

STORMWATER POLLUTION CONTROL PLAN

Construction of the Charter Oak Greenway Shared Use Path Manchester, CT

State Project No. 76-217

Connecticut Department of Transportation

February 2015

This Stormwater Pollution Control Plan (SPCP) is prepared to comply with the requirements for the General Permit for Stormwater Discharges (GPSD) from Construction Activities. Also to be considered part of the SPCP are the proposed construction plans, special provisions, and the Connecticut Department of Transportation's "Standard Specifications for Roads, Bridges and Incidental Construction" (Form 816) including supplements thereto and the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control

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1. Site Description

Site Description

The project is located in the Town of Manchester. The project extends from the eastern limits of the recently completed Charter Oak Greenway (Project No. 76-207) at Camp Meeting Road (SR 534), opposite Porter Street and continues easterly for approximately 4,000 feet before terminating at Finley Street in the Town of Manchester.

This project consists of the construction of a shared use path (path). The path will have a paved width of ten feet and five foot grass shoulders on either side. It will begin in the Town of Manchester at the parking lot of the Charter Oak Greenway, which is located on the south side of Camp Meeting Road (SR 534) opposite Porter Street, mile marker 1.90. It will then continue easterly along the south side of Camp Meeting Road, travelling under 1-384 to Birch Mountain Road where it will enter a circular ramp connecting to an overhead pedestrian bridge. The path will cross to the north side of Camp Meeting Road, continuing around the Town of Manchester water pump station and then run parallel to Camp Meeting Road until its end at Finley Street. Two pedestrian bridges will be installed to cross major roadways and drainage features. Right of way has been acquired. A CT DEEP Inland Wetlands General Permit and an Army Corps of Engineers Category 1 Permit have been registered.

The purpose of this project is to provide a dedicated space, separated from motorized vehicular traffic by open space or physical barrier. The path may be used by pedestrians, skaters, wheelchair users, joggers and other non-motorized users. This extension of the Charter Oak Greenway will increase the connectivity of the shared use path to other trails in the project area.

Site work includes: construction of a ten foot wide paved path with five foot grass shoulders, two bridges to cross Camp Meeting Road and a small wetland channel, some additions and modifications to the existing storm drainage system, as well as retaining walls adjacent to Camp Meeting Road.

Estimated Disturbed Area

The total area for this project site is 18.74 acres. Approximately 5.18 acres of the entire project site is expected to be disturbed by construction activities.

Estimated Runoff Coefficient

The runoff coefficient for effectively impervious areas is assumed to be 0.9. Pervious areas were classified as 0.20. Weighted runoff coefficients for the existing and proposed condition are shown in Equation 1 and Equation 2 respectively.

Equation 1: Pre-Construction Drainage Condition

$$C_{wt} = \frac{13.00 \text{ ac.} \times 0.20 + 5.74 \text{ ac.} \times 0.90}{18.74 \text{ ac.}} = 0.41$$

Equation 2: Post-Construction Drainage Condition

$$C_{wt} = \frac{12.11 \text{ ac.} \times 0.20 + 6.63 \text{ ac.} \times 0.90}{18.74 \text{ ac.}} = 0.45$$

Receiving Waters

Drainage from the site which is not infiltrated into the ground is collected by the ConnDOT storm drainage system and conveyed to wetlands. These wetlands lead to the Birch Mountain Brook and Case Pond.

Extent of Wetlands on Site

There are wetlands in the area adjacent to the intersection of Birch Mountain Road and Camp Meeting Road. Permanent wetland impacts will total 0.097 acres (or 4236 square feet). The maximum slope steepness was used adjacent wetlands to mitigate impacts. Overland sheet flow for drainage discharges was encouraged where possible to slow the speed of runoff and naturally filter the water through vegetated surfaces. The bridge in the vicinity of STA 39+00 will have no permanent or temporary impacts to wetlands. There are no regulated floodplain areas within the project limits.

2. Construction Sequencing

The contractor will be given two construction seasons to complete all phases of the project. Some activities will overlap and little work can be done during the winter shutdown from December to March.

The suggested sequence of construction is as follows:

1. Conduct a preconstruction meeting – 1 week.
2. Install sedimentation control system and construct anti tracking pads as shown on the plans or as directed by the engineer – 2 weeks.
3. Perform clearing and grubbing activities. Excavated materials may be stored in the staging area – 10 weeks.
4. Install, maintain and relocate, as necessary, all temporary traffic signs, barricades, temporary pavement markings and delineators – 1 week.
5. Remove and relocate boulders and construct the pipes and manhole as shown in the stage

construction plans – 4 weeks.

6. Remove existing fencing as shown on the plans, construct bridge abutments, retaining walls, pedestrian bridges, and the shared use path – 35 weeks.
7. After all stages are completed, mill and overlay Camp Meeting Road as shown on the plans – 1 week.
8. Furnishing and placing topsoil, turf establishment, and install landscaping items as shown on the plans – 4 weeks.
9. Regrade the parking lot, reset boulders, remove the anti tracking pads and sedimentation control system – 3 weeks.
10. Perform project cleanup – 1 week.

If the construction sequencing activities create an area of disturbance between two (2) acres and five (5) acres per discharge point, the Contractor must submit to the Engineer a revised SWPCP for review and approval. The SWPCP must include locations of the temporary sedimentation trap per discharge point with a capacity to contain 134 cubic yards per acre of material in accordance with the 2002 Guidelines. The Contractor shall provide an inspection and maintenance plan for the temporary sedimentation trap as part of the amended SWPCP.

3. Control Measures

Erosion and Sedimentation Controls

CT DOT will have construction inspection personnel assigned to the project in order to oversee the Contractor's operations to ensure compliance with the provisions of the Standard Specifications. Further CT DOT oversight is provided by the District 1 Environmental Coordinator and the Office of Environmental Planning.

The following time-lines will be followed for the proposed construction activities:

- If construction activities are complete or have been temporarily halted for more than seven (7) days, stabilization activities will be implemented within three (3) days.
- Areas that remain disturbed but inactive for at least 30 days shall receive temporary seeding or soil protection within seven (7) days.
- Disturbed areas that do not establish a vegetative cover within 30 days of seeding shall have erosion control blankets installed. Prior to the erosion control blanket installation, the soil would be prepared with the application of lime, fertilizer, and seed.
- Areas that will be disturbed past the planting season will be covered with a long-term, non-vegetative stabilization method that will provide protection through the winter.

- Stabilization practices will be implemented as quickly as possible in accordance with the Guidelines.
- The Contractor shall stabilize disturbed areas with temporary or permanent measures as quickly as possible after the land is disturbed. Requirements for soil stabilization are detailed in Form 816 Section 1.10.03, Best Management Practices.

Temporary Stabilization Practices

- Erosion Control Matting: On slopes steeper than 2:1 erosion control matting shall be used to stabilize the topsoil.
- Silt Fence: Silt fence shall be placed at the base of embankments.
- Anti-Tracking Pads: Construction entrances (gravel anti-tracking pads) shall be constructed at truck access points to off-road route.
- Dust Control: Routine sweeping and application of dust suppression agents, including water and calcium chloride, over exposed subbase shall be completed for dust control.
- Temporary Water Handling: Clean runoff will be diverted around disturbed areas in accordance with the temporary water handling plans.
- Stockpiles: When stockpiles are downgradient from a long slope, measures to divert runoff water should be taken. Material that is not to be used within 30 days needs to be seeded and mulched immediately after formation of the stockpile.

Stabilization practices shall be implemented no more than three days after completion, as final grades are reached, or if work has been suspended for more than seven days.

Temporary seeding shall be spread over any disturbed areas which will remain inactive for at least 30 days. Areas to remain disturbed through winter shall be protected with non-vegetative stabilization measures. The Contractor must provide an Erosion and Sedimentation Control plan for each winter season during construction operations.

The Contractor may use other controls in the project as necessary if they conform to the 2002 Connecticut Erosion and Sedimentation Guidelines and are approved by the Engineer. The contractor will be required to provide the necessary details for any erosion controls not specifically called for on the project plans.

During construction, all areas disturbed by the construction activity that have not been stabilized, structural control measures, and locations where vehicles enter or exit the site shall be inspected at least once every seven calendar days. These areas shall also be inspected within 24 hours following any storm in which 0.5 inches or greater of rain occurs.

Permanent Stabilization Practices

All new embankments disturbed by construction and unpaved areas that are graded or disturbed by construction will receive erosion control matting, topsoil and/or turf establishment. The Contractor may use other permanent stabilization practices approved by the Engineer and conforming to Connecticut's Erosion and Sedimentation Control Guidelines (2002).

Structural Measures

Structural measures shall be used to divert flows and limit runoff to minimize the discharge of pollutants. This includes the minimal use of curbing to maximize the overland sheet flow and the use of outlet protection at proposed outlets to decrease flow velocities and erosion.

Maintenance

All construction activities and related activities shall conform to the requirements of Section 1.10 "Environmental Compliance" of ConnDOT's Standard Specifications, Form 816. In general, all construction activities shall proceed in such a manner so as not to pollute any wetlands, watercourses, water body, and conduit carrying stormwater. The Contractor shall limit, in so far as possible, the surface area of earthen materials exposed by construction activity and immediately provide temporary and permanent pollution control to prevent soil erosion and contamination on the site. Water pollution control provisions and best management practices per Section 1.10.03 of the Standard Specifications shall be administered during construction. Control measures shall be inspected and maintained in accordance with the 2002 Guidelines and as directed by the Engineer.

4. Dewatering Wastewaters

Dewatering Guidelines

If encountered, dewatering wastewaters will be infiltrated into the ground unless otherwise directed by the Engineer. When dewatering is necessary, pumps used shall not be allowed to discharge directly into a wetland or watercourse. Prior to any dewatering, the Contractor must submit to the Engineer a written proposal for specific methods and devices to be used, and must obtain the Engineer's written approval of such methods and devices, including, but not limited to, the pumping of water into a temporary sedimentation basin, providing surge protection at the inlet or outlet of pumps, floating the intake of a pump, or any other method for minimizing and retaining the suspended solids. If the Engineer determines that a pumping operation is causing turbidity problems, the Contractor shall halt said operation until a means of controlling the turbidity is submitted by the Contractor in writing to the Engineer, approved in writing by the Engineer and implemented by the Contractor. No discharge of dewatering wastewater shall

contain or cause a visible oil sheen, floating solids or foaming in the receiving water. If required, all activities are to be performed in compliance with ConnDOT Form 816.

5. Post-Construction Stormwater Management

Post-Construction Guidelines

After the project is complete, the Town of Manchester will perform the following maintenance and restorative measures:

- Litter/debris will be removed from the site regularly.
- Mowing and maintenance of turf and vegetated areas will occur as needed.
- Riprap outlet protection will be inspected and repaired annually or as needed.
- Outlets will be checked for excessive scour and repaired as needed.

Post-Construction Performance Standards

Much of the project site is undeveloped, as it runs along the side of Camp Meeting Road, with an effective impervious cover of approximately 30%, so it is defined as an "Other Development". The full water quality volume of the site is 0.575 acre-feet and should be retained. Calculations for impervious area and water quality volume can be found in Appendix B, Figure B-2.

Runoff Reduction and LID Practices

LID concepts were incorporated into the project where possible, including a curbless path in order to utilize overland sheet flow. As the path will not be used by motorized vehicles, its runoff will be cleaner than that of other paved surfaces. Grass swales are used to convey water along the sides of the path, minimizing the need to use drainage structures to convey stormwater. Design calculations for grass swales can be found in Appendix B, Figure B-1. Underdrains will be installed in cut sections in order to encourage infiltration in these low lying areas. Existing vegetation will be left in place wherever possible.

Suspended Solids and Floatables Removal

The path travels through developed and undeveloped areas adjacent to Interstate 384 and Camp Meeting Road. A goal of 80% removal of the average annual post-construction total suspended solids load was used in designing stormwater management measures. To help meet this goal, sheet flow away from the trail is utilized wherever possible and stormwater is routed through grass swales to limit the number and size of drainage structures and encourage infiltration. CT ECO soil drainage maps indicate that soils in this area are "somewhat excessively drained" and "well drained". Underdrains will be installed in cut sections to limit standing water and enhance

infiltration. Though this is a paved path, motorized vehicles will not be allowed on it so runoff should be relatively clean compared to runoff from other paved surfaces.

Velocity Dissipation

Where existing measures are not sufficient, riprap aprons will be constructed at revised and proposed outlets to dissipate the energy of stormwater exiting the drainage system as noted on the plans and details. Calculations for the sizing of riprap aprons can be found in Appendix B, Figure B-1. The existing outlet protection at EO-10 and EO-1 was inspected and found to be in good condition with the proposed changes to the drainage system. Additional riprap outlet protection at PO-17, PO-4, and PO-5 was found to be unnecessary as the existing riprap is in good condition. At PO-17 the existing riprap lined channel was found to have an adequate lining. PO-4 and PO-5 outlet into an adequately riprap lined area as well.

6. Other Controls

Waste Disposal

Construction site waste shall be properly managed and disposed of during the entire construction period. Additionally,

- A waste collection area will be designated by the engineer. The selected area will minimize truck travel through the site and will not drain directly to the adjacent wetlands.
- Waste collection shall be scheduled regularly to prevent the containers from overflowing.
- Spills shall be cleaned up immediately.
- Defective containers that may cause leaks or spills will be identified through regular inspection. Any found to be defective will be repaired or replaced immediately.
- Any stockpiling of materials should be confined to the designated area as defined by the engineer.

Washout Areas

Washout of applicators, containers, vehicles and equipment for concrete shall be conducted in a designated washout area as specified by the engineer. No surface discharge of washout wastewaters from the area will be allowed. All concrete washwater will be directed into a container or pit such that no overflows can occur. Washout shall be conducted in an entirely self-contained system and will be clearly designed and flagged or signed where necessary. The washout area shall be located outside of any buffers and at least 50 feet from any stream, wetland or other sensitive water or natural resources as determined or designated by CTDOT Office of Environmental Planning.

The designated area shall be designed and maintained such that no overflows can occur during rainfall or after snowmelt. Containers or pits shall be inspected at least once a week to ensure structural integrity, adequate holding capacity and will be repaired prior to future use if leaks are present. The contractor shall remove hardened concrete waste when it accumulates to a height of ½ of the container or pit or as necessary to avoid overflows. All concrete waste shall be disposed of in a manner consistent with all applicable laws, regulations and guidelines.

Anti-tracking Pads and Dust Control

Off-site vehicle tracking of sediments and the generation of dust shall be minimized. Temporary anti-tracking pads from the active work site to the existing pavement will be installed and maintained at the locations shown on the plans. The contractor shall:

- Maintain the entrance in a condition which will prevent tracking and washing of sediment onto paved surfaces.
- Provide periodic top dressing with additional stone or additional length as conditions demand.
- Repair any measures used to trap sediment as needed.
- Immediately remove all sediment spilled, dropped, washed or tracked onto paved surfaces.
- Ensure roads adjacent to a construction site are left clean at the end of each day.

If the construction entrance is being properly maintained and the action of a vehicle traveling over the stone pad is not sufficient to remove the majority of the sediment, then the contractor shall either:

- Increase the length of the construction entrance,
- Modify the construction access road surface, or
- Install washing racks and associated settling area or similar devices before the vehicle enters a paved surface.

For construction activities which cause airborne particulates, wet dust suppression shall be utilized. Construction site dust will be controlled by sprinkling the ground surface with water until it is moist on an as-needed basis. The volume of water sprayed shall be such that it suppresses dust yet also prevents the runoff of water.

