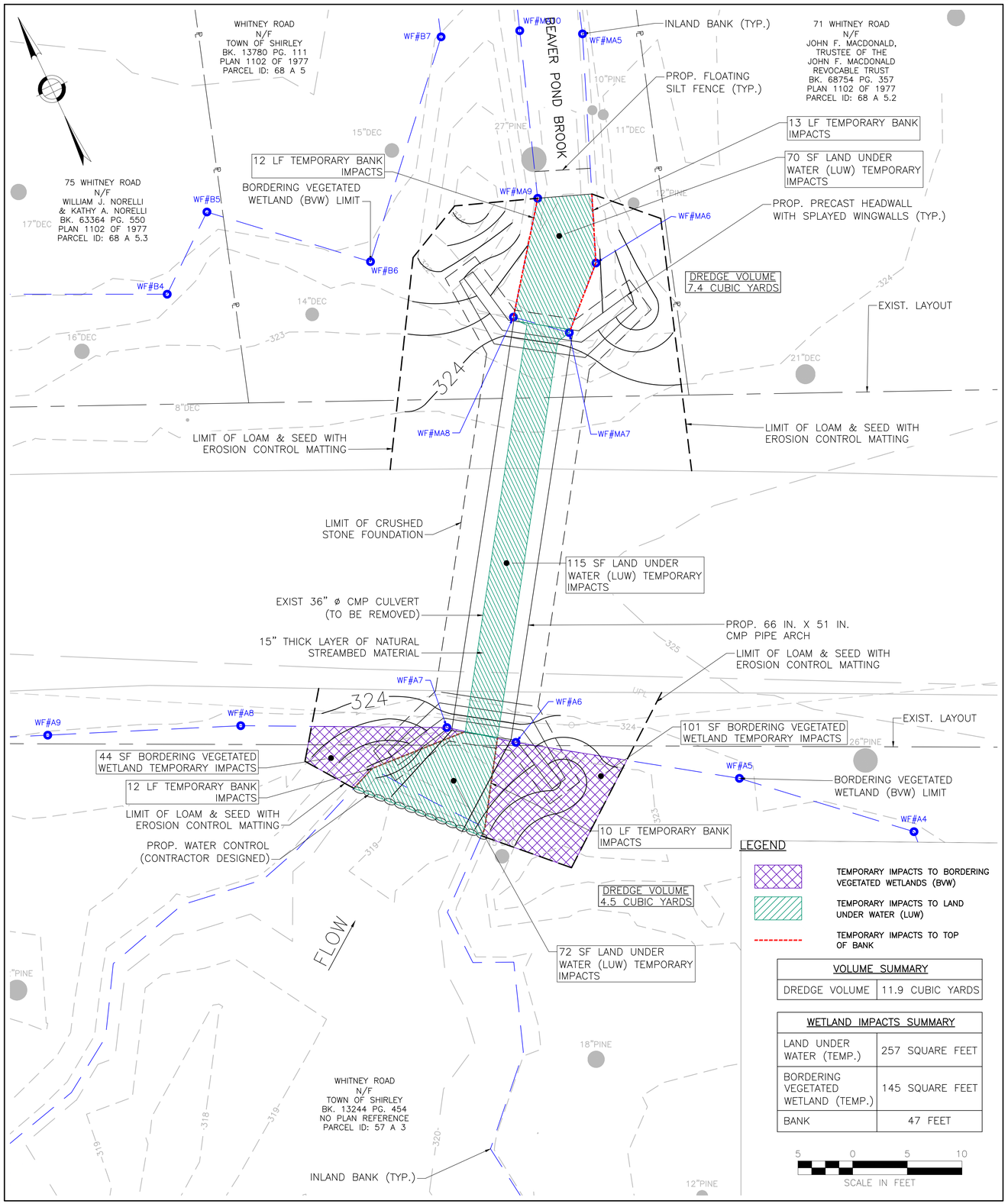
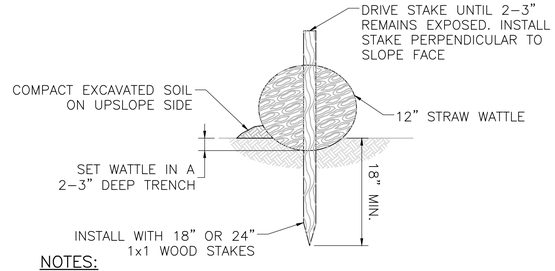


WETLAND IMPACT PLAN

SCALE: 1" = 5'

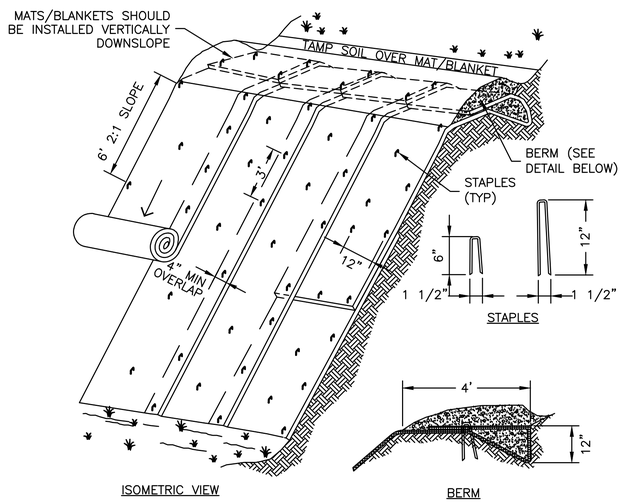


NOTES:

1. BEGIN AT THE LOCATION WHERE THE WATTLE IS TO BE INSTALLED BY EXCAVATING A 2–3" DEEP X 9" WIDTH TRENCH ALONG THE CONTOUR OF THE SLOPE. EXCAVATED SOIL SHOULD BE PLACED UPSLOPE FROM THE ANCHOR TRENCH.
2. PLACE THE WATTLE IN THE TRENCH SO THAT IT CONTOURS TO THE SOIL SURFACE. COMPACT SOIL FROM THE THE EXCAVATED TRENCH AGAINST THE WATTLE ON THE UPHILL SIDE. ADJACENT WATTLES SHOULD TIGHTLY ABUT.
3. SECURE THE WATTLE WITH 18–24" STAKES EVERY 3–4' AND WITH A STAKE ON EACH END. STAKES SHALL BE DRIVEN THROUGH THE MIDDLE OF THE WATTLE LEAVING AT LEAST 2–3" OF STAKE EXTENDING ABOVE HE WATTLE. STAKES SHOULD BE DRIVEN PERPENDICULAR TO SLOPE FACE.

STRAW WATTLE DETAIL

NOT TO SCALE



NOTES:

1) SLOPE SURFACE SHALL BE FREE OF ROCKS, CLODS, STICKS AND GRASS. MATS/ BLANKETS SHALL HAVE GOOD SOIL CONTACT.
2) APPLY PERMANENT SEEDING BEFORE PLACING BLANKETS.
3) LAY BLANKETS LOOSELY AND STAKE OR STAPLE TO MAINTAIN DIRECT CONTACT WITH THE SOIL. DO NOT STRETCH.

EROSION BLANKETS AND TURF REINFORCEMENT MATS SLOPE INSTALLATION

NOT TO SCALE

WETLAND RESTORATION

1. IF TOPSOIL IS ABSENT, APPROXIMATELY 6 INCHES OF CLEAN TOPSOIL (LEAF COMPOST AND LOAM MIXTURE) SHALL BE ESTABLISHED WITHIN THE BUFFER ZONE PLANTING AREAS. COMPACTED SOILS SHALL BE TILLED/LOOSENED AS NEEDED. APPROXIMATELY 10% ORGANIC MATTER CONTENT IS RECOMMENDED FOR ANY ADDED TOPSOIL FROM OFF–SITE.
2. BIODEGRADABLE NETTING IS RECOMMENDED ON SLOPES (E.G. 3:1 OR GREATER)WITHIN THE RESTORATION AREA WHERE APPLICABLE OR AS RECOMMENDED BY THE PROJECT ENGINEER.
3. DISTURBED WETLAND AREAS SHALL BE SEEDED WITH THE NEW ENGLAND CONSERVATION AND WILDLIFE SEED MIX OR EQUIVALENT NATIVE MIX APPROVED BY THE PROJECT ENGINEER.
4. THE PROPOSED NATIVE SEEDMIX SHALL BE LIGHTLY RAKED INTO THE SURFACE AND APPLIED ACCORDING TO THE SUPPLIERS INSTRUCTIONS.
5. A ONE TIME APPLICATION OF COMPOST MULCH SHALL BE APPLIED TO THE DRIP LINE OF THE INSTALLED SHRUBS.
6. HYDROSEED SHALL BE USED IN NON–WETLAND AREAS WHERE NECESSARY FOR SOIL STABILIZATION.

New England Conservation and Wildlife Mix
(Application Rate: 30 lbs./acre; 1450 sq. ft./lb.)
(New England Wetland Plants, Inc.)

SPECIES: Virginia Wild Rye, (Elymus virginicus), Little Bluestem, (Schizachyrium scoparium), Big Bluestem, (Andropogon gerardii), Creeping Red Fescue, (Festuca rubra), Switch Grass, (Panicum virgatum), Partridge Pea, (Chamaecrista fasciculata), Deer Tongue, (Panicum clandestinum), Indian Grass, (Sorghastrum nutans), Ox Eye Sunflower, (Heliopsis helianthoides), Common Milkweed, (Asclepias syriaca), Spotted Joe Pye Weed, (Eupatorium maculatum), Grass Leaved Goldenrod, (Euthamnia graminifolia), Blue Vervain, (Verbena hastata), New England Aster, (Aster novae-angliae), Early Goldenrod, (Solidago juncea).

HOWARD STEIN HUDSON
11 Beacon Street, Suite 1010
Boston, MA 02108
www.hshassoc.com

PREPARED FOR:

TOWN OF SHIRLEY
DEPARTMENT OF PUBLIC WORKS
158 GREAT ROAD
SHIRLEY, MA 01464

BEAVER POND BROOK TRIBUTARY CULVERT REPLACEMENT

WHITNEY ROAD
SHIRLEY, MA 01464
MIDDLESEX COUNTY

REVISIONS:

NO	BY	DATE	DESCRIPTION

COMMONWEALTH OF MASSACHUSETTS
PAUL W. BERTHIAUME
CIVIL
No. 50513
REGISTERED PROFESSIONAL ENGINEER

Digitally signed by Paul W. Berthiaume, P.E.
Date: 2024.09.16 15:14:07-04'00'

DESIGN PLANS

WETLAND IMPACT & EROSION CONTROL PLAN

DATE:	9/16/2024
PROJECT NUMBER:	2022048.00
DESIGNED BY:	RSG
DRAWN BY:	RSG
CHECKED BY:	PWB

C200

9/16/2024 L:\2048\CURRENT\OUTSHEETS\2048_Wetland Impact Plan.dwg
Last Saved by: BGIBSON
Printed by: Bob Gibson

APPENDIX B

M.G.L. CH. 131
ORDER OF CONDITIONS

Order of Conditions Certification

I hereby Certify that I have read and understand all Order of Conditions requirements and conditions applicable to this project and included in this Appendix B, and my responsibilities to comply with all requirements set forth therein.

_____
Signature

_____
Printed Name

_____
Title

_____
Company Name

_____
Date

17.B

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Bk: 83207 Pg: 57 Doc: ORD
Page: 1 of 17 09/05/2024 11:57 AM

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 5 – Order of Conditions

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

Provided by MassDEP:
284-0507
MassDEP File #

eDEP Transaction #
Shirley
City/Town

A. General Information

Please note: this form has been modified with added space to accommodate the Registry of Deeds Requirements

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

1. From: Shirley
Conservation Commission

2. This issuance is for (check one): a. ☒ Order of Conditions b. ☐ Amended Order of Conditions

3. To: Applicant:

David
a. First Name

Schwartz
b. Last Name

Shirley Depatment of Public Work
c. Organization

158 Great Road
d. Mailing Address

Shirley
e. City/Town

MA
f. State

01464
g. Zip Code

4. Property Owner (if different from applicant):

a. First Name

b. Last Name

Town of Shirley
c. Organization

7 Keady Way
d. Mailing Address

Shirley
e. City/Town

MA
f. State

01464
g. Zip Code

5. Project Location:

Whitney Road
a. Street Address

Shirley
b. City/Town

N/A
c. Assessors Map/Plat Number

N/A
d. Parcel/Lot Number

Latitude and Longitude, if known: 42d34m34s
d. Latitude

71d40m02s
e. Longitude

KP Law
101 Arch Street
Boston, MA 02110

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
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Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

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Shirley
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A. General Information (cont.)

6. Property recorded at the Registry of Deeds for (attach additional information if more than one parcel):

Middlesex	N/A
a. County	b. Certificate Number (if registered land)
26774	373
c. Book	d. Page

7. Dates:

June 4, 2024	July 23, 2024	August 13, 2024
a. Date Notice of Intent Filed	b. Date Public Hearing Closed	c. Date of Issuance

8. Final Approved Plans and Other Documents (attach additional plan or document references as needed):

Beaver Pond Brook Tributary Culvert Replacement, Whitney Road, Shirley, MA 01464 (3 sheets)
a. Plan Title

Howard Stein Hudson	Paul W. Berthiaume, R.P.E.
b. Prepared By	c. Signed and Stamped by
12/06/2022	various
d. Final Revision Date	e. Scale

Notice of Intent Whitney Road Over Beaver Pond Brook Tributary Culvert Replace	June 3, 2024
f. Additional Plan or Document Title	g. Date

B. Findings

1. Findings pursuant to the Massachusetts Wetlands Protection Act:

Following the review of the above-referenced Notice of Intent and based on the information provided in this application and presented at the public hearing, this Commission finds that the areas in which work is proposed is significant to the following interests of the Wetlands Protection Act (the Act). Check all that apply:

a. ☒ Public Water Supply b. ☐ Land Containing Shellfish c. ☒ Prevention of Pollution

d. ☒ Private Water Supply e. ☒ Fisheries f. ☒ Protection of Wildlife Habitat

g. ☒ Groundwater Supply h. ☒ Storm Damage Prevention i. ☒ Flood Control

2. This Commission hereby finds the project, as proposed, is: (check one of the following boxes)

Approved subject to:

a. ☒ the following conditions which are necessary in accordance with the performance standards set forth in the wetlands regulations. This Commission orders that all work shall be performed in accordance with the Notice of Intent referenced above, the following General Conditions, and any other special conditions attached to this Order. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, these conditions shall control.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
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Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

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City/Town

B. Findings (cont.)

Denied because:

b. ☐ the proposed work cannot be conditioned to meet the performance standards set forth in the wetland regulations. Therefore, work on this project may not go forward unless and until a new Notice of Intent is submitted which provides measures which are adequate to protect the interests of the Act, and a final Order of Conditions is issued. **A description of the performance standards which the proposed work cannot meet is attached to this Order.**

c. ☐ the information submitted by the applicant is not sufficient to describe the site, the work, or the effect of the work on the interests identified in the Wetlands Protection Act. Therefore, work on this project may not go forward unless and until a revised Notice of Intent is submitted which provides sufficient information and includes measures which are adequate to protect the Act's interests, and a final Order of Conditions is issued. **A description of the specific information which is lacking and why it is necessary is attached to this Order as per 310 CMR 10.05(6)(c).**

3. ☒ Buffer Zone Impacts: Shortest distance between limit of project disturbance and the wetland resource area specified in 310 CMR 10.02(1)(a) — 0 a. linear feet

Inland Resource Area Impacts: Check all that apply below. (For Approvals Only)

Resource Area	Proposed Alteration	Permitted Alteration	Proposed Replacement	Permitted Replacement
4. ☒ Bank	47 a. linear feet	47 b. linear feet	47 c. linear feet	47 d. linear feet
5. ☒ Bordering Vegetated Wetland	145 a. square feet	145 b. square feet	245 c. square feet	245 d. square feet
6. ☒ Land Under Waterbodies and Waterways	257 a. square feet 11.9 e. c/y dredged	257 b. square feet 11.9 f. c/y dredged	257 c. square feet	257 d. square feet
7. ☐ Bordering Land Subject to Flooding	a. square feet	b. square feet	c. square feet	d. square feet
Cubic Feet Flood Storage	e. cubic feet	f. cubic feet	g. cubic feet	h. cubic feet
8. ☐ Isolated Land Subject to Flooding	a. square feet	b. square feet		
Cubic Feet Flood Storage	c. cubic feet	d. cubic feet	e. cubic feet	f. cubic feet
9. ☐ Riverfront Area	a. total sq. feet	b. total sq. feet		
Sq ft within 100 ft	c. square feet	d. square feet	e. square feet	f. square feet
Sq ft between 100-200 ft	g. square feet	h. square feet	i. square feet	j. square feet

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

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B. Findings (cont.)

Coastal Resource Area Impacts: Check all that apply below. (For Approvals Only)

	Proposed Alteration	Permitted Alteration	Proposed Replacement	Permitted Replacement
10. ☐ Designated Port Areas	Indicate size under Land Under the Ocean, below			
11. ☐ Land Under the Ocean	a. square feet	b. square feet		
	c. c/y dredged	d. c/y dredged		
12. ☐ Barrier Beaches	Indicate size under Coastal Beaches and/or Coastal Dunes below			
13. ☐ Coastal Beaches	a. square feet	b. square feet	c. nourishment cu yd	d. nourishment cu yd
14. ☐ Coastal Dunes	a. square feet	b. square feet	c. nourishment cu yd	d. nourishment cu yd
15. ☐ Coastal Banks	a. linear feet	b. linear feet		
16. ☐ Rocky Intertidal Shores	a. square feet	b. square feet		
17. ☐ Salt Marshes	a. square feet	b. square feet	c. square feet	d. square feet
18. ☐ Land Under Salt Ponds	a. square feet	b. square feet		
	c. c/y dredged	d. c/y dredged		
19. ☐ Land Containing Shellfish	a. square feet	b. square feet	c. square feet	d. square feet
20. ☐ Fish Runs	Indicate size under Coastal Banks, Inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above			
	a. c/y dredged	b. c/y dredged		
21. ☐ Land Subject to Coastal Storm Flowage	a. square feet	b. square feet		
22. ☐ Riverfront Area	a. total sq. feet	b. total sq. feet		
Sq ft within 100 ft	c. square feet	d. square feet	e. square feet	f. square feet
Sq ft between 100-200 ft	g. square feet	h. square feet	i. square feet	j. square feet

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B. Findings (cont.)

* **#23.** If the project is for the purpose of restoring or enhancing a wetland resource area in addition to the square footage that has been entered in Section B.5.c (BVW) or B.17.c (Salt Marsh) above, please enter the additional amount here.

23. ☐ Restoration/Enhancement *:

a. square feet of BVW	b. square feet of salt marsh

24. ☒ Stream Crossing(s):

a. number of new stream crossings	b. number of replacement stream crossings
	1 (intermitent)

C. General Conditions Under Massachusetts Wetlands Protection Act

The following conditions are only applicable to Approved projects.

1. Failure to comply with all conditions stated herein, and with all related statutes and other regulatory measures, shall be deemed cause to revoke or modify this Order.
2. The Order does not grant any property rights or any exclusive privileges; it does not authorize any injury to private property or invasion of private rights.
3. This Order does not relieve the permittee or any other person of the necessity of complying with all other applicable federal, state, or local statutes, ordinances, bylaws, or regulations.
4. The work authorized hereunder shall be completed within three years from the date of this Order unless either of the following apply:
   a. The work is a maintenance dredging project as provided for in the Act; or
   b. The time for completion has been extended to a specified date more than three years, but less than five years, from the date of issuance. If this Order is intended to be valid for more than three years, the extension date and the special circumstances warranting the extended time period are set forth as a special condition in this Order.
   c. If the work is for a Test Project, this Order of Conditions shall be valid for no more than one year.
5. This Order may be extended by the issuing authority for one or more periods of up to three years each upon application to the issuing authority at least 30 days prior to the expiration date of the Order. An Order of Conditions for a Test Project may be extended for one additional year only upon written application by the applicant, subject to the provisions of 310 CMR 10.05(11)(f).
6. If this Order constitutes an Amended Order of Conditions, this Amended Order of Conditions does not extend the issuance date of the original Final Order of Conditions and the Order will expire on 08/13/2027 unless extended in writing by the Department.
7. Any fill used in connection with this project shall be clean fill. Any fill shall contain no trash, refuse, rubbish, or debris, including but not limited to lumber, bricks, plaster, wire, lath, paper, cardboard, pipe, tires, ashes, refrigerators, motor vehicles, or parts of any of the foregoing.

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C. General Conditions Under Massachusetts Wetlands Protection Act

8. This Order is not final until all administrative appeal periods from this Order have elapsed, or if such an appeal has been taken, until all proceedings before the Department have been completed.

9. No work shall be undertaken until the Order has become final and then has been recorded in the Registry of Deeds or the Land Court for the district in which the land is located, within the chain of title of the affected property. In the case of recorded land, the Final Order shall also be noted in the Registry's Grantor Index under the name of the owner of the land upon which the proposed work is to be done. In the case of the registered land, the Final Order shall also be noted on the Land Court Certificate of Title of the owner of the land upon which the proposed work is done. The recording information shall be submitted to the Conservation Commission on the form at the end of this Order, which form must be stamped by the Registry of Deeds, prior to the commencement of work.

10. A sign shall be displayed at the site not less then two square feet or more than three square feet in size bearing the words,

"Massachusetts Department of Environmental Protection" [or, "MassDEP"]

"File Number 284-0507 "

11. Where the Department of Environmental Protection is requested to issue a Superseding Order, the Conservation Commission shall be a party to all agency proceedings and hearings before MassDEP.

12. Upon completion of the work described herein, the applicant shall submit a Request for Certificate of Compliance (WPA Form 8A) to the Conservation Commission.

13. The work shall conform to the plans and special conditions referenced in this order.

14. Any change to the plans identified in Condition #13 above shall require the applicant to inquire of the Conservation Commission in writing whether the change is significant enough to require the filing of a new Notice of Intent.

15. The Agent or members of the Conservation Commission and the Department of Environmental Protection shall have the right to enter and inspect the area subject to this Order at reasonable hours to evaluate compliance with the conditions stated in this Order, and may require the submittal of any data deemed necessary by the Conservation Commission or Department for that evaluation.

16. This Order of Conditions shall apply to any successor in interest or successor in control of the property subject to this Order and to any contractor or other person performing work conditioned by this Order.

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C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

17. Prior to the start of work, and if the project involves work adjacent to a Bordering Vegetated Wetland, the boundary of the wetland in the vicinity of the proposed work area shall be marked by wooden stakes or flagging. Once in place, the wetland boundary markers shall be maintained until a Certificate of Compliance has been issued by the Conservation Commission.

18. All sedimentation barriers shall be maintained in good repair until all disturbed areas have been fully stabilized with vegetation or other means. At no time shall sediments be deposited in a wetland or water body. During construction, the applicant or his/her designee shall inspect the erosion controls on a daily basis and shall remove accumulated sediments as needed. The applicant shall immediately control any erosion problems that occur at the site and shall also immediately notify the Conservation Commission, which reserves the right to require additional erosion and/or damage prevention controls it may deem necessary. Sedimentation barriers shall serve as the limit of work unless another limit of work line has been approved by this Order.

19. The work associated with this Order (the "Project")
    (1) ☐ is subject to the Massachusetts Stormwater Standards
    (2) ☒ is NOT subject to the Massachusetts Stormwater Standards

    If the work is subject to the Stormwater Standards, then the project is subject to the following conditions:

    a) All work, including site preparation, land disturbance, construction and redevelopment, shall be implemented in accordance with the construction period pollution prevention and erosion and sedimentation control plan and, if applicable, the Stormwater Pollution Prevention Plan required by the National Pollution Discharge Elimination System Construction General Permit as required by Stormwater Condition 8. Construction period erosion, sedimentation and pollution control measures and best management practices (BMPs) shall remain in place until the site is fully stabilized.

    b) No stormwater runoff may be discharged to the post-construction stormwater BMPs unless and until a Registered Professional Engineer provides a Certification that:
    i. all construction period BMPs have been removed or will be removed by a date certain specified in the Certification. For any construction period BMPs intended to be converted to post construction operation for stormwater attenuation, recharge, and/or treatment, the conversion is allowed by the MassDEP Stormwater Handbook BMP specifications and that the BMP has been properly cleaned or prepared for post construction operation, including removal of all construction period sediment trapped in inlet and outlet control structures;
    ii. as-built final construction BMP plans are included, signed and stamped by a Registered Professional Engineer, certifying the site is fully stabilized;
    iii. any illicit discharges to the stormwater management system have been removed, as per the requirements of Stormwater Standard 10;

C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

iv. all post-construction stormwater BMPs are installed in accordance with the plans (including all planting plans) approved by the issuing authority, and have been inspected to ensure that they are not damaged and that they are in proper working condition;

v. any vegetation associated with post-construction BMPs is suitably established to withstand erosion.

c) The landowner is responsible for BMP maintenance until the issuing authority is notified that another party has legally assumed responsibility for BMP maintenance. Prior to requesting a Certificate of Compliance, or Partial Certificate of Compliance, the responsible party (defined in General Condition 18(e)) shall execute and submit to the issuing authority an Operation and Maintenance Compliance Statement ("O&M Statement) for the Stormwater BMPs identifying the party responsible for implementing the stormwater BMP Operation and Maintenance Plan ("O&M Plan") and certifying the following:

i.) the O&M Plan is complete and will be implemented upon receipt of the Certificate of Compliance, and

ii.) the future responsible parties shall be notified in writing of their ongoing legal responsibility to operate and maintain the stormwater management BMPs and implement the Stormwater Pollution Prevention Plan.

d) Post-construction pollution prevention and source control shall be implemented in accordance with the long-term pollution prevention plan section of the approved Stormwater Report and, if applicable, the Stormwater Pollution Prevention Plan required by the National Pollution Discharge Elimination System Multi-Sector General Permit.

e) Unless and until another party accepts responsibility, the landowner, or owner of any drainage easement, assumes responsibility for maintaining each BMP. To overcome this presumption, the landowner of the property must submit to the issuing authority a legally binding agreement of record, acceptable to the issuing authority, evidencing that another entity has accepted responsibility for maintaining the BMP, and that the proposed responsible party shall be treated as a permittee for purposes of implementing the requirements of Conditions 19(f) through 19(k) with respect to that BMP. Any failure of the proposed responsible party to implement the requirements of Conditions 19(f) through 19(k) with respect to that BMP shall be a violation of the Order of Conditions or Certificate of Compliance. In the case of stormwater BMPs that are serving more than one lot, the legally binding agreement shall also identify the lots that will be serviced by the stormwater BMPs. A plan and easement deed that grants the responsible party access to perform the required operation and maintenance must be submitted along with the legally binding agreement.

f) The responsible party shall operate and maintain all stormwater BMPs in accordance with the design plans, the O&M Plan, and the requirements of the Massachusetts Stormwater Handbook.

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C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

g) The responsible party shall:
1. Maintain an operation and maintenance log for the last three (3) consecutive calendar years of inspections, repairs, maintenance and/or replacement of the stormwater management system or any part thereof, and disposal (for disposal the log shall indicate the type of material and the disposal location);
2. Make the maintenance log available to MassDEP and the Conservation Commission ("Commission") upon request; and
3. Allow members and agents of the MassDEP and the Commission to enter and inspect the site to evaluate and ensure that the responsible party is in compliance with the requirements for each BMP established in the O&M Plan approved by the issuing authority.

h) All sediment or other contaminants removed from stormwater BMPs shall be disposed of in accordance with all applicable federal, state, and local laws and regulations.

i) Illicit discharges to the stormwater management system as defined in 310 CMR 10.04 are prohibited.

j) The stormwater management system approved in the Order of Conditions shall not be changed without the prior written approval of the issuing authority.

k) Areas designated as qualifying pervious areas for the purpose of the Low Impact Site Design Credit (as defined in the MassDEP Stormwater Handbook, Volume 3, Chapter 1, Low Impact Development Site Design Credits) shall not be altered without the prior written approval of the issuing authority.

l) Access for maintenance, repair, and/or replacement of BMPs shall not be withheld. Any fencing constructed around stormwater BMPs shall include access gates and shall be at least six inches above grade to allow for wildlife passage.

Special Conditions (if you need more space for additional conditions, please attach a text document):

See "Special Conditions" pages 1 - 4.

20. For Test Projects subject to 310 CMR 10.05(11), the applicant shall also implement the monitoring plan and the restoration plan submitted with the Notice of Intent. If the conservation commission or Department determines that the Test Project threatens the public health, safety or the environment, the applicant shall implement the removal plan submitted with the Notice of Intent or modify the project as directed by the conservation commission or the Department.

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City/Town

D. Findings Under Municipal Wetlands Bylaw or Ordinance

1. Is a municipal wetlands bylaw or ordinance applicable? ☒ Yes ☐ No

2. The Shirley Conservation Commission hereby finds (check one that applies):

   a. ☐ that the proposed work cannot be conditioned to meet the standards set forth in a municipal ordinance or bylaw, specifically:

   _____ (1. Municipal Ordinance or Bylaw) _____ (2. Citation)

   Therefore, work on this project may not go forward unless and until a revised Notice of Intent is submitted which provides measures which are adequate to meet these standards, and a final Order of Conditions is issued.

   b. ☒ that the following additional conditions are necessary to comply with a municipal ordinance or bylaw:

   Shirley Non-Zoning Wetlands Bylaw (1. Municipal Ordinance or Bylaw) _____ (2. Citation)

3. The Commission orders that all work shall be performed in accordance with the following conditions and with the Notice of Intent referenced above. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, the conditions shall control.

   The special conditions relating to municipal ordinance or bylaw are as follows (if you need more space for additional conditions, attach a text document):

   See "Special Conditions" pages 1 - 4.

SPECIAL CONDITIONS FOR: Whitney Road Over Beaver Pond Brook Tributary Culvert Replacement - DEP File # 284-0507
PROPERTY OWNER: Shirley Department of Public Works

Please review the General Conditions on the DEP Form 1 - 20, particularly Condition 1.

21. The work shall conform to the following plans and documents, unless otherwise specified in this Order:

a. Notice of Intent filed by **Hudson Stein Howard,** submitted **June 3, 2024.**

b. **Plan entitled "** BEAVER POND BROOK TRIBUTARY CULVERT REPLACEMENT, WHITNEY ROAD, SHIRLEY, MA 01464, Middlesex County**", Prepared for "**Town of Shirley, Department of Public Works**",** 3 **Sheets, dated** 12/06/2022**, signed and stamped by** Paul W. Berthiaume, R.P.E..

22. The site engineer or contractor shall have a copy of this Order of Conditions at the site and available for inspection during all phases of construction.

23. No equipment is to enter the wetlands at any time during site preparation or construction or during any other phase of the project, and no materials are to be placed in or allowed to enter the wetland.

24. **Any** change in the plans approved under this Order, including those due to review by other boards or resulting from the aforementioned conditions, must be submitted to the Shirley Conservation Commission **in writing** for approval prior to implementation. The Commission will then decide whether the change is substantial enough to require a new Notice of Intent filing or a request for an amendment to this Order of Conditions. Any errors found in the plans or information submitted by the owner, or the owner's representative, shall be considered as changes.

25. Upon completion of this project (or within one year of the issuance of an occupancy permit), the owner, or the owner's representative, shall submit the following to the Conservation Commission to receive a Certificate of Compliance per Condition 12:

a. Submission of a "Request for Certificate of Compliance" from the owner, or owner's representative, requesting a Certificate of Compliance for **File #284-0507.**

b. A written statement from a registered professional engineer of the Commonwealth certifying that the work has been completed in compliance with this Order of Conditions and the approved plans referenced herein (or approved revisions). Any discrepancies shall be noted.

c. An as-built topographic plan of the same scale as the approved plan signed and stamped by a registered professional land surveyor of the Commonwealth, for the public record. This plan will include as-built elevations of all drainage ways constructed within 100 feet of any wetland or 200 feet of a perennial stream, distances to all structures, and all elevations within 100 feet of wetlands and 200 feet of perennial streams. The as-built must show elevations of all filled, altered, or replicated wetlands.

26. No driveway, footing, or roof drain with an above-ground or subsurface discharge nor any garage floor drain or any deck or addition or shed or pool shall be installed within the 100-foot buffer zone or the 200-foot riverfront protection area without prior written permission of the Conservation Commission.

27. No proposed earthen embankment in the buffer zone shall have a slope steeper than 2:1 (horizontal: vertical) without prior written approval of the Commission.

PRIOR TO CONSTRUCTION

Please note General Conditions 8, 9, and 10.

28. Prior to any work within 100 feet of wetlands or within 200 feet of a perennial stream, erosion control devices must be inspected and approved by the Shirley Conservation Commission or its agent. In addition, the owner, or the owner's representative, shall meet with an agent of the Commission at the site to review the proposed work and measures designed to mitigate any impact on the wetlands and to ensure that all of the conditions of this Order are understood.

29. Prior to any work on site, the wetland boundaries shall be clearly marked with flags and shall be confirmed by the Conservation Commission or its agent. Such markers shall be maintained until all construction activity is completed.

30. Prior to the commencement of any work on site, the owner, or the owner's representative, shall submit to the Shirley Conservation Commission for approval a detailed Sequence of Construction with a timetable and details, **including the construction of the required wetland mitigation area on site, if any.** The owner, or the owner's representative, shall also include the name(s) and telephone number(s) of the person(s) responsible on site for compliance with this Order.

31. The owner, or the owner's representative, shall report in writing to the Shirley Conservation Commission prior to the commencement of construction, once every week during construction, and for as long thereafter as the ground remains unstabilized, as well as upon completion of the project. These reports shall include an update of the status of the erosion controls, what work within 100 feet of wetlands or within 200 feet

of perennial streams has been completed to date, and what work is proposed for the next week. This will update the construction sequence.

SEDIMENT AND EROSION CONTROLS

32. Accepted and usual methods for controlling sedimentation and erosion (e.g., silt fences, staked hay bales, etc.) shall be used during all phases of construction to prevent material from entering wetlands and surface waters. There shall be no erosion into wetlands and surface waters during any phase of construction or after completion of the project. Erosion controls shall be placed according to the plan referenced in Condition 21 above (or 25 feet from the wetland boundary, whichever is further from the wetlands) prior to any activity on site. Erosion control devices may be placed within wetlands and closer than 25 feet to the wetland boundary only where the Commission is allowing wetland disturbance and replication. Erosion control devices shall be installed in accordance with practices set forth by the U. S. Natural Resource Conservation Service.

33. If soils are to be disturbed for longer than two months, a temporary cover of annual rye (*Lolium perenne*) or other suitable grass shall be established to prevent erosion. Once final grading is completed, loaming and seeding of each area shall be completed promptly. Vegetative cover, either temporary or permanent, shall be established prior to winter. If the season is not appropriate for plant growth, exposed soils shall be stabilized with jute netting, staked mulches, or other U.S.D.A. Natural Resource Conservation Service methods.

34. The limit of work shall be the erosion control devices beyond which no work may occur. The Shirley Conservation Commission reserves the right to require additional erosion control and storm damage prevention measures in the future if it should become necessary. Erosion control devices shall be inspected regularly and after any major storm event. Any entrapped silt or other materials shall be removed to an area outside the 100-foot buffer zone. Hay bales and other devices shall be replaced as necessary.

35. The owner, or the owner's representative, shall report any problems with erosion control immediately to the Shirley Conservation Commission office at (978) 425-2600 Ext. 245.

36. Erosion control devices and wetland flags shall remain in place until all disturbed surfaces have been stabilized with final vegetative cover and written permission has been received from the Shirley Conservation Commission. Siltation fencing and hay bale stakes shall be removed when such vegetation is established and on inspection by the Shirley Conservation Commission.

SOIL STOCKPILES AND FILL STORAGE

37. Stockpiled earth and other materials shall be piled outside the 100-foot buffer zone and shall be stabilized to prevent erosion into wetland resource areas.

LAND SUBJECT TO FLOODING

38. There shall be no filling within the 100-year floodplain without provision of compensatory flood storage. Such storage is to be provided prior to deposition of fill within the floodplain and prior to other development.

STORMWATER MANAGEMENT

39. There shall be no direct discharge of runoff into streams or wetlands. Runoff from the site shall be directed overland to maximize groundwater recharge and cleansing of the runoff through contact with natural soils and vegetation.

40. All discharges shall be riprapped to minimize erosion.

OTHER CONDITIONS

41. Equipment fuel storage and refueling and lubrication operations shall be situated in an upland area at least 100 feet from any wetland resource area and outside the 200-foot riverfront protection area.

