

# Memorandum

**To:** Bassett Creek Watershed Management Commission  
**From:** Barr Engineering Co. (Karen Chandler, P.E., and Jessica Olson, P.E.)  
**Subject:** Item 6B – Consider Approval of 90% Plans for 2025 Plymouth Creek Stream Restoration Project (CIP 2025 CR-P) – BCWMC December 18, 2025 Meeting Agenda  
**Date:** December 11, 2025  
**Project:** 23270051.65-6000-650

## 6B. Consider Approval of 90% 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:** 90% Plans Review

**Change in Impervious Surface:** N.A.

### **Recommendations:**

- 1) Conditional approval of 90% drawings
- 2) Authorize the BCWMC Engineer to provide administrative approval after final plans have been revised and comments have been sufficiently addressed

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 project (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. 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.

At their October 16, 2025 meeting, the BCWMC reviewed and conditionally approved the 60% design plans for this project. The City of Plymouth provided the 90% design plans and specifications to the BCWMC for review and to consider for approval.

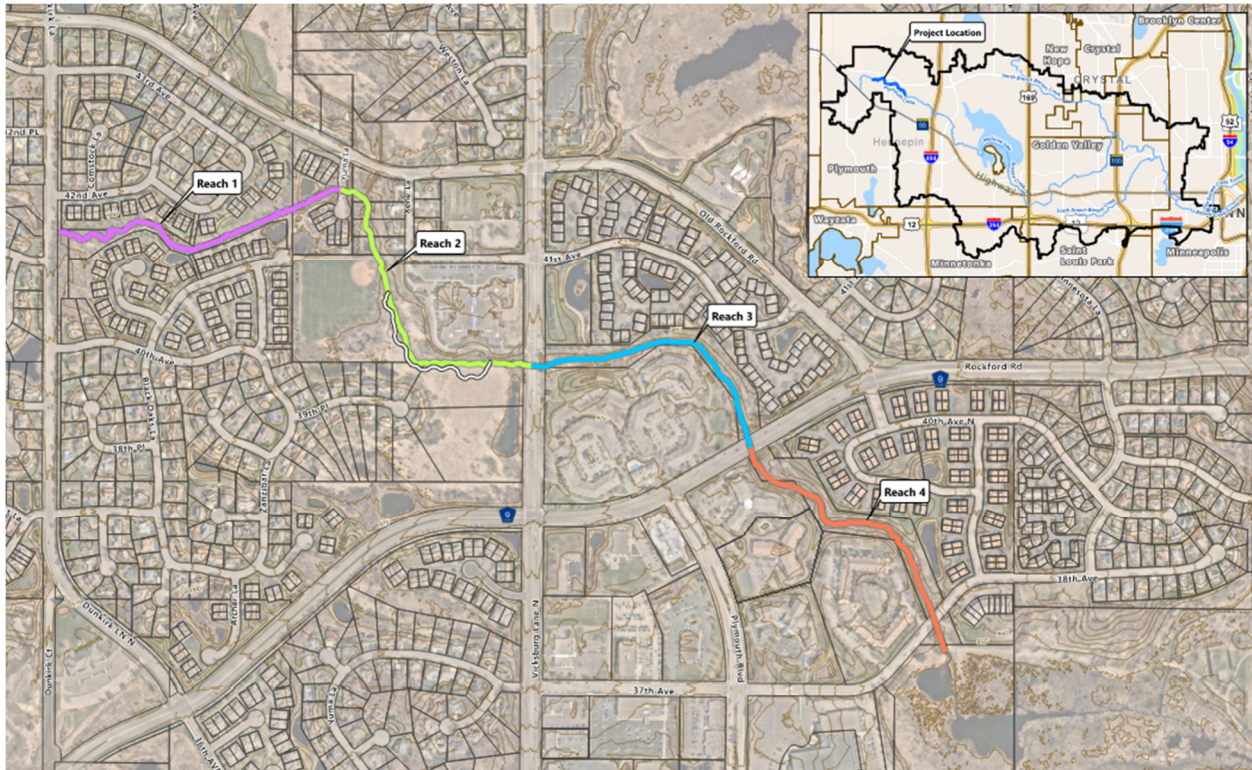
### **Feasibility Study Summary**

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 38<sup>th</sup> 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).

