APPENDIX B

Proposed Project Engineering Designs
1. Use gate on river right to draw down impoundment; follow steps listed above, or the contractor may submit an alternate plan. Suggested water control plan sequencing, for the purposes of project bidding, are as follows:

1. Use gate on river right to draw down impoundment; use methods (e.g., bulk bags, silt curtains, etc.) to separate active flow from the work area; begin removing dam and impounded material; build riffle; use pumps and piping as necessary to facilitate riffle construction; and remove equipment once dam removal, dredging and riffle construction is complete.

The contractor shall submit a water control plan (plan) for approval by the engineer prior to mobilization. The plan can follow steps listed above, or the contractor may submit an alternate plan. Overall, the plan will be the contractor's plan that meets all permit requirements and is subject to approval by the engineer. See specifications.

The contractor shall phase work and control water during all phases so as to conduct work out of the active flow of the river and limit downstream mobilization of sediment. The contractor's means and methods for water control must be suitable to manage the Shawsheen river flows. Average monthly stream discharge is provided in the table on this sheet. Actual flows during construction may vary from these averages.

The contractor will monitor the weather, rainfall, and storm warnings issued by the National Weather Service throughout the project and will remove all equipment and materials that may be affected by flood flows from the Shawsheen river.

Construction Access

Contractor to build ramps and remove prior to project completion. Ramps shall be 10% or less. See specifications.

NOTE: 16' wide drive with 14' overhead clearance. No construction access.

Protection required at all inlets, see specifications.

5. Remove equipment once dam removal, dredging and riffle construction is complete.

10% or less. See specifications.

Conclude stream banks.

5. Remove downstream access road.

Remove riprap.

RE-vegetate disturbed areas.

Re-vegetate disturbed areas.

Excavate sediment.

Excavate channel, bank and floodplain sediments.

Construct riffle and install riprap.

Construct stream banks.

Remove downstream access road.

Notch dam to lower impoundment surface.

Remove dam structure.

Construct the downstream temporary access road.

Construct the upstream temporary access road.

Place riprap.

Place upstream access road.

Inter-fluve, Inc. in May, 2008 and December, 2012.

Survey Control

Survey performed by Inter-fluve, Inc. in May, 2008 and December, 2012.

The horizontal coordinate system is the North American Datum of 1983. Massachusetts State Plane, Middlesex Zone, US Feet.

The vertical datum is the North American Vertical Datum of 1988.

The survey is performed to NAIP 2005 & CSIP requirements. The contours are drawn to a 10 ft. interval.

The survey control points are plotted and labeled with a red dot and character.

The control points are surveyed to 1" = 40 ft. accuracy. All others are shown for location only.

**NOTES:**

Protection required at all inlets, see specifications.

Survey Control

Survey performed by Inter-fluve, Inc. in May, 2008 and December, 2012.

The horizontal coordinate system is the North American Datum of 1983. Massachusetts State Plane, Middlesex Zone, US Feet.

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**NOTES:**

Protection required at all inlets, see specifications.

Survey Control

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The control points are plotted and labeled with a red dot and character.

The control points are surveyed to 1" = 40 ft. accuracy. All others are shown for location only.

**NOTES:**

Protection required at all inlets, see specifications.
NOTES:
1. CROSS SECTIONS FACE DOWNSTREAM.

EXISTING
GRADE
PROPOSED
GRADE
EXISTING
GROUND
SLUICE BOX INVERT
ELEV 33.66
STA 0+28.33
ELEV 32.19
STA 0+36.70
ELEV 28.19
STA 0+76.74
ELEV 28.23
STA 0+94.57
ELEV 32.74
STA 1+19.09
ELEV 37.12
STA 0+45.37
ELEV 28.69
STA 0+85.46
ELEV 28.69

IMPORTED
SOIL, TYP.

EXISTING
BUILDING
OR
CONCRETE
FOUNDATION

EX OHW EL = 39.4
PR OHW EL = 36.7

CONSTRUCTION SECTION
MARLAND PLACE STA 281+00

3.0' BEYOND
FES TOE (TYP.)

