Memorandum

To: Bassett Creek Watershed Management Commission
From: Barr Engineering Co. (Karen Chandler, P.E., and Jessica Olson, P.E.)
Subject: Item 5A – Consider Approval of 60% Plans for 2025 Plymouth Creek Stream Restoration Project (CIP 2025 CR-P) – BCWMC October 16, 2025 Meeting Agenda
Date: October 9, 2025
Project: 23270051.65-6000-650

5A. Consider Approval of 60% Plans for 2025 Plymouth Creek Stream Restoration Project, Plymouth (CIP 2025 CR-P)

Summary:

Proposed Work: 2025 Plymouth Creek Stream Restoration Project, Plymouth (CIP 2025 CR-P)
Basis for Commission Review: 60% Plans Review
Change in Impervious Surface: N.A.
Recommendations:

1) Conditional approval of 60% drawings
2) Authorize the City of Plymouth to continue design and bring 90% plans to a future Commission meeting

At their meeting in September 2024, the BCWMC ordered this BCWMC CIP project and entered into an agreement with the City of Plymouth to design and construct the project. The BCWMC received a $400,000 Clean Water Fund grant from the Minnesota Board of Water and Soil Resources for the 2025 Plymouth Creek Stream Restoration (CIP 2025 CR-P). The BCWMC will fund the remainder of the project costs from BCWMC Capital Improvement Project funds paid with Hennepin County property taxes levied on all BCWMC residents. The agreement requires submittal of the 50% and 90% plans and specifications to the BCWMC for approval, in accordance with the BCWMC's CIP project review process. For the 50% review of the project, the City of Plymouth provided 60% plans to the BCWMC for review and comment. As described in more detail later in this memo, the City of Plymouth decided to split the project into two parts, completing the upstream portion first.

Feasibility Study Summary

The BCWMC completed the Feasibility Report for Plymouth Creek Restoration Project (Barr, May 2024) to examine the feasibility of restoration within the project area in the City of Plymouth. The Plymouth Creek Stream Restoration project area is located along Plymouth Creek from Dunkirk Lane North, on the upstream end, to 38th Avenue North behind Plymouth Ice Center, on the downstream end (Figure 1). The feasibility report identified multiple measures for implementation including:

- Removing trees and invasive vegetation (e.g., buckthorn) and planting native species to restore riparian areas and improve habitat
- Incorporating a variety of stream restoration measures to reduce erosion including streambank grading for improved floodplain connectivity and stability along with vegetation establishment; hard armoring like riprap; and bioengineering techniques such as installing root wads and toe wood, coir logs, vegetated reinforced soil stabilization (VRSS), rock or log j-hook vanes and cross vanes, brush mattresses, and live stakes

- Removing accumulated sediment in targeted areas near culvert crossings
- Constructing a new meandering channel segment to replace a straightened segment of channel near Plymouth Creek Elementary School
- Establishing new vegetation in areas disturbed by construction