42. All stumps, brush, and debris shall be removed from the site, including existing and construction debris. This material shall be disposed of promptly and properly. Records as to the destination of all materials, including stumps, brush, and excess fill, shall be kept and supplied to the Commission if requested.

REPLICATION / RESTORATION

43. All re-vegetation shall be performed according to the plan and details provided on Plans, as referenced under Conditions 21 above, unless otherwise specified in this Order. The Conservation Commission reserves the right to require additional plantings to ensure good cover density with indigenous species.

44. All disturbed areas located within wetland resource areas that are to be only temporarily disturbed during construction shall be restored to their original grade, soil profile, and vegetative cover. The area must be 75 percent re-vegetated with wetland plant species similar to those disturbed within two growing seasons. If the area is not at least 50 percent re-vegetated with indigenous wetland plant species within one growing season, the owner, or the owner's representative, shall submit a supplemental planting plan to be approved by the Commission and implemented by the owner, or the owner's representative.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 5 – Order of Conditions
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
284-0507
MassDEP File #

eDEP Transaction #

Shirley
City/Town

E. Signatures

This Order is valid for three years, unless otherwise specified as a special condition pursuant to General Conditions #4, from the date of issuance.

08/13/2024
1. Date of Issuance

Please indicate the number of members who will sign this form.
This Order must be signed by a majority of the Conservation Commission.

5
2. Number of Signers

The Order must be mailed by certified mail (return receipt requested) or hand delivered to the applicant. A copy also must be mailed or hand delivered at the same time to the appropriate Department of Environmental Protection Regional Office, if not filing electronically, and the property owner, if different from applicant.

Signature	Printed Name
	Jennifer McGuinness
	Susan Gillham
	Marie Elwyn
	Stuart Sears
	Daniel Knapp
	Gaynor Bigelbach
	Bonnie Woodward

☑ by hand delivery on

8/14/24
Date

☐ by certified mail, return receipt requested, on

Date

F. Appeals

The applicant, the owner, any person aggrieved by this Order, any owner of land abutting the land subject to this Order, or any ten residents of the city or town in which such land is located, are hereby notified of their right to request the appropriate MassDEP Regional Office to issue a Superseding Order of Conditions. The request must be made by certified mail or hand delivery to the Department, with the appropriate filing fee and a completed Request for Departmental Action Fee Transmittal Form, as provided in 310 CMR 10.03(7) within ten business days from the date of issuance of this Order. A copy of the request shall at the same time be sent by certified mail or hand delivery to the Conservation Commission and to the applicant, if he/she is not the appellant.

Any appellants seeking to appeal the Department's Superseding Order associated with this appeal will be required to demonstrate prior participation in the review of this project. Previous participation in the permit proceeding means the submission of written information to the Conservation Commission prior to the close of the public hearing, requesting a Superseding Order, or providing written information to the Department prior to issuance of a Superseding Order.

The request shall state clearly and concisely the objections to the Order which is being appealed and how the Order does not contribute to the protection of the interests identified in the Massachusetts Wetlands Protection Act (M.G.L. c. 131, § 40), and is inconsistent with the wetlands regulations (310 CMR 10.00). To the extent that the Order is based on a municipal ordinance or bylaw, and not on the Massachusetts Wetlands Protection Act or regulations, the Department has no appellate jurisdiction.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 5 – Order of Conditions
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
284-0507
MassDEP File #

eDEP Transaction #

Shirley
City/Town

G. Recording Information

Prior to commencement of work, this Order of Conditions must be recorded in the Registry of Deeds or the Land Court for the district in which the land is located, within the chain of title of the affected property. In the case of recorded land, the Final Order shall also be noted in the Registry's Grantor Index under the name of the owner of the land subject to the Order. In the case of registered land, this Order shall also be noted on the Land Court Certificate of Title of the owner of the land subject to the Order of Conditions. The recording information on this page shall be submitted to the Conservation Commission listed below.

Shirley
Conservation Commission

Detach on dotted line, have stamped by the Registry of Deeds and submit to the Conservation Commission.

To:

Shirley
Conservation Commission

Please be advised that the Order of Conditions for the Project at:

Whitney Road, Shirley, MA 01464
Project Location

284-0507
MassDEP File Number

Has been recorded at the Registry of Deeds of:

Middlesex South
County

Book

Page

for: Town of Shirley
Property Owner

and has been noted in the chain of title of the affected property in:

Book

Page

In accordance with the Order of Conditions issued on:

Date

If recorded land, the instrument number identifying this transaction is:

Instrument Number

If registered land, the document number identifying this transaction is:

Document Number

Signature of Applicant

The Commonwealth of Massachusetts
William Francis Galvin, Secretary of the Commonwealth

Maria C. Curtatone, Register of Deeds
Southern Middlesex District Registry of Deeds

Dear Sir/Madam:

Enclosed please find your recorded document/s.

Please be advised that **all recordings must be accompanied by a stamped, return-addressed envelope.**

If you have any questions, please call the Registry at (617)679-6300.

Thank you for your attention to this matter.

Middlesex South Registry of Deeds

208 Cambridge Street, PO Box 410068, Cambridge, MA 02141
Telephone: (617) 679-6310 • Fax: (617) 679-6379 • Email: maria.curtatone@sec.state.ma.us
Web: www.cambridgedeeds.com

TOWN OF SHIRLEY
CONSERVATION COMMISSION

7 KEADY WAY, SHIRLEY, MASSACHUSETTS 01464

PHONE: (978) 425-2600 Ext. 245
FAX: (978) 425-2627

DELIVERY RECEIPT

TO: SHIRLEY CONSERVATION COMMISSION

FROM: Bryan Sawyer OR: _____
Applicant (print name) Representative (print name)

DATE: 8/14/24

RE: Order of Conditions / DEP File Number: 284 - 0507

On this date, I accepted in-hand delivery of the above referenced Order of Conditions and its accompanying cover letter.

_____
Signature

DELIVERD BY: Maria Criscenzo
Name (print name)

Land Use Dept.
Title

_____
Signature

APPENDIX C

THE COMMONWEALTH OF MASSACHUSETTS PREVAILING WAGE RATES FOR THIS PROJECT ARE ON THE FOLLOWING PAGES

MAURA HEALEY
Governor

KIM DRISCOLL
Lt. Governor

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT
DEPARTMENT OF LABOR STANDARDS

Prevailing Wage Rates

As determined by the Director under the provisions of the Massachusetts General Laws, Chapter 149, Sections 26 to 27H

LAUREN JONES
Secretary

MICHAEL FLANAGAN
Director

Awarding Authority: Town of Shirley

Contract Number:

City/Town: SHIRLEY

Description of Work: Replacement of an existing culvert structure. Work shall include replacement of existing culvert, asphalt paving, installation of guardrail, tree removal and streambed restoration.

Job Location: 98 Whitney Road, Shirley, MA

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

- The wage rates will remain in effect for the duration of the project, except in the case of multi-year public construction projects. For construction projects lasting longer than one year, awarding authorities must request an updated wage schedule no later than two weeks before the anniversary of the date the contract was executed by the awarding authority and the general contractor. For multi-year CM AT RISK projects, the awarding authority must request an annual update no later than two weeks before the anniversary date, determined as the earlier of: (a) the execution date of the GMP Amendment, or (b) the execution date of the first amendment to permit procurement of construction services. The updated wage schedule must be provided to all contractors, including general and sub-contractors, working on the construction project.
- This annual update requirement is generally not applicable to 27F "rental of equipment" contracts. For such contracts, the prevailing wage rates issued by DLS shall remain in effect for the duration of the contract term. However, if the prevailing wage rate sheet issued does not contain wage rates for each year covered by the contract term, the Awarding Authority must request updated rate sheets from DLS and provide them to the contractor to ensure the correct rates are being paid throughout the duration of the contract. Additionally, if an Awarding Authority exercises an option to renew or extend the contract term, they must request updated rate sheets form DLS and provide them to the contractor.
- This wage schedule applies only to the specific project referenced at the top of this page and uniquely identified by the "Wage Request Number" on all pages of this schedule.
- An Awarding Authority must request an updated wage schedule if it has not opened bids or selected a contractor within90 days of the date of issuance of the wage schedule. For CM AT RISK projects (bid pursuant to G.L. c.149A), the earlier of: (a) the execution date of the GMP Amendment, or (b) the bid for the first construction scope of work must be within 90-days of the wage schedule issuance date.
- The wage schedule shall be incorporated in any advertisement or call for bids for the project as required by M.G.L. c. 149, § 27.The wage schedule shall be made a part of the contract awarded for the project. The wage schedule must be posted in a conspicuous place at the work site for the life of the project in accordance with M.G.L. c. 149 § 27. The wages listed on the wage schedule must be paid to employees performing construction work on the project whether they are employed by the prime contractor, a filed sub-bidder, or a sub-contractor.
- Apprentices working on the project are required to be registered with the Massachusetts Division of Apprentice Standards (DAS). Apprentices must keep their apprentice identification card on their persons during all work hours on the project. An apprentice registered with DAS may be paid the lower apprentice wage rate at the applicable step as provided on the prevailing wage schedule. **Any apprentice not registered with DAS regardless of whether they are registered with another federal, state, local, or private agency must be paid the journeyworker's rate.**
- Every contractor or subcontractor working on the construction project must submit weekly payroll reports and a Statement of Compliance directly to the awarding authority by mail or email and keep them on file for three years. Each weekly payroll report must contain: the employee's name, address, occupational classification, hours worked, and wages paid. Do not submit weekly payroll reports to DLS. For a sample payroll reporting form go to http://www.mass.gov/dols/pw.
- Contractors with questions about the wage rates or classifications included on the wage schedule have an affirmative obligation to inquire with DLS at (617) 626-6953.
- Contractors must obtain the wage schedules from awarding authorities. Failure of a contractor or subcontractor to pay the prevailing wage rates listed on the wage schedule to all employees who perform construction work on the project is a violation of the law and subjects the contractor or subcontractor to civil and criminal penalties.
- Employees not receiving the prevailing wage rate set forth on the wage schedule may file a complaint with the Fair Labor Division of the office of the Attorney General at (617) 727-3465.

Issue Date: 02/18/2025 **Wage Request Number:** 20250217-006

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Construction						
(2 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	01/01/2025	$39.95	$15.57	$20.17	$0.00	$75.69
	06/01/2025	$40.95	$15.57	$20.17	$0.00	$76.69
	12/01/2025	$40.95	$15.57	$21.78	$0.00	$78.30
	01/01/2026	$40.95	$16.17	$21.78	$0.00	$78.90
	06/01/2026	$41.95	$16.17	$21.78	$0.00	$79.90
	12/01/2026	$41.95	$16.17	$23.52	$0.00	$81.64
	01/01/2027	$41.95	$16.77	$23.52	$0.00	$82.24
(3 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	01/01/2025	$40.02	$15.57	$20.17	$0.00	$75.76
	06/01/2025	$41.02	$15.57	$20.17	$0.00	$76.76
	12/01/2025	$41.02	$15.57	$21.78	$0.00	$78.37
	01/01/2026	$41.02	$16.17	$21.78	$0.00	$78.97
	06/01/2026	$42.02	$16.17	$21.78	$0.00	$79.97
	12/01/2026	$42.02	$16.17	$23.52	$0.00	$81.71
	01/01/2027	$42.02	$16.77	$23.52	$0.00	$82.31
(4 & 5 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	01/01/2025	$40.14	$15.57	$20.17	$0.00	$75.88
	06/01/2025	$41.14	$15.57	$20.17	$0.00	$76.88
	12/01/2025	$41.14	$15.57	$21.78	$0.00	$78.49
	01/01/2026	$41.14	$16.17	$21.78	$0.00	$79.09
	06/01/2026	$42.14	$16.17	$21.78	$0.00	$80.09
	12/01/2026	$42.14	$16.17	$23.52	$0.00	$81.83
	01/01/2027	$42.14	$16.77	$23.52	$0.00	$82.43
ADS/SUBMERSIBLE PILOT *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2024	$117.16	$10.08	$24.29	$0.00	$151.53
For apprentice rates see "Apprentice- PILE DRIVER"						
AIR TRACK OPERATOR *LABORERS - ZONE 2*	12/01/2024	$40.61	$9.65	$17.70	$0.00	$67.96
	06/01/2025	$42.00	$9.65	$17.70	$0.00	$69.35
	12/01/2025	$43.38	$9.65	$17.70	$0.00	$70.73
	06/01/2026	$44.82	$9.65	$17.70	$0.00	$72.17
	12/01/2026	$46.26	$9.65	$17.70	$0.00	$73.61
	06/01/2027	$47.71	$9.65	$17.70	$0.00	$75.06
	12/01/2027	$49.16	$9.65	$17.70	$0.00	$76.51
	06/01/2028	$50.66	$9.65	$17.70	$0.00	$78.01
	12/01/2028	$52.16	$9.65	$17.70	$0.00	$79.51
For apprentice rates see "Apprentice- LABORER"						
AIR TRACK OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2024	$40.61	$9.65	$17.80	$0.00	$68.06
	06/01/2025	$42.00	$9.65	$17.80	$0.00	$69.45
	12/01/2025	$43.38	$9.65	$17.80	$0.00	$70.83
	06/01/2026	$44.82	$9.65	$17.80	$0.00	$72.27
	12/01/2026	$46.26	$9.65	$17.80	$0.00	$73.71
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
ASBESTOS REMOVER - PIPE / MECH. EQUIPT. *HEAT & FROST INSULATORS LOCAL 6 (BOSTON)*	12/01/2024	$42.80	$14.50	$11.05	$0.00	$68.35
	06/01/2025	$43.80	$14.50	$11.05	$0.00	$69.35
	12/01/2025	$44.80	$14.50	$11.05	$0.00	$70.35

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ASPHALT RAKER *LABORERS - ZONE 2*	12/01/2024	$40.11	$9.65	$17.70	$0.00	$67.46
	06/01/2025	$41.50	$9.65	$17.70	$0.00	$68.85
	12/01/2025	$42.88	$9.65	$17.70	$0.00	$70.23
	06/01/2026	$44.32	$9.65	$17.70	$0.00	$71.67
	12/01/2026	$45.76	$9.65	$17.70	$0.00	$73.11
	06/01/2027	$47.21	$9.65	$17.70	$0.00	$74.56
	12/01/2027	$48.66	$9.65	$17.70	$0.00	$76.01
	06/01/2028	$50.16	$9.65	$17.70	$0.00	$77.51
	12/01/2028	$51.66	$9.65	$17.70	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"						
ASPHALT RAKER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2024	$40.11	$9.65	$17.80	$0.00	$67.56
	06/01/2025	$41.50	$9.65	$17.80	$0.00	$68.95
	12/01/2025	$42.88	$9.65	$17.80	$0.00	$70.33
	06/01/2026	$44.32	$9.65	$17.80	$0.00	$71.77
	12/01/2026	$45.76	$9.65	$17.80	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$57.03	$15.55	$16.50	$0.00	$89.08
	06/01/2025	$58.33	$15.55	$16.50	$0.00	$90.38
	12/01/2025	$59.78	$15.55	$16.50	$0.00	$91.83
	06/01/2026	$61.08	$15.55	$16.50	$0.00	$93.13
	12/01/2026	$62.53	$15.55	$16.50	$0.00	$94.58
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BACKHOE/FRONT-END LOADER *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$57.03	$15.55	$16.50	$0.00	$89.08
	06/01/2025	$58.33	$15.55	$16.50	$0.00	$90.38
	12/01/2025	$59.78	$15.55	$16.50	$0.00	$91.83
	06/01/2026	$61.08	$15.55	$16.50	$0.00	$93.13
	12/01/2026	$62.53	$15.55	$16.50	$0.00	$94.58
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BARCO-TYPE JUMPING TAMPER *LABORERS - ZONE 2*	12/01/2024	$40.11	$9.65	$17.70	$0.00	$67.46
	06/01/2025	$41.50	$9.65	$17.70	$0.00	$68.85
	12/01/2025	$42.88	$9.65	$17.70	$0.00	$70.23
	06/01/2026	$44.32	$9.65	$17.70	$0.00	$71.67
	12/01/2026	$45.76	$9.65	$17.70	$0.00	$73.11
	06/01/2027	$47.21	$9.65	$17.70	$0.00	$74.56
	12/01/2027	$48.66	$9.65	$17.70	$0.00	$76.01
	06/01/2028	$50.16	$9.65	$17.70	$0.00	$77.51
	12/01/2028	$51.66	$9.65	$17.70	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BLOCK PAVER, RAMMER / CURB SETTER *LABORERS - ZONE 2*	12/01/2024	$40.61	$9.65	$17.70	$0.00	$67.96
	06/01/2025	$42.00	$9.65	$17.70	$0.00	$69.35
	12/01/2025	$43.38	$9.65	$17.70	$0.00	$70.73
	06/01/2026	$44.82	$9.65	$17.70	$0.00	$72.17
	12/01/2026	$46.26	$9.65	$17.70	$0.00	$73.61
	06/01/2027	$47.71	$9.65	$17.70	$0.00	$75.06
	12/01/2027	$49.16	$9.65	$17.70	$0.00	$76.51
	06/01/2028	$50.66	$9.65	$17.70	$0.00	$78.01
	12/01/2028	$52.16	$9.65	$17.70	$0.00	$79.51
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2024	$40.61	$9.65	$17.80	$0.00	$68.06
	06/01/2025	$42.00	$9.65	$17.80	$0.00	$69.45
	12/01/2025	$43.38	$9.65	$17.80	$0.00	$70.83
	06/01/2026	$44.82	$9.65	$17.80	$0.00	$72.27
	12/01/2026	$46.26	$9.65	$17.80	$0.00	$73.71
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
BOILER MAKER *BOILERMAKERS LOCAL 29*	01/01/2024	$48.12	$7.07	$20.60	$0.00	$75.79

Apprentice - *BOILERMAKER - Local 29*

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	$31.28	$7.07	$13.22	$0.00	$51.57
2	65	$31.28	$7.07	$13.22	$0.00	$51.57
3	70	$33.68	$7.07	$14.23	$0.00	$54.98
4	75	$36.09	$7.07	$15.24	$0.00	$58.40
5	80	$38.50	$7.07	$16.25	$0.00	$61.82
6	85	$40.90	$7.07	$17.28	$0.00	$65.25
7	90	$43.31	$7.07	$18.28	$0.00	$68.66
8	95	$45.71	$7.07	$19.32	$0.00	$72.10

Notes:

Apprentice to Journeyworker Ratio:1:4

BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING) *BRICKLAYERS LOCAL 3 (LOWELL)*	02/01/2025	$63.66	$11.49	$22.90	$0.00	$98.05
	08/01/2025	$65.81	$11.49	$22.90	$0.00	$100.20
	02/01/2026	$67.16	$11.49	$22.90	$0.00	$101.55
	08/01/2026	$69.36	$11.49	$22.90	$0.00	$103.75
	02/01/2027	$70.76	$11.49	$22.90	$0.00	$105.15

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *BRICK/PLASTER/CEMENT MASON - Local 3 Lowell*

Effective Date - 02/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$31.83	$11.49	$22.90	$0.00	$66.22
2	60	$38.20	$11.49	$22.90	$0.00	$72.59
3	70	$44.56	$11.49	$22.90	$0.00	$78.95
4	80	$50.93	$11.49	$22.90	$0.00	$85.32
5	90	$57.29	$11.49	$22.90	$0.00	$91.68

Effective Date - 08/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$32.91	$11.49	$22.90	$0.00	$67.30
2	60	$39.49	$11.49	$22.90	$0.00	$73.88
3	70	$46.07	$11.49	$22.90	$0.00	$80.46
4	80	$52.65	$11.49	$22.90	$0.00	$87.04
5	90	$59.23	$11.49	$22.90	$0.00	$93.62

Notes:

Apprentice to Journeyworker Ratio:1:5

BULLDOZER/GRADER/SCRAPER *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$56.40	$15.55	$16.50	$0.00	$88.45
	06/01/2025	$57.68	$15.55	$16.50	$0.00	$89.73
	12/01/2025	$59.12	$15.55	$16.50	$0.00	$91.17
	06/01/2026	$60.40	$15.55	$16.50	$0.00	$92.45
	12/01/2026	$61.84	$15.55	$16.50	$0.00	$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
CAISSON & UNDERPINNING BOTTOM MAN *LABORERS - FOUNDATION AND MARINE*	12/01/2024	$48.10	$9.65	$18.22	$0.00	$75.97
	06/01/2025	$49.60	$9.65	$18.22	$0.00	$77.47
	12/01/2025	$51.10	$9.65	$18.22	$0.00	$78.97
	06/01/2026	$52.65	$9.65	$18.22	$0.00	$80.52
	12/01/2026	$54.15	$9.65	$18.22	$0.00	$82.02
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING LABORER *LABORERS - FOUNDATION AND MARINE*	12/01/2024	$46.95	$9.65	$18.22	$0.00	$74.82
	06/01/2025	$48.45	$9.65	$18.22	$0.00	$76.32
	12/01/2025	$49.95	$9.65	$18.22	$0.00	$77.82
	06/01/2026	$51.50	$9.65	$18.22	$0.00	$79.37
	12/01/2026	$53.00	$9.65	$18.22	$0.00	$80.87
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING TOP MAN *LABORERS - FOUNDATION AND MARINE*	12/01/2024	$47.28	$9.65	$18.22	$0.00	$75.15
	06/01/2025	$48.78	$9.65	$18.22	$0.00	$76.65
	12/01/2025	$50.28	$9.65	$18.22	$0.00	$78.15
	06/01/2026	$51.83	$9.65	$18.22	$0.00	$79.70
	12/01/2026	$53.33	$9.65	$18.22	$0.00	$81.20
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CARBIDE CORE DRILL OPERATOR	12/01/2024	$40.11	$9.65	$17.70	$0.00	$67.46
LABORERS - ZONE 2	06/01/2025	$41.50	$9.65	$17.70	$0.00	$68.85
	12/01/2025	$42.88	$9.65	$17.70	$0.00	$70.23
	06/01/2026	$44.32	$9.65	$17.70	$0.00	$71.67
	12/01/2026	$45.76	$9.65	$17.70	$0.00	$73.11
	06/01/2027	$47.21	$9.65	$17.70	$0.00	$74.56
	12/01/2027	$48.66	$9.65	$17.70	$0.00	$76.01
	06/01/2028	$50.16	$9.65	$17.70	$0.00	$77.51
	12/01/2028	$51.66	$9.65	$17.70	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"						
CARPENTER	09/01/2024	$48.37	$9.83	$19.97	$0.00	$78.17
CARPENTERS -ZONE 2 (Eastern Massachusetts)	03/01/2025	$49.62	$9.83	$19.97	$0.00	$79.42
	09/01/2025	$50.87	$9.83	$19.97	$0.00	$80.67
	03/01/2026	$52.12	$9.83	$19.97	$0.00	$81.92
	09/01/2026	$53.37	$9.83	$19.97	$0.00	$83.17
	03/01/2027	$54.62	$9.83	$19.97	$0.00	$84.42

Apprentice - *CARPENTER - Zone 2 Eastern MA*

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$21.77	$9.83	$1.73	$0.00	$33.33
2	45	$21.77	$9.83	$1.73	$0.00	$33.33
3	55	$26.60	$9.83	$3.40	$0.00	$39.83
4	55	$26.60	$9.83	$3.40	$0.00	$39.83
5	70	$33.86	$9.83	$16.51	$0.00	$60.20
6	70	$33.86	$9.83	$16.51	$0.00	$60.20
7	80	$38.70	$9.83	$18.24	$0.00	$66.77
8	80	$38.70	$9.83	$18.24	$0.00	$66.77

Effective Date - 03/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$22.33	$9.83	$1.73	$0.00	$33.89
2	45	$22.33	$9.83	$1.73	$0.00	$33.89
3	55	$27.29	$9.83	$3.40	$0.00	$40.52
4	55	$27.29	$9.83	$3.40	$0.00	$40.52
5	70	$34.73	$9.83	$16.51	$0.00	$61.07
6	70	$34.73	$9.83	$16.51	$0.00	$61.07
7	80	$39.70	$9.83	$18.24	$0.00	$67.77
8	80	$39.70	$9.83	$18.24	$0.00	$67.77

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CARPENTER WOOD FRAME *CARPENTERS-ZONE 3 (Wood Frame)*	10/01/2024	$26.65	$7.02	$4.80	$0.00	$38.47
	10/01/2025	$27.75	$7.02	$4.80	$0.00	$39.57
	10/01/2026	$28.85	$7.02	$4.80	$0.00	$40.67

All Aspects of New Wood Frame Work

Apprentice - *CARPENTER (Wood Frame) - Zone 3*

Effective Date - 10/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$15.99	$7.02	$0.00	$0.00	$23.01
2	60	$15.99	$7.02	$0.00	$0.00	$23.01
3	65	$17.32	$7.02	$1.00	$0.00	$25.34
4	70	$18.66	$7.02	$1.00	$0.00	$26.68
5	75	$19.99	$7.02	$4.80	$0.00	$31.81
6	80	$21.32	$7.02	$4.80	$0.00	$33.14
7	85	$22.65	$7.02	$4.80	$0.00	$34.47
8	90	$23.99	$7.02	$4.80	$0.00	$35.81

Effective Date - 10/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$16.65	$7.02	$0.00	$0.00	$23.67
2	60	$16.65	$7.02	$0.00	$0.00	$23.67
3	65	$18.04	$7.02	$1.00	$0.00	$26.06
4	70	$19.43	$7.02	$1.00	$0.00	$27.45
5	75	$20.81	$7.02	$4.80	$0.00	$32.63
6	80	$22.20	$7.02	$4.80	$0.00	$34.02
7	85	$23.59	$7.02	$4.80	$0.00	$35.41
8	90	$24.98	$7.02	$4.80	$0.00	$36.80

Notes:

Apprentice to Journeyworker Ratio:1:5

CEMENT MASONRY/PLASTERING *BRICKLAYERS LOCAL 3 (LOWELL)*	07/01/2024	$49.19	$13.35	$24.21	$1.80	$88.55

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *CEMENT MASONRY/PLASTERING - Lowell*

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.60	$13.35	$16.43	$0.00	$54.38
2	60	$29.51	$13.35	$19.21	$1.80	$63.87
3	65	$31.97	$13.35	$20.21	$1.80	$67.33
4	70	$34.43	$13.35	$21.21	$1.80	$70.79
5	75	$36.89	$13.35	$22.21	$1.80	$74.25
6	80	$39.35	$13.35	$23.21	$1.80	$77.71
7	90	$44.27	$13.35	$24.21	$1.80	$83.63

Notes:

Steps 3,4 are 500 hrs. All other steps are 1,000 hrs.

Apprentice to Journeyworker Ratio:1:3

CHAIN SAW OPERATOR *LABORERS - ZONE 2*	12/01/2024	$40.11	$9.65	$17.70	$0.00	$67.46
	06/01/2025	$41.50	$9.65	$17.70	$0.00	$68.85
	12/01/2025	$42.88	$9.65	$17.70	$0.00	$70.23
	06/01/2026	$44.32	$9.65	$17.70	$0.00	$71.67
	12/01/2026	$45.76	$9.65	$17.70	$0.00	$73.11
	06/01/2027	$47.21	$9.65	$17.70	$0.00	$74.56
	12/01/2027	$48.66	$9.65	$17.70	$0.00	$76.01
	06/01/2028	$50.16	$9.65	$17.70	$0.00	$77.51
	12/01/2028	$51.66	$9.65	$17.70	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"						
CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$58.18	$15.55	$16.50	$0.00	$90.23
	06/01/2025	$59.51	$15.55	$16.50	$0.00	$91.56
	12/01/2025	$60.98	$15.55	$16.50	$0.00	$93.03
	06/01/2026	$62.31	$15.55	$16.50	$0.00	$94.36
	12/01/2026	$63.79	$15.55	$16.50	$0.00	$95.84
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
COMPRESSOR OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$36.67	$15.55	$16.50	$0.00	$68.72
	06/01/2025	$37.52	$15.55	$16.50	$0.00	$69.57
	12/01/2025	$38.47	$15.55	$16.50	$0.00	$70.52
	06/01/2026	$39.33	$15.55	$16.50	$0.00	$71.38
	12/01/2026	$40.28	$15.55	$16.50	$0.00	$72.33
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DELEADER (BRIDGE) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2025	$58.46	$9.95	$23.95	$0.00	$92.36

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$29.23	$9.95	$0.00	$0.00	$39.18
2	55	$32.15	$9.95	$6.66	$0.00	$48.76
3	60	$35.08	$9.95	$7.26	$0.00	$52.29
4	65	$38.00	$9.95	$7.87	$0.00	$55.82
5	70	$40.92	$9.95	$20.32	$0.00	$71.19
6	75	$43.85	$9.95	$20.93	$0.00	$74.73
7	80	$46.77	$9.95	$21.53	$0.00	$78.25
8	90	$52.61	$9.95	$22.74	$0.00	$85.30

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

DEMO: ADZEMAN *LABORERS - ZONE 2*	12/02/2024	$47.00	$9.65	$18.40	$0.00	$75.05
	06/02/2025	$48.50	$9.65	$18.40	$0.00	$76.55
	12/01/2025	$50.00	$9.65	$18.40	$0.00	$78.05
	06/01/2026	$51.55	$9.65	$18.40	$0.00	$79.60
	12/07/2026	$53.05	$9.65	$18.40	$0.00	$81.10
	06/07/2027	$54.65	$9.65	$18.40	$0.00	$82.70
	12/06/2027	$56.25	$9.65	$18.40	$0.00	$84.30
	06/05/2028	$57.93	$9.65	$18.40	$0.00	$85.98
	12/04/2028	$59.60	$9.65	$18.40	$0.00	$87.65
For apprentice rates see "Apprentice- LABORER"						
DEMO: BACKHOE/LOADER/HAMMER OPERATOR *LABORERS - ZONE 2*	12/02/2024	$48.00	$9.65	$18.40	$0.00	$76.05
	06/02/2025	$49.50	$9.65	$18.40	$0.00	$77.55
	12/01/2025	$51.00	$9.65	$18.40	$0.00	$79.05
	06/01/2026	$52.55	$9.65	$18.40	$0.00	$80.60
	12/07/2026	$54.05	$9.65	$18.40	$0.00	$82.10
	06/07/2027	$55.65	$9.65	$18.40	$0.00	$83.70
	12/06/2027	$57.25	$9.65	$18.40	$0.00	$85.30
	06/05/2028	$58.93	$9.65	$18.40	$0.00	$86.98
	12/04/2028	$60.60	$9.65	$18.40	$0.00	$88.65
For apprentice rates see "Apprentice- LABORER"						
DEMO: BURNERS *LABORERS - ZONE 2*	12/02/2024	$47.75	$9.65	$18.40	$0.00	$75.80
	06/02/2025	$49.25	$9.65	$18.40	$0.00	$77.30
	12/01/2025	$50.75	$9.65	$18.40	$0.00	$78.80
	06/01/2026	$52.30	$9.65	$18.40	$0.00	$80.35
	12/07/2026	$53.80	$9.65	$18.40	$0.00	$81.85
	06/07/2027	$55.40	$9.65	$18.40	$0.00	$83.45
	12/06/2027	$57.00	$9.65	$18.40	$0.00	$85.05
	06/05/2028	$58.68	$9.65	$18.40	$0.00	$86.73
	12/04/2028	$60.35	$9.65	$18.40	$0.00	$88.40

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"						
DEMO: CONCRETE CUTTER/SAWYER *LABORERS - ZONE 2*	12/02/2024	$48.00	$9.65	$18.40	$0.00	$76.05
	06/02/2025	$49.50	$9.65	$18.40	$0.00	$77.55
	12/01/2025	$51.00	$9.65	$18.40	$0.00	$79.05
	06/01/2026	$52.55	$9.65	$18.40	$0.00	$80.60
	12/07/2026	$54.05	$9.65	$18.40	$0.00	$82.10
	06/07/2027	$55.65	$9.65	$18.40	$0.00	$83.70
	12/06/2027	$57.25	$9.65	$18.40	$0.00	$85.30
	06/05/2028	$58.93	$9.65	$18.40	$0.00	$86.98
	12/04/2028	$60.60	$9.65	$18.40	$0.00	$88.65
For apprentice rates see "Apprentice- LABORER"						
DEMO: JACKHAMMER OPERATOR *LABORERS - ZONE 2*	12/02/2024	$47.75	$9.65	$18.40	$0.00	$75.80
	06/02/2025	$49.25	$9.65	$18.40	$0.00	$77.30
	12/01/2025	$50.75	$9.65	$18.40	$0.00	$78.80
	06/01/2026	$52.30	$9.65	$18.40	$0.00	$80.35
	12/07/2026	$53.80	$9.65	$18.40	$0.00	$81.85
	06/07/2027	$55.40	$9.65	$18.40	$0.00	$83.45
	12/06/2027	$57.00	$9.65	$18.40	$0.00	$85.05
	06/05/2028	$58.68	$9.65	$18.40	$0.00	$86.73
	12/04/2028	$60.35	$9.65	$18.40	$0.00	$88.40
For apprentice rates see "Apprentice- LABORER"						
DEMO: WRECKING LABORER *LABORERS - ZONE 2*	12/02/2024	$47.00	$9.65	$18.40	$0.00	$75.05
	06/02/2025	$48.50	$9.65	$18.40	$0.00	$76.55
	12/01/2025	$50.00	$9.65	$18.40	$0.00	$78.05
	06/01/2026	$51.55	$9.65	$18.40	$0.00	$79.60
	12/07/2026	$53.05	$9.65	$18.40	$0.00	$81.10
	06/07/2027	$54.65	$9.65	$18.40	$0.00	$82.70
	12/06/2027	$56.25	$9.65	$18.40	$0.00	$84.30
	06/05/2028	$57.93	$9.65	$18.40	$0.00	$85.98
	12/04/2028	$59.60	$9.65	$18.40	$0.00	$87.65
For apprentice rates see "Apprentice- LABORER"						
DIRECTIONAL DRILL MACHINE OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$56.40	$15.55	$16.50	$0.00	$88.45
	06/01/2025	$57.68	$15.55	$16.50	$0.00	$89.73
	12/01/2025	$59.12	$15.55	$16.50	$0.00	$91.17
	06/01/2026	$60.40	$15.55	$16.50	$0.00	$92.45
	12/01/2026	$61.84	$15.55	$16.50	$0.00	$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DIVER *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2024	$78.11	$10.08	$24.29	$0.00	$112.48
as of 8-1-24, Apprentices with diving licenses begin at second year. % of Diver wage 70/80/90 2A $69.83, 3A $91.79,4A $102.14 Total Rate						
DIVER TENDER *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2024	$51.97	$10.08	$24.29	$0.00	$86.34
as of 8-1-24, Apprentices with diving licenses begin at second year. % of Piledriver wage 70/80/90 2A $54.20, 3A $73.93,4A $82.05 Total Rate						
DIVER TENDER (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2024	$83.69	$10.08	$24.29	$0.00	$118.06
For apprentice rates see "Apprentice- PILE DRIVER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DIVER/SLURRY (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 2)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2024	$117.16	$10.08	$24.29	$0.00	$151.53
DRAWBRIDGE OPERATOR (Construction) *DRAWBRIDGE - SEIU LOCAL 888*	07/01/2020	$26.77	$6.67	$3.93	$0.16	$37.53
ELECTRICIAN *ELECTRICIANS LOCAL 96*	09/01/2024	$47.05	$13.99	$19.22	$0.00	$80.26
	09/07/2025	$48.16	$14.98	$19.60	$0.00	$82.74
	09/06/2026	$49.38	$15.96	$20.00	$0.00	$85.34

Apprentice - *ELECTRICIAN - Local 96*

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$18.82	$13.99	$0.56	$0.00	$33.37
2	45	$21.17	$13.99	$0.64	$0.00	$35.80
3	48	$22.58	$13.99	$15.79	$0.00	$52.36
4	55	$25.88	$13.99	$16.26	$0.00	$56.13
5	65	$30.58	$13.99	$16.91	$0.00	$61.48
6	80	$37.64	$13.99	$17.90	$0.00	$69.53

Effective Date - 09/07/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$19.26	$14.98	$0.58	$0.00	$34.82
2	45	$21.67	$14.98	$0.65	$0.00	$37.30
3	48	$23.12	$14.98	$16.09	$0.00	$54.19
4	55	$26.49	$14.98	$16.57	$0.00	$58.04
5	65	$31.30	$14.98	$17.25	$0.00	$63.53
6	80	$38.53	$14.98	$18.26	$0.00	$71.77

Notes:

Steps 1-2 are 1000 hrs; Steps 3-6 are 1500 hrs.

