



**US Army Corps
of Engineers** ®
New England District
696 Virginia Road
Concord, MA 01742-2751

PUBLIC NOTICE

Comment Period Begins: April 25, 2017
Comment Period Ends: May 25, 2017
File Number: NAE-2016-1969
In Reply Refer To: Kevin R. Kotelly, P.E.
Phone: (978) 318-8703
E-mail: kevin.r.kotelly@usace.army.mil

The District Engineer has received a permit application to conduct work in waters of the United States from the Chelmsford Department of Public Works, 9 Alpha Road, Chelmsford, Massachusetts 01824. This work is proposed in the Merrimack River at Wellman Avenue, Chelmsford, Massachusetts. The site coordinates are: Latitude 42° ,38',54" N, Longitude 71° ,23',00" W.

The project is to perform work and place fill below the ordinary high water line (OHWL) of waters of the United States in order to perform the Merrimack River Bank Stabilization project. 1.36 acres of fill below the OHWL would be placed along 3950 linear feet (LF) of river bank to stabilize the river bank along a stretch of the Merrimack River.

An adjacent residential condominium complex occupies approximately 82 acres along 4520 LF of shoreline. Approximately 1605 residents live in 535 residential units. Wastewater disposal for the condominium complex is collected in an existing gravity sewerline located parallel and adjacent to the Merrimack river. Sewage flows by gravity easterly to a pump station, from which sewage is pumped to, and treated at, the Lowell wastewater treatment facility. The purpose of this bank stabilization project is to prevent further erosion which could wash out, expose, and rupture the existing gravity sewer which serves the 535 unit condominium complex.

The river bank in this location is eroded with vertical, nearly vertical, and undercut banks. The proposed project is a hybrid design that incorporates a combination of structural and non-structural methods to provide the required level of protection, and it incorporates living materials to stabilize the bank and provide habitat. Three stabilization techniques are proposed: Bank Support (timber toe protection and vegetation management), Bank Repair (installing stone sill and soil to stabilize the slope), and Bank Restoration (restoring the entire slope cross-section by installing a stone sill and reconstructing the bank with coir fiber rolls and replanting the slope). In all three treatment zones, an invasive species management plan would be developed and implemented to promote the growth of native species. Additionally, trees on the slope and along the top of slope that are in imminent danger of toppling would be removed to maintain the integrity of the reconstructed, repaired, and supported bank reaches. The project would be performed under a grant from the Federal Emergency Management Agency (FEMA).

The work is shown on the attached plans entitled, "Merrimack River Stabilization At Wellman Avenue, North Chelmsford, Massachusetts," on 39 sheets, and dated, November, 2016.

Stabilizing the riverbank would involve work along the toe of slope within the Merrimack River. The following measures are proposed in order to avoid and minimize impacts to the water quality and riverine habitats during construction:

CENAE-R

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- A turbidity barrier would be installed in the river around active work areas to contain turbid water and prevent its transport outside of the work zone.
- A proposed “marine mattress” and stone sill would be installed and would provide a raised work platform on which construction equipment can work. This would minimize equipment working on river sediments and in the water column. After the installation of the marine mattress and stone sill, all other work would occur above the water elevation.

AUTHORITY

Permits are required pursuant to:

Section 10 of the Rivers and Harbors Act of 1899

Section 404 of the Clean Water Act

Section 103 of the Marine Protection, Research and Sanctuaries Act.

The decision whether to issue a permit will be based on an evaluation of the probable impact of the proposed activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefit which may reasonably accrue from the proposal must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the proposal will be considered, including the cumulative effects thereof; among those are: conservation, economics, aesthetics, general environmental concerns, wetlands, cultural value, fish and wildlife values, flood hazards, flood plain value, land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food production and, in general, the needs and welfare of the people.

The Corps of Engineers is soliciting comments from the public; Federal, state, and local agencies and officials; Indian Tribes; and other interested parties in order to consider and evaluate the impacts of this proposed activity. Any comments received will be considered by the Corps of Engineers to determine whether to issue, modify, condition or deny a permit for this proposal. To make this decision, comments are used to assess impacts on endangered species, historic properties, water quality, general environmental effects, and the other public interest factors listed above. Comments are used in the preparation of an Environmental Assessment and/or an Environmental Impact Statement pursuant to the National Environmental Policy Act. Comments are also used to determine the need for a public hearing and to determine the overall public interest of the proposed activity.

Where the activity involves the discharge of dredged or fill material into waters of the United States or the transportation of dredged material for the purpose of disposing it in ocean waters, the evaluation of the impact of the activity in the public interest will also include application of the guidelines promulgated by the Administrator, U.S Environmental Protection Agency, under authority of Section 404(b) of the Clean Water Act, and/or Section 103 of the Marine Protection Research and Sanctuaries Act of 1972, as amended.

ESSENTIAL FISH HABITAT

The Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), requires all federal agencies to consult with the National Marine Fisheries Service on all actions, or proposed actions, permitted, funded, or undertaken by the agency, that may adversely affect Essential Fish Habitat (EFH). This project would impact 1.36 acres of Essential Fish Habitat (EFH) for Atlantic Salmon. This habitat consists of riverbank habitat. Loss of this habitat may adversely affect Atlantic Salmon. However, the District Engineer has made a preliminary determination that the site-specific adverse

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effect will not be substantial. Further consultation with the National Marine Fisheries Service regarding EFH conservation recommendations is being conducted and will be concluded prior to the final decision.

NATIONAL HISTORIC PRESERVATION ACT

Based on his initial review, the District Engineer has determined that little likelihood exists for the proposed work to impinge upon properties with cultural or Native American significance, or listed in, or eligible for listing in, the National Register of Historic Places. Therefore, no further consideration of the requirements of Section 106 of the National Historic Preservation Act of 1966, as amended, is necessary. This determination is based upon one or more of the following:

- a. The permit area has been extensively modified by previous work.
- b. The permit area has been recently created.
- c. The proposed activity is of limited nature and scope.
- d. Review of the latest published version of the National Register shows that no presence of registered properties listed as being eligible for inclusion therein are in the permit area or general vicinity.
- e. Coordination with the State Historic Preservation Officer and/or Tribal Historic Preservation Officer(s)

ENDANGERED SPECIES CONSULTATION

The New England District, Army Corps of Engineers has reviewed the list of species protected under the Endangered Species Act of 1973, as amended, which might occur at the project site. It is our preliminary determination that the proposed activity for which authorization is being sought is designed, situated or would be operated/used in such a manner that it is not likely to adversely affect any Federally listed endangered or threatened species or their designated critical habitat. By this Public Notice, we are requesting that the appropriate Federal Agency concur with our determination.

The following authorizations have been applied for, or have been, or will be obtained:

- (X) Permit, License or Assent from State.
- (X) Permit from Local Wetland Agency or Conservation Commission.
- (X) Water Quality Certification in accordance with Section 401 of the Clean Water Act.

In order to properly evaluate the proposal, we are seeking public comment. Anyone wishing to comment is encouraged to do so. Comments should be submitted in writing by the above date. If you have any questions, please contact Kevin Kotelly at (978) 318-8703 or kevin.r.kotelly@usace.army.mil

Any person may request, in writing, within the comment period specified in this notice, that a public hearing be held to consider the application. Requests for a public hearing shall specifically state the reasons for holding a public hearing. The Corps holds public hearings for the purpose of obtaining public comments when that is the best means for understanding a wide variety of concerns from a diverse segment of the public.

The initial determinations made herein will be reviewed in light of facts submitted in response to this notice. All comments will be considered a matter of public record. Copies of letters of objection will be forwarded to the applicant who will normally be requested to contact objectors directly in an effort to reach an understanding.

THIS NOTICE IS NOT AN AUTHORIZATION TO DO ANY WORK.



Barbara Newman
Chief, Permits and Enforcement Branch
Regulatory Division

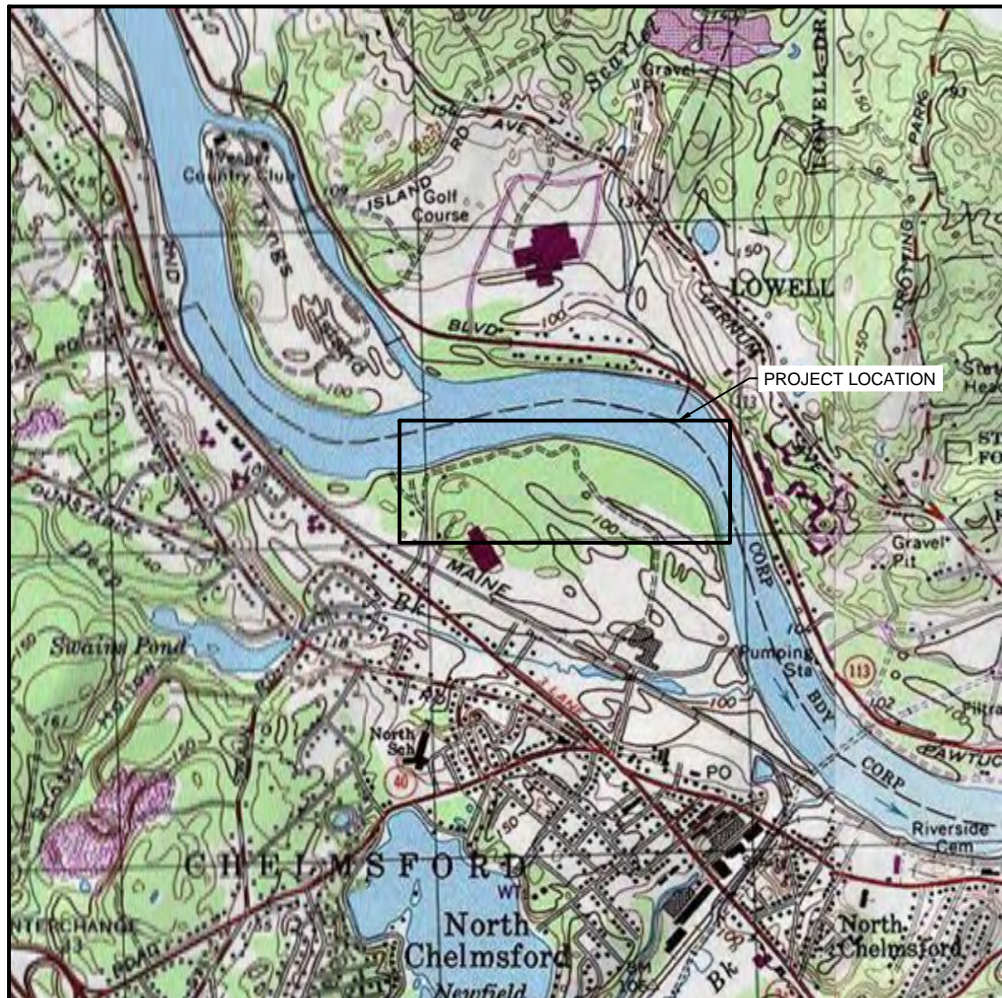
If you would prefer not to continue receiving Public Notices by email, please contact Ms. Tina Chaisson at (978) 318-8058 or e-mail her at bettina.m.chaisson@usace.army.mil. You may also check here () and return this portion of the Public Notice to: Bettina Chaisson, Regulatory Division, U.S. Army Corps of Engineers, 696 Virginia Road, Concord, MA 01742-2751.

NAME: _____
ADDRESS: _____
PHONE: _____

MERRIMACK RIVER STABILIZATION AT WELLMAN AVENUE

NORTH CHELMSFORD, MASSACHUSETTS

PERMIT PLANS FOR RIVERBANK STABILIZATION & SLOPE RESTORATION



USGS LOCUS MAP

0 1000 2000 4000

SCALE, FEET

This Image provided by MassGIS is from U.S.G.S. Topographic 7.5 Minute Series Nashua South Quadrangle, 1977. Datum is National Geodetic Vertical Datum (NGVD). Contour Interval is 10 Feet.



MASSACHUSETTS QUADRANGLE LOCATION



AERIAL MAP

MERRIMACK RIVER INFORMATION

FEMA CROSS SECTION "Y" - 48,255 FEET ABOVE COUNTY BOUNDARY

0.2% ANNUAL CHANCE FLOOD	EL. ±103.5
1.0% ANNUAL CHANCE FLOOD	EL. ±102.0
2.0% ANNUAL CHANCE FLOOD	EL. ±100.5
10% ANNUAL CHANCE FLOOD	EL. ±98.5
ORDINARY HIGH WATER	EL. ±92.5 (TOP OF INLAND BANK)
ORDINARY LOW WATER	EL. ±86.5 (TOE OF INLAND BANK)
OBSERVED WATER (MAY 2016)	EL. ±90
FLOODWAY SECTION AREA	18,440 SQ. FT.
FLOODWAY WIDTH	865 FT.

PAWTUCKET DAM, LOWELL, MA INFORMATION

EXISTING CREST ELEVATION	EL. 92.2 NGVD29 = EL. 91.43 NAVD88
NEW PNEUMATIC CREST ELEVATION	EL. 92.2 NGVD29 = EL. 91.43 NAVD88
MAX. CREST BEFORE LOWERING	EL. 93.2 NGVD29 = EL. 92.43 NAVD88

HISTORIC FLOODS

DATE	PEAK DISCHARGE (CFS)
MARCH 20, 1936	173,000
SEPTEMBER 23, 1938	121,000
APRIL 23, 1852	108,000
APRIL 7, 1987	84,700
APRIL 6, 1960	79,000
NOVEMBER 5, 1927	76,800

DRAWING INDEX

- SHEET 1 - COVER SHEET
- SHEETS 2-5 - TOPOGRAPHIC PLANS SHOWING EXISTING CONDITION
- SHEETS 6-13 - SITE PLANS
- SHEETS 14-37 - SECTIONS
- SHEETS 38-39 - CONSTRUCTION DETAILS

DRAFT

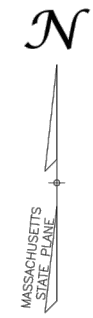
Merrimack Riverbank Stabilization Wellman Avenue North Chelmsford, Massachusetts		COVER SHEET	
Town of Chelmsford Chelmsford, Massachusetts		Project 1603860	October 2016

LEGEND

- UTILITY POLE
- FIRE HYDRANT
- WATER GATE VALVE BOX
- 102 — EXISTING 1-FOOT CONTOUR
- 100 — EXISTING 5-FOOT CONTOUR
- SMH R=101.4 (S) EXISTING SEWER MANHOLE (WITH RIM ELEVATION)
- MH R=104.6 (M) EXISTING MANHOLE (WITH RIM ELEVATION)
- EXISTING TREE WITH TRUNK DIAMETER
- EXISTING SOIL BORING
- WF#A3 EXISTING WETLAND FLAG
- HH EXISTING HANDHOLE
- EH EXISTING ELECTRIC HANDHOLE
- SBDH EXISTING STONE BOUND WITH DRILL HOLE
- CB PIL CONCRETE BOUND WITH PIN IN LEAD
- ICV IRRIGATION CONTROL VALVE
- IP IRON PIPE
- APPROXIMATE WATER LEVEL ON MAY 2, 2016 AND MAY 5, 2016
- CB CATCH BASIN
- - - - - LIMIT OF FEMA FLOOD HAZARD AREA ZONE AE
- S BUILDING SEWER
- FM SEWER FORCE MAIN

LIST OF ABBREVIATIONS

- BVW = BORDERING VEGETATED WETLAND
- R = RIM ELEVATION
- TYP = TYPICAL
- RR TIE = RAILROAD TIE
- SBDH = STONE BOUND DRILL HOLE
- S&N = STAKE AND NAIL
- CB PIL = CONCRETE BOUND WITH PIN IN LEAD
- IP = IRON PIPE
- PM = PUNCH MARK
- EP = EDGE OF PAVEMENT
- HH = HANDHOLE
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- EL = ELEVATION



SEE SHEET 3

SEE SHEET 3

DRAWING: TP-4
Sheet 2 of 39

SCALE: 1"=40'
0' 20' 40' 80'

JUNE 29, 2016
DATE

NO.

**TOPOGRAPHIC PLAN
SHOWING EXISTING CONDITIONS**
WILLIAMSBURG CONDOMINIUMS
631 WELLMAN AVENUE, NORTH CHELMSFORD, MA 01863-1365

Owner:
WILLIAMSBURG CONDOMINIUMS
631 WELLMAN AVENUE
NORTH CHELMSFORD, MA 01863-1365

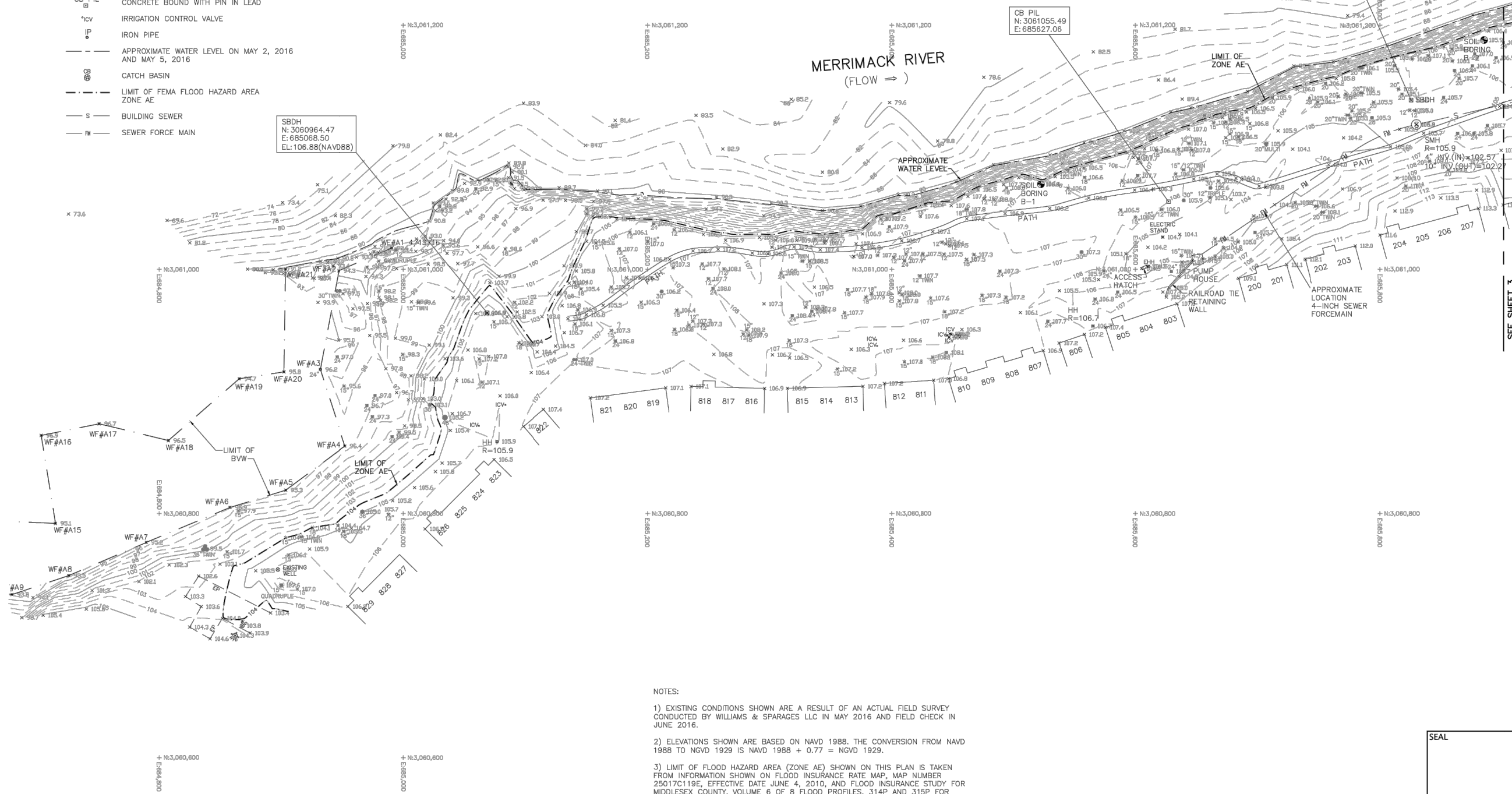
Applicant:
Same as owner

Designed By: N/A
Drawn By: Mep
Reviewed By: CPS
Project Manager: CPS

Job File Number: CHEL-0023
Drawing File Folder: CHEL23

Drawing Issued for Review Only
 Drawing Issued for Permit
 Drawing Issued for Construction

SEAL

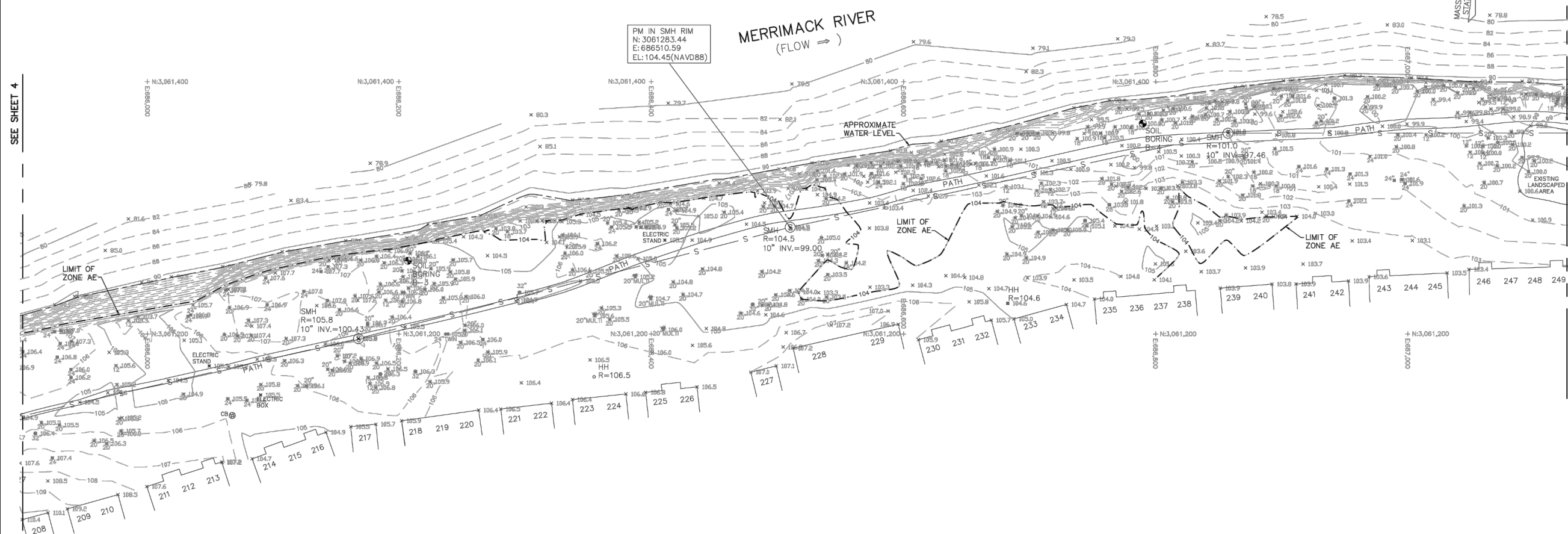
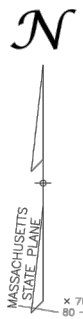


NOTES:

- 1) EXISTING CONDITIONS SHOWN ARE A RESULT OF AN ACTUAL FIELD SURVEY CONDUCTED BY WILLIAMS & SPARAGES LLC IN MAY 2016 AND FIELD CHECK IN JUNE 2016.
- 2) ELEVATIONS SHOWN ARE BASED ON NAVD 1988. THE CONVERSION FROM NAVD 1988 TO NGVD 1929 IS NAVD 1988 + 0.77 = NGVD 1929.
- 3) LIMIT OF FLOOD HAZARD AREA (ZONE AE) SHOWN ON THIS PLAN IS TAKEN FROM INFORMATION SHOWN ON FLOOD INSURANCE RATE MAP, MAP NUMBER 250170119E, EFFECTIVE DATE JUNE 4, 2010, AND FLOOD INSURANCE STUDY FOR MIDDLESEX COUNTY, VOLUME 6 OF 8 FLOOD PROFILES, 314P AND 315P FOR THE MERRIMACK RIVER, EFFECTIVE DATE JUNE 4, 2010.