Post-Construction

Upon completion of construction activities and stabilization of the site, all post-construction stormwater structures, including manholes, catch basins, and riprap aprons, shall be cleaned of construction sediment and any remaining silt fence shall be removed prior to acceptance of the project by CTDOT. Sediment shall be properly disposed of in accordance with all applicable laws, regulations and guidelines.

Maintaining and Storing Vehicles and Equipment

The contractor shall take measures to prevent any contamination to wetlands and watercourses while maintaining and storing construction equipment on the site. All chemical and petroleum containers stored on site shall be provided with impermeable containment which will hold at least 110% of the volume of the largest container, or 10% of the total volume of all containers in the area, whichever is larger, without overflow from the containment area. All chemicals and their containers shall be stored under a roofed area except for those stored in containers of 100 gallon capacity or more, in which case double-walled tanks will suffice.

7. Inspections

Inspection Guidelines

All construction activities shall be inspected initially for Plan implementation and then weekly for Routine Inspections.

During construction, all areas disturbed by the construction activity that have not been stabilized, all erosion and sedimentation control measures, all structural control measures, soil stockpile areas, washout areas and locations where vehicles enter or exit the site shall be inspected for evidence of, or the potential for, pollutants entering the drainage system and impacts to receiving waters at least once every seven calendar days and within 24 hours of the end of a storm that generates a discharge.

For storms that end on a weekend, holiday or other time in which working hours will not commence within 24 hours, an inspection is required within 24 hours only for storms that equal or exceed 0.5 inches. For lesser storms, inspection shall occur immediately upon the start of subsequent normal working hours.

Where sites have been temporarily or finally stabilized, such inspection shall be conducted at least once every month for three months.

Qualified personnel provided by the DOT District 1 Office shall conduct Inspections.

Items to be inspected: the following items shall be inspected as described below:

<u>Item</u>	<u>Procedure</u>
Silt Fence	Silt fence shall be inspected to ensure that the fence line is intact with no breaks or tears. The fence shall be firmly anchored to the ground. Areas where the fence is excessively sagging or where support posts are broken or uprooted shall be noted. Depth of sediment behind the fence shall be noted.

Catch Basin Protection	Protective measures shall be inspected to ensure that sediment is not entering the catch basins. Catch basin sumps shall be monitored for sediment deposition. Hay bales shall be inspected to ensure they have not clogged.
Vehicle Entrances / Exits	Locations where vehicles enter or exit the site shall be inspected for evidence of off-site tracking.
General	Construction areas and the perimeter of the site shall be inspected for any evidence of debris that may be or has been blown or washed off the site. Construction areas shall be inspected for any spills or unsafe storage of materials that could pollute off site waters.

8. Keeping Plans Current

Revisions to Stormwater Pollution Control Plans:

CTDOT shall amend the Plan if the actions required by the Plan fail to prevent pollution or otherwise comply with provisions of the General Permit. The Plan shall also be amended whenever there is a change in contractors or sub-contractors at the site. If the results of the inspections require modifications to the Stormwater Pollution Control Plan, the plans shall be revised as soon as practicable after the inspection. Such modifications shall provide for a timely implementation of any changes to non-engineered controls on the site within 24 hours and implementation of any changes to the plan within 3 (three) calendar days following the inspection. For Engineered measures, corrective actions shall be implemented on site within 7 (seven) days and incorporated into a revised Plan within 10 (ten) days of the date of inspection.

In no event shall the requirements to keep the Plan current or update a Plan, relieve the permittee and their contractor(s) of the responsibility to properly implement any actions required to protect the waters of the State and to comply with all conditions of the permit.

9. Monitoring Requirements

A written report summarizing the scope of the inspection, the name(s) and qualifications of inspection personnel, the date and time of the inspection, major observations relative to the implementation of the Pollution Control Plan, and actions taken shall be completed within 24

hours of the inspection. This report shall be retained as part of the Stormwater Pollution Control Plan for at least five years after the date of the inspection.

Turbidity monitoring shall be conducted at the 6 outlet locations depicted on the Plan utilizing a procedure consistent with 40 CFR Part 136 (http://www.epa.gov/region9/qa/pdfs/40cfr136_03.pdf) and may be taken manually or by an in-situ turbidity probe or other automatic sampling device equipped to take individual turbidity readings. The first sample shall be taken within the first hour of stormwater discharge from the site and at least three grab samples shall be taken during a storm event and shall be representative of the flow and characteristics of the discharge. Sampling shall be conducted at least monthly when there is a discharge of stormwater from the site while construction activity is ongoing, until final stabilization of the drainage area associated with each outfall is achieved.

Samples shall be taken during normal working hours, which for this project shall be defined as Monday through Friday, 8 am to 5 pm. If a storm continues past working hours, sampling shall resume the following morning or the morning of the next working day following a weekend or Holiday, as long as the discharge continues. Sampling may be temporarily suspended when conditions exist that may reasonably pose a threat to the safety of the person taking the sample.

Within 30 days following the end of each month, the stormwater sampling results shall be submitted on the Stormwater Monitoring Report (SMR) and submit in accordance with Net DMR. If there is no stormwater discharge during a month, sampling is not required, however, SMR's indicating "no discharge" shall still be submitted as required.

10. Contractors

General

This section shall identify all Contractors and Subcontractors who will perform on site actions which may reasonably be expected to cause or have the potential to cause pollution of the waters of the State.

Certification Statement

All contractors and subcontractors must sign the attached statement. All certification will be included in the Stormwater Pollution Control Plan.

State Project No. 76-217

Construction of Charter Oak Greenway Shared Use Path
Manchester, CT

"I certify under penalty of law that I have read and understand the terms and conditions of the general permit for the discharge of stormwater associated with construction activity. I understand that as Contractor on the project, I am covered by this general permit, and must comply with the terms and conditions of this permit, including, but not limited to, the requirements of the Stormwater Pollution Control Plan prepared for this project."

GENERAL CONTRACTOR

Signed: _____ Date: _____
Title: _____
Firm: _____ Telephone: _____
Address: _____

SUBCONTRACTOR

Signed: _____ Date: _____
Title: _____
Firm: _____ Telephone: _____
Address: _____

List of Applicable Figures / Plans:

Appendix A - Figures

Project Location Plan	Figure A-1
Aerial Photo	Figure A-2

Appendix B – Drainage Calculations

Drainage Calculations	Figure B-1
Water Quality Computations	Figure B-2

Appendix C – Permit Plans

Title Sheet	PER-01
Miscellaneous Details	PER-02
Sedimentation and Erosion Control	PER-03
Plan	PER-07

Appendix D – Stormwater Monitoring Report Form

Appendix E – Notice of Termination Form

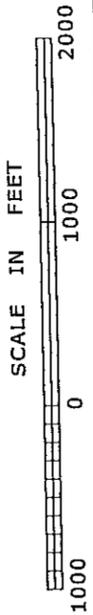
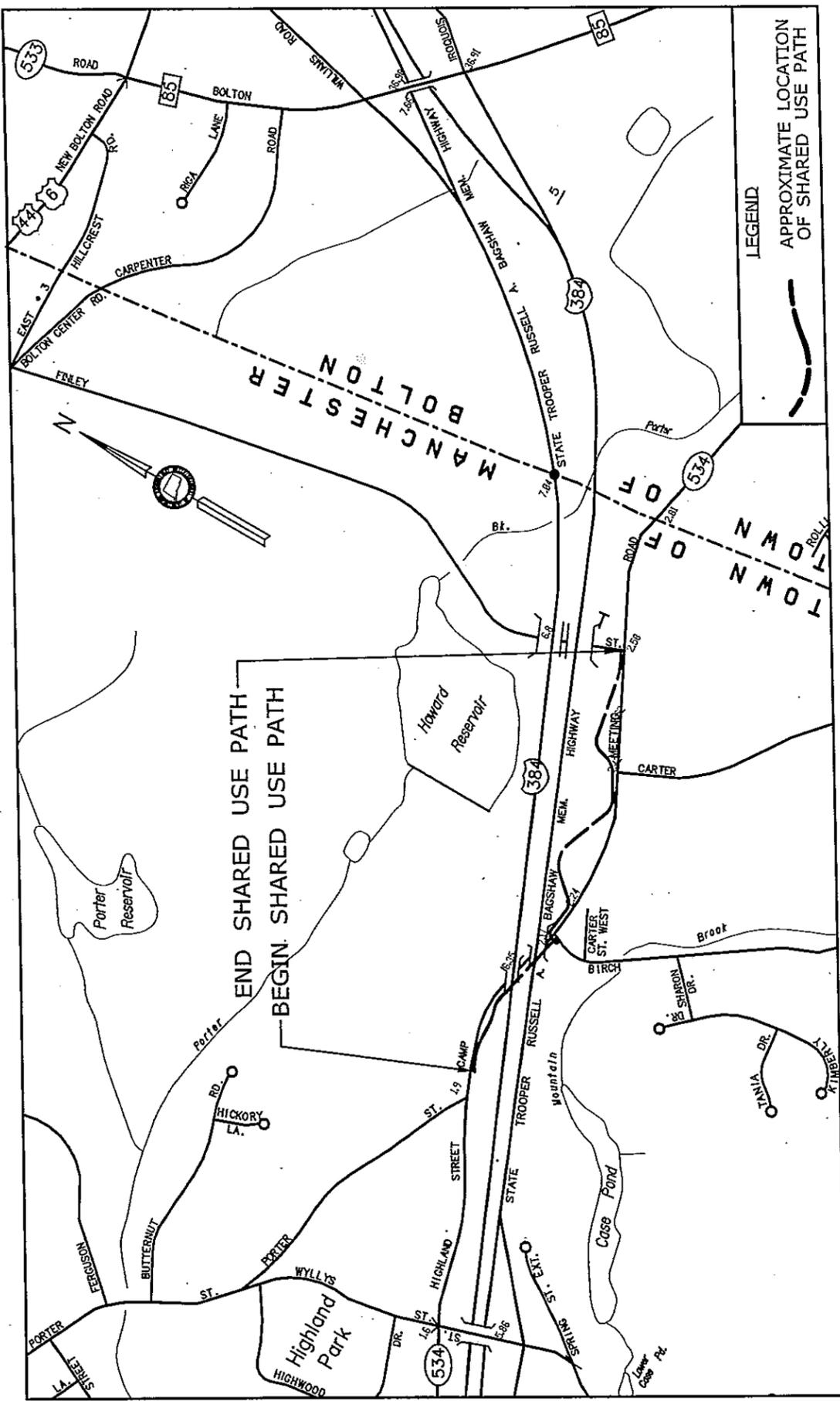
APPENDIX A

Figure A-1 Location Plan
Figure A-2 Project Aerial Map

Project No. 76-217

Construction of Charter Oak Greenway
Shared Use Path

Town of Manchester



LEGEND
 - - - - - APPROXIMATE LOCATION OF SHARED USE PATH

STATE PROJECT NO.: 76-217 CITY/TOWN: MANCHESTER	 STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION LOCATION PLAN SHARED USE PATH	 OFFICE OF ENGINEERING	DATE: AUGUST 20, 2013 FIGURE A-1
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APPENDIX B

Figure B-1 Drainage Calculations
Figure B-2 Water Quality Volume Computation

Project No. 76-217

Construction of Charter Oak Greenway
Shared Use Path

Town of Manchester

Figure B-1 Drainage Calculations

Project No. 76-217

Construction of Charter Oak Greenway
Shared Use Path

Town of Manchester

PROJECT NO. 76-217 UNIT: English

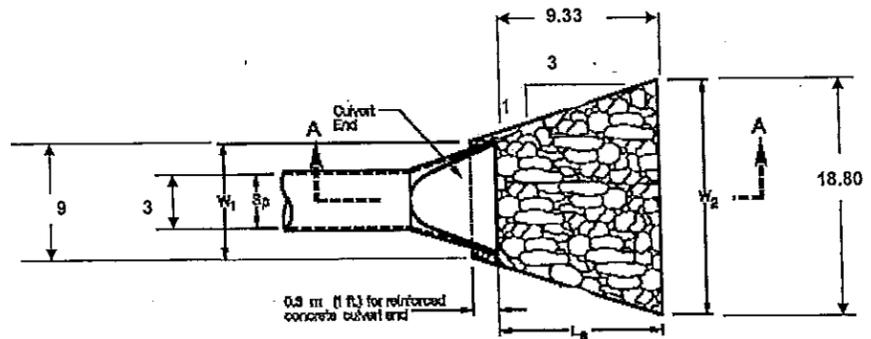
Location EO-1 / STA 18+21

Type A & B Riprap Apron Design Form

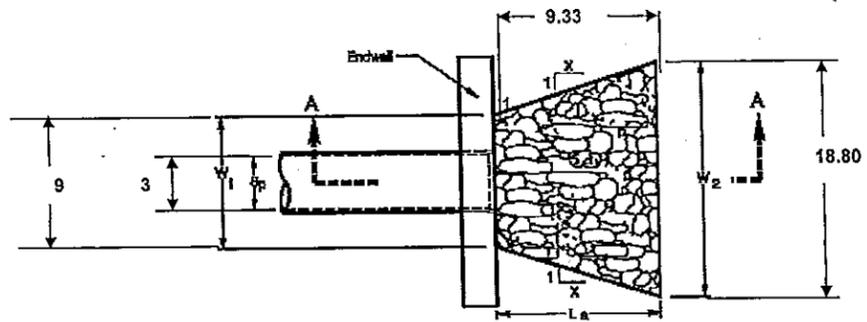
TW = 0.55 ft Tailwater depth
 Q = 3.08 cfs Discharge
 Rp = 3 ft Max. inside pipe rise (non-circular sections); inside pipe diameter (circular sections)
 Sp = 3 ft Max. inside pipe span (non-circular sections); inside pipe diameter (circular sections)
 V = 2.85 ft/s Outlet Velocity
 Well Defined Channel Exist at Downstream? No

Apron Type A
 Riprap Type M Use Modified Riprap, $d_{50} = 0.42$ ft or 5 inches

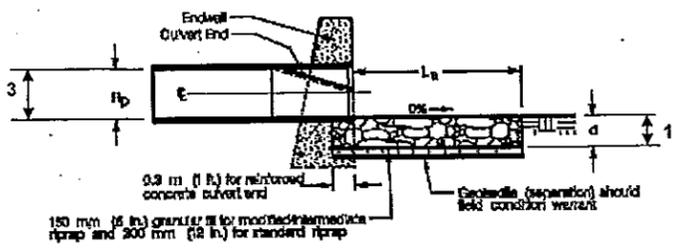
Dimensions
 $L_a =$ 9.33 ft (Minimum Tailwater Condition, per CT DOT DM, Eq. 11.31)
14 ft (From CT DOT DM, Table 11-12)
 $X =$ 3 ft
 $W_1 =$ 9 ft
 $W_2 =$ 18.8 ft
 $d =$ 12 inches EXISTING RIPRAP IS ADEQUATE



CULVERT END PLAN VIEW



ENDWALL PLAN VIEW



SECTION A-A
CULVERT END AND ENDWALL

LEGEND

$S_p =$ { Max. inside pipe span (non-circular sections)
inside pipe diameter (circular sections)
 $R_p =$ { Max. inside pipe rise (non-circular sections)
inside pipe diameter (circular sections)
 $L_a =$ Length of riprap apron measured from the end of culvert end section or face of endwall
 $d =$ { 300 mm (12 in.) Modified Riprap
450 mm (18 in.) Intermediate Riprap
900 mm (36 in.) Standard Riprap