Apprentice to Journeyworker Ratio:2:3***

ELEVATOR CONSTRUCTOR *ELEVATOR CONSTRUCTORS LOCAL 41*	01/01/2025	$62.83	$16.28	$21.36	$0.00	$100.47
	01/01/2026	$63.68	$16.38	$21.76	$0.00	$101.82
	01/01/2027	$64.53	$16.48	$22.16	$0.00	$103.17

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ELEVATOR CONSTRUCTOR - Local 41*

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$31.42	$16.28	$0.00	$0.00	$47.70
2	55	$34.56	$16.28	$21.36	$0.00	$72.20
3	65	$40.84	$16.28	$21.36	$0.00	$78.48
4	70	$43.98	$16.28	$21.36	$0.00	$81.62
5	80	$50.26	$16.28	$21.36	$0.00	$87.90

Effective Date - 01/01/2026

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$31.84	$16.38	$0.00	$0.00	$48.22
2	55	$35.02	$16.38	$21.76	$0.00	$73.16
3	65	$41.39	$16.38	$21.76	$0.00	$79.53
4	70	$44.58	$16.38	$21.76	$0.00	$82.72
5	80	$50.94	$16.38	$21.76	$0.00	$89.08

Notes:
Steps 1-2 are 6 mos.; Steps 3-5 are 1 year

Apprentice to Journeyworker Ratio:1:1

ELEVATOR CONSTRUCTOR HELPER *ELEVATOR CONSTRUCTORS LOCAL 41*	01/01/2025	$43.98	$16.28	$21.36	$0.00	$81.62
	01/01/2026	$44.58	$16.38	$21.76	$0.00	$82.72
	01/01/2027	$45.17	$16.48	$22.16	$0.00	$83.81
For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"						
FENCE & GUARD RAIL ERECTOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2024	$40.11	$9.65	$17.80	$0.00	$67.56
	06/01/2025	$41.50	$9.65	$17.80	$0.00	$68.95
	12/01/2025	$42.88	$9.65	$17.80	$0.00	$70.33
	06/01/2026	$44.32	$9.65	$17.80	$0.00	$71.77
	12/01/2026	$45.76	$9.65	$17.80	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	11/01/2024	$51.78	$15.30	$16.40	$0.00	$83.48
	05/01/2025	$53.22	$15.30	$16.40	$0.00	$84.92
	11/01/2025	$54.51	$15.30	$16.40	$0.00	$86.21
	05/01/2026	$55.95	$15.30	$16.40	$0.00	$87.65
	11/01/2026	$57.24	$15.30	$16.40	$0.00	$88.94
	05/01/2027	$58.67	$15.30	$16.40	$0.00	$90.37
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	11/01/2024	$53.37	$15.30	$16.40	$0.00	$85.07
	05/01/2025	$54.82	$15.30	$16.40	$0.00	$86.52
	11/01/2025	$56.12	$15.30	$16.40	$0.00	$87.82
	05/01/2026	$57.57	$15.30	$16.40	$0.00	$89.27
	11/01/2026	$58.87	$15.30	$16.40	$0.00	$90.57
	05/01/2027	$60.32	$15.30	$16.40	$0.00	$92.02
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	11/01/2024	$25.37	$15.30	$16.40	$0.00	$57.07
	05/01/2025	$26.22	$15.30	$16.40	$0.00	$57.92
	11/01/2025	$26.98	$15.30	$16.40	$0.00	$58.68
	05/01/2026	$27.83	$15.30	$16.40	$0.00	$59.53
	11/01/2026	$28.59	$15.30	$16.40	$0.00	$60.29
	05/01/2027	$29.44	$15.30	$16.40	$0.00	$61.14
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIRE ALARM INSTALLER *ELECTRICIANS LOCAL 96*	09/01/2024	$47.05	$13.99	$19.22	$0.00	$80.26
	09/07/2025	$48.16	$14.98	$19.60	$0.00	$82.74
	09/06/2026	$49.38	$15.96	$20.00	$0.00	$85.34
For apprentice rates see "Apprentice- ELECTRICIAN"						
FIRE ALARM REPAIR / MAINT/COMMISSIONING *ELECTRICIANS LOCAL 96*	09/01/2024	$47.05	$13.99	$19.22	$0.00	$80.26
	09/07/2025	$48.16	$14.98	$19.60	$0.00	$82.74
	09/06/2026	$49.38	$15.96	$20.00	$0.00	$85.34
For apprentice rates see "Apprentice- ELECTRICIAN"						
FIREMAN (ASST. ENGINEER) *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$45.96	$15.55	$16.50	$0.00	$78.01
	06/01/2025	$47.02	$15.55	$16.50	$0.00	$79.07
	12/01/2025	$48.19	$15.55	$16.50	$0.00	$80.24
	06/01/2026	$49.25	$15.55	$16.50	$0.00	$81.30
	12/01/2026	$50.43	$15.55	$16.50	$0.00	$82.48
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FLAGGER & SIGNALER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2024	$27.01	$9.65	$17.80	$0.00	$54.46
	06/01/2025	$28.09	$9.65	$17.80	$0.00	$55.54
	12/01/2025	$28.09	$9.65	$17.80	$0.00	$55.54
	06/01/2026	$29.21	$9.65	$17.80	$0.00	$56.66
	12/01/2026	$29.21	$9.65	$17.80	$0.00	$56.66
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
FLOORCOVERER *FLOORCOVERERS LOCAL 2168 ZONE I*	09/01/2024	$56.23	$8.83	$20.27	$0.00	$85.33
	03/01/2025	$57.73	$8.83	$20.27	$0.00	$86.83
	09/01/2025	$59.23	$8.83	$20.27	$0.00	$88.33
	03/01/2026	$60.73	$8.83	$20.27	$0.00	$89.83
	09/01/2026	$62.23	$8.83	$20.27	$0.00	$91.33
	03/01/2027	$63.73	$8.83	$20.27	$0.00	$92.83

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *FLOORCOVERER - Local 2168 Zone I*

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$25.30	$8.83	$1.76	$0.00	$35.89
2	45	$25.30	$8.83	$1.76	$0.00	$35.89
3	55	$30.93	$8.83	$3.52	$0.00	$43.28
4	55	$30.93	$8.83	$3.52	$0.00	$43.28
5	70	$39.36	$8.83	$16.75	$0.00	$64.94
6	70	$39.36	$8.83	$16.75	$0.00	$64.94
7	80	$44.98	$8.83	$18.51	$0.00	$72.32
8	80	$44.98	$8.83	$18.51	$0.00	$72.32

Effective Date - 03/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$25.98	$8.83	$1.76	$0.00	$36.57
2	45	$25.98	$8.83	$1.76	$0.00	$36.57
3	55	$31.75	$8.83	$3.52	$0.00	$44.10
4	55	$31.75	$8.83	$3.52	$0.00	$44.10
5	70	$40.41	$8.83	$16.75	$0.00	$65.99
6	70	$40.41	$8.83	$16.75	$0.00	$65.99
7	80	$46.18	$8.83	$18.51	$0.00	$73.52
8	80	$46.18	$8.83	$18.51	$0.00	$73.52

Notes: Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

FORK LIFT/CHERRY PICKER *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$57.03	$15.55	$16.50	$0.00	$89.08
	06/01/2025	$58.33	$15.55	$16.50	$0.00	$90.38
	12/01/2025	$59.78	$15.55	$16.50	$0.00	$91.83
	06/01/2026	$61.08	$15.55	$16.50	$0.00	$93.13
	12/01/2026	$62.53	$15.55	$16.50	$0.00	$94.58
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GENERATOR/LIGHTING PLANT/HEATERS *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$36.67	$15.55	$16.50	$0.00	$68.72
	06/01/2025	$37.52	$15.55	$16.50	$0.00	$69.57
	12/01/2025	$38.47	$15.55	$16.50	$0.00	$70.52
	06/01/2026	$39.33	$15.55	$16.50	$0.00	$71.38
	12/01/2026	$40.28	$15.55	$16.50	$0.00	$72.33
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) *GLAZIERS LOCAL 35 (ZONE 2)*	01/01/2025	$47.96	$9.95	$23.95	$0.00	$81.86

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *GLAZIER - Local 35 Zone 2*

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.98	$9.95	$0.00	$0.00	$33.93
2	55	$26.38	$9.95	$6.66	$0.00	$42.99
3	60	$28.78	$9.95	$7.26	$0.00	$45.99
4	65	$31.17	$9.95	$7.87	$0.00	$48.99
5	70	$33.57	$9.95	$20.32	$0.00	$63.84
6	75	$35.97	$9.95	$20.93	$0.00	$66.85
7	80	$38.37	$9.95	$21.53	$0.00	$69.85
8	90	$43.16	$9.95	$22.74	$0.00	$75.85

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

HOISTING ENGINEER/CRANES/GRADALLS *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$57.03	$15.55	$16.50	$0.00	$89.08
	06/01/2025	$58.33	$15.55	$16.50	$0.00	$90.38
	12/01/2025	$59.78	$15.55	$16.50	$0.00	$91.83
	06/01/2026	$61.08	$15.55	$16.50	$0.00	$93.13
	12/01/2026	$62.53	$15.55	$16.50	$0.00	$94.58

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *OPERATING ENGINEERS - Local 4*

Effective Date - 12/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$31.37	$0.00	$0.00	$0.00	$31.37
2	60	$34.22	$15.55	$16.50	$0.00	$66.27
3	65	$37.07	$15.55	$16.50	$0.00	$69.12
4	70	$39.92	$15.55	$16.50	$0.00	$71.97
5	75	$42.77	$15.55	$16.50	$0.00	$74.82
6	80	$45.62	$15.55	$16.50	$0.00	$77.67
7	85	$48.48	$15.55	$16.50	$0.00	$80.53
8	90	$51.33	$15.55	$16.50	$0.00	$83.38

Effective Date - 06/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$32.08	$0.00	$0.00	$0.00	$32.08
2	60	$35.00	$15.55	$16.50	$0.00	$67.05
3	65	$37.91	$15.55	$16.50	$0.00	$69.96
4	70	$40.83	$15.55	$16.50	$0.00	$72.88
5	75	$43.75	$15.55	$16.50	$0.00	$75.80
6	80	$46.66	$15.55	$16.50	$0.00	$78.71
7	85	$49.58	$15.55	$16.50	$0.00	$81.63
8	90	$52.50	$15.55	$16.50	$0.00	$84.55

Notes:

Apprentice to Journeyworker Ratio:1:6

HVAC (DUCTWORK) *SHEETMETAL WORKERS LOCAL 17 - A*	02/01/2025	$59.69	$14.75	$28.12	$2.98	$105.54
	08/01/2025	$61.54	$14.75	$28.12	$2.98	$107.39
	02/01/2026	$63.49	$14.75	$28.12	$2.98	$109.34
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (ELECTRICAL CONTROLS) *ELECTRICIANS LOCAL 96*	09/01/2024	$47.05	$13.99	$19.22	$0.00	$80.26
	09/07/2025	$48.16	$14.98	$19.60	$0.00	$82.74
	09/06/2026	$49.38	$15.96	$20.00	$0.00	$85.34
For apprentice rates see "Apprentice- ELECTRICIAN"						
HVAC (TESTING AND BALANCING - AIR) *SHEETMETAL WORKERS LOCAL 17 - A*	02/01/2025	$59.69	$14.75	$28.12	$2.98	$105.54
	08/01/2025	$61.54	$14.75	$28.12	$2.98	$107.39
	02/01/2026	$63.49	$14.75	$28.12	$2.98	$109.34
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (TESTING AND BALANCING -WATER) *PLUMBERS LOCAL 4*	09/01/2024	$55.00	$9.90	$17.77	$0.00	$82.67
	03/01/2025	$56.40	$9.90	$17.77	$0.00	$84.07
	09/01/2025	$57.80	$9.90	$17.77	$0.00	$85.47
	03/01/2026	$59.20	$9.90	$17.77	$0.00	$86.87
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HVAC MECHANIC *PLUMBERS LOCAL 4*	09/01/2024	$55.00	$9.90	$17.77	$0.00	$82.67
	03/01/2025	$56.40	$9.90	$17.77	$0.00	$84.07
	09/01/2025	$57.80	$9.90	$17.77	$0.00	$85.47
	03/01/2026	$59.20	$9.90	$17.77	$0.00	$86.87
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HYDRAULIC DRILLS *LABORERS - ZONE 2*	12/01/2024	$40.61	$9.65	$17.70	$0.00	$67.96
	06/01/2025	$42.00	$9.65	$17.70	$0.00	$69.35
	12/01/2025	$43.38	$9.65	$17.70	$0.00	$70.73
	06/01/2026	$44.82	$9.65	$17.70	$0.00	$72.17
	12/01/2026	$46.26	$9.65	$17.70	$0.00	$73.61
	06/01/2027	$47.71	$9.65	$17.70	$0.00	$75.06
	12/01/2027	$49.16	$9.65	$17.70	$0.00	$76.51
	06/01/2028	$50.66	$9.65	$17.70	$0.00	$78.01
	12/01/2028	$52.16	$9.65	$17.70	$0.00	$79.51
For apprentice rates see "Apprentice- LABORER"						
HYDRAULIC DRILLS (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2024	$40.61	$9.65	$17.80	$0.00	$68.06
	06/01/2025	$42.00	$9.65	$17.80	$0.00	$69.45
	12/01/2025	$43.38	$9.65	$17.80	$0.00	$70.83
	06/01/2026	$44.82	$9.65	$17.80	$0.00	$72.27
	12/01/2026	$46.26	$9.65	$17.80	$0.00	$73.71
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
INSULATOR (PIPES & TANKS) *HEAT & FROST INSULATORS LOCAL 6 (BOSTON)*	09/01/2024	$56.92	$14.75	$19.61	$0.00	$91.28
	09/01/2025	$60.34	$14.75	$19.61	$0.00	$94.70
	09/01/2026	$63.76	$14.75	$19.61	$0.00	$98.12

Apprentice - *ASBESTOS INSULATOR (Pipes & Tanks) - Local 6 Boston*

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.46	$14.75	$14.32	$0.00	$57.53
2	60	$34.15	$14.75	$15.37	$0.00	$64.27
3	70	$39.84	$14.75	$16.43	$0.00	$71.02
4	80	$45.54	$14.75	$17.49	$0.00	$77.78

Effective Date - 09/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$30.17	$14.75	$14.32	$0.00	$59.24
2	60	$36.20	$14.75	$15.37	$0.00	$66.32
3	70	$42.24	$14.75	$16.43	$0.00	$73.42
4	80	$48.27	$14.75	$17.49	$0.00	$80.51

Notes:
Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

IRONWORKER/WELDER *IRONWORKERS LOCAL 7 (WORCESTER AREA)*	03/16/2024	$53.67	$8.35	$26.70	$0.00	$88.72

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *IRONWORKER - Local 7 Worcester*

Effective Date - 03/16/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$32.20	$8.35	$26.70	$0.00	$67.25
2	70	$37.57	$8.35	$26.70	$0.00	$72.62
3	75	$40.25	$8.35	$26.70	$0.00	$75.30
4	80	$42.94	$8.35	$26.70	$0.00	$77.99
5	85	$45.62	$8.35	$26.70	$0.00	$80.67
6	90	$48.30	$8.35	$26.70	$0.00	$83.35

Notes:

Apprentice to Journeyworker Ratio:1:4

JACKHAMMER & PAVING BREAKER OPERATOR *LABORERS - ZONE 2*	12/01/2024	$40.11	$9.65	$17.70	$0.00	$67.46
	06/01/2025	$41.50	$9.65	$17.70	$0.00	$68.85
	12/01/2025	$42.88	$9.65	$17.70	$0.00	$70.23
	06/01/2026	$44.32	$9.65	$17.70	$0.00	$71.67
	12/01/2026	$45.76	$9.65	$17.70	$0.00	$73.11
	06/01/2027	$47.21	$9.65	$17.70	$0.00	$74.56
	12/01/2027	$48.66	$9.65	$17.70	$0.00	$76.01
	06/01/2028	$50.16	$9.65	$17.70	$0.00	$77.51
	12/01/2028	$51.66	$9.65	$17.70	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"						
LABORER *LABORERS - ZONE 2*	12/01/2024	$39.86	$9.65	$17.70	$0.00	$67.21
	06/01/2025	$41.25	$9.65	$17.70	$0.00	$68.60
	12/01/2025	$42.63	$9.65	$17.70	$0.00	$69.98
	06/01/2026	$44.07	$9.65	$17.70	$0.00	$71.42
	12/01/2026	$45.51	$9.65	$17.70	$0.00	$72.86
	06/01/2027	$46.96	$9.65	$17.70	$0.00	$74.31
	12/01/2027	$48.41	$9.65	$17.70	$0.00	$75.76
	06/01/2028	$49.91	$9.65	$17.70	$0.00	$77.26
	12/01/2028	$51.41	$9.65	$17.70	$0.00	$78.76

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *LABORER - Zone 2*

Effective Date - 12/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$23.92	$9.65	$17.70	$0.00	$51.27
2	70	$27.90	$9.65	$17.70	$0.00	$55.25
3	80	$31.89	$9.65	$17.70	$0.00	$59.24
4	90	$35.87	$9.65	$17.70	$0.00	$63.22

Effective Date - 06/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$24.75	$9.65	$17.70	$0.00	$52.10
2	70	$28.88	$9.65	$17.70	$0.00	$56.23
3	80	$33.00	$9.65	$17.70	$0.00	$60.35
4	90	$37.13	$9.65	$17.70	$0.00	$64.48

Notes:

Apprentice to Journeyworker Ratio:1:5

LABORER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2024	$39.86	$9.65	$17.80	$0.00	$67.31
	06/01/2025	$41.25	$9.65	$17.80	$0.00	$68.70
	12/01/2025	$42.63	$9.65	$17.80	$0.00	$70.08
	06/01/2026	$44.07	$9.65	$17.80	$0.00	$71.52
	12/01/2026	$45.51	$9.65	$17.80	$0.00	$72.96

Apprentice - *LABORER (Heavy & Highway) - Zone 2*

Effective Date - 12/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$23.92	$9.65	$17.80	$0.00	$51.37
2	70	$27.90	$9.65	$17.80	$0.00	$55.35
3	80	$31.89	$9.65	$17.80	$0.00	$59.34
4	90	$35.87	$9.65	$17.80	$0.00	$63.32

Effective Date - 06/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$24.75	$9.65	$17.80	$0.00	$52.20
2	70	$28.88	$9.65	$17.80	$0.00	$56.33
3	80	$33.00	$9.65	$17.80	$0.00	$60.45
4	90	$37.13	$9.65	$17.80	$0.00	$64.58

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: CARPENTER TENDER *LABORERS - ZONE 2*	12/01/2024	$39.86	$9.65	$17.70	$0.00	$67.21
	06/01/2025	$41.25	$9.65	$17.70	$0.00	$68.60
	12/01/2025	$42.63	$9.65	$17.70	$0.00	$69.98
	06/01/2026	$44.07	$9.65	$17.70	$0.00	$71.42
	12/01/2026	$45.51	$9.65	$17.70	$0.00	$72.86
	06/01/2027	$46.96	$9.65	$17.70	$0.00	$74.31
	12/01/2027	$48.41	$9.65	$17.70	$0.00	$75.76
	06/01/2028	$49.91	$9.65	$17.70	$0.00	$77.26
	12/01/2028	$51.41	$9.65	$17.70	$0.00	$78.76
For apprentice rates see "Apprentice- LABORER"						
LABORER: CEMENT FINISHER TENDER *LABORERS - ZONE 2*	12/01/2024	$39.86	$9.65	$17.70	$0.00	$67.21
	06/01/2025	$41.25	$9.65	$17.70	$0.00	$68.60
	12/01/2025	$42.63	$9.65	$17.70	$0.00	$69.98
	06/01/2026	$44.07	$9.65	$17.70	$0.00	$71.42
	12/01/2026	$45.51	$9.65	$17.70	$0.00	$72.86
	06/01/2027	$46.96	$9.65	$17.70	$0.00	$74.31
	12/01/2027	$48.41	$9.65	$17.70	$0.00	$75.76
	06/01/2028	$49.91	$9.65	$17.70	$0.00	$77.26
	12/01/2028	$51.41	$9.65	$17.70	$0.00	$78.76
For apprentice rates see "Apprentice- LABORER"						
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER *LABORERS - ZONE 2*	12/02/2024	$39.95	$9.65	$17.76	$0.00	$67.36
	06/02/2025	$41.34	$9.65	$17.76	$0.00	$68.75
	12/01/2025	$42.72	$9.65	$17.76	$0.00	$70.13
	06/01/2026	$44.16	$9.65	$17.76	$0.00	$71.57
	12/07/2026	$45.60	$9.65	$17.76	$0.00	$73.01
	06/07/2027	$47.05	$9.65	$17.76	$0.00	$74.46
	12/06/2027	$48.50	$9.65	$17.76	$0.00	$75.91
	06/05/2028	$50.00	$9.65	$17.76	$0.00	$77.41
	12/04/2028	$51.50	$9.65	$17.76	$0.00	$78.91
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER *LABORERS - ZONE 2*	12/01/2024	$40.11	$9.65	$17.70	$0.00	$67.46
	06/01/2025	$41.50	$9.65	$17.70	$0.00	$68.85
	12/01/2025	$42.88	$9.65	$17.70	$0.00	$70.23
	06/01/2026	$44.32	$9.65	$17.70	$0.00	$71.67
	12/01/2026	$45.76	$9.65	$17.70	$0.00	$73.11
	06/01/2027	$47.21	$9.65	$17.70	$0.00	$74.56
	12/01/2027	$48.66	$9.65	$17.70	$0.00	$76.01
	06/01/2028	$50.16	$9.65	$17.70	$0.00	$77.51
	12/01/2028	$51.66	$9.65	$17.70	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2024	$40.11	$9.65	$17.80	$0.00	$67.56
	06/01/2025	$41.50	$9.65	$17.80	$0.00	$68.95
	12/01/2025	$42.88	$9.65	$17.80	$0.00	$70.33
	06/01/2026	$44.32	$9.65	$17.80	$0.00	$71.77
	12/01/2026	$45.76	$9.65	$17.80	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: MULTI-TRADE TENDER *LABORERS - ZONE 2*	12/01/2024	$39.86	$9.65	$17.70	$0.00	$67.21
	06/01/2025	$41.25	$9.65	$17.70	$0.00	$68.60
	12/01/2025	$42.63	$9.65	$17.70	$0.00	$69.98
	06/01/2026	$44.07	$9.65	$17.70	$0.00	$71.42
	12/01/2026	$45.51	$9.65	$17.70	$0.00	$72.86
	06/01/2027	$46.96	$9.65	$17.70	$0.00	$74.31
	12/01/2027	$48.41	$9.65	$17.70	$0.00	$75.76
	06/01/2028	$49.91	$9.65	$17.70	$0.00	$77.26
	12/01/2028	$51.41	$9.65	$17.70	$0.00	$78.76
For apprentice rates see "Apprentice- LABORER"						
LABORER: TREE REMOVER *LABORERS - ZONE 2*	12/01/2024	$39.86	$9.65	$17.70	$0.00	$67.21
	06/01/2025	$41.25	$9.65	$17.70	$0.00	$68.60
	12/01/2025	$42.63	$9.65	$17.70	$0.00	$69.98
	06/01/2026	$44.07	$9.65	$17.70	$0.00	$71.42
	12/01/2026	$45.51	$9.65	$17.70	$0.00	$72.86
	06/01/2027	$46.96	$9.65	$17.70	$0.00	$74.31
	12/01/2027	$48.41	$9.65	$17.70	$0.00	$75.76
	06/01/2028	$49.91	$9.65	$17.70	$0.00	$77.26
	12/01/2028	$51.41	$9.65	$17.70	$0.00	$78.76
This classification applies to the removal of standing trees, and the trimming and removal of branches and limbs when related to public works construction or site clearance incidental to construction . For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR *LABORERS - ZONE 2*	12/01/2024	$40.11	$9.65	$17.70	$0.00	$67.46
	06/01/2025	$41.50	$9.65	$17.70	$0.00	$68.85
	12/01/2025	$42.88	$9.65	$17.70	$0.00	$70.23
	06/01/2026	$44.32	$9.65	$17.70	$0.00	$71.67
	12/01/2026	$45.76	$9.65	$17.70	$0.00	$73.11
	06/01/2027	$47.21	$9.65	$17.70	$0.00	$74.56
	12/01/2027	$48.66	$9.65	$17.70	$0.00	$76.01
	06/01/2028	$50.16	$9.65	$17.70	$0.00	$77.51
	12/01/2028	$51.66	$9.65	$17.70	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2024	$40.11	$9.65	$17.80	$0.00	$67.56
	06/01/2025	$41.50	$9.65	$17.80	$0.00	$68.95
	12/01/2025	$42.88	$9.65	$17.80	$0.00	$70.33
	06/01/2026	$44.32	$9.65	$17.80	$0.00	$71.77
	12/01/2026	$45.76	$9.65	$17.80	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
MARBLE & TILE FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2025	$50.36	$11.49	$21.62	$0.00	$83.47
	08/01/2025	$52.08	$11.49	$21.62	$0.00	$85.19
	02/01/2026	$53.16	$11.49	$21.62	$0.00	$86.27
	08/01/2026	$54.92	$11.49	$21.62	$0.00	$88.03
	02/01/2027	$56.04	$11.49	$21.62	$0.00	$89.15

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *MARBLE & TILE FINISHER - Local 3 Marble & Tile*

Effective Date - 02/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.18	$11.49	$21.62	$0.00	$58.29
2	60	$30.22	$11.49	$21.62	$0.00	$63.33
3	70	$35.25	$11.49	$21.62	$0.00	$68.36
4	80	$40.29	$11.49	$21.62	$0.00	$73.40
5	90	$45.32	$11.49	$21.62	$0.00	$78.43

Effective Date - 08/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.04	$11.49	$21.62	$0.00	$59.15
2	60	$31.25	$11.49	$21.62	$0.00	$64.36
3	70	$36.46	$11.49	$21.62	$0.00	$69.57
4	80	$41.66	$11.49	$21.62	$0.00	$74.77
5	90	$46.87	$11.49	$21.62	$0.00	$79.98

Notes:

Apprentice to Journeyworker Ratio:1:3

MARBLE MASONS,TILELAYERS & TERRAZZO MECH *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2025	$65.82	$11.49	$23.56	$0.00	$100.87
	08/01/2025	$67.97	$11.49	$23.56	$0.00	$103.02
	02/01/2026	$69.32	$11.49	$23.56	$0.00	$104.37
	08/01/2026	$71.52	$11.49	$23.56	$0.00	$106.57
	02/01/2027	$72.92	$11.49	$23.56	$0.00	$107.97

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *MARBLE-TILE-TERRAZZO MECHANIC - Local 3 Marble & Tile*

Effective Date - 02/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$32.91	$11.49	$23.56	$0.00	$67.96
2	60	$39.49	$11.49	$23.56	$0.00	$74.54
3	70	$46.07	$11.49	$23.56	$0.00	$81.12
4	80	$52.66	$11.49	$23.56	$0.00	$87.71
5	90	$59.24	$11.49	$23.56	$0.00	$94.29

Effective Date - 08/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$33.99	$11.49	$23.56	$0.00	$69.04
2	60	$40.78	$11.49	$23.56	$0.00	$75.83
3	70	$47.58	$11.49	$23.56	$0.00	$82.63
4	80	$54.38	$11.49	$23.56	$0.00	$89.43
5	90	$61.17	$11.49	$23.56	$0.00	$96.22

Notes:

Apprentice to Journeyworker Ratio:1:5

MECH. SWEEPER OPERATOR (ON CONST. SITES) *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$56.40	$15.55	$16.50	$0.00	$88.45
	06/01/2025	$57.68	$15.55	$16.50	$0.00	$89.73
	12/01/2025	$59.12	$15.55	$16.50	$0.00	$91.17
	06/01/2026	$60.40	$15.55	$16.50	$0.00	$92.45
	12/01/2026	$61.84	$15.55	$16.50	$0.00	$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MECHANICS MAINTENANCE *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$56.40	$15.55	$16.50	$0.00	$88.45
	06/01/2025	$57.68	$15.55	$16.50	$0.00	$89.73
	12/01/2025	$59.12	$15.55	$16.50	$0.00	$91.17
	06/01/2026	$60.40	$15.55	$16.50	$0.00	$92.45
	12/01/2026	$61.84	$15.55	$16.50	$0.00	$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MILLWRIGHT (Zone 2) *MILLWRIGHTS LOCAL 1121 - Zone 2*	01/06/2025	$45.09	$10.08	$21.47	$0.00	$76.64
	01/05/2026	$47.42	$10.08	$21.47	$0.00	$78.97

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *MILLWRIGHT - Local 1121 Zone 2*

Effective Date - 01/06/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$24.80	$10.08	$5.50	$0.00	$40.38
2	65	$29.31	$10.08	$6.50	$0.00	$45.89
3	75	$33.82	$10.08	$18.97	$0.00	$62.87
4	85	$38.33	$10.08	$19.97	$0.00	$68.38

Effective Date - 01/05/2026

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$26.08	$10.08	$5.50	$0.00	$41.66
2	65	$30.82	$10.08	$6.50	$0.00	$47.40
3	75	$35.57	$10.08	$18.97	$0.00	$64.62
4	85	$40.31	$10.08	$19.97	$0.00	$70.36

Notes: Step 1&2 Appr. indentured after 1/6/2020 receive no pension, but do receive annuity. (Step 1 $5.72, Step 2 $6.66)
Steps are 2,000 hours

Apprentice to Journeyworker Ratio:1:4

MORTAR MIXER *LABORERS - ZONE 2*	12/01/2024	$40.11	$9.65	$17.70	$0.00	$67.46
	06/01/2025	$41.50	$9.65	$17.70	$0.00	$68.85
	12/01/2025	$42.88	$9.65	$17.70	$0.00	$70.23
	06/01/2026	$44.32	$9.65	$17.70	$0.00	$71.67
	12/01/2026	$45.76	$9.65	$17.70	$0.00	$73.11
	06/01/2027	$47.21	$9.65	$17.70	$0.00	$74.56
	12/01/2027	$48.66	$9.65	$17.70	$0.00	$76.01
	06/01/2028	$50.16	$9.65	$17.70	$0.00	$77.51
	12/01/2028	$51.66	$9.65	$17.70	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"						
OILER (OTHER THAN TRUCK CRANES,GRADALLS) *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$25.37	$15.30	$16.40	$0.00	$57.07
	06/01/2025	$25.97	$15.30	$16.40	$0.00	$57.67
	12/01/2025	$26.63	$15.30	$16.40	$0.00	$58.33
	06/01/2026	$27.22	$15.30	$16.40	$0.00	$58.92
	12/01/2026	$27.89	$15.30	$16.40	$0.00	$59.59
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OILER (TRUCK CRANES, GRADALLS) *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$31.08	$15.30	$16.40	$0.00	$62.78
	06/01/2025	$31.80	$15.30	$16.40	$0.00	$63.50
	12/01/2025	$32.60	$15.30	$16.40	$0.00	$64.30
	06/01/2026	$33.32	$15.30	$16.40	$0.00	$65.02
	12/01/2026	$34.12	$15.30	$16.40	$0.00	$65.82
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
OTHER POWER DRIVEN EQUIPMENT - CLASS II *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$56.40	$15.55	$16.50	$0.00	$88.45
	06/01/2025	$57.68	$15.55	$16.50	$0.00	$89.73
	12/01/2025	$59.12	$15.55	$16.50	$0.00	$91.17
	06/01/2026	$60.40	$15.55	$16.50	$0.00	$92.45
	12/01/2026	$61.84	$15.55	$16.50	$0.00	$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PAINTER (BRIDGES/TANKS) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2025	$58.46	$9.95	$23.95	$0.00	$92.36

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$29.23	$9.95	$0.00	$0.00	$39.18
2	55	$32.15	$9.95	$6.66	$0.00	$48.76
3	60	$35.08	$9.95	$7.26	$0.00	$52.29
4	65	$38.00	$9.95	$7.87	$0.00	$55.82
5	70	$40.92	$9.95	$20.32	$0.00	$71.19
6	75	$43.85	$9.95	$20.93	$0.00	$74.73
7	80	$46.77	$9.95	$21.53	$0.00	$78.25
8	90	$52.61	$9.95	$22.74	$0.00	$85.30

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, NEW) * * If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 2*	01/01/2025	$49.36	$9.95	$23.95	$0.00	$83.26

Apprentice - *PAINTER Local 35 Zone 2 - Spray/Sandblast - New*

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.68	$9.95	$0.00	$0.00	$34.63
2	55	$27.15	$9.95	$6.66	$0.00	$43.76
3	60	$29.62	$9.95	$7.26	$0.00	$46.83
4	65	$32.08	$9.95	$7.87	$0.00	$49.90
5	70	$34.55	$9.95	$20.32	$0.00	$64.82
6	75	$37.02	$9.95	$20.93	$0.00	$67.90
7	80	$39.49	$9.95	$21.53	$0.00	$70.97
8	90	$44.42	$9.95	$22.74	$0.00	$77.11

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PAINTER (SPRAY OR SANDBLAST, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2025	$47.42	$9.95	$23.95	$0.00	$81.32

Apprentice - *PAINTER Local 35 Zone 2 - Spray/Sandblast - Repaint*

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.71	$9.95	$0.00	$0.00	$33.66
2	55	$26.08	$9.95	$6.66	$0.00	$42.69
3	60	$28.45	$9.95	$7.26	$0.00	$45.66
4	65	$30.82	$9.95	$7.87	$0.00	$48.64
5	70	$33.19	$9.95	$20.32	$0.00	$63.46
6	75	$35.57	$9.95	$20.93	$0.00	$66.45
7	80	$37.94	$9.95	$21.53	$0.00	$69.42
8	90	$42.68	$9.95	$22.74	$0.00	$75.37

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, NEW) * * If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 2*	01/01/2025	$47.96	$9.95	$23.95	$0.00	$81.86

Apprentice - *PAINTER - Local 35 Zone 2 - BRUSH NEW*

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.98	$9.95	$0.00	$0.00	$33.93
2	55	$26.38	$9.95	$6.66	$0.00	$42.99
3	60	$28.78	$9.95	$7.26	$0.00	$45.99
4	65	$31.17	$9.95	$7.87	$0.00	$48.99
5	70	$33.57	$9.95	$20.32	$0.00	$63.84
6	75	$35.97	$9.95	$20.93	$0.00	$66.85
7	80	$38.37	$9.95	$21.53	$0.00	$69.85
8	90	$43.16	$9.95	$22.74	$0.00	$75.85

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2025	$46.02	$9.95	$23.95	$0.00	$79.92

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 Zone 2 - BRUSH REPAINT*

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.01	$9.95	$0.00	$0.00	$32.96
2	55	$25.31	$9.95	$6.66	$0.00	$41.92
3	60	$27.61	$9.95	$7.26	$0.00	$44.82
4	65	$29.91	$9.95	$7.87	$0.00	$47.73
5	70	$32.21	$9.95	$20.32	$0.00	$62.48
6	75	$34.52	$9.95	$20.93	$0.00	$65.40
7	80	$36.82	$9.95	$21.53	$0.00	$68.30
8	90	$41.42	$9.95	$22.74	$0.00	$74.11

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER TRAFFIC MARKINGS (HEAVY/HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2024	$39.86	$9.65	$17.80	$0.00	$67.31
	06/01/2025	$41.25	$9.65	$17.80	$0.00	$68.70
	12/01/2025	$42.63	$9.65	$17.80	$0.00	$70.08
	06/01/2026	$44.07	$9.65	$17.80	$0.00	$71.52
	12/01/2026	$45.51	$9.65	$17.80	$0.00	$72.96
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
PANEL & PICKUP TRUCKS DRIVER *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	01/01/2025	$39.78	$15.57	$20.17	$0.00	$75.52
	06/01/2025	$40.78	$15.57	$20.17	$0.00	$76.52
	12/01/2025	$40.78	$15.57	$21.78	$0.00	$78.13
	01/01/2026	$40.78	$16.17	$21.78	$0.00	$78.73
	06/01/2026	$41.78	$16.17	$21.78	$0.00	$79.73
	12/01/2026	$41.78	$16.17	$23.52	$0.00	$81.47
	01/01/2027	$41.78	$16.77	$23.52	$0.00	$82.07
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2024	$51.97	$10.08	$24.29	$0.00	$86.34
For apprentice rates see "Apprentice- PILE DRIVER"						
PILE DRIVER *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2024	$51.97	$10.08	$24.29	$0.00	$86.34

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PILE DRIVER - Local 56 Zone 2*

Effective Date - 08/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$23.39	$10.08	$2.53	$0.00	$36.00
2	55	$28.58	$10.08	$5.07	$0.00	$43.73
3	70	$36.38	$10.08	$19.22	$0.00	$65.68
4	80	$41.58	$10.08	$21.76	$0.00	$73.42