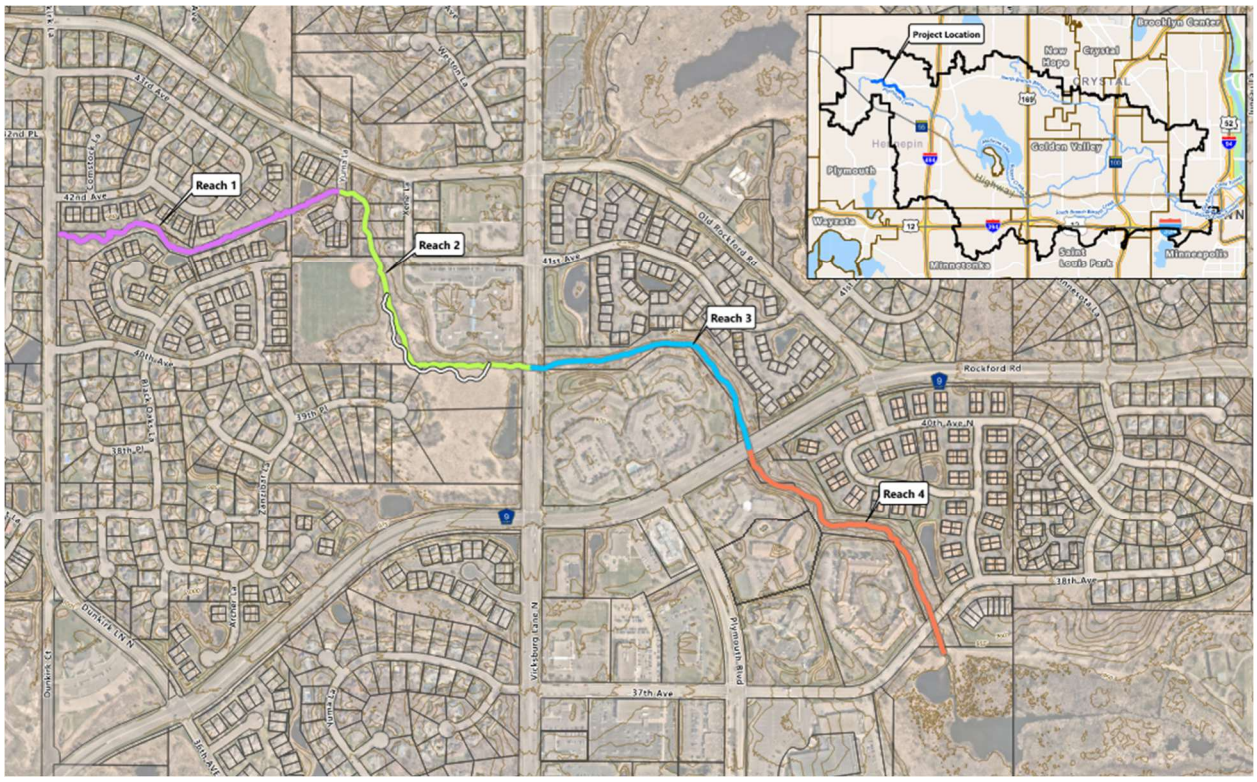


Figure 1: Plymouth Creek Stream Restoration Reach (CIP 2025 CR-P)

The feasibility report also identified, mapped, and prioritized stream sections in need of restoration along the 7,000-foot section of Plymouth Creek. The study identified 26 restoration areas, defined as areas of similar erosion properties and prioritization metrics, within the approximate 7,000-foot assessed reach. The restoration areas are ranked from low to high priority. At their May 15, 2024 meeting, the BCWMC approved the implementation of "Option 3a" to restore and stabilize all identified high, medium, and low priority areas along the stream, improve vegetated buffers along the stream, and create a meander of the stream channel in one section.

The feasibility report estimated that this restoration project would require the removal of approximately 208 trees, 140 of which are buckthorn, box elder, green ash, or Siberian elm (species that are invasive or prone to disease or infestation).

To avoid impacts to nesting northern long-eared bats, the feasibility study recommended that tree removal should occur in the period from October 15 to early April, outside of the bat's active season (mid-April –October 14). If tree clearing would be required during the bat's active season, the feasibility study recommended additional consultation with the US Fish and Wildlife Service.

The feasibility study included a desktop (Level 1) wetland delineation that identified 17.02 acres of wetland within the project area. Most of the delineated wetlands were adjacent to Plymouth Creek and

are likely Type 1, Floodplain Forest wetlands. A large wetland complex is located at the northwest intersection of Rockford Road and Vicksburg Lane and is likely a combination of Type 2, Fresh (wet) meadow, and Type 3, Shallow marsh.

The feasibility study estimated that project implementation would reduce the total phosphorus load from the site by 148.4 pounds per year and the total suspended sediment load by 296,720 pounds per year.

At the time the project was ordered, the total cost of the project, including the feasibility study, design, construction, and administration was $2,600,000. Of this cost, the construction costs were estimated at $1,440,000 ($1,728,000 with 20% construction contingency).