	X	W ₁	W ₂
Type A Riprap Apron	3	3S _p	3S _p +0.7 L _a
Type B Riprap Apron	5	3S _p	3S _p +0.4 L _a

PROJECT NO. **76-217** UNIT: **English**

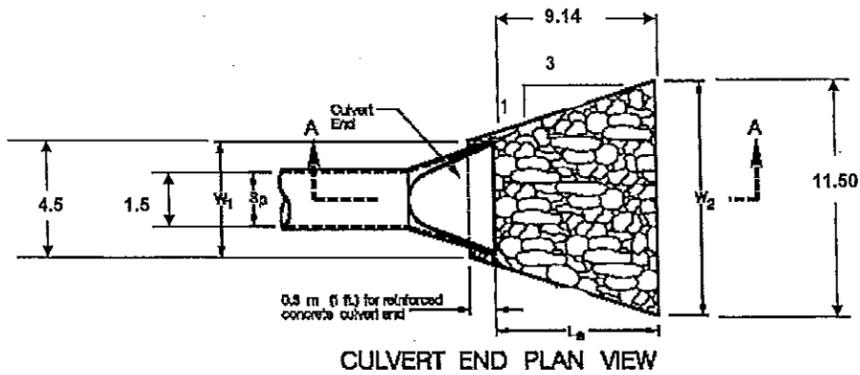
Location **PO-3 / STA 20+94**

Type A & B Riprap Apron Design Form

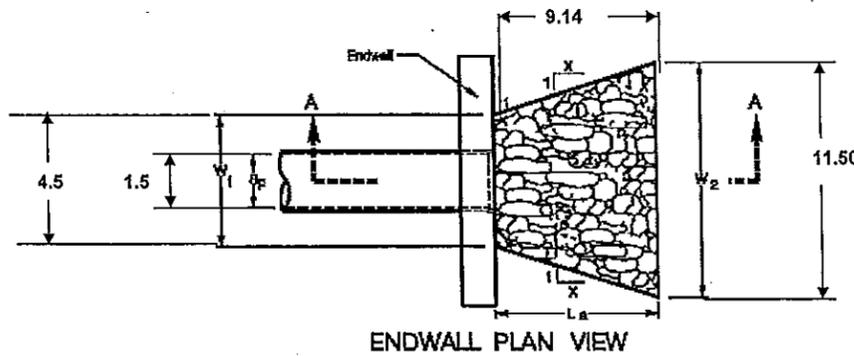
TW = **0.68** ft Tailwater depth
 Q = **4.12** cfs Discharge
 Rp = **1.5** ft Max. inside pipe rise (non-circular sections); inside pipe diameter (circular sections)
 Sp = **1.5** ft Max. inside pipe span (non-circular sections); inside pipe diameter (circular sections)
 V = **5.3** ft/s Outlet Velocity
 Well Defined Channel Exist at Downstream? **NO**

Apron Type **A**
 Riprap Type **M** Use Modified Riprap, $d_{50} = 0.42$ ft or 5 inches

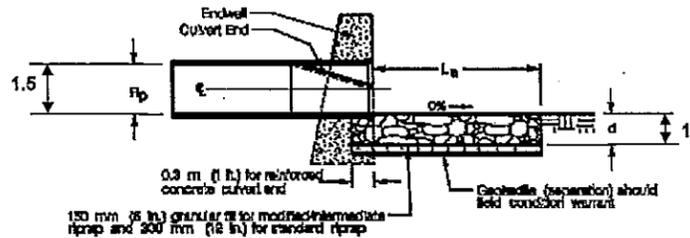
Dimensions
 $L_a = 9.14$ ft (Minimum Tailwater Condition, per CT DOT DM, Eq. 11.31)
 $X = 3$ ft (From CT DOT DM, Table 11-12)
 $W_1 = 4.5$ ft
 $W_2 = 11.5$ ft
 $d = 12$ inches



CULVERT END PLAN VIEW



ENDWALL PLAN VIEW



SECTION A-A
 CULVERT END AND ENDWALL

LEGEND

$S_p =$ { Max. inside pipe span (non-circular sections)
 inside pipe diameter (circular sections)
 $R_p =$ { Max. inside pipe rise (non-circular sections)
 inside pipe diameter (circular sections)
 $L_a =$ Length of riprap apron measured from the end of culvert end section or face of endwall
 $d =$ { 300 mm (12 in.) Modified Riprap
 450 mm (18 in.) Intermediate Riprap
 900 mm (36 in.) Standard Riprap

	X	W ₁	W ₂
Type A Riprap Apron	3	$3S_p$	$3S_p + 0.7 L_a$
Type B Riprap Apron	5	$3S_p$	$3S_p + 0.4 L_a$

PROJECT NO. 76-217 UNIT: English

Location PO-4 / STA 24+65

Type A & B Riprap Apron Design Form

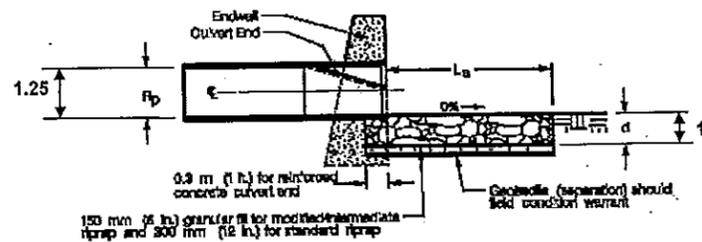
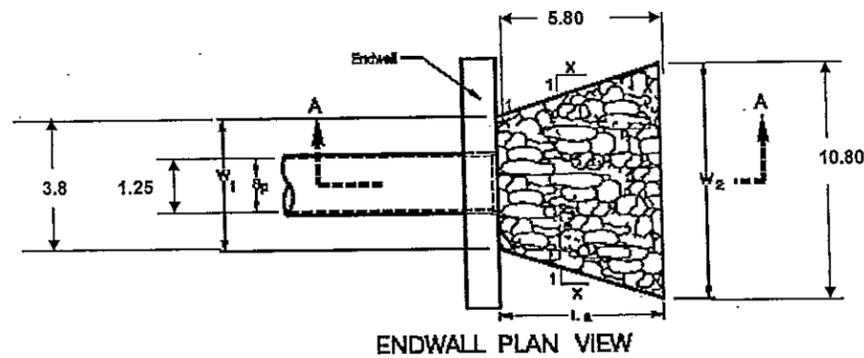
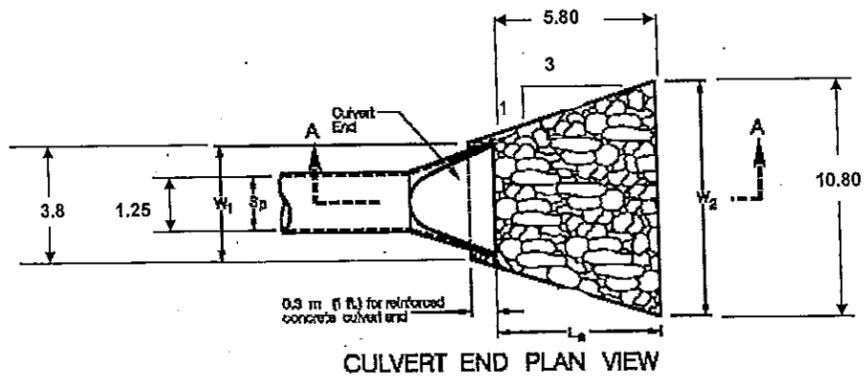
TW = 0.27 ft Tailwater depth
 Q = 1.74 cfs Discharge
 Rp = 1.25 ft Max. inside pipe rise (non-circular sections); inside pipe diameter (circular sections)
 Sp = 1.25 ft Max. inside pipe span (non-circular sections); inside pipe diameter (circular sections)
 V = 7.5 ft/s Outlet Velocity
 Well Defined Channel Exist at Downstream? NO

Apron Type A
 Riprap Type M Use Modified Riprap, $d_{50} = 0.42$ ft or 5 inches

Dimensions

La =	5.80 ft	(Minimum Tailwater Condition, per CT DOT DM, Eq. 11.31)
	10 ft	(From CT DOT DM, Table 11-12)
X =	3 ft	
W1 =	3.8 ft	
W2 =	10.8 ft	
d =	12 inches	

EXISTING RIPRAP IS ADEQUATE



LEGEND

Sp = { Max. inside pipe span (non-circular sections)
 inside pipe diameter (circular sections)
 Rp = { Max. inside pipe rise (non-circular sections)
 inside pipe diameter (circular sections)
 La = Length of riprap apron measured from the end of culvert end section or face of endwall
 d = { 300 mm (12 in.) Modified Riprap
 450 mm (18 in.) Intermediate Riprap
 900 mm (36 in.) Standard Riprap

	X	W1	W2
Type A Riprap Apron	3	$3S_p$	$3S_p + 0.7 L_a$
Type B Riprap Apron	5	$3S_p$	$3S_p + 0.4 L_a$

PROJECT NO. 76-217 UNIT: English

Location PO-5 / STA 24+02

Empirical Preformed Scour Hole Equations:

TW = 0.81 ft Tailwater depth
 Q = 7.08 cfs Discharge * Based on 25 Year Event
 Rp = 1.5 ft Max. inside pipe rise (non-circular sections); inside pipe diameter (circular sections)
 Sp = 1.5 ft Max. inside pipe span (non-circular sections); inside pipe diameter (circular sections)

Type 1: Scour Hole Depression = one-half pipe rise, ft
 $d_{50} = (0.0125 R_p^2 / TW)(Q/R_p^2.5)^{1.333}$ Eq. 11.35
 = 0.12 ft

Riprap Class	Acceptable Range	Check	Vol. Cu.ft
Modified	$d_{50} < 0.42'$	G	71.1
Intermediate	$0.42' < d_{50} < 0.67'$	G	106.6
Standard	$0.67' < d_{50} < 1.25'$	G	213.3

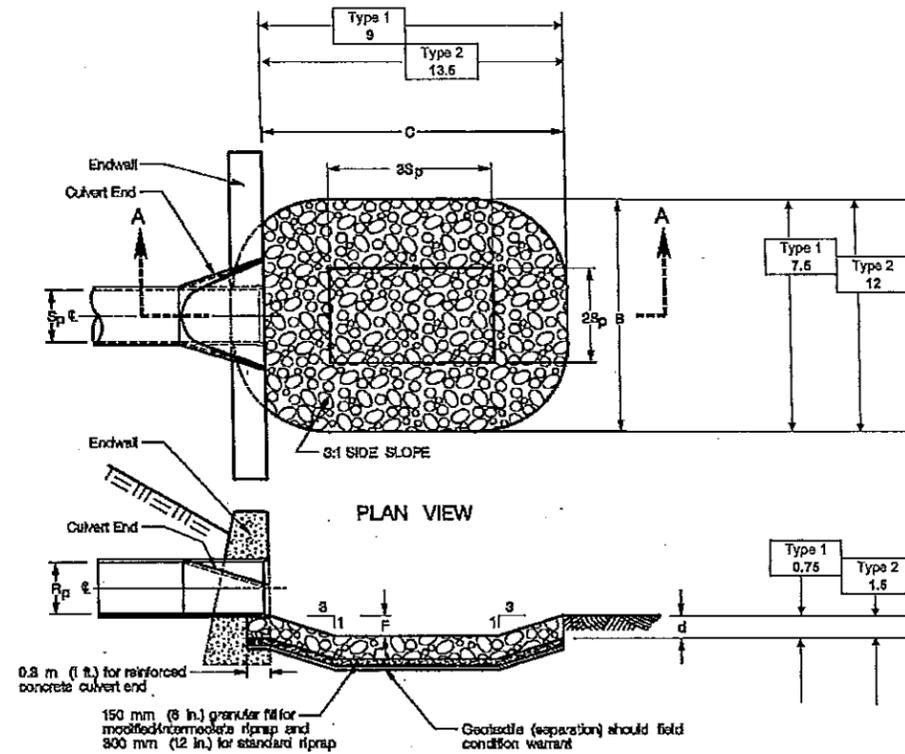
C	9	Basin Length
B	7.5	Basin Inlet and Outlet Width
F	0.75	Basin Depression

EXISTING RIPRAP IS ADEQUATE

Type 2: Scour Hole Depression = full pipe rise, ft
 $d_{50} = (0.0082 R_p^2 / TW)(Q/R_p^2.5)^{1.333}$ Eq. 11.36
 = 0.08 ft

Riprap Class	Acceptable Range	Check	Vol. Cu.ft
Modified	$d_{50} < 0.42'$	G	160.1
Intermediate	$0.42' < d_{50} < 0.67'$	G	240.2
Standard	$0.67' < d_{50} < 1.25'$	G	480.3

C	13.5	Basin Length
B	12	Basin Inlet and Outlet Width
F	1.5	Basin Depression



SECTION A-A

LEGEND

$S_p = \begin{cases} \text{Max. inside pipe span (non-circular sections)} \\ \text{inside pipe diameter (circular sections)} \end{cases}$
 $R_p = \begin{cases} \text{Max. inside pipe rise (non-circular sections)} \\ \text{inside pipe diameter (circular sections)} \end{cases}$
 $d = \begin{cases} 200 \text{ mm (12 in.) Modified Riprap} \\ 400 \text{ mm (16 in.) Intermediate Riprap} \\ 600 \text{ mm (24 in.) Standard Riprap} \end{cases}$
 Type 1 $F = 0.5 R_p$
 Type 2 $F = R_p$
 $C = 3S_p + 6F$
 $B = 2S_p + 6F$

Figure 11-15 Preformed Scour Hole Type 1 and Type 2

PROJECT NO. 76-217 UNIT: English

Location PO-6 / STA 33+15

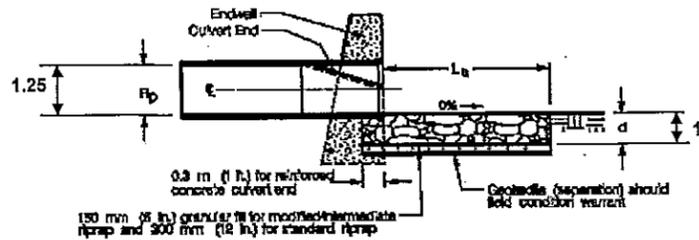
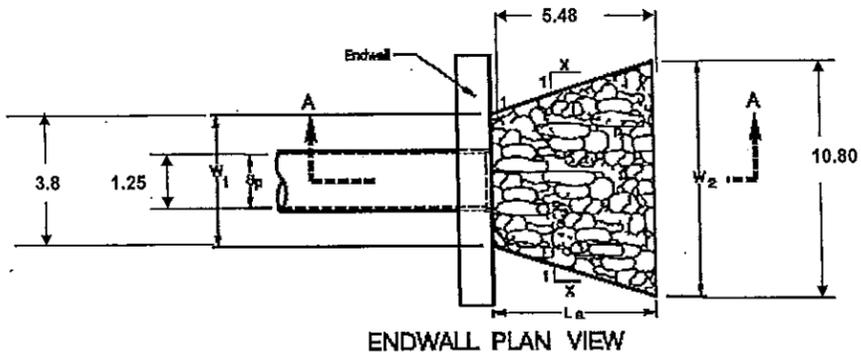
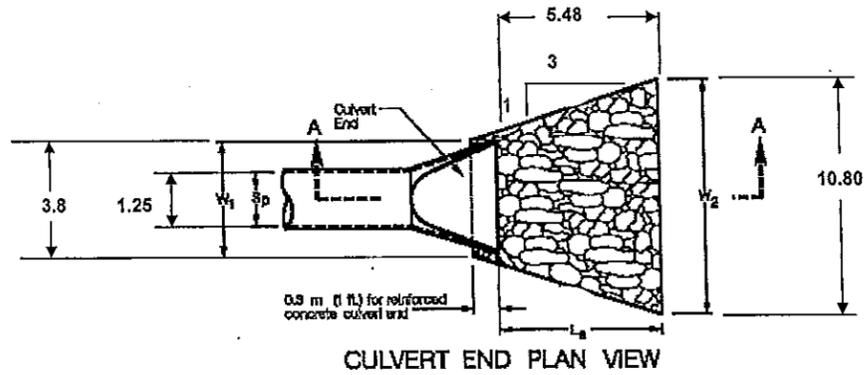
Type A & B Riprap Apron Design Form