CONSTRUCTION SECTION
MARLAND PLACE STA 281+63

3.0' BEYOND
FES TOE (TYP.)

CONSTRUCTION SECTION
MARLAND PLACE STA 282+00

3.0' BEYOND
FES TOE (TYP.)

CONSTRUCTION SECTION
MARLAND PLACE STA 280+00

3.0' BEYOND
FES TOE (TYP.)

CONSTRUCTION SECTION
MARLAND PLACE STA 280+55

3.0' BEYOND
FES TOE (TYP.)

"RESERVED FOR ENGINEER'S STAMP"
**LEGEND**

- **LIMITS OF DISTURBANCE**
- **EXISTING ROADS**
- **EXISTING 1 FT CONTOURS**
- **BUILDINGS/STRUCTURES**
- **SILT FENCE**
- **EXISTING STORM OUTFALL**
- **EXISTING STORM INLET**

**SEED**
- **BROW**
- **GREEN**
- **PINK**

**TURF GRASS SOD**

**SCALE**
1" = 60'

**RESERVED FOR ENGINEER'S STAMP**

---

**FLOODPLAIN / WETLAND PLANTS**

- **Goldentag**
- **Aster punicus**
- **Achillea millefolium**
- **Thalictrum pubescens**
- **Polygonum sagittatum**
- **Acer rubrum**
- **Ulmus americana**
- **Betula aleghannensis**
- **Salix nigra**
- **Celastrus alatus**
- **Cornus alternifolia**
- **Cephalanthus occidentalis**
- **Cornus flaminia**
- **Viburnum lentago**

**Marland Place Dam Removal**

**Andover, MA**

**Marland Place Vegetation Plan**

**Marland Place Planting Table**

<table>
<thead>
<tr>
<th>Floodplain / Wetland</th>
<th>Channel Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>New England Conservation Mix</td>
<td>x</td>
</tr>
<tr>
<td>New England Wetland Mix</td>
<td>x</td>
</tr>
</tbody>
</table>

**Date:** 11-11-15

**Designed:** 15-05-04

**Drawn:** 11-11-15

**Checked:** 11-11-15

**Approved:** 16-05-04

**Shawsheen River**
NOTE: THE APPROXIMATE FLOOD INUNDATION EXTENTS SHOWN ARE BASED ON THE FLOOD FREQUENCY ESTIMATES USED FOR ANALYSIS AND DESIGN SIMULATED WITH THE FINAL PROJECT HYDRAULIC MODEL, AND ARE INCLUDED FOR INFORMATIONAL PURPOSES ONLY. SEE FINAL DESIGN REPORT FOR FURTHER DETAIL ON THE FLOOD FREQUENCY ESTIMATES AND HYDRAULIC MODELING. FLOOD INUNDATION EXTENTS INCLUDED HEREIN SHOULD UNDER NO CIRCUMSTANCE BE SUBSTITUTED FOR OR INTERPRETED TO REPRESENT PREVAILING REGULATORY FLOODPLAIN MAPPING COMPLETED UNDER THE JURISDICTION AND DIRECTION OF THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA).
NOTE:

THE APPROXIMATE FLOOD INUNDATION EXTENTS SHOWN ARE BASED ON THE FLOOD FREQUENCY ESTIMATES USED FOR ANALYSIS AND DESIGN SIMULATED WITH THE FINAL PROJECT HYDRAULIC MODEL, AND ARE INCLUDED FOR INFORMATIONAL PURPOSES ONLY. SEE FINAL DESIGN REPORT FOR FURTHER DETAIL ON THE FLOOD FREQUENCY ESTIMATES AND HYDRAULIC MODELING. FLOOD INUNDATION EXTENTS INCLUDED HEREIN SHOULD UNDER NO CIRCUMSTANCE BE SUBSTITUTED FOR OR INTERPRETED TO REPRESENT PREVAILING REGULATORY FLOODPLAIN MAPPING COMPLETED UNDER THE JURISDICTION AND DIRECTION OF THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA).
NOTE:
The approximate flood inundation extents shown are based on the flood frequency estimates used for analysis and design simulated with the final project hydraulic model, and are included for informational purposes only. See final design report for further detail on the flood frequency estimates and hydraulic modeling. Flood inundation extents included herein should under no circumstance be substituted for or interpreted to represent prevailing regulatory floodplain mapping completed under the jurisdiction and direction of the Federal Emergency Management Agency (FEMA)