SEE SHEET 4

SEE SHEET 4



PM IN SMH RIM
N: 3061283.44
E: 686510.59
EL: 104.45 (NAVD88)

MERRIMACK RIVER
(FLOW ⇒)

LEGEND

- UTILITY POLE
- FIRE HYDRANT
- WATER GATE VALVE BOX
- EXISTING 1-FOOT CONTOUR
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SEAL

TOPOGRAPHIC PLAN
SHOWING EXISTING CONDITIONS

WILLIAMSBURG CONDOMINIUMS
631 WELLMAN AVENUE, NORTH CHELMSFORD, MA 01863-1365

Owner:
WILLIAMSBURG CONDOMINIUMS
631 WELLMAN AVENUE
NORTH CHELMSFORD, MA 01863-1365
Applicant:
Same as owner

Designed By: N/A
Drawn By: MRP
Reviewed By: CPS
Project Manager: CPS
Job File Number: CHEL-0023
Drawing File Folder: CHEL23

- Drawing Issued for Review Only
- Drawing Issued for Permit
- Drawing Issued for Construction

DRAWING: TP-3

Sheet 3 of 39

SCALE: 1" = 40'

0' 20' 40' 80'

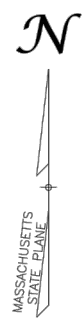
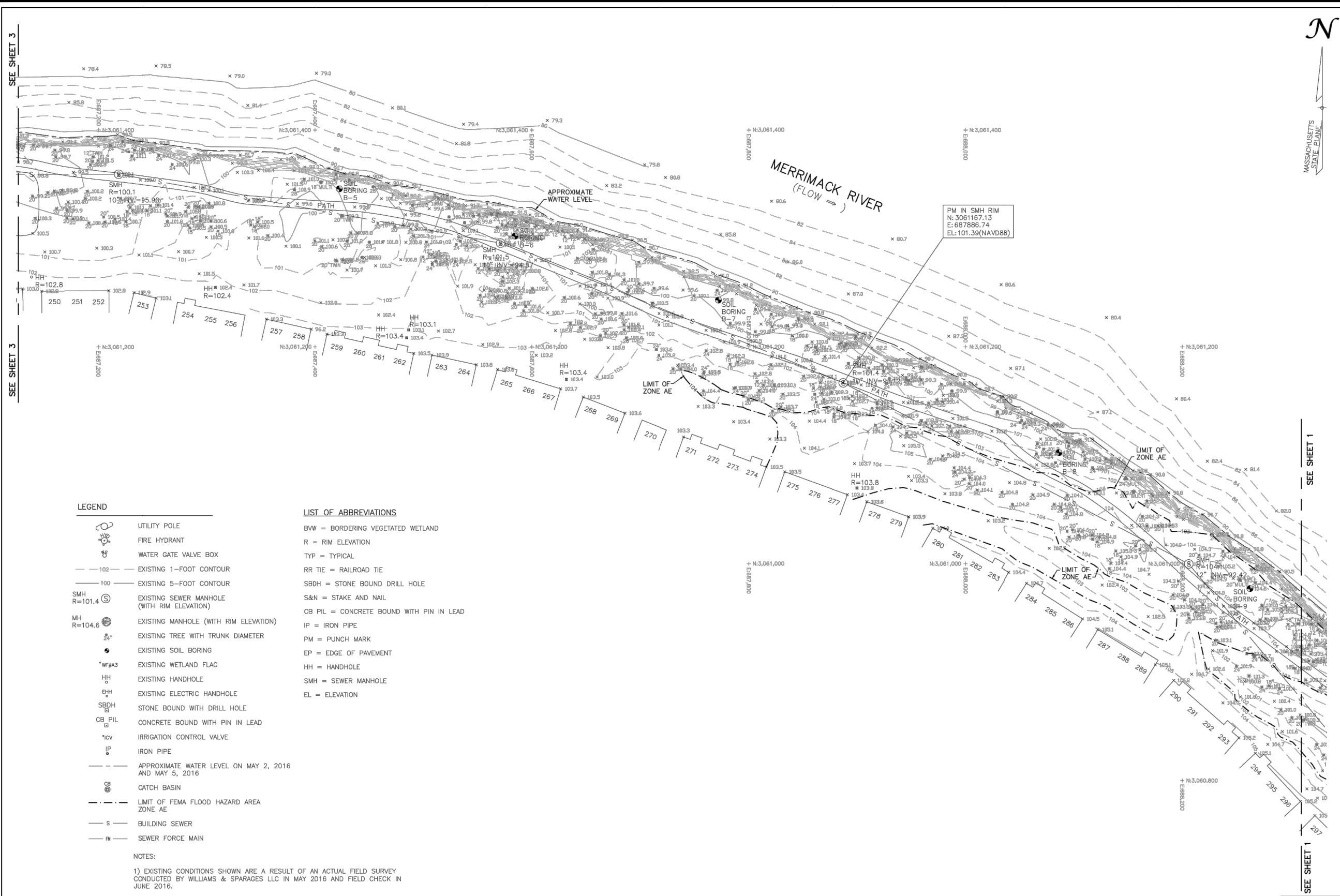
JUNE 29, 2016

DATE

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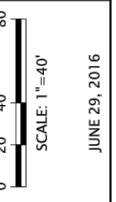
SEE SHEET 2

SEE SHEET 2



**TOPOGRAPHIC PLAN
SHOWING EXISTING CONDITIONS**
WILLIAMSBURG CONDOMINIUMS
631 WELLMAN AVENUE, NORTH CHELMSFORD, MA 01863-1365

DRAWING: TP-2
Sheet 4 of 39



NO.	DATE
4	
3	
2	
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LEGEND

- UTILITY POLE
- FIRE HYDRANT
- WATER GATE VALVE BOX
- EXISTING 1-FOOT CONTOUR
- EXISTING 5-FOOT CONTOUR
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- EXISTING MANHOLE (WITH RIM ELEVATION)
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- EXISTING SOIL BORING
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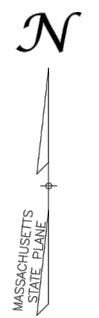
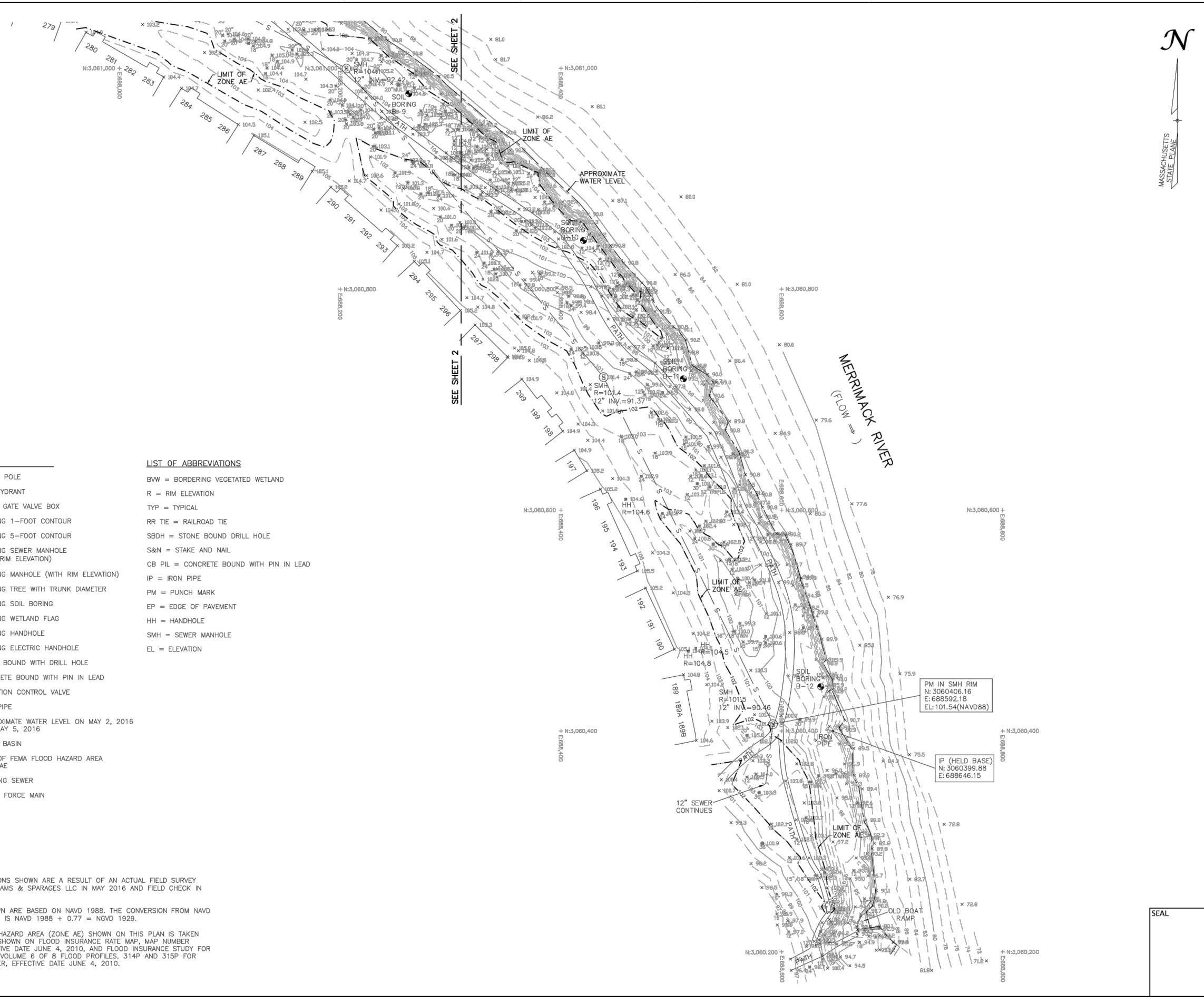
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Applicant:
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Designed By: N/A
Drawn By: MRP
Reviewed By: CPS
Project Manager: CPS
Job File Number: CHEL-0023
Drawing File Folder: CHEL23

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- Drawing Issued for Permit
- Drawing Issued for Construction

SEAL



LEGEND

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Project Manager: CPS
Job File Number: CHEL-0023
Drawing File Folder: CHEL23

Applicant:
Same as owner

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DRAWING: TP-1

Sheet 5 of 39

0' 20' 40' 80'
SCALE: 1"=40'

JUNE 29, 2016

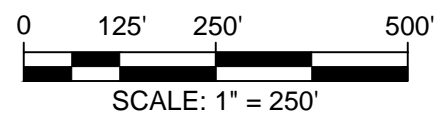
NO.	DATE
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3	
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SEAL



NOTES:
 1. BORINGS LOCATED USING EXISTING SURVEY DATA FROM DRAWING SP-1 "TOPOGRAPHIC PLAN SHOWING EXISTING CONDITIONS" DATED JUNE 20, 2016 PROVIDED BY WILLIAMS & SPARAGES, LLC.

LEGEND:
 ● B-9 GEI BORING LOCATION



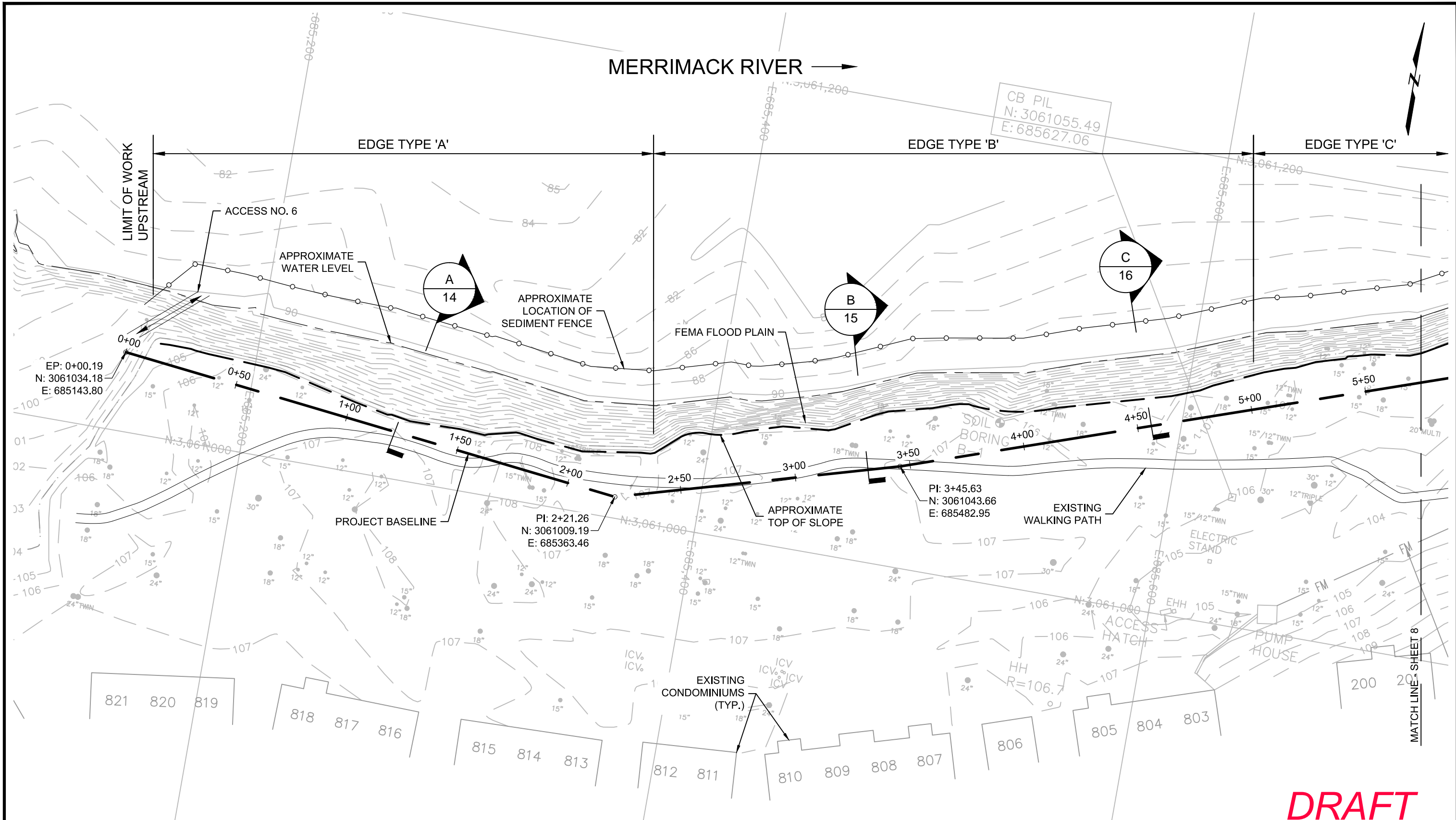
Merrimack Riverbank Stabilization
 Wellman Avenue
 North Chelmsford, Massachusetts

Town of Chelmsford
 Chelmsford, Massachusetts



SITE OVERVIEW

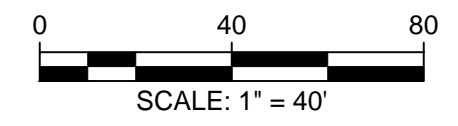
Project 1603860 October 2016 Sheet 6 of 39




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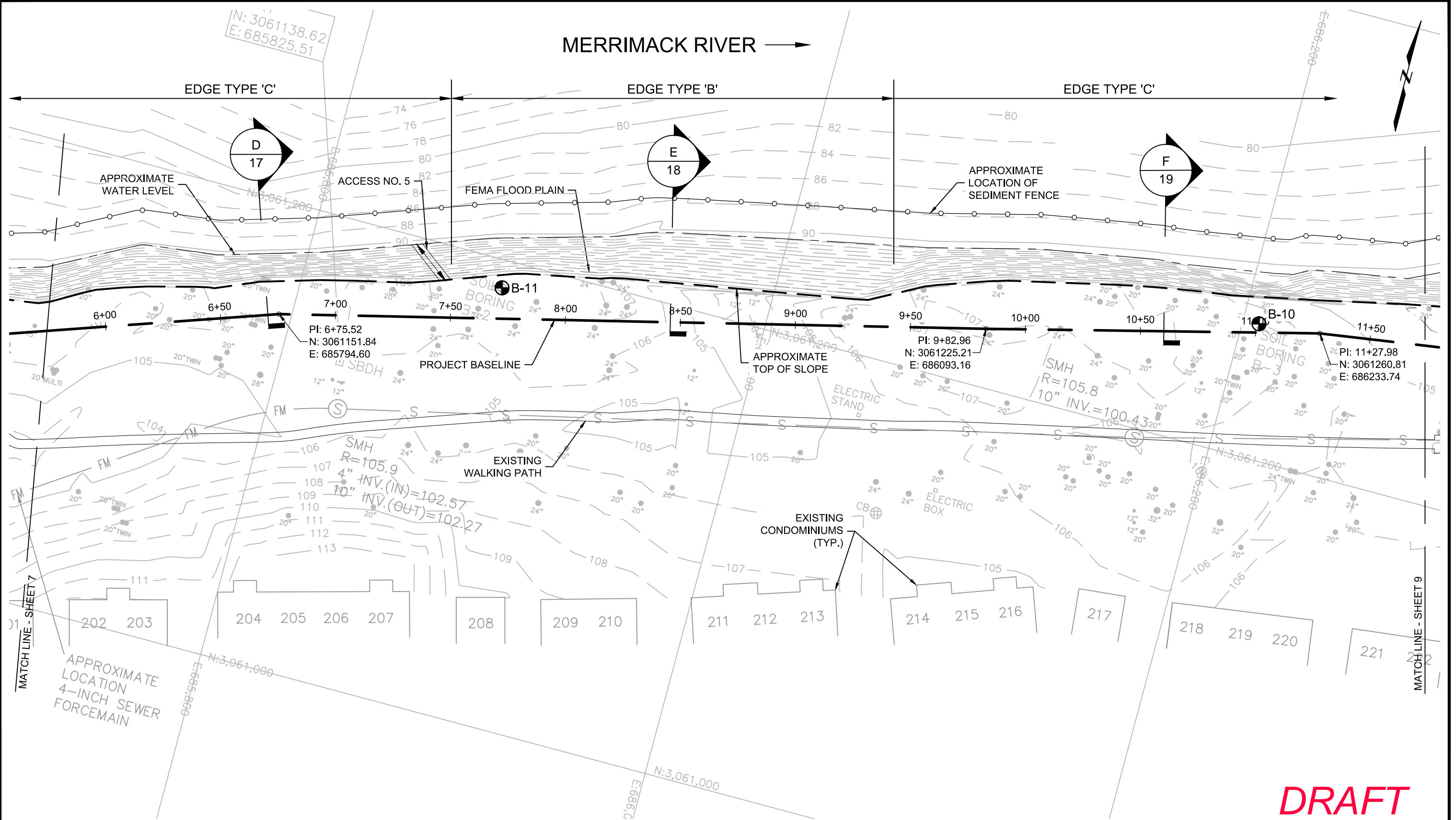
NOTES:
 1. EXISTING SURVEY DATA FROM DRAWING SP-1 "TOPOGRAPHIC PLAN SHOWING EXISTING CONDITIONS" DATED JUNE 20, 2016 PROVIDED BY WILLIAMS & SPARAGES, LLC.

LEGEND:
 ● B-9 GEI BORING LOCATION



Merrimack Riverbank Stabilization Wellman Avenue North Chelmsford, Massachusetts		SITE PLAN (1 OF 7)
Town of Chelmsford Chelmsford, Massachusetts	Project 1603860	October 2016 Sheet 7 of 39

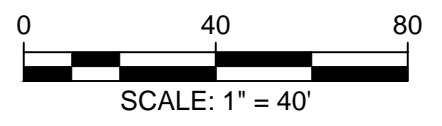
MERRIMACK RIVER →




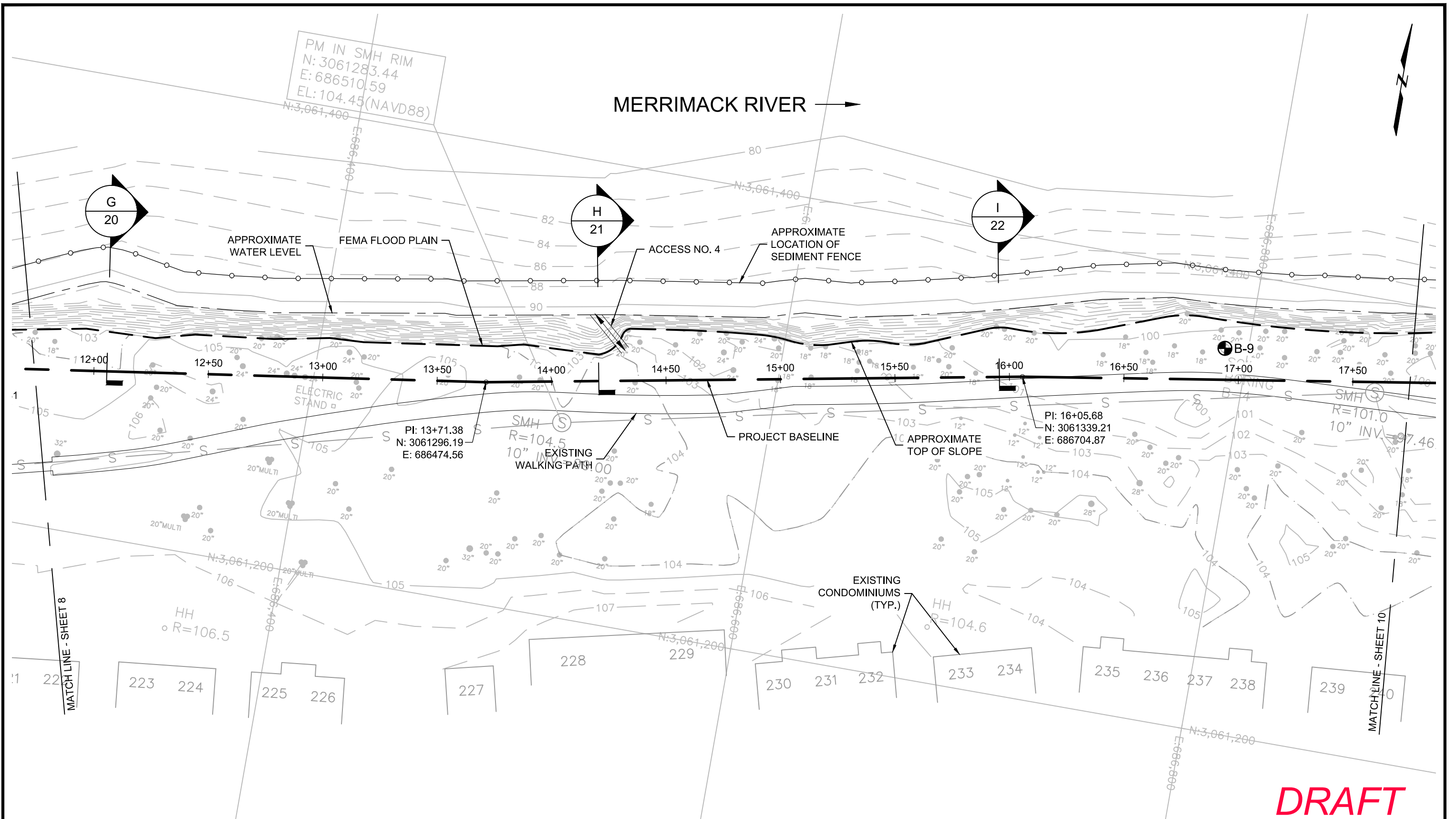
DRAFT

NOTES:
 1. EXISTING SURVEY DATA FROM DRAWING SP-1 "TOPOGRAPHIC PLAN SHOWING EXISTING CONDITIONS" DATED JUNE 20, 2016 PROVIDED BY WILLIAMS & SPARAGES, LLC.

LEGEND:
 ● B-9 GEI BORING LOCATION



Merrimack Riverbank Stabilization Wellman Avenue North Chelmsford, Massachusetts		SITE PLAN (2 OF 7)
Town of Chelmsford Chelmsford, Massachusetts	Project 1603860	October 2016 Sheet 8 of 39

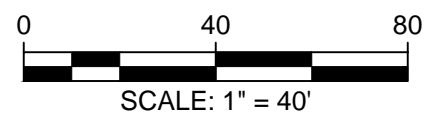


MERRIMACK RIVER →



NOTES:
 1. EXISTING SURVEY DATA FROM DRAWING SP-1 "TOPOGRAPHIC PLAN SHOWING EXISTING CONDITIONS" DATED JUNE 20, 2016 PROVIDED BY WILLIAMS & SPARAGES, LLC.

