



Memorandum

To: Bassett Creek Watershed Management Commission
From: Barr Engineering Co.
Subject: Item 6B – Consider Approval of 50% Design Plans for 2015 Main Stem Restoration Project, Golden Valley (CIP CR2015)
BCWMC March 19, 2015 Meeting Agenda
Date: March 11, 2015
Project: 23270051 2015 630

6B Consider Approval of 50% Design Plans for 2015 Main Stem Restoration Project, Golden Valley (CIP CR2015)

Summary:

Proposed Work: 2015 Main Stem Restoration Project (CIP CR2015)

Basis for Commission Review: 50% Design Plans Review

Change in Impervious Surface: N.A.

Recommendations:

- 1) Conditional approval of 50% drawings
- 2) Authorize the City of Golden Valley to proceed with final plans and contract documents

The 2015 Bassett Creek Main Stem Restoration project (CIP CR2015) is being funded by the BCWMC's ad valorem levy (via Hennepin County). The City of Golden Valley provided the 50% design plans to the BCWMC for review and comment, as set forth in the BCWMC CIP project flow chart developed by the TAC.

Feasibility Study Summary

The City of Golden Valley completed the 2015 Bassett Creek Main Stem Restoration Project Feasibility Report (WSB, June 10, 2014) to examine the feasibility of restoring sites along the 9,500-foot reach of the creek from 10th Avenue North and Rhode Island Avenue North. The feasibility report identified 29 sites where bank erosion, bank failure, and infrastructure repairs were needed, in addition to removal of debris, fallen trees, gabion baskets, and block walls.

The feasibility report identified two restoration design options for the project: 1) a bioengineering (or soft armoring) approach that uses techniques that rely primarily on vegetation, and 2) a more structural (or hard armoring) approach that uses rock and other non-vegetative materials. Both approaches included the use of stone toe armoring. In the bioengineering approach, the stone toe was one foot high, while in the hard armoring approach, the stone toe was two feet high. Both approaches also included a section of

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six-foot high fieldstone boulder. The bioengineering approach included biologs, biologs with a stone toe, root wads, rock vanes, live fascines (dormant willow and dogwood cuttings), live stakes, and vegetated reinforced slope stabilization (VRSS). The more structural approach included two-foot high stone toe, and nine-foot high fieldstone boulder.

The feasibility report estimated that the bioengineering/soft armoring approach would require the removal of approximately 800 trees, while the more structural/hard armoring approach would require the removal of approximately 400 trees. A combination of these two options was preliminarily selected as a preferred option in many of the restoration areas.

The following text, quoted from the feasibility report, provided the approach the city would use in selecting the design option for each particular site:

The selection of the best option for a given stream reach will be based on a number of factors including but not limited to; ease of and ability to obtain access for installation and future maintenance, slope of creek bank, presence of mature trees in the area and need to remove trees, exposure of creek bank to sunlight, velocity of flow in channel reach, and property owners' preferences for type of treatment.

Since selection of the type of treatment used in a given area will need the support of the property owner, the City will need to finalize the design approach as a collaborative effort with the property owner. At this time, based on our review of the feasible options available and input from a number of property owners that attended a public informational meeting on the project, it is anticipated that either the vegetative or hybrid option would be selected for most areas of the channel requiring stabilization work.

The feasibility report estimated that project implementation would reduce the total phosphorus load by 60 – 100 pounds per year and the total suspended sediment load by 140,000 – 200,000 pounds per year.

50% Design Plans

The 50% design plans include a combination of the two stabilization measure options (bioengineering and hard armoring), including biolog and stone toe, biolog and boulder toe, boulder wall, vegetated bench (which includes stones and live fascines), intermittent stone toe, and slope shaping. The design plans also include infrastructure repairs, and removal of debris, fallen trees, gabion baskets, and block walls. The 50% design plan sheets show the total approximate tree removal to be from 427 to 457 trees.

The 50% design generally relies more on toe stabilization from bioengineering measures (12-inch biolog with 6- to 12-inch stones) rather than pure hard armoring (30- to 34-inch stones). However, the design does not include the root wads, rock vanes, and VRSS that were part of the bioengineering options in the feasibility study. These in-stream structures can add significant stream bank stability while also providing habitat diversity within the channel. If a bioengineering approach is to be pursued, it is recommended that

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the plans be modified to include features such as root wads, rock vanes, and VRSS, as included in the feasibility study. This is especially important for the more-sinuuous stream sections, such as from 67+00 to 81+00 (Area D).

The 50% design plans call for an intermittent stone toe in two sections where the feasibility study recommended continuous riprap stabilization (48+00 to 53+50 (Area C) and 62+50 to 65+25 (Area D)). More details should be provided about why more-robust bank stabilization is not needed. If erosive stress is generally low, placing intermittent stone toes may lead to localized scour and erosion and create the need for stabilization in the future. In such a situation, it is recommended that the plans not include intermittent stone toes.

The feasibility study included significant installations of either VRSS (bioengineering option) or a 9-foot tall boulder wall (hard armoring option) to stabilize the right bank from 68+50 to 71+00 (Area D). The 50% plans include biolog and single boulder toe stabilization in this area. More details should be provided regarding the adequacy of the proposed design to stabilize this slope.