### 90% 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) includes the stream reach from Dunkirk Lane North to the trail crossing near 41<sup>st</sup> Avenue North, as shown in Figure 2 below. The second phase includes the remainder of the stream reach, from the trail crossing near 41<sup>st</sup> Avenue North to just south of 38<sup>th</sup> 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 90% plans follow many of the recommendations from the feasibility study, including the use of slope grading with seeding and blanketing, riprap toe protection, coir toe, and brush mattress. Notable differences between the design plans and the feasibility study were identified during the 60% review, which included the use of vegetated riprap instead of vegetated reinforced soil slope (VRSS), stream-width rock vanes instead of rock/ boulder j-hook vanes, and revising the design to include more robust practices (such as coir toe or riprap toe) to address erosion progression. The 90% design plans incorporate modifications since the 60% design plans that are noted below.

- Revising design from muck excavation to redefining the channel between Sta 20+60 to 23+80. Under current conditions the 320-foot reach from Sta 20+60 to 23+80 is a wide-open area with a shallow path for flow.
- Updating cross section details
- Adding erosion control details
- Adding stormwater pollution prevention plan (SWPPP) sheets
- Adding existing conditions sheets
- Adding stationing of bank restoration BMPs and showing the design profile on all proposed conditions sheets
- Revising drawings based on comments from BCWMC

The City’s consultant provided a list of trees that are proposed for removal during Phase 1 construction. 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% and 90% designs propose 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, like Green Ash, Box Elder, Buckthorn, and Siberian Elm). Of the 110 healthy trees noted for removal in the 90% plans, there are 17 desirable species. The table below compares the tree removals proposed in the feasibility study to those proposed in the 90% plans. There were no changes in tree removals from the 60% to 90% design.

<b>Tree Species <sup>1</sup></b>	<b>Feasibility Study Healthy</b>	<b>90% Plans Healthy</b>	<b>90% Plans Dying/Dead</b>	<b>90% Plans Removal Total</b>
<b>Ash/Green</b>	12	5	19	24
<b>Basswood/American</b>	2	3	0	3
<b>Box Elder</b>	49	42	18	60
<b>Buckthorn</b>	6	42	5	47
<b>Cottonwood</b>	10	2	0	2
<b>Elm/American</b>	10	6	4	10
<b>Elm/Siberian</b>	0	4	0	4
<b>Lombardy Poplar</b>	0	1	0	1

Tree Species <sup>1</sup>	Feasibility Study Healthy	90% Plans Healthy	90% Plans Dying/Dead	90% Plans Removal Total
Oak/Bur	4	1	0	1
Oak/Pin	2	0	0	0
Willow/Black	4	4	7	11
<b>Totals</b>	<b>99</b>	<b>110</b>	<b>53</b>	<b>163</b>

1. This table compares healthy trees slated for removal in the feasibility study with those slated for removal in the 90% 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 provided pollutant reduction analysis for the 90% design. The tool used for the pollutant reduction was a simplified version of the tool the BCWMC Engineer used for the feasibility study. Using the simplified pollutant reduction tool, the proposed restoration in Phase 1 is expected to reduce total phosphorus by 59 pounds per year and total suspended solids by 118,054 pounds per year. In the feasibility study, the restoration for the Phase 1 reach was expected to reduce total phosphorus by 67 pounds per year and total suspended solids by 133,860 pounds per year. The 90% design has extended the restoration length compared to the feasibility study. Therefore, if the BCWMC Engineer's tool were used to calculate pollutant reductions, we would expect the 90% design to reduce total phosphorus by at least as much as were calculated for the feasibility study for this reach: a minimum of 67 pounds per year and total suspended solids by a minimum of 133,860 pounds per year. The City's consultant will be updating pollutant reduction calculations prior to the December BCWMC meeting.

As part of the design process, the City's consultant hired a subconsultant, In Situ Archaeological Consulting, to complete a desktop archaeological assessment of the project area. In Situ Archaeological Consulting recommended a field assessment if work occurs outside of the channel/banks of the creek. Phase I work is entirely bank work except for the redefined channel area, which was previously excavated, so no field assessment is expected.