60% Plans

The City of Plymouth decided to break out Plymouth Creek 2025 CR-P into two phases due to the level of effort needed to complete the design and construction. The first phase (about one-third of the overall project stream reach) will focus on the stream reach from Dunkirk Lane North to the trail crossing near 41st Avenue North, as shown in Figure 2 below. The second phase will focus on the remainder of the stream reach, from the trail crossing near 41st Avenue North to just south of 38th Avenue North. The City's goal is to design and permit the first phase of the project in fall/winter 2025 and construct in early winter/spring of 2026. The City plans for phase two to be designed and permitted starting spring 2026 and constructed in winter 2026/2027.



Figure 2: Project Area for Phase 1 of 2025 Plymouth Creek Stream Restoration

The 60% plans follow many of the recommendations from the feasibility study, including the use of slope grading with seeding and blanketing, vegetative riprap, coir toe, and brush mattress. Notable differences

between the 60% plans and the feasibility study recommendations for the selected alternatives are listed below, as provided in the September 26, 2025 submittal memorandum from the City's consultant (Moore Engineering), and as identified in a figure created by the City's consultant (Attachment 1).

- Moore Engineering conducted a field assessment of the reach to assess changes since the 2023 field work conducted for the feasibility study. The updated field assessment identified additional erosion progression, which resulted in the design including increased stream restoration lengths (for example, more linear feet of vegetated riprap) in some areas. To address the additional identified erosion progression, the 60% design plans show more robust practices such as coir toe or riprap toe to provide increased protection in some areas where the feasibility study recommended using bank grading with vegetation.

- The feasibility study called for implementation of vegetated reinforced soil stabilization (VRSS). The 60% design plans propose using vegetated riprap instead to simplify construction in a relatively small channel.

- The feasibility study called for implementation of rock/boulder j-hook vanes. The 60% design plans propose using stream-width rock vanes instead to simplify construction in a relatively small channel.

The City's consultant provided a list of trees that are proposed for removal as part of phase 1. These trees are proposed for removal because of their proximity to the new proposed stream stabilization measures and/or because the tree species are undesirable. The feasibility study proposed removal of 99 healthy trees through this reach, while the 60% design proposes removal of 110 healthy trees. Of the 99 healthy trees proposed for removal in the feasibility study, 32 are desirable species (species that are not invasive or prone to disease or infestation, including Green Ash, Box Elder, Buckthorn, and Siberian Elm). Of the 110 healthy trees noted for removal in the 60% plans, there are 17 desirable species. The table below compares the tree removals proposed in the feasibility study to those proposed in the 60% plans.

Tree Species [1]	Feasibility Study Healthy	60% Plans Healthy	60% Plans Dying/Dead	60% Plans Removal Total
Ash/Green	12	5	19	24
Basswood/American	2	3	0	3
Box Elder	49	42	18	60
Buckthorn	6	42	5	47
Cottonwood	10	2	0	2
Elm/American	10	6	4	10
Elm/Siberian	0	4	0	4
Lombardy Poplar	0	1	0	1
Oak/Bur	4	1	0	1

Tree Species [1]	Feasibility Study Healthy	60% Plans Healthy	60% Plans Dying/Dead	60% Plans Removal Total
Oak/Pin	2	0	0	0
Willow/Black	4	4	7	11
Totals	**99**	**110**	**53**	**163**

1. This table compares healthy trees slated for removal in the feasibility study with those slated for removal in the 60% design. Additionally, this table includes dead/dying trees identified by the City's consultant for removal (dead/dying trees were not included in the quantities noted for removal in the feasibility study)

The City's consultant did not provide pollutant reduction estimates with the 60% submittal.

The City will host an open house this fall (potentially late October) to give residents the opportunity to review proposed plans, provide feedback and ask questions. The 90% plans should be revised to address feedback received at the open house.

The submitted drawings were at a 60% design stage, which means there are a number of details yet to be worked out before the design is final. The current estimated construction cost for Phase 1 is $524,000. Based on the amount of work proposed for Phase 1, restoring approximately a third or the reach (and not including establishment of the new meander), the 60% construction cost is aligned with the estimated cost in the feasibility study.

As the design progresses, the City must address the comments below in the 90% design stage plans and specifications.