LEGEND:
 ● B-9 GEI BORING LOCATION



Merrimack Riverbank Stabilization
 Wellman Avenue
 North Chelmsford, Massachusetts

Town of Chelmsford
 Chelmsford, Massachusetts

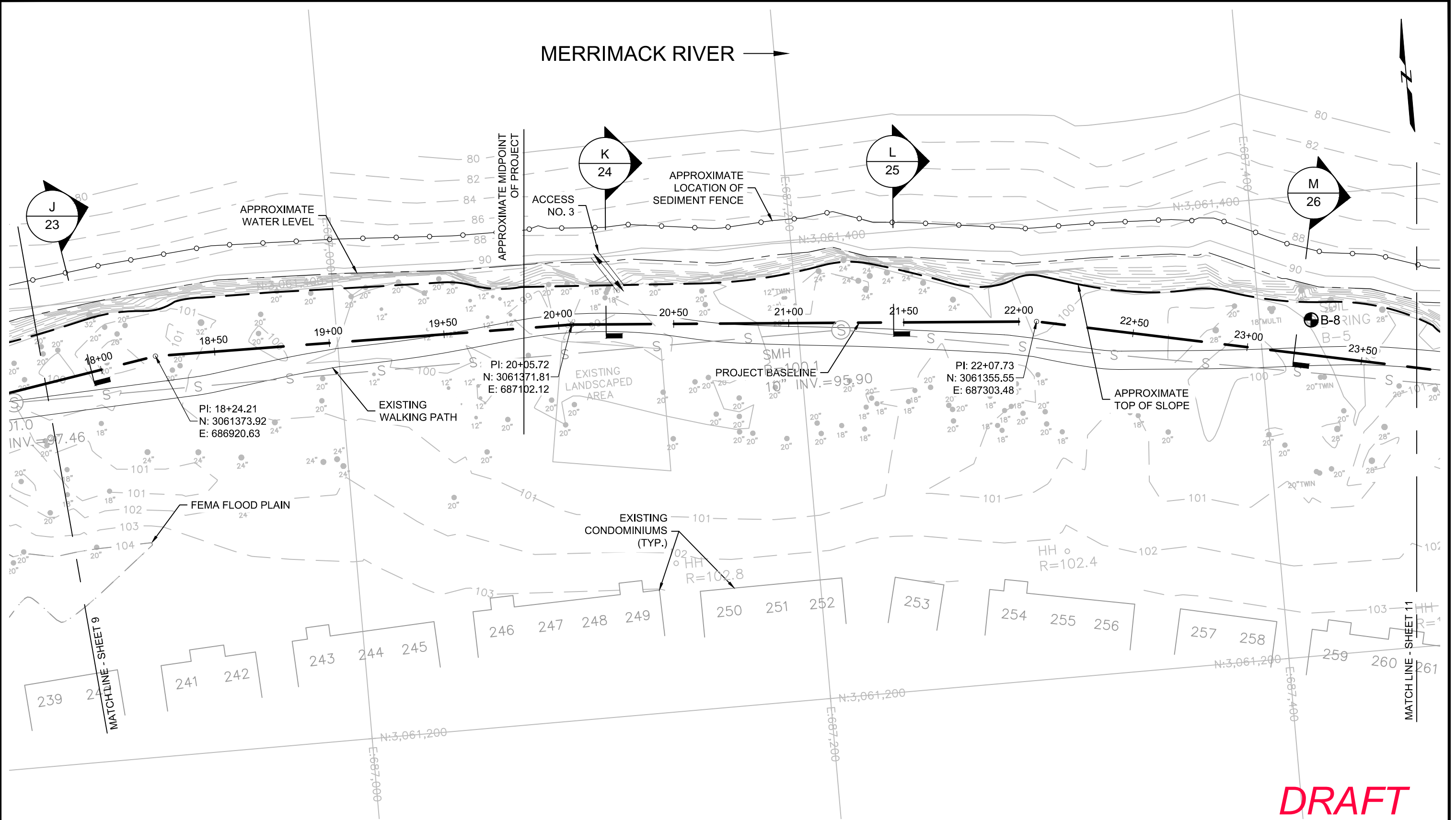


SITE PLAN
 (3 OF 7)

Project 1603860 October 2016 Sheet 9 of 39

DRAFT

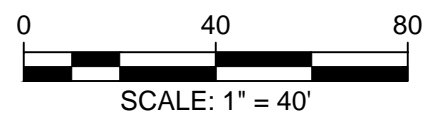
MERRIMACK RIVER →




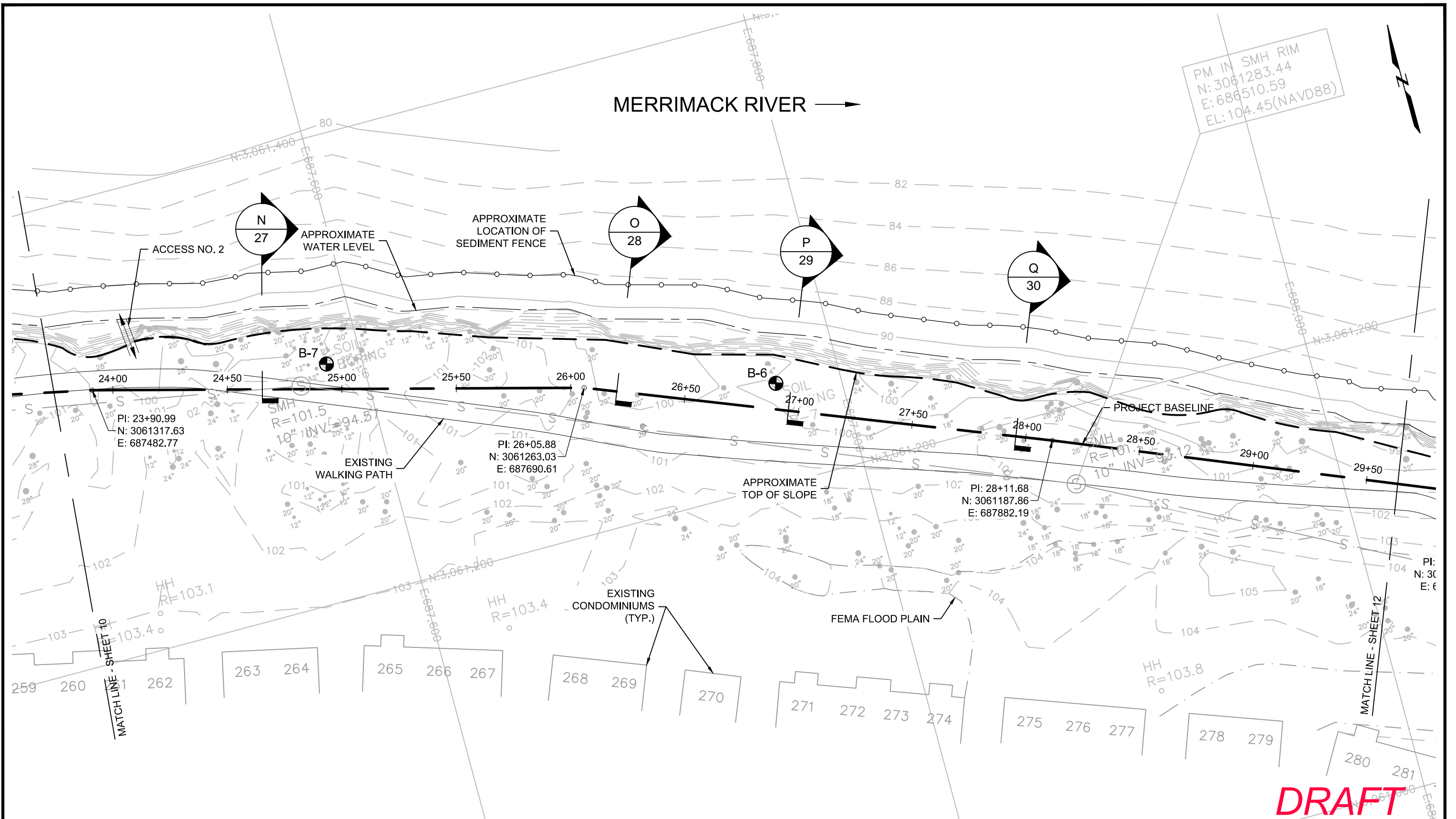
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NOTES:
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LEGEND:
 ● B-9 GEI BORING LOCATION



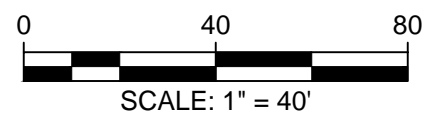
Merrimack Riverbank Stabilization Wellman Avenue North Chelmsford, Massachusetts		SITE PLAN (4 OF 7)
Town of Chelmsford Chelmsford, Massachusetts	Project 1603860	October 2016 Sheet 10 of 39




DRAFT

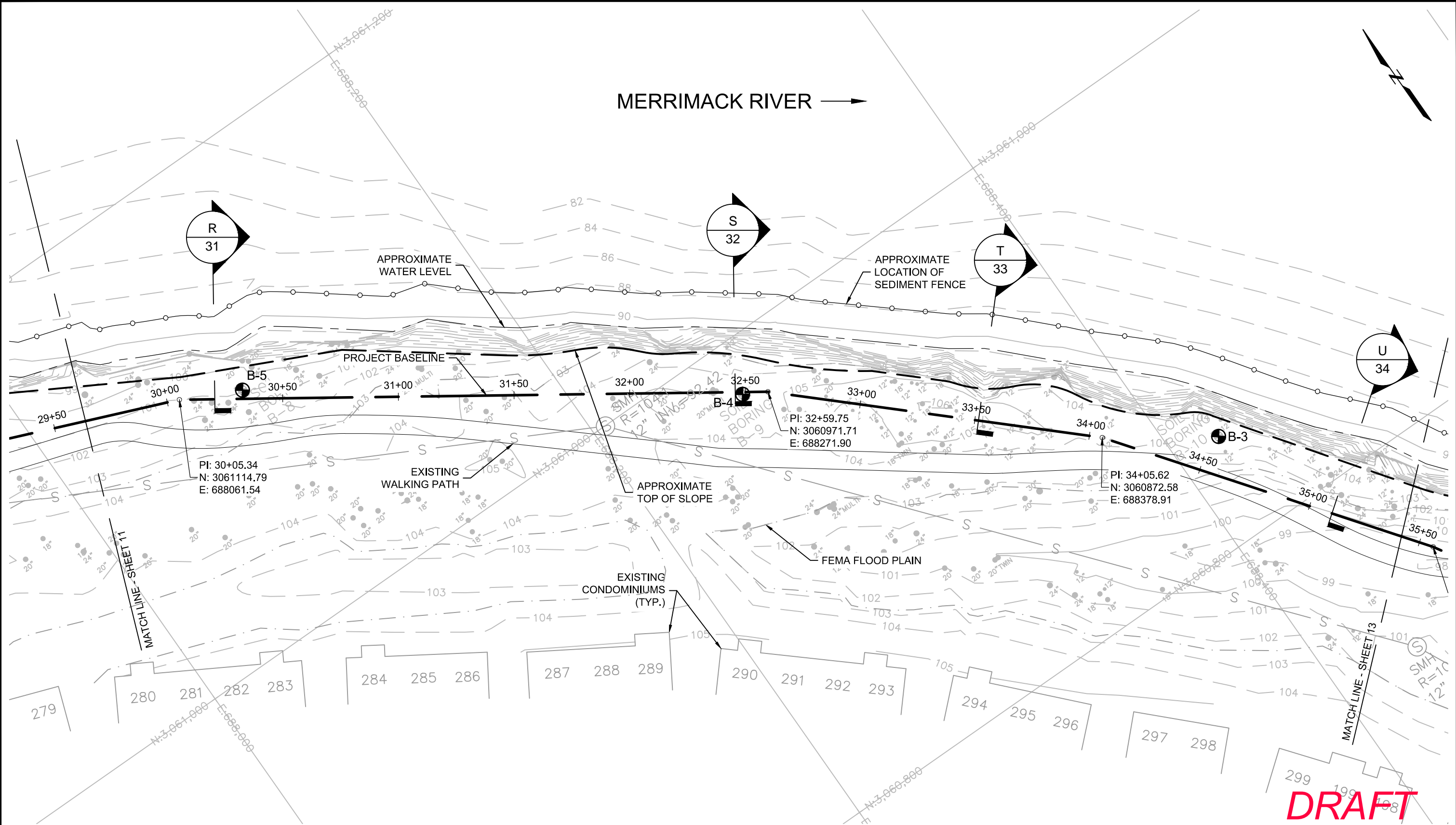
NOTES:
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LEGEND:
 ● B-9 GEI BORING LOCATION



Merrimack Riverbank Stabilization Wellman Avenue North Chelmsford, Massachusetts		SITE PLAN (5 OF 7)
Town of Chelmsford Chelmsford, Massachusetts	Project 1603860	October 2016 Sheet 11 of 39

MERRIMACK RIVER →



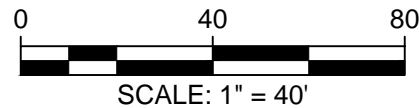
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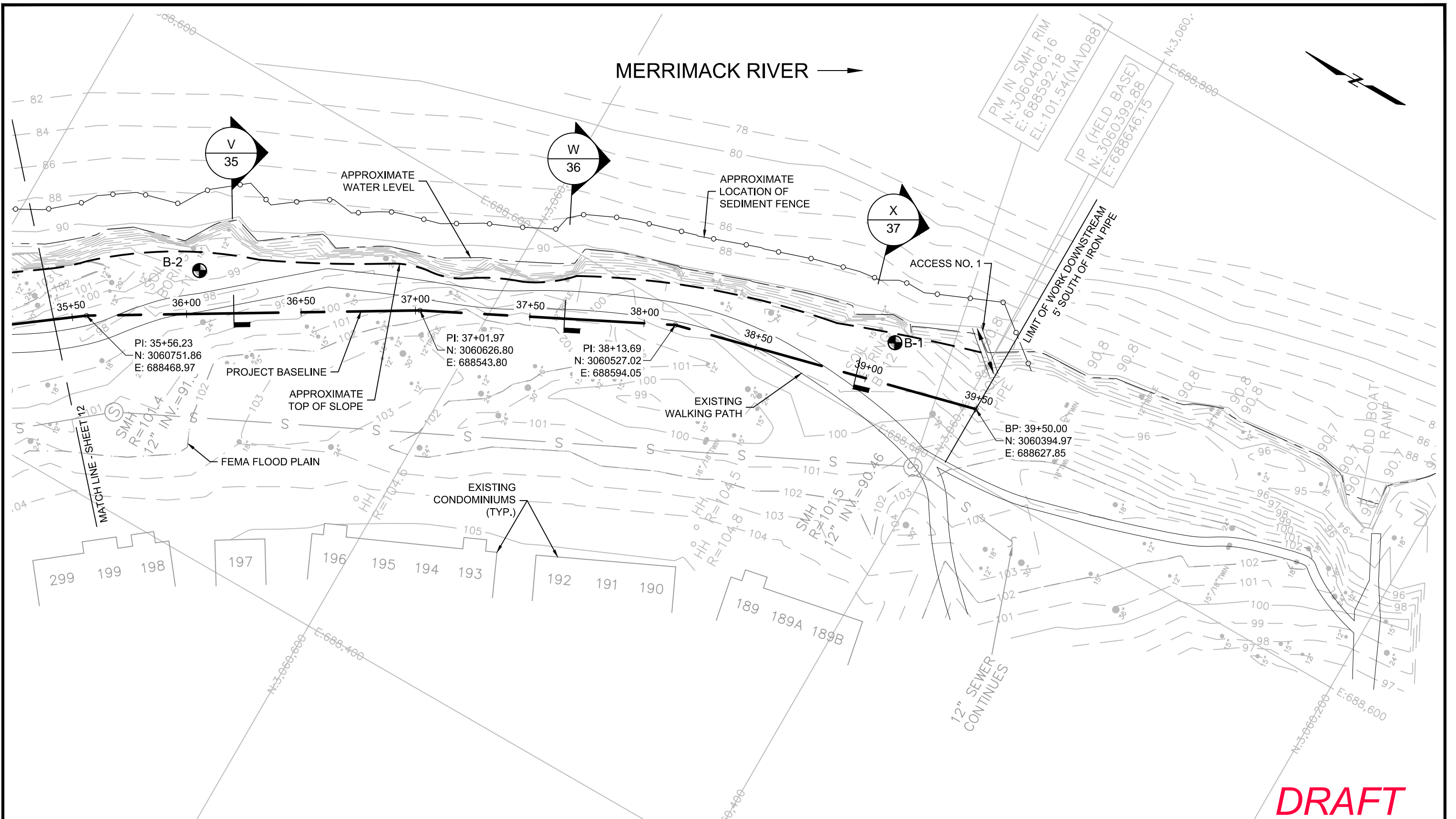
- EXISTING SURVEY DATA FROM DRAWING SP-1 "TOPOGRAPHIC PLAN SHOWING EXISTING CONDITIONS" DATED JUNE 20, 2016 PROVIDED BY WILLIAMS & SPARAGES, LLC.

LEGEND:

● B-9 GEI BORING LOCATION



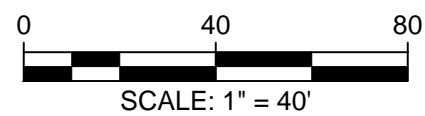
Merrimack Riverbank Stabilization Wellman Avenue North Chelmsford, Massachusetts		SITE PLAN (6 OF 7)
Town of Chelmsford Chelmsford, Massachusetts	Project 1603860	October 2016 Sheet 12 of 39




DRAFT

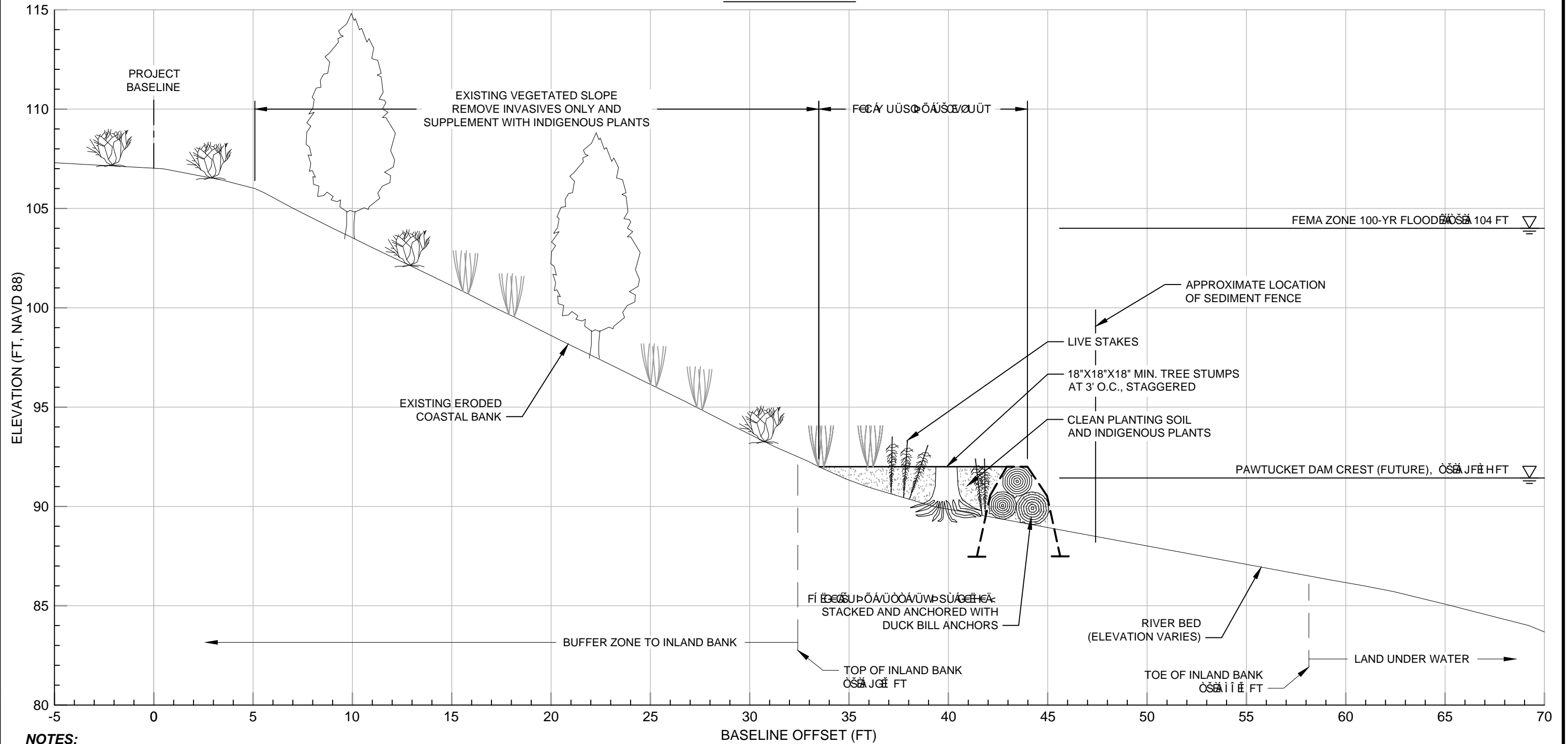
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LEGEND:
 ● B-9 GEI BORING LOCATION



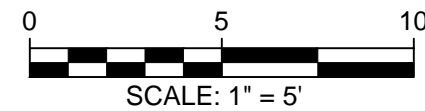
Merrimack Riverbank Stabilization Wellman Avenue North Chelmsford, Massachusetts		SITE PLAN (7 OF 7)
Town of Chelmsford Chelmsford, Massachusetts	Project 1603860	October 2016 Sheet 13 of 39

STA. 1+22



NOTES:

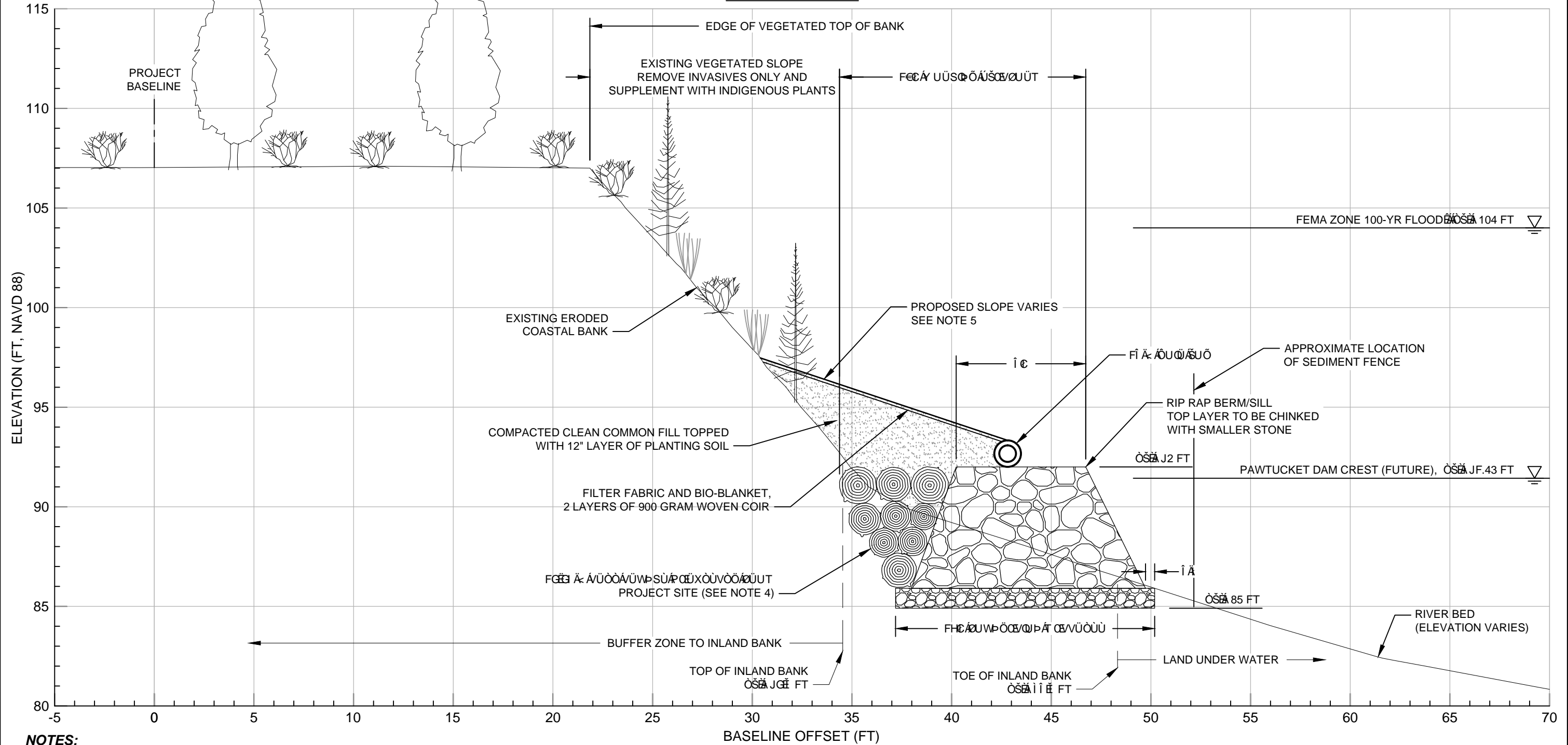
1. ALL WORK TO BE DONE FROM THE RIVER BY UTILIZING THE WORKING PLATFORM AS A BASE.
2. MAINTAIN AN APPROXIMATELY 20' DISTANCE FROM THE TOP OF THE EXISTING ERODED COASTAL BANK TO THE CENTER OF THE RIP RAP BERM TO MINIMIZE TREE REMOVAL AND ACHIEVE A 2H:1V PREFERRED SLOPE.
3. ELEVATIONS SHOWN ARE SUBJECT TO CHANGE BASED ON EXISTING FIELD CONDITIONS OBSERVED DURING CONSTRUCTION. THE CONTRACTOR SHALL NOTIFY GEI AND EPSILON OF SIGNIFICANT DISCREPANCIES IN EXPECTED CONDITIONS PRIOR TO CONTINUING WORK.
4. HARVESTED TREE TRUNKS SHALL BE BUNDLED AND PLACED ADJACENT TO THE RIP RAP BERM/SILL TO EXTEND THE WORKING PLATFORM. TREE TRUNKS ARE FOR TEMPORARY USE DURING CONSTRUCTION AND SHALL BE REMOVED AND REPLACED WITH SAND FILL.
5. PROPOSED RIVER EDGE STABILIZATION WILL VARY IN SLOPE FROM A MAXIMUM OF 3H:1V TO A MINIMUM OF 1.5H:1V. THIS ACTION WILL PREVENT EXCESSIVE ENCROACHMENT INTO THE RIVER AND WILL MAINTAIN A REASONABLE ALIGNMENT.
6. OVERLAND STORMWATER TRENCH LOCATION TO BE DETERMINED IN THE FIELD. ESTIMATED LENGTH OF 2,000' REQUIRED.



