



Memorandum

To: Bassett Creek Watershed Management Commission
From: Barr Engineering Co.
Subject: Item 5B – Consider Approval of 90% Design Plans for 2021 Mt. Olivet Stream Restoration & Parkers Lake Drainage Improvement Projects, Plymouth (CIP 2021 ML-20 and PL-7) -- BCWMC August 19, 2021 Meeting Agenda
Date: August 11, 2021
Project: 23270051.52-2021-644&645

5B Consider Approval of 90% Design Plans for 2021 Mt. Olivet Stream Restoration & Parkers Lake Drainage Improvement Projects, Plymouth (CIP 2021 ML-20 and PL-7)

Summary:

Proposed Work: 2021 Mt. Olivet Stream Restoration & Parkers Lake Drainage Improvement Projects, Plymouth (CIP 2021 ML-20 and PL-7)

Basis for Commission Review: 90% Design Plans Review

Change in Impervious Surface: N.A.

Recommendations:

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

At their September 2020 meeting, the BCWMC entered into an agreement with the City of Plymouth to design and construct these BCWMC CIP projects. The 2021 Mount Olivet Stream Restoration & Parkers Lake Drainage Improvement Projects (CIP 2021 ML-20 and PL-7) are being funded by the BCWMC's ad valorem levy (via Hennepin County). The City of Plymouth provided the combined 90% design plans for both projects to the BCWMC for review and comment, per the agreement with the City.

Feasibility Study Summary

The BCWMC completed the Feasibility Report for Mount Olivet Stream Stabilization and Parkers Lake Drainage Improvement Projects (Barr, June 2020) to examine the feasibility of restoring sites within these two separate project areas in the City of Plymouth. The Mount Olivet Stream Stabilization project area is located along an unnamed stream adjacent to Mount Olivet Lutheran Church and Clifton E. French Regional Park of the Three Rivers Park District (Figure 1). The Parkers Lake Drainage Improvement project area is located on an unnamed stream within Parkers Lake Community Playfields, upstream of Parkers Lake (Figure 2). At both sites, the feasibility report identified multiple locations where bank erosion, bank failure, and infrastructure repairs were needed, in addition to removal of debris and fallen trees.

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The feasibility report also included evaluation of potential projects that would improve the water quality of stormwater leaving the Parkers Lake Community Playfield site by reducing total phosphorus and total suspended solids (Alternatives 5a/5b) and chloride loading into Parkers Lake (Alternative 6).

The feasibility report identified 2 to 3 design options and a final recommendation for each project site. For most of the individual restoration sites, the feasibility report included two alternative designs: 1) a bioengineering (or soft armoring) approach using techniques that rely primarily on vegetation; 2) a more structural (or hard armoring) approach using rock and other non-vegetative materials. Some of the individual restoration sites included additional alternatives that did not focus on preserving the existing alignment or channel configuration, such as re-meandering the channel or conveying flow through a pipe rather than the stream channel. At their May 21, 2020 meeting, the Commission approved the following:

- Mount Olivet Stream Stabilization project: implementing Alternative 1—stream stabilization using bio-engineering techniques, wetland restoration, and installation of a manhole drop structure at the Mount Olivet Church parking lot
- Parkers Lake Drainage Improvement project:
 - For stream stabilization portion of the project, implementing Alternative 3—stream stabilization using bio-engineering techniques (this is the project included in the 90% design plans under current review)
 - For water quality improvement portion of the project, implementing Alternative 6—chloride reduction demonstration project for the northern tributary watershed (this is a separate project not included in the 90% design plans under current review)

The feasibility study also estimated that project implementation would reduce the total phosphorus load from the two sites combined by 25.4 pounds per year (5.3 pounds TP per year from the Mount Olivet site and 20.1 pounds TP per year at the Parkers Lake site) and the total suspended sediment load by 50,700 pounds per year (10,560 pounds per year TSS from the Mount Olivet site and 40,140 pounds TSS per year at the Parkers Lake site).