Notes:

% Indentured BEFORE 8/1/2020, 50/60/70/75/80/80/90/90

Step 1 $60.36/2 $65.75/3 $70.75/4 $73.35/5&6 $75.95/7&8 81.14

Apprentice to Journeyworker Ratio:1:5

PIPELAYER *LABORERS - ZONE 2*	12/01/2024	$40.11	$9.65	$17.70	$0.00	$67.46
	06/01/2025	$41.50	$9.65	$17.70	$0.00	$68.85
	12/01/2025	$42.88	$9.65	$17.70	$0.00	$70.23
	06/01/2026	$44.32	$9.65	$17.70	$0.00	$71.67
	12/01/2026	$45.76	$9.65	$17.70	$0.00	$73.11
	06/01/2027	$47.21	$9.65	$17.70	$0.00	$74.56
	12/01/2027	$48.66	$9.65	$17.70	$0.00	$76.01
	06/01/2028	$50.16	$9.65	$17.70	$0.00	$77.51
	12/01/2028	$51.66	$9.65	$17.70	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"						
PIPELAYER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2024	$40.11	$9.65	$17.80	$0.00	$67.56
	06/01/2025	$41.50	$9.65	$17.80	$0.00	$68.95
	12/01/2025	$42.88	$9.65	$17.80	$0.00	$70.33
	06/01/2026	$44.32	$9.65	$17.80	$0.00	$71.77
	12/01/2026	$45.76	$9.65	$17.80	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
PLUMBER & PIPEFITTER *PLUMBERS LOCAL 4*	09/01/2024	$55.00	$9.90	$17.77	$0.00	$82.67
	03/01/2025	$56.40	$9.90	$17.77	$0.00	$84.07
	09/01/2025	$57.80	$9.90	$17.77	$0.00	$85.47
	03/01/2026	$59.20	$9.90	$17.77	$0.00	$86.87

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PLUMBER/PIPEFITTER - Local 4*

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$22.00	$9.90	$0.00	$0.00	$31.90
2	50	$27.50	$9.90	$0.00	$0.00	$37.40
3	60	$33.00	$9.90	$0.00	$0.00	$42.90
4	70	$38.50	$9.90	$8.06	$0.00	$56.46
5	80	$44.00	$9.90	$8.06	$0.00	$61.96

Effective Date - 03/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$22.56	$9.90	$0.00	$0.00	$32.46
2	50	$28.20	$9.90	$0.00	$0.00	$38.10
3	60	$33.84	$9.90	$0.00	$0.00	$43.74
4	70	$39.48	$9.90	$8.06	$0.00	$57.44
5	80	$45.12	$9.90	$8.06	$0.00	$63.08

Notes:
Steps - 2000 hrs; Step 4 w/lic 75%, Step 5 w/lic 85%
Step 4 w/lic $52.59, Step 5 w/lic $57.44

Apprentice to Journeyworker Ratio:1:3

PNEUMATIC CONTROLS (TEMP.) *PLUMBERS LOCAL 4*	09/01/2024	$55.00	$9.90	$17.77	$0.00	$82.67
	03/01/2025	$56.40	$9.90	$17.77	$0.00	$84.07
	09/01/2025	$57.80	$9.90	$17.77	$0.00	$85.47
	03/01/2026	$59.20	$9.90	$17.77	$0.00	$86.87
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
PNEUMATIC DRILL/TOOL OPERATOR *LABORERS - ZONE 2*	12/01/2024	$40.61	$9.65	$17.70	$0.00	$67.96
	06/01/2025	$42.00	$9.65	$17.70	$0.00	$69.35
	12/01/2025	$43.38	$9.65	$17.70	$0.00	$70.73
	06/01/2026	$44.82	$9.65	$17.70	$0.00	$72.17
	12/01/2026	$46.26	$9.65	$17.70	$0.00	$73.61
	06/01/2027	$47.71	$9.65	$17.70	$0.00	$75.06
	12/01/2027	$49.16	$9.65	$17.70	$0.00	$76.51
	06/01/2028	$50.66	$9.65	$17.70	$0.00	$78.01
	12/01/2028	$52.16	$9.65	$17.70	$0.00	$79.51
For apprentice rates see "Apprentice- LABORER"						
PNEUMATIC DRILL/TOOL OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2024	$40.11	$9.65	$17.80	$0.00	$67.56
	06/01/2025	$41.50	$9.65	$17.80	$0.00	$68.95
	12/01/2025	$42.88	$9.65	$17.80	$0.00	$70.33
	06/01/2026	$44.32	$9.65	$17.80	$0.00	$71.77
	12/01/2026	$45.76	$9.65	$17.80	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
POWDERMAN & BLASTER *LABORERS - ZONE 2*	12/01/2024	$40.86	$9.65	$17.70	$0.00	$68.21
	06/01/2025	$42.25	$9.65	$17.70	$0.00	$69.60
	12/01/2025	$43.63	$9.65	$17.70	$0.00	$70.98
	06/01/2026	$45.07	$9.65	$17.70	$0.00	$72.42
	12/01/2026	$46.51	$9.65	$17.70	$0.00	$73.86
	06/01/2027	$47.96	$9.65	$17.70	$0.00	$75.31
	12/01/2027	$49.41	$9.65	$17.70	$0.00	$76.76
	06/01/2028	$50.91	$9.65	$17.70	$0.00	$78.26
	12/01/2028	$52.41	$9.65	$17.70	$0.00	$79.76
For apprentice rates see "Apprentice- LABORER"						
POWDERMAN & BLASTER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2024	$40.86	$9.40	$17.55	$0.00	$67.81
	06/01/2025	$42.25	$9.40	$17.55	$0.00	$69.20
	12/01/2025	$43.63	$9.40	$17.55	$0.00	$70.58
	06/01/2026	$45.07	$9.40	$17.55	$0.00	$72.02
	12/01/2026	$46.51	$9.40	$17.55	$0.00	$73.46
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
POWER SHOVEL/DERRICK/TRENCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$57.03	$15.55	$16.50	$0.00	$89.08
	06/01/2025	$58.33	$15.55	$16.50	$0.00	$90.38
	12/01/2025	$59.78	$15.55	$16.50	$0.00	$91.83
	06/01/2026	$61.08	$15.55	$16.50	$0.00	$93.13
	12/01/2026	$62.53	$15.55	$16.50	$0.00	$94.58
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (CONCRETE) *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$56.40	$15.55	$16.50	$0.00	$88.45
	06/01/2025	$57.68	$15.55	$16.50	$0.00	$89.73
	12/01/2025	$59.12	$15.55	$16.50	$0.00	$91.17
	06/01/2026	$60.40	$15.55	$16.50	$0.00	$92.45
	12/01/2026	$61.84	$15.55	$16.50	$0.00	$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER) *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$36.67	$15.55	$16.50	$0.00	$68.72
	06/01/2025	$37.52	$15.55	$16.50	$0.00	$69.57
	12/01/2025	$38.47	$15.55	$16.50	$0.00	$70.52
	06/01/2026	$39.33	$15.55	$16.50	$0.00	$71.38
	12/01/2026	$40.28	$15.55	$16.50	$0.00	$72.33
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
READY-MIX CONCRETE DRIVER *TEAMSTERS 170 - J.G. MacLellan (Lowell)*	01/01/2025	$30.00	$11.57	$6.55	$0.00	$48.12
	05/01/2025	$30.50	$11.57	$6.65	$0.00	$48.72
	01/01/2026	$30.50	$11.97	$6.65	$0.00	$49.12
RECLAIMERS *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$56.40	$15.55	$16.50	$0.00	$88.45
	06/01/2025	$57.68	$15.55	$16.50	$0.00	$89.73
	12/01/2025	$59.12	$15.55	$16.50	$0.00	$91.17
	06/01/2026	$60.40	$15.55	$16.50	$0.00	$92.45
	12/01/2026	$61.84	$15.55	$16.50	$0.00	$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
RIDE-ON MOTORIZED BUGGY OPERATOR *LABORERS - ZONE 2*	12/01/2024	$40.11	$9.65	$17.70	$0.00	$67.46
	06/01/2025	$41.50	$9.65	$17.70	$0.00	$68.85
	12/01/2025	$42.88	$9.65	$17.70	$0.00	$70.23
	06/01/2026	$44.32	$9.65	$17.70	$0.00	$71.67
	12/01/2026	$45.76	$9.65	$17.70	$0.00	$73.11
	06/01/2027	$47.21	$9.65	$17.70	$0.00	$74.56
	12/01/2027	$48.66	$9.65	$17.70	$0.00	$76.01
	06/01/2028	$50.16	$9.65	$17.70	$0.00	$77.51
	12/01/2028	$51.66	$9.65	$17.70	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"						
ROLLER/SPREADER/MULCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$56.40	$15.55	$16.50	$0.00	$88.45
	06/01/2025	$57.68	$15.55	$16.50	$0.00	$89.73
	12/01/2025	$59.12	$15.55	$16.50	$0.00	$91.17
	06/01/2026	$60.40	$15.55	$16.50	$0.00	$92.45
	12/01/2026	$61.84	$15.55	$16.50	$0.00	$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
ROOFER (Inc.Roofer Waterproofng &Roofer Damproofg) *ROOFERS LOCAL 33*	02/01/2025	$52.28	$13.03	$21.70	$0.00	$87.01
	08/01/2025	$53.78	$13.03	$21.70	$0.00	$88.51
	02/01/2026	$55.03	$13.03	$21.70	$0.00	$89.76

Apprentice - *ROOFER - Local 33*

Effective Date - 02/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.14	$13.03	$15.55	$0.00	$54.72
2	60	$31.37	$13.03	$21.70	$0.00	$66.10
3	65	$33.98	$13.03	$21.70	$0.00	$68.71
4	75	$39.21	$13.03	$21.70	$0.00	$73.94
5	85	$44.44	$13.03	$21.70	$0.00	$79.17

Effective Date - 08/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.89	$13.03	$15.55	$0.00	$55.47
2	60	$32.27	$13.03	$21.70	$0.00	$67.00
3	65	$34.96	$13.03	$21.70	$0.00	$69.69
4	75	$40.34	$13.03	$21.70	$0.00	$75.07
5	85	$45.71	$13.03	$21.70	$0.00	$80.44

Notes: ** 1:5, 2:6-10, the 1:10; Reroofing: 1:4, then 1:1
Step 1 is 2000 hrs.; Steps 2-5 are 1000 hrs.
(Hot Pitch Mechanics' receive $1.00 hr. above ROOFER)

Apprentice to Journeyworker Ratio:**

ROOFER SLATE / TILE / PRECAST CONCRETE *ROOFERS LOCAL 33*	02/01/2025	$52.53	$13.03	$21.70	$0.00	$87.26
	08/01/2025	$54.03	$13.03	$21.70	$0.00	$88.76
	02/01/2026	$55.28	$13.03	$21.70	$0.00	$90.01
For apprentice rates see "Apprentice- ROOFER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
SHEETMETAL WORKER *SHEETMETAL WORKERS LOCAL 17 - A*	02/01/2025	$59.69	$14.75	$28.12	$2.98	$105.54
	08/01/2025	$61.54	$14.75	$28.12	$2.98	$107.39
	02/01/2026	$63.49	$14.75	$28.12	$2.98	$109.34

Apprentice - *SHEET METAL WORKER - Local 17-A*

Effective Date - 02/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	42	$25.07	$14.75	$6.13	$0.00	$45.95
2	42	$25.07	$14.75	$6.13	$0.00	$45.95
3	47	$28.05	$14.75	$12.11	$1.62	$56.53
4	47	$28.05	$14.75	$12.11	$1.62	$56.53
5	52	$31.04	$14.75	$13.09	$1.74	$60.62
6	52	$31.04	$14.75	$13.34	$1.75	$60.88
7	60	$35.81	$14.75	$14.75	$1.93	$67.24
8	65	$38.80	$14.75	$15.73	$2.04	$71.32
9	75	$44.77	$14.75	$17.69	$2.28	$79.49
10	85	$50.74	$14.75	$19.15	$2.49	$87.13

Effective Date - 08/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	42	$25.85	$14.75	$6.13	$0.00	$46.73
2	42	$25.85	$14.75	$6.13	$0.00	$46.73
3	47	$28.92	$14.75	$12.11	$1.62	$57.40
4	47	$28.92	$14.75	$12.11	$1.62	$57.40
5	52	$32.00	$14.75	$13.09	$1.74	$61.58
6	52	$32.00	$14.75	$13.34	$1.75	$61.84
7	60	$36.92	$14.75	$14.75	$1.93	$68.35
8	65	$40.00	$14.75	$15.73	$2.04	$72.52
9	75	$46.16	$14.75	$17.69	$2.28	$80.88
10	85	$52.31	$14.75	$19.15	$2.49	$88.70

Notes:
Steps are 6 mos.

Apprentice to Journeyworker Ratio:1:4

SPECIALIZED EARTH MOVING EQUIP < 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	01/01/2025	$40.24	$15.57	$20.17	$0.00	$75.98
	06/01/2025	$41.24	$15.57	$20.17	$0.00	$76.98
	12/01/2025	$41.24	$15.57	$21.78	$0.00	$78.59
	01/01/2026	$41.24	$16.17	$21.78	$0.00	$79.19
	06/01/2026	$42.24	$16.17	$21.78	$0.00	$80.19
	12/01/2026	$42.24	$16.17	$23.52	$0.00	$81.93
	01/01/2027	$42.24	$16.77	$23.52	$0.00	$82.53

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
SPECIALIZED EARTH MOVING EQUIP > 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	01/01/2025	$40.53	$15.57	$20.17	$0.00	$76.27
	06/01/2025	$41.53	$15.57	$20.17	$0.00	$77.27
	12/01/2025	$41.53	$15.57	$21.78	$0.00	$78.88
	01/01/2026	$41.53	$16.17	$21.78	$0.00	$79.48
	06/01/2026	$42.53	$16.17	$21.78	$0.00	$80.48
	12/01/2026	$42.53	$16.17	$23.52	$0.00	$82.22
	01/01/2027	$42.53	$16.77	$23.52	$0.00	$82.82
SPRINKLER FITTER *SPRINKLER FITTERS LOCAL 550 - (Section A) Zone 1*	10/01/2024	$70.34	$11.51	$23.80	$0.00	$105.65
	03/01/2025	$72.14	$11.51	$23.80	$0.00	$107.45

Apprentice - *SPRINKLER FITTER - Local 550 (Section A) Zone 1*

Effective Date - 10/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$24.62	$11.51	$13.07	$0.00	$49.20
2	40	$28.14	$11.51	$13.90	$0.00	$53.55
3	45	$31.65	$11.51	$14.73	$0.00	$57.89
4	50	$35.17	$11.51	$15.55	$0.00	$62.23
5	55	$38.69	$11.51	$16.37	$0.00	$66.57
6	60	$42.20	$11.51	$17.20	$0.00	$70.91
7	65	$45.72	$11.51	$18.03	$0.00	$75.26
8	70	$49.24	$11.51	$18.85	$0.00	$79.60
9	75	$52.76	$11.51	$19.67	$0.00	$83.94
10	80	$56.27	$11.51	$20.50	$0.00	$88.28

Effective Date - 03/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$25.25	$11.51	$13.07	$0.00	$49.83
2	40	$28.86	$11.51	$13.90	$0.00	$54.27
3	45	$32.46	$11.51	$14.73	$0.00	$58.70
4	50	$36.07	$11.51	$15.55	$0.00	$63.13
5	55	$39.68	$11.51	$16.37	$0.00	$67.56
6	60	$43.28	$11.51	$17.20	$0.00	$71.99
7	65	$46.89	$11.51	$18.03	$0.00	$76.43
8	70	$50.50	$11.51	$18.85	$0.00	$80.86
9	75	$54.11	$11.51	$19.67	$0.00	$85.29
10	80	$57.71	$11.51	$20.50	$0.00	$89.72

Notes: Apprentice entered prior 9/30/10:
40/45/50/55/60/65/70/75/80/85
Steps are 850 hours

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
STEAM BOILER OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$56.40	$15.55	$16.50	$0.00	$88.45
	06/01/2025	$57.68	$15.55	$16.50	$0.00	$89.73
	12/01/2025	$59.12	$15.55	$16.50	$0.00	$91.17
	06/01/2026	$60.40	$15.55	$16.50	$0.00	$92.45
	12/01/2026	$61.84	$15.55	$16.50	$0.00	$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$56.40	$15.55	$16.50	$0.00	$88.45
	06/01/2025	$57.68	$15.55	$16.50	$0.00	$89.73
	12/01/2025	$59.12	$15.55	$16.50	$0.00	$91.17
	06/01/2026	$60.40	$15.55	$16.50	$0.00	$92.45
	12/01/2026	$61.84	$15.55	$16.50	$0.00	$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TERRAZZO FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2025	$64.74	$11.49	$23.59	$0.00	$99.82
	08/01/2025	$66.89	$11.49	$23.59	$0.00	$101.97
	02/01/2026	$68.24	$11.49	$23.59	$0.00	$103.32
	08/01/2026	$70.44	$11.49	$23.59	$0.00	$105.52
	02/01/2027	$71.84	$11.49	$23.59	$0.00	$106.92

Apprentice - *TERRAZZO FINISHER - Local 3 Marble & Tile*

Effective Date - 02/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$32.37	$11.49	$23.59	$0.00	$67.45
2	60	$38.84	$11.49	$23.59	$0.00	$73.92
3	70	$45.32	$11.49	$23.59	$0.00	$80.40
4	80	$51.79	$11.49	$23.59	$0.00	$86.87
5	90	$58.27	$11.49	$23.59	$0.00	$93.35

Effective Date - 08/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$33.45	$11.49	$23.59	$0.00	$68.53
2	60	$40.13	$11.49	$23.59	$0.00	$75.21
3	70	$46.82	$11.49	$23.59	$0.00	$81.90
4	80	$53.51	$11.49	$23.59	$0.00	$88.59
5	90	$60.20	$11.49	$23.59	$0.00	$95.28

Notes:

Apprentice to Journeyworker Ratio:1:3

TEST BORING DRILLER *LABORERS - FOUNDATION AND MARINE*	12/01/2024	$51.28	$9.65	$18.22	$0.00	$79.15
	06/01/2025	$52.78	$9.65	$18.22	$0.00	$80.65
	12/01/2025	$54.28	$9.65	$18.22	$0.00	$82.15
	06/01/2026	$55.83	$9.65	$18.22	$0.00	$83.70
	12/01/2026	$57.33	$9.65	$18.22	$0.00	$85.20
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TEST BORING DRILLER HELPER *LABORERS - FOUNDATION AND MARINE*	12/01/2024	$47.07	$9.65	$18.22	$0.00	$74.94
	06/01/2025	$48.57	$9.65	$18.22	$0.00	$76.44
	12/01/2025	$50.07	$9.65	$18.22	$0.00	$77.94
	06/01/2026	$51.62	$9.65	$18.22	$0.00	$79.49
	12/01/2026	$53.12	$9.65	$18.22	$0.00	$80.99
For apprentice rates see "Apprentice- LABORER"						
TEST BORING LABORER *LABORERS - FOUNDATION AND MARINE*	12/01/2024	$46.95	$9.65	$18.22	$0.00	$74.82
	06/01/2025	$48.45	$9.65	$18.22	$0.00	$76.32
	12/01/2025	$49.95	$9.65	$18.22	$0.00	$77.82
	06/01/2026	$51.50	$9.65	$18.22	$0.00	$79.37
	12/01/2026	$53.00	$9.65	$18.22	$0.00	$80.87
For apprentice rates see "Apprentice- LABORER"						
TRACTORS/PORTABLE STEAM GENERATORS *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$56.40	$15.55	$16.50	$0.00	$88.45
	06/01/2025	$57.68	$15.55	$16.50	$0.00	$89.73
	12/01/2025	$59.12	$15.55	$16.50	$0.00	$91.17
	06/01/2026	$60.40	$15.55	$16.50	$0.00	$92.45
	12/01/2026	$61.84	$15.55	$16.50	$0.00	$93.89
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TRAILERS FOR EARTH MOVING EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	01/01/2025	$40.82	$15.57	$20.17	$0.00	$76.56
	06/01/2025	$41.82	$15.57	$20.17	$0.00	$77.56
	12/01/2025	$41.82	$15.57	$21.78	$0.00	$79.17
	01/01/2026	$41.82	$16.17	$21.78	$0.00	$79.77
	06/01/2026	$42.82	$16.17	$21.78	$0.00	$80.77
	12/01/2026	$42.82	$16.17	$23.52	$0.00	$82.51
	01/01/2027	$42.82	$16.77	$23.52	$0.00	$83.11
TUNNEL WORK - COMPRESSED AIR *LABORERS (COMPRESSED AIR)*	12/01/2024	$59.18	$9.65	$19.00	$0.00	$87.83
	06/01/2025	$60.68	$9.65	$19.00	$0.00	$89.33
	12/01/2025	$62.18	$9.65	$19.00	$0.00	$90.83
	06/01/2026	$63.73	$9.65	$19.00	$0.00	$92.38
	12/01/2026	$65.23	$9.65	$19.00	$0.00	$93.88
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) *LABORERS (COMPRESSED AIR)*	12/01/2024	$61.18	$9.65	$19.00	$0.00	$89.83
	06/01/2025	$62.68	$9.65	$19.00	$0.00	$91.33
	12/01/2025	$64.18	$9.65	$19.00	$0.00	$92.83
	06/01/2026	$65.73	$9.65	$19.00	$0.00	$94.38
	12/01/2026	$67.23	$9.65	$19.00	$0.00	$95.88
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR *LABORERS (FREE AIR TUNNEL)*	12/01/2024	$51.25	$9.65	$19.00	$0.00	$79.90
	06/01/2025	$52.75	$9.65	$19.00	$0.00	$81.40
	12/01/2025	$54.25	$9.65	$19.00	$0.00	$82.90
	06/01/2026	$55.80	$9.65	$19.00	$0.00	$84.45
	12/01/2026	$57.30	$9.65	$19.00	$0.00	$85.95
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TUNNEL WORK - FREE AIR (HAZ. WASTE) *LABORERS (FREE AIR TUNNEL)*	12/01/2024	$53.25	$9.65	$19.00	$0.00	$81.90
	06/01/2025	$54.75	$9.65	$19.00	$0.00	$83.40
	12/01/2025	$56.25	$9.65	$19.00	$0.00	$84.90
	06/01/2026	$57.80	$9.65	$19.00	$0.00	$86.45
	12/01/2026	$59.30	$9.65	$19.00	$0.00	$87.95
For apprentice rates see "Apprentice- LABORER"						
VAC-HAUL *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	01/01/2025	$40.24	$15.57	$20.17	$0.00	$75.98
	06/01/2025	$41.24	$15.57	$20.17	$0.00	$76.98
	12/01/2025	$41.24	$15.57	$21.78	$0.00	$78.59
	01/01/2026	$41.24	$16.17	$21.78	$0.00	$79.19
	06/01/2026	$42.24	$16.17	$21.78	$0.00	$80.19
	12/01/2026	$42.24	$16.17	$23.52	$0.00	$81.93
	01/01/2027	$42.24	$16.77	$23.52	$0.00	$82.53
VOICE-DATA-VIDEO TECHNICIAN *ELECTRICIANS LOCAL 96*	09/01/2024	$35.29	$13.99	$17.57	$0.00	$66.85
	09/07/2025	$36.12	$14.98	$17.91	$0.00	$69.01
	09/06/2026	$37.04	$15.96	$18.27	$0.00	$71.27

Apprentice - *VOICE-DATA-VIDEO TECHNICIAN - Local 96*

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$17.65	$13.99	$4.41	$0.00	$36.05
2	55	$19.41	$13.99	$4.46	$0.00	$37.86
3	60	$21.17	$13.99	$17.15	$0.00	$52.31
4	65	$22.94	$13.99	$17.20	$0.00	$54.13
5	70	$24.70	$13.99	$17.25	$0.00	$55.94
6	75	$26.47	$13.99	$17.30	$0.00	$57.76
7	80	$28.23	$13.99	$17.36	$0.00	$59.58
8	85	$30.00	$13.99	$17.41	$0.00	$61.40

Effective Date - 09/07/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$18.06	$14.98	$4.51	$0.00	$37.55
2	55	$19.87	$14.98	$4.57	$0.00	$39.42
3	60	$21.67	$14.98	$17.48	$0.00	$54.13
4	65	$23.48	$14.98	$17.53	$0.00	$55.99
5	70	$25.28	$14.98	$17.59	$0.00	$57.85
6	75	$27.09	$14.98	$17.64	$0.00	$59.71
7	80	$28.90	$14.98	$17.70	$0.00	$61.58
8	85	$30.70	$14.98	$17.75	$0.00	$63.43

Notes:

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
WAGON DRILL OPERATOR *LABORERS - ZONE 2*	12/01/2024	$40.61	$9.65	$17.70	$0.00	$67.96
	06/01/2025	$42.00	$9.65	$17.70	$0.00	$69.35
	12/01/2025	$43.38	$9.65	$17.70	$0.00	$70.73
	06/01/2026	$44.82	$9.65	$17.70	$0.00	$72.17
	12/01/2026	$46.26	$9.65	$17.70	$0.00	$73.61
	06/01/2027	$47.71	$9.65	$17.70	$0.00	$75.06
	12/01/2027	$49.16	$9.65	$17.70	$0.00	$76.51
	06/01/2028	$50.66	$9.65	$17.70	$0.00	$78.01
	12/01/2028	$52.16	$9.65	$17.70	$0.00	$79.51
For apprentice rates see "Apprentice- LABORER"						
WAGON DRILL OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2024	$40.11	$9.65	$17.80	$0.00	$67.56
	06/01/2025	$41.50	$9.65	$17.80	$0.00	$68.95
	12/01/2025	$42.88	$9.65	$17.80	$0.00	$70.33
	06/01/2026	$44.32	$9.65	$17.80	$0.00	$71.77
	12/01/2026	$45.76	$9.65	$17.80	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
WASTE WATER PUMP OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2024	$57.03	$15.55	$16.50	$0.00	$89.08
	06/01/2025	$58.33	$15.55	$16.50	$0.00	$90.38
	12/01/2025	$59.78	$15.55	$16.50	$0.00	$91.83
	06/01/2026	$61.08	$15.55	$16.50	$0.00	$93.13
	12/01/2026	$62.53	$15.55	$16.50	$0.00	$94.58
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
WATER METER INSTALLER *PLUMBERS LOCAL 4*	09/01/2024	$55.00	$9.90	$17.77	$0.00	$82.67
	03/01/2025	$56.40	$9.90	$17.77	$0.00	$84.07
	09/01/2025	$57.80	$9.90	$17.77	$0.00	$85.47
	03/01/2026	$59.20	$9.90	$17.77	$0.00	$86.87
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"						

Additional Apprentice Information:

All apprentices must be registered with the Division of Apprenticeship Training (DAS) in accordance with M.G.L. c. 23, §§ 11E-11L. Minimum wage rates for apprentices employed on public works projects are listed above as a percentage of the hourly prevailing wage rate established by the Commissioner under the provisions of M.G.L. c. 149, §§ 26-27D. Apprentice ratios are established by DAS pursuant to M.G.L. c. 23, §§ 11E-11L. Ratios are expressed as the allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified. The ratios listed herein have been taken from relevant private collective bargaining agreements (CBAs) and are provided for illustrative purposes only. They have not been independently verified as being accurate or continuing to be accurate. Parties having questions regarding what ratio to use should contact DAS.

APPENDIX D

HYDROLOGIC AND HYDRAULIC ANALYSIS FOR CULVERT UNDER WHITNEY ROAD TECHNICAL MEMORANDUM

TETRA TECH

MEMO

To:	Paul Berthiaume, PE, Manager of Structural Engineering, Howard Stein Hudson
Cc:	Steven Tyler, PE, Associate Principal, Howard Stein Hudson
From:	Elizabeth Parent, PE, Project Manager
Date:	November 10, 2022
Subject:	Hydrologic and Hydraulic Analysis for culvert under Whitney Road - Shirley, Massachusetts

Executive Summary

The culvert in question conveys an intermittent stream under Whitney Road and is located in the vicinity of 71 and 75 Whitney Road just east of the Lunenburg town line. The intermittent stream is tributary to Beaver Pond Brook, which flows northeast for 1.3 miles through one more crossing, under Route 2A, before reaching its confluence with the Mulpus Brook. Beaver Pond Brook becomes perennial downstream of Whitney Road. The reach of Beaver Pond Brook 0.2 miles upstream of the Route 2A crossing also marks the beginning of the FEMA Zone AE 100-year flood zone and regulatory floodway.

The headwater of the intermittent stream is a bordering vegetated wetland that is identified as BVW A in the wetland report and plans. BVW A is located on the south side of Whitney Road and has a contributing watershed of 0.1 square miles. There is no FEMA 100-year flood boundary or regulatory floodway defined for this tributary. Downstream of the culvert on the north side of Whitney Road, there is a defined channel with flagged bank boundary within a bordering vegetated wetland that is identified as BVW B in the wetland report and on the plans. The bankfull width was measured between the bank flags as surveyed.

The existing culvert at Whitney Road has partially collapsed and a new culvert has been designed that meets hydraulic design standards as well as the Massachusetts Stream Crossing standards to the maximum extent practicable.

Project Description

The existing culvert is a 36-inch diameter corrugated metal pipe that is approximately 45 feet long. The upstream opening and invert were not found due to the blockage and ponding on that side of Whitney Road. The length of the culvert was approximated using the topography to identify the likely culvert inlet location.

The culvert conveys an intermittent stream that is tributary to Beaver Pond Brook, with a bankfull width of 6 feet, under Whitney Road, which is classified as a local road. Land use in the contributing watershed consists of single family residential, open space, forest, pasture, and wetlands. At the crossing, there is a National Heritage Priority Habitat of Rare Species area that includes the Thompson, Laputka, and Morse Conservation Areas. The culvert is within the estimated and priority habitat area and connects the Thompson Conservation Area to the Laputka and Morse Conservation Areas.

Replacement of the culvert will result in temporary impacts to Bank and Land Under Water as defined under the Massachusetts Wetlands Protection Act 310 CMR 10.54 and 10.56, therefore, the culvert must be designed to meet the Stream Crossing Performance Standards. Site constraints prevent this freshwater stream crossing replacement from meeting all of the eligibility criteria set forth in 310 CMR 10.13(3) and 10.53(4)(e)(2), therefore, it does not qualify as an ecological restoration project. In accordance with 310 CMR 10.53(8)(a), the crossing has been designed to meet the Massachusetts Stream Crossing Standards to the maximum extent practicable.

Tetra Tech
Marlborough Technology Park, 100 Nickerson Road, Marlborough, MA 01752
Tel 508.786.2200 Fax 508.786.2201 tetratech.com

The proposed culvert is a 66-inch by 51-inch corrugated metal pipe arch with 60-inch equivalent diameter and 3-inch by 1-inch corrugation. The culvert will be embedded 15 inches with natural streambed material.

Data Collection

A field survey plan was prepared by A-Plus Construction Services Corporation in September 2022 and used for the basis of design. A wetland resource evaluation was prepared by EcoTec, Inc. in July 2022. The wetland report describes the wetland resources found at the site. EcoTec also sampled the streambed substrate and noted the following conditions: 0-2 inches of muck over 1-5 inches of gravelly sand over gravelly sand with 6-inch minus cobbles.

MassGIS LiDAR Terrain Data was used to delineate a drainage area for the culvert and aerial imagery was used to gather watershed characteristics for the hydrologic model.

Existing data is included in Attachment 1.

Engineering Methods

Hydrologic Analysis

The culvert crossing under Whitney Road is outside the limits of the NFIP study and the intermittent stream was not found on the USGS StreamStats application. Therefore, statistical peak flow discharges were calculated using the SCS TR-20 methodology in HydroCAD. The peak flow discharges are summarized in Table 1. The HydroCAD report is included in Attachment 2.

Table 1 – Contributing Watershed Peak Flows

Drainage Area (square miles)	2-Year Flood Peak Discharge (CFS)	5-Year Flood Peak Discharge (CFS)	10-Year Flood Peak Discharge (CFS)	25-Year Flood Peak Discharge (CFS)	50-Year Flood Peak Discharge (CFS)	100-Year Flood Peak Discharge (CFS)
0.1	25	44	62	87	106	128

In accordance with the MassDOT Project Development and Design Guide (PDDG) 2006, the 10-year (10% annual chance) peak discharge was used for design because Whitney Road is a local road. The 25-year, 50-year and 100-year peak discharges were used as check floods to analyze potential impacts to property and habitat upstream and downstream of the crossing as well as to the culvert and roadway embankment.

Hydraulic Analysis

The U.S. Department of Transportation, Federal Highway Administration (FHWA), HY-8 Culvert Analysis Program, Version 7.60 was used to perform the hydraulic calculations. The hydraulic model was created using input data from the hydrologic analysis, ground survey, and proposed culvert design. The tailwater data was defined using the downstream channel geometry.

Hydraulic results for the existing culvert are presented in Table 2 and results for the proposed culvert replacement conditions are presented in Table 3. The HY-8 output report is included in Attachment 2.

Table 2 – Hydraulic Results for Existing Conditions

	Flood Return Frequency (Years)	Peak Discharge (CFS)	Headwater Elevation (FT)	Tailwater Elevation (FT)	Outlet Velocity (FT/S)	Tailwater Velocity (FT/S)
36" Diameter CMP	2	25	321.8	320.0	6.5	2.9
	5	44	323.1	320.3	8.2	2.9
	10	62	324.6	320.4	9.6	3.2
	25	87	324.8	320.5	9.8	3.6
	50	106	324.9	320.6	9.9	3.8
	100	128	325.0	320.7	10.0	4.0

Table 3 – Hydraulic Results for Proposed Conditions

	Flood Return Frequency (Years)	Peak Discharge (CFS)	Headwater Elevation (FT)	Tailwater Elevation (FT)	Outlet Velocity (FT/S)	Tailwater Velocity (FT/S)
66"x51" Pipe Arch Eq. Dia. 60"	2	25	320.8	320.0	4.8	2.9
	5	44	321.7	320.3	6.6	2.9
	10	62	322.3	320.4	7.5	3.2
	25	87	323.2	320.5	8.7	3.6
	50	106	324.3	320.6	9.7	3.8
	100	128	324.8	320.7	10.0	4.0

In this case, the US Army Corps of Engineers HEC-RAS River Analysis System is not an appropriate hydraulic analysis tool because the culvert functions as a pond outlet instead of carrying a stream with a defined channel. We determined upstream and downstream flood elevation impacts and evaluated velocities at the culvert to address the potential for scour and erosion using HydroCAD and HY-8.

Scour Countermeasure

There was no evidence of scour observed during field inspection, but due to the constricted velocity of 5-10 feet per second calculated at the outlet of the proposed culvert, scour countermeasure design is recommended to prevent erosion of the streambed material during high flows. Hydraulic Engineering Circular No. 14 (HEC-14) (FHWA 2006) was used to design a riprap apron to protect against scour at the outlet. The 25-year peak discharge was used to design the scour countermeasure. See Attachment 2 for scour countermeasure calculations.

Stream Crossing Performance Standards

The Massachusetts Stream Crossing Standards consist of the following:

1. *Spans that preserve the natural stream channel are strongly preferred.*
2. *If a culvert, then it should be embedded: a minimum of 2 feet for all culverts; a minimum of 2 feet and at least 25% for round pipe culverts.*
3. *Spans channel width (a minimum of 1.2 times the bankfull width).*
4. *Natural bottom substrate within the structure.*
5. *Designed with appropriate 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.*
6. *Openness> 0.82 feet*
7. *Banks should be present on each side of the stream matching the horizontal profile of the existing stream and banks.*

Constraints and Benefits Analysis

The replacement of the culvert at Whitney Road is required because the existing culvert at that location is blocked and partially collapsed. The project scope is limited to replacing the culvert and patching the roadway over the trench. Extended roadway reconstruction and raising the profile of the roadway are not included in the project scope. The existing streambed is approximately 5.5 feet below the roadway elevation, which limits the size of the proposed culvert opening. There are no known underground utilities in the vicinity of the crossing, but there is a utility pole that is located about 10 feet from the crossing centerline.

The contributing drainage area is 0.1 square miles with a watershed consisting mostly of wetlands and forest. The stream is intermittent and the flow through the crossing is dependent on the water elevation in the upstream wetland. The culvert acts as an outlet control for the wetland in concert with a broad crested weir (i.e., embankment) at elevation 322.5 feet that connects BVW A to the adjacent bordering vegetated wetland for Beaver Pond Brook. The culvert is located within the National Heritage Estimated Habitat and Priority Habitat of Rare Species area.