DRAFT

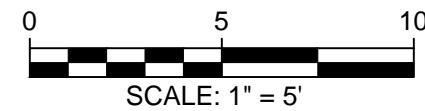
Chelmsford River Bank Stabilization Wellman Avenue North Chelmsford, Massachusetts		EDGE TYPE 'A' MINIMAL DISTURBANCE SECTION A
Town of Chelmsford Chelmsford, Massachusetts	Project 1603860	October 2016 Sheet 14 of 39

STA. 3+32




NOTES:

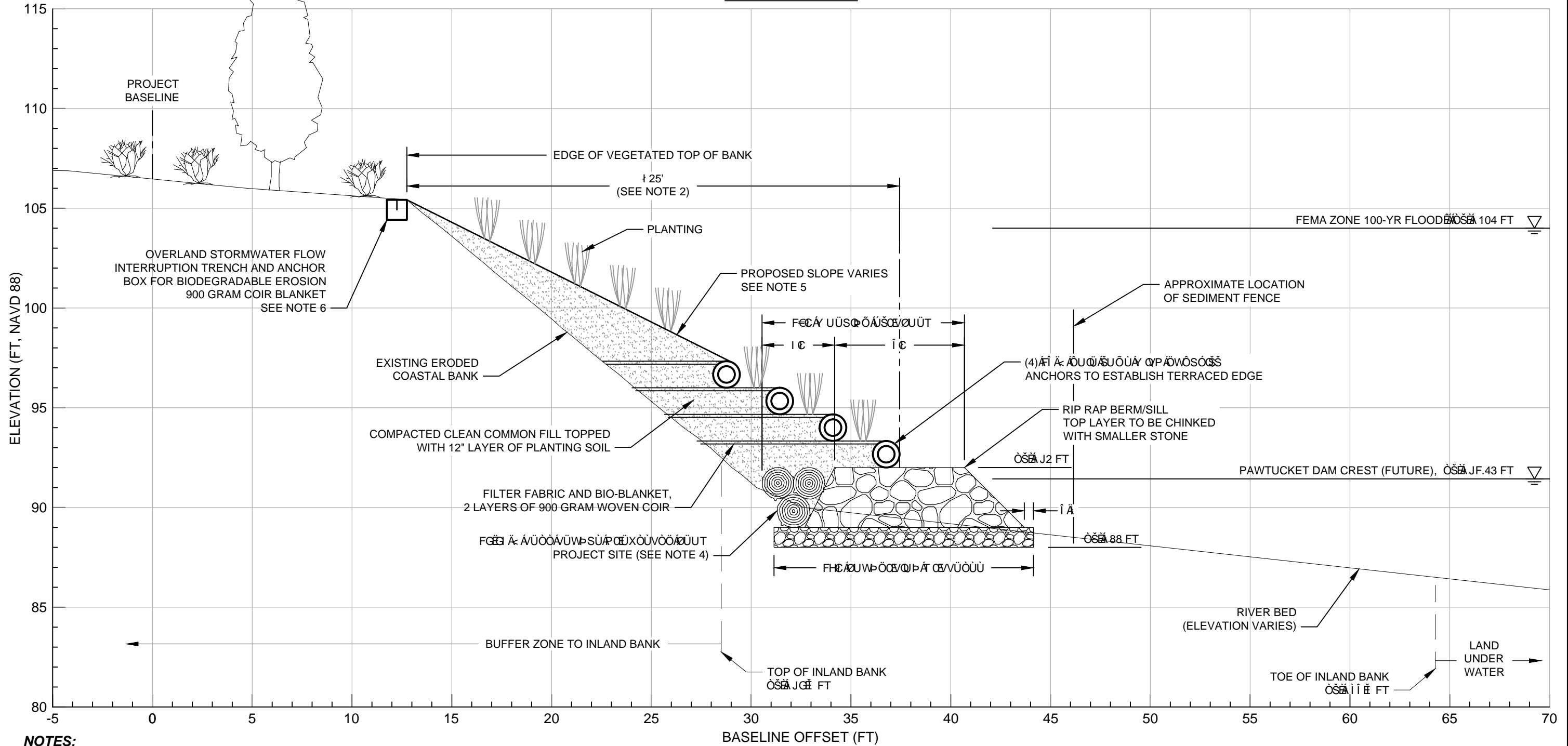
1. ALL WORK TO BE DONE FROM THE RIVER BY UTILIZING THE WORKING PLATFORM AS A BASE.
2. MAINTAIN AN APPROXIMATELY 20' DISTANCE FROM THE TOP OF THE EXISTING ERODED COASTAL BANK TO THE CENTER OF THE RIP RAP BERM TO MINIMIZE TREE REMOVAL AND ACHIEVE A 2H:1V PREFERRED SLOPE.
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5. PROPOSED RIVER EDGE STABILIZATION WILL VARY IN SLOPE FROM A MAXIMUM OF 3H:1V TO A MINIMUM OF 1.5H:1V. THIS ACTION WILL PREVENT EXCESSIVE ENCROACHMENT INTO THE RIVER AND WILL MAINTAIN A REASONABLE ALIGNMENT.
6. OVERLAND STORMWATER TRENCH LOCATION TO BE DETERMINED IN THE FIELD. ESTIMATED LENGTH OF 2,000' REQUIRED.



DRAFT

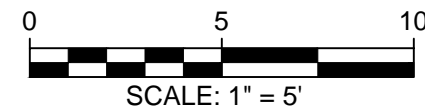
Chelmsford River Bank Stabilization Wellman Avenue North Chelmsford, Massachusetts		EDGE TYPE 'B' MODERATE DISTURBANCE SECTION B
Town of Chelmsford Chelmsford, Massachusetts	Project 1603860	October 2016 Sheet 15 of 39

STA. 4+56



NOTES:

1. ALL WORK TO BE DONE FROM THE RIVER BY UTILIZING THE WORKING PLATFORM AS A BASE.
2. MAINTAIN AN APPROXIMATELY 20' DISTANCE FROM THE TOP OF THE EXISTING ERODED COASTAL BANK TO THE CENTER OF THE RIP RAP BERM TO MINIMIZE TREE REMOVAL AND ACHIEVE A 2H:1V PREFERRED SLOPE.
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5. PROPOSED RIVER EDGE STABILIZATION WILL VARY IN SLOPE FROM A MAXIMUM OF 3H:1V TO A MINIMUM OF 1.5H:1V. THIS ACTION WILL PREVENT EXCESSIVE ENCROACHMENT INTO THE RIVER AND WILL MAINTAIN A REASONABLE ALIGNMENT.
6. OVERLAND STORMWATER TRENCH LOCATION TO BE DETERMINED IN THE FIELD. ESTIMATED LENGTH OF 2,000' REQUIRED.



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Merrimack Riverbank Stabilization
Wellman Avenue
North Chelmsford, Massachusetts
Town of Chelmsford
Chelmsford, Massachusetts

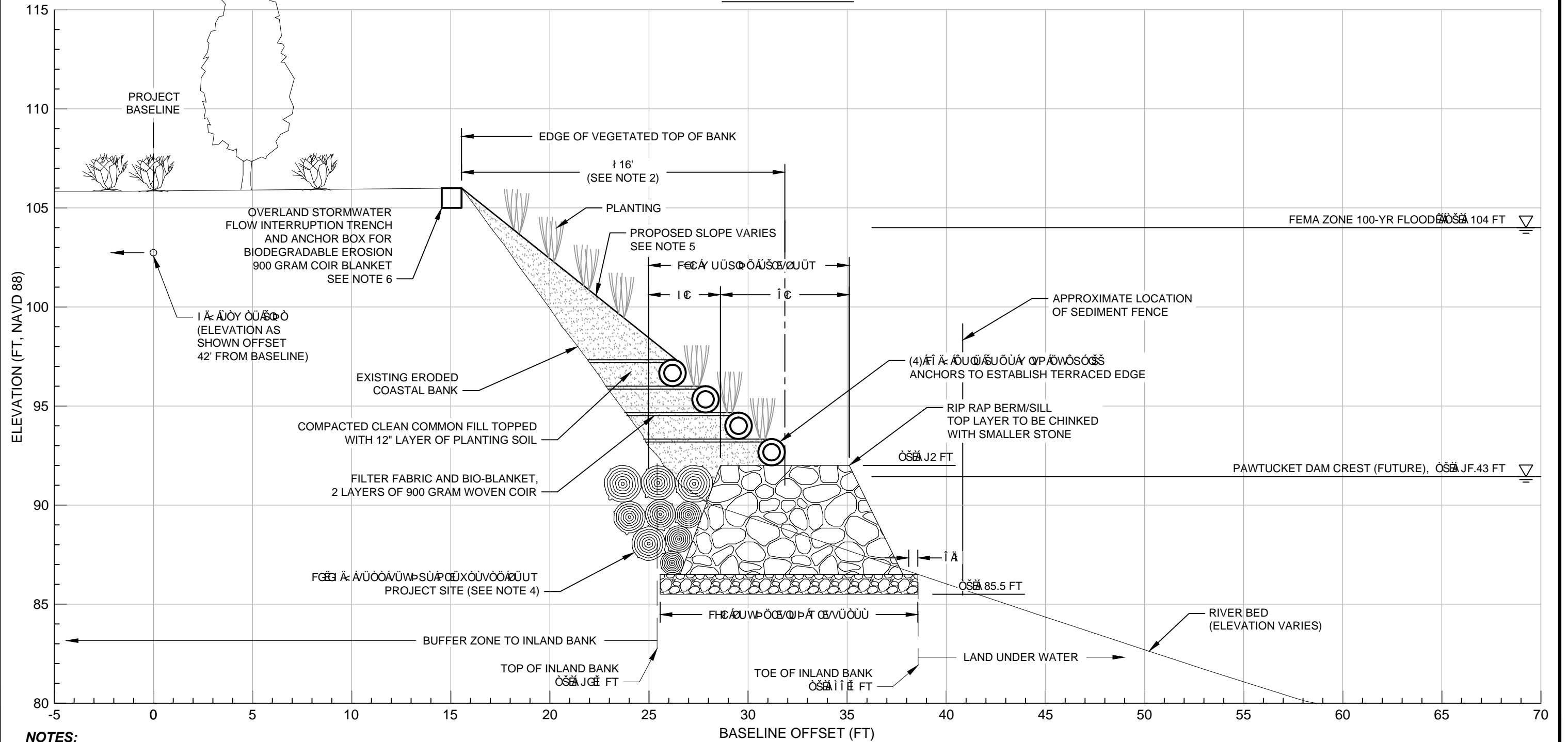


Project 1603860

EDGE TYPE 'B'
MODERATE DISTURBANCE
SECTION C

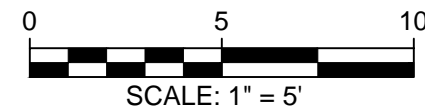
October 2016 Sheet 16 of 39

STA. 6+71



NOTES:

1. ALL WORK TO BE DONE FROM THE RIVER BY UTILIZING THE WORKING PLATFORM AS A BASE.
2. MAINTAIN AN APPROXIMATELY 20' DISTANCE FROM THE TOP OF THE EXISTING ERODED COASTAL BANK TO THE CENTER OF THE RIP RAP BERM TO MINIMIZE TREE REMOVAL AND ACHIEVE A 2H:1V PREFERRED SLOPE.
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6. OVERLAND STORMWATER TRENCH LOCATION TO BE DETERMINED IN THE FIELD. ESTIMATED LENGTH OF 2,000' REQUIRED.



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Merrimack Riverbank Stabilization
Wellman Avenue
North Chelmsford, Massachusetts
Town of Chelmsford
Chelmsford, Massachusetts

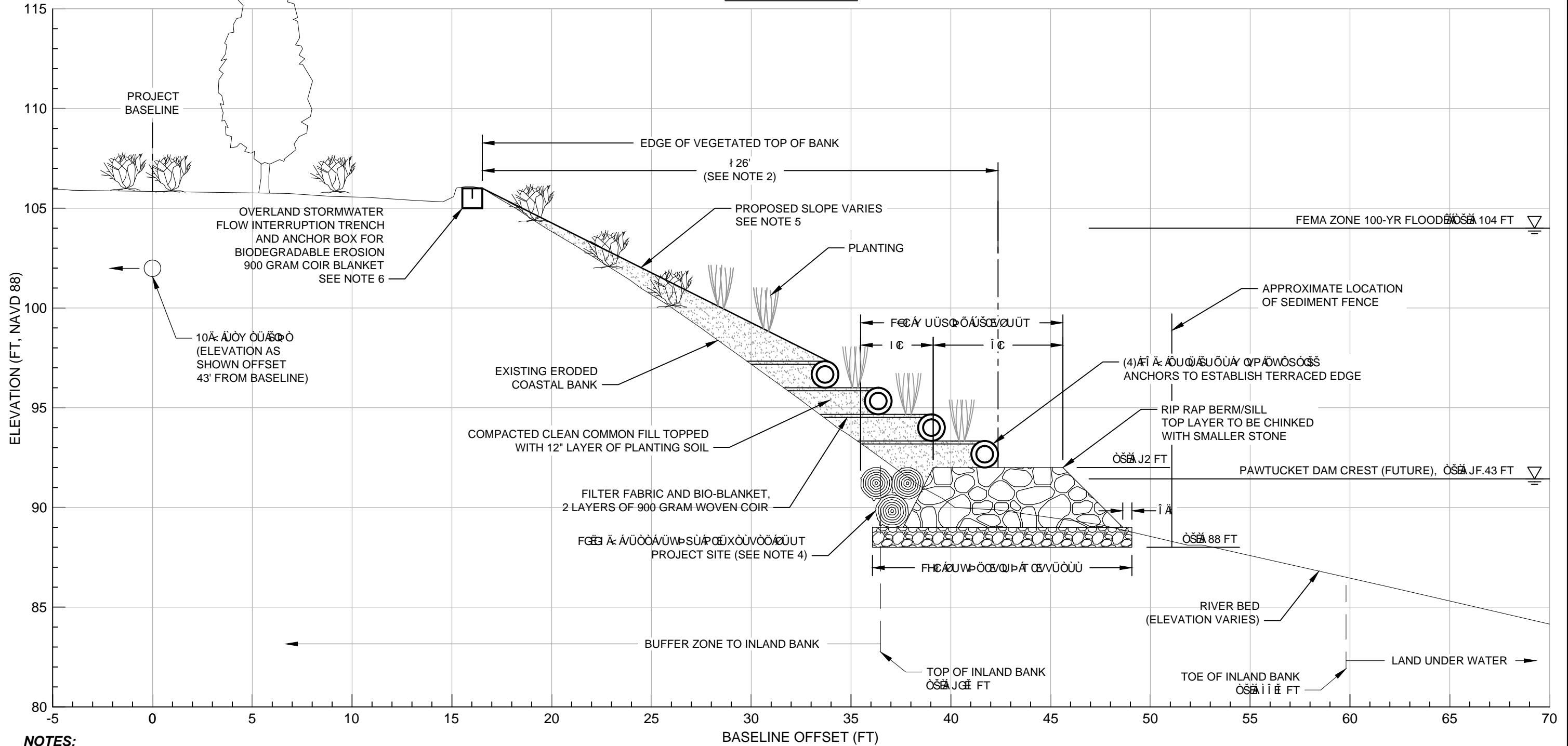


Project 1603860

EDGE TYPE 'C'
MAJOR DISTURBANCE
SECTION D

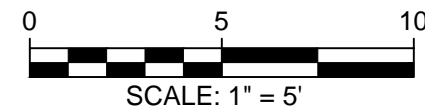
October 2016 Sheet 17 of 39

STA. 8+46




NOTES:

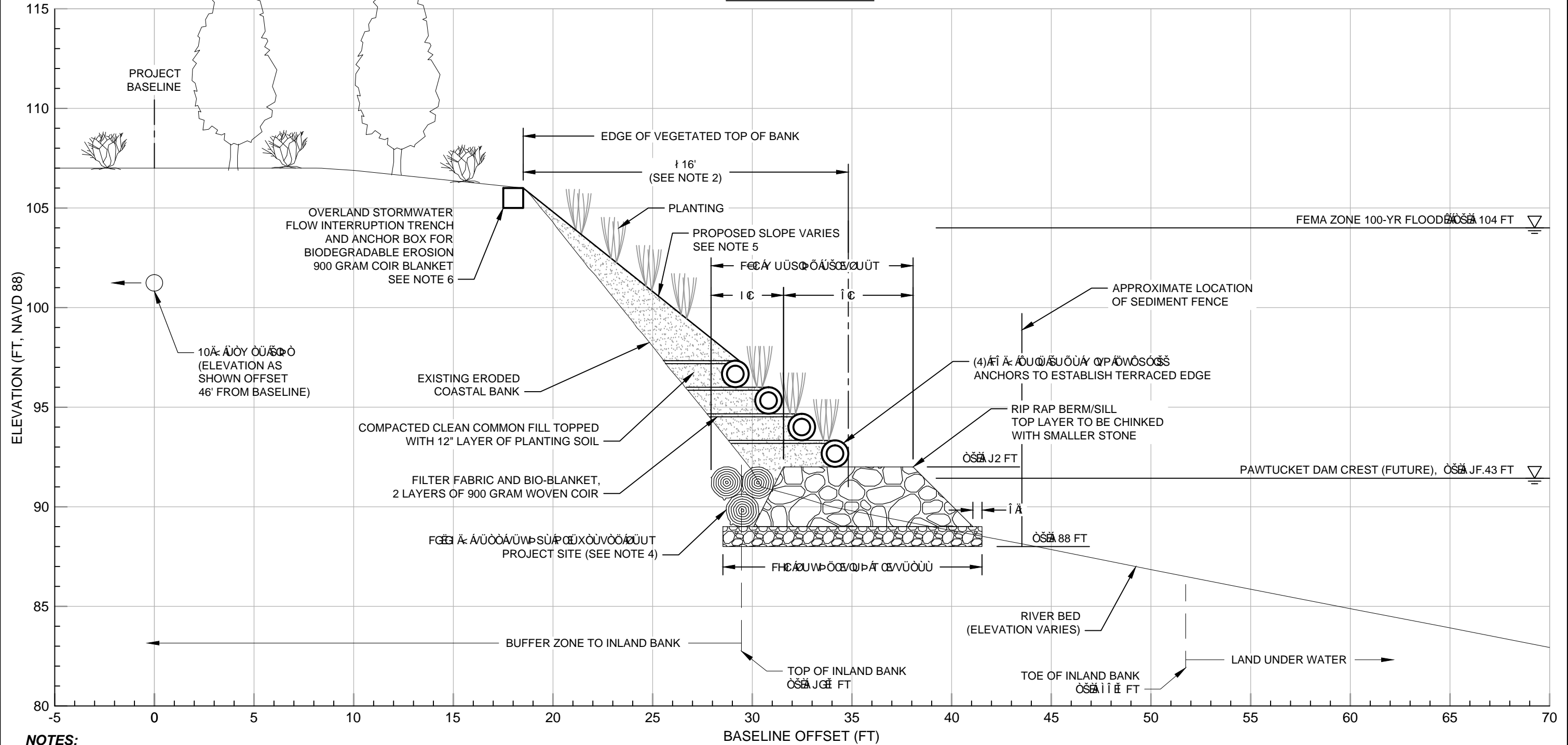
1. ALL WORK TO BE DONE FROM THE RIVER BY UTILIZING THE WORKING PLATFORM AS A BASE.
2. MAINTAIN AN APPROXIMATELY 20' DISTANCE FROM THE TOP OF THE EXISTING ERODED COASTAL BANK TO THE CENTER OF THE RIP RAP BERM TO MINIMIZE TREE REMOVAL AND ACHIEVE A 2H:1V PREFERRED SLOPE.
3. ELEVATIONS SHOWN ARE SUBJECT TO CHANGE BASED ON EXISTING FIELD CONDITIONS OBSERVED DURING CONSTRUCTION. THE CONTRACTOR SHALL NOTIFY GEI AND EPSILON OF SIGNIFICANT DISCREPANCIES IN EXPECTED CONDITIONS PRIOR TO CONTINUING WORK.
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6. OVERLAND STORMWATER TRENCH LOCATION TO BE DETERMINED IN THE FIELD. ESTIMATED LENGTH OF 2,000' REQUIRED.



DRAFT

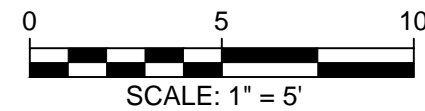
Merrimack Riverbank Stabilization Wellman Avenue North Chelmsford, Massachusetts		EDGE TYPE 'B' MODERATE DISTURBANCE SECTION E
Town of Chelmsford Chelmsford, Massachusetts	Project 1603860	October 2016 Sheet 18 of 39

STA. 10+60



NOTES:

1. ALL WORK TO BE DONE FROM THE RIVER BY UTILIZING THE WORKING PLATFORM AS A BASE.
2. MAINTAIN AN APPROXIMATELY 20' DISTANCE FROM THE TOP OF THE EXISTING ERODED COASTAL BANK TO THE CENTER OF THE RIP RAP BERM TO MINIMIZE TREE REMOVAL AND ACHIEVE A 2H:1V PREFERRED SLOPE.
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6. OVERLAND STORMWATER TRENCH LOCATION TO BE DETERMINED IN THE FIELD. ESTIMATED LENGTH OF 2,000' REQUIRED.