The project area is within the Plymouth Creek 100-year floodplain, so the project must result in no increase in flood level ("no rise") at any point along the trunk system, managed to a precision of 0.00 feet. The Minnesota Department of Natural Resources also requires any decreases in flood levels to be less than 0.1 feet within the flood zone where the project is located. To demonstrate the project meets the no rise and decrease under 0.1 feet requirements, the City's consultant developed two models: an existing conditions model and proposed conditions model. The existing conditions model was developed using Hennepin County LiDAR for elevation information outside of the stream banks, with survey data added within the stream banks. The 100-year flow rate data from the BCWMC XPSWMM model was used within the HEC-RAS model. The proposed condition model was developed by revising the existing conditions HEC-RAS model to include re-sloped banks, adjusted stream bottom widths, and updated bottom elevations. The table below demonstrates that the project meets the flood level requirements within the project area for the 90% design.

River Station	Total Flow	Channel Bottom Elevation		Channel Velocity		Water Surface Elevation		
		Existing	Proposed	Existing	Proposed	Existing	Proposed	Difference
2413	145	973.04	973.90	2.87	2.34	976.996	976.998	0.002
2331	145	973.00	973.10	2.62	2.40	976.866	976.869	0.003
2192	145	972.54	972.90	3.26	3.19	976.550	976.488	-0.062
2099	145	971.91	972.40	3.80	3.50	976.228	976.151	-0.077
1874	145	971.80	971.80	3.56	3.05	975.560	975.545	-0.015
1612	145	971.28	971.28	3.66	3.66	974.745	974.744	-0.001
1589	145	970.93	970.93	5.81	5.83	974.201	974.195	-0.006
1579	145	970.69	970.69	4.77	4.81	974.111	974.100	-0.011
1558	145	970.40	970.40	5.52	5.64	973.707	973.674	-0.033
1281	145	968.63	968.73	3.23	3.29	972.382	972.300	-0.082
1122	145	967.66	967.67	4.71	4.56	971.393	971.300	-0.093
1006	145	967.18	967.18	4.54	4.41	970.634	970.599	-0.035
950	145	967.27	967.27	5.11	5.51	970.122	970.026	-0.096
871	145	963.86	963.90	1.85	1.79	969.790	969.793	0.003
778	145	965.21	965.21	2.51	2.52	969.685	969.686	0.001
747	145	965.44	965.44	2.16	2.15	969.660	969.661	0.001
644	145	964.70	964.70	5.83	5.91	967.192	967.172	-0.020
603	145	962.15	962.15	1.39	1.24	967.404	967.402	-0.002
494	155	961.61	962.20	1.47	1.43	967.380	967.376	-0.004
368	155	959.41	962.20	0.71	0.92	967.385	967.378	-0.007
220	155	960.46	962.20	0.26	0.57	967.386	967.377	-0.009
192	206	961.51	962.18	0.56	0.83	967.383	967.374	-0.009
100	206	959.06	961.10	0.97	1.48	966.047	966.030	-0.017
69	206	958.74	960.52	1.49	1.53	966.020	966.020	0.000
27	206	958.61	958.61	1.31	1.31	966.020	966.020	0.000

The BCWMC floodplain requirements also state that projects must maintain no net loss in floodplain storage. The project will result in cut and fill in the floodplain. There is a total proposed cut of 561 cubic yards and a total proposed fill of 1108 cubic yards, resulting in a net proposed fill of 547 cubic yards. The City’s consultant noted that fill for the rock arch rapids and arch vanes is below the normal water level in the stream and not included in the floodplain cut/fill volume totals noted here.

A breakdown of the various project elements and associated earthwork is shown below:

- Graded banks: net cut/fill balance
- Coir toe, vegetated riprap: some net fill in eroded areas of stream
- Brush mattresses: net fill

The design surfaces with a net fill are reflected in the proposed condition HEC-RAS model, which demonstrates no rise in flood elevation. Given the project demonstrates a no rise in flood elevation and portions of the fill replace eroded material, the BCWMC Engineer does not believe a variance is needed for the fill in the floodplain.