LEGEND

- Ordinary = high water (under existing conditions *)
- Ordinary = high water (under proposed conditions *)
- Approx. 100-year flood inundation (under existing conditions *)
- Approx. 100-year flood inundation (under proposed conditions *)

* from hydraulic model

Shawsheen River
Marland Place Dam Removal - Permitting Information
Andover, MA

Permitting Cross Sections

10 of 13
1. The filter fabric shall be purchased in a continuous roll cut to the length of the barrier to avoid use of joints. When joints are necessary, filter cloth shall be spliced together only at a support post, with a minimum 6 inch overlap, and both ends securely fastened to the post. Alternatively, overlap and interlock two posts with attached fabric as approved by the owner's representative.

2. The silt fence is to be installed at locations shown on the plan along the downhill perimeter of disturbed areas. The fence post shall be spaced a maximum of 6 feet apart and driven securely into the ground a minimum of 24 inches apart.

3. The filter fabric shall have a minimum vertical burial of 6 inches. All excavated material from silt fence installation shall be back-filled and compacted along the entire disturbed area.

4. Standard or heavy duty silt fence shall have manufactured stitched loops for 2 inches x 2 inches post installation.

5. Silt fences shall be removed when they have served their useful purpose, but not before the upslope area has been permanently protected and stabilized, or as directed by the owner's representative.

Additional notes and specifications are provided in the diagrams and associated text blocks.
**STAKES THROUGH BOTTOM FABRIC LAYER**

DOWNSTREAM FABRIC LAYER LAPS UNDER

**TYPICAL DETAIL**

**FABRIC JOINING**

2 FT

**OVERLAP**

**FLOW**

**NOT TO SCALE**

**SECTION A - A'**

**FABRIC FOLD**

**NOT TO SCALE**

**FLOW**

**STAKE THROUGH BOTTOM FABRIC LAYER**

STAKES THROUGH BOTH FABRIC LAYERS

DOWNSTREAM FABRIC LAYER LAPS UNDER

UPSTREAM FABRIC LAYER LAPS OVER

INNER FABRIC TO BE BUTTED TOGETHER

**CONSTRUCTION FORM**

**TYPICAL DETAIL**

**FABRIC FOLDING OF OUTER FABRIC**

**NOT TO SCALE**

**FLOW**

**STAKE 3 FT OC IN STAGGERED ROWS**

**1 FT MIN.**

**STAPLES 18 IN OC IN STAGGERED ROWS**

LEG WIDTH 0.6” TAPERED TO POINT

STAPLE THICKNESS 0.4”

WOODEN STAKES AND STAPLES

FABRICATING DETAIL

**NOT TO SCALE**

**KEY TRENCH DETAIL**

**TERMINATION TRENCH**

**NOT TO SCALE**

**SUGGESTED CONSTRUCTION SEQUENCE**

**FABRIC FOLD STAKES**

**TYPICAL DETAIL**

**FABRIC FOLD**

**NOT TO SCALE**

**FLOW**

**SECTION B - B'**

**FABRIC JOINING**

**NOT TO SCALE**

**FLOW**

**STAKE 3 FT OC IN STAGGERED ROWS**

**STAPLES 18 IN OC IN STAGGERED ROWS**

**WOODEN STAKE AND STAPLES**

**NOT TO SCALE**

**WOVEN COIR FABRIC WRAP**

WOVEN (OUTER)

COIR FABRIC

NON-WOVEN (INNER)

COIR FABRIC

NATIVE SEED MIX

FILL OR NATIVE SOIL

WOODEN STAKES ON 3 FT CENTERS

TOE DETAIL

BIODEGRADABLE FABRICS AND STAKES

**NOT TO SCALE**

**GENERAL NOTES ON SECURING COIR FABRIC**

1. SECURE THE OUTER FABRIC (WOVEN, WHERE APPLICABLE), WITH A WOODEN STAKE THROUGH THE FABRIC ON 3 FT CENTERS (SEE DETAIL VIEWS 1 & 2)

NOTE: THE HOLES FOR STAKES SHALL NOT BE PRECUT. ALLOW THE STAKE TO BREAK THE MINIMUM NUMBER OF STRANDS AS IT IS BEING DRIVEN IN. DRIVE STAKES SO THAT 2” TO 3” OF THE TOP OF THE STAKE IS LEFT EXPOSED.