Recommendations

A) Conditional approval of 60% plans, recognizing that the current plans reflect the 60% level of design. The following comments must be addressed as part of the 90% plans submittal:

1) The Plymouth Creek 100-year floodplain elevation ranges from 978.3 to 966.0 feet NAVD88 in the project area. The BCWMC floodplain elevation should be shown and called out on the plans. If the project results in fill below the BCWMC floodplain, floodplain fill, and mitigation computations must be provided to demonstrate no net fill in the floodplain.

2) As part of the 90% design the City's consultant must provide an existing and proposed conditions model to show no increase in the Plymouth Creek 100-year flood elevation as a result of the project.

3) The 60% memorandum indicates a desktop cultural resources review was completed. As part of the 90% design, please include the results of the desktop cultural resources review. If cultural resources field work was completed, please also provide that information.

4) The 60% memorandum indicates that a wetland delineation was completed for the project. Please include the wetland delineation results with the 90% design.

5) The plans should be revised to show and call out invasives removal in the proposed seeding area.

6) The City's consultant indicated that riprap is required if stream velocities exceed four feet per second. Soft armoring (i.e. bioengineering) has been found effective for stream velocities exceeding 4 feet per second. Please consider incorporating bioengineering for flow velocities up to 8 feet per second.

7) Survey, computations, and other field/watershed indicators need to be provided for the 90% design to justify the proposed bankfull width, bankfull depth, bottom width, and channel cross section.

8) Elevations and upstream/downstream stationing must be provided in the 90% design plans for all proposed toe stabilization features. Similarly, if the channel invert will be graded the proposed profile must be provided.

9) Computations must be submitted for the 90% design to justify the riprap and boulder sizing for the project features.

10) Updated pollutant reduction estimates must be provided for total phosphorus and total suspended sediment that reflect the current design.

11) A summary of the expected permitting requirements must be provided.

12) The vegetated riprap is called out as angular, please revise to be fieldstone for this restoration project. Similarly, please clarify in the rock arch rapids details on sheet C-202 that the riprap will be fieldstone.

13) The vegetated riprap detail uses a 1:1 side slope, please revise to at most a 2:1 side slope to ensure the long-term stability of the riprap.

14) Areas that have vegetated riprap do not include either a brush mattress or VRSS above the riprap on the bank. The concern is these areas have the potential for high velocity during the 10-yr and 100-yr storm events and a robust vegetation establishment will be necessary. This is especially true for locations that had VRSS proposed in the feasibility study, such as ~Sta. 2+75 through 6+00, and Sta. 19+00. The proposed vegetated riprap detail will be sufficient in areas where the feasibility study proposed brush mattress, but request the team revisit the removal of the VRSS in these locations. If VRSS must be replaced, please provide documentation justifying that the revegetation plan above the riprap will achieve the velocity and shear stress requirements for those specific locations.

15) The typical section for the brush mattress on sheet C-204 calls for a 6-foot bottom width of the channel but also shows a 6-foot width riverward of the coir. Please revise this detail to ensure the definition of the 6-foot bottom width is clear.

16) Please provide the design details for the inlets that are discharging stormwater to the stream. How will the design ensure these outlets remain stable long-term while achieving the restoration goals?

17) Consider replacing the vegetated riprap between Sta. 10+00 and 14+00 with coir log and/or brush mattress. These areas have lower velocities and the coir/brush mattress will provide better habitat as there is potential for the soil over the ripap below the normal water level to be washed away

long term, leaving the rock exposed. Vegetated riprap should only be used in areas where velocities are high and require its use.

18) Why is vegetated riprap proposed around Sta. 17+00 but not at Sta. 18+20, where the velocities are noted as being above 4 feet per second? Should vegetated riprap be included at Sta. 18+20? Consider using coir toe if velocities are lower than 4 feet per second.

19) The grading within the reach between approximately 21+00 to 24+00 does not appear to include any restoration of the natural channel dimensions.. Please consider options to construct a natural channel through here that aligns with the design channel cross section and ensures sediment transport. The current design will continue to result in sediment deposition in this reach, especially since the upstream invert of the downstream culvert is above the 960 grading elevation proposed in this area.