TW = 0.29 ft Tailwater depth
 Q = 1.49 cfs Discharge
 Rp = 1.25 ft Max. inside pipe rise (non-circular sections); inside pipe diameter (circular sections)
 Sp = 1.25 ft Max. inside pipe span (non-circular sections); inside pipe diameter (circular sections)
 V = 7.03 ft/s Outlet Velocity
 Well Defined Channel Exist at Downstream? NO

Apron Type A
 Riprap Type M Use Modified Riprap, d 50 = 0.42 ft or 5 inches

Dimensions

La =	5.48 ft	(Minimum Tailwater Condition, per CT DOT DM, Eq. 11.31)
	10 ft	(From CT DOT DM, Table 11-12)
X =	3 ft	
W1 =	3.8 ft	
W2 =	10.8 ft	
d =	12 inches	



LEGEND

Sp = { Max. inside pipe span (non-circular sections)
 inside pipe diameter (circular sections)
 Rp = { Max. inside pipe rise (non-circular sections)
 inside pipe diameter (circular sections)
 La = Length of riprap apron measured from the end of culvert end section or face of endwall
 d = { 300 mm (12 in.) Modified Riprap
 450 mm (18 in.) Intermediate Riprap
 900 mm (36 in.) Standard Riprap

	X	W1	W2
Type A Riprap Apron	3	3Sp	3Sp+0.7 La
Type B Riprap Apron	5	3Sp	3Sp+0.4 La

PROJECT NO. 76-217 UNIT: English

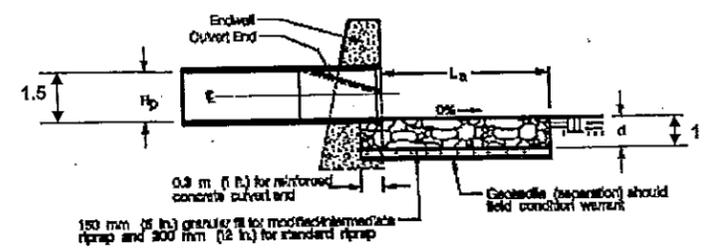
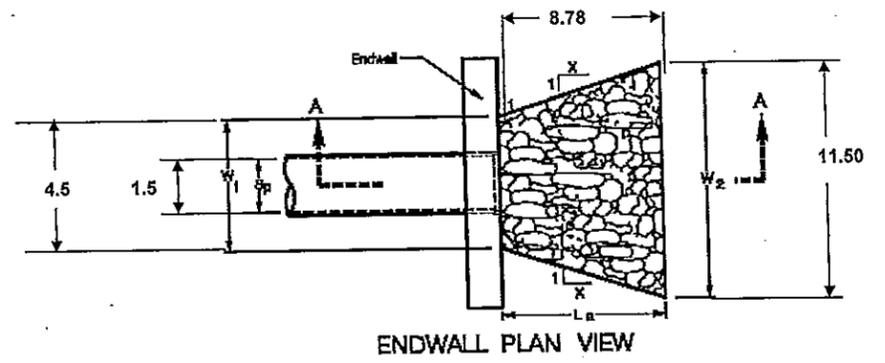
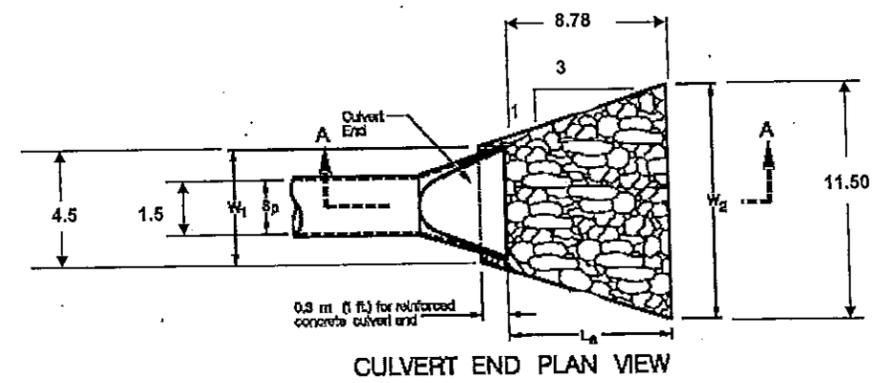
Location EO-10 / STA 15+03

Type A & B Riprap Apron Design Form

TW = 0.74 ft Tailwater depth
 Q = 3.75 cfs Discharge
 Rp = 1.5 ft Max. inside pipe rise (non-circular sections); inside pipe diameter (circular sections)
 Sp = 1.5 ft Max. inside pipe span (non-circular sections); inside pipe diameter (circular sections)
 V = 4.32 ft/s Outlet Velocity
 Well Defined Channel Exist at Downstream? no

Apron Type A
 Riprap Type M Use Modified Riprap, d 50 = 0.42 ft or 5 inches

Dimensions
 La = 8.78 ft (Minimum Tailwater Condition, per CT DOT DM, Eq. 11.31)
 10 ft (From CT DOT DM, Table 11-12)
 X = 3 ft
 W1 = 4.5 ft
 W2 = 11.5 ft
 d = 12 inches EXISTING RIPRAP IS ADEQUATE



SECTION A-A
CULVERT END AND ENDWALL

LEGEND

Sp = { Max. inside pipe span (non-circular sections)
 inside pipe diameter (circular sections)
 Rp = { Max. inside pipe rise (non-circular sections)
 inside pipe diameter (circular sections)
 La = Length of riprap apron measured from the
 end of culvert end section or face of endwall
 d = { 300 mm (12 in.) Modified Riprap
 450 mm (18 in.) Intermediate Riprap
 900 mm (36 in.) Standard Riprap

	X	W1	W2
Type A Riprap Apron	3	3Sp	3Sp + 0.7 La
Type B Riprap Apron	5	3Sp	3Sp + 0.4 La

PROJECT NO. 76-217 UNIT: English

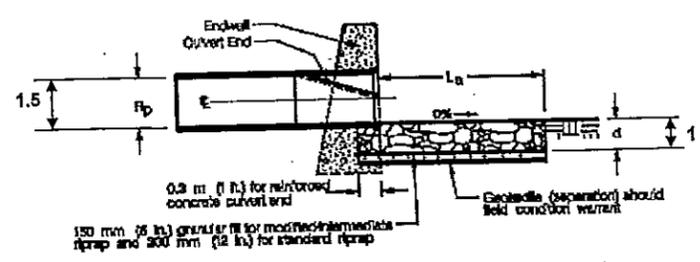
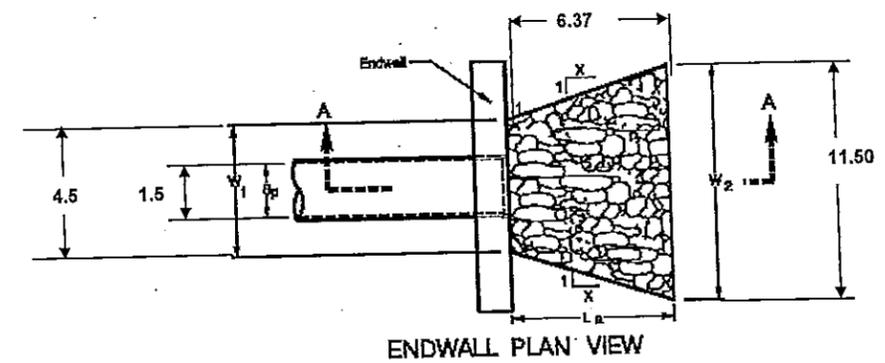
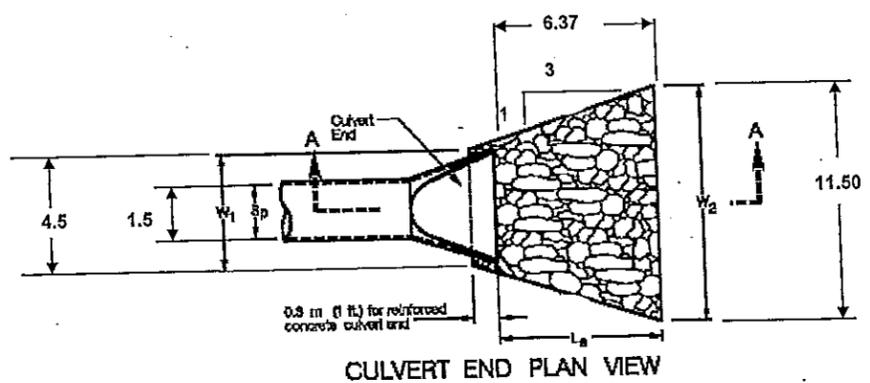
Location PO-17 / STA 10+50

Type A & B Riprap Apron Design Form

TW = 0.75 ft Tailwater depth
 Q = 1.3 cfs Discharge
 Rp = 1.5 ft Max. inside pipe rise (non-circular sections); inside pipe diameter (circular sections)
 Sp = 1.5 ft Max. inside pipe span (non-circular sections); inside pipe diameter (circular sections)
 V = 3.14 ft/s Outlet Velocity
 Well Defined Channel Exist at Downstream? No

Apron Type A
 Riprap Type M Use Modified Riprap, d 50 = 0.42 ft or 5 inches

Dimensions
 La = 6.37 ft (Minimum Tailwater Condition, per CT DOT DM, Eq. 11.31)
 10 ft (From CT DOT DM, Table 11-12)
 X = 3 ft
 W1 = 4.5 ft
 W2 = 11.5 ft
 d = 12 inches EXISTING RIPRAP IS ADEQUATE



LEGEND

Sp = { Max. inside pipe span (non-circular sections)
 inside pipe diameter (circular sections)
 Rp = { Max. inside pipe rise (non-circular sections)
 inside pipe diameter (circular sections)
 La = Length of riprap apron measured from the
 end of culvert end section or face of endwall
 d = { 300 mm (12 in.) Modified Riprap
 450 mm (18 in.) Intermediate Riprap
 900 mm (36 in.) Standard Riprap

	X	W1	W2
Type A Riprap Apron	3	3Sp	3Sp + 0.7 La
Type B Riprap Apron	5	3Sp	3Sp + 0.4 La

Hydraulic Analysis Report

Project Data

Project Title: 76-217 Manchester Shared Use Path
Designer: WGS
Project Date: Monday, January 06, 2014
Project Units: U.S. Customary Units
Notes: Analysis of Channel at STA 20+94_RT using Hydraulic Toolbox 4.1

Channel Analysis: Channel Analysis - Permanent

Notes: Vegetative cover with Retardance Class C (permissible shear stress of 1.00 lb/ft²). Ten-year storm used for design.

Input Parameters

Channel Type: Trapezoidal
Side Slope 1 (Z1): 2.0000 ft/ft
Side Slope 2 (Z2): 10.0000 ft/ft
Channel Width: 10.0000 ft
Longitudinal Slope: 0.0250 ft/ft
Manning's n: 0.1778
Lining Type: Vegetative - Class C
Flow: 4.1200 cfs

Result Parameters

Depth: 0.4653 ft
Area of Flow: 5.9520 ft²
Wetted Perimeter: 15.7166 ft
Hydraulic Radius: 0.3787 ft
Average Velocity: 0.6922 ft/s
Top Width: 15.5836 ft
Froude Number: 0.1974
Critical Depth: 0.1682 ft
Critical Velocity: 2.2254 ft/s
Critical Slope: 0.8628 ft/ft
Critical Top Width: 12.0180 ft
Calculated Max Shear Stress: 0.7259 lb/ft²
Calculated Avg Shear Stress: 0.5908 lb/ft²

Hydraulic Analysis Report

Project Data

Project Title: 76-217 Manchester Shared Use Path

Designer: WGS

Project Date: Monday, January 06, 2014

Project Units: U.S. Customary Units

Notes: Analysis of Channel at STA 20+94_RT using Hydraulic Toolbox 4.1

Channel Analysis: Channel Analysis - Permanent

Notes: Temporary lining of Jute Net used (permissible shear stress of 0.45 lb/ft²).
Two-year storm used for design.

Input Parameters

Channel Type: Trapezoidal
Side Slope 1 (Z1): 2.0000 ft/ft
Side Slope 2 (Z2): 10.0000 ft/ft
Channel Width: 10.0000 ft
Longitudinal Slope: 0.0250 ft/ft
Manning's n: 0.0190
Lining Type: Jute Net
Flow: 2.7800 cfs

Result Parameters

Depth: 0.1013 ft
Area of Flow: 1.0745 ft²
Wetted Perimeter: 11.2445 ft
Hydraulic Radius: 0.0956 ft
Average Velocity: 2.5872 ft/s
Top Width: 11.2156 ft
Froude Number: 1.4730
Critical Depth: 0.1304 ft
Critical Velocity: 1.9770 ft/s
Critical Slope: 0.0107 ft/ft
Critical Top Width: 11.5649 ft
Calculated Max Shear Stress: 0.1580 lb/ft²
Calculated Avg Shear Stress: 0.1491 lb/ft²

Hydraulic Analysis Report

Project Data

Project Title: 76-217 Manchester Shared Use Path

Designer: WGS

Project Date: Monday, January 06, 2014

Project Units: U.S. Customary Units

Notes: Analysis of Channel at STA 33+15_RT using Hydraulic Toolbox 4.1

Channel Analysis: Channel Analysis - Permanent

Notes: Vegetative cover with Retardance Class C (permissible shear stress of 1.00 lb/ft²). Ten-year storm used for design.

Input Parameters

Channel Type: Trapezoidal
Side Slope 1 (Z1): 4.0000 ft/ft
Side Slope 2 (Z2): 4.0000 ft/ft
Channel Width: 4.0000 ft
Longitudinal Slope: 0.0379 ft/ft
Manning's n: 0.2050
Lining Type: Vegetative - Class C
Flow: 1.5400 cfs

Result Parameters

Depth: 0.4149 ft
Area of Flow: 2.3480 ft²
Wetted Perimeter: 7.4211 ft
Hydraulic Radius: 0.3164 ft
Average Velocity: 0.6559 ft/s
Top Width: 7.3190 ft
Froude Number: 0.2041
Critical Depth: 0.1575 ft
Critical Velocity: 2.1122 ft/s
Critical Slope: 1.1955 ft/ft
Critical Top Width: 5.2598 ft
Calculated Max Shear Stress: 0.9812 lb/ft²
Calculated Avg Shear Stress: 0.7482 lb/ft²

Hydraulic Analysis Report

Project Data

Project Title: 76-217 Manchester Shared Use Path
Designer: WGS
Project Date: Monday, January 06, 2014
Project Units: U.S. Customary Units
Notes: Analysis of Channel at STA 33+15_RT using Hydraulic Toolbox 4.1

Channel Analysis: Channel Analysis - Permanent

Notes: Temporary lining of Jute Net used (permissible shear stress of 0.45 lb/ft²).
Two-year storm used for design.