2. OUTER FABRIC ENDS SHALL BE JOINED BY LAPPING THE UPSTREAM PIECE OF FABRIC OVER THE DOWNSTREAM PIECE AS SHOWN IN DETAIL X. OVERLAPS SHALL BE A MINIMUM OF 3 FT, INNER FABRIC ENDS SHALL BE BUTTED TOGETHER, NOT OVERLAPPED. OVERLAPS SHALL BE STAGGERED FROM LIFT TO LIFT BY A MINIMUM OF 15 FT.

3. STAKING SPACING IS DEFINED IN SPECIFICATIONS FOR FES LIFT AND SURFACE FABRIC.
GENERAL INSTRUCTIONS FOR FABRIC ENCAPSULATED LIFTS

1. BANKS MAY BE CONSTRUCTED IN EITHER AN UPSTREAM OR DOWNSTREAM DIRECTION, AS LONG AS THE FABRIC IS OVERLAPPED IN THE PROPER DIRECTION.

2. PLACE A SERIES OF THREE OR MORE FORMS ON THE GROUND SO THAT THE FORMS FOLLOW THE PROPOSED STREAM BANK ALIGNMENT. BUTT THE ENDS OF THE FORMS TIGHTLY TOGETHER.


6. APPLY NATIVE SEED MIX TO TOP OF FILL FROM THE FRONT OF THE LIFT TO 3 FT BACK FROM FRONT OF THE LIFT (FIG C).

7. FOLD THE LOOSE ENDS OF THE TWO COR FABRIC LAYERS BACK OVER THE COMPACTED FILL MATERIAL AND STRETCH TIGHTLY TO REMOVE WRINKLES (FIG G). SECURE WITH WOODEN STAKES 1 PER 3 L.F. ALONG THE BACK EDGE AND INTO UNDISTURBED SOIL.


9. WHERE THE TOP OF THE LIFT MEETS THE GROUND SURFACE, EXCAVATE A KEY TRENCH 1.5 FEET WIDE AND 1 FOOT DEEP ALONG THE EDGE OF THE OUTER FABRIC LAYER. PARALLEL TO THE FORMS. SEED ENTIRE AREA OF TOP LIFT. SECURE FABRIC IN THE KEY TRENCH WITH WOODEN STAKES, 3 FT O.C.

10. BACKFILL THE KEY TRENCH WITH TOPSOIL AND CONTINUE TO APPLY TOPSOIL TO SMOOTHLY MERGE WITH EXISTING CONTOURS. APPLY NATIVE SEED MIX TO KEY TRENCH AREA.

11. SUPPLEMENT LIFT STAKING WITH ADDITIONAL WOODEN STAPLES ON 18" CENTERS EXCEPT WHERE WOODEN STAKES HAVE ALREADY BEEN PlACED.

FIG 1. PLACE A ROW OF CONSTRUCTION FORMS ALONG DESIRED CHANNEL ALIGNMENT FOR FIRST FES LIFT.\
FIG 2. CONSTRUCT FES LIFTS ALONG LENGTH OF FIRST SET OF FORMS AND THEN BEGIN PLACEMENT OF FORMS AND CONSTRUCTION OF SECOND LIFT.\
FIG 3. STAGGER FABRIC OVERLAPS A MINIMUM OF 15 FT BETWEEN LIFTS.

Typical Details
Fabric Encapsulated Soil (FES) Lifts

Shawsheen River
Marland Place Dam Removal
Andover, MA

DATENO.
REVISION DESCRIPTION
PROJECT
CHECKED
APPROVED
DRAWN
DATE
DESIGNED

SHEET
OF
"RESERVED FOR ENGINEER'S STAMP"