20) The feasibility study included cross vanes in the drainage channel upstream of Plymouth Creek near Sta. 20+20. Please clarify if work will be proposed in this channel to stabilize the channel invert.

21) Please verify whether the use of the "MnDOT Wet Ditch" mix in the riprap toe detail is the mix of choice for a restoration along a shaded stream such as this.

22) The plans must be revised to include a Stormwater Pollution Prevention Plan (SWPPP) that meets BCWMC requirements as described in Section 7 of the BCWMC Requirements Document.

23) The plans must be revised to include installation details for erosion control best management practices.

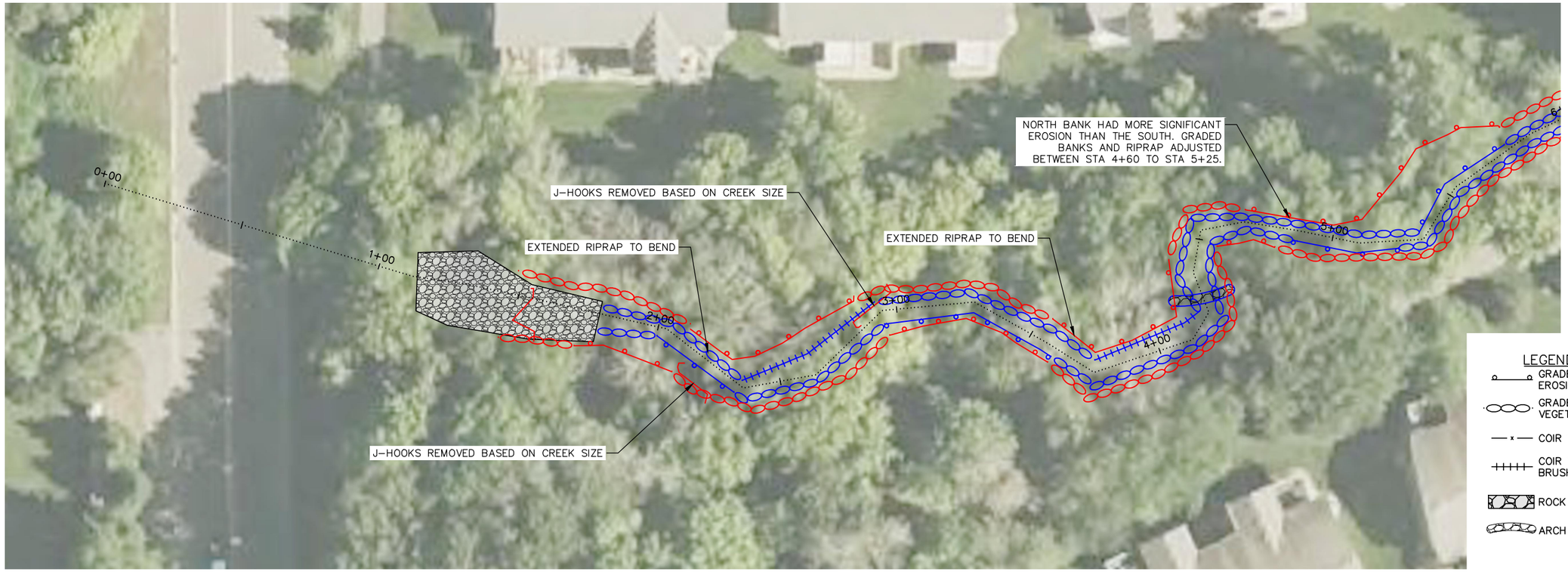
24) The removal and erosion control sheets must be revised as follows:

    a. Clarify locations of erosion control practices such as construction entrance, inlet protection, and perimeter control.

    b. Clarify the tree removals (i.e., are the trees colored in red being removed?).

B) Authorize the City of Plymouth to continue design and bring 90% plans and specifications to a future BCWMC meeting.