The estimated construction cost for the 60% design of Phase 1 was \$524,000. The estimated construction cost for the 90% design of Phase 1 is \$766,150. The 90% construction cost (\$766,150) is approximately 60% of the estimated total construction cost from the feasibility study. The \$242,150 increase in costs from 60% to 90% design is primarily due to:

1. Trail reconstruction near the project area, including reconstruction of portions of the trail that are required for site access, as well as additional trail reconstruction not related to the stream restoration. Trail reconstruction work related to construction access is eligible for reimbursement from BCWMC CIP funds. All other trail reconstruction work will be covered by the City of Plymouth's Park Department. The trail reconstruction work accounts for approximately \$220,000 of the cost increase. The City's consultant will separate trail reconstruction costs required for the stream restoration project from other trail reconstruction costs in the 100% design.
2. The 90% design includes redefining the channel (from Sta 20+60 to 23+80), while the 60% design included dredging in this area. Under current conditions, the 320-foot reach is a wide-open area with a shallow path for flow. Defining the channel includes incorporating stream restoration measures (brush mattress and coir logs) and dredging a channel, which costs more than the muck excavation proposed in the 60% design. For the 320-foot reach, the feasibility study called for an in-stream structure and grading to improve channel definition. The BCWMC Engineer agrees with the 90% design change and believes this will provide a better end result than the feasibility concept.

The City hosted an open house on November 3, 2025 to give residents the opportunity to review proposed plans, provide feedback, and ask questions. The open house was attended by approximately 19 residents. Residents were interested in the project and had questions about the construction process and the proposed methods of stabilization. Discussions were generally positive. The topics discussed at the meeting included construction process and specific stream restoration methods.

## Previous Reviews

The City of Plymouth submitted the 60% design plans for this project, and the BCWMC conditionally approved the 60% plans at its October 16, 2025 meeting. The BCWMC Engineer's October 21, 2025 letter documented the BCMWC's conditional approval of the 60% plans and requested additional information for the 90% design submittal. Following the conditional approval of the 60% design plans, the City's consultant revised and submitted the 90% design drawings along with responses to the comments from the BCWMC's review of the 60% design plans. The 90% design drawings and associated submittals sufficiently addressed the majority of the BCWMC Engineer's comments on the 60% design plans. The 90% plans did not reduce the quantity of vegetated riprap, as was requested in the BCWMC Engineer's 60% design comments. The City proposes to replace 171 linear feet of vegetated riprap currently shown in the 90% plans with a softer bioengineering approach of a riprap toe with brush mattresses above the riprap toe. The BCWMC Engineer's October 21, 2025 comments are noted below, followed by the City's consultant's (Moore Engineering) responses dated December 3, 2025 in *italics*, and the BCWMC Engineer's comments regarding the City's consultant's responses, with remaining comments to be addressed underlined.

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.

### **Moore Engineering Response:**

- a. *Noted, floodplain elevations have been added to the plans in 90%.*

**BCWMC Engineer comment:** Floodplain elevations have been added to the plans. Due to the demonstrated no-rise in flood elevation, the City's consultant did not submit cut/fill calculations. The design memo must be revised to include documentation on cut/fill for the proposed conditions.

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.

**Moore Engineering Response:**

- b. Effective Existing model and proposed model are included in this submittal.*

**BCWMC Engineer comment:** The BCWMC Engineer reviewed the effective existing model and the proposed model. The models should be revised based on comments from the BCWMC Engineer dated 12/4/2025.

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.

**Moore Engineering Response:**

- a. Cultural report included in this submittal, completed by In Situ Archaeological Consulting.*

**BCWMC Engineer comment:** Comment addressed.

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

**Moore Engineering Response:**

- a. Wetlands were in the 60% plans, hatching increased and labels were added to make them more obvious.*

**BCWMC Engineer comment:** Comment addressed.

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

**Moore Engineering Response:**

- a. Hatch added to removal sheets calling for invasive removal.*

**BCWMC Engineer comment:** Comment addressed.

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.

**Moore Engineering Response:**

- a. *The reference of hard armoring in the report was for when vegetated riprap would be used instead of just bank grading. Vegetated riprap is still considered a bioengineering practice. The no-rise model did not show any areas of the stream exceeding eight feet per second so no true hard armoring is proposed for the banks.*

**BCWMC Engineer comment:** Based on the 12/8/2025 our meeting with the City and the City's consultant, the City's consultant will incorporate additional areas for a softer bioengineering approach of riprap toe with brush mattresses above the riprap toe.