The submitted drawings were at a 50% design stage, which means there are a number of details yet to be worked out before the design is final, including coordination with local property owners. The Commission Engineer expects the majority of the comments below to be addressed in the 90% design stage drawings.

Recommendations

A. Conditional approval of 50% drawings based on the following comments, recognizing that the current plans are preliminary:

- 1) The BCWMC does not allow filling in the floodplain unless compensatory storage is created, or it can be demonstrated that the fill will not adversely impact upstream flood levels. Although the current design does not include significant earthen fill areas, the riprap and boulders that will be added to the channel banks may constitute fill. Modeling or other documentation must be submitted to verify no change in the flood level caused by the proposed design.
- 2) Modeling or other documentation should be provided to verify that the proposed rock sizes are adequate to meet the design stability criteria.
- 3) Given the number of trees that are proposed for removal, the design should consider including root wads or toe wood structures for outside bend stabilization and habitat improvement as a cost-effective stabilization measure.
- 4) If a bioengineering approach is to be pursued, it is recommended that the plans be modified to include features such as root wads, rock vanes, and VRSS as included in the feasibility study. This is especially important for the more-sinuuous stream sections, e.g., from 67+00 to 81+00 (Area D).
- 5) More details should be provided about why more-robust bank stabilization is not needed from 48+00 to 53+50 (Area C) and from 62+50 to 65+25 (Area D), where the 50% design plans call for

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an intermittent stone toe, but the feasibility study recommended continuous riprap stabilization. If erosive stress is generally low, placing intermittent stones may lead to localized scour and erosion and create the need for stabilization in the future. In such a situation, it is recommended that the city consider not including intermittent stones in the plans.

- 6) More details should be provided regarding the adequacy of the proposed biolog and single boulder toe stabilization design to stabilize the right bank of the stream from 68+50 to 71+00 (Area D); the feasibility study proposed significant installations of either VRSS (bioengineering option) or a 9-foot tall boulder wall (hard armoring option).
- 7) The feasibility study included the following work items that do not appear on the 50% design plans:
 - Removal of an 80-foot long block wall at 63+80 (Area D).
 - Turf reinforcement mat on the peninsulas at 76+00 and 77+00 (Area D).
 - Removal of gabion baskets at 86+50 (Area E).

The revised plans need to include the above items, if they are part of the project.

- 8) Instructions for the contractor to limit tree clearing as much as possible and only at the direction of the Engineer should be included on the plans.
- 9) The construction area and access routes are not clearly identified on all plan sheets. In addition, restoration of site access must be included on the drawings.
- 10) Erosion control measures, including in-stream measures as appropriate and measures to control erosion from access and staging areas, must be included on the drawings.
- 11) Proposed seed mixes and other vegetation (live plantings, dormant stakes, etc.) for restoration of the disturbed slopes should be included on the plans.
- 12) Elevations and upstream/downstream stationing should be provided for all proposed toe stabilization measures. Relevant elevations such as the bankfull elevation or top of boulder walls could be shown by including a stream profile or callouts for individual structures.
- 13) Sheet 2 (Area A): For the gabion removal at 8+00, the feasibility study discussed removal of both gabions and grouted riprap. The drawings should clarify whether grouted riprap is to be removed as well.
- 14) Sheet 4 (Area C):
 - a. Elevations should be provided for the fieldstone boulders from 58+70 to 59+70. Also, it should be clarified whether this stabilization is intended for both sides of the stream or only one side.

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- b. For the manhole installation at 50+90, the plan sheet or detail should specify the rim, upstream invert, and downstream invert elevations and whether a sump is to be provided in the manhole. Bedding requirements for the manhole and piping should be shown in a detail. Also, the length of the outflow 12" RCP pipe should be specified.

15) Sheet 5 (Area D):

- a. The drawings should clarify whether "reinstall sheetpiling" at 63+20 includes driving sheet pile into stream bed, or simply attaching the new FES to existing sheet pile.
- b. Elevations and stationing should be provided for boulder walls (new and repair of existing) and for the extents of the "previously repaired areas" (at approximately 75+00) where limited work is to be performed.

16) Sheet 6 (Area E): The overall note on the plan sheet indicates slope shaping, but there is not a corresponding detail on the details sheets.

17) Sheet 7 (Details):

- a. Elevations for rock installation, vegetated bench, and boulder wall should be referenced in the details and provided on the plan sheets or in a summary table.
- b. The note referencing the constraint of no net cut/fill requires additional documentation to verify that the proposed boulder and stone installation does not change the upstream flood levels. (See also comment 1.)
- c. A detail is included for fieldstone riprap installation, but no areas of fieldstone riprap installation are included in the plan sheets.

18) Sheet 8 (Details): A detail is included for live stakes, but no areas of live staking are included in the plan sheets.

19) Sheet 9 (Details):

- a. The FES sheet piling detail states "this drawing is typical for all flared end sections." However, it does not appear from the plan sheets that sheet piles are intended or currently in place at all FES replacement locations. This should be clarified on the drawings by identifying the appropriate detail for each installation.
- b. For riprap at FES outlets, it is recommended that the city consider using filter aggregate (MNDOT Spec. 3601) below riprap rather than fabric for in-stream applications.

- B. Authorize the City of Golden Valley to proceed with final plans and contract documents.