90% Design Plans

The 90% design plans follow many of the recommendations from the feasibility study and include the use of slope grading with bioengineering, stabilization of stormwater outlets, debris clearing, and vegetation management. Notable differences between the 90% design plans and the feasibility study recommendations for the selected alternatives were addressed in a May 19, 2021 submittal memorandum from the design engineers (WSB). The differences between the design plans and the feasibility study were noted during the 60% review and have not changed. Based on the 90% design plans, the Commission Engineer does not consider any of the changes to represent a significant departure from the intent of the project as evaluated in the feasibility study.

The 90% design plans show the removal of approximately 57 trees for the two sites combined (23 trees for the Mt. Olivet site and 34 trees for the Parkers Lake site), which is unchanged from the 60% design plans and is similar to the total estimated tree removal numbers in the feasibility study. No tree plantings

have been proposed based on the City of Plymouth's desire to open up the tree canopy in these areas and remove undesirable species and falling/diseased trees.

Previous Reviews

The City of Plymouth submitted the 60% design plans for this project, and the BCWMC conditionally approved the 60% plans at its June 17, 2021 meeting. Following the conditional approval of the 60% design plans, the City of Plymouth revised and submitted the 90% design drawings with the inclusion of the comments from the BCWMC's review of the 60% design plans. The 90% design drawings and associated submittals sufficiently addressed and provided responses to the BCWMC Engineer's comments on the 60% design plans. The Commission Engineer's June 21, 2021 60% design comment letter requested the following additional information. The Commission Engineer's June 21, 2021 comments are noted below, followed by the City's consultant's (WSB) responses dated June 25, 2021 in *italics*:

A) Comments that apply to both the Mount Olivet Streambank Restoration and Parkers Lake Drainage Improvements projects:

- 1) The two-dimensional modeling results submitted with the 60% drawings show areas of high velocity during the 100-year flood event, with velocities reaching 6.1 ft/s at the Mount Olivet site and 9.0 ft/s at the Parkers Lake site. Many of the highest-velocity areas are proposed for stabilization with fieldstone riprap armoring on the channel banks and as a component of rock ditch checks. We understand from communication with the design engineer that MNDOT Class III fieldstone riprap is proposed for these applications. Please confirm the proposed riprap gradation and provide additional detail to document that the proposed materials are adequately sized to meet the design stability criteria based on the hydraulic modeling results.

WSB Response: *Class III fieldstone riprap is proposed for the hard armoring as shown in the detail on page 14. The hydraulic modeling indicates velocities between 6-9 fps on the high end. Per the MnDOT Drainage Manual, Class II riprap can be used for areas with velocities of 6-8 fps, while Class III riprap should be used for areas with velocities of 8-10 fps. For construction supply purposes and to provide a factor of safety, Class III riprap is proposed for the entire project area.*

Commission Engineer comment: Comment addressed.

- 2) The plans do not provide a design typical cross section or detail for riprap bank stabilization applications. Please include a design riprap section on the design drawings, including proposed riprap sizes, thickness, filter, and side slopes.

WSB response: *See detail added to Sheet 14.*

Commission Engineer comment: Comment addressed.

- 3) The plans call for the use of geotextile fabric beneath ditch checks and in plunge pools; however, for in-stream applications, geotextile fabric can allow for the development of preferential flow paths beneath the fabric. Please revise the design to use a granular filter in place of the proposed geotextile fabric. This comment does not apply at flared end sections, where the use of the City-standard detail and geotextile fabric is appropriate.

WSB response: Granular filter has replaced geotextile fabric beneath the ditch checks (see details on Sheet 13) and rock plunge pools (see notes on Sheet 12).

Commission Engineer comment: Comment addressed.

- 4) The plans include trees anchored to the side slope to provide protection against toe erosion, with the trees anchored by duckbill cable anchors. Please provide additional detail on the proposed cable anchors, including the number of anchors required per log to counteract buoyancy forces.

WSB response: Model 68 duckbill earth anchors are proposed every 3 feet along the tree's length, as indicated in the detail on Sheet 13. Model 68 anchors go 30" into the ground and have a capacity of 1100 lbs per anchor. This greatly exceeds the buoyant force for a 12-18" diameter tree (approx. 1600 lbs total).