Input Parameters

Channel Type: Trapezoidal
Side Slope 1 (Z1): 4.0000 ft/ft
Side Slope 2 (Z2): 4.0000 ft/ft
Channel Width: 4.0000 ft
Longitudinal Slope: 0.0400 ft/ft
Manning's n: 0.0190
Lining Type: Jute Net
Flow: 1.1000 cfs

Result Parameters

Depth: 0.0868 ft
Area of Flow: 0.3771 ft²
Wetted Perimeter: 4.7154 ft
Hydraulic Radius: 0.0800 ft
Average Velocity: 2.9168 ft/s
Top Width: 4.6940 ft
Froude Number: 1.8135
Critical Depth: 0.1272 ft
Critical Velocity: 1.9176 ft/s
Critical Slope: 0.0109 ft/ft
Critical Top Width: 5.0178 ft
Calculated Max Shear Stress: 0.2165 lb/ft²
Calculated Avg Shear Stress: 0.1996 lb/ft²

Figure B-2

Water Quality Volume (WQV) Calculations

Post-Construction Conditions

PROJECT NO. 76-217 PREPARED BY W. Sterritt
 DATE September 16, 2014 CHECKED BY _____
 PROJ. DESC. Construction of Charter Oak Greenway

GIVEN : This project is classified as 'Other Development' (Site < 40% impervious);
 therefore, the full WQV should be retained and treated.

FIND : The Full Water Quality Volume for the Site.

ON-SITE DRAINAGE TO OUTLETS [ACRE]

Outlet ID *	Impervious Area	Grassy/Wooded Area
PO-17	0.34	0.22
EO-10	1.08	3.86
EO-1	0.85	1.53
PO-4	0.68	4.24
PO-3	0.36	0.00
PO-5	0.80	4.76
PO-6	0.11	1.55

* Refer to General Permit Attachment A (USGS Location Plan) for Corresponding Outlet Locations

TOTAL SITE COMPOSITION [ACRE]

Impervious Area	Grassy/Wooded Area
6.63	12.11

WATER QUALITY VOLUME (WQV) CALCULATION

Total Site Area, A = 18.74 acres
 Design Precipitation, P = 1 inch
 % Impervious Cover, I = 35
 Volumetric Runoff Coefficient, R = 0.368

WQV =	(P x R x A) / 12	ac-ft
=	0.575	ac-ft
=	25062	cubic feet

APPENDIX C

Permit Plans

Project No. 76-217

Construction of Charter Oak Greenway
Shared Use Path

Town of Manchester

APPENDIX D

Stormwater Monitoring Report Form

Project No. 76-217

Construction of Charter Oak Greenway
Shared Use Path

Town of Manchester



Connecticut Department of
 Energy & Environmental Protection
 Bureau of Materials Management & Compliance Assurance
 Water Permitting & Enforcement Division

**General Permit for the Discharge of Stormwater and Dewatering Wastewaters from
 Construction Activities, issued 8/21/13, effective 10/1/13
 Stormwater Monitoring Report**

SITE INFORMATION

Permittee: _____
 Mailing Address: _____
 Business Phone: _____ ext.: _____ Fax: _____
 Contact Person: _____ Title: _____
 Site Name: _____
 Site Address: _____
 Receiving Water (name, basin): _____
 Stormwater Permit No. GSN _____

SAMPLING INFORMATION (Submit a separate form for each outfall)

Outfall Designation: _____ Date/Time Collected: _____
 Outfall Location(s) (lat/lon or map link): _____
 Person Collecting Sample: _____
 Storm Magnitude (inches): _____ Storm Duration (hours): _____
 Size of Disturbed Area at any time: _____

MONITORING RESULTS

Sample #	Parameter	Method	Results (units)	Laboratory (if applicable)
1	Turbidity			
2	Turbidity			
3	Turbidity			
4	Turbidity			

(provide an attachment if more than 4 samples were taken for this outfall)

Avg = _____

STATEMENT OF ACKNOWLEDGMENT

I certify that the data reported on this document were prepared under my direction or supervision in accordance with the General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities. The information submitted is, to the best of my knowledge and belief, true, accurate and complete.

Authorized Official: _____
 Signature: _____ Date: _____

Please send completed form to:

DEPARTMENT OF ENERGY & ENVIRONMENTAL PROTECTION
 BUREAU OF MATERIALS MANAGEMENT AND COMPLIANCE ASSURANCE
 79 ELM STREET
 HARTFORD, CT 06106-5127
 ATTN: NEAL WILLIAMS

APPENDIX E

Notice of Termination Form

Project No. 76-217

Construction of Charter Oak Greenway
Shared Use Path

Town of Manchester



General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities

Notice of Termination Form

Please complete and submit this form in accordance with the general permit (DEP-PED-GP-015) in order to ensure the proper handling of your termination. Print or type unless otherwise noted.

Note: Ensure that for commercial and industrial facilities, registrations under the *General Permit for the Discharge of Stormwater Associated with Industrial Activity* (DEP-PED-GP-014) or the *General Permit for the Discharge of Stormwater from Commercial Activities* (DEP-PED-GP-004) have been filed where applicable. For questions about the applicability of these general permits, please call the Department at 860-424-3018.

Part I: Registrant Information

1. Permit number: <i>GSN</i>		
2. Fill in the name of the registrant(s) as indicated on the registration certificate: Registrant:		
3. Site Address: City/Town: _____ State: _____ Zip Code: _____		
4. Date all storm drainage structures were cleaned of construction sediment: Date of Completion of Construction: _____ Date of Last Inspection (must be at least three months after final stabilization pursuant to Section 6(b)(6)(D) of the general permit): _____		
5. Check the post-construction activities at the site (check all that apply):		
<input type="checkbox"/> Industrial	<input type="checkbox"/> Residential	<input type="checkbox"/> Commercial
<input type="checkbox"/> Other (describe): _____	<input type="checkbox"/> Capped Landfill	

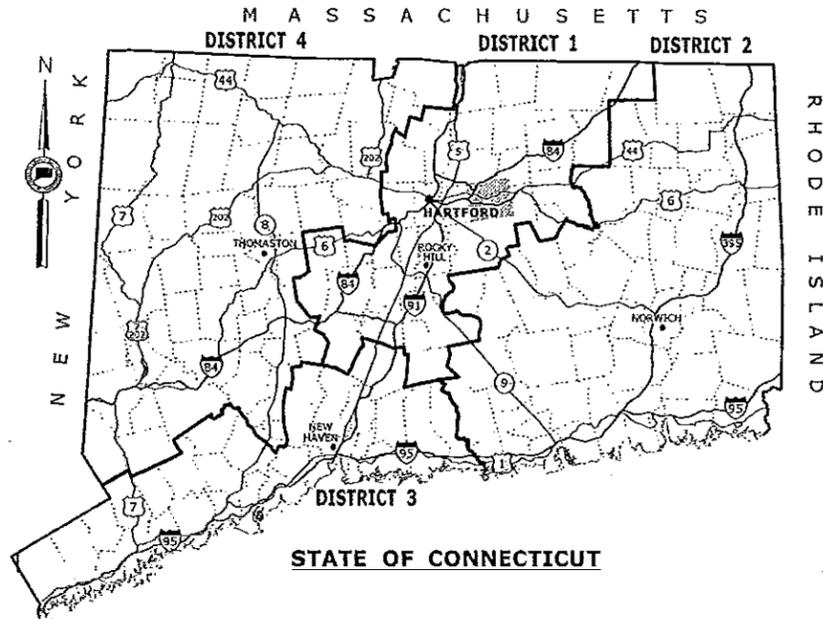
Part II: Certification

"I have personally examined and am familiar with the information submitted in this document and all attachments thereto, and I certify that, based on reasonable investigation, including my inquiry of those individuals responsible for obtaining the information, the submitted information is true, accurate and complete to the best of my knowledge and belief. I understand that a false statement made in this document or its attachments may be punishable as a criminal offense, in accordance with Section 22a-6 of the Connecticut General Statutes, pursuant to Section 53a-157b of the Connecticut General Statutes, and in accordance with any other applicable statute."	
Signature of Permittee _____	Date _____
Name of Permittee (print or type) _____	Title (if applicable) _____

Note: Please submit this Notice of Termination Form to:
 STORMWATER PERMIT COORDINATOR
 BUREAU OF WATER MANAGEMENT
 DEPARTMENT OF ENVIRONMENTAL PROTECTION
 79 ELM STREET
 HARTFORD, CT 06106-5127

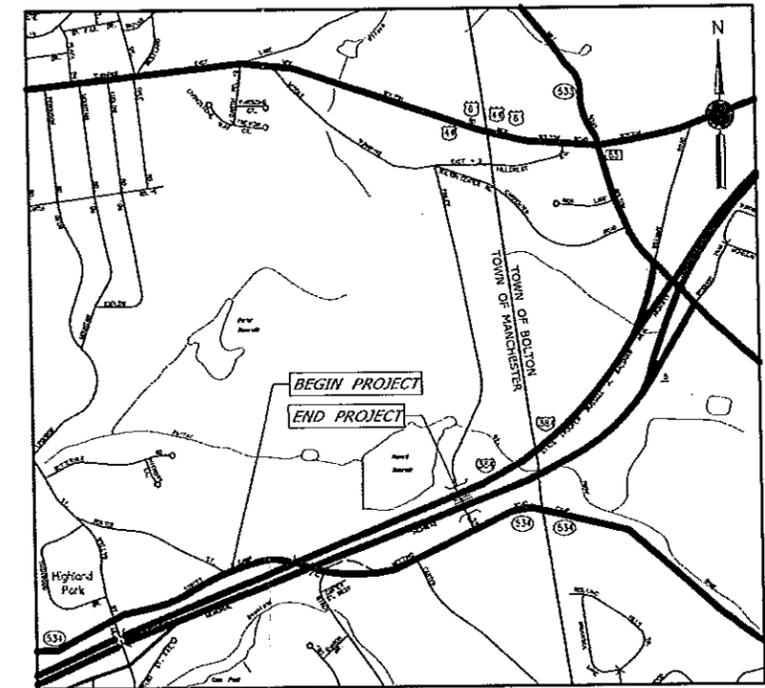
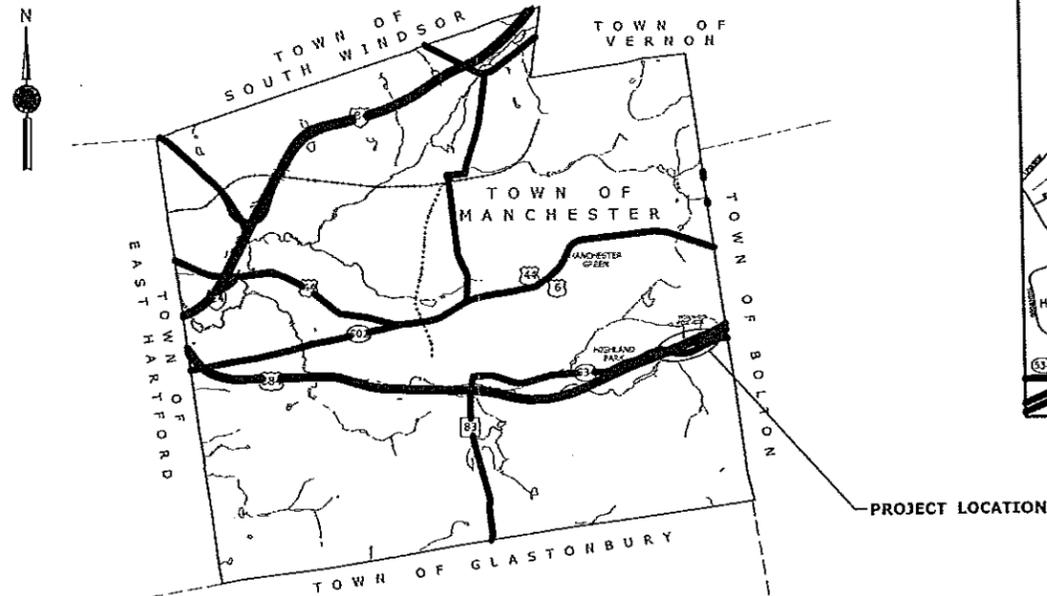
STORMWATER PERMIT PLANS

CONSTRUCTION OF CHARTER OAK GREENWAY SHARED USE PATH Town of MANCHESTER



GENERAL NOTES:

1. THESE PLANS ARE FOR ENVIRONMENTAL PERMITTING PURPOSES ONLY, THE INTENT IS TO SHOW PROCEDURES, DIMENSIONS AND PROCESSES FOR THE PROTECTION OF ENVIRONMENTAL AREAS. FOR ALL OTHER CONSTRUCTION INFORMATION, INCLUDING INFORMATION RELATED TO PAYMENT, REFER TO THE CONSTRUCTION PLANS, STANDARD DRAWINGS AND SPECIFICATIONS. IF THERE ARE CONFLICTS BETWEEN THESE PERMIT PLANS AND THE CONSTRUCTION PLANS IN THE REGULATED AREAS, THE PERMIT PLANS SHALL GOVERN.
2. ALL PERTINENT INFORMATION SUBJECT TO THE IMPACT OF THE WETLANDS IS SHOWN AND CALLED OUT IN THE ENCLOSED CIRCLES. TECHNICAL REVISIONS WILL BE SUBMITTED TO DEEP WHEN THE DOT MAKES DESIGN CHANGES FOR THOSE ITEMS CALLED OUT IN THE ENCLOSED CIRCLES OR FOR ANY ROADWAY CONSTRUCTION THAT IMPACTS THE REGULATED AREAS.
3. THE CONTRACTOR SHALL PREPARE EROSION AND SEDIMENTATION CONTROL PLANS BASED ON THE CONTRACT DRAWINGS AND THE STORMWATER POLLUTION CONTROL PLAN IN ACCORDANCE WITH SECTION 1.10 ENVIRONMENTAL COMPLIANCE, INCLUDING BEST MANAGEMENT PRACTICES. AS SPECIFIED, THE PLANS SHALL BE CONSISTENT IN ALL RESPECTS WITH THE 2002 CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENTATION CONTROL, AND WITH CONDOT'S ON-SITE MITIGATION FOR CONSTRUCTION ACTIVITIES. THE PLANS SHALL INCLUDE DETAILS OF THE PROPOSED SYSTEMS.
4. IN ALL CASES, THE CONTRACTOR SHALL IMPLEMENT STABILIZATION MEASURES AS SOON AS POSSIBLE AFTER ANY SOIL DISTURBANCE. WHERE CONSTRUCTION ACTIVITIES HAVE BEEN PERMANENTLY CEASED OR HAVE TEMPORARILY BEEN SUSPENDED FOR MORE THAN SEVEN DAYS, OR WHEN FINAL GRADES ARE REACHED IN ANY PORTION OF THE SITE, STABILIZATION PRACTICES SHALL BE IMPLEMENTED WITHIN THREE DAYS. TEMPORARY STABILIZATION MEASURES MAY INCLUDE MULCHING AND TRACKING AND SHALL BE PAID FOR AT THE CONTRACT UNIT PRICE PER SQUARE YARD FOR "TEMPORARY SEEDING". AREAS THAT WILL REMAIN DISTURBED BUT INACTIVE FOR 30 DAYS OR MORE SHALL BE STABILIZED WITHIN THE FIRST SEVEN DAYS OF THAT PERIOD. THE CONTRACTOR SHALL COMPLY AT ALL TIMES WITH THE REQUIREMENTS OF SECTION 1.10.
5. SEE THE PERMIT APPLICATION FOR A DESCRIPTION OF THE WATERCOURSES, WETLAND AND WETLAND SOILS AND FOR ADDITIONAL NARRATIVE INFORMATION.



