DRAFT: Revised Supplemental Environmental Project
for the Boardman River

Background

A supplemental environmental project (SEP) was submitted to the Michigan Department of Environmental Quality (DEQ) on September 15, 2015 to provide streambank stabilization and habitat improvements along the Boardman River. The SEP was proposed within the Study Reach, which was defined in a Settlement Agreement between the City of Traverse City and the plaintiffs as the river reach from the former Brown Bridge Pond dam downstream to the Downer Property. The proposed work included minor bank grading, structure placement, and re-vegetation.

Upon review of the SEP, the DEQ determined that the proposed work within the study reach provided minimal environmental benefit at a substantial cost. The DEQ rejected the proposed SEP in its entirety and recommended that the City consider submitting a revised SEP to take place on the impacted reach upstream of the former pond. This upstream reach was discussed in some detail in the previously submitted SEP proposal. The following describes the proposed work for this reach.

Project Reach and Existing Conditions

The proposed project reach starts at the upstream terminus of the former pond and extends approximately 1200 feet upstream. Figure 1 shows the approximate location and limits of the project reach. The cross sections (XSec1 and 2) were surveyed by the Grand Traverse Band of Ottawa and Chippewa Indians, Natural Resources Department (Tribe). The float visit stop shows where the Tribe staff stopped with DEQ staff on a float trip in the summer of 2015.
Cross sections 1 and 2 are provided below in Figures 2 and 3. The blue line represents the bankfull stage, the red line is the floodprone area width, and the dotted line is the low bank elevation. The bankfull and flood dimensions are shown below the graphs. The cross sections show that this reach is incised (bank height ratios of 3.2 and 2.7) and entrenched (entrenchment ratio of 1.1 for both cross sections). The Rosgen Stream Type is a F4. Using the Stream Functions Pyramid Framework, this reach would score a “Not Functioning” for floodplain connectivity.

Figure 2: Cross Section 1

![Cross Section 1 Diagram]

Photographs taken along the project reach are shown in Figure 4. Bank erosion is prevalent along both sides of the channel, which is very common when streams are disconnected from their floodplain, e.g., has shown with the high bank height ratio. This condition is found throughout the project reach and it is unlikely that the banks will stabilize on their own in a short period of time.
Figure 3: Cross Section 2.

![Graph showing cross section with measured elevations and widths.]

<table>
<thead>
<tr>
<th>Bankfull Dimensions</th>
<th>Flood Dimensions</th>
<th>Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>79.7 x-section area (ft.sq.)</td>
<td>52.0 W flood prone area (ft)</td>
<td>--- D50 (mm)</td>
</tr>
<tr>
<td>47.2 width (ft)</td>
<td>1.1 entrenchment ratio</td>
<td>--- D84 (mm)</td>
</tr>
<tr>
<td>1.7 mean depth (ft)</td>
<td>5.5 low bank height (ft)</td>
<td>--- threshold grain size (mm):</td>
</tr>
<tr>
<td>2.1 max depth (ft)</td>
<td>2.7 low bank height ratio</td>
<td></td>
</tr>
<tr>
<td>47.8 wetted perimeter (ft)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.7 hyd radi (ft)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27.9 width-depth ratio</td>
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</tbody>
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Figure 4: Photos of Project Reach

![Photos of project reach showing the natural state of the riverbank and surrounding environment.]
Design and Construction

Design Approach

A conceptual design is provided below in Figures 5 through 7. Figure 5 shows three phases of construction. Phase 1 is the downstream most reach and will be completed first. A bankfull bench will be constructed along the approximate alignment of the red lines. A typical design cross section is provided in Figure 6. The purpose of the bankfull bench is to reduce streambank heights and increase the width of the active floodplain. Transplants will be removed from source areas and used to re-build the streambanks and a portion of the bankfull bench as shown in Figure 7. Live stakes and native seed will be used to stabilize the remainder of the bankfull bench and terrace slope. Excavated material from the banks and bankfull bench will be placed on the terrace where transplants were removed and the area re-seeded and planted with native vegetation. Currently, a portion of the right bank (looking downstream) is not proposed for treatment (no red line). This portion is close to the hillslope making it difficult for equipment to work from the bank. Excavated material might have to be transported across the channel to the disposal area. This section will be re-assessed before construction starts. If it is determined that the banks are unstable and construction is easier than expected, and other project budgetary parameters can be met, the section will be added to the project.
After Phase 1 has been completely stabilized, including the banks, bankfull bench, and terrace, work in Phase 2 will begin. Since there is uncertainty about how much stream length can be treated, completing one phase before starting another will prevent the project from running out of funds before work has been stabilized. Phase 2 will start at the downstream end and progress upstream.

Figure 6 shows a typical cross section of the design approach.

The left streambank is almost against the existing hillslope and has large woody debris along the toe of the bank. No work is proposed for this section of Phase 2 because lateral migration will be prevented by the hillslope. In addition, woody debris along the toe is providing aquatic habitat and some toe stability. However, the entire right bank (blue line on Figure 5) will be re-graded and transplanted using the same methods as Phase 1.

It is unlikely that funds will be sufficient to start Phase 3 but this area will be included in the permit application in case it becomes an option. However, if funds are available, the same approach will be applied. Transplants from Phase 2 will be used for as long as supplies last. If needed, new transplant source areas and soil disposal areas will be located along the Phase 3 terrace.
Figure 7 shows a typical conceptual detail drawing of how native transplants will be installed.

Spacing and density of the plantings will vary based upon the current spacing and density of the existing native plant material being transplanted.

**Construction Approach**

Construction access is limited and equipment must be tracked in from the former Brown Bridge Pond Stream Stabilization Project. An existing construction access road can be used for a portion of the distance through the former Stabilization project. Once the road ends, equipment will need to track upstream *within the channel* to reach the project site. This method will prevent construction equipment from damaging the recently planted floodplain vegetation. Once equipment reaches the project site, most of the work will be completed from the streambank.

The general construction sequence includes the following steps for each reach.

1. Excavate existing streambank material from the edge of channel to top of bank and away from the channel for a distance of five to ten feet. A track hoe will be used to excavate this material.
2. Remove transplants from source area using another track hoe and off-road dump or a wheel-loader (most likely will use a wheel-loader). Re-build streambank with transplants
as shown in Figure 7 up to the bankfull stage. This will also create a portion of the bankfull bench.

3. Excavate the remainder of the bankfull bench with widths varying from 20 to 25 feet in most places. Bench width will taper to meet untreated reaches and may be narrower in some places to save larger trees or to blend with existing landscape.

4. Live stake the remainder of the bankfull bench and terrace slope. Seed with native herbaceous cover. Note, live stakes will be done at a later time with volunteers. This work will be coordinated by the Tribe.

5. Dispose of excess soil material along terrace and as close to hillslope (away from channel) as is feasible. Once grading is completed, seed all disturbed areas using the same seed mix and rate that was used in the downstream project reach.

### Permitting

This document along with the proper forms and fees will be submitted to DEQ for permitting. It is assumed that a formal set of plan sheets sealed by a Michigan PE is not needed for bank stabilization work as proposed in this revised SEP, and that the detail in this report is sufficient for all permitting. A local sediment and erosion control permit will also be obtained if required by the City or County.

### Next Steps and Post Construction

Upon approval of this Revised SEP, a permitting and construction scope of work will be prepared for the City of Traverse City (City). Once that scope is approved, Stream Mechanics will work with a contractor and the IT to obtain permits and schedule project construction. As-built cross sections and photographs of the completed work will be submitted to the City and DEQ. The goal is to complete construction in spring 2016.

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