Commission Engineer comment: Comment addressed. Concur that the proposed anchors are sufficient at the spacing proposed, which will result in multiple anchors per individual tree.

- 5) The plans call for rock and rock-log ditch checks at multiple locations, with a typical height of 30 inches above the existing channel bed. Please consider whether the ditch checks have the potential for downstream scour hole development and whether scour protection through material embedment in the channel bottom, flattening of the downstream slope of the ditch check, or a decrease in ditch check height is required.

WSB response: The rock and rock-log ditch check details have been modified to a typical height of 18 inches to better reflect actual field conditions and prevent downstream scour.

Commission Engineer comment: Comment addressed.

- 6) The plans do not provide a design cross section or allowable slope limits for areas with grading only ("blend side slope into the ditch bottom"). Please include a design typical section on the design drawings, including proposed maximum slope and stabilization extents (erosion control blanket or other stabilization).

WSB response: The extents of the stabilization will follow the plans and be confirmed in the field by the engineer. The maximum allowable slope is 3:1 as shown in the detail on page 14.

Commission Engineer comment: Comment addressed.

- 7) The plans include the use of bioroll (sediment control log) at the toe of graded areas and downstream floating silt curtain for erosion and sedimentation control. We understand from communication with the design engineer that bioroll is also proposed at the downstream locations to provide sedimentation control during very low-flow conditions. Please include the proposed bioroll/silt curtain combination on the drawings.

WSB response: See the updated legend on all proposed conditions plan sheets, indicating that bioroll will be installed with floating silt curtain.

Commission Engineer comment: Comment addressed.

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- 8) The plans do not show any construction staging areas within the construction limits or on adjacent areas. Please identify construction staging areas that will be required and provide appropriate erosion and sedimentation control measures on the plans.

WSB response: *Construction staging areas surrounded by bioroll have been added to Sheets 10, 11, and 12.*

Commission Engineer comment: Comment addressed.

- 9) Please include on the plans instructions for the contractor to limit tree clearing as much as possible and only at the direction of the Engineer. We understand from communication with the City that additional tree plantings are not proposed at this time, as discussed above.

WSB response: *See Note 1 on the Proposed Site Plan & Profile sheets.*

Commission Engineer comment: Comment addressed.

- 10) Please include on the plans the elevations and upstream/downstream stationing for all proposed toe stabilization measures.

WSB response: *See the tables added to the stabilization details on Sheets 13 and 14. Exact limits of stabilization will be verified by the engineer in the field.*

Commission Engineer comment: Comment addressed.

- 11) The proposed seed mixes in the wetland restoration area are BWSR mix 34-271 (wet meadow south and west) and BWSR mix 34-181 (emergent wetland). Stream bank bioengineering areas call for "seeding special" with a seed mix referenced in the specifications (not provided with the 60% drawings). Please provide the custom seed mix proposed for use on the stream bank areas for Commission review.

WSB response: *The Minnesota Native Landscapes Minnesota Woodland Mix (or approved equal) is proposed.*

Commission Engineer comment: Comment addressed.

B) Comments that apply only to the Mount Olivet Streambank Restoration site:

- 1) The plans do not specify any outlet protection or stilling basin at the proposed storm sewer outlet from the Mount Olivet parking lot at station 4+10. We understand from communication with the City that a City-standard outlet protection detail is proposed; please include the standard detail on the plans.

WSB response: *See note on Sheet 8 and City standard detail on Sheet 14.*

Commission Engineer comment: Comment addressed.

- 2) The plans call for widening of the stream channel to eight feet wide from station 7+00 to 9+00; however, a design cross section or proposed channel side slopes are not provided. Please specify a design cross section or side slopes and indicate the extent of the disturbance on the plans.

WSB response: *See the stream typical section added to Sheet 9. The area of disturbance will be limited to that area within the construction limits.*

Commission Engineer comment: Comment addressed.