DRAFT

Merrimack Riverbank Stabilization
Wellman Avenue
North Chelmsford, Massachusetts
Town of Chelmsford
Chelmsford, Massachusetts



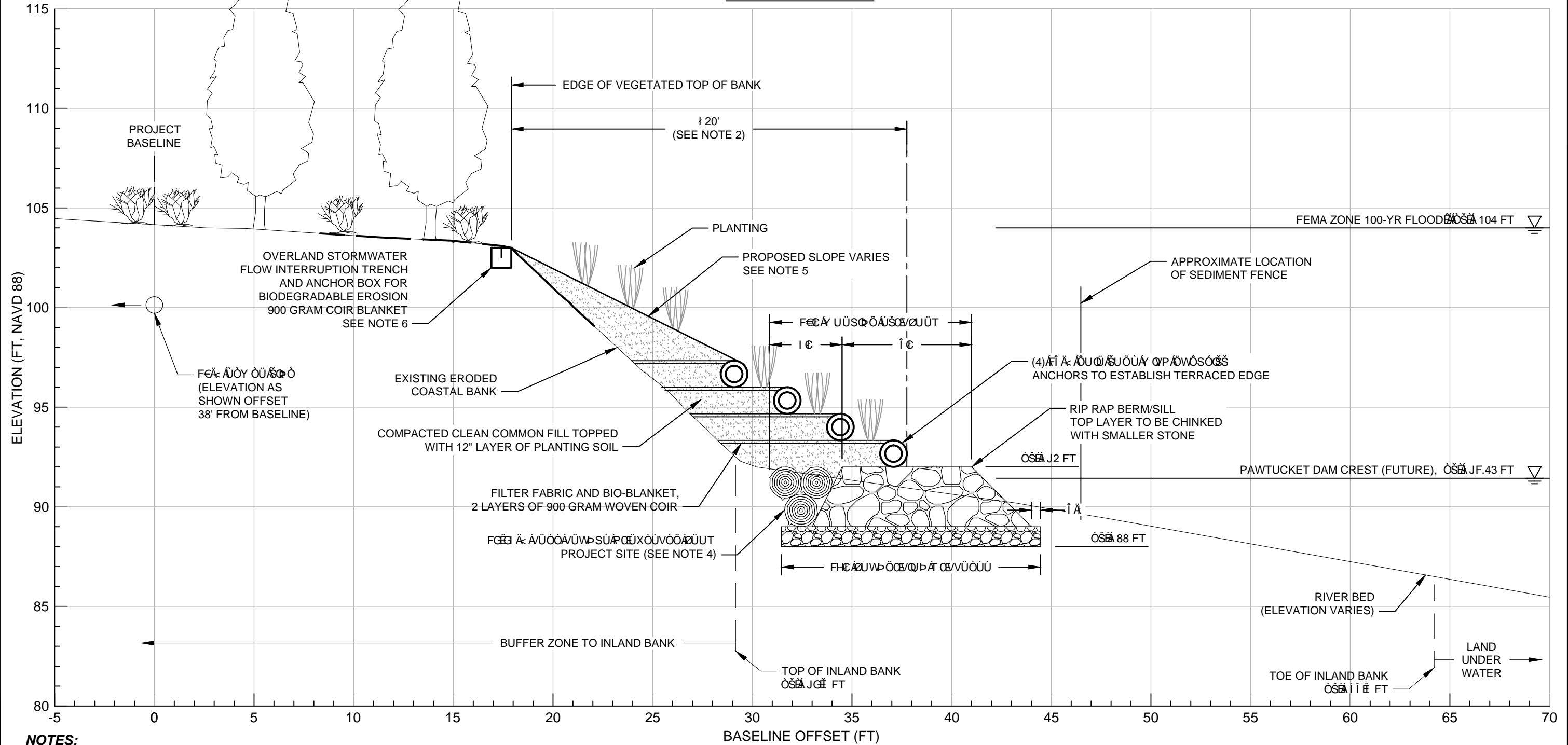
Project 1603860

EDGE TYPE 'C'
MAJOR DISTURBANCE
SECTION F

October 2016

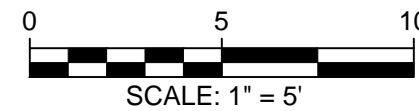
Sheet 19 of 39

STA. 12+06



NOTES:

1. ALL WORK TO BE DONE FROM THE RIVER BY UTILIZING THE WORKING PLATFORM AS A BASE.
2. MAINTAIN AN APPROXIMATELY 20' DISTANCE FROM THE TOP OF THE EXISTING ERODED COASTAL BANK TO THE CENTER OF THE RIP RAP BERM TO MINIMIZE TREE REMOVAL AND ACHIEVE A 2H:1V PREFERRED SLOPE.
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6. OVERLAND STORMWATER TRENCH LOCATION TO BE DETERMINED IN THE FIELD. ESTIMATED LENGTH OF 2,000' REQUIRED.



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Merrimack Riverbank Stabilization
Wellman Avenue
North Chelmsford, Massachusetts
Town of Chelmsford
Chelmsford, Massachusetts



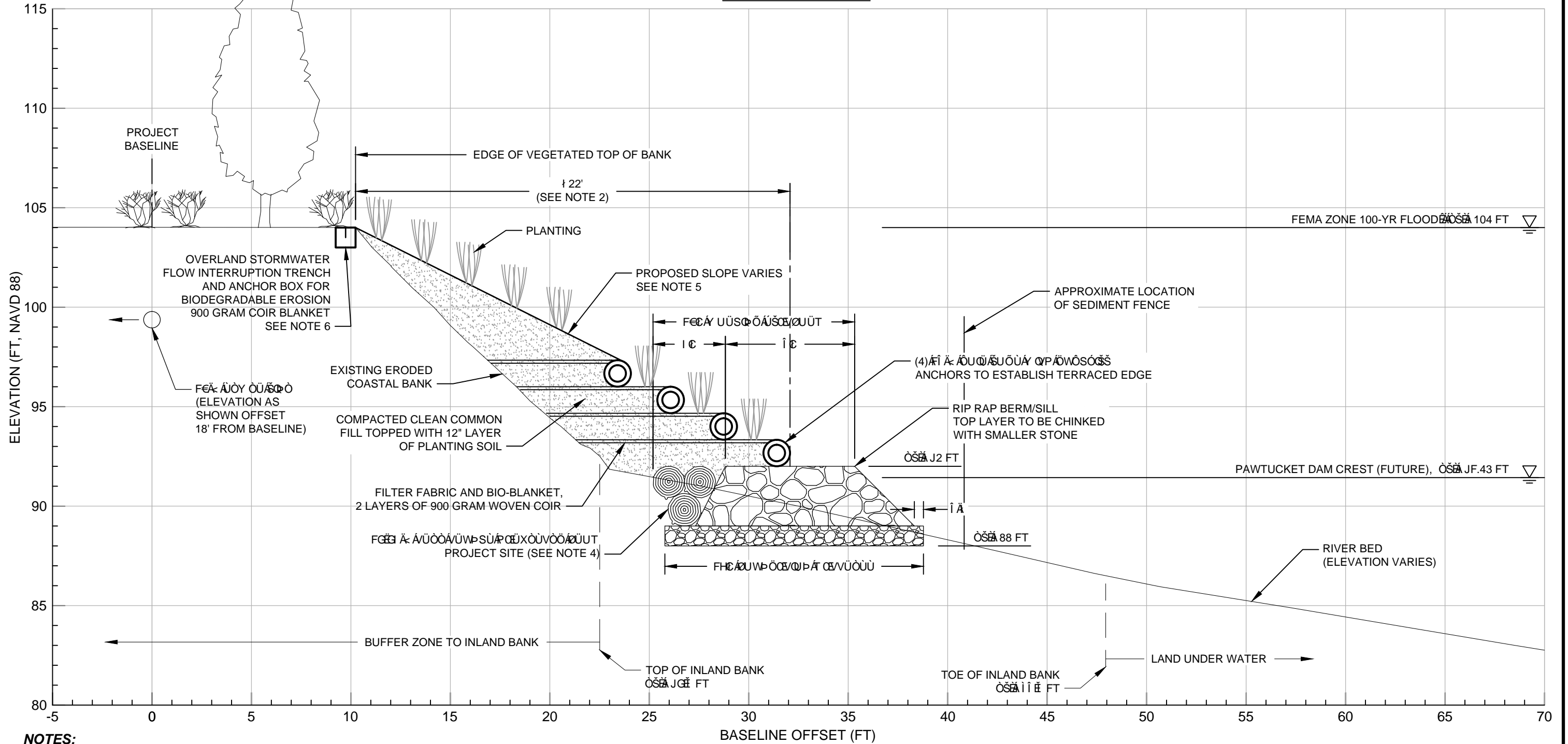
Project 1603860

EDGE TYPE 'C'
MAJOR DISTURBANCE
SECTION G

October 2016

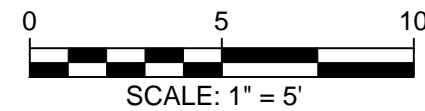
Sheet 20 of 39

STA. 14+21




NOTES:

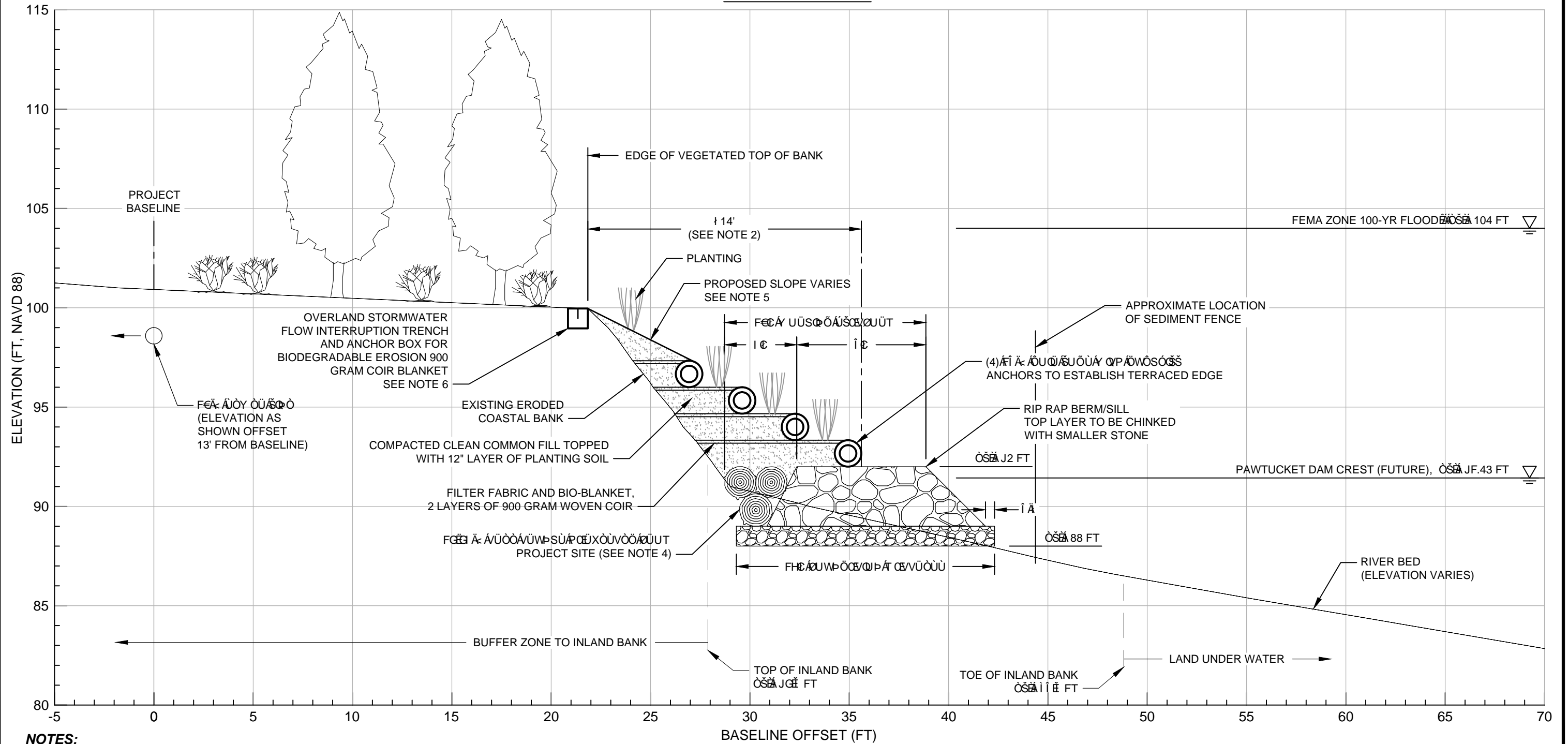
1. ALL WORK TO BE DONE FROM THE RIVER BY UTILIZING THE WORKING PLATFORM AS A BASE.
2. MAINTAIN AN APPROXIMATELY 20' DISTANCE FROM THE TOP OF THE EXISTING ERODED COASTAL BANK TO THE CENTER OF THE RIP RAP BERM TO MINIMIZE TREE REMOVAL AND ACHIEVE A 2H:1V PREFERRED SLOPE.
3. ELEVATIONS SHOWN ARE SUBJECT TO CHANGE BASED ON EXISTING FIELD CONDITIONS OBSERVED DURING CONSTRUCTION. THE CONTRACTOR SHALL NOTIFY GEI AND EPSILON OF SIGNIFICANT DISCREPANCIES IN EXPECTED CONDITIONS PRIOR TO CONTINUING WORK.
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6. OVERLAND STORMWATER TRENCH LOCATION TO BE DETERMINED IN THE FIELD. ESTIMATED LENGTH OF 2,000' REQUIRED.



DRAFT

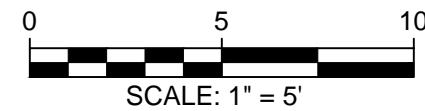
Merrimack Riverbank Stabilization Wellman Avenue North Chelmsford, Massachusetts		EDGE TYPE 'C' MAJOR DISTURBANCE SECTION H
Town of Chelmsford Chelmsford, Massachusetts	Project 1603860	October 2016 Sheet 21 of 39

STA. 15+96



NOTES:

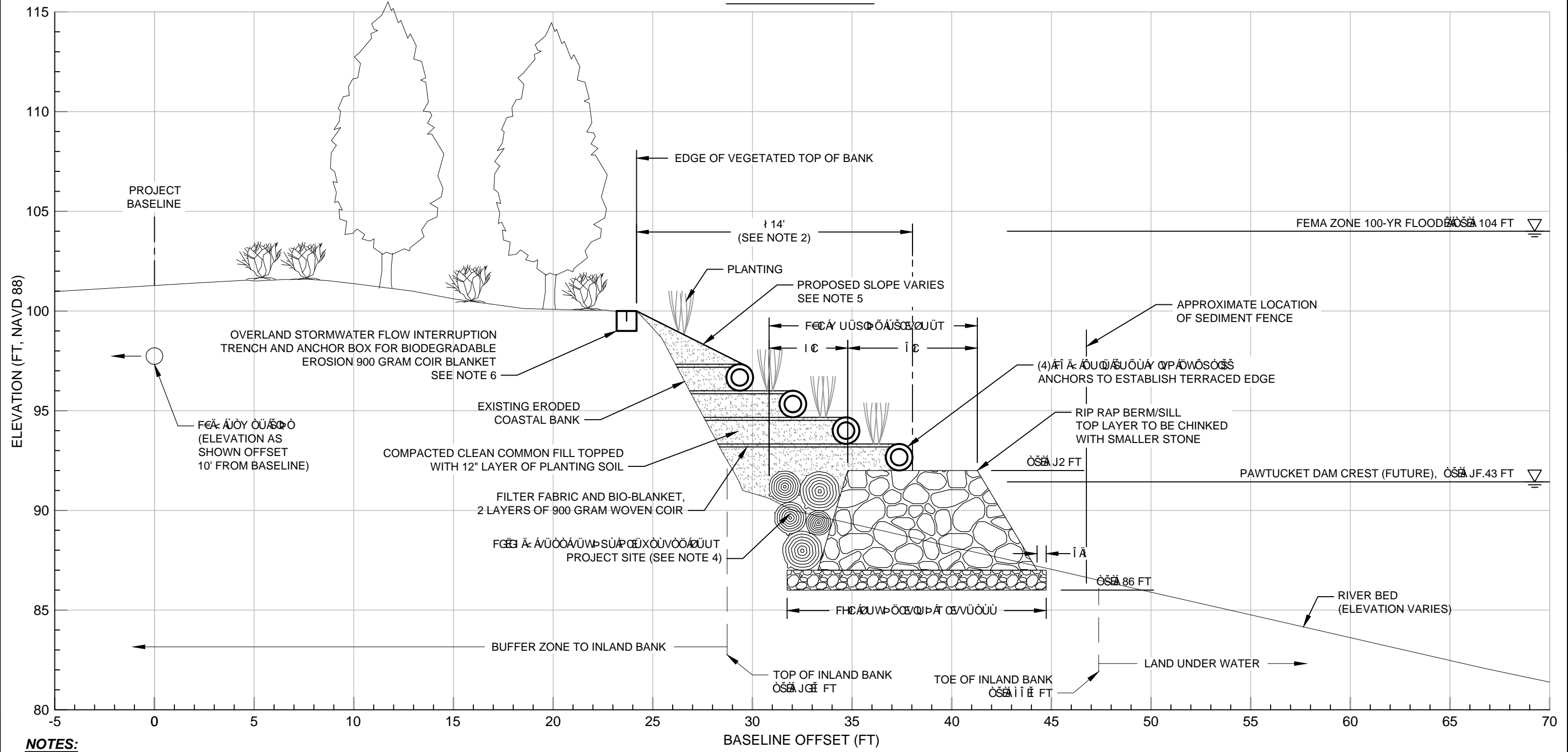
1. ALL WORK TO BE DONE FROM THE RIVER BY UTILIZING THE WORKING PLATFORM AS A BASE.
2. MAINTAIN AN APPROXIMATELY 20' DISTANCE FROM THE TOP OF THE EXISTING ERODED COASTAL BANK TO THE CENTER OF THE RIP RAP BERM TO MINIMIZE TREE REMOVAL AND ACHIEVE A 2H:1V PREFERRED SLOPE.
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6. OVERLAND STORMWATER TRENCH LOCATION TO BE DETERMINED IN THE FIELD. ESTIMATED LENGTH OF 2,000' REQUIRED.



DRAFT

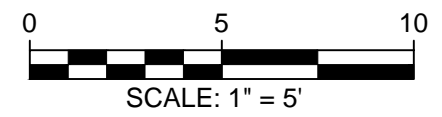
<p>Merrimack Riverbank Stabilization Wellman Avenue North Chelmsford, Massachusetts</p>		<p>EDGE TYPE 'C' MAJOR DISTURBANCE SECTION I</p>
<p>Town of Chelmsford Chelmsford, Massachusetts</p>	<p>Project 1603860</p>	<p>October 2016 Sheet 22 of 39</p>

STA. 17+96




NOTES:

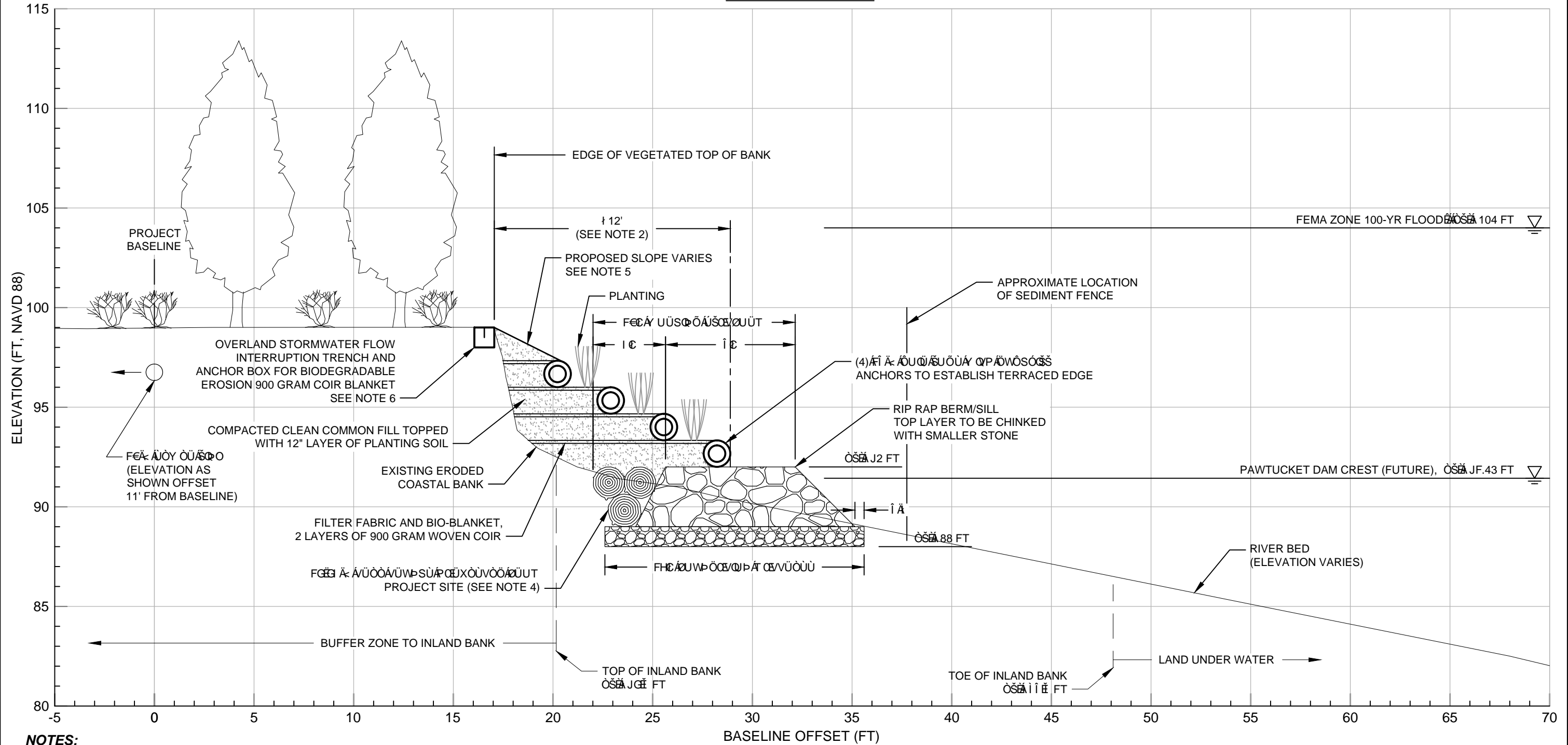
1. ALL WORK TO BE DONE FROM THE RIVER BY UTILIZING THE WORKING PLATFORM AS A BASE.
2. MAINTAIN AN APPROXIMATELY 20' DISTANCE FROM THE TOP OF THE EXISTING ERODED COASTAL BANK TO THE CENTER OF THE RIP RAP BERM TO MINIMIZE TREE REMOVAL AND ACHIEVE A 2H:1V PREFERRED SLOPE.
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5. PROPOSED RIVER EDGE STABILIZATION WILL VARY IN SLOPE FROM A MAXIMUM OF 3H:1V TO A MINIMUM OF 1.5H:1V. THIS ACTION WILL PREVENT EXCESSIVE ENCROACHMENT INTO THE RIVER AND WILL MAINTAIN A REASONABLE ALIGNMENT.
6. OVERLAND STORMWATER TRENCH LOCATION TO BE DETERMINED IN THE FIELD. ESTIMATED LENGTH OF 2,000' REQUIRED.