Meeting the Stream Crossing Standards to the maximum extent practicable, given the constraints, will increase the hydraulic capacity for flood flows, thus increasing the resiliency of the infrastructure. It will also provide a better biological and ecological connection, which will benefit wildlife passage.

Maximum Extent Practicable Evaluation

In accordance with 310 CMR 10.53(8)(a), the replacement crossing has been designed to meet the Massachusetts Stream Crossing Standards to the maximum extent practicable. Site and budget constraints prevent this stream crossing replacement from fully complying with the Stream Crossing Standards. The following criteria were evaluated for the crossing to ensure compliance to the maximum extent practicable:

- *The potential for downstream flooding:* The existing culvert is currently blocked, so the downstream flow is artificially low. When the culvert is replaced, flow through the crossing will be restored. Careful consideration was taken to ensure that unblocking this outlet will not cause an increase to downstream flooding. The downstream channel geometry was used to determine the tailwater elevation for the various alternatives, which was compared to the downstream channel bank elevations and surrounding topography. The calculated tailwater elevation matched existing for all alternatives.
- *Upstream and downstream habitat:* There are wetlands located upstream and downstream of the crossing. The upstream wetland elevation is associated with ponding from the currently blocked culvert. A significant change to the size of the culvert, or just removing the blockage, could impact the water levels and consequently the bordering wetland habitat. Changes to the water levels upstream were analyzed for each alternative.

- *Potential for erosion and head-cutting:* The risk for erosion and head-cutting due to the change in hydraulic opening size is mitigated by the proposed scour countermeasure, which will dissipate the constricted velocity at the culvert outlet.
- *Stream stability:* The culvert is aligned with the downstream channel, but an increase in velocity or flow could impact stream stability. Criteria such as channel slope, streambed and embankment material, and channel alignment were considered for each alternative with the goal of matching the downstream condition as much as feasible.
- *Habitat fragmentation caused by the crossing:* The culvert is an important habitat connection within the estimated and priority habitat area. The existing crossing is 36-inches high. An increased opening size would benefit a large habitat area.
- *The amount of stream mileage made accessible by the improvements:* Improvements to this culvert will improve the connection between BVW A and Beaver Pond Brook. The length of the Beaver Pond Brook stream reach between the tributary confluence and the downstream Mulpus Brook confluence is approximately 1.1 miles.
- *Storm flow conveyance:* The existing blocked culvert is undersized and hydraulic calculations show that the design flood discharge overtops the roadway, even when the opening is not blocked. The proposed culvert must be designed to meet hydraulic design standards to protect the infrastructure. All alternatives meet the applicable hydraulic design criteria.
- *Engineering design constraints specific to the crossing:* The location of the existing utility pole, the elevation of the roadway, and the elevation of the existing streambed are all engineering design constraints for this crossing. The utility pole will not require relocation for the culvert replacement, but due to the proximity to the crossing site, care should be taken during excavation and construction to avoid impact. Minimum pipe cover varies for different materials. A minimum cover of 2.5’ was used for class III reinforced concrete pipe, 15” for metal pipe arches, and 3’ for reinforced concrete box culvert.
- *Hydrologic constraints specific to this crossing:* Other than the reasons previously mentioned for the potential for downstream flooding and the impact to upstream and downstream habitat, there are not specific hydrologic constraints for this crossing. The crossing is not located in a FEMA flood zone or regulatory floodway.
- *Impacts to wetlands that would occur by improving the crossing:* A significant change to hydraulic opening could change the water levels in the surrounding wetlands, which would affect both habitat and vegetation. The hydrologic analysis results for existing and proposed conditions show there is a slight increase to the water level in the upstream wetland in the range of 0.1 to 0.3 feet for the various design storms. This increase can be considered de minimis and will not cause impacts to the existing wetland habitat or vegetation.
- *Potential to affect property and infrastructure:* There are two houses located on the downstream side of the crossing at 71 and 75 Whitney Road that were evaluated for potential impacts. The house at 71 Whitney Road is at approximate elevation 337 feet. The house at 75 Whitney Road is at approximate elevation 326 feet. The tailwater elevations for the various design discharges were compared to these elevations to determine potential impacts. While there is variability between the alternatives for calculated headwater elevation, the tailwater elevations remained the same as existing for all alternatives. Therefore, the proposed culvert replacement will not impact the two houses located downstream of the crossing.
- *Cost of replacement:* As with any publicly funded infrastructure project, the cost of replacement is a constraint. The alternatives analysis includes an evaluation of the safety benefits, compliance with environmental regulations, and long-term value of the public investment. If grant funding can be obtained, this constraint may be mitigated. However, for this evaluation, it was included as a constraint.

Design Alternatives Analysis

An alternatives analysis was conducted to identify a preferred design alternative. In addition to the design criteria associated with the Stream Crossing Performance Standards, the allowable headwater criteria presented in section 8.4.2.3 of the MassDOT PDDG was used a basis for the proposed culvert design. The maximum value for HW/D is 1.5 and minimum freeboard to the roadway embankment is 2 feet. Four alternatives were considered for the proposed culvert design. Approximate costs listed for each alternative are for comparison purposes only.

Table 4 summarizes the results of hydraulic calculations for the design alternatives using the 10-year design flood discharge. The roadway embankment elevation is 324.6 feet for all design alternatives.

Table 4 – Hydraulic Results for Design Alternatives

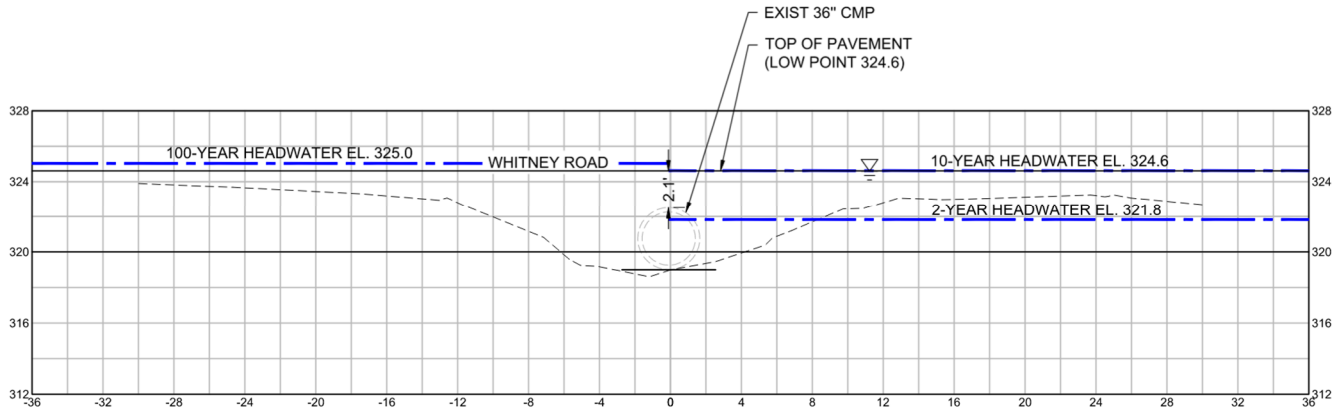
Design Alternative	Culvert Size	Headwater Elevation (FT)	HW/D {1.5 MAX}	Freeboard to Embankment {2 FT MIN}	Outlet Velocity (FT/S)
Existing	36” Round	324.6	{1.9}	{0.0}	9.6
1	60” Round	322.3	1.1	2.3	7.7
2	54" Eq Dia Arch	322.6	1.3	2.0	8.0
3	60” Eq Dia Arch	322.3	1.1	2.3	7.5
4	8’x4.5’ Box	321.2	1.1	3.4	5.6
5	84” Eq Dia Arch	321.6	0.8	3.0	6.1

Table 5 summarizes the Stream Crossing Standards performance measures for each alternative.

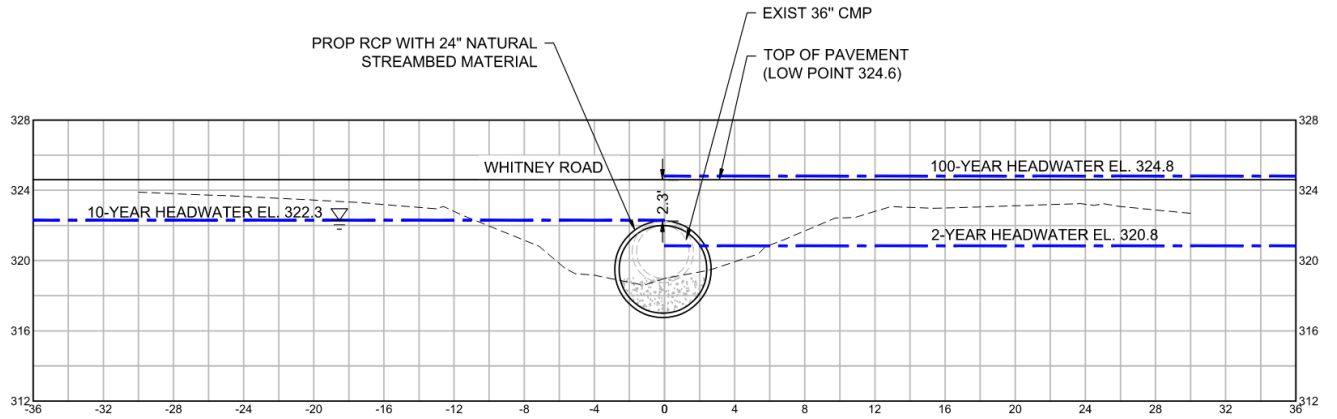
Table 5 – Stream Crossing Criteria for Design Alternatives

Design Alternative	Culvert Size	Embedment Depth (IN)	Crossing Span Width (FT)	Openness Ratio
Existing	36” Round	0	3.0	0.16
1	60” Round	24	5.0	0.27
2	54" Eq Dia Arch	14	5.0	0.26
3	60” Eq Dia Arch	15	5.5	0.32
4	8’x4.5’ Box	29	8.0	0.37
5	84” Eq Dia Arch	28	7.9	0.49

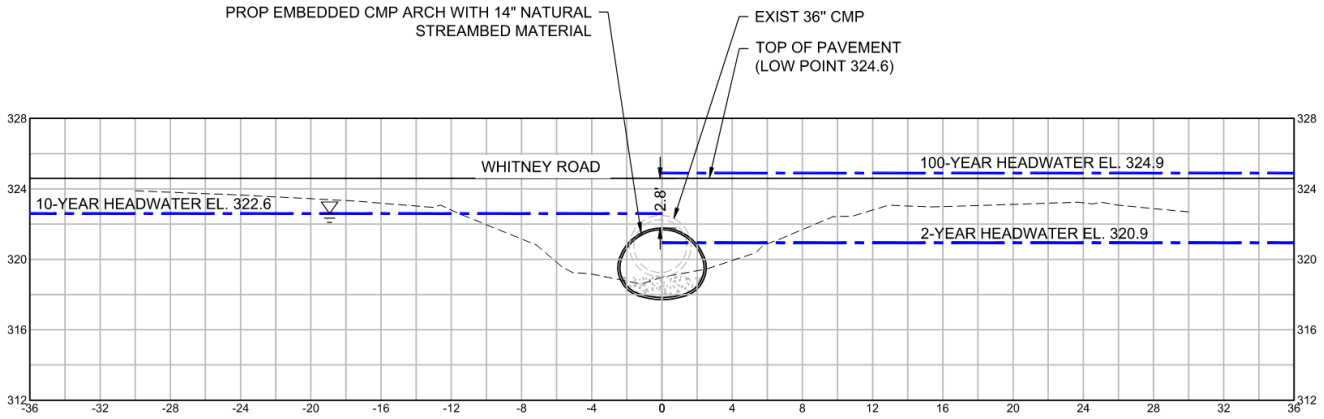
The existing culvert was evaluated as a basis for the alternatives analysis. With respect to the Stream Crossing Standards, there is a layer of mucky sediment through the culvert, but no substantial embedment, therefore, the streambed through the crossing does not match the downstream channel. The existing hydraulic opening is a constriction of the 6-foot bankfull width with a span of 3 feet at the midpoint of the pipe opening. Hydraulic results for the existing culvert dimensions show that the design flood discharge overtops the roadway, therefore, the existing culvert does not meet hydraulic design criteria for allowable headwater elevation. Additionally, the existing culvert is currently partially collapsed, blocked at the inlet, and requires replacement for safety and flood damage prevention purposes.



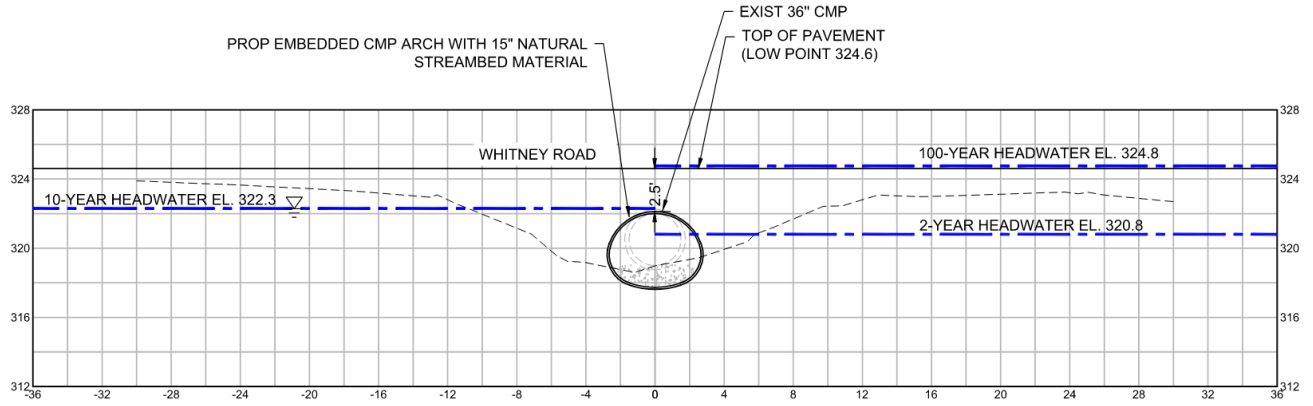
Alternative 1 is a 60-inch diameter round reinforced concrete pipe with 24 inches embedment of natural streambed material. The width of the opening at the streambed elevation is 5 feet. This alternative complies with the Stream Crossing Standards by improving existing conditions with a larger hydraulic opening and providing natural substrate through the culvert. The water surface profile downstream of this crossing matches existing flood elevations. The upstream water surface profile elevation of 322.3 is less than existing by about 2.3 feet for the 10-year storm. There is less than 3 feet of cover over this pipe, so the concrete shall be extra strength or class III. The approximate cost for Alternative 1 is $12,000.



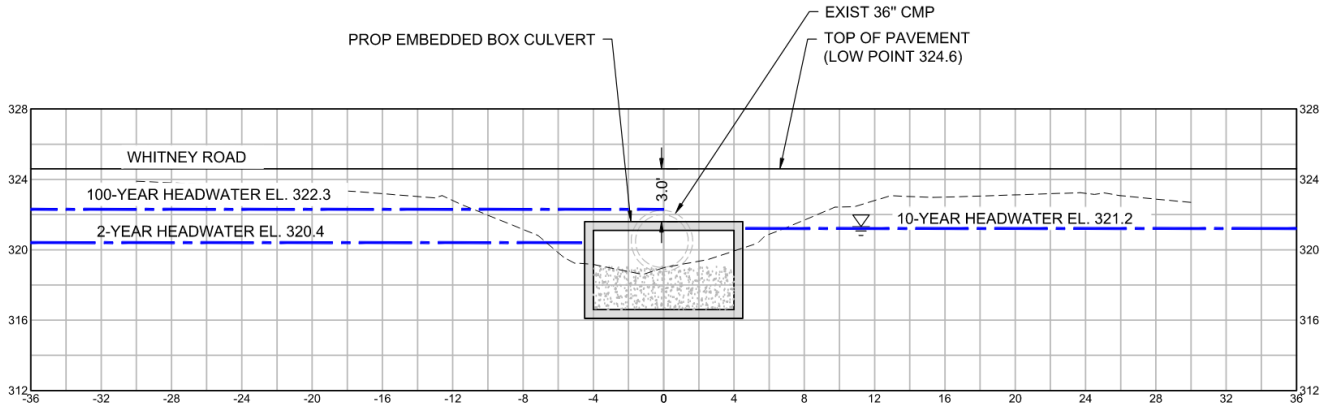
Alternative 2 is a 60-inch by 46-inch corrugated metal pipe arch with 54-inch equivalent diameter, 3-inch by 1-inch corrugation and 14 inches embedment of natural streambed material. The width of the opening at the streambed elevation is 5.0 feet. This alternative complies with the Stream Crossing Standards by improving existing conditions with a larger hydraulic opening and providing natural substrate through the culvert. The water surface profile downstream of this crossing matches existing flood elevations. The upstream water surface profile elevation of 322.6 is less than existing by about 2 feet for the 10-year storm. The approximate cost for Alternative 2 is $16,000.



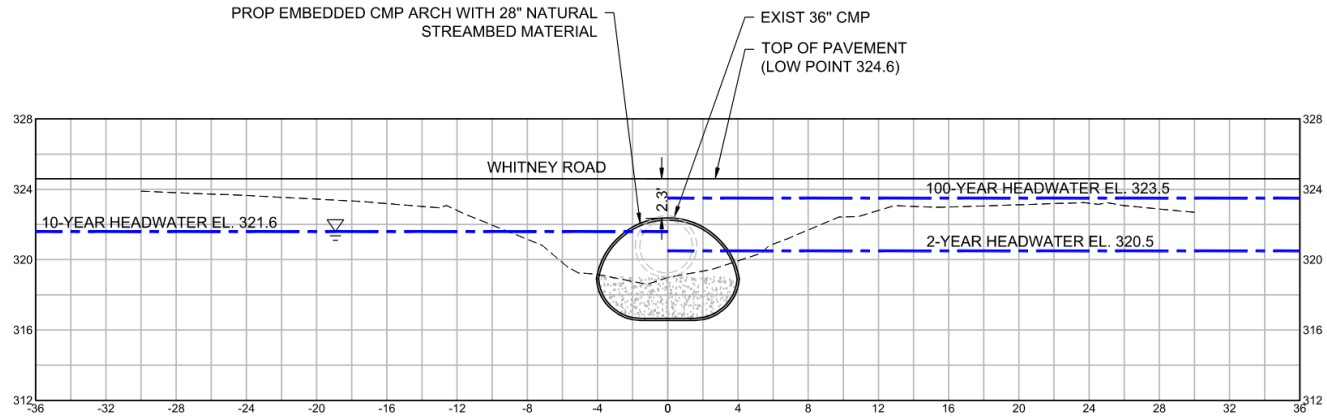
Alternative 3 is a 66-inch by 51-inch corrugated metal pipe arch with 60-inch equivalent diameter, 3-inch by 1-inch corrugation and 15 inches embedment of natural streambed material. The width of the opening at the streambed elevation is 5.5 feet. Similar to Alternative 2, this alternative complies with the Stream Crossing Standards by improving existing conditions with a larger hydraulic opening and providing natural substrate through the culvert. The water surface profile downstream of this crossing matches existing flood elevations. The upstream water surface profile elevation of 322.3 is less than existing by about 2.3 feet. The approximate cost for Alternative 3 is $18,000.



Alternative 4 is an 8-foot by 4.5-foot concrete box culvert. This alternative complies with the Stream Crossing Standards by improving existing conditions with a larger hydraulic opening and providing natural substrate through the culvert. The span width is greater than 1.2 times bankfull width and the embedment depth meets the 2-foot minimum depth. The openness ratio was limited by the minimum cover constraint. The water surface profile downstream of this crossing matches existing flood elevations. The upstream water surface profile elevation of 321.2 is less than existing by about 3.4 feet. The approximate cost for Alternative 1 is $180,000.



Alternative 5 is a 95-inch by 67-inch corrugated metal pipe arch with 84-inch equivalent diameter, 3-inch by 1-inch corrugation and 28 inches embedment of natural streambed material. The width of the opening at the streambed elevation is 7.9 feet. This alternative complies with the Stream Crossing Standards by improving existing conditions with a larger hydraulic opening and providing natural substrate through the culvert. The span width is greater than 1.2 times bankfull width and the embedment depth meets the 2-foot minimum depth. The water surface profile downstream of this crossing matches existing flood elevations. The upstream water surface profile elevation of 321.6 is less than existing by about 3.0 feet. The approximate cost for Alternative 5 is $25,000.



Proposed Design Alternative 3 is the preferred alternative. The proposed design will improve wildlife passage, hydraulic capacity, and resiliency of the infrastructure to the maximum extent practicable by providing the largest span width and openness ratio of the Alternatives 1 through 3. Alternative 4 is not feasible due to the high cost. Alternative 5 was in consideration for preferred alternative because it provides better performance with respect to the Stream Crossing Standards. However, Alternatives 3 and 5 both meet the hydraulic design criteria and improve existing ecological conditions. Alternative 5 is 40% more expensive than Alternative 3 and the construction budget

is a substantial constraint. Therefore, Alternative 3 is the most cost-effective solution that will provide both hydraulic and ecological improvements.

Conclusions and Recommendations

The hydraulic model for the culvert predicts that the headwater for the 10-year design flood discharge meets the allowable headwater criteria presented in section 8.4.2.3 of the MassDOT PDDG.

The proposed culvert design meets the Massachusetts Stream Crossing Standards to the maximum extent practicable as required under the Massachusetts Wetlands Protection Act 310 CMR 10.54 and 10.56.

The proposed culvert shall be a 66-inch by 51-inch corrugated metal pipe arch with 60-inch equivalent diameter and 3-inch by 1-inch corrugation. A standard detail of the shape geometry is included in Attachment 3. The culvert shall be embedded 15 inches with natural streambed material that matches the existing upstream and downstream channel conditions.

The recommended scour countermeasure design is comprised of an 18-inch deep layer of D_{50} = 5 inches riprap under a 15-inch deep layer of natural streambed material. The top elevation of the streambed material shall match the adjacent stream channel. The length of the riprap apron along the stream channel shall be 12 feet, measured from the culvert outlet.

Construction shall occur during low or no flow periods of the year. Erosion prevention and sediment control measures shall be implemented during construction to prevent downstream transport of sediment and degradation of the stream and bordering vegetated wetlands.

Attachments

1. *Existing Data*
2. *Calculations*
3. *Standard Pipe Arch Detail*

P:\77518\143-77518-22002\DOCS\REPORTS\H&H TECH MEMO.DOCX

ATTACHMENT 1

NOTES:

1. UNDERGROUND UTILITIES SHOWN ARE BASED UPON FIELD OBSERVATIONS AND INFORMATION OF RECORD. THEY ARE NOT WARRANTED TO BE EXACT, NOR IS IT WARRANTED THAT ALL UNDERGROUND PIPES OR OTHER STRUCTURES ARE SHOWN ON THIS PLAN. CH. 82 SEC. 40 OF THE M.G.L. REQUIRES 72 HOUR NOTICE TO ALL UTILITY OWNERS. PRIOR TO EXCAVATIONS, CALL "DIG SAFE" 1-888-DIG-SAFE AND EACH UTILITY OWNER.
2. THE ELEVATIONS DEPICTED ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM (N.A.V.D.) OF 1988(USFT). PROVIDED BY A-PLUS CONSTRUCTION SERVICES CORP. BY RTK GPS MEANS USING THE KEYNETGPS NETWORK.
3. THE HORIZONTAL CONTROL DEPICTED ARE BASED ON MASSACHUSETTS COORDINATE SYSTEM, MAINLAND ZONE, NAD83(2011) EPOCH 2010.00 SET BY A-PLUS CONSTRUCTION SERVICES CORP. BY RTK GPS MEANS USING THE KeyNetGPS NETWORK.

PLAN REFERENCES
PL# 1707 OF 2005
PL# 1102 OF 1977

WHITNEY ROAD
N/F
TOWN OF SHIRLEY
BK. 13780 PG. 111
PLAN 1102 OF 1977
PARCEL ID: 68 A 5

77 WHITNEY ROAD
N/F
ROBERTO MARTINEZ &
JENNIFER M. MARTINEZ
CO-TRUSTEES OF
MARTINEZ INVESTMENT TRUST
BK. 78249 PG. 535
PLAN 1102 OF 1977
PARCEL ID: 68 A 5.4

75 WHITNEY ROAD
N/F
WILLIAM J. NORELLI
& KATHY A. NORELLI
BK. 63364 PG. 550
PLAN 1102 OF 1977
PARCEL ID: 68 A 5.3

71 WHITNEY ROAD
N/F
JOHN F. MACDONALD,
TRUSTEE OF THE
JOHN F. MACDONALD
REVOCABLE TRUST
BK. 68754 PG. 357
PLAN 1102 OF 1977
PARCEL ID: 68 A 5.2

67 WHITNEY ROAD
N/F
MICHAEL D. FERREIRA
& DONNA C. FERREIRA
BK. 19947 PG. 353
PLAN 1102 OF 1977
PARCEL ID: 68 A 5.1

WHITNEY ROAD
N/F
TOWN OF SHIRLEY
BK. 13244 PG. 454
NO PLAN REFERENCE
PARCEL ID: 57 A 3

BENCHMARK: SPIKE SET IN UPL #36
EL=327.58'

1
N: 3035136.010'
E: 610466.216'
EL: 327.246'
MAG

2
N: 3035014.370'
E: 610697.432'
EL: 324.593'
MAG

3
N: 3034866.905'
E: 610989.955'
EL: 332.319'
MAG

BENCHMARK: SPIKE SET IN UPL #34
EL=331.20'

WHITNEY ROAD
(PUBLIC - VARIABLE WIDTH)

491.54'
S65°43'07"E

S57°07'00"E
258.17'

INV 36" CMP
EL=319.00

WD FNC
GRAVEL PATH
BROOK
EDGE WATER
EDGE WATER
TREES
APPROX PROP LINE
IR PIPE FND
ULT 34
OHW
EP
UPL

WF#A1 WF#A2 WF#A3 WF#A4 WF#A5 WF#A6 WF#A7 WF#A8 WF#A9 WF#A10 WF#A11 WF#A12 WF#A13 WF#A14 WF#A15 WF#A16 WF#A17 WF#A18 WF#A19 WF#A20
WF#MA1 WF#MA2 WF#MA3 WF#MA4 WF#MA5 WF#MA6 WF#MA7 WF#MA8 WF#MA9 WF#MA10 WF#MA11 WF#MA12 WF#MA13 WF#MA14
WF#B1 WF#B2 WF#B3 WF#B4 WF#B5 WF#B6 WF#B7 WF#B8 WF#B9

0 20 50 100
SCALE: 1" = 20'

REVISIONS		
REV.	COMMENTS	DATE

ORIGINAL FULL SIZE DRAWING=4"
REPRODUCTIONS MAY BE REDUCED SIZE

PREPARED BY:
A-PLUS
CONSTRUCTION SERVICES CORP.
17 ACCORD PARK DRIVE, UNIT #102
NORWELL, MA 02061-1629
PHONE (781) 681-6667
FAX (781) 681-6673

FIELD CHIEF: JW	DES/COMP: N/A	DRAFTED BY: JW	CHECKED BY: MC
DATE: September 6, 2022	SCALE: 1"=20'	JOB#:4283	FILE: 4283 WHITNEY RD

EXISTING CONDITIONS PLAN
WHITNEY ROAD CULVERT
SHIRLEY, MASS.

PREPARED FOR:
HOWARD STEIN HUDSON

SHEET 1 of 1
REV 0

ATTACHMENT 1

NOAA Atlas 14, Volume 10, Version 3
Location name: Shirley, Massachusetts, USA*
Latitude: 42.5762°, Longitude: -71.6689°
Elevation: 325.43 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.326** (0.256-0.409)	**0.385** (0.301-0.483)	**0.481** (0.375-0.605)	**0.561** (0.435-0.709)	**0.671** (0.503-0.876)	**0.754** (0.553-1.00)	**0.840** (0.598-1.15)	**0.936** (0.631-1.30)	**1.07** (0.695-1.53)	**1.18** (0.747-1.72)
10-min	**0.462** (0.362-0.579)	**0.545** (0.427-0.684)	**0.681** (0.531-0.856)	**0.794** (0.615-1.00)	**0.950** (0.713-1.24)	**1.07** (0.783-1.42)	**1.19** (0.847-1.63)	**1.33** (0.894-1.84)	**1.52** (0.984-2.17)	**1.67** (1.06-2.43)
15-min	**0.544** (0.426-0.681)	**0.642** (0.502-0.805)	**0.802** (0.625-1.01)	**0.935** (0.725-1.18)	**1.12** (0.838-1.46)	**1.26** (0.922-1.67)	**1.40** (0.996-1.91)	**1.56** (1.05-2.17)	**1.79** (1.16-2.55)	**1.97** (1.25-2.86)
30-min	**0.732** (0.574-0.918)	**0.864** (0.676-1.08)	**1.08** (0.842-1.36)	**1.26** (0.976-1.59)	**1.51** (1.13-1.97)	**1.69** (1.24-2.25)	**1.89** (1.34-2.58)	**2.10** (1.42-2.92)	**2.40** (1.56-3.43)	**2.65** (1.68-3.85)
60-min	**0.921** (0.721-1.15)	**1.09** (0.851-1.36)	**1.36** (1.06-1.71)	**1.58** (1.23-2.00)	**1.89** (1.42-2.47)	**2.13** (1.56-2.83)	**2.37** (1.69-3.24)	**2.64** (1.78-3.67)	**3.02** (1.96-4.32)	**3.33** (2.11-4.83)
2-hr	**1.15** (0.906-1.42)	**1.38** (1.09-1.72)	**1.76** (1.39-2.20)	**2.08** (1.63-2.60)	**2.51** (1.91-3.27)	**2.84** (2.11-3.76)	**3.19** (2.30-4.37)	**3.60** (2.44-4.97)	**4.22** (2.75-5.99)	**4.74** (3.01-6.84)
3-hr	**1.31** (1.04-1.62)	**1.59** (1.26-1.97)	**2.04** (1.62-2.54)	**2.42** (1.91-3.02)	**2.94** (2.24-3.82)	**3.33** (2.49-4.41)	**3.75** (2.73-5.14)	**4.26** (2.89-5.86)	**5.03** (3.28-7.12)	**5.70** (3.63-8.19)
6-hr	**1.66** (1.33-2.04)	**2.02** (1.62-2.48)	**2.62** (2.09-3.22)	**3.11** (2.47-3.85)	**3.79** (2.91-4.89)	**4.29** (3.23-5.64)	**4.84** (3.55-6.60)	**5.51** (3.76-7.53)	**6.54** (4.29-9.20)	**7.44** (4.76-10.6)
12-hr	**2.10** (1.71-2.56)	**2.56** (2.07-3.11)	**3.29** (2.66-4.02)	**3.91** (3.13-4.79)	**4.75** (3.68-6.07)	**5.37** (4.08-7.00)	**6.05** (4.46-8.17)	**6.87** (4.72-9.32)	**8.12** (5.35-11.3)	**9.20** (5.91-13.0)
24-hr	**2.54** (2.08-3.07)	**3.08** (2.52-3.73)	**3.97** (3.24-4.81)	**4.71** (3.81-5.73)	**5.72** (4.47-7.25)	**6.47** (4.95-8.36)	**7.28** (5.40-9.75)	**8.25** (5.71-11.1)	**9.73** (6.44-13.5)	**11.0** (7.09-15.5)
2-day	**2.92** (2.41-3.49)	**3.55** (2.93-4.25)	**4.59** (3.77-5.51)	**5.44** (4.45-6.57)	**6.63** (5.23-8.34)	**7.50** (5.78-9.63)	**8.45** (6.31-11.2)	**9.59** (6.67-12.8)	**11.3** (7.52-15.6)	**12.8** (8.28-17.9)
3-day	**3.19** (2.66-3.80)	**3.87** (3.22-4.62)	**4.99** (4.13-5.96)	**5.91** (4.86-7.10)	**7.18** (5.69-8.99)	**8.12** (6.29-10.4)	**9.14** (6.85-12.1)	**10.4** (7.22-13.8)	**12.2** (8.12-16.7)	**13.7** (8.91-19.1)
4-day	**3.44** (2.88-4.09)	**4.15** (3.47-4.93)	**5.31** (4.42-6.33)	**6.27** (5.18-7.51)	**7.60** (6.04-9.47)	**8.59** (6.66-10.9)	**9.64** (7.24-12.7)	**10.9** (7.62-14.5)	**12.8** (8.53-17.4)	**14.3** (9.32-19.9)
7-day	**4.12** (3.47-4.86)	**4.87** (4.10-5.75)	**6.11** (5.12-7.23)	**7.13** (5.94-8.48)	**8.54** (6.83-10.5)	**9.60** (7.49-12.1)	**10.7** (8.06-13.9)	**12.0** (8.44-15.8)	**13.9** (9.31-18.8)	**15.4** (10.0-21.3)
10-day	**4.78** (4.05-5.61)	**5.56** (4.70-6.53)	**6.83** (5.76-8.05)	**7.89** (6.60-9.34)	**9.35** (7.50-11.5)	**10.4** (8.17-13.0)	**11.6** (8.72-14.9)	**12.9** (9.09-16.9)	**14.7** (9.88-19.8)	**16.1** (10.5-22.2)
20-day	**6.82** (5.84-7.94)	**7.65** (6.54-8.91)	**9.00** (7.66-10.5)	**10.1** (8.55-11.9)	**11.7** (9.44-14.1)	**12.9** (10.1-15.8)	**14.1** (10.6-17.7)	**15.3** (10.9-19.9)	**16.8** (11.4-22.6)	**18.0** (11.8-24.7)
30-day	**8.52** (7.34-9.87)	**9.39** (8.07-10.9)	**10.8** (9.25-12.6)	**12.0** (10.2-14.0)	**13.6** (11.0-16.3)	**14.9** (11.7-18.1)	**16.1** (12.1-20.1)	**17.2** (12.3-22.3)	**18.7** (12.7-24.9)	**19.7** (13.0-26.8)
45-day	**10.6** (9.21-12.2)	**11.5** (9.99-13.3)	**13.0** (11.2-15.1)	**14.3** (12.2-16.6)	**16.0** (13.1-19.1)	**17.4** (13.7-21.0)	**18.6** (14.0-23.1)	**19.8** (14.2-25.4)	**21.1** (14.4-28.0)	**22.0** (14.5-29.8)
60-day	**12.4** (10.8-14.2)	**13.3** (11.6-15.3)	**14.9** (12.9-17.2)	**16.2** (13.9-18.8)	**18.0** (14.8-21.4)	**19.5** (15.5-23.5)	**20.8** (15.7-25.6)	**21.9** (15.8-28.1)	**23.2** (15.9-30.7)	**24.0** (16.0-32.4)

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

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

Please refer to NOAA Atlas 14 document for more information.