- 3) The plans do not show any downstream erosion control measures at the proposed wetland restoration and access route at the Mount Olivet site (downstream and to the south of the proposed construction areas). Please provide downstream erosion control, such as silt fence or bioroll along the access and at the wetland restoration location.

WSB response: *A double layer of silt fence has been added to the downstream edge of the wetland restoration area as shown on Sheet 10. Construction of the project is planned for winter when the ground will be frozen. No erosion control measures are proposed along the access path above and beyond the rock construction entrance. Silt fence will be added to this area during construction if it is necessary.*

Commission Engineer comment: Comment addressed.

- C) Comments that apply only to the Parkers Lake Drainage Improvements site:

- 1) The plans call for grading of the stream channel bottom from station 13+00 to 14+80; however, only a portion of this length has accompanying bank stabilization measures shown. We understand from communication with the design engineer that the remaining length is proposed for sediment removal and reshaping of the bottom of the channel only and will not require additional bank grading. Please provide clarification regarding the proposed grading in the drawings, including a design slope and direction to the contractor to limit bank disturbance in this area.

WSB response: *See updated note on Sheet 11.*

Commission Engineer comment: Comment addressed.

- D) In addition to the above comments, the BCWMC requested the inclusion of the following additional information as part of the 90% plan submittal (WSB responses are dated June 25 and 29, 2021):

- 1) Regarding the HEC-RAS 2D model, provide additional model documentation including the following:
 - a) Boundary conditions and inflow hydrographs, including any 1D/2D model interaction
 - b) Existing and post-project Manning's roughness values for channel and overbanks
 - c) 2D model cell sizes and justification for the selected size

- d) A review of areas with high velocity adjacent to the model boundary to determine whether the boundary should be extended or cell sizes reduced
- e) Discussion of areas where model results do not match observed erosion patterns

WSB response: HEC-RAS 2D was used to determine areas of potential erosion based on the existing condition of the two stream stabilization locations. There are no 1D/2D interactions, the model is full 2D computation. The Parkers Lake part of the project is split up into two separate 2D simulations (upstream and downstream). The following steps outline the modeling process:

1. Existing survey data was merged with LiDAR data to create an existing condition terrain Data Elevation Model (DEM). This DEM was imported into HECRAS to create a terrain data file.

2. This HEC RAS 2D Model only simulates existing conditions. Manning's n values were determined based on existing site conditions, based on guidance from Table 2-1 of the HECRAS 6.0 2D Modeling Users Manual. A Manning's n land cover layer was created in HEC-RAS to provide spatially varied manning's n values across the modeled area.

Main channel = 0.05
Overbanks = 0.1
Outside channel area = 0.15

3. A 2D perimeter was created and computation points were generated within the perimeter based on an average 2D cell size. Refinement Regions were used to create smaller 2D cell sizes within areas of interest, such as steep slopes within the main channel of the stream and areas of high velocity. After an iterative process of decreasing cell sizes in areas of high velocities/steep slopes using refinement regions, adjusting the time step for the computation, and analyzing the courant number, we determined the following to be acceptable for each location:

Mt. Olivet: Computation interval time step – 2 second, refinement region cell size = 5'x5', perimeter cell size = 10'x10'
Parkers Lake (upstream): Computation interval time step – 1 second, refinement region cell size = 2'x2', perimeter cell size = 10'x10'
Parkers Lake (downstream): Computation interval time step – 1 second, refinement region cell size = 5'x5', perimeter cell size = 10'x10'

4. Inflow boundary conditions were set as a constant inflow hydrograph for the 100-year storm event from the feasibility report and from computed full pipe flow. To simulate the peak flow through the unsteady state scenario which is required for 2D, we use a constant peak flow over a 48 hour time period.

Mt. Olivet: upstream peak inflow = 45.1 cfs
Parkers Lake (upstream): upstream peak inflow = 115 cfs
Parkers Lake (downstream): upstream peak inflow = 206 cfs

5. Downstream boundary conditions were set as Normal Depth type, which computes the water surface elevation in each 2D cell along the boundary condition line. The computed water surface elevation is used as the downstream boundary for each modeled area. A friction slope of 0.002 was

used for all downstream locations; a friction slope of 0.05 was used for the tunnel outflow from the Parkers Lake (downstream) model.