DRAFT

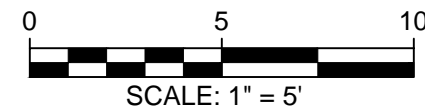
Merrimack Riverbank Stabilization Wellman Avenue North Chelmsford, Massachusetts		EDGE TYPE 'C' MAJOR DISTURBANCE SECTION J
Town of Chelmsford Chelmsford, Massachusetts	Project 1603860	October 2016 Sheet 23 of 39

STA. 20+21




NOTES:

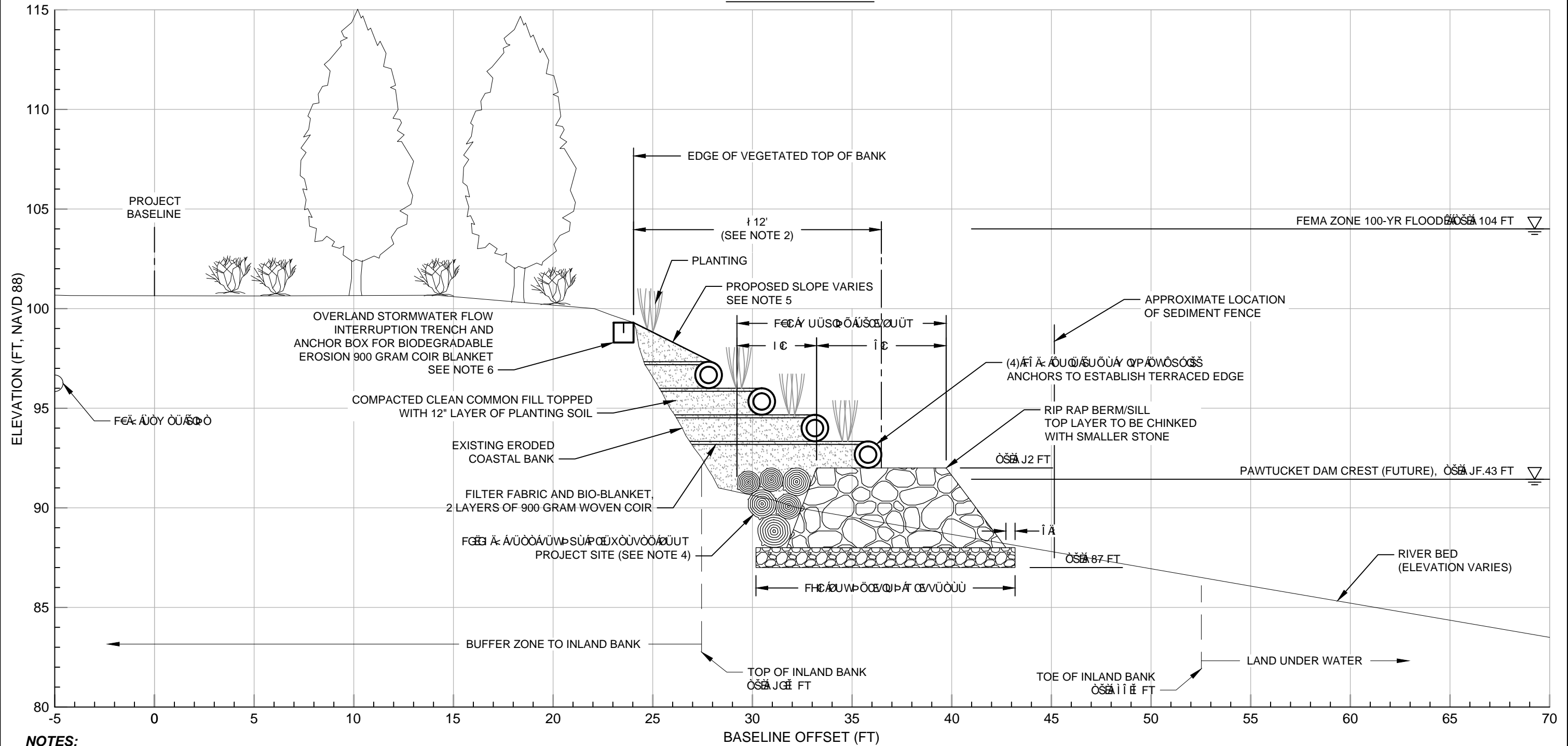
1. ALL WORK TO BE DONE FROM THE RIVER BY UTILIZING THE WORKING PLATFORM AS A BASE.
2. MAINTAIN AN APPROXIMATELY 20' DISTANCE FROM THE TOP OF THE EXISTING ERODED COASTAL BANK TO THE CENTER OF THE RIP RAP BERM TO MINIMIZE TREE REMOVAL AND ACHIEVE A 2H:1V PREFERRED SLOPE.
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DRAFT

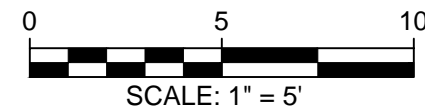
Merrimack Riverbank Stabilization Wellman Avenue North Chelmsford, Massachusetts		EDGE TYPE 'C' MAJOR DISTURBANCE SECTION K
Town of Chelmsford Chelmsford, Massachusetts	Project 1603860	October 2016 Sheet 24 of 39

STA. 21+46




NOTES:

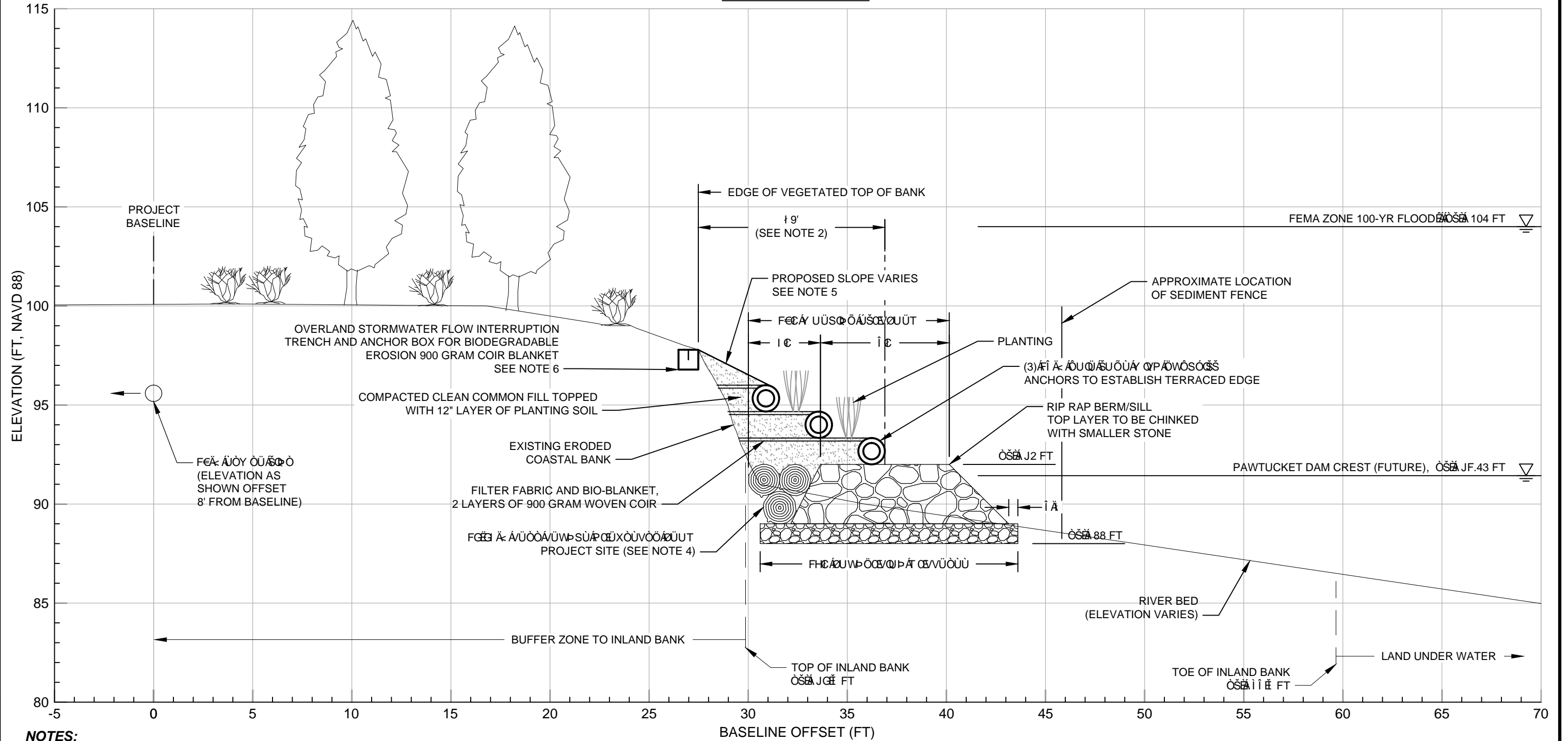
1. ALL WORK TO BE DONE FROM THE RIVER BY UTILIZING THE WORKING PLATFORM AS A BASE.
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6. OVERLAND STORMWATER TRENCH LOCATION TO BE DETERMINED IN THE FIELD. ESTIMATED LENGTH OF 2,000' REQUIRED.



DRAFT

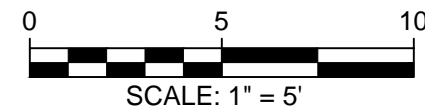
Merrimack Riverbank Stabilization Wellman Avenue North Chelmsford, Massachusetts		EDGE TYPE 'C' MAJOR DISTURBANCE SECTION L
Town of Chelmsford Chelmsford, Massachusetts	Project 1603860	October 2016 Sheet 25 of 39

STA. 23+21



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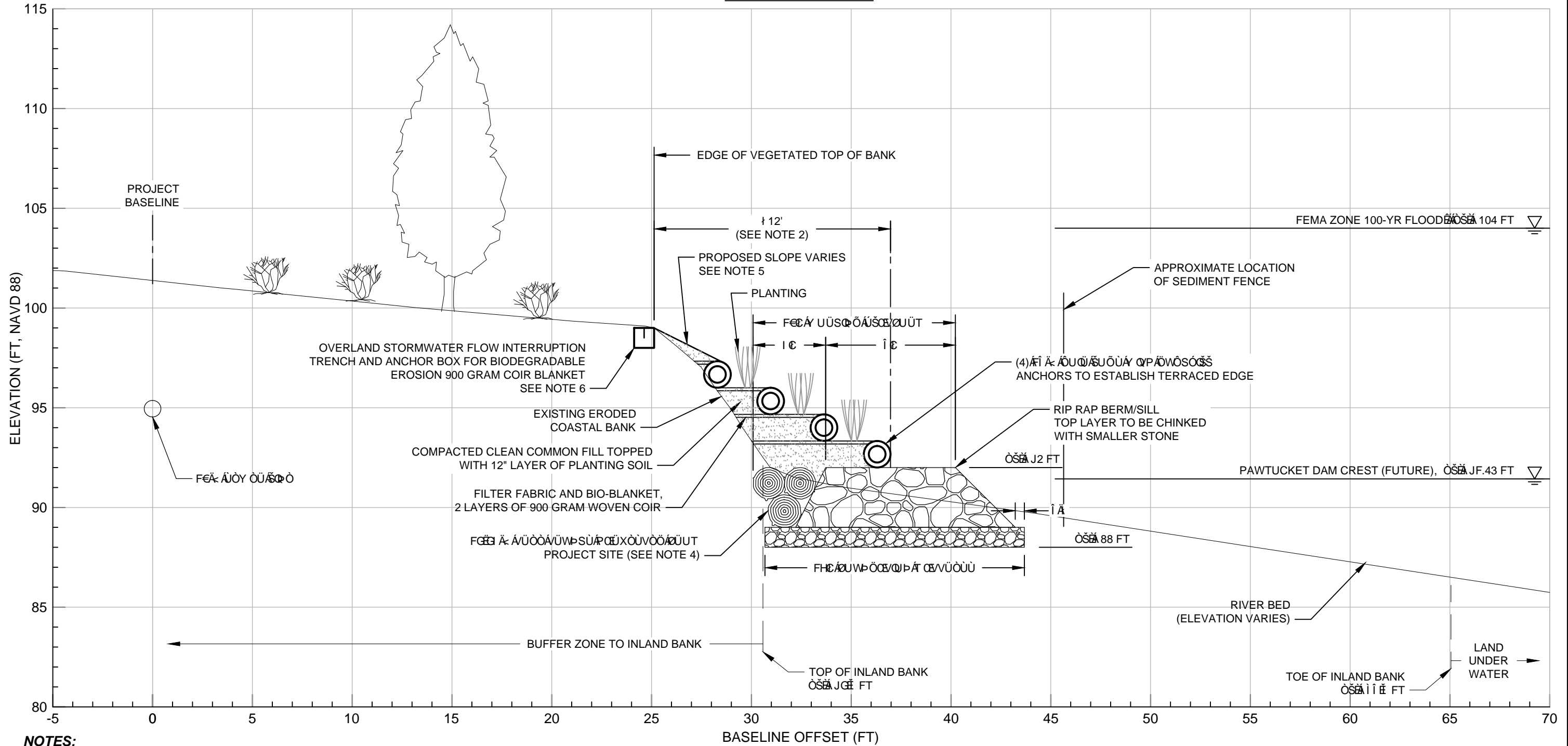
1. ALL WORK TO BE DONE FROM THE RIVER BY UTILIZING THE WORKING PLATFORM AS A BASE.
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DRAFT

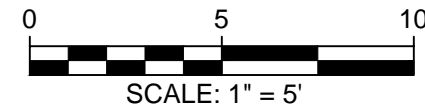
Merrimack Riverbank Stabilization Wellman Avenue North Chelmsford, Massachusetts		EDGE TYPE 'C' MAJOR DISTURBANCE SECTION M
Town of Chelmsford Chelmsford, Massachusetts	Project 1603860	October 2016 Sheet 26 of 39

STA. 24+65




NOTES:

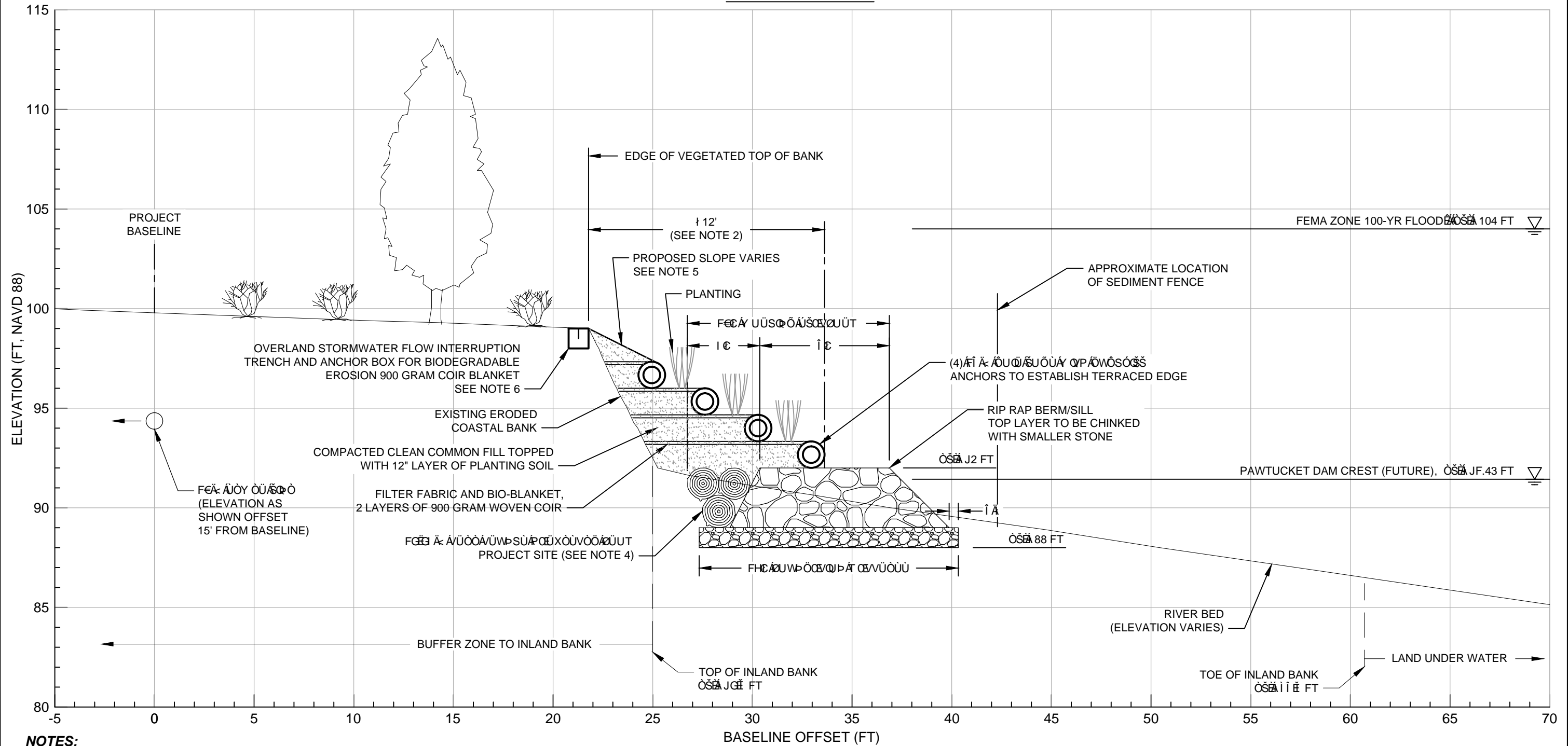
1. ALL WORK TO BE DONE FROM THE RIVER BY UTILIZING THE WORKING PLATFORM AS A BASE.
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DRAFT

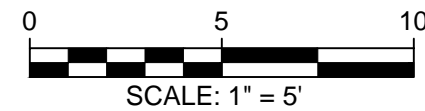
Merrimack Riverbank Stabilization Wellman Avenue North Chelmsford, Massachusetts		EDGE TYPE 'C' MAJOR DISTURBANCE SECTION N
Town of Chelmsford Chelmsford, Massachusetts	Project 1603860	October 2016 Sheet 27 of 39

STA. 26+20



NOTES:

1. ALL WORK TO BE DONE FROM THE RIVER BY UTILIZING THE WORKING PLATFORM AS A BASE.
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Merrimack Riverbank Stabilization
Wellman Avenue
North Chelmsford, Massachusetts
Town of Chelmsford
Chelmsford, Massachusetts



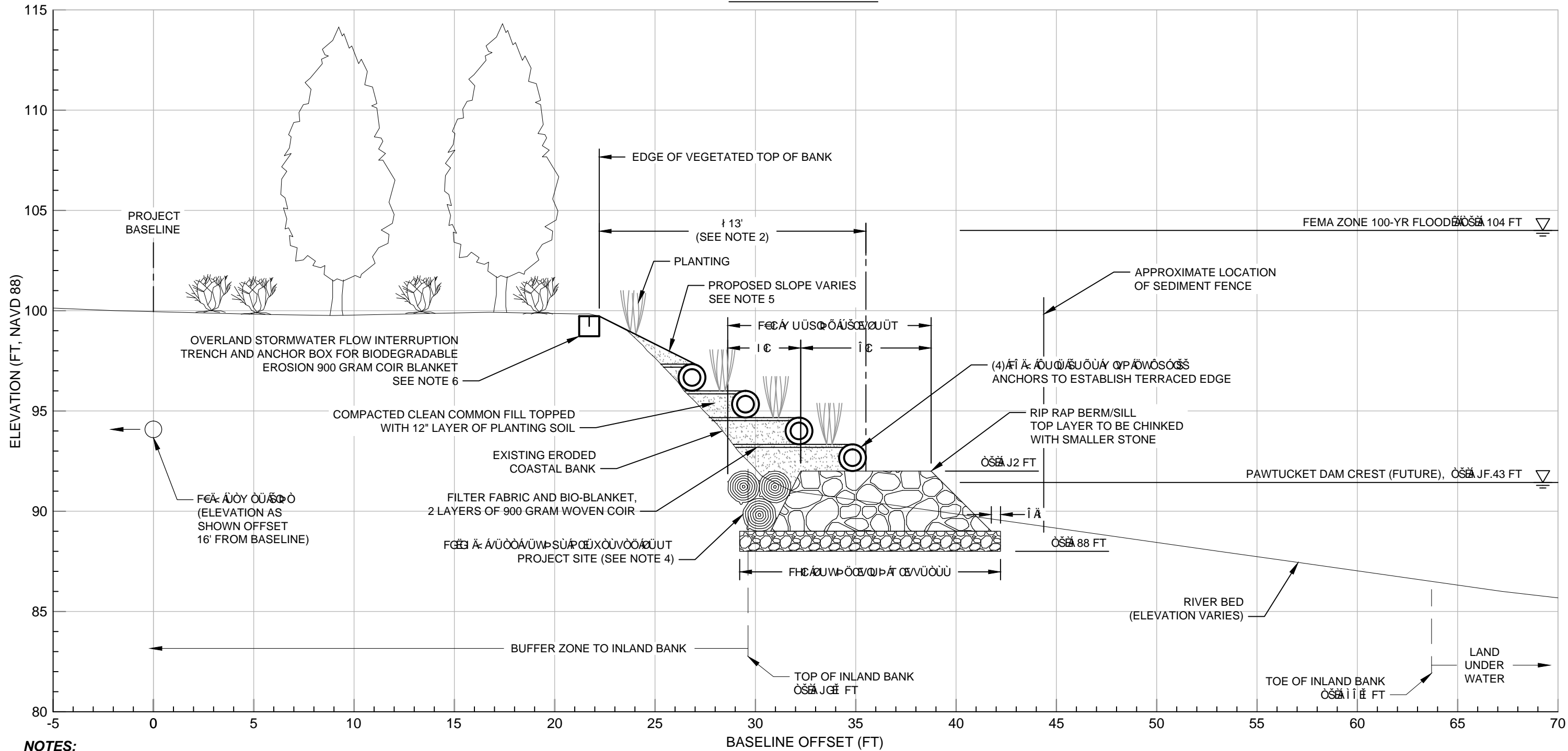
EDGE TYPE 'C'
MAJOR DISTURBANCE
SECTION O

Project 1603860

October 2016

Sheet 28 of 39

STA. 26+96




NOTES:

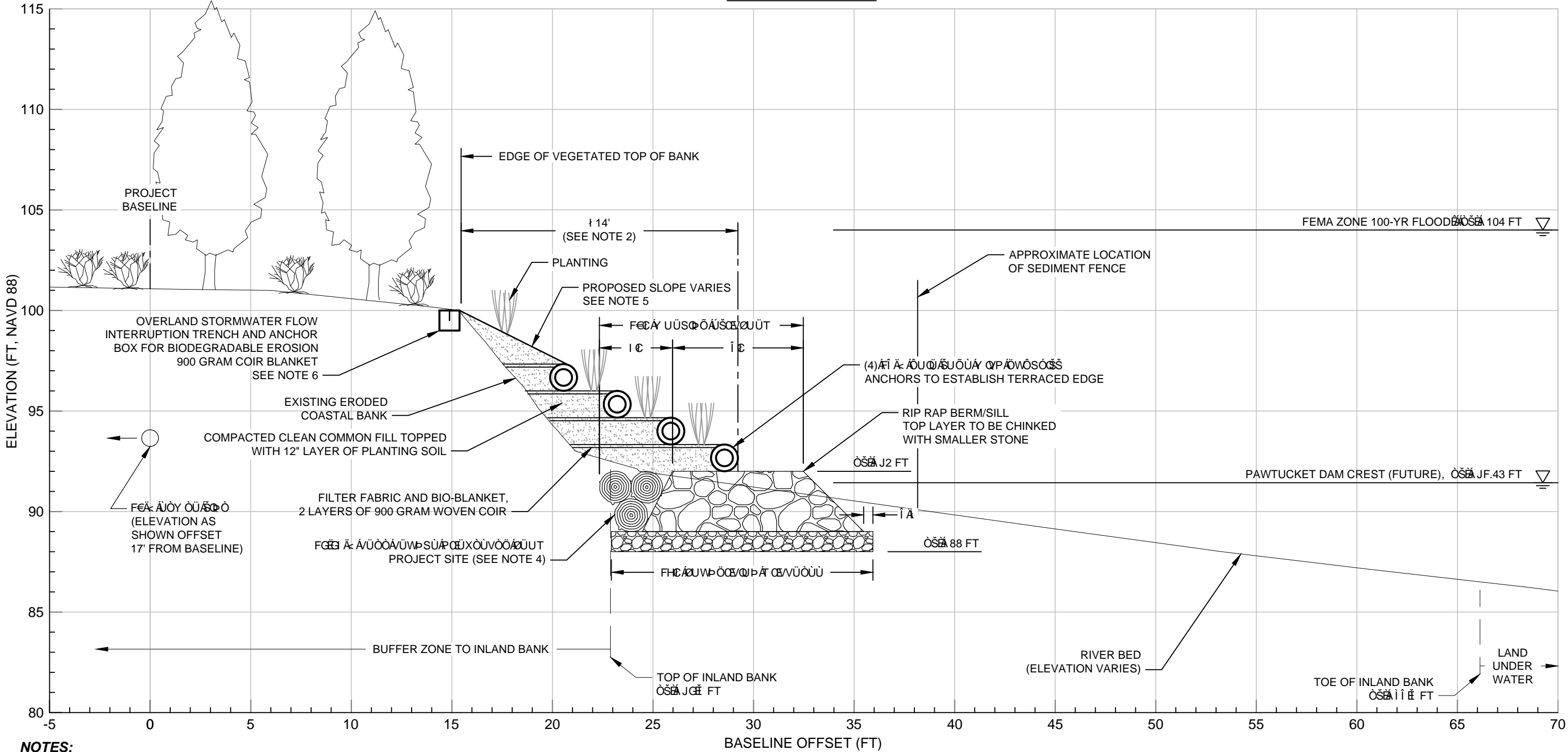
1. ALL WORK TO BE DONE FROM THE RIVER BY UTILIZING THE WORKING PLATFORM AS A BASE.
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6. OVERLAND STORMWATER TRENCH LOCATION TO BE DETERMINED IN THE FIELD. ESTIMATED LENGTH OF 2,000' REQUIRED.