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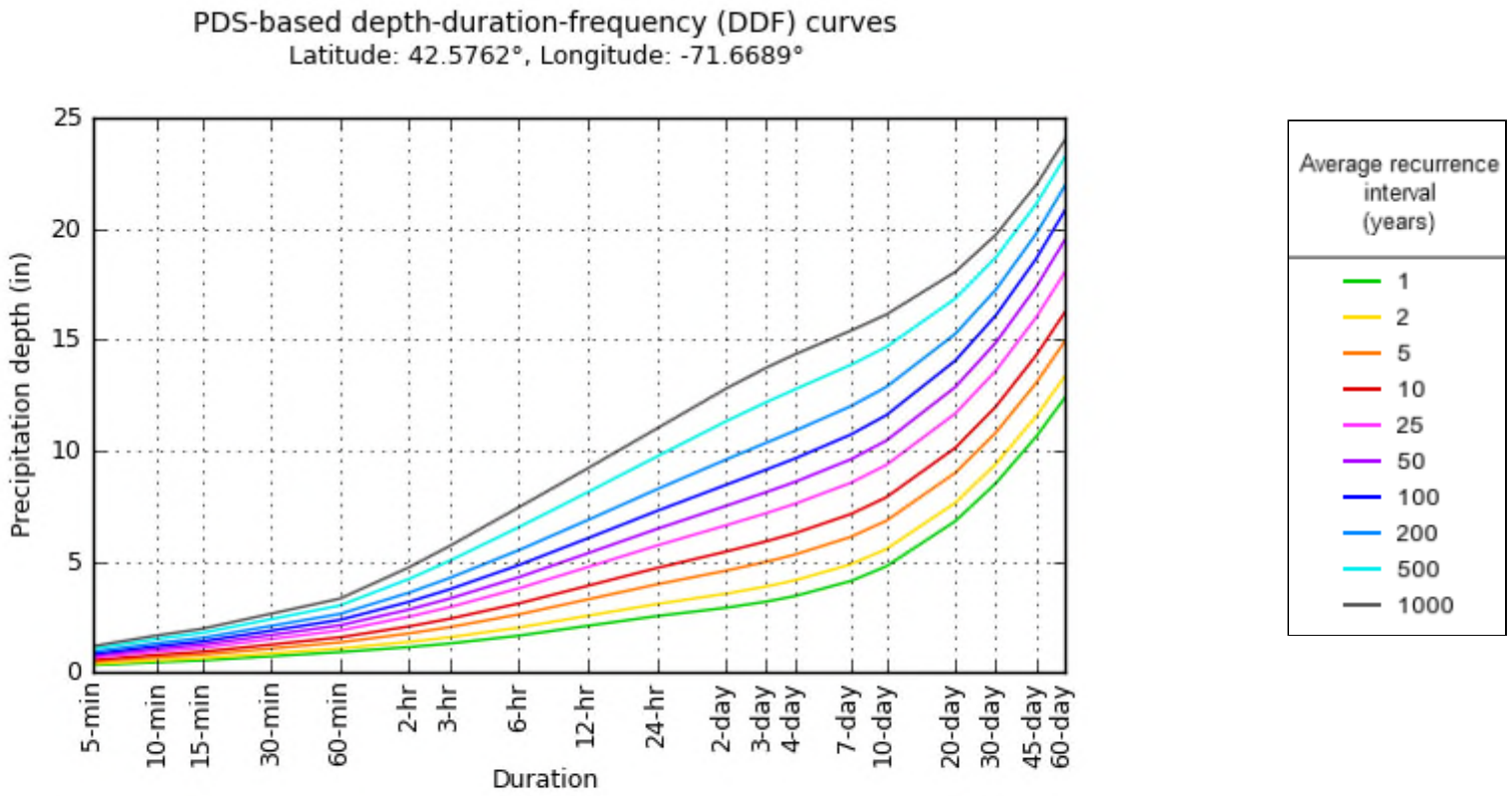
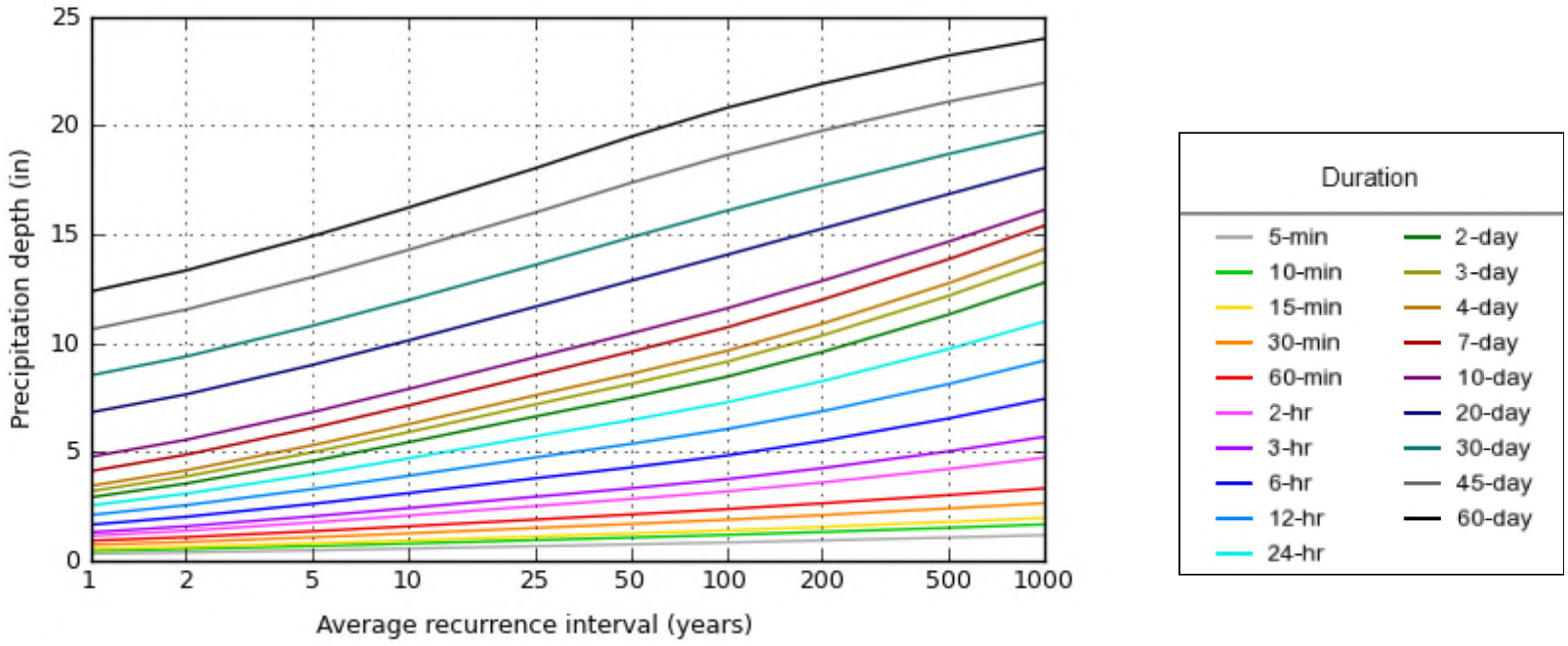
PF graphical





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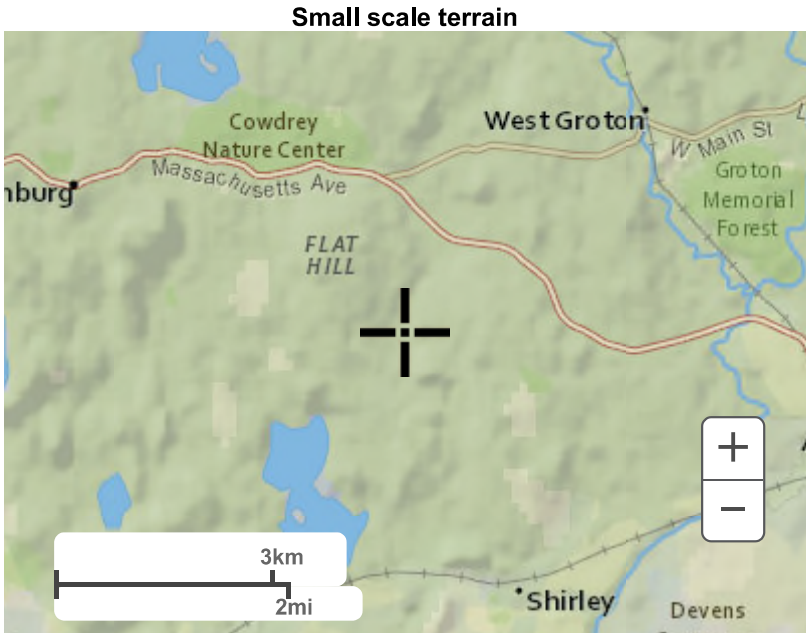
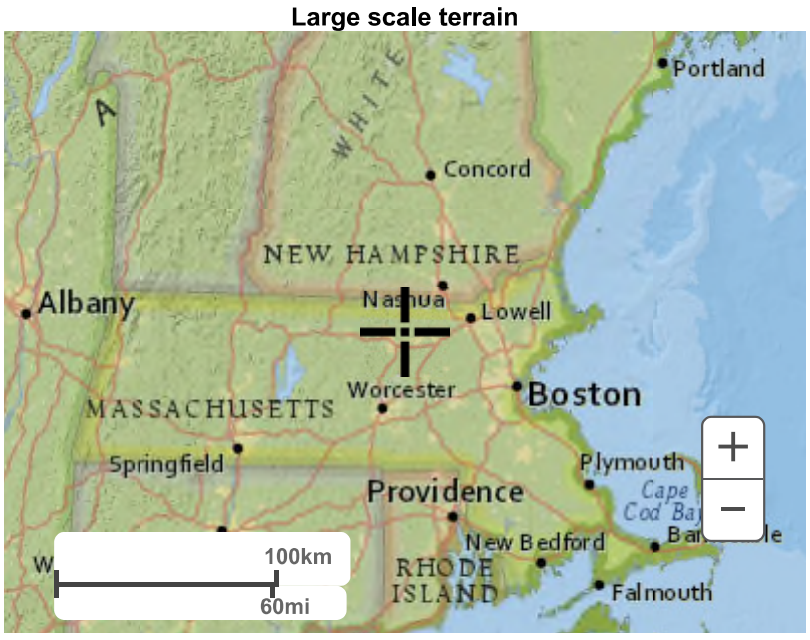
Maps & aerials

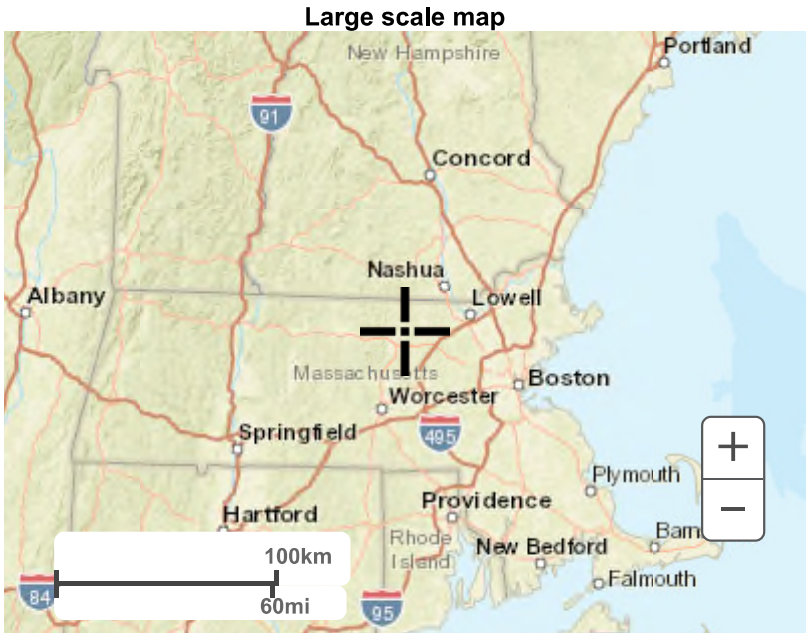
Small scale terrain



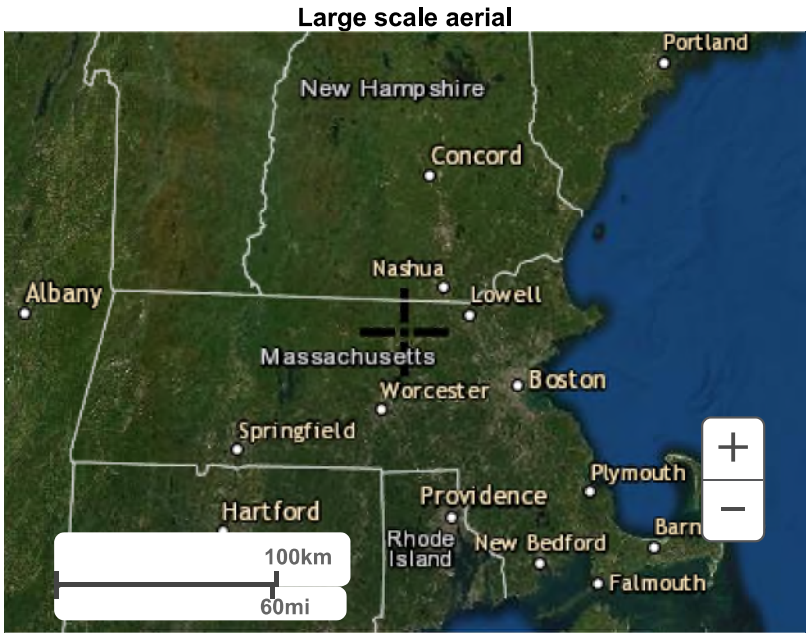
Large scale terrain



Large scale map



Large scale aerial



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National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
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Questions?: HDSC.Questions@noaa.gov

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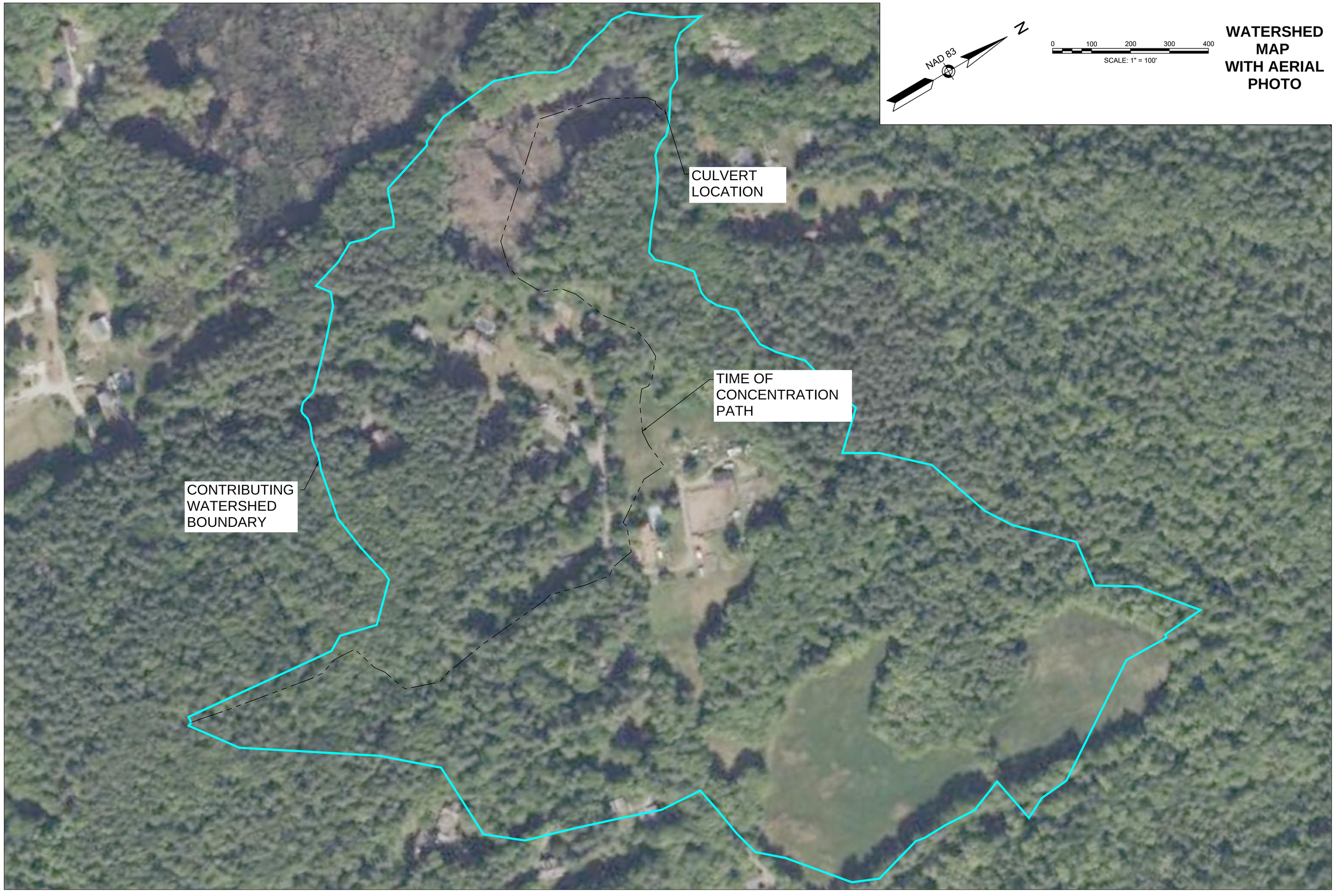
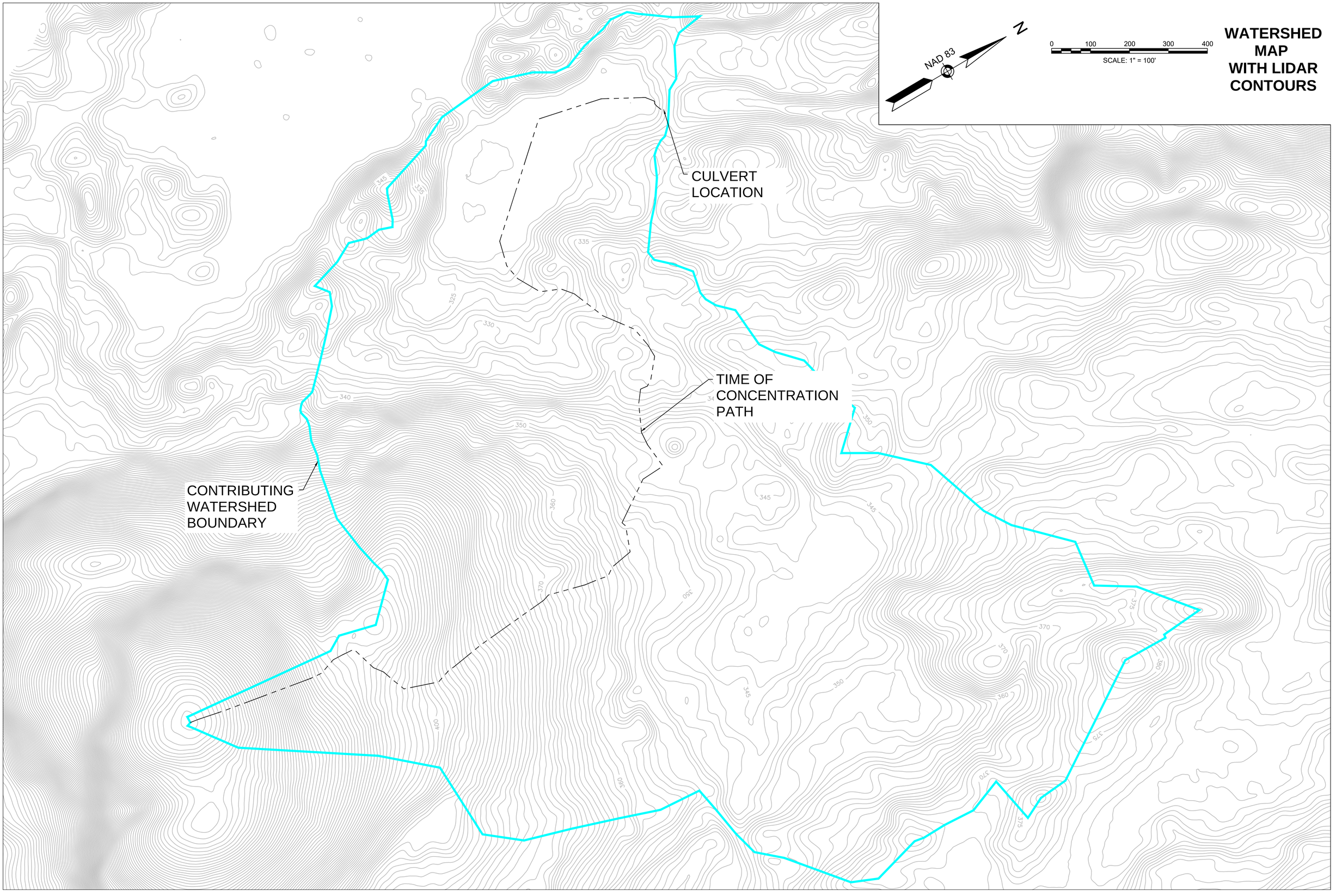
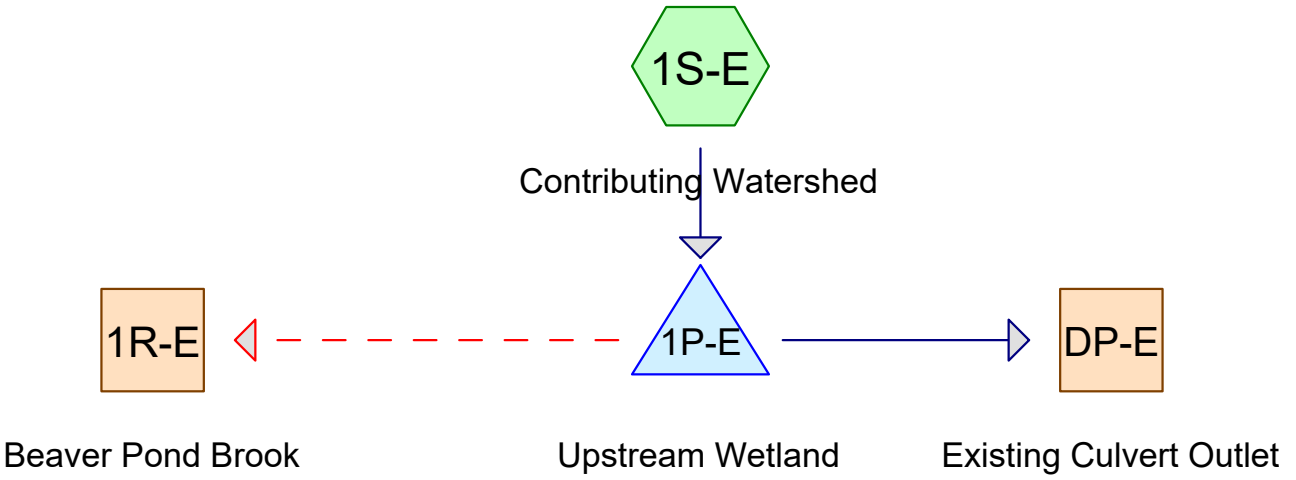
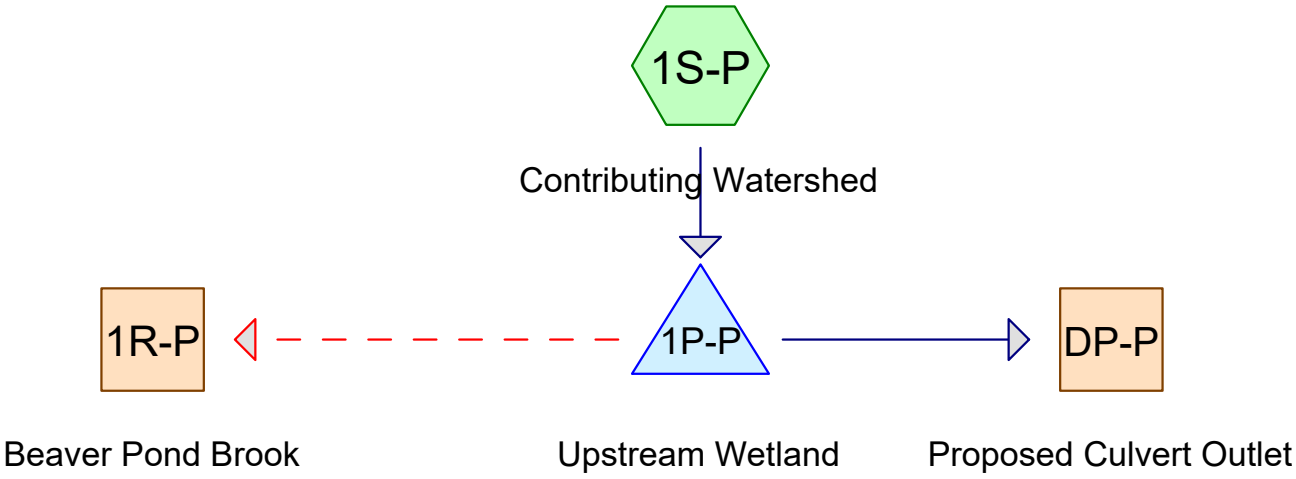


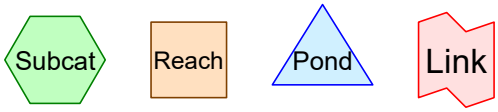
WATERSHED MAP WITH AERIAL PHOTO


NAD 83
N
0
100
200
300
400
SCALE: 1" = 100'
WATERSHED MAP WITH LIDAR CONTOURS
CULVERT LOCATION
TIME OF CONCENTRATION PATH
CONTRIBUTING WATERSHED BOUNDARY

ATTACHMENT 2







Routing Diagram for Shirley
Prepared by Tetra Tech Inc, Printed 11/7/2022
HydroCAD® 10.10-6a s/n 01186 © 2020 HydroCAD Software Solutions LLC

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S-E: Contributing Runoff Area=63.087 ac 3.66% Impervious Runoff Depth=0.91"
Flow Length=3,105' Tc=55.3 min CN=73 Runoff=25.48 cfs 4.768 af

Subcatchment1S-P: Contributing Runoff Area=63.087 ac 3.66% Impervious Runoff Depth=0.91"
Flow Length=3,105' Tc=55.3 min CN=73 Runoff=25.48 cfs 4.768 af

Reach 1R-E: Beaver Pond Brook Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach 1R-P: Beaver Pond Brook Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach DP-E: Existing Culvert Outlet Inflow=12.16 cfs 7.148 af
Outflow=12.16 cfs 7.148 af

Reach DP-P: Proposed Culvert Outlet Inflow=7.36 cfs 6.293 af
Outflow=7.36 cfs 6.293 af

Pond 1P-E: Upstream Wetland Peak Elev=321.00' Storage=105,653 cf Inflow=25.48 cfs 4.768 af
Primary=12.16 cfs 7.148 af Secondary=0.00 cfs 0.000 af Outflow=12.16 cfs 7.148 af

Pond 1P-P: Upstream Wetland Peak Elev=321.15' Storage=126,126 cf Inflow=25.48 cfs 4.768 af
Primary=7.36 cfs 6.293 af Secondary=0.00 cfs 0.000 af Outflow=7.36 cfs 6.293 af

Total Runoff Area = 126.174 ac Runoff Volume = 9.536 af Average Runoff Depth = 0.91"
96.34% Pervious = 121.552 ac 3.66% Impervious = 4.622 ac

Summary for Subcatchment 1S-E: Contributing Watershed

Runoff = 25.48 cfs @ 12.84 hrs, Volume= 4.768 af, Depth= 0.91"
Routed to Pond 1P-E : Upstream Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.08"

Area (ac)	CN	Description
1.232	98	Unconnected pavement, HSG A
1.079	98	Roofs, HSG A
4.546	49	50-75% Grass cover, Fair, HSG A
8.793	43	Woods/grass comb., Fair, HSG A
4.596	69	50-75% Grass cover, Fair, HSG B
4.153	65	Woods/grass comb., Fair, HSG B
16.013	84	50-75% Grass cover, Fair, HSG D
22.675	82	Woods/grass comb., Fair, HSG D
63.087	73	Weighted Average
60.776		96.34% Pervious Area
2.311		3.66% Impervious Area
1.232		53.31% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0700	0.13		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 3.08"
2.1	258	0.1700	2.06		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.2	203	0.0440	1.05		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
8.3	680	0.0750	1.37		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.1	28	0.0360	3.85		**Shallow Concentrated Flow, 5** Paved Kv= 20.3 fps
6.7	539	0.0370	1.35		**Shallow Concentrated Flow, 6** Short Grass Pasture Kv= 7.0 fps
15.8	206	0.0019	0.22		**Shallow Concentrated Flow, 7** Woodland Kv= 5.0 fps
0.1	17	0.0180	2.72		**Shallow Concentrated Flow, 8** Paved Kv= 20.3 fps
4.5	379	0.0400	1.40		**Shallow Concentrated Flow, 9** Short Grass Pasture Kv= 7.0 fps
1.2	695		9.83		**Lake or Reservoir, 10** Mean Depth= 3.00'
55.3	3,105	Total			

Summary for Subcatchment 1S-P: Contributing Watershed

Runoff = 25.48 cfs @ 12.84 hrs, Volume= 4.768 af, Depth= 0.91"
Routed to Pond 1P-P : Upstream Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.08"

Area (ac)	CN	Description
1.232	98	Unconnected pavement, HSG A
1.079	98	Roofs, HSG A
4.546	49	50-75% Grass cover, Fair, HSG A
8.793	43	Woods/grass comb., Fair, HSG A
4.596	69	50-75% Grass cover, Fair, HSG B
4.153	65	Woods/grass comb., Fair, HSG B
16.013	84	50-75% Grass cover, Fair, HSG D
22.675	82	Woods/grass comb., Fair, HSG D
63.087	73	Weighted Average
60.776		96.34% Pervious Area
2.311		3.66% Impervious Area
1.232		53.31% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0700	0.13		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 3.08"
2.1	258	0.1700	2.06		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.2	203	0.0440	1.05		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
8.3	680	0.0750	1.37		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.1	28	0.0360	3.85		**Shallow Concentrated Flow, 5** Paved Kv= 20.3 fps
6.7	539	0.0370	1.35		**Shallow Concentrated Flow, 6** Short Grass Pasture Kv= 7.0 fps
15.8	206	0.0019	0.22		**Shallow Concentrated Flow, 7** Woodland Kv= 5.0 fps
0.1	17	0.0180	2.72		**Shallow Concentrated Flow, 8** Paved Kv= 20.3 fps
4.5	379	0.0400	1.40		**Shallow Concentrated Flow, 9** Short Grass Pasture Kv= 7.0 fps
1.2	695		9.83		**Lake or Reservoir, 10** Mean Depth= 3.00'
55.3	3,105	Total			

Summary for Reach 1R-E: Beaver Pond Brook

[40] Hint: Not Described (Outflow=Inflow)

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 1R-P: Beaver Pond Brook

[40] Hint: Not Described (Outflow=Inflow)

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach DP-E: Existing Culvert Outlet

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 63.087 ac, 3.66% Impervious, Inflow Depth > 1.36" for 2-Year event
Inflow = 12.16 cfs @ 0.00 hrs, Volume= 7.148 af
Outflow = 12.16 cfs @ 0.00 hrs, Volume= 7.148 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach DP-P: Proposed Culvert Outlet

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 63.087 ac, 3.66% Impervious, Inflow Depth > 1.20" for 2-Year event
Inflow = 7.36 cfs @ 14.22 hrs, Volume= 6.293 af
Outflow = 7.36 cfs @ 14.22 hrs, Volume= 6.293 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Pond 1P-E: Upstream Wetland

Per Survey, water line at elevation 321

Inflow Area = 63.087 ac, 3.66% Impervious, Inflow Depth = 0.91" for 2-Year event
Inflow = 25.48 cfs @ 12.84 hrs, Volume= 4.768 af
Outflow = 12.16 cfs @ 0.00 hrs, Volume= 7.148 af, Atten= 52%, Lag= 0.0 min
Primary = 12.16 cfs @ 0.00 hrs, Volume= 7.148 af
Routed to Reach DP-E : Existing Culvert Outlet
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 1R-E : Beaver Pond Brook

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Starting Elev= 321.00' Surf.Area= 137,441 sf Storage= 105,653 cf
Peak Elev= 321.00' @ 0.00 hrs Surf.Area= 137,441 sf Storage= 105,653 cf
Flood Elev= 324.60' Surf.Area= 182,024 sf Storage= 426,736 cf (321,083 cf above start)

Plug-Flow detention time= 171.3 min calculated for 4.723 af (99% of inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	319.00'	426,736 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)
319.00	21,959	792.0	0	0	21,959
320.00	32,212	907.0	26,922	26,922	37,530
321.00	137,441	1,739.0	78,730	105,653	212,723
322.00	161,615	1,860.0	149,365	255,017	247,424
323.00	182,024	1,964.0	171,718	426,736	279,129

Device	Routing	Invert	Outlet Devices
#1	Primary	319.00'	**36.0" Round Culvert** L= 45.4' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 319.00' / 319.00' S= 0.0000 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf
#2	Secondary	322.50'	**14.0' 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

Primary OutFlow Max=12.16 cfs @ 0.00 hrs HW=321.00' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 12.16 cfs @ 3.44 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=321.00' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 1P-P: Upstream Wetland

Per Survey, water line at elevation 321

Inflow Area = 63.087 ac, 3.66% Impervious, Inflow Depth = 0.91" for 2-Year event
Inflow = 25.48 cfs @ 12.84 hrs, Volume= 4.768 af
Outflow = 7.36 cfs @ 14.22 hrs, Volume= 6.293 af, Atten= 71%, Lag= 82.7 min
Primary = 7.36 cfs @ 14.22 hrs, Volume= 6.293 af
Routed to Reach DP-P : Proposed Culvert Outlet
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 1R-P : Beaver Pond Brook

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Starting Elev= 321.00' Surf.Area= 137,441 sf Storage= 105,653 cf
Peak Elev= 321.15' @ 14.22 hrs Surf.Area= 140,875 sf Storage= 126,126 cf (20,474 cf above start)
Flood Elev= 324.60' Surf.Area= 182,024 sf Storage= 426,736 cf (321,083 cf above start)

Plug-Flow detention time= 406.6 min calculated for 3.867 af (81% of inflow)
Center-of-Mass det. time= 28.9 min (942.5 - 913.7)

Volume	Invert	Avail.Storage	Storage Description
#1	319.00'	426,736 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)
319.00	21,959	792.0	0	0	21,959
320.00	32,212	907.0	26,922	26,922	37,530
321.00	137,441	1,739.0	78,730	105,653	212,723
322.00	161,615	1,860.0	149,365	255,017	247,424
323.00	182,024	1,964.0	171,718	426,736	279,129

Device	Routing	Invert	Outlet Devices
#1	Primary	320.25'	**65.0" W x 54.0" H, R=34.0"/56.3" Pipe Arch CMP_Arch_1 66x51 w/ 15.0" insi** L= 45.4' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 319.00' / 319.00' S= 0.0000 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 14.59 sf
#2	Secondary	322.50'	**14.0' 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

Primary OutFlow Max=7.36 cfs @ 14.22 hrs HW=321.15' TW=0.00' (Dynamic Tailwater)
↑—**1=CMP_Arch_1 66x51** (Barrel Controls 7.36 cfs @ 2.08 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=321.00' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S-E: Contributing Runoff Area=63.087 ac 3.66% Impervious Runoff Depth=1.51"
Flow Length=3,105' Tc=55.3 min CN=73 Runoff=44.40 cfs 7.917 af

Subcatchment1S-P: Contributing Runoff Area=63.087 ac 3.66% Impervious Runoff Depth=1.51"
Flow Length=3,105' Tc=55.3 min CN=73 Runoff=44.40 cfs 7.917 af

Reach 1R-E: Beaver Pond Brook Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach 1R-P: Beaver Pond Brook Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach DP-E: Existing Culvert Outlet Inflow=14.54 cfs 10.297 af
Outflow=14.54 cfs 10.297 af

Reach DP-P: Proposed Culvert Outlet Inflow=13.91 cfs 9.441 af
Outflow=13.91 cfs 9.441 af

Pond 1P-E: Upstream Wetland Peak Elev=321.19' Storage=132,716 cf Inflow=44.40 cfs 7.917 af
Primary=14.54 cfs 10.297 af Secondary=0.00 cfs 0.000 af Outflow=14.54 cfs 10.297 af

Pond 1P-P: Upstream Wetland Peak Elev=321.53' Storage=181,978 cf Inflow=44.40 cfs 7.917 af
Primary=13.91 cfs 9.441 af Secondary=0.00 cfs 0.000 af Outflow=13.91 cfs 9.441 af

Total Runoff Area = 126.174 ac Runoff Volume = 15.834 af Average Runoff Depth = 1.51"
96.34% Pervious = 121.552 ac 3.66% Impervious = 4.622 ac

Summary for Subcatchment 1S-E: Contributing Watershed

Runoff = 44.40 cfs @ 12.78 hrs, Volume= 7.917 af, Depth= 1.51"
Routed to Pond 1P-E : Upstream Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 5-Year Rainfall=3.97"

Area (ac)	CN	Description
1.232	98	Unconnected pavement, HSG A
1.079	98	Roofs, HSG A
4.546	49	50-75% Grass cover, Fair, HSG A
8.793	43	Woods/grass comb., Fair, HSG A
4.596	69	50-75% Grass cover, Fair, HSG B
4.153	65	Woods/grass comb., Fair, HSG B
16.013	84	50-75% Grass cover, Fair, HSG D
22.675	82	Woods/grass comb., Fair, HSG D
63.087	73	Weighted Average
60.776		96.34% Pervious Area
2.311		3.66% Impervious Area
1.232		53.31% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0700	0.13		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 3.08"
2.1	258	0.1700	2.06		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.2	203	0.0440	1.05		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
8.3	680	0.0750	1.37		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.1	28	0.0360	3.85		**Shallow Concentrated Flow, 5** Paved Kv= 20.3 fps
6.7	539	0.0370	1.35		**Shallow Concentrated Flow, 6** Short Grass Pasture Kv= 7.0 fps
15.8	206	0.0019	0.22		**Shallow Concentrated Flow, 7** Woodland Kv= 5.0 fps
0.1	17	0.0180	2.72		**Shallow Concentrated Flow, 8** Paved Kv= 20.3 fps
4.5	379	0.0400	1.40		**Shallow Concentrated Flow, 9** Short Grass Pasture Kv= 7.0 fps
1.2	695		9.83		**Lake or Reservoir, 10** Mean Depth= 3.00'
55.3	3,105	Total			