6. The computation settings for the unsteady state plan in HEC-RAS were refined to produce a stable unsteady state model with acceptable Courant number results.

Since it is a trunk conveyance, the design storm selected for the stabilization improvements was the 100-year event. The City has chosen to use stabilization in areas where both the model and site observations show the need for hard armoring. In areas where the field conditions do not reveal issues we are not proposing fixes to accommodate the Commission request to minimize hard armoring.

Commission Engineer comment: Comment addressed.

- 2) Show nearest mapped FEMA floodplain area(s) (SFHAs)

WSB response: *The construction limits of both Mt. Olivet and Parkers Lake project sites are outside of FEMA floodplain areas.*

Commission Engineer comment: Concur.

- 3) Provide the updated construction cost estimate

WSB response: *The updated estimate for the construction cost of the Mt. Olivet Streambank Restoration is \$154,120.00, with an additional \$14,938.00 for the optional culvert crossing. The updated estimate for the construction cost of the Parkers Lake Drainage Improvements is \$101,683.00.*

Commission Engineer comment: Comment addressed (the attached table from WSB shows the detailed cost estimate for the projects).

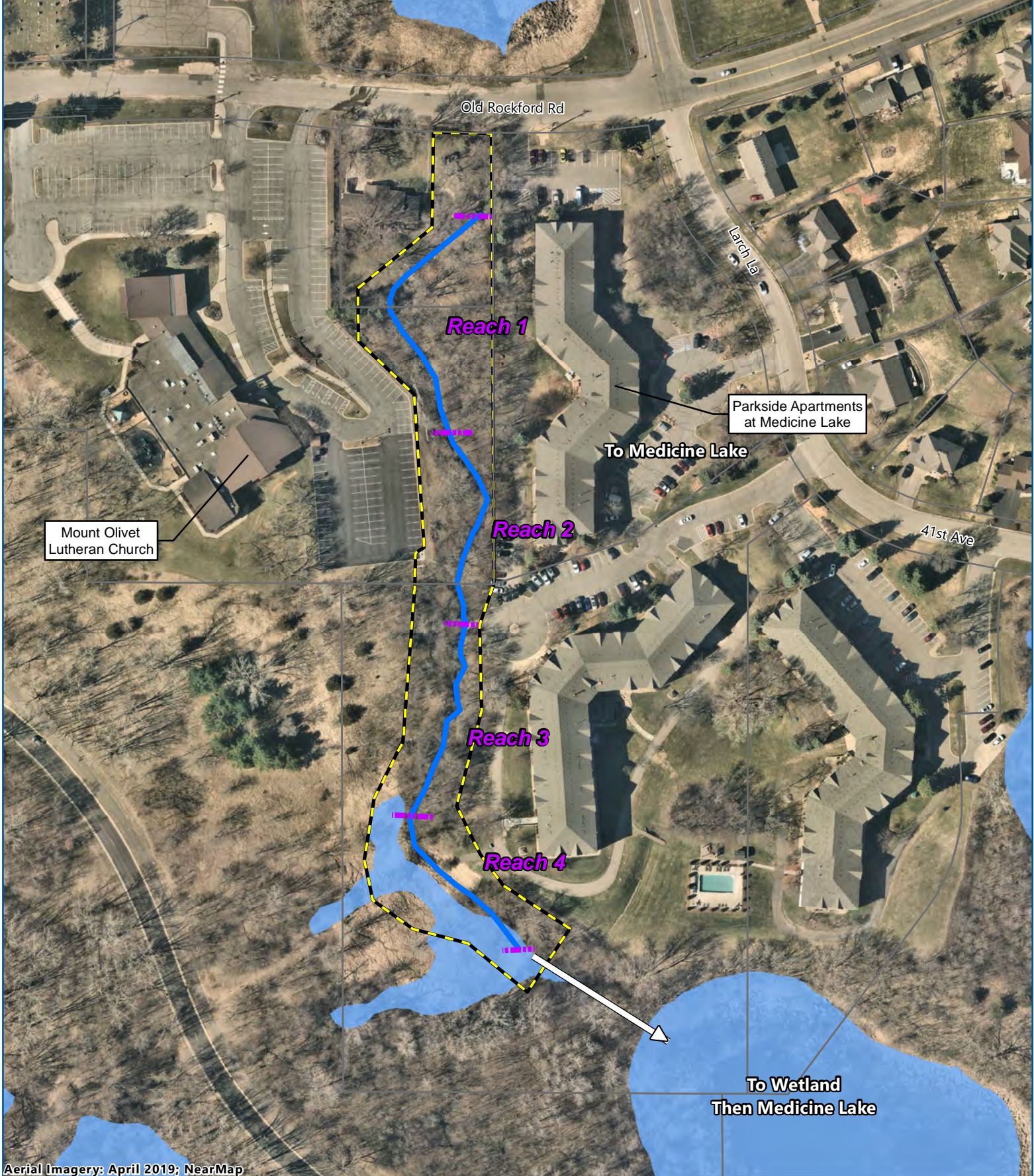
Recommendations

- A) Conditional approval of 90% drawings based on the following comments:
 - 1) Restoration/seeding requirements and appropriate erosion control shall be provided for access and staging areas.
 - 2) Notes must be included on the plans to address the following BCWMC erosion and sediment control requirements:
 - a) Require that soils tracked from the site be removed from all paved surfaces within 24 hours of discovery throughout the duration of construction.
 - b) Require that exposed soil areas be stabilized as soon as possible, but in no case later than 14 days after the construction activity has temporarily or permanently ceased or within 7 days if the project is within 1 mile of a special or impaired water.
 - c) Require a temporary vegetative cover consisting of a suitable, fast-growing, dense grass seed mix spread at a minimum at the MnDOT-specified rate per acre. If temporary cover is




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to remain in place beyond the present growing season, two-thirds of the seed mix shall be composed of perennial grasses.

- 3) The final plans must be submitted to the BCWMC Engineer for review and approval after modifications have been completed.
- B) Authorize BCWMC Engineer to provide administrative approval after final plans have been revised and comments have been sufficiently addressed.