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.

**Moore Engineering Response:**

- a. *Moore used survey data along with the Bassett Creek Watershed XPSWMM model, and StreamStats to determine bankfull depth, depth/width ratios, and bankfull widths. Bankfull depth was determined to be two feet based on the watershed model and StreamStats. Surveyed top of banks were consistently six to seven feet away from the stream centerline so a bankfull width of 13 was used. This width was also inline with results from StreamStats. Assuming an average side slope of two and a half to one side slopes the bottom width was set to three feet. Two and a half side slopes assume two to one vegetated riprap slopes and three to one graded bank slopes. The StreamStats report is attached.*

**BCWMC Engineer comment:** We agree with the approach, but this information needs to be documented in the design memo to record the basis for these critical design parameters.

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.

**Moore Engineering Response:**

- a. *Stationing added in the plans for all bank BMPs. A proposed grade line has been added to the profile views. No channel inverts are being changed at the time of construction outside of the rock arch rapids areas. The proposed grade line was added to highlight the grades between grade control structures (culvert inverts and arch vanes).*

**BCWMC Engineer comment:** The additional clarification in the plans is helpful. Station 20+61 starting on Sheet C-404 shows Coir Toe with Brush Mattress in the profile while the plan view only shows this as Coir Toe. Please clarify this in the plans.

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

**Moore Engineering Response:**

- a. *Based on the no -rise model, the 100 -yr velocities do not top six feet per second which is within the permissible velocity range for Class II riprap (6 -in. d50) of five to ten based on Table 2 of "Stability Thresholds for Stream Restoration Materials", see attached. City*

*requires Class IV riprap downstream of culverts larger than 42”, vanes on the rock arch rapids were sized based on this. Other arch vanes use Class IV for consistency and as a factor of safety. Shear stress within the stream based on the no -rise model is never more than 1.5 pounds per square foot which is much less than the permissible shear stress for Class IV (12 -in. d50) of 5.1.*

**BCWMC Engineer comment:** We agree with the approach, but this information needs to be documented in the design memo to record the basis for the riprap sizing.

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

**Moore Engineering Response:**

- a. *Pollutant reduction estimates section added to design memo.*

**BCWMC Engineer comment:** Comment addressed, with updated information to be provided for the December BCWMC meeting.

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

**Moore Engineering Response:**

Agency	Permit	Status
USACE - MVP-2023-	Section 404 Permit	Applied for
MNDNR	Public Waters Permit	Applied for
City of Plymouth	Wetland Conservation Act (WCA) Approval	Applied for
MPCA	National Pollution Discharge Elimination System Construction Stormwater Permit	Pending submittal
	401 Water Quality Certification	Applied for
Bassett Creek Watershed Commission	Floodplain Review	Applied for

**BCWMC Engineer comment:** Comment addressed.

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.

**Moore Engineering Response:**

- a. *General intent is for “visible” riprap to be fieldstone. Vegetated riprap is called out as angular to add additional interlocking strength.*

**BCWMC Engineer comment:** Thank you for updating the rock arch rapids to fieldstone. We recognize that angular riprap is better than fieldstone in terms of providing better interlocking function. While we understand that the angular riprap is meant to be buried beneath vegetation, there is concern that it may be exposed over time. Please document the need for angular riprap

instead of fieldstone in the design memo (i.e. design guidance related to permissible velocities or shear stresses for angular vs. rounded stone).

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.

**Moore Engineering Response:**

- a. *Vegetated riprap slopes have been updated to 2:1.*

**BCWMC Engineer comment:** Comment addressed.

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.

**Moore Engineering Response:**

- a. *Vegetated riprap will be covered with coir roll that is staked and keyed into the banks similar to what would be proposed by VRSS. Based on the no-rise model, the 100-yr velocities do not top six feet per second which is less than the permissible velocity of eight based on Table 2 of "Stability Thresholds for Stream Restoration Materials", see attached. Vegetated riprap will also be seeded with long-rooted native grasses that have a permissible velocity of four to six which once established would be sufficient to protect the banks after the coir roll degrades.*

**BCWMC Engineer comment:** Comment addressed.

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.

**Moore Engineering Response:**

- a. *Detail has been updated.*

**BCWMC Engineer comment:** Comment addressed.

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?