FILE LOCATION: Q:\Projects\30000\30400\30495 StreamRestorationPlymouth\CAD\C3D\Presentation\30495_FeasibilityvsProp.dwg





LEGEND

- GRADED BANKS WITH EROSION CONTROL BLANKET
- GRADED BANKS WITH VEGETATED RIP RAP
- COIR TOE
- COIR TOE WITH BRUSH MATTRESS
- ROCK RIFFLE
- ARCH VANE

NOTES:

1. THE RED LINEWORK REPRESENTS PROPOSED WORK FROM THE FEASIBILITY STUDY. BLUE LINEWORK REPRESENTS PROPOSED WORK IN THE 60% DESIGN.
2. SOME LINEWORK FROM THE FEASIBILITY STUDY MAY HAVE BEEN MOVED OR ADJUSTED TO NOT OVERLAP WITH OTHER LINEWORK.

PRELIMINARY

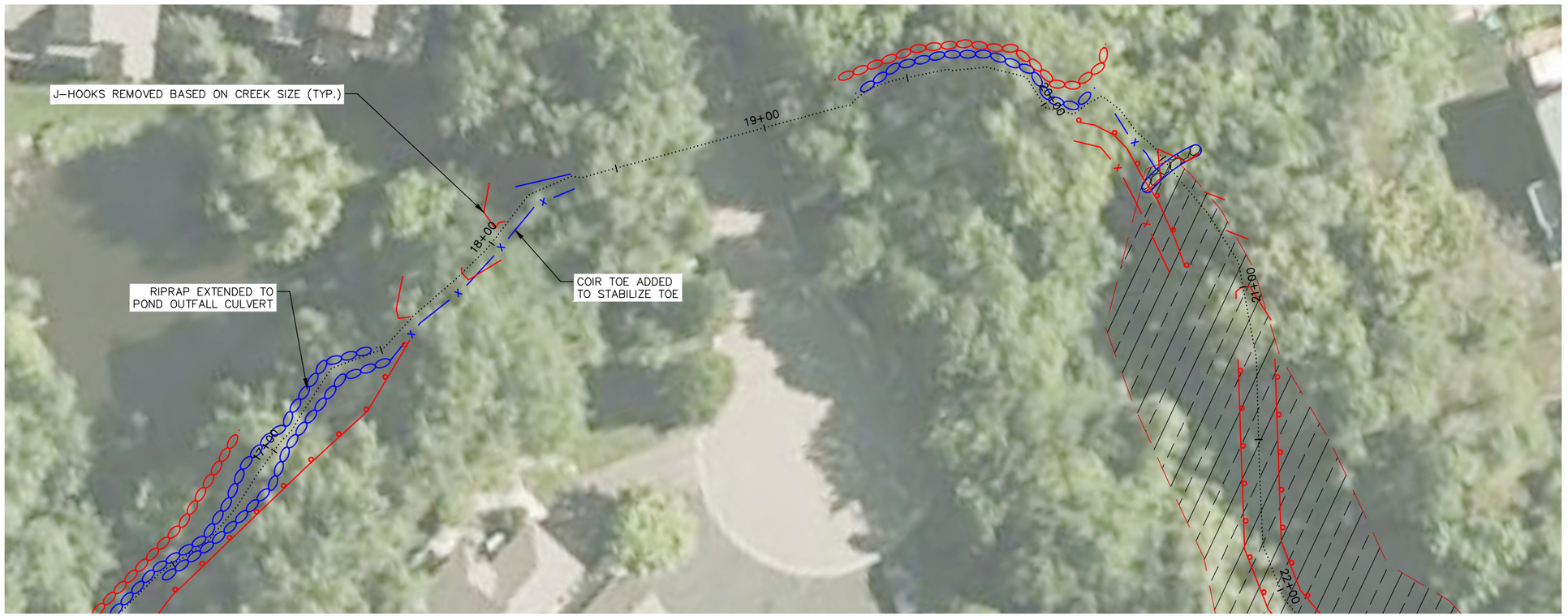
moore engineering, inc.