Summary for Subcatchment 1S-P: Contributing Watershed

Runoff = 44.40 cfs @ 12.78 hrs, Volume= 7.917 af, Depth= 1.51"
Routed to Pond 1P-P : Upstream Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 5-Year Rainfall=3.97"

Area (ac)	CN	Description
1.232	98	Unconnected pavement, HSG A
1.079	98	Roofs, HSG A
4.546	49	50-75% Grass cover, Fair, HSG A
8.793	43	Woods/grass comb., Fair, HSG A
4.596	69	50-75% Grass cover, Fair, HSG B
4.153	65	Woods/grass comb., Fair, HSG B
16.013	84	50-75% Grass cover, Fair, HSG D
22.675	82	Woods/grass comb., Fair, HSG D
63.087	73	Weighted Average
60.776		96.34% Pervious Area
2.311		3.66% Impervious Area
1.232		53.31% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0700	0.13		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 3.08"
2.1	258	0.1700	2.06		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.2	203	0.0440	1.05		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
8.3	680	0.0750	1.37		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.1	28	0.0360	3.85		**Shallow Concentrated Flow, 5** Paved Kv= 20.3 fps
6.7	539	0.0370	1.35		**Shallow Concentrated Flow, 6** Short Grass Pasture Kv= 7.0 fps
15.8	206	0.0019	0.22		**Shallow Concentrated Flow, 7** Woodland Kv= 5.0 fps
0.1	17	0.0180	2.72		**Shallow Concentrated Flow, 8** Paved Kv= 20.3 fps
4.5	379	0.0400	1.40		**Shallow Concentrated Flow, 9** Short Grass Pasture Kv= 7.0 fps
1.2	695		9.83		**Lake or Reservoir, 10** Mean Depth= 3.00'
55.3	3,105	Total			

Summary for Reach 1R-E: Beaver Pond Brook

[40] Hint: Not Described (Outflow=Inflow)

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 1R-P: Beaver Pond Brook

[40] Hint: Not Described (Outflow=Inflow)

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach DP-E: Existing Culvert Outlet

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 63.087 ac, 3.66% Impervious, Inflow Depth > 1.96" for 5-Year event
Inflow = 14.54 cfs @ 13.88 hrs, Volume= 10.297 af
Outflow = 14.54 cfs @ 13.88 hrs, Volume= 10.297 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach DP-P: Proposed Culvert Outlet

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 63.087 ac, 3.66% Impervious, Inflow Depth > 1.80" for 5-Year event
Inflow = 13.91 cfs @ 13.94 hrs, Volume= 9.441 af
Outflow = 13.91 cfs @ 13.94 hrs, Volume= 9.441 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Pond 1P-E: Upstream Wetland

Per Survey, water line at elevation 321

Inflow Area = 63.087 ac, 3.66% Impervious, Inflow Depth = 1.51" for 5-Year event
Inflow = 44.40 cfs @ 12.78 hrs, Volume= 7.917 af
Outflow = 14.54 cfs @ 13.88 hrs, Volume= 10.297 af, Atten= 67%, Lag= 65.9 min
Primary = 14.54 cfs @ 13.88 hrs, Volume= 10.297 af
Routed to Reach DP-E : Existing Culvert Outlet
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 1R-E : Beaver Pond Brook

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Starting Elev= 321.00' Surf.Area= 137,441 sf Storage= 105,653 cf
Peak Elev= 321.19' @ 13.88 hrs Surf.Area= 141,971 sf Storage= 132,716 cf (27,064 cf above start)
Flood Elev= 324.60' Surf.Area= 182,024 sf Storage= 426,736 cf (321,083 cf above start)

Plug-Flow detention time= 160.8 min calculated for 7.871 af (99% of inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	319.00'	426,736 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)
319.00	21,959	792.0	0	0	21,959
320.00	32,212	907.0	26,922	26,922	37,530
321.00	137,441	1,739.0	78,730	105,653	212,723
322.00	161,615	1,860.0	149,365	255,017	247,424
323.00	182,024	1,964.0	171,718	426,736	279,129

Device	Routing	Invert	Outlet Devices
#1	Primary	319.00'	**36.0" Round Culvert** L= 45.4' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 319.00' / 319.00' S= 0.0000 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf
#2	Secondary	322.50'	**14.0' 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

Primary OutFlow Max=14.54 cfs @ 13.88 hrs HW=321.19' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 14.54 cfs @ 3.66 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=321.00' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 1P-P: Upstream Wetland

Per Survey, water line at elevation 321

Inflow Area = 63.087 ac, 3.66% Impervious, Inflow Depth = 1.51" for 5-Year event
Inflow = 44.40 cfs @ 12.78 hrs, Volume= 7.917 af
Outflow = 13.91 cfs @ 13.94 hrs, Volume= 9.441 af, Atten= 69%, Lag= 69.4 min
Primary = 13.91 cfs @ 13.94 hrs, Volume= 9.441 af
Routed to Reach DP-P : Proposed Culvert Outlet
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 1R-P : Beaver Pond Brook

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Starting Elev= 321.00' Surf.Area= 137,441 sf Storage= 105,653 cf
Peak Elev= 321.53' @ 13.94 hrs Surf.Area= 150,038 sf Storage= 181,978 cf (76,326 cf above start)
Flood Elev= 324.60' Surf.Area= 182,024 sf Storage= 426,736 cf (321,083 cf above start)

Plug-Flow detention time= 311.2 min calculated for 7.015 af (89% of inflow)
Center-of-Mass det. time= 76.7 min (974.6 - 898.0)

Volume	Invert	Avail.Storage	Storage Description
#1	319.00'	426,736 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)
319.00	21,959	792.0	0	0	21,959
320.00	32,212	907.0	26,922	26,922	37,530
321.00	137,441	1,739.0	78,730	105,653	212,723
322.00	161,615	1,860.0	149,365	255,017	247,424
323.00	182,024	1,964.0	171,718	426,736	279,129

Device	Routing	Invert	Outlet Devices
#1	Primary	320.25'	**65.0" W x 54.0" H, R=34.0"/56.3" Pipe Arch CMP_Arch_1 66x51 w/ 15.0" insi** L= 45.4' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 319.00' / 319.00' S= 0.0000 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 14.59 sf
#2	Secondary	322.50'	**14.0' 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

Primary OutFlow Max=13.91 cfs @ 13.94 hrs HW=321.53' TW=0.00' (Dynamic Tailwater)
↑—**1=CMP_Arch_1 66x51** (Barrel Controls 13.91 cfs @ 2.73 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=321.00' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S-E: Contributing Runoff Area=63.087 ac 3.66% Impervious Runoff Depth=2.06"
Flow Length=3,105' Tc=55.3 min CN=73 Runoff=61.71 cfs 10.806 af

Subcatchment1S-P: Contributing Runoff Area=63.087 ac 3.66% Impervious Runoff Depth=2.06"
Flow Length=3,105' Tc=55.3 min CN=73 Runoff=61.71 cfs 10.806 af

Reach 1R-E: Beaver Pond Brook Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach 1R-P: Beaver Pond Brook Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach DP-E: Existing Culvert Outlet Inflow=19.47 cfs 13.185 af
Outflow=19.47 cfs 13.185 af

Reach DP-P: Proposed Culvert Outlet Inflow=20.56 cfs 12.330 af
Outflow=20.56 cfs 12.330 af

Pond 1P-E: Upstream Wetland Peak Elev=321.57' Storage=187,828 cf Inflow=61.71 cfs 10.806 af
Primary=19.47 cfs 13.185 af Secondary=0.00 cfs 0.000 af Outflow=19.47 cfs 13.185 af

Pond 1P-P: Upstream Wetland Peak Elev=321.86' Storage=232,327 cf Inflow=61.71 cfs 10.806 af
Primary=20.56 cfs 12.330 af Secondary=0.00 cfs 0.000 af Outflow=20.56 cfs 12.330 af

Total Runoff Area = 126.174 ac Runoff Volume = 21.612 af Average Runoff Depth = 2.06"
96.34% Pervious = 121.552 ac 3.66% Impervious = 4.622 ac

Summary for Subcatchment 1S-E: Contributing Watershed

Runoff = 61.71 cfs @ 12.78 hrs, Volume= 10.806 af, Depth= 2.06"
Routed to Pond 1P-E : Upstream Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.71"

Area (ac)	CN	Description
1.232	98	Unconnected pavement, HSG A
1.079	98	Roofs, HSG A
4.546	49	50-75% Grass cover, Fair, HSG A
8.793	43	Woods/grass comb., Fair, HSG A
4.596	69	50-75% Grass cover, Fair, HSG B
4.153	65	Woods/grass comb., Fair, HSG B
16.013	84	50-75% Grass cover, Fair, HSG D
22.675	82	Woods/grass comb., Fair, HSG D
63.087	73	Weighted Average
60.776		96.34% Pervious Area
2.311		3.66% Impervious Area
1.232		53.31% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0700	0.13		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 3.08"
2.1	258	0.1700	2.06		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.2	203	0.0440	1.05		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
8.3	680	0.0750	1.37		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.1	28	0.0360	3.85		**Shallow Concentrated Flow, 5** Paved Kv= 20.3 fps
6.7	539	0.0370	1.35		**Shallow Concentrated Flow, 6** Short Grass Pasture Kv= 7.0 fps
15.8	206	0.0019	0.22		**Shallow Concentrated Flow, 7** Woodland Kv= 5.0 fps
0.1	17	0.0180	2.72		**Shallow Concentrated Flow, 8** Paved Kv= 20.3 fps
4.5	379	0.0400	1.40		**Shallow Concentrated Flow, 9** Short Grass Pasture Kv= 7.0 fps
1.2	695		9.83		**Lake or Reservoir, 10** Mean Depth= 3.00'
55.3	3,105	Total			

Summary for Subcatchment 1S-P: Contributing Watershed

Runoff = 61.71 cfs @ 12.78 hrs, Volume= 10.806 af, Depth= 2.06"
Routed to Pond 1P-P : Upstream Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.71"

Area (ac)	CN	Description
1.232	98	Unconnected pavement, HSG A
1.079	98	Roofs, HSG A
4.546	49	50-75% Grass cover, Fair, HSG A
8.793	43	Woods/grass comb., Fair, HSG A
4.596	69	50-75% Grass cover, Fair, HSG B
4.153	65	Woods/grass comb., Fair, HSG B
16.013	84	50-75% Grass cover, Fair, HSG D
22.675	82	Woods/grass comb., Fair, HSG D
63.087	73	Weighted Average
60.776		96.34% Pervious Area
2.311		3.66% Impervious Area
1.232		53.31% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0700	0.13		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 3.08"
2.1	258	0.1700	2.06		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.2	203	0.0440	1.05		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
8.3	680	0.0750	1.37		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.1	28	0.0360	3.85		**Shallow Concentrated Flow, 5** Paved Kv= 20.3 fps
6.7	539	0.0370	1.35		**Shallow Concentrated Flow, 6** Short Grass Pasture Kv= 7.0 fps
15.8	206	0.0019	0.22		**Shallow Concentrated Flow, 7** Woodland Kv= 5.0 fps
0.1	17	0.0180	2.72		**Shallow Concentrated Flow, 8** Paved Kv= 20.3 fps
4.5	379	0.0400	1.40		**Shallow Concentrated Flow, 9** Short Grass Pasture Kv= 7.0 fps
1.2	695		9.83		**Lake or Reservoir, 10** Mean Depth= 3.00'
55.3	3,105	Total			

Summary for Reach 1R-E: Beaver Pond Brook

[40] Hint: Not Described (Outflow=Inflow)

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 1R-P: Beaver Pond Brook

[40] Hint: Not Described (Outflow=Inflow)

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach DP-E: Existing Culvert Outlet

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 63.087 ac, 3.66% Impervious, Inflow Depth > 2.51" for 10-Year event
Inflow = 19.47 cfs @ 13.87 hrs, Volume= 13.185 af
Outflow = 19.47 cfs @ 13.87 hrs, Volume= 13.185 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach DP-P: Proposed Culvert Outlet

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 63.087 ac, 3.66% Impervious, Inflow Depth > 2.35" for 10-Year event
Inflow = 20.56 cfs @ 13.81 hrs, Volume= 12.330 af
Outflow = 20.56 cfs @ 13.81 hrs, Volume= 12.330 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Pond 1P-E: Upstream Wetland

Per Survey, water line at elevation 321

Inflow Area = 63.087 ac, 3.66% Impervious, Inflow Depth = 2.06" for 10-Year event
Inflow = 61.71 cfs @ 12.78 hrs, Volume= 10.806 af
Outflow = 19.47 cfs @ 13.87 hrs, Volume= 13.185 af, Atten= 68%, Lag= 65.6 min
Primary = 19.47 cfs @ 13.87 hrs, Volume= 13.185 af
Routed to Reach DP-E : Existing Culvert Outlet
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 1R-E : Beaver Pond Brook

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Starting Elev= 321.00' Surf.Area= 137,441 sf Storage= 105,653 cf
Peak Elev= 321.57' @ 13.87 hrs Surf.Area= 150,981 sf Storage= 187,828 cf (82,176 cf above start)
Flood Elev= 324.60' Surf.Area= 182,024 sf Storage= 426,736 cf (321,083 cf above start)

Plug-Flow detention time= 160.5 min calculated for 10.758 af (100% of inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	319.00'	426,736 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)
319.00	21,959	792.0	0	0	21,959
320.00	32,212	907.0	26,922	26,922	37,530
321.00	137,441	1,739.0	78,730	105,653	212,723
322.00	161,615	1,860.0	149,365	255,017	247,424
323.00	182,024	1,964.0	171,718	426,736	279,129

Device	Routing	Invert	Outlet Devices
#1	Primary	319.00'	**36.0" Round Culvert** L= 45.4' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 319.00' / 319.00' S= 0.0000 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf
#2	Secondary	322.50'	**14.0' 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

Primary OutFlow Max=19.47 cfs @ 13.87 hrs HW=321.57' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 19.47 cfs @ 4.06 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=321.00' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 1P-P: Upstream Wetland

Per Survey, water line at elevation 321

Inflow Area = 63.087 ac, 3.66% Impervious, Inflow Depth = 2.06" for 10-Year event
Inflow = 61.71 cfs @ 12.78 hrs, Volume= 10.806 af
Outflow = 20.56 cfs @ 13.81 hrs, Volume= 12.330 af, Atten= 67%, Lag= 62.0 min
Primary = 20.56 cfs @ 13.81 hrs, Volume= 12.330 af
Routed to Reach DP-P : Proposed Culvert Outlet
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 1R-P : Beaver Pond Brook

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Starting Elev= 321.00' Surf.Area= 137,441 sf Storage= 105,653 cf
Peak Elev= 321.86' @ 13.81 hrs Surf.Area= 158,064 sf Storage= 232,327 cf (126,675 cf above start)
Flood Elev= 324.60' Surf.Area= 182,024 sf Storage= 426,736 cf (321,083 cf above start)

Plug-Flow detention time= 269.0 min calculated for 9.904 af (92% of inflow)
Center-of-Mass det. time= 94.8 min (983.5 - 888.7)

Volume	Invert	Avail.Storage	Storage Description
#1	319.00'	426,736 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)
319.00	21,959	792.0	0	0	21,959
320.00	32,212	907.0	26,922	26,922	37,530
321.00	137,441	1,739.0	78,730	105,653	212,723
322.00	161,615	1,860.0	149,365	255,017	247,424
323.00	182,024	1,964.0	171,718	426,736	279,129

Device	Routing	Invert	Outlet Devices
#1	Primary	320.25'	**65.0" W x 54.0" H, R=34.0"/56.3" Pipe Arch CMP_Arch_1 66x51 w/ 15.0" insi** L= 45.4' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 319.00' / 319.00' S= 0.0000 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 14.59 sf
#2	Secondary	322.50'	**14.0' 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

Primary OutFlow Max=20.56 cfs @ 13.81 hrs HW=321.86' TW=0.00' (Dynamic Tailwater)
↑—**1=CMP_Arch_1 66x51** (Barrel Controls 20.56 cfs @ 3.20 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=321.00' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S-E: Contributing Runoff Area=63.087 ac 3.66% Impervious Runoff Depth=2.86"
Flow Length=3,105' Tc=55.3 min CN=73 Runoff=86.73 cfs 15.025 af

Subcatchment1S-P: Contributing Runoff Area=63.087 ac 3.66% Impervious Runoff Depth=2.86"
Flow Length=3,105' Tc=55.3 min CN=73 Runoff=86.73 cfs 15.025 af

Reach 1R-E: Beaver Pond Brook Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach 1R-P: Beaver Pond Brook Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach DP-E: Existing Culvert Outlet Inflow=26.43 cfs 17.403 af
Outflow=26.43 cfs 17.403 af

Reach DP-P: Proposed Culvert Outlet Inflow=30.77 cfs 16.547 af
Outflow=30.77 cfs 16.547 af

Pond 1P-E: Upstream Wetland Peak Elev=322.09' Storage=269,438 cf Inflow=86.73 cfs 15.025 af
Primary=26.43 cfs 17.403 af Secondary=0.00 cfs 0.000 af Outflow=26.43 cfs 17.403 af

Pond 1P-P: Upstream Wetland Peak Elev=322.30' Storage=304,779 cf Inflow=86.73 cfs 15.025 af
Primary=30.77 cfs 16.547 af Secondary=0.00 cfs 0.000 af Outflow=30.77 cfs 16.547 af

Total Runoff Area = 126.174 ac Runoff Volume = 30.049 af Average Runoff Depth = 2.86"
96.34% Pervious = 121.552 ac 3.66% Impervious = 4.622 ac

Summary for Subcatchment 1S-E: Contributing Watershed

Runoff = 86.73 cfs @ 12.77 hrs, Volume= 15.025 af, Depth= 2.86"
Routed to Pond 1P-E : Upstream Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.72"

Area (ac)	CN	Description
1.232	98	Unconnected pavement, HSG A
1.079	98	Roofs, HSG A
4.546	49	50-75% Grass cover, Fair, HSG A
8.793	43	Woods/grass comb., Fair, HSG A
4.596	69	50-75% Grass cover, Fair, HSG B
4.153	65	Woods/grass comb., Fair, HSG B
16.013	84	50-75% Grass cover, Fair, HSG D
22.675	82	Woods/grass comb., Fair, HSG D
63.087	73	Weighted Average
60.776		96.34% Pervious Area
2.311		3.66% Impervious Area
1.232		53.31% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0700	0.13		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 3.08"
2.1	258	0.1700	2.06		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.2	203	0.0440	1.05		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
8.3	680	0.0750	1.37		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.1	28	0.0360	3.85		**Shallow Concentrated Flow, 5** Paved Kv= 20.3 fps
6.7	539	0.0370	1.35		**Shallow Concentrated Flow, 6** Short Grass Pasture Kv= 7.0 fps
15.8	206	0.0019	0.22		**Shallow Concentrated Flow, 7** Woodland Kv= 5.0 fps
0.1	17	0.0180	2.72		**Shallow Concentrated Flow, 8** Paved Kv= 20.3 fps
4.5	379	0.0400	1.40		**Shallow Concentrated Flow, 9** Short Grass Pasture Kv= 7.0 fps
1.2	695		9.83		**Lake or Reservoir, 10** Mean Depth= 3.00'
55.3	3,105	Total			

Summary for Subcatchment 1S-P: Contributing Watershed

Runoff = 86.73 cfs @ 12.77 hrs, Volume= 15.025 af, Depth= 2.86"
Routed to Pond 1P-P : Upstream Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.72"

Area (ac)	CN	Description
1.232	98	Unconnected pavement, HSG A
1.079	98	Roofs, HSG A
4.546	49	50-75% Grass cover, Fair, HSG A
8.793	43	Woods/grass comb., Fair, HSG A
4.596	69	50-75% Grass cover, Fair, HSG B
4.153	65	Woods/grass comb., Fair, HSG B
16.013	84	50-75% Grass cover, Fair, HSG D
22.675	82	Woods/grass comb., Fair, HSG D
63.087	73	Weighted Average
60.776		96.34% Pervious Area
2.311		3.66% Impervious Area
1.232		53.31% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0700	0.13		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 3.08"
2.1	258	0.1700	2.06		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.2	203	0.0440	1.05		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
8.3	680	0.0750	1.37		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.1	28	0.0360	3.85		**Shallow Concentrated Flow, 5** Paved Kv= 20.3 fps
6.7	539	0.0370	1.35		**Shallow Concentrated Flow, 6** Short Grass Pasture Kv= 7.0 fps
15.8	206	0.0019	0.22		**Shallow Concentrated Flow, 7** Woodland Kv= 5.0 fps
0.1	17	0.0180	2.72		**Shallow Concentrated Flow, 8** Paved Kv= 20.3 fps
4.5	379	0.0400	1.40		**Shallow Concentrated Flow, 9** Short Grass Pasture Kv= 7.0 fps
1.2	695		9.83		**Lake or Reservoir, 10** Mean Depth= 3.00'
55.3	3,105	Total			

Summary for Reach 1R-E: Beaver Pond Brook

[40] Hint: Not Described (Outflow=Inflow)

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 1R-P: Beaver Pond Brook

[40] Hint: Not Described (Outflow=Inflow)

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach DP-E: Existing Culvert Outlet

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 63.087 ac, 3.66% Impervious, Inflow Depth > 3.31" for 25-Year event
Inflow = 26.43 cfs @ 13.86 hrs, Volume= 17.403 af
Outflow = 26.43 cfs @ 13.86 hrs, Volume= 17.403 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach DP-P: Proposed Culvert Outlet

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 63.087 ac, 3.66% Impervious, Inflow Depth > 3.15" for 25-Year event
Inflow = 30.77 cfs @ 13.71 hrs, Volume= 16.547 af
Outflow = 30.77 cfs @ 13.71 hrs, Volume= 16.547 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Pond 1P-E: Upstream Wetland

Per Survey, water line at elevation 321

Inflow Area = 63.087 ac, 3.66% Impervious, Inflow Depth = 2.86" for 25-Year event
Inflow = 86.73 cfs @ 12.77 hrs, Volume= 15.025 af
Outflow = 26.43 cfs @ 13.86 hrs, Volume= 17.403 af, Atten= 70%, Lag= 65.5 min
Primary = 26.43 cfs @ 13.86 hrs, Volume= 17.403 af
Routed to Reach DP-E : Existing Culvert Outlet
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 1R-E : Beaver Pond Brook

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Starting Elev= 321.00' Surf.Area= 137,441 sf Storage= 105,653 cf
Peak Elev= 322.09' @ 13.86 hrs Surf.Area= 163,377 sf Storage= 269,438 cf (163,786 cf above start)
Flood Elev= 324.60' Surf.Area= 182,024 sf Storage= 426,736 cf (321,083 cf above start)

Plug-Flow detention time= 163.6 min calculated for 14.978 af (100% of inflow)
Center-of-Mass det. time= 38.7 min (917.8 - 879.1)

Volume	Invert	Avail.Storage	Storage Description
#1	319.00'	426,736 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)
319.00	21,959	792.0	0	0	21,959
320.00	32,212	907.0	26,922	26,922	37,530
321.00	137,441	1,739.0	78,730	105,653	212,723
322.00	161,615	1,860.0	149,365	255,017	247,424
323.00	182,024	1,964.0	171,718	426,736	279,129

Device	Routing	Invert	Outlet Devices
#1	Primary	319.00'	**36.0" Round Culvert** L= 45.4' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 319.00' / 319.00' S= 0.0000 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf
#2	Secondary	322.50'	**14.0' 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

Primary OutFlow Max=26.43 cfs @ 13.86 hrs HW=322.09' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 26.43 cfs @ 4.51 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=321.00' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 1P-P: Upstream Wetland

Per Survey, water line at elevation 321

Inflow Area = 63.087 ac, 3.66% Impervious, Inflow Depth = 2.86" for 25-Year event
Inflow = 86.73 cfs @ 12.77 hrs, Volume= 15.025 af
Outflow = 30.77 cfs @ 13.71 hrs, Volume= 16.547 af, Atten= 65%, Lag= 56.2 min
Primary = 30.77 cfs @ 13.71 hrs, Volume= 16.547 af
Routed to Reach DP-P : Proposed Culvert Outlet
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 1R-P : Beaver Pond Brook

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Starting Elev= 321.00' Surf.Area= 137,441 sf Storage= 105,653 cf
Peak Elev= 322.30' @ 13.71 hrs Surf.Area= 167,656 sf Storage= 304,779 cf (199,127 cf above start)
Flood Elev= 324.60' Surf.Area= 182,024 sf Storage= 426,736 cf (321,083 cf above start)

Plug-Flow detention time= 233.3 min calculated for 14.120 af (94% of inflow)
Center-of-Mass det. time= 107.1 min (986.2 - 879.1)

Volume	Invert	Avail.Storage	Storage Description
#1	319.00'	426,736 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)
319.00	21,959	792.0	0	0	21,959
320.00	32,212	907.0	26,922	26,922	37,530
321.00	137,441	1,739.0	78,730	105,653	212,723
322.00	161,615	1,860.0	149,365	255,017	247,424
323.00	182,024	1,964.0	171,718	426,736	279,129

Device	Routing	Invert	Outlet Devices
#1	Primary	320.25'	**65.0" W x 54.0" H, R=34.0"/56.3" Pipe Arch CMP_Arch_1 66x51 w/ 15.0" insi** L= 45.4' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 319.00' / 319.00' S= 0.0000 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 14.59 sf
#2	Secondary	322.50'	**14.0' 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

Primary OutFlow Max=30.77 cfs @ 13.71 hrs HW=322.30' TW=0.00' (Dynamic Tailwater)
↑—**1=CMP_Arch_1 66x51** (Barrel Controls 30.77 cfs @ 3.76 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=321.00' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S-E: Contributing Runoff Area=63.087 ac 3.66% Impervious Runoff Depth=3.48"
Flow Length=3,105' Tc=55.3 min CN=73 Runoff=106.13 cfs 18.308 af

Subcatchment1S-P: Contributing Runoff Area=63.087 ac 3.66% Impervious Runoff Depth=3.48"
Flow Length=3,105' Tc=55.3 min CN=73 Runoff=106.13 cfs 18.308 af

Reach 1R-E: Beaver Pond Brook Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach 1R-P: Beaver Pond Brook Inflow=1.47 cfs 0.075 af
Outflow=1.47 cfs 0.075 af

Reach DP-E: Existing Culvert Outlet Inflow=31.22 cfs 20.687 af
Outflow=31.22 cfs 20.687 af

Reach DP-P: Proposed Culvert Outlet Inflow=38.66 cfs 19.756 af
Outflow=38.66 cfs 19.756 af

Pond 1P-E: Upstream Wetland Peak Elev=322.48' Storage=334,749 cf Inflow=106.13 cfs 18.308 af
Primary=31.22 cfs 20.687 af Secondary=0.00 cfs 0.000 af Outflow=31.22 cfs 20.687 af

Pond 1P-P: Upstream Wetland Peak Elev=322.62' Storage=359,273 cf Inflow=106.13 cfs 18.308 af
Primary=38.66 cfs 19.756 af Secondary=1.47 cfs 0.075 af Outflow=40.13 cfs 19.831 af

Total Runoff Area = 126.174 ac Runoff Volume = 36.617 af Average Runoff Depth = 3.48"
96.34% Pervious = 121.552 ac 3.66% Impervious = 4.622 ac

Summary for Subcatchment 1S-E: Contributing Watershed

Runoff = 106.13 cfs @ 12.73 hrs, Volume= 18.308 af, Depth= 3.48"
Routed to Pond 1P-E : Upstream Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Year Rainfall=6.47"

Area (ac)	CN	Description
1.232	98	Unconnected pavement, HSG A
1.079	98	Roofs, HSG A
4.546	49	50-75% Grass cover, Fair, HSG A
8.793	43	Woods/grass comb., Fair, HSG A
4.596	69	50-75% Grass cover, Fair, HSG B
4.153	65	Woods/grass comb., Fair, HSG B
16.013	84	50-75% Grass cover, Fair, HSG D
22.675	82	Woods/grass comb., Fair, HSG D
63.087	73	Weighted Average
60.776		96.34% Pervious Area
2.311		3.66% Impervious Area
1.232		53.31% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0700	0.13		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 3.08"
2.1	258	0.1700	2.06		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.2	203	0.0440	1.05		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
8.3	680	0.0750	1.37		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.1	28	0.0360	3.85		**Shallow Concentrated Flow, 5** Paved Kv= 20.3 fps
6.7	539	0.0370	1.35		**Shallow Concentrated Flow, 6** Short Grass Pasture Kv= 7.0 fps
15.8	206	0.0019	0.22		**Shallow Concentrated Flow, 7** Woodland Kv= 5.0 fps
0.1	17	0.0180	2.72		**Shallow Concentrated Flow, 8** Paved Kv= 20.3 fps
4.5	379	0.0400	1.40		**Shallow Concentrated Flow, 9** Short Grass Pasture Kv= 7.0 fps
1.2	695		9.83		**Lake or Reservoir, 10** Mean Depth= 3.00'
55.3	3,105	Total			

Summary for Subcatchment 1S-P: Contributing Watershed

Runoff = 106.13 cfs @ 12.73 hrs, Volume= 18.308 af, Depth= 3.48"
Routed to Pond 1P-P : Upstream Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Year Rainfall=6.47"

Area (ac)	CN	Description
1.232	98	Unconnected pavement, HSG A
1.079	98	Roofs, HSG A
4.546	49	50-75% Grass cover, Fair, HSG A
8.793	43	Woods/grass comb., Fair, HSG A
4.596	69	50-75% Grass cover, Fair, HSG B
4.153	65	Woods/grass comb., Fair, HSG B
16.013	84	50-75% Grass cover, Fair, HSG D
22.675	82	Woods/grass comb., Fair, HSG D
63.087	73	Weighted Average
60.776		96.34% Pervious Area
2.311		3.66% Impervious Area
1.232		53.31% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0700	0.13		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 3.08"
2.1	258	0.1700	2.06		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.2	203	0.0440	1.05		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
8.3	680	0.0750	1.37		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.1	28	0.0360	3.85		**Shallow Concentrated Flow, 5** Paved Kv= 20.3 fps
6.7	539	0.0370	1.35		**Shallow Concentrated Flow, 6** Short Grass Pasture Kv= 7.0 fps
15.8	206	0.0019	0.22		**Shallow Concentrated Flow, 7** Woodland Kv= 5.0 fps
0.1	17	0.0180	2.72		**Shallow Concentrated Flow, 8** Paved Kv= 20.3 fps
4.5	379	0.0400	1.40		**Shallow Concentrated Flow, 9** Short Grass Pasture Kv= 7.0 fps
1.2	695		9.83		**Lake or Reservoir, 10** Mean Depth= 3.00'
55.3	3,105	Total			

Summary for Reach 1R-E: Beaver Pond Brook

[40] Hint: Not Described (Outflow=Inflow)

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 1R-P: Beaver Pond Brook

[40] Hint: Not Described (Outflow=Inflow)

Inflow = 1.47 cfs @ 13.63 hrs, Volume= 0.075 af
Outflow = 1.47 cfs @ 13.63 hrs, Volume= 0.075 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach DP-E: Existing Culvert Outlet

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 63.087 ac, 3.66% Impervious, Inflow Depth > 3.93" for 50-Year event
Inflow = 31.22 cfs @ 13.87 hrs, Volume= 20.687 af
Outflow = 31.22 cfs @ 13.87 hrs, Volume= 20.687 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach DP-P: Proposed Culvert Outlet

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 63.087 ac, 3.66% Impervious, Inflow Depth > 3.76" for 50-Year event
Inflow = 38.66 cfs @ 13.63 hrs, Volume= 19.756 af
Outflow = 38.66 cfs @ 13.63 hrs, Volume= 19.756 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Pond 1P-E: Upstream Wetland

Per Survey, water line at elevation 321

Inflow Area = 63.087 ac, 3.66% Impervious, Inflow Depth = 3.48" for 50-Year event
Inflow = 106.13 cfs @ 12.73 hrs, Volume= 18.308 af
Outflow = 31.22 cfs @ 13.87 hrs, Volume= 20.687 af, Atten= 71%, Lag= 68.7 min
Primary = 31.22 cfs @ 13.87 hrs, Volume= 20.687 af
Routed to Reach DP-E : Existing Culvert Outlet
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 1R-E : Beaver Pond Brook

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Starting Elev= 321.00' Surf.Area= 137,441 sf Storage= 105,653 cf
Peak Elev= 322.48' @ 13.87 hrs Surf.Area= 171,242 sf Storage= 334,749 cf (229,096 cf above start)
Flood Elev= 324.60' Surf.Area= 182,024 sf Storage= 426,736 cf (321,083 cf above start)

Plug-Flow detention time= 166.9 min calculated for 18.261 af (100% of inflow)
Center-of-Mass det. time= 61.9 min (935.3 - 873.4)

Volume	Invert	Avail.Storage	Storage Description
#1	319.00'	426,736 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)
319.00	21,959	792.0	0	0	21,959
320.00	32,212	907.0	26,922	26,922	37,530
321.00	137,441	1,739.0	78,730	105,653	212,723
322.00	161,615	1,860.0	149,365	255,017	247,424
323.00	182,024	1,964.0	171,718	426,736	279,129

Device	Routing	Invert	Outlet Devices
#1	Primary	319.00'	**36.0" Round Culvert** L= 45.4' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 319.00' / 319.00' S= 0.0000 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf
#2	Secondary	322.50'	**14.0' 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

Primary OutFlow Max=31.22 cfs @ 13.87 hrs HW=322.48' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 31.22 cfs @ 4.78 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=321.00' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 1P-P: Upstream Wetland

Per Survey, water line at elevation 321

Inflow Area = 63.087 ac, 3.66% Impervious, Inflow Depth = 3.48" for 50-Year event
Inflow = 106.13 cfs @ 12.73 hrs, Volume= 18.308 af
Outflow = 40.13 cfs @ 13.63 hrs, Volume= 19.831 af, Atten= 62%, Lag= 54.0 min
Primary = 38.66 cfs @ 13.63 hrs, Volume= 19.756 af
Routed to Reach DP-P : Proposed Culvert Outlet
Secondary = 1.47 cfs @ 13.63 hrs, Volume= 0.075 af
Routed to Reach 1R-P : Beaver Pond Brook

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Starting Elev= 321.00' Surf.Area= 137,441 sf Storage= 105,653 cf
Peak Elev= 322.62' @ 13.63 hrs Surf.Area= 174,149 sf Storage= 359,273 cf (253,621 cf above start)
Flood Elev= 324.60' Surf.Area= 182,024 sf Storage= 426,736 cf (321,083 cf above start)

Plug-Flow detention time= 215.9 min calculated for 17.405 af (95% of inflow)
Center-of-Mass det. time= 111.4 min (984.8 - 873.4)

Volume	Invert	Avail.Storage	Storage Description
#1	319.00'	426,736 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)
319.00	21,959	792.0	0	0	21,959
320.00	32,212	907.0	26,922	26,922	37,530
321.00	137,441	1,739.0	78,730	105,653	212,723
322.00	161,615	1,860.0	149,365	255,017	247,424
323.00	182,024	1,964.0	171,718	426,736	279,129

Device	Routing	Invert	Outlet Devices
#1	Primary	320.25'	**65.0" W x 54.0" H, R=34.0"/56.3" Pipe Arch CMP_Arch_1 66x51 w/ 15.0" insi** L= 45.4' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 319.00' / 319.00' S= 0.0000 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 14.59 sf
#2	Secondary	322.50'	**14.0' 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

Primary OutFlow Max=38.66 cfs @ 13.63 hrs HW=322.62' TW=0.00' (Dynamic Tailwater)
↑—**1=CMP_Arch_1 66x51** (Barrel Controls 38.66 cfs @ 4.12 fps)

Secondary OutFlow Max=1.47 cfs @ 13.63 hrs HW=322.62' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 1.47 cfs @ 0.87 fps)

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S-E: Contributing Runoff Area=63.087 ac 3.66% Impervious Runoff Depth=4.18"
Flow Length=3,105' Tc=55.3 min CN=73 Runoff=127.67 cfs 21.963 af

Subcatchment1S-P: Contributing Runoff Area=63.087 ac 3.66% Impervious Runoff Depth=4.18"
Flow Length=3,105' Tc=55.3 min CN=73 Runoff=127.67 cfs 21.963 af