**Moore Engineering Response:**

- a. *Outlet near STA 9+50 already hard armored and stable. Outlet near STA 15+00 will have riprap added and regraded to enter the stream at a stable slope. Outlet near STA 17+10*

*will have vegetated riprap added to protect the toe, some existing riprap at the outlet will be reset to match typical storm outlet details for riprap at FESs.*

**BCWMC Engineer comment:** Comment addressed.

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 riprap 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.

**Moore Engineering Response:**

- a. *The creek and banks are extremely close to the trail in this area (within 3 feet). Vegetation riprap was added here as extra protection for the trail to avoid undercutting.*

**BCWMC Engineer comment:** Comment addressed.

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.

**Moore Engineering Response:**

- a. *In the field visit, the area near 17+00 showed significant erosion whereas the area near 18+20 was mostly stable other than some bank cutting on the south bank which led to the decision to use coir log verse vegetated riprap.*

**BCWMC Engineer comment:** Comment addressed.

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.

**Moore Engineering Response:**

- a. *Rechannelizing this portion of the stream has been added to the plans. Due to no -rise restrictions, the channel was designed to be wider and shallower in this section.*

**BCWMC Engineer comment:** Comment addressed.

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.

**Moore Engineering Response:**

- a. *Note added to the plans to add arch vanes to that channel. Vane placement will be reviewed in the field.*

**BCWMC Engineer comment:** Comment addressed.

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.

**Moore Engineering Response:**

- a. *Seeding notes on details have been updated.*

**BCWMC Engineer comment:** In the 90% plans, the graded banks detail and vegetated riprap toe detail call for "early successional floodplain mix." If the "early successional floodplain mix" seed refers to BWSR mix 34-16, we would recommend revising the seed mix to a woodland mix in areas that are fully wooded. The early successional floodplain mix can be used in areas that are not fully wooded.

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.

**Moore Engineering Response:**

- a. *A SWPPP has been added to the plans.*

**BCWMC Engineer comment:** Comment addressed.

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

**Moore Engineering Response:**

- a. *Additional "C - 100" sheets have been added to more clearly show both existing conditions and erosion control practices.*

**BCWMC Engineer comment:** Comment addressed.

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.

**Moore Engineering Response:**

- a. *See response to comment 12.*

**BCWMC Engineer comment:** Comment addressed.

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

**Moore Engineering Response:**

- a. *Yes, red trees are meant to be removed. Symbol added to the plan legend for clarity.*

**BCWMC Engineer comment:** Comment addressed.

To: Bassett Creek Watershed Management Commission  
From: Barr Engineering Co. (Karen Chandler, P.E., and Jessica Olson, P.E.)  
Subject: Item 6B – Consider Approval of 90% Plans for 2025 Plymouth Creek Stream Restoration Project (CIP 2025 CR-P) – BCWMC December 18, 2025 Meeting Agenda  
Date: December 11, 2025  
Page: 14

---

25. Revised (90%) plans and specifications must be submitted to the BCWMC engineer for review and BCWMC approval at a future Commission meeting.

**Moore Engineering Response:**

- a. *Revised plans and specifications are included in this submittal.*

**BCWMC Engineer comment:** Comment addressed.

**New comments based on the 90% review:**

1. Please clarify the reason for the additional riprap in the right overbank upstream and downstream of Sta. 17+00? Consider replacing this section of riprap in the ROB with graded banks/coir blanket and seeding and/or coir toe. If riprap is needed for the outfall, the riprap should only be included in areas with high energy from the outfall.
2. To ensure plant establishment within the vegetated riprap, the riprap voids should be soil filled. The plans and the specifications do not provide a requirement that the riprap is filled with soil. The concern is the surface soil will have limited stability given its thin layer over the riprap and could result in riprap exposure without any vegetation establishment.
3. Sheet C-104 right side is partially cut off.

**Recommendations**

- A) Conditional approval of 90% drawings and specifications, based on the following comments:
  - 1) The final plans and specifications must be submitted to the BCWMC Engineer for review and approval after modifications underlined in the engineer's comments above have been completed and the new comments above have been addressed.
- B) Authorize BCWMC Engineer to provide administrative approval after final plans have been revised and comments have been sufficiently addressed.