LOCATION PLAN
NOT TO SCALE

DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION PLAN REVISION BLOCK					
WETLAND SITE NO.	APPLICANT NAME	ORIGINAL SUBMISSION DATE	REVISION DATE	REVISION DESCRIPTION	REVISION NUMBER

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.	DESIGNER/DRAFTER: WGS	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	SIGNATURE/ BLOCK: 	PROJECT TITLE: CONSTRUCTION OF CHARTER OAK GREENWAY SHARED USE PATH	TOWN: MANCHESTER	PROJECT NO. 76-217
	CHECKED BY: MLW		OFFICE OF ENGINEERING APPROVED BY: _____ DATE: _____	DRAWINGS TITLE: TITLE SHEET STORMWATER PERMIT PLANS	DRAWING NO. PER-01	SHEET NO.
REV. DATE REVISION DESCRIPTION SHEET NO. Plotted Date: 2/18/2015	Filename: ...Y:\M.MSH.0076.0217.PER-01.dgn					

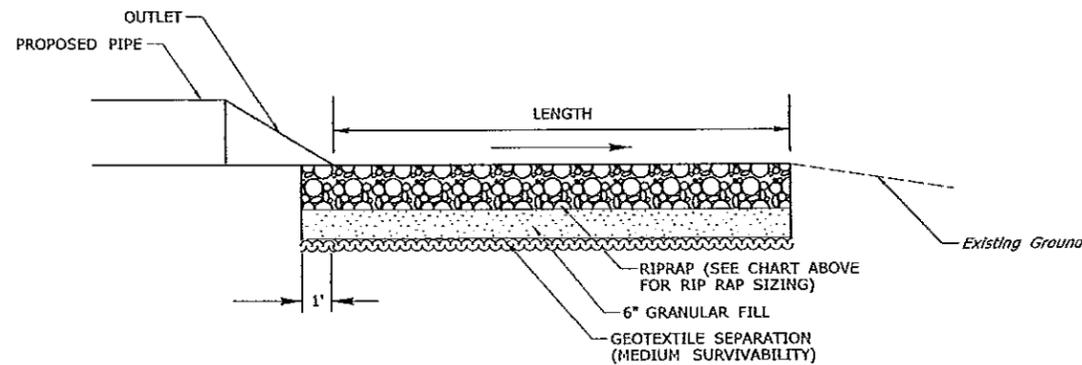
GENERAL NOTES

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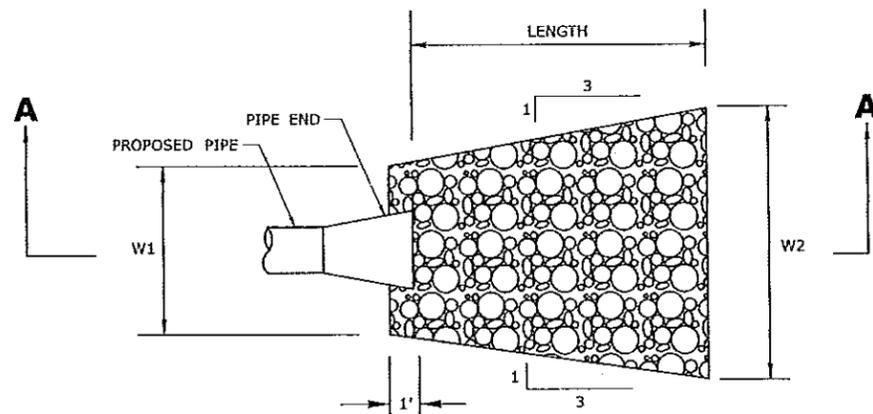
2. THE CONTRACTOR SHALL NOT DISTURB ANY REGULATED AREA OUTSIDE OF THE LIMITS OF THE WETLAND SITE SHOWN IN THE PLANS.

3. RIPRAP APRON TO BE CONSTRUCTED AS FLAT AS POSSIBLE.

STATION	APRON TYPE	RIPRAP DEPTH & TYPE	DIMENSIONS		
			LENGTH (ft)	W1 (ft)	W2 (ft)
20+94 RT	A	12" MODIFIED	10	5	12
33+13 RT	A	18" INTERMEDIATE	10	4	11

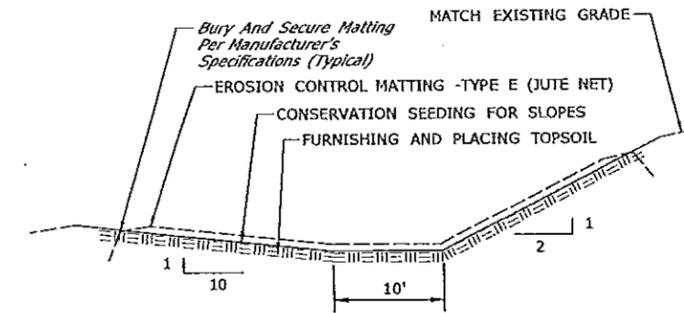


SECTION A-A

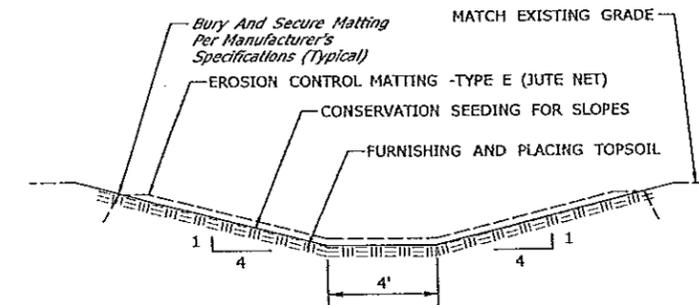


PLAN VIEW

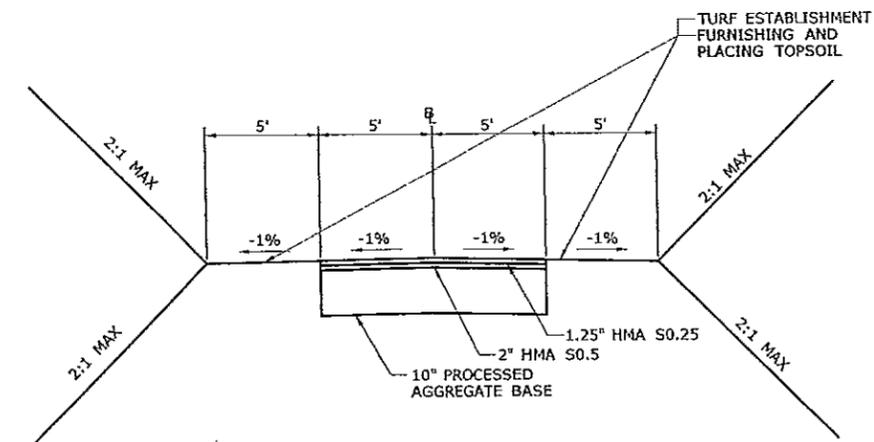
TYPE A RIPRAP APRON DETAIL



STA 20+94 CHANNEL CROSS SECTION



STA 33+15 CHANNEL CROSS SECTION



TYPICAL PATH CROSS SECTION

DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION PLAN REVISION BLOCK					
WETLAND SITE NO.	APPLICANT NAME	ORIGINAL SUBMISSION DATE	REVISION DATE	REVISION DESCRIPTION	REVISION NUMBER

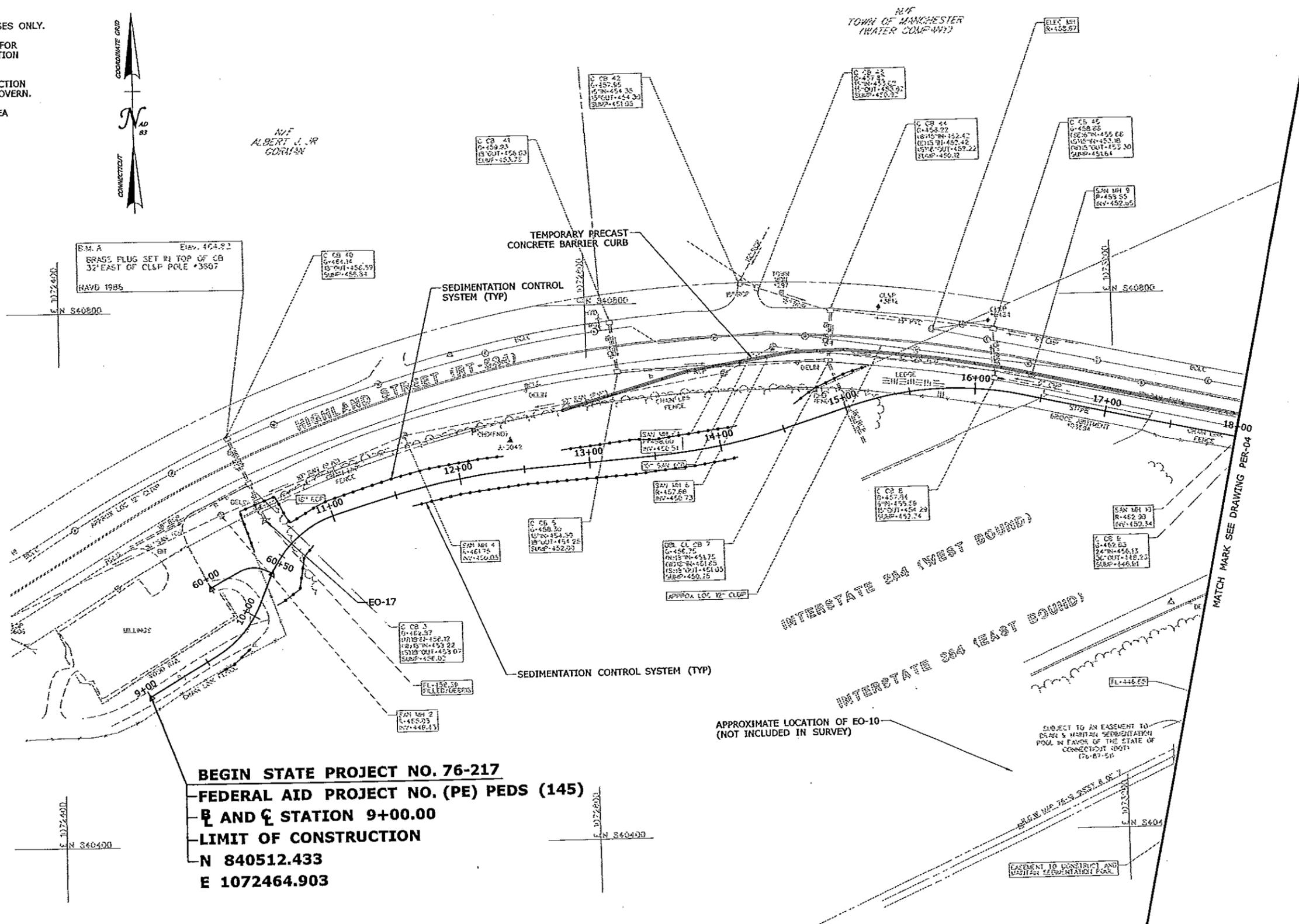
DESIGNER/DRAFTER: WGS		PROJECT TITLE: CONSTRUCTION OF CHARTER OAK GREENWAY SHARED USE PATH	TOWN: MANCHESTER	PROJECT NO. 76-217
CHECKED BY: MLW				
THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.	NOT TO SCALE	APPROVED BY:	SHEET NO.	SHEET NO.
REV. DATE	REVISION DESCRIPTION	SHEET NO.	Plotted Date: 2/18/2015	Filename: ...\\VW_MSH_0076_0217_PER-02.dgn

GENERAL NOTES

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2. THE CONTRACTOR SHALL NOT DISTURB ANY REGULATED AREA OUTSIDE OF THE LIMITS OF THE WETLAND SITE SHOWN IN THE PLANS.

SUGGESTED CONSTRUCTION SEQUENCE NOTES

1. CONSTRUCTION SHALL OCCUR DURING THE ALLOWABLE PERIOD AS DIRECTED IN THE CONTRACT DOCUMENTS, SECTION 1.08, "PROSECUTION AND PROGRESS."
2. INSTALL SEDIMENTATION CONTROL SYSTEM AND CONSTRUCT ANTI TRACKING PADS AS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER.
3. INSTALL, MAINTAIN, AND RELOCATE, AS NECESSARY, ALL TEMPORARY TRAFFIC SIGNS, BARRICADES, TEMPORARY PAVEMENT MARKINGS AND DELINEATORS IN ACCORDANCE WITH THE CONTRACT DOCUMENTS, SECTION 9.71, "MAINTENANCE AND PROTECTION OF TRAFFIC."
4. REMOVE AND RELOCATE BOULDERS. CONSTRUCT THE PIPES AND MANHOLE AS SHOWN.
5. REMOVE EXISTING FENCING AS SHOWN ON THE PLANS. CONSTRUCT BRIDGE ABUTMENTS, RETAINING WALLS, PEDESTRIAN BRIDGES, AND SHARED USE PATH.
6. AFTER ALL STAGES ARE COMPLETED, MILL AND OVERLAY CAMP MEETING ROAD AS SHOWN ON THE PLANS.
7. REMOVE EXISTING GUIDE RAILING, INSTALL NEW GUIDERAILING, AND INSTALL NEW FENCING AS SHOWN ON THE PLANS.
8. FURNISHING AND PLACING TOPSOIL, TURF ESTABLISHMENT, AND INSTALL LANDSCAPING ITEMS AS SHOWN ON THE PLANS.
9. REGRADE PARKING LOT, RESET BOULDERS, REMOVE ANTI TRACKING PADS, AND REMOVE SEDIMENTATION CONTROL SYSTEM.