GENERAL
COMPARISON BETWEEN FEASIBILITY PROPOSED WORK
AND 60% DESIGN PROPOSED WORK
STATION 0+00 TO 11+50

DATE:	10/08/2025
REV DATE:	---
REV NUM:	---
RECORD:	---
PROJECT No.	30495
MANAGER:	JCM
DESIGNER:	QDS
DRAFTER:	DWA
REVIEWER:	DTE

FILE LOCATION: Q:\Projects\30000\30400\30495 StreamRestorationPlymouthICADIC3D\Presentation\30495_FeasibilityvsProp.dwg





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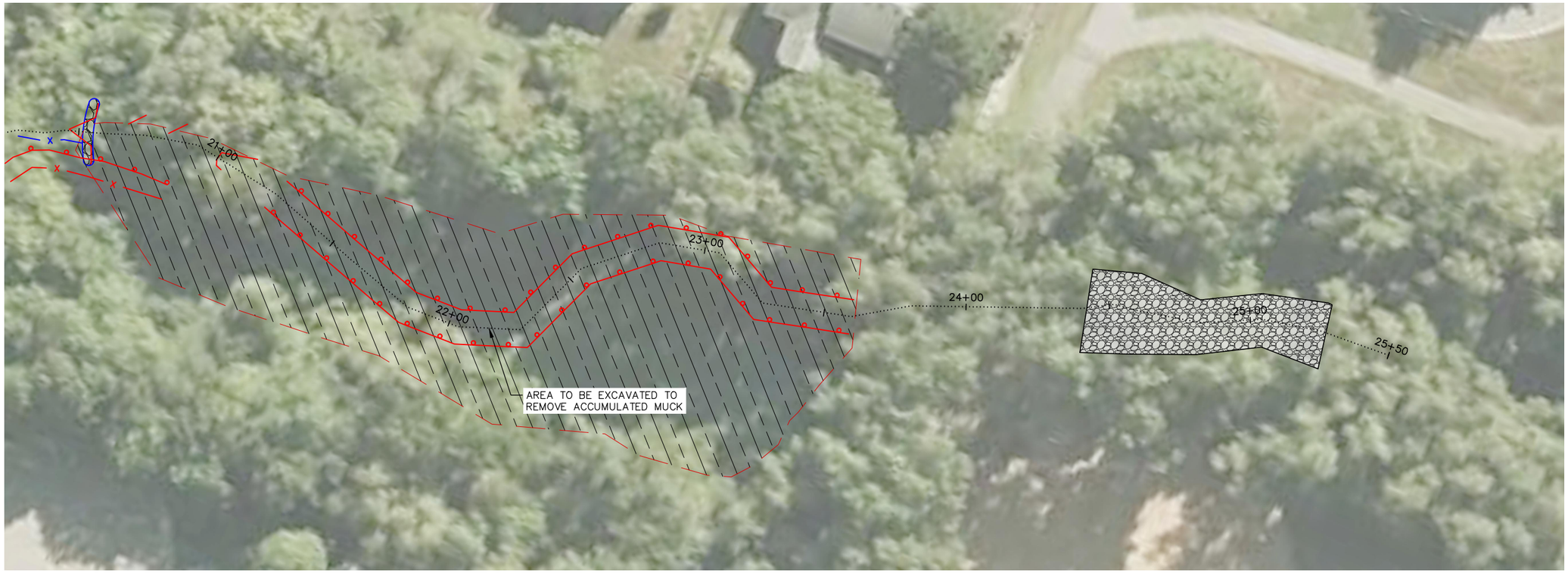
PRELIMINARY

moore engineering, inc.

GENERAL
COMPARISON BETWEEN FEASIBILITY PROPOSED WORK
AND 60% DESIGN PROPOSED WORK
STATION 11+50 TO 21+50

DATE:	10/08/2025
REV DATE:	---
REV NUM:	---
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MANAGER:	JCM
DESIGNER:	QDS
DRAFTER:	DWA
REVIEWER:	DTE

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PRELIMINARY

moore engineering, inc.

GENERAL
COMPARISON BETWEEN FEASIBILITY PROPOSED WORK AND 60% DESIGN PROPOSED WORK
STATION 21+50 TO 25+50

DATE:	10/08/2025
REV DATE:	----
REV NUM:	----
RECORD:	----
PROJECT No.	30495
MANAGER:	JCM
DESIGNER:	QDS
DRAFTER:	DWA
REVIEWER:	DTE