DRAFT

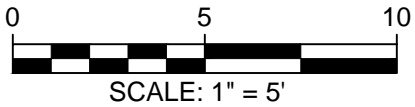
Merrimack Riverbank Stabilization Wellman Avenue North Chelmsford, Massachusetts		EDGE TYPE 'C' MAJOR DISTURBANCE SECTION P
Town of Chelmsford Chelmsford, Massachusetts	Project 1603860	October 2016 Sheet 29 of 39

STA. 27+96




NOTES:

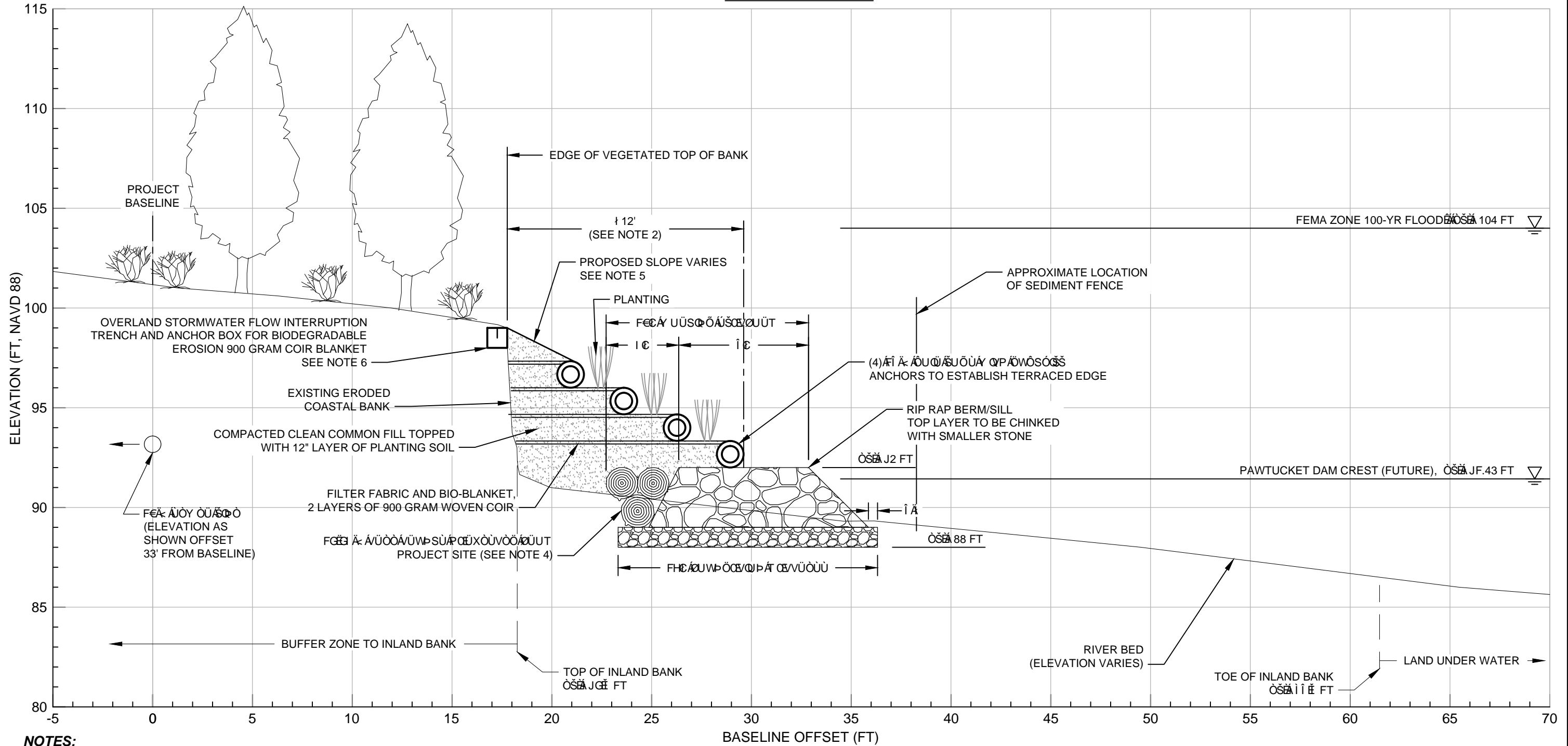
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6. OVERLAND STORMWATER TRENCH LOCATION TO BE DETERMINED IN THE FIELD. ESTIMATED LENGTH OF 2,000' REQUIRED.



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Merrimack Riverbank Stabilization Wellman Avenue North Chelmsford, Massachusetts		EDGE TYPE 'C' MAJOR DISTURBANCE SECTION Q
Town of Chelmsford Chelmsford, Massachusetts	Project 1603860	October 2016 Sheet 30 of 39

STA. 30+21




NOTES:

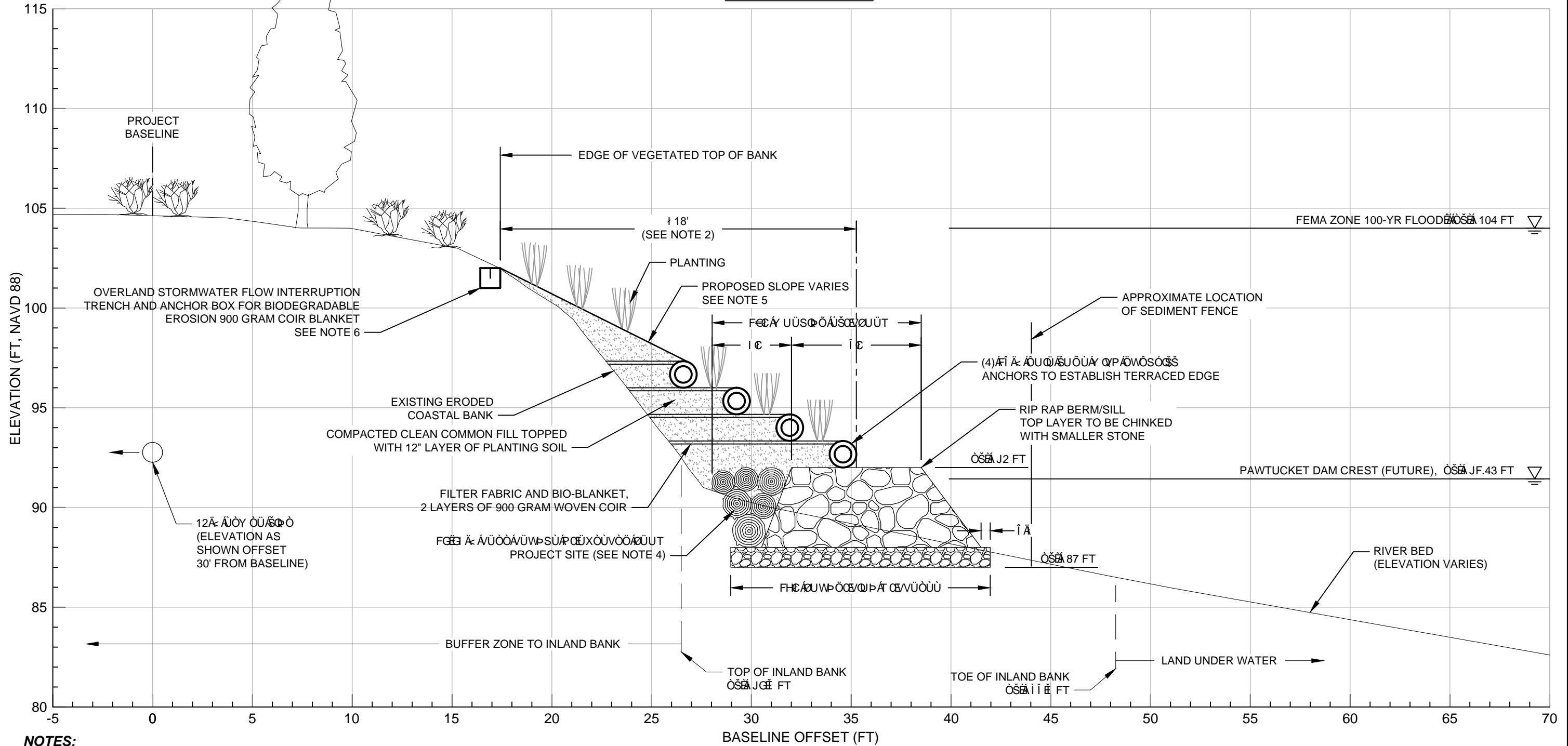
1. ALL WORK TO BE DONE FROM THE RIVER BY UTILIZING THE WORKING PLATFORM AS A BASE.
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6. OVERLAND STORMWATER TRENCH LOCATION TO BE DETERMINED IN THE FIELD. ESTIMATED LENGTH OF 2,000' REQUIRED.



DRAFT

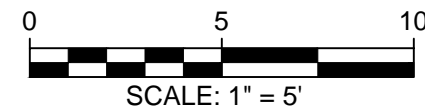
Merrimack Riverbank Stabilization Wellman Avenue North Chelmsford, Massachusetts		EDGE TYPE 'C' MAJOR DISTURBANCE SECTION R
Town of Chelmsford Chelmsford, Massachusetts	Project 1603860	October 2016 Sheet 31 of 39

STA. 32+46




NOTES:

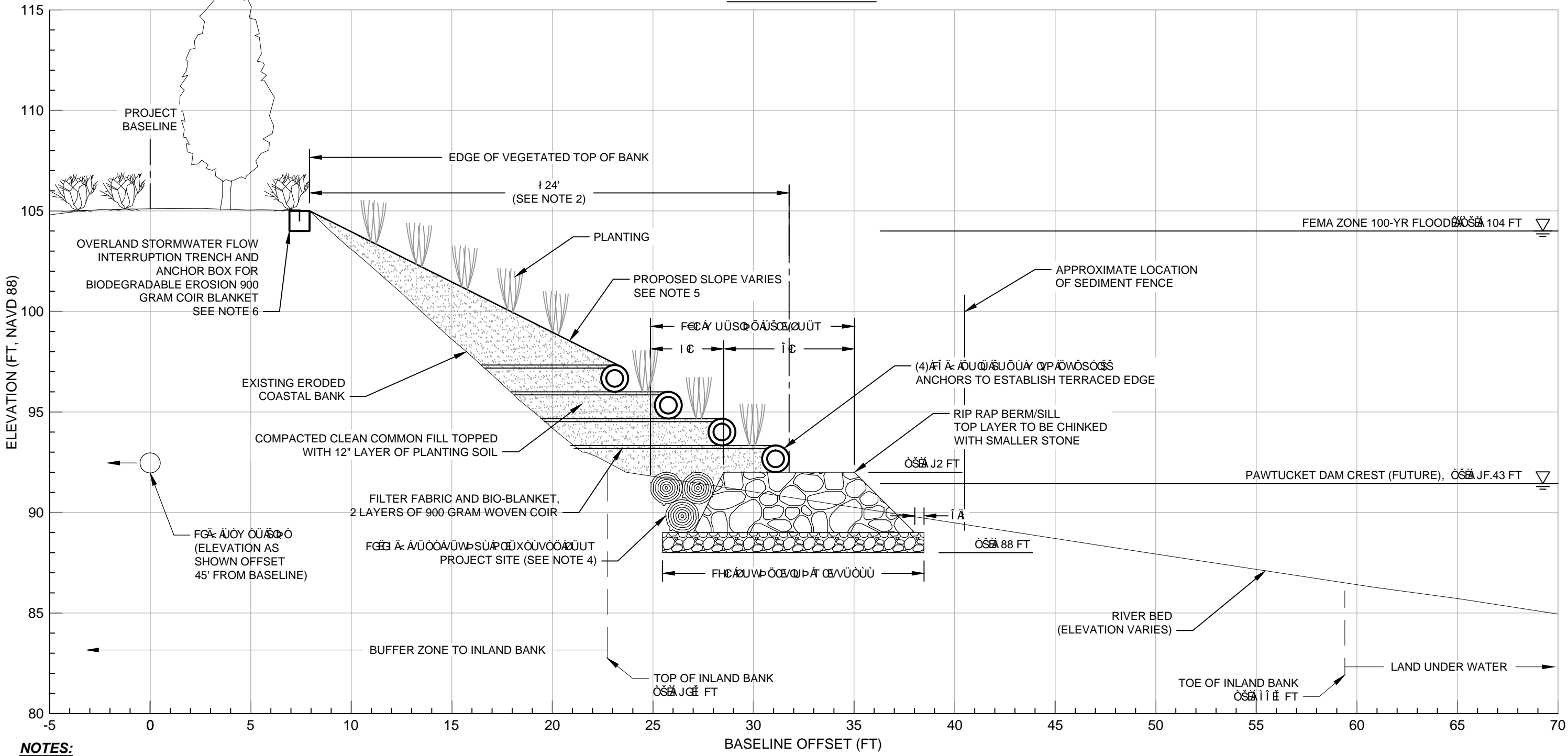
1. ALL WORK TO BE DONE FROM THE RIVER BY UTILIZING THE WORKING PLATFORM AS A BASE.
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DRAFT

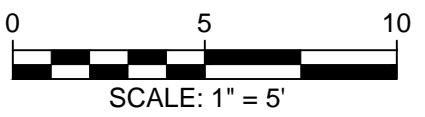
Merrimack Riverbank Stabilization Wellman Avenue North Chelmsford, Massachusetts		EDGE TYPE 'C' MAJOR DISTURBANCE SECTION S
Town of Chelmsford Chelmsford, Massachusetts	Project 1603860	October 2016 Sheet 32 of 39

STA. 33+52




NOTES:

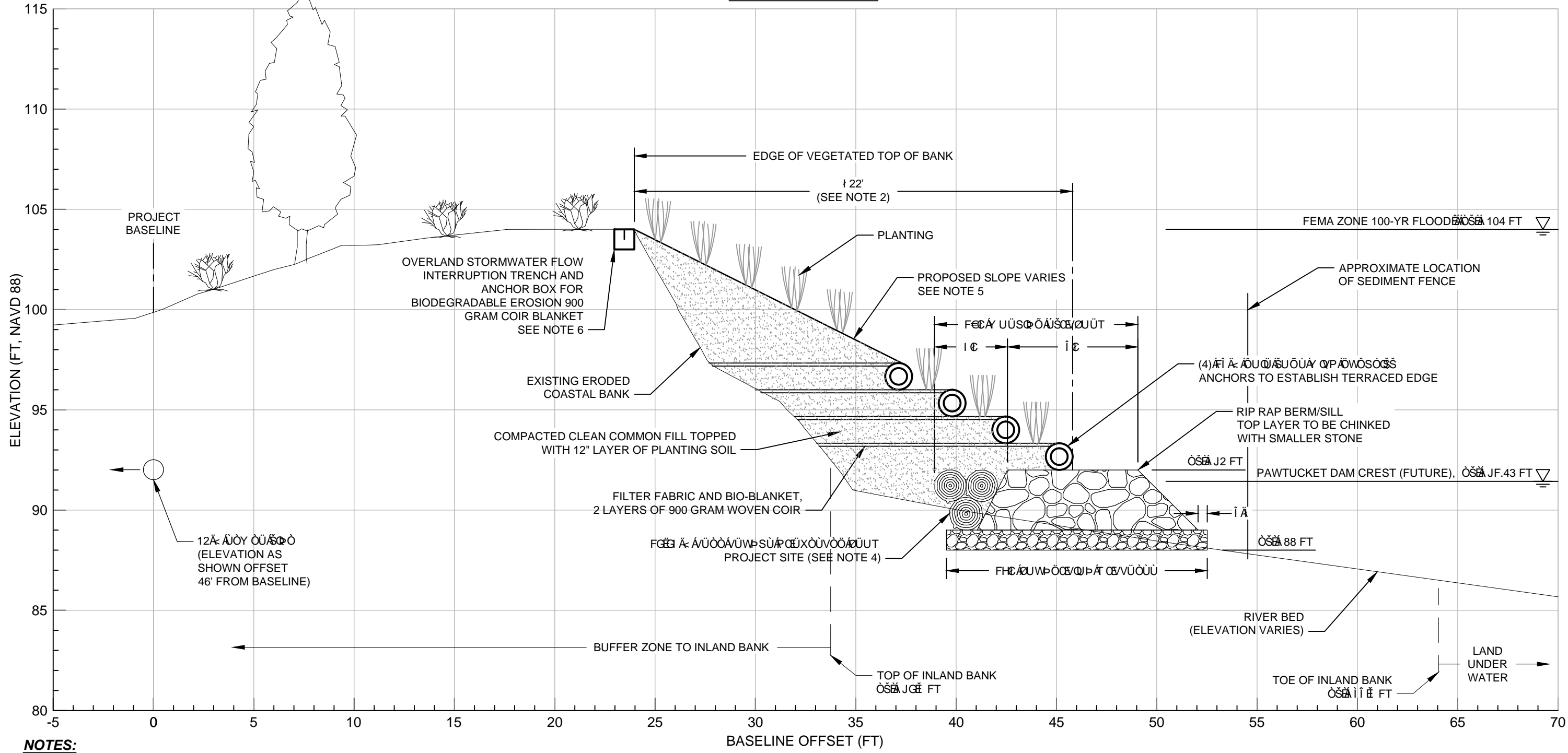
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DRAFT

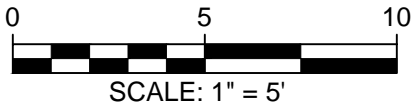
Merrimack Riverbank Stabilization Wellman Avenue North Chelmsford, Massachusetts		EDGE TYPE 'C' MAJOR DISTURBANCE SECTION T
Town of Chelmsford Chelmsford, Massachusetts	Project 1603860	October 2016 Sheet 33 of 39

STA. 35+10




NOTES:

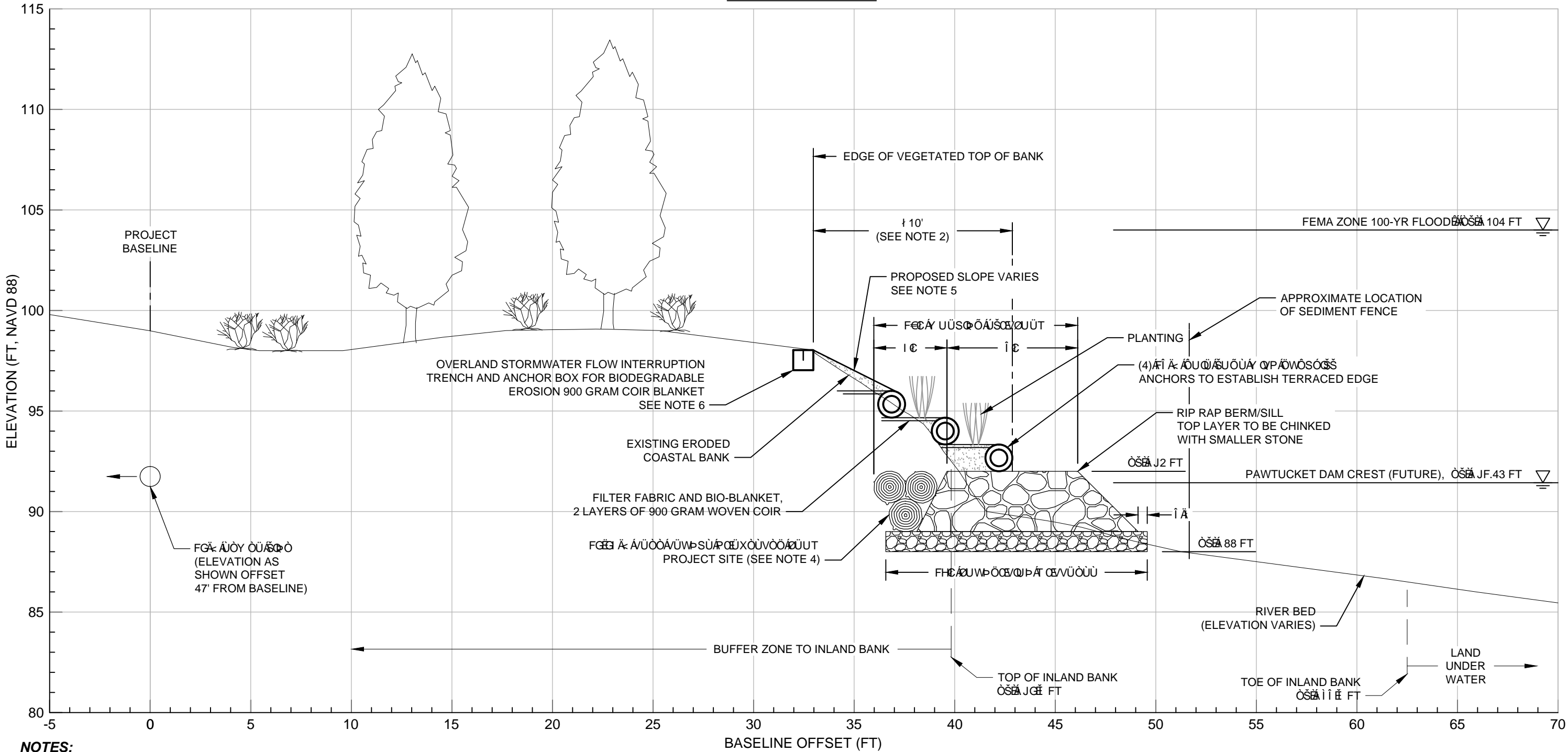
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DRAFT

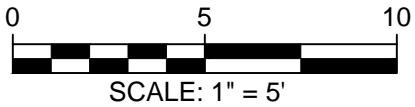
Merrimack Riverbank Stabilization Wellman Avenue North Chelmsford, Massachusetts		EDGE TYPE 'C' MAJOR DISTURBANCE SECTION U
Town of Chelmsford Chelmsford, Massachusetts	Project 1603860	October 2016 Sheet 34 of 39

STA. 36+21




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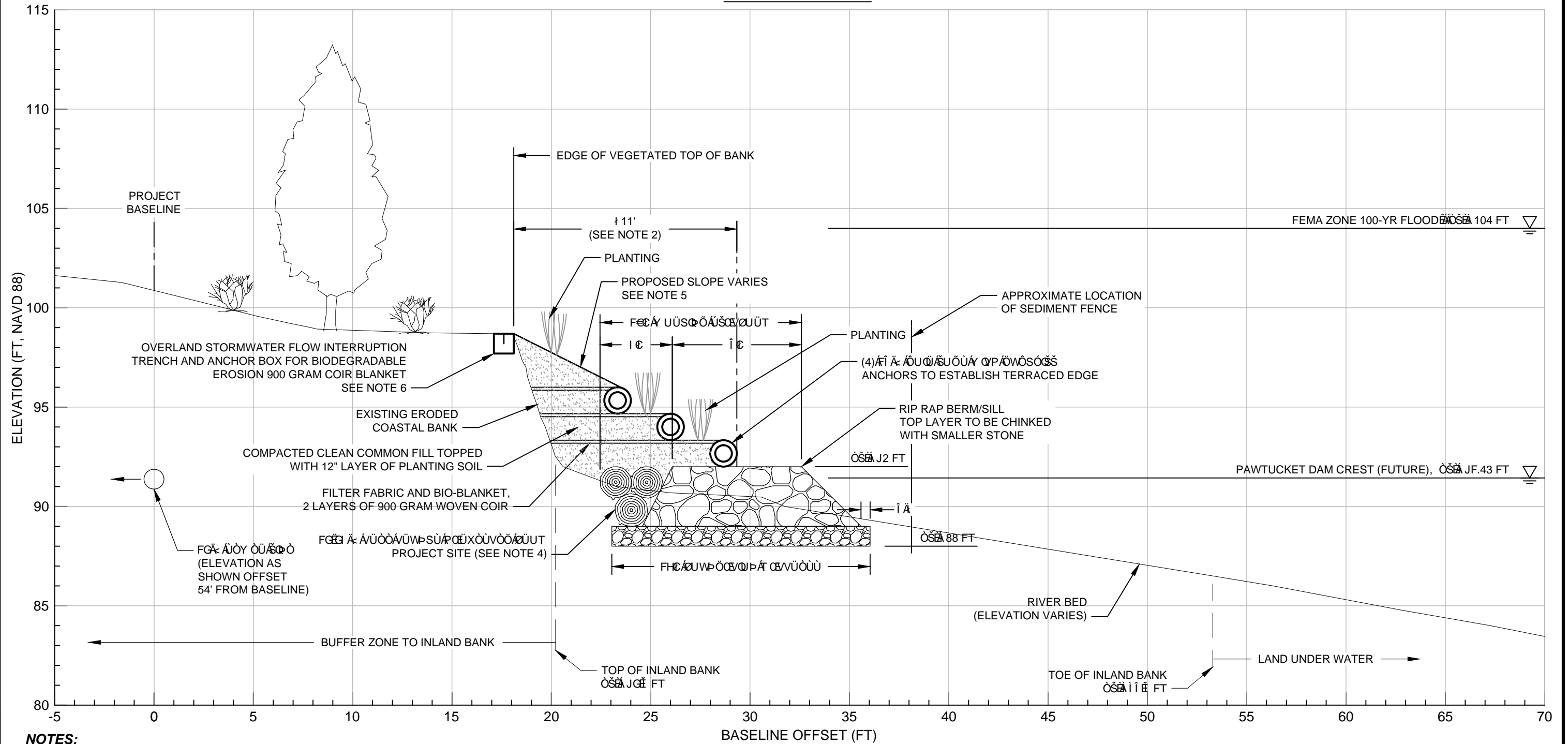
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DRAFT