**BEGIN STATE PROJECT NO. 76-217
 FEDERAL AID PROJECT NO. (PE) PEDS (145)
 AND C STATION 9+00.00
 LIMIT OF CONSTRUCTION
 N 840512.433
 E 1072464.903**

DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION PLAN REVISION BLOCK				
WETLAND SITE NO.	APPLICANT NAME	ORIGINAL SUBMISSION DATE	REVISION DATE	REVISION DESCRIPTION

DESIGNER/DRAFTER: MLA	CHECKED BY: MLW
SCALE IN FEET 0 40 80 SCALE 1"=40'	
REV. DATE	REVISION DESCRIPTION

STATE OF CONNECTICUT
 DEPARTMENT OF TRANSPORTATION

FILENAME: ...VW_MSH_0076_0217_PER-03-ESC.dgn

SIGNATURE/BLOCK:
OFFICE OF ENGINEERING

APPROVED BY:

PROJECT TITLE:
**CONSTRUCTION OF
 CHARTER OAK GREENWAY
 SHARED USE PATH**

TOWN:
MANCHESTER

DRAWING TITLE:
**SEDIMENTATION AND EROSION CONTROL
 STORMWATER PERMIT PLANS**

PROJECT NO.
76-217

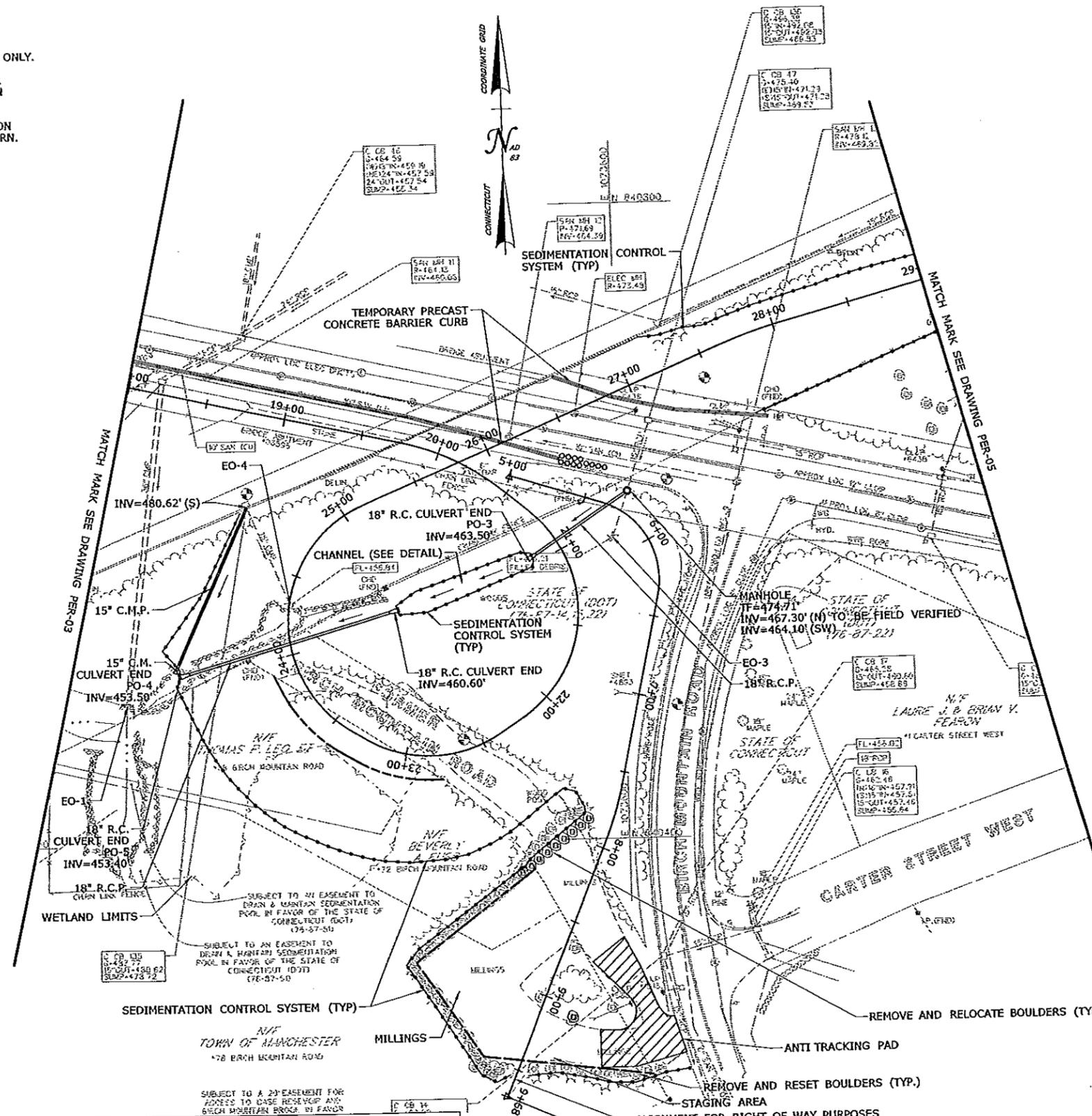
DRAWING NO.
PER-03

SHEET NO.

GENERAL NOTES

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DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION PLAN REVISION BLOCK				
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REV.	DATE	REVISION DESCRIPTION	SHEET NO.

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DESIGNER/DRAFTER:
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MLW
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SCALE 1"=40'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Signature/Block:
OFFICE OF ENGINEERING
APPROVED BY:

PROJECT TITLE:
**CONSTRUCTION OF
CHARTER OAK GREENWAY
SHARED USE PATH**

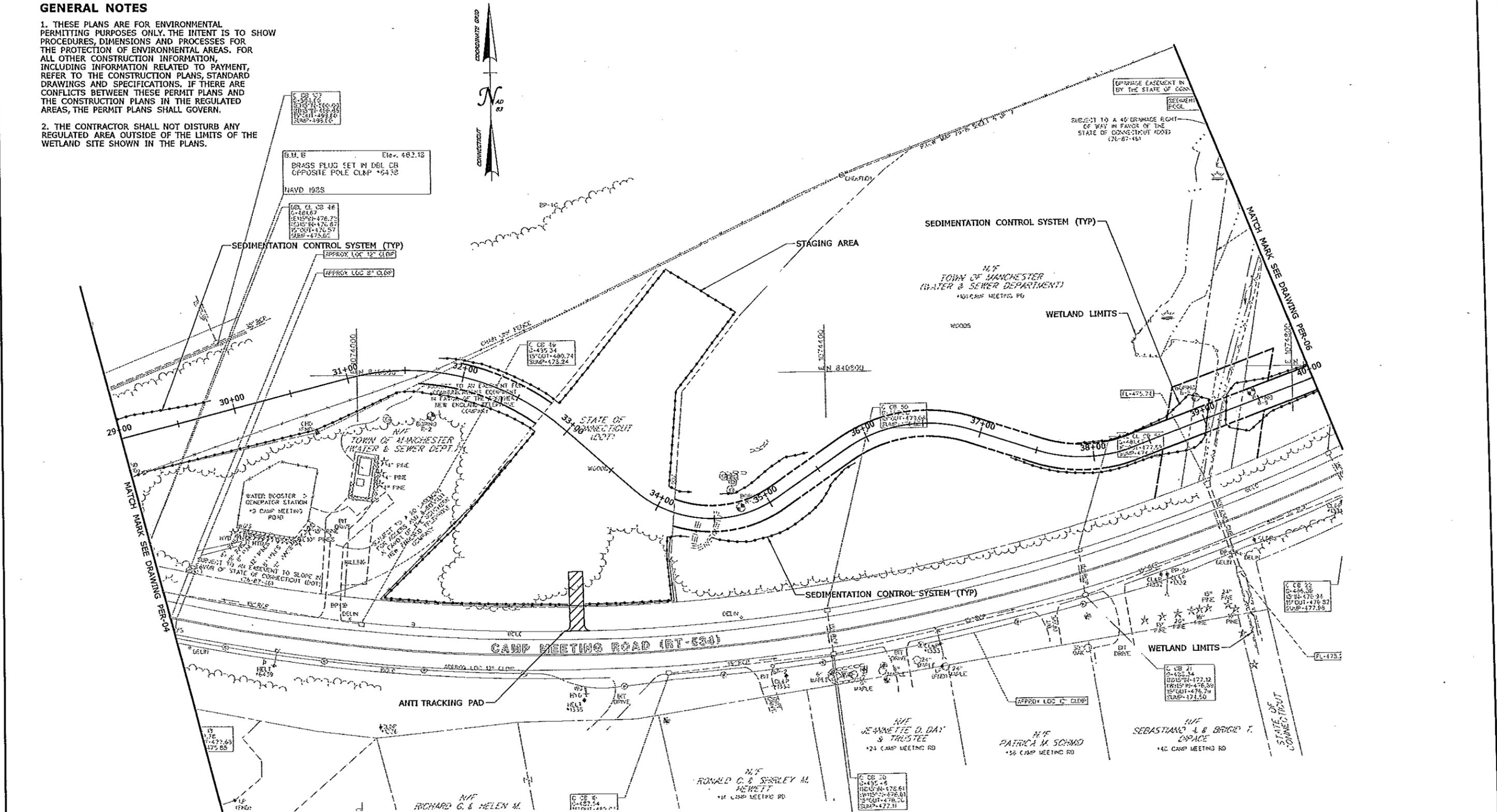
TOWN:
MANCHESTER
DRAWING TITLE:
**SEDIMENTATION AND EROSION CONTROL
STORMWATER PERMIT PLANS**

PROJECT NO.
76-217
DRAWING NO.
PER-04
SHEET NO.

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DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION PLAN REVISION BLOCK

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REV.	DATE	REVISION DESCRIPTION	SHEET NO.

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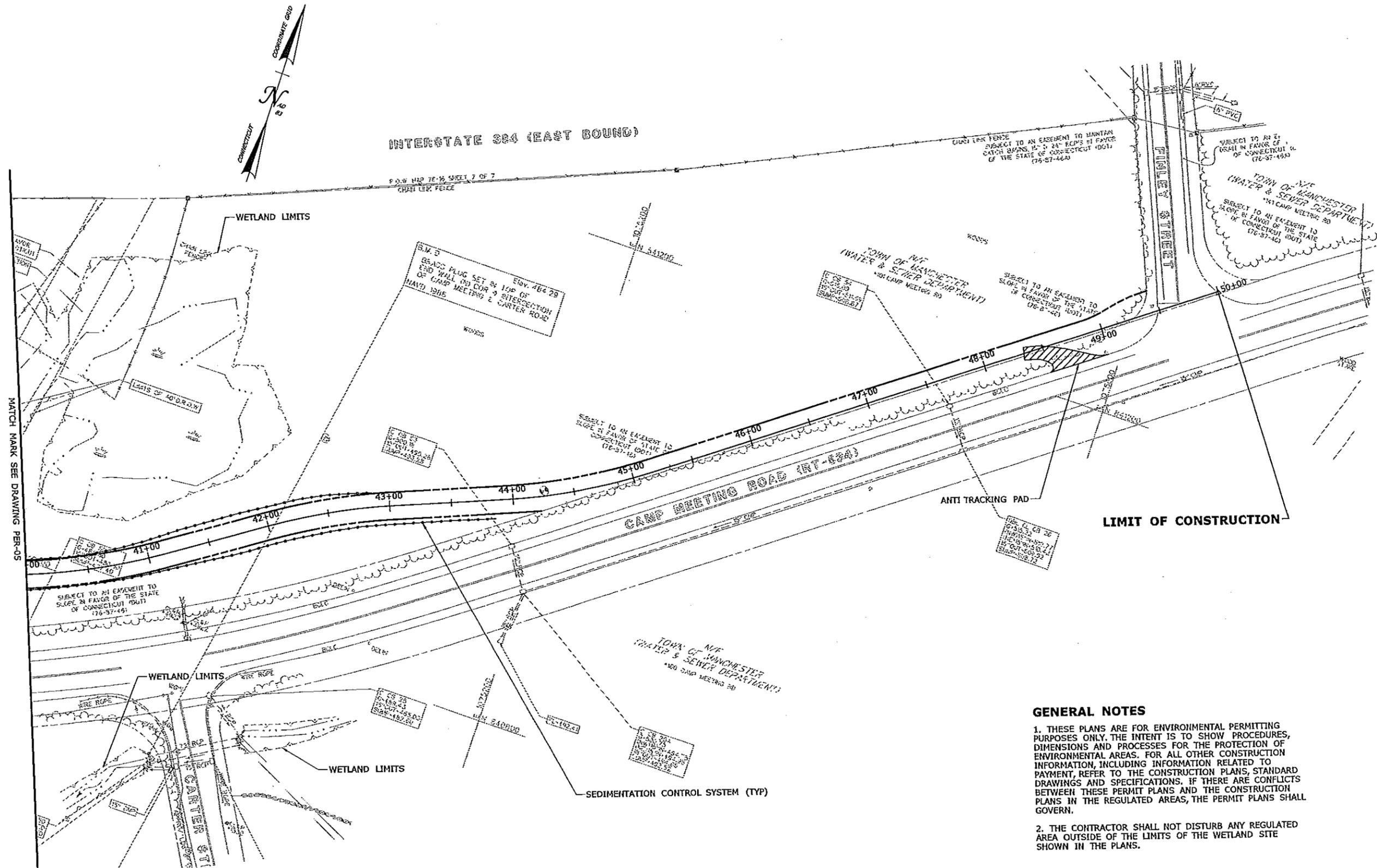


SIGNATURE/BLOCK:
OFFICE OF ENGINEERING
APPROVED BY:

PROJECT TITLE:
CONSTRUCTION OF CHARTER OAK GREENWAY SHARED USE PATH

TOWN:
MANCHESTER
DRAWING TITLE:
SEDIMENTATION AND EROSION CONTROL STORMWATER PERMIT PLANS

PROJECT NO.
76-217
DRAWING NO.
PER-05
SHEET NO.



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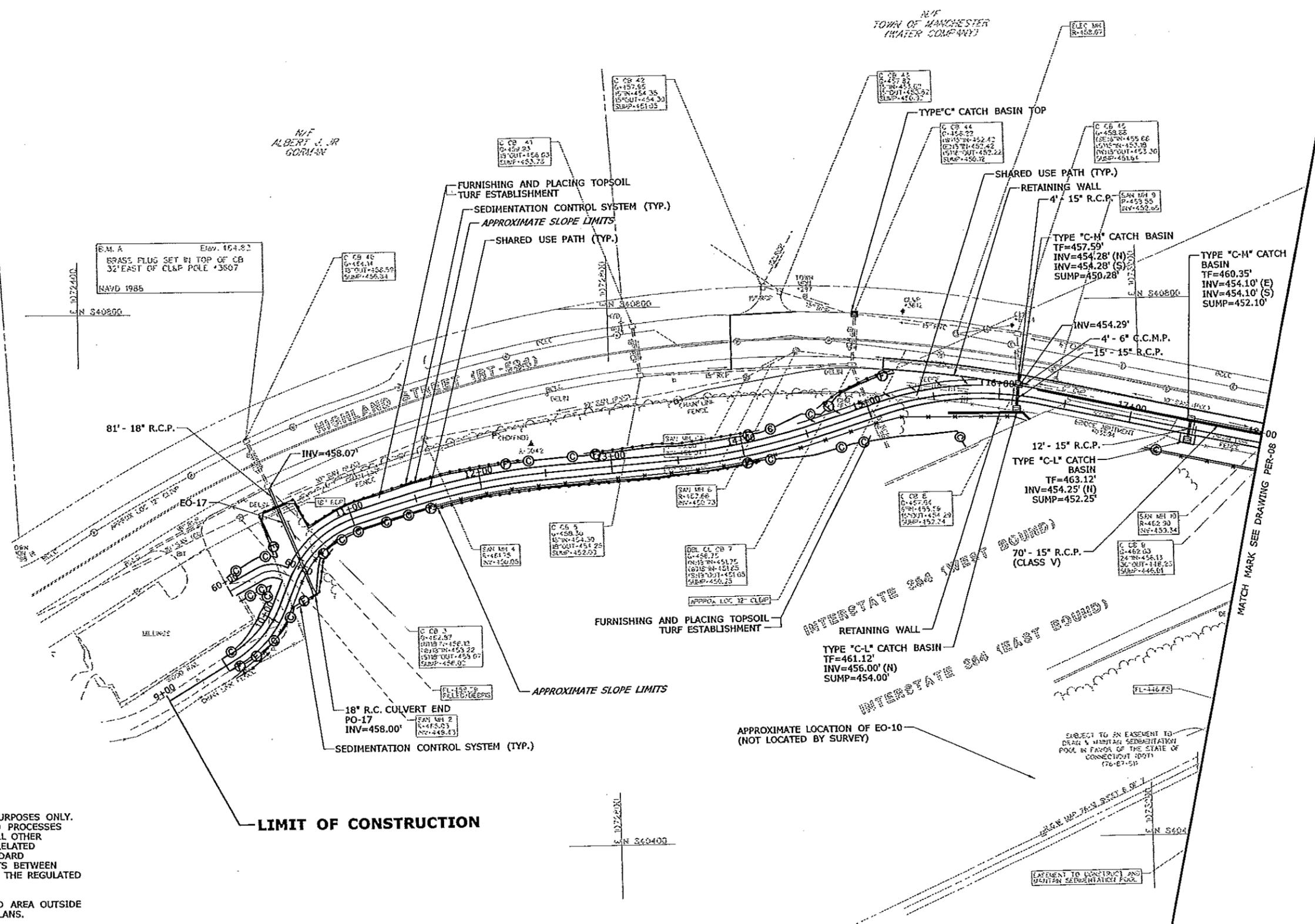
PROJECT TITLE:
**CONSTRUCTION OF
 CHARTER OAK GREENWAY
 SHARED USE PATH**

TOWN:
MANCHESTER
 DRAWING TITLE:
**SEDIMENTATION AND EROSION CONTROL
 STORMWATER PERMIT PLANS**

PROJECT NO.
76-217
 DRAWING NO.
PER-06
 SHEET NO.