Reach 1R-E: Beaver Pond Brook Inflow=7.27 cfs 0.688 af
Outflow=7.27 cfs 0.688 af

Reach 1R-P: Beaver Pond Brook Inflow=9.35 cfs 0.775 af
Outflow=9.35 cfs 0.775 af

Reach DP-E: Existing Culvert Outlet Inflow=34.49 cfs 23.653 af
Outflow=34.49 cfs 23.653 af

Reach DP-P: Proposed Culvert Outlet Inflow=45.96 cfs 22.710 af
Outflow=45.96 cfs 22.710 af

Pond 1P-E: Upstream Wetland Peak Elev=322.85' Storage=399,130 cf Inflow=127.67 cfs 21.963 af
Primary=34.49 cfs 23.653 af Secondary=7.27 cfs 0.688 af Outflow=41.76 cfs 24.342 af

Pond 1P-P: Upstream Wetland Peak Elev=322.91' Storage=410,049 cf Inflow=127.67 cfs 21.963 af
Primary=45.96 cfs 22.710 af Secondary=9.35 cfs 0.775 af Outflow=55.31 cfs 23.485 af

Total Runoff Area = 126.174 ac Runoff Volume = 43.927 af Average Runoff Depth = 4.18"
96.34% Pervious = 121.552 ac 3.66% Impervious = 4.622 ac

Summary for Subcatchment 1S-E: Contributing Watershed

Runoff = 127.67 cfs @ 12.72 hrs, Volume= 21.963 af, Depth= 4.18"
Routed to Pond 1P-E : Upstream Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=7.28"

Area (ac)	CN	Description
1.232	98	Unconnected pavement, HSG A
1.079	98	Roofs, HSG A
4.546	49	50-75% Grass cover, Fair, HSG A
8.793	43	Woods/grass comb., Fair, HSG A
4.596	69	50-75% Grass cover, Fair, HSG B
4.153	65	Woods/grass comb., Fair, HSG B
16.013	84	50-75% Grass cover, Fair, HSG D
22.675	82	Woods/grass comb., Fair, HSG D
63.087	73	Weighted Average
60.776		96.34% Pervious Area
2.311		3.66% Impervious Area
1.232		53.31% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0700	0.13		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 3.08"
2.1	258	0.1700	2.06		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.2	203	0.0440	1.05		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
8.3	680	0.0750	1.37		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.1	28	0.0360	3.85		**Shallow Concentrated Flow, 5** Paved Kv= 20.3 fps
6.7	539	0.0370	1.35		**Shallow Concentrated Flow, 6** Short Grass Pasture Kv= 7.0 fps
15.8	206	0.0019	0.22		**Shallow Concentrated Flow, 7** Woodland Kv= 5.0 fps
0.1	17	0.0180	2.72		**Shallow Concentrated Flow, 8** Paved Kv= 20.3 fps
4.5	379	0.0400	1.40		**Shallow Concentrated Flow, 9** Short Grass Pasture Kv= 7.0 fps
1.2	695		9.83		**Lake or Reservoir, 10** Mean Depth= 3.00'
55.3	3,105	Total			

Summary for Subcatchment 1S-P: Contributing Watershed

Runoff = 127.67 cfs @ 12.72 hrs, Volume= 21.963 af, Depth= 4.18"
Routed to Pond 1P-P : Upstream Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=7.28"

Area (ac)	CN	Description
1.232	98	Unconnected pavement, HSG A
1.079	98	Roofs, HSG A
4.546	49	50-75% Grass cover, Fair, HSG A
8.793	43	Woods/grass comb., Fair, HSG A
4.596	69	50-75% Grass cover, Fair, HSG B
4.153	65	Woods/grass comb., Fair, HSG B
16.013	84	50-75% Grass cover, Fair, HSG D
22.675	82	Woods/grass comb., Fair, HSG D
63.087	73	Weighted Average
60.776		96.34% Pervious Area
2.311		3.66% Impervious Area
1.232		53.31% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0700	0.13		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 3.08"
2.1	258	0.1700	2.06		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.2	203	0.0440	1.05		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
8.3	680	0.0750	1.37		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.1	28	0.0360	3.85		**Shallow Concentrated Flow, 5** Paved Kv= 20.3 fps
6.7	539	0.0370	1.35		**Shallow Concentrated Flow, 6** Short Grass Pasture Kv= 7.0 fps
15.8	206	0.0019	0.22		**Shallow Concentrated Flow, 7** Woodland Kv= 5.0 fps
0.1	17	0.0180	2.72		**Shallow Concentrated Flow, 8** Paved Kv= 20.3 fps
4.5	379	0.0400	1.40		**Shallow Concentrated Flow, 9** Short Grass Pasture Kv= 7.0 fps
1.2	695		9.83		**Lake or Reservoir, 10** Mean Depth= 3.00'
55.3	3,105	Total			

Summary for Reach 1R-E: Beaver Pond Brook

[40] Hint: Not Described (Outflow=Inflow)

Inflow = 7.27 cfs @ 13.74 hrs, Volume= 0.688 af
Outflow = 7.27 cfs @ 13.74 hrs, Volume= 0.688 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 1R-P: Beaver Pond Brook

[40] Hint: Not Described (Outflow=Inflow)

Inflow = 9.35 cfs @ 13.50 hrs, Volume= 0.775 af
Outflow = 9.35 cfs @ 13.50 hrs, Volume= 0.775 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach DP-E: Existing Culvert Outlet

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 63.087 ac, 3.66% Impervious, Inflow Depth > 4.50" for 100-Year event
Inflow = 34.49 cfs @ 13.74 hrs, Volume= 23.653 af
Outflow = 34.49 cfs @ 13.74 hrs, Volume= 23.653 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach DP-P: Proposed Culvert Outlet

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 63.087 ac, 3.66% Impervious, Inflow Depth > 4.32" for 100-Year event
Inflow = 45.96 cfs @ 13.50 hrs, Volume= 22.710 af
Outflow = 45.96 cfs @ 13.50 hrs, Volume= 22.710 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Pond 1P-E: Upstream Wetland

Per Survey, water line at elevation 321

Inflow Area = 63.087 ac, 3.66% Impervious, Inflow Depth = 4.18" for 100-Year event
Inflow = 127.67 cfs @ 12.72 hrs, Volume= 21.963 af
Outflow = 41.76 cfs @ 13.74 hrs, Volume= 24.342 af, Atten= 67%, Lag= 61.2 min
Primary = 34.49 cfs @ 13.74 hrs, Volume= 23.653 af
Routed to Reach DP-E : Existing Culvert Outlet
Secondary = 7.27 cfs @ 13.74 hrs, Volume= 0.688 af
Routed to Reach 1R-E : Beaver Pond Brook

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Starting Elev= 321.00' Surf.Area= 137,441 sf Storage= 105,653 cf
Peak Elev= 322.85' @ 13.74 hrs Surf.Area= 178,823 sf Storage= 399,130 cf (293,478 cf above start)
Flood Elev= 324.60' Surf.Area= 182,024 sf Storage= 426,736 cf (321,083 cf above start)

Plug-Flow detention time= 165.9 min calculated for 21.916 af (100% of inflow)
Center-of-Mass det. time= 77.1 min (945.3 - 868.2)

Volume	Invert	Avail.Storage	Storage Description
#1	319.00'	426,736 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)
319.00	21,959	792.0	0	0	21,959
320.00	32,212	907.0	26,922	26,922	37,530
321.00	137,441	1,739.0	78,730	105,653	212,723
322.00	161,615	1,860.0	149,365	255,017	247,424
323.00	182,024	1,964.0	171,718	426,736	279,129

Device	Routing	Invert	Outlet Devices
#1	Primary	319.00'	**36.0" Round Culvert** L= 45.4' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 319.00' / 319.00' S= 0.0000 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 7.07 sf
#2	Secondary	322.50'	**14.0' 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

Primary OutFlow Max=34.49 cfs @ 13.74 hrs HW=322.85' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 34.49 cfs @ 4.94 fps)

Secondary OutFlow Max=7.27 cfs @ 13.74 hrs HW=322.85' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 7.27 cfs @ 1.50 fps)

Summary for Pond 1P-P: Upstream Wetland

Per Survey, water line at elevation 321

Inflow Area = 63.087 ac, 3.66% Impervious, Inflow Depth = 4.18" for 100-Year event
Inflow = 127.67 cfs @ 12.72 hrs, Volume= 21.963 af
Outflow = 55.31 cfs @ 13.50 hrs, Volume= 23.485 af, Atten= 57%, Lag= 46.7 min
Primary = 45.96 cfs @ 13.50 hrs, Volume= 22.710 af
Routed to Reach DP-P : Proposed Culvert Outlet
Secondary = 9.35 cfs @ 13.50 hrs, Volume= 0.775 af
Routed to Reach 1R-P : Beaver Pond Brook

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Starting Elev= 321.00' Surf.Area= 137,441 sf Storage= 105,653 cf
Peak Elev= 322.91' @ 13.50 hrs Surf.Area= 180,092 sf Storage= 410,049 cf (304,396 cf above start)
Flood Elev= 324.60' Surf.Area= 182,024 sf Storage= 426,736 cf (321,083 cf above start)

Plug-Flow detention time= 198.4 min calculated for 21.060 af (96% of inflow)
Center-of-Mass det. time= 111.2 min (979.3 - 868.2)

Volume	Invert	Avail.Storage	Storage Description
#1	319.00'	426,736 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)
319.00	21,959	792.0	0	0	21,959
320.00	32,212	907.0	26,922	26,922	37,530
321.00	137,441	1,739.0	78,730	105,653	212,723
322.00	161,615	1,860.0	149,365	255,017	247,424
323.00	182,024	1,964.0	171,718	426,736	279,129

Device	Routing	Invert	Outlet Devices
#1	Primary	320.25'	**65.0" W x 54.0" H, R=34.0"/56.3" Pipe Arch CMP_Arch_1 66x51 w/ 15.0" insi** L= 45.4' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 319.00' / 319.00' S= 0.0000 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 14.59 sf
#2	Secondary	322.50'	**14.0' 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

Primary OutFlow Max=45.96 cfs @ 13.50 hrs HW=322.91' TW=0.00' (Dynamic Tailwater)
↑—**1=CMP_Arch_1 66x51** (Barrel Controls 45.96 cfs @ 4.41 fps)

Secondary OutFlow Max=9.35 cfs @ 13.50 hrs HW=322.91' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 9.35 cfs @ 1.64 fps)

ATTACHMENT 2
HY-8 Culvert Analysis Report

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Straight Culvert

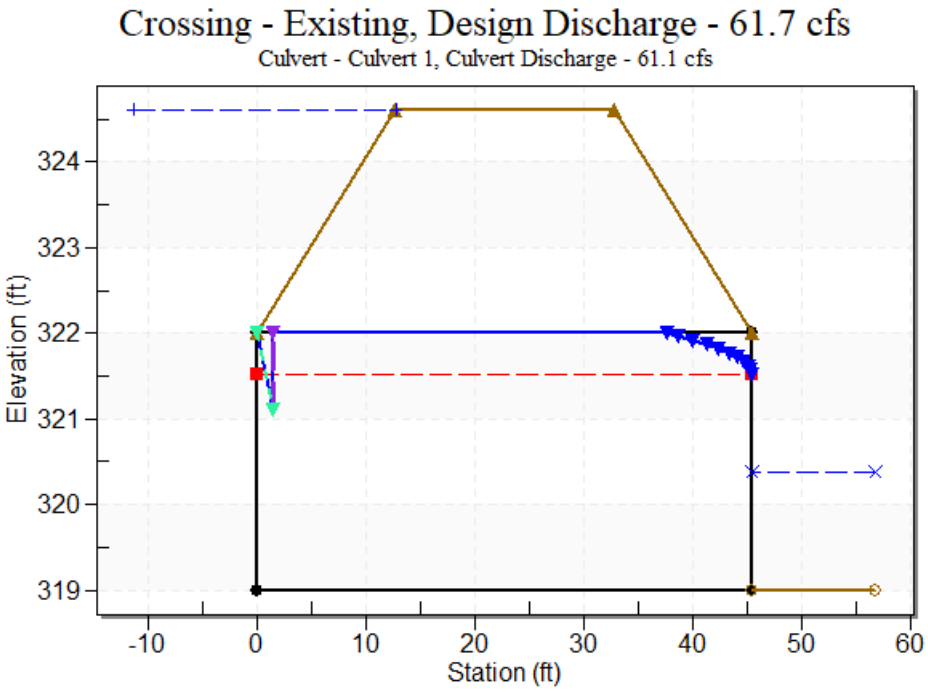
Inlet Elevation (invert): 319.00 ft, Outlet Elevation (invert): 319.00 ft

Culvert Length: 45.40 ft, Culvert Slope: 0.0000

****

EXISTING

Water Surface Profile Plot for Culvert: Culvert 1



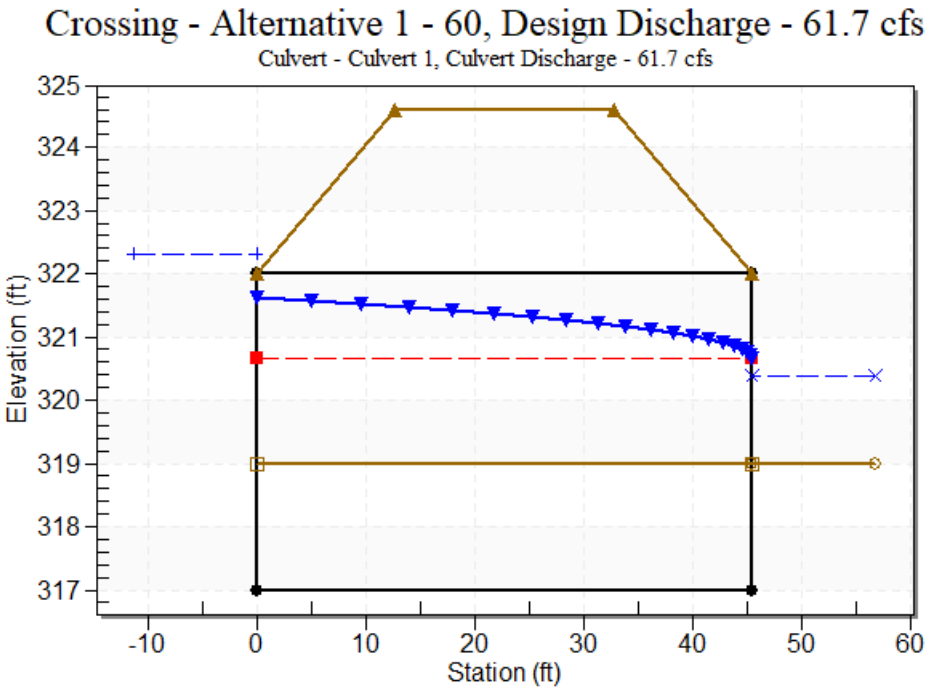
EXISTING

Table 1 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (f	Outlet Control Depth (f	Flow Type	Normal Depth (f	Critical Depth (f	Outlet Depth (f	Tailwater Depth (f	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
25.48	25.48	321.82	2.440	2.824	7-H2	-1.000	1.629	1.629	0.973	6.499	2.890
35.70	35.70	322.52	3.106	3.524	7-H2	-1.000	1.942	1.942	1.106	7.374	3.127
45.92	45.92	323.11	3.953	4.115	7-H2	-1.000	2.207	2.207	1.270	8.237	2.914
56.14	56.14	324.02	5.023	4.666	7-JH2 c	-1.000	2.429	2.429	1.339	9.157	3.114
61.71	61.09	324.62	5.618	4.973	7-JH2 c	-1.000	2.521	2.521	1.374	9.638	3.211
76.58	62.23	324.76	5.761	5.048	7-JH2 c	-1.000	2.540	2.540	1.460	9.751	3.443
86.79	62.76	324.83	5.827	5.082	7-JH2 c	-1.000	2.549	2.549	1.514	9.805	3.583
97.01	63.20	324.89	5.885	5.112	7-JH2 c	-1.000	2.556	2.556	1.565	9.851	3.711
107.23	63.62	324.94	5.938	5.140	7-JH2 c	-1.000	2.563	2.563	1.614	9.894	3.829
117.45	63.98	324.99	5.985	5.165	7-JH2 c	-1.000	2.569	2.569	1.661	9.932	3.939
127.67	64.34	325.03	6.031	5.189	7-JH2 c	-1.000	2.575	2.575	1.705	9.968	4.042

ALTERNATIVE 1

Water Surface Profile Plot for Culvert: Culvert 1



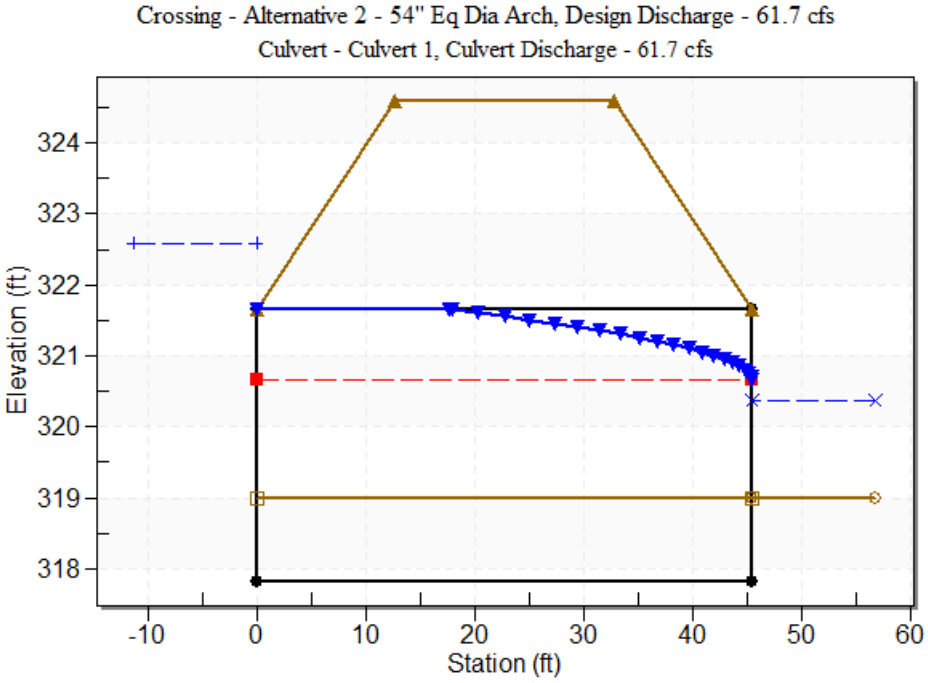
ALTERNATIVE 1

Table 2 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (f	Outlet Control Depth (f	Flow Type	Normal Depth (f	Critical Depth (f	Outlet Depth (f	Tailwater Depth (f	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
25.48	25.48	320.84	1.648	1.843	7-H2	-1.000	0.935	0.973	0.973	5.288	2.890
35.70	35.70	321.27	2.060	2.273	7-H2	-1.000	1.165	1.165	1.106	6.210	3.127
45.92	45.92	321.68	2.453	2.680	7-H2	-1.000	1.375	1.375	1.270	6.810	2.914
56.14	56.14	322.08	2.861	3.080	7-H2	-1.000	1.564	1.564	1.339	7.377	3.114
61.71	61.71	322.30	3.096	3.300	7-H2	-1.000	1.662	1.662	1.374	7.666	3.211
76.58	76.58	322.92	3.791	3.921	7-H2	-1.000	1.904	1.904	1.460	8.431	3.443
86.79	86.79	323.33	4.334	4.211	7-H2	-1.000	2.057	2.057	1.514	8.950	3.583
97.01	97.01	323.93	4.931	4.513	7-H2	-1.000	2.195	2.195	1.565	9.493	3.711
107.23	107.23	324.58	5.582	4.849	7-H2	-1.000	2.322	2.322	1.614	10.053	3.829
117.45	109.16	324.71	5.711	4.916	7-H2	-1.000	2.345	2.345	1.661	10.160	3.939
127.67	110.23	324.78	5.784	4.954	7-H2	-1.000	2.358	2.358	1.705	10.219	4.042

ALTERNATIVE 2

Water Surface Profile Plot for Culvert: Culvert 1



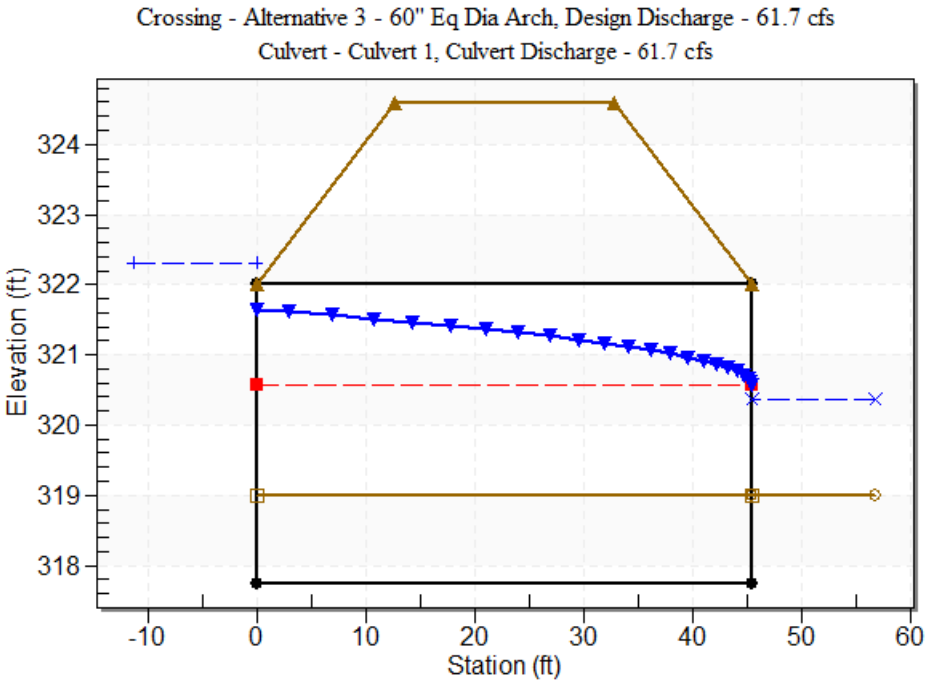
ALTERNATIVE 2

Table 3 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (f	Outlet Control Depth (f	Flow Type	Normal Depth (f	Critical Depth (f	Outlet Depth (f	Tailwater Depth (f	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
25.48	25.48	320.94	1.668	1.944	7-H2	-1.000	0.935	0.977	0.973	5.326	2.890
35.70	35.70	321.44	2.111	2.443	7-H2	-1.000	1.160	1.160	1.106	6.343	3.127
45.92	45.92	321.95	2.540	2.949	7-H2	-1.000	1.371	1.371	1.270	7.003	2.914
56.14	56.14	322.42	3.069	3.420	7-H2	-1.000	1.562	1.562	1.339	7.628	3.114
61.71	61.71	322.57	3.424	3.577	7-H2	-1.000	1.660	1.660	1.374	7.963	3.211
76.58	76.58	323.43	4.433	4.069	7-H2	-1.000	1.897	1.897	1.460	8.864	3.443
86.79	86.79	324.17	5.177	4.468	7-H2	-1.000	2.041	2.041	1.514	9.508	3.583
97.01	92.64	324.67	5.676	4.719	7-H2	-1.000	2.116	2.116	1.565	9.890	3.711
107.23	93.62	324.76	5.760	4.763	7-H2	-1.000	2.127	2.127	1.614	9.959	3.829
117.45	94.38	324.82	5.825	4.797	7-H2	-1.000	2.135	2.135	1.661	10.013	3.939
127.67	95.05	324.88	5.882	4.827	7-H2	-1.000	2.143	2.143	1.705	10.060	4.042

ALTERNATIVE 3

Water Surface Profile Plot for Culvert: Culvert 1



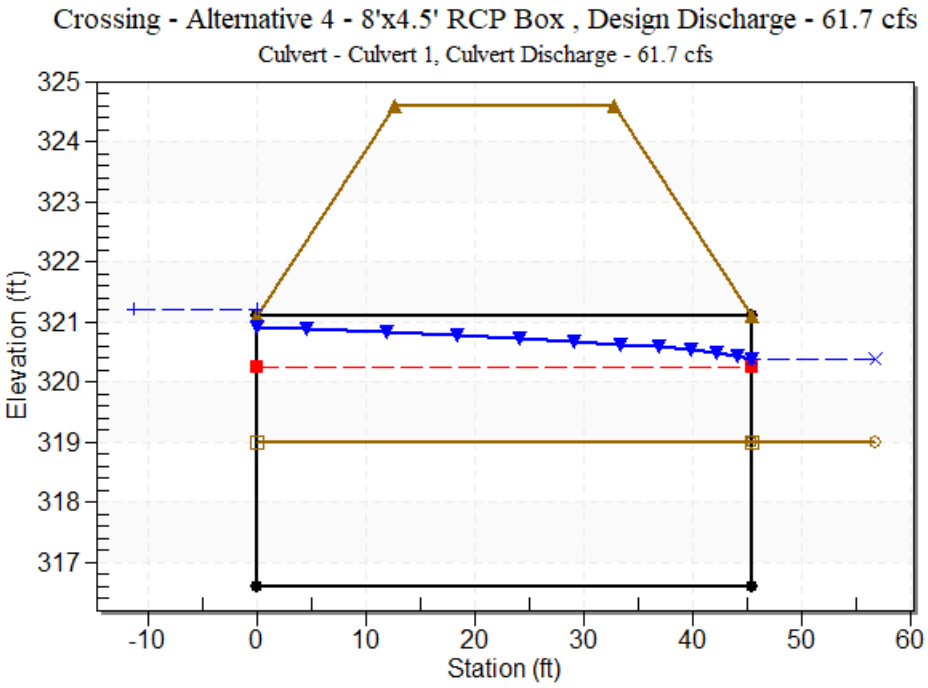
ALTERNATIVE 3

Table 4 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (f	Outlet Control Depth (f	Flow Type	Normal Depth (f	Critical Depth (f	Outlet Depth (f	Tailwater Depth (f	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
25.48	25.48	320.81	1.572	1.805	7-H2	-1.000	0.888	0.973	0.973	4.844	2.890
35.70	35.70	321.24	1.950	2.237	7-H2	-1.000	1.098	1.106	1.106	5.984	3.127
45.92	45.92	321.65	2.327	2.652	7-H2	-1.000	1.290	1.290	1.270	6.646	2.914
56.14	56.14	322.06	2.691	3.065	7-H2	-1.000	1.472	1.472	1.339	7.188	3.114
61.71	61.71	322.30	2.890	3.295	7-H2	-1.000	1.567	1.567	1.374	7.465	3.211
76.58	76.58	322.90	3.575	3.900	7-H2	-1.000	1.799	1.799	1.460	8.191	3.443
86.79	86.79	323.16	4.128	4.156	7-H2	-1.000	1.949	1.949	1.514	8.677	3.583
97.01	97.01	323.72	4.722	4.445	7-H2	-1.000	2.086	2.086	1.565	9.172	3.711
107.23	107.23	324.34	5.342	4.765	7-H2	-1.000	2.212	2.212	1.614	9.688	3.829
117.45	112.73	324.68	5.676	4.951	7-H2	-1.000	2.277	2.277	1.661	9.966	3.939
127.67	113.98	324.76	5.756	4.994	7-H2	-1.000	2.291	2.291	1.705	10.028	4.042

ALTERNATIVE 4

Water Surface Profile Plot for Culvert: Culvert 1



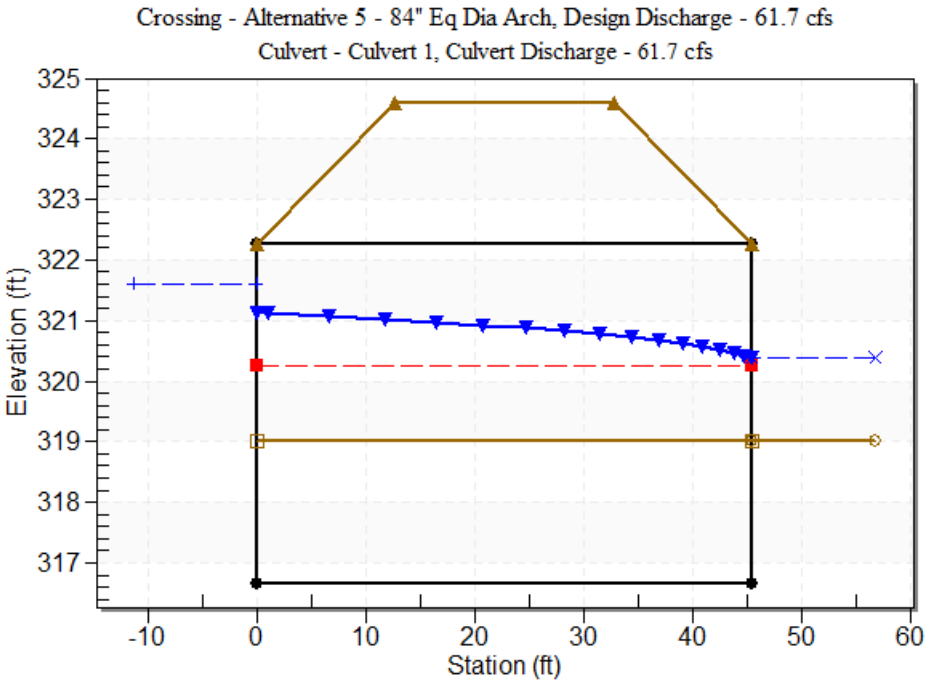
ALTERNATIVE 4

Table 5 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (f	Outlet Control Depth (f	Flow Type	Normal Depth (f	Critical Depth (f	Outlet Depth (f	Tailwater Depth (f	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
25.48	25.48	320.35	1.065	1.354	7-H2	-1.000	0.681	0.973	0.973	3.272	2.890
35.70	35.70	320.62	1.333	1.621	7-H2	-1.000	0.852	1.106	1.106	4.035	3.127
45.92	45.92	320.87	1.574	1.873	7-H2	-1.000	1.008	1.270	1.270	4.518	2.914
56.14	56.14	321.09	1.795	2.092	7-H2	-1.000	1.152	1.339	1.339	5.242	3.114
61.71	61.71	321.21	1.910	2.208	7-H2	-1.000	1.227	1.374	1.374	5.616	3.211
76.58	76.58	321.49	2.206	2.487	7-H2	-1.000	1.417	1.460	1.460	6.558	3.443
86.79	86.79	321.60	2.407	2.598	7-H2	-1.000	1.540	1.540	1.514	7.043	3.583
97.01	97.01	321.72	2.610	2.722	7-H2	-1.000	1.659	1.659	1.565	7.309	3.711
107.23	107.23	321.86	2.819	2.860	7-H2	-1.000	1.774	1.774	1.614	7.557	3.829
117.45	117.45	322.04	3.039	3.011	7-H2	-1.000	1.885	1.885	1.661	7.790	3.939
127.67	127.67	322.27	3.270	3.177	7-H2	-1.000	1.992	1.992	1.705	8.010	4.042

ALTERNATIVE 5

Water Surface Profile Plot for Culvert: Culvert 1



ALTERNATIVE 5

Table 1 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (f	Outlet Control Depth (f	Flow Type	Normal Depth (f	Critical Depth (f	Outlet Depth (f	Tailwater Depth (f	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
25.48	25.48	320.49	1.295	1.489	7-H2	-1.000	0.685	0.970	0.973	3.467	2.890
35.70	35.70	320.82	1.635	1.821	7-H2	-1.000	0.862	1.103	1.106	4.312	3.127
45.92	45.92	321.14	1.908	2.139	7-H2	-1.000	1.023	1.267	1.270	4.879	2.914
56.14	56.14	321.44	2.180	2.433	7-H2	-1.000	1.174	1.335	1.339	5.686	3.114
61.71	61.71	321.60	2.329	2.592	7-H2	-1.000	1.252	1.370	1.374	6.106	3.211
76.58	76.58	322.02	2.718	3.016	7-H2	-1.000	1.447	1.456	1.460	7.174	3.443
86.79	86.79	322.31	2.981	3.312	7-H2	-1.000	1.574	1.574	1.514	7.591	3.583
97.01	97.01	322.62	3.244	3.613	7-H2	-1.000	1.696	1.696	1.565	7.950	3.711
107.23	107.23	322.93	3.572	3.929	7-H2	-1.000	1.814	1.814	1.614	8.294	3.829
117.45	117.45	323.27	3.971	4.268	7-H2	-1.000	1.924	1.924	1.661	8.645	3.939
127.67	127.67	323.46	4.371	4.453	7-H2	-1.000	2.029	2.029	1.705	8.998	4.042

ATTACHMENT 2

TETRA TECH	Calculated EAP	Date 11/7/22	Job Number
			77518-22001
607977 - I-495/I-90 INTERCHANGE			

Scour Countermeasure Design, Riprap Apron

$$D_{50} = 0.2\,D\left(\frac{Q}{\sqrt{gD^{2.5}}}\right)^{4/3}\left(\frac{D}{TW}\right)$$ *(Eq. 10.4, HEC-14)*

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)

	25-YR	*10-YR*
Q* =	31 CFS	21 CFS
TW =	1.5 FT	1.4 FT
D =	3.0 ft	3.0 ft

* Flow at culvert outlet.

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.

25-year peak discharge

Class

D_{50} = 0.2 x 3.0 x (31/(32.2^0.5 x 3.0^2.5))^(4/3) x (3.0/1.5) = 0.3 ft = **3.6 in** **1**

Class 1 Riprap Apron design dimensions

D_{50} =		**5 in**
Length =	4 x 3 =	**12 ft**
Depth =	3.5 x 5 =	**18 in**

10-year peak discharge

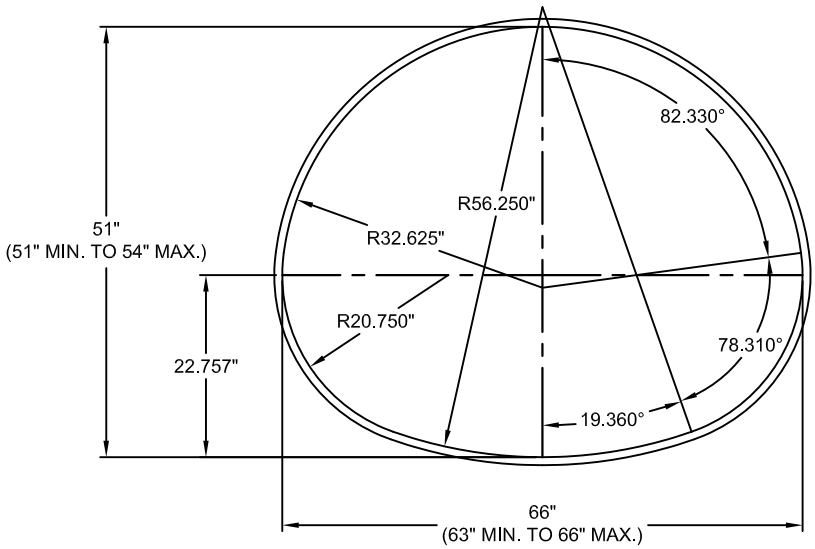
Class

D_{50} = 0.2 x 3.0 x (21/(32.2^0.5 x 3.0^2.5))^(4/3) x (3.0/1.4) = 0.2 ft = **2.3 in** **1**

Class 1 Riprap Apron design dimensions

D_{50} =		**5 in**
Length =	4 x 3 =	**12 ft**
Depth =	3.5 x 5 =	**18 in**

ATTACHMENT 3



NOMINAL 66" X 51" (60" ROUND EQUIVALENT)

AREA= 19.3 SF

NOTES:
1. ALL DIMENSIONS ARE TO THE INSIDE CORRUGATION CREST UNLESS NOTED OTHERWISE.
2. ALL DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
3. RISE AND SPAN DIMENSIONS ACCOUNT FOR SPECIFICATION TOLERANCES FROM NOMINAL DIMENSIONS. (AASHTO M 36 STEEL, M 196 ALUMINUM, ASTM A 760 STEEL, B 745 ALUMINUM).

CMP 060X1 PA

CONTECH ENGINEERED SOLUTIONS LLC
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9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH PIPE SOLUTIONS

SHAPE DRAWING
3" x 1" OR 5" x 1" CMP PIPE ARCH
60" EQ DIA 66"x51"

DATE DRAWN: 6/16/16	REV #:	REV DATE:	SCALE: N.T.S.	DRAWING TYPE:

H:\DRAINAGE PLATE AND SPECIALTY ENGINEERING\PRODUCTS\CMP\STANDARD DETAILS\600-SHAPE DETAILS\WORKING\SHAPE FILES\CMP 060X1 PA.DWG 11/30/2016 8:59 AM