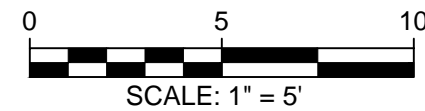
Merrimack Riverbank Stabilization Wellman Avenue North Chelmsford, Massachusetts		EDGE TYPE 'C' MAJOR DISTURBANCE SECTION V
Town of Chelmsford Chelmsford, Massachusetts	Project 1603860	October 2016 Sheet 35 of 39

STA. 37+65



NOTES:

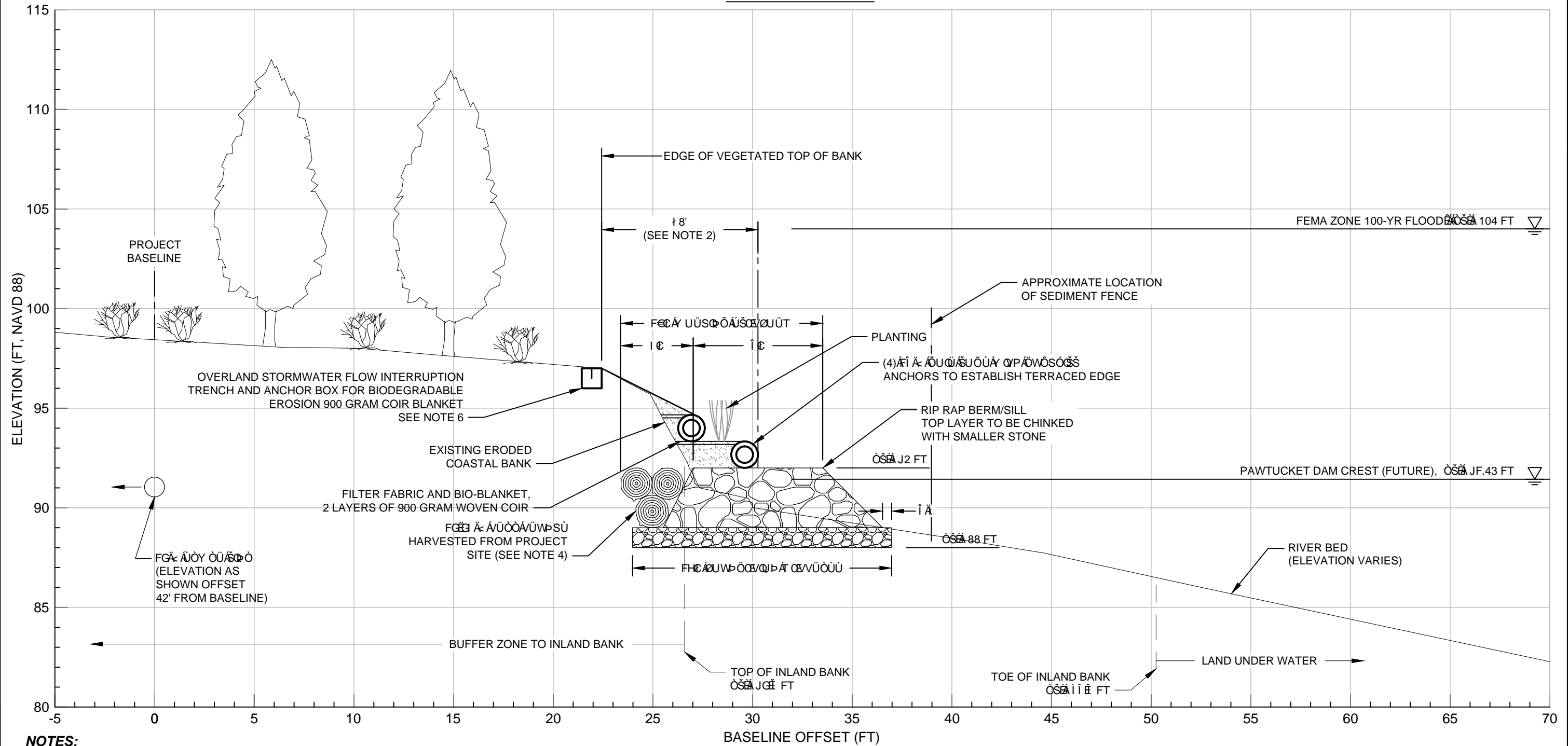
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4. HARVESTED TREE TRUNKS SHALL BE BUNDLED AND PLACED ADJACENT TO THE RIP RAP BERM/SILL TO EXTEND THE WORKING PLATFORM. TREE TRUNKS ARE FOR TEMPORARY USE DURING CONSTRUCTION AND SHALL BE REMOVED AND REPLACED WITH SAND FILL.
5. PROPOSED RIVER EDGE STABILIZATION WILL VARY IN SLOPE FROM A MAXIMUM OF 3H:1V TO A MINIMUM OF 1.5H:1V. THIS ACTION WILL PREVENT EXCESSIVE ENCROACHMENT INTO THE RIVER AND WILL MAINTAIN A REASONABLE ALIGNMENT.
6. OVERLAND STORMWATER TRENCH LOCATION TO BE DETERMINED IN THE FIELD. ESTIMATED LENGTH OF 2,000' REQUIRED.



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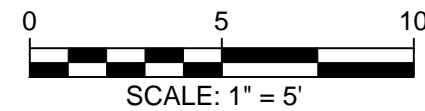
Merrimack Riverbank Stabilization Wellman Avenue North Chelmsford, Massachusetts		EDGE TYPE 'C' MAJOR DISTURBANCE SECTION W
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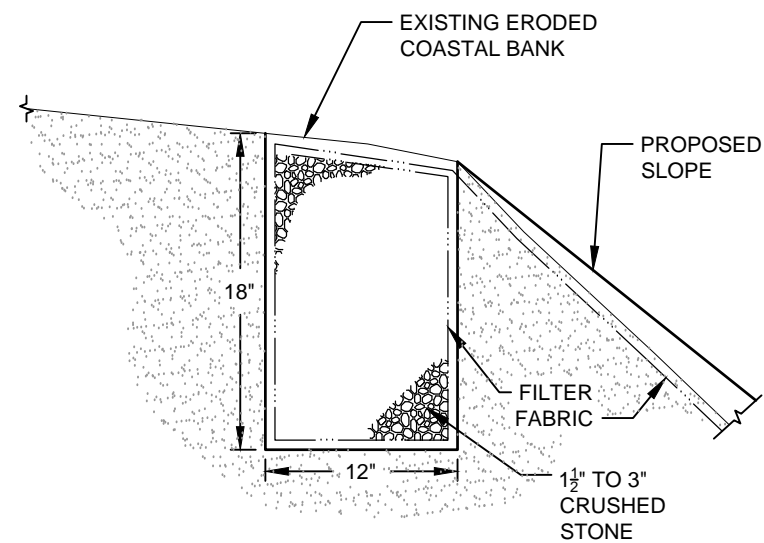
NOTES:

- ALL WORK TO BE DONE FROM THE RIVER BY UTILIZING THE WORKING PLATFORM AS A BASE.
- MAINTAIN AN APPROXIMATELY 20' DISTANCE FROM THE TOP OF THE EXISTING ERODED COASTAL BANK TO THE CENTER OF THE RIP RAP BERM TO MINIMIZE TREE REMOVAL AND ACHIEVE A 2H:1V PREFERRED SLOPE.
- ELEVATIONS SHOWN ARE SUBJECT TO CHANGE BASED ON EXISTING FIELD CONDITIONS OBSERVED DURING CONSTRUCTION. THE CONTRACTOR SHALL NOTIFY GEI AND EPSILON OF SIGNIFICANT DISCREPANCIES IN EXPECTED CONDITIONS PRIOR TO CONTINUING WORK.
- HARVESTED TREE TRUNKS SHALL BE BUNDLED AND PLACED ADJACENT TO THE RIP RAP BERM/SILL TO EXTEND THE WORKING PLATFORM. TREE TRUNKS ARE FOR TEMPORARY USE DURING CONSTRUCTION AND SHALL BE REMOVED AND REPLACED WITH SAND FILL.
- PROPOSED RIVER EDGE STABILIZATION WILL VARY IN SLOPE FROM A MAXIMUM OF 3H:1V TO A MINIMUM OF 1.5H:1V. THIS ACTION WILL PREVENT EXCESSIVE ENCROACHMENT INTO THE RIVER AND WILL MAINTAIN A REASONABLE ALIGNMENT.
- OVERLAND STORMWATER TRENCH LOCATION TO BE DETERMINED IN THE FIELD. ESTIMATED LENGTH OF 2,000' REQUIRED.



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Merrimack Riverbank Stabilization Wellman Avenue North Chelmsford, Massachusetts		EDGE TYPE 'C' MAJOR DISTURBANCE SECTION X
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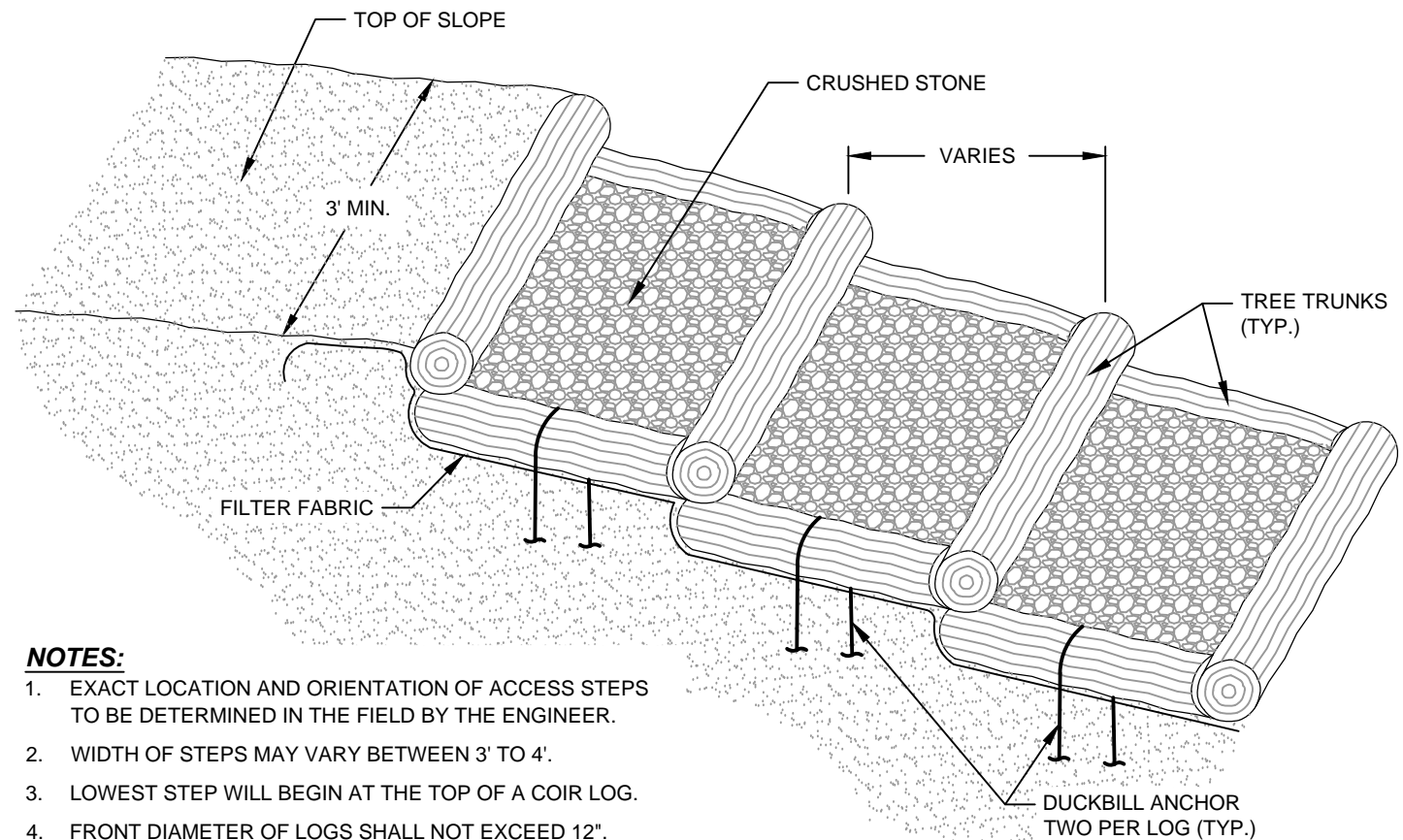


NOTES:

1. STORMWATER INTERRUPTION TRENCH SHALL BE INSTALLED ALONG THE TOP OF THE SLOPE TO PREVENT OVERLAND FLOW. LOCATION WILL BE DETERMINED AT THE SITE TO MINIMIZE IMPACT ON EXISTING TREE ROOTS.

STORMWATER FLOW TRENCH

SCALE: 1" = 1'



NOTES:

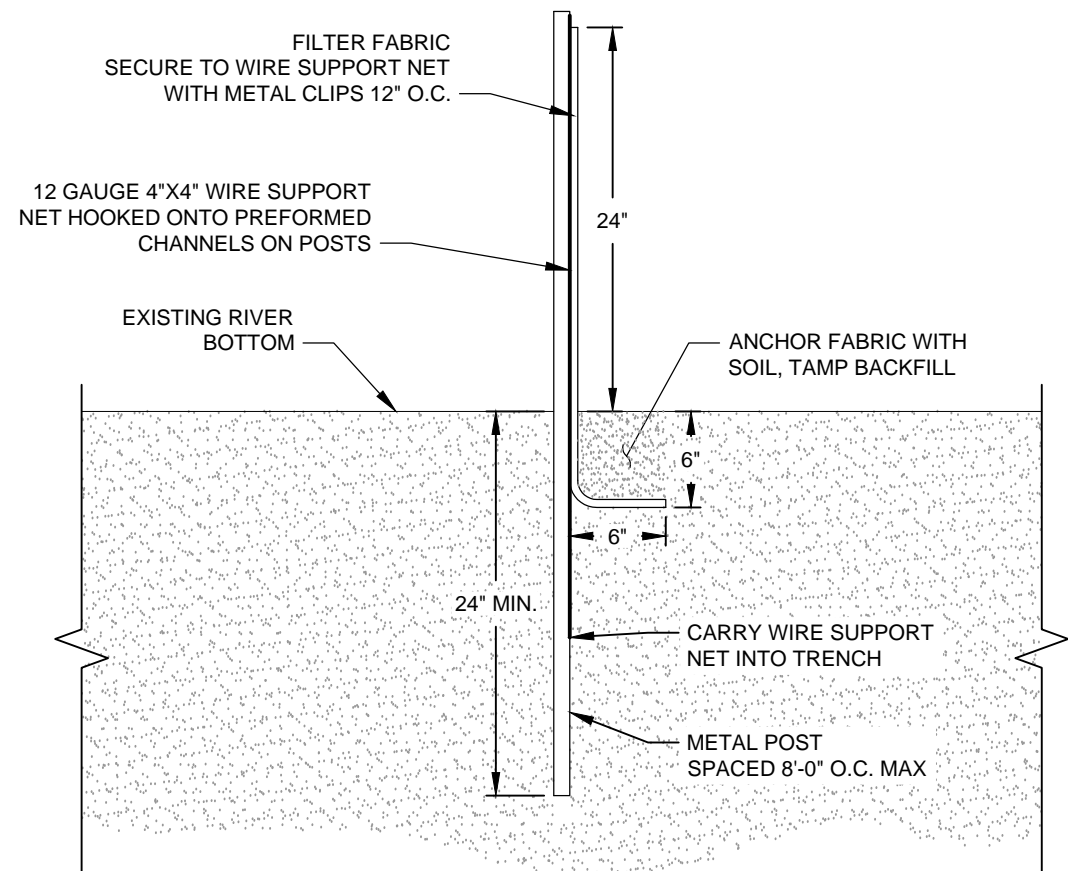
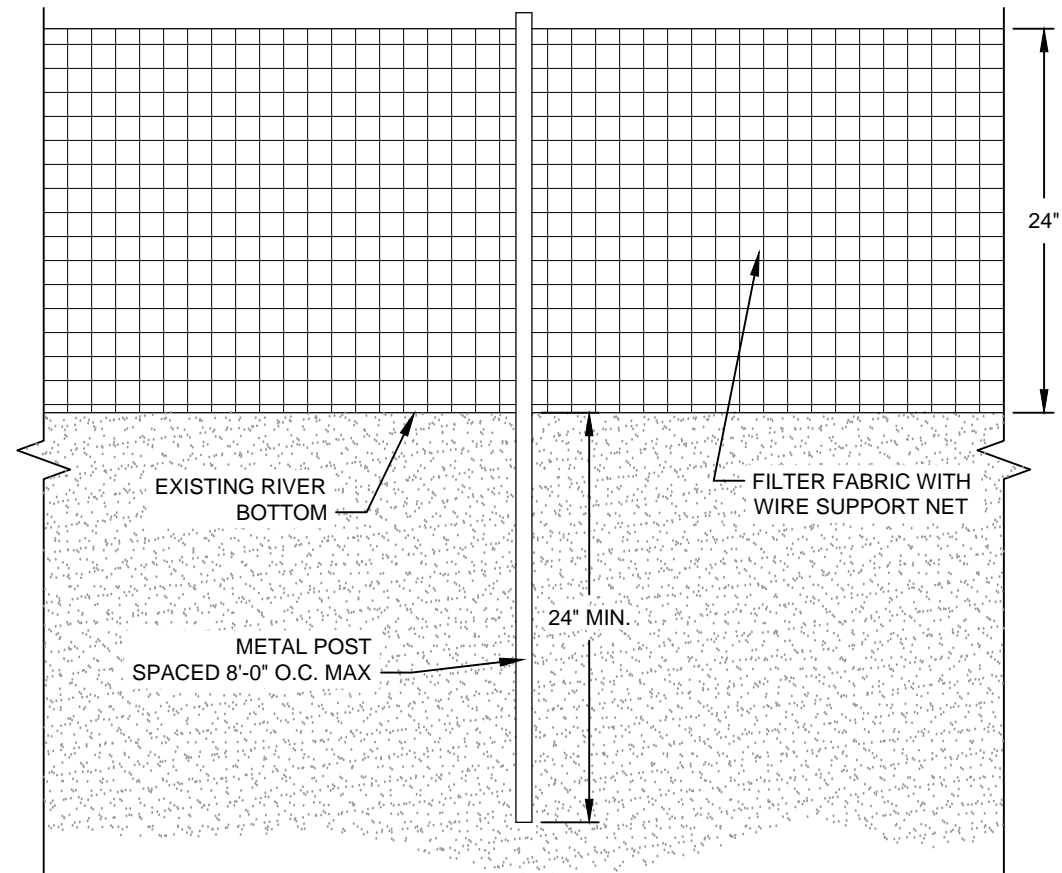
1. EXACT LOCATION AND ORIENTATION OF ACCESS STEPS TO BE DETERMINED IN THE FIELD BY THE ENGINEER.
2. WIDTH OF STEPS MAY VARY BETWEEN 3' TO 4'.
3. LOWEST STEP WILL BEGIN AT THE TOP OF A COIR LOG.
4. FRONT DIAMETER OF LOGS SHALL NOT EXCEED 12".

TYPICAL ACCESS STAIRS

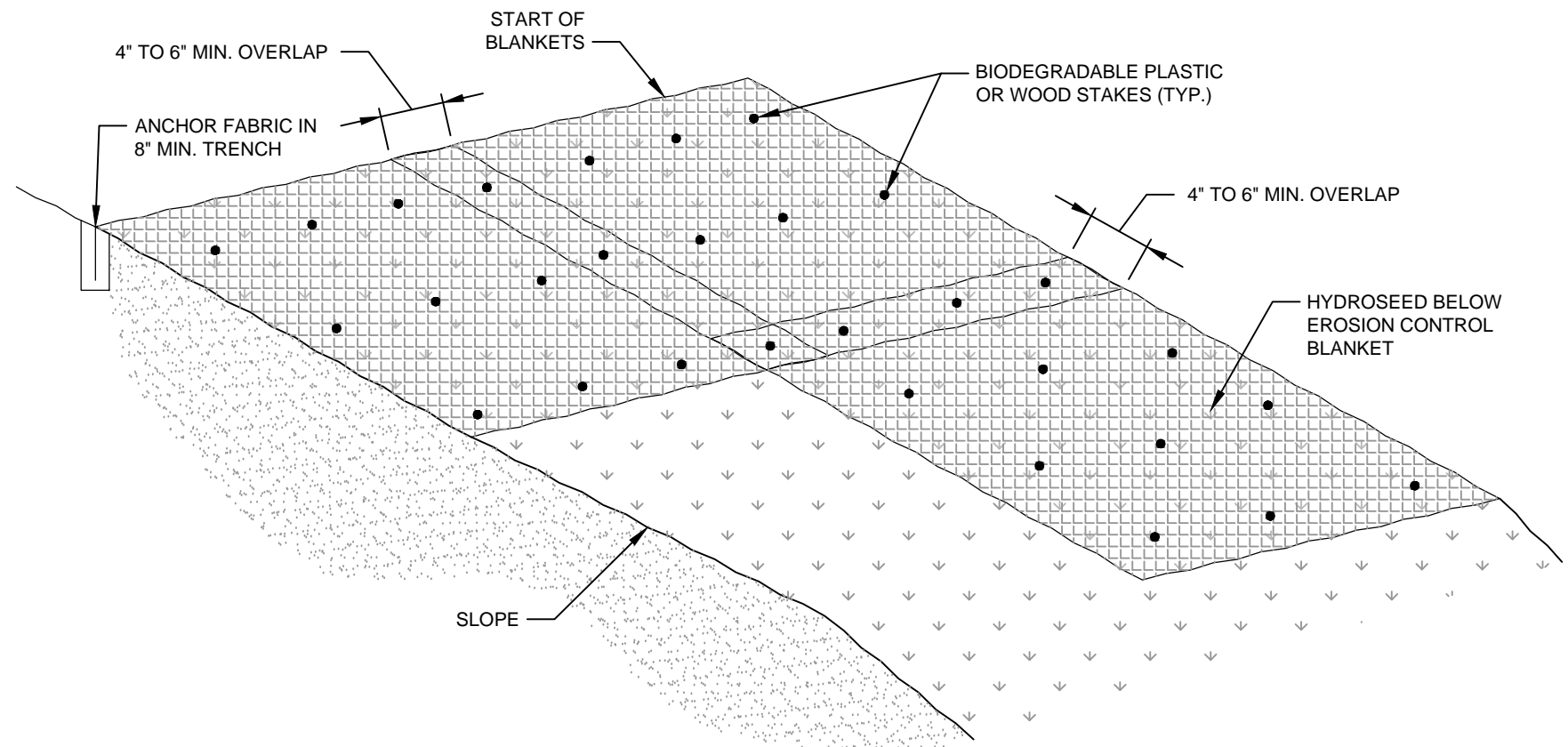
SCALE: 1" = 2'

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SEDIMENT FENCE
SCALE: 1" = 1'




NOTES:

1. PLACE AND PREPARE TOPSOIL AND HYDROSEED.
2. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING FABRIC IN 8" MIN. TRENCH, BACKFILLING, AND COMPACTING.
3. UNROLL EROSION CONTROL BLANKETS DOWN OR HORIZONTALLY ACROSS THE SLOPE FOR GRASS-LINED SWALE INSTALLATION. UNROLL BLANKETS IN DIRECTION OF WATER FLOW. OVERLAP ALL ADJACENT BLANKETS END OVER END (SHINGLE STYLE). MINIMIZE DISTURBANCE OF HYDROSEED DURING FIBER ROLL INSTALLATION. REPLACE DAMAGED AREAS WITH HAND BROADCAST SEED.
4. SECURELY FASTEN EROSION CONTROL BLANKETS TO THE 6" TOPSOIL LAYER AND SUBGRADE USING BIODEGRADABLE PLASTIC OR WOOD STAKES. STAKES SHALL BE OF SUFFICIENT LENGTH TO SECURE TO THE SUBGRADE. STAKE SPACING AND PATTERN SHALL BE AS RECOMMENDED BY THE MANUFACTURER. STAKE SPACING AND PATTERN SHOWN HEREIN IS FOR ILLUSTRATION PURPOSES ONLY.

EROSION CONTROL BLANKET

SCALE: 1" = 2'

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