REV. DATE	REVISION DESCRIPTION	SHEET NO.	Plotted Date: 3/10/2015

Filename: ...\\VW_MSH_0076_0217_PER-06-ESC.dgn



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LIMIT OF CONSTRUCTION

DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION PLAN REVISION BLOCK					
WETLAND SITE NO.	APPLICANT NAME	ORIGINAL SUBMISSION DATE	REVISION DATE	REVISION DESCRIPTION	REVISION NUMBER

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

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SIGNATURE/BLOCK:
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APPROVED BY:

PROJECT TITLE:
CONSTRUCTION OF CHARTER OAK GREENWAY SHARED USE PATH

TOWN:
MANCHESTER
DRAWING TITLE:
PLAN STORMWATER PERMIT PLANS

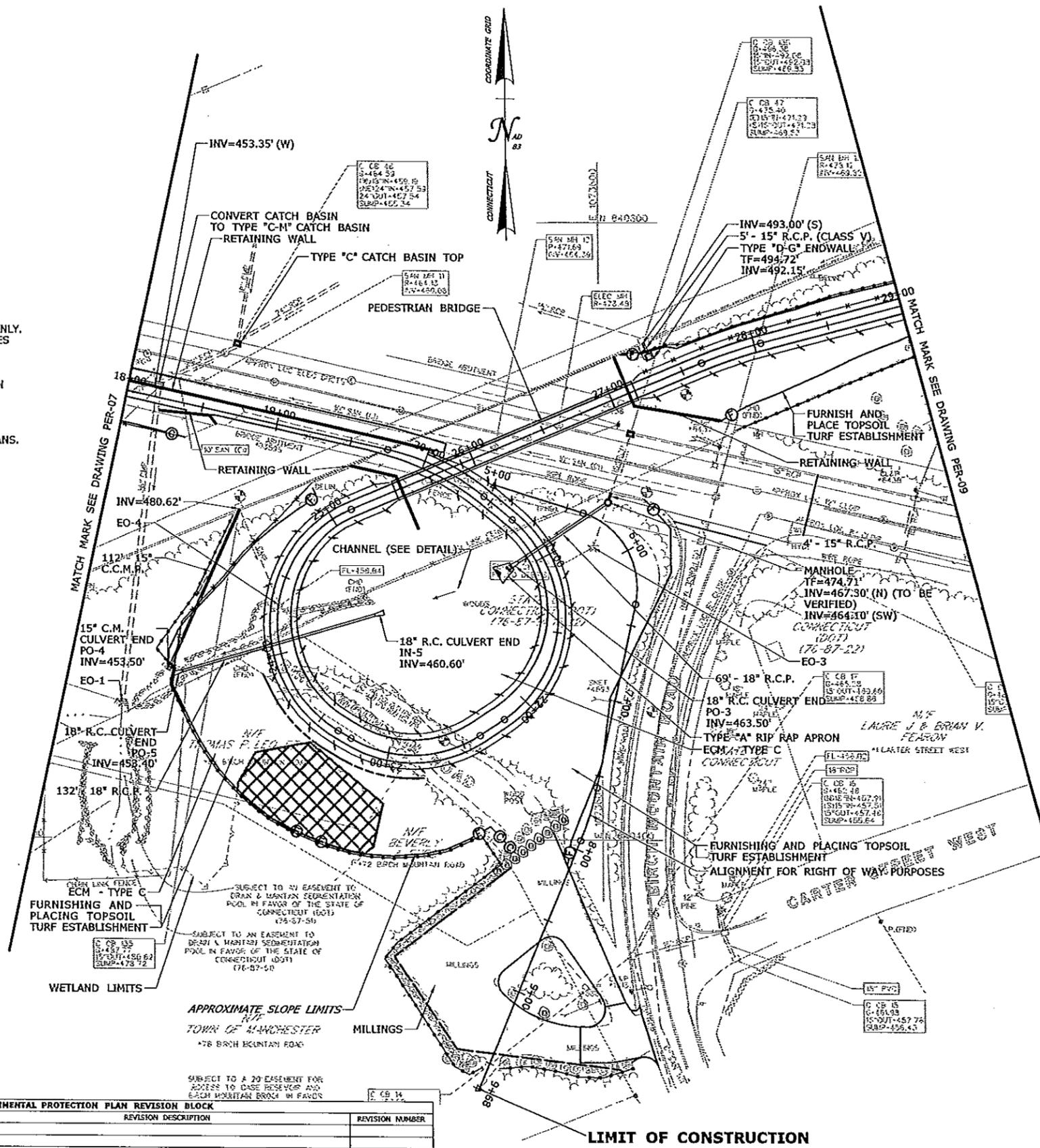
PROJECT NO.
76-217
DRAWING NO.
PER-07
SHEET NO.

INLAND WETLAND IMPACTS

 PERMANENT IMPACTS 0.097 ACRES (4,236 SQ. FT.)

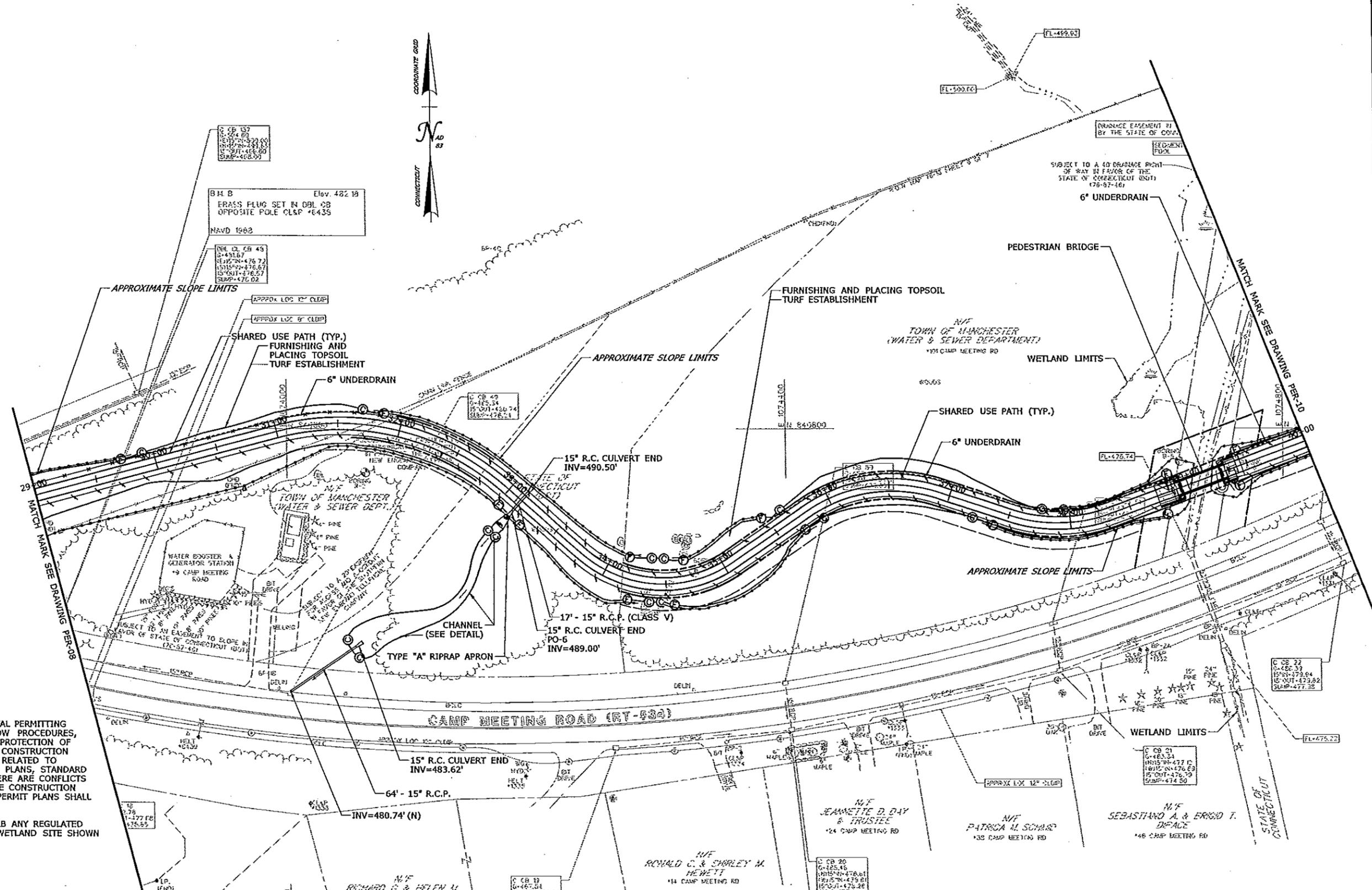
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DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION PLAN REVISION BLOCK				
WETLAND SITE NO.	APPLICANT NAME	ORIGINAL SUBMISSION DATE	REVISION DATE	REVISION NUMBER

DESIGNER/DRAFTER: WGS CHECKED BY: MLW SCALE IN FEET SCALE 1"=40' Plotted Date: 3/10/2015	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION OFFICE OF ENGINEERING	PROJECT TITLE: CONSTRUCTION OF CHARTER OAK GREENWAY SHARED USE PATH	TOWN: MANCHESTER	PROJECT NO. 76-217
			DRAWING TITLE: PLAN STORMWATER PERMIT PLANS	DRAWING NO. PER-08



GENERAL NOTES

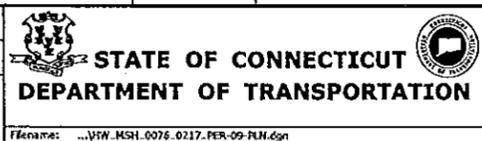
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REV.	DATE	REVISION DESCRIPTION	SHEET NO.

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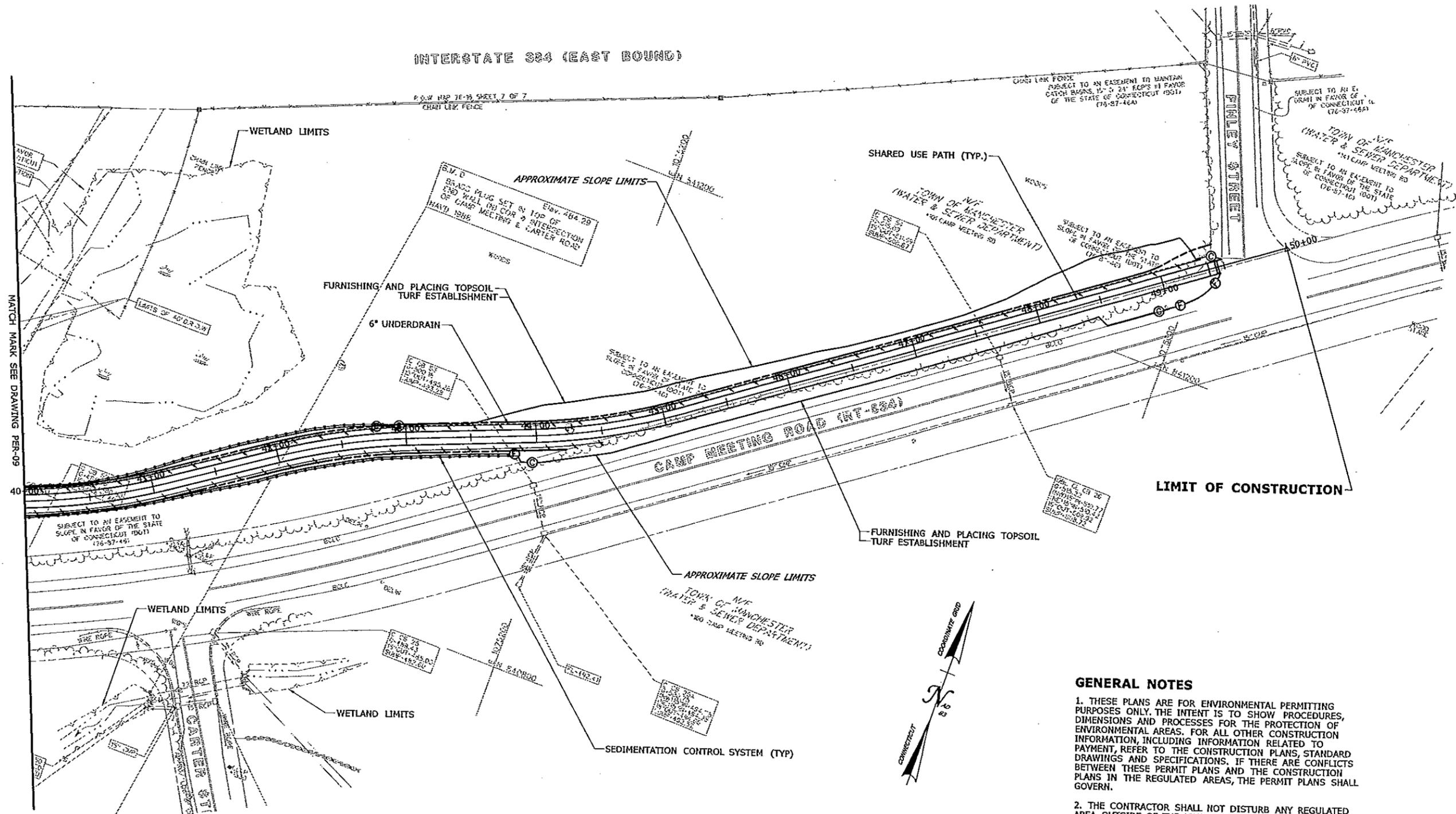


SIGNATURE/BLOCK:
OFFICE OF ENGINEERING
APPROVED BY:

PROJECT TITLE:
**CONSTRUCTION OF
CHARTER OAK GREENWAY
SHARED USE PATH**

TOWN:
MANCHESTER
DRAWING TITLE:
**PLAN
STORMWATER PERMIT PLANS**

PROJECT NO.
76-217
DRAWING NO.
PER-09
SHEET NO.



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DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION PLAN REVISION BLOCK				
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	CHECKED BY: MLW		SCALE IN FEET SCALE 1"=40'	DRAWING NO. PER-10		
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