Aerial Imagery: April 2019; NearMap

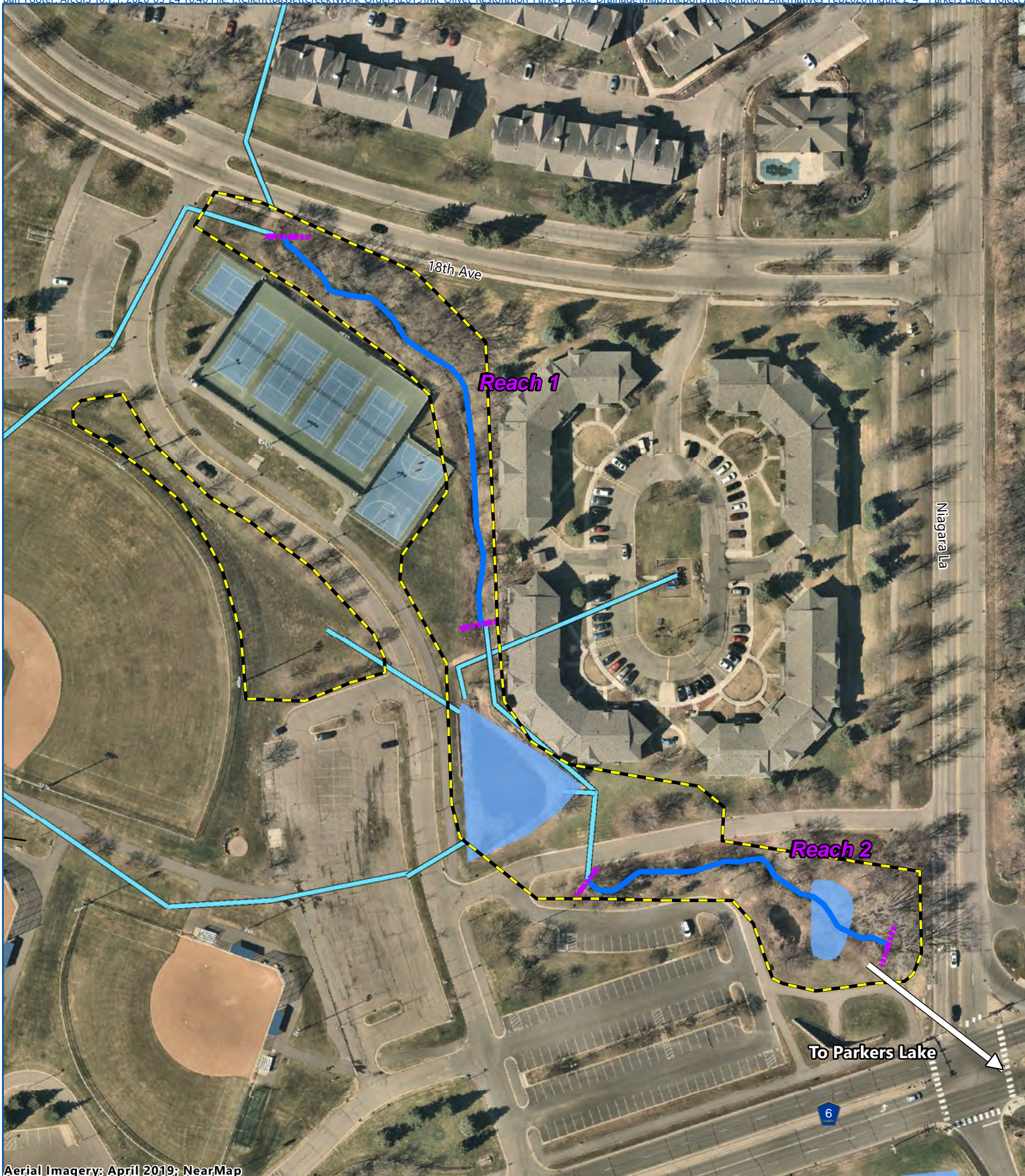
-  Stream Path
-  Reach Boundary
-  Project Area
-  Ponds and Wetlands
-  Parcels


0 150 300
Feet



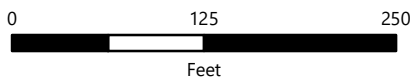
MT. OLIVET
PROJECT AREA
Mt. Olivet/Parkers Lake
Design Project Review

FIGURE 1



Aerial Imagery: April 2019; NearMap

- Stream Path
- Reach Boundary
- Project Area (Stream/BMPs)
- Ponds and Wetlands
- Storm Sewer



PARKERS LAKE
PROJECT AREA
Mt. Olivet/Parkers Lake
Design Project Review

FIGURE 2

Drainage Improvement Project						
WSB Project: Mt. Olivet Streambank Restoration and Parkers Lake Drainage Improvements				Design By: LGR		
Project Location: City of Plymouth				Checked By: JHN		
WSB Project No: 016857-000				Date: 6/25/2021		
Item No.	MNDOT Specification No.	Description	Unit	Estimated Total Quantity	Estimated Unit Price	Estimated Total Cost
Schedule A. Mt. Olivet Streambank Restoration						
	2021.501	MOBILIZATION	LUMP SUM	1	\$10,000.00	\$10,000.00
	2101.524	CLEARING	TREE	23	\$350.00	\$8,050.00
	2101.524	GRUBBING	TREE	23	\$250.00	\$5,750.00
	2104.502	REMOVE DRAINAGE STRUCTURE	EACH	1	\$800.00	\$800.00
	2104.503	REMOVE SEWER PIPE (STORM)	LIN FT	45	\$10.00	\$450.00
	2104.609	REMOVE DEBRIS	TON	15	\$75.00	\$1,125.00
	2105.504	GEOTEXTILE FABRIC TYPE 4	SQ YD	26	\$6.00	\$156.00
	2105.507	COMMON EXCAVATION (LV)	CU YD	1500	\$24.00	\$36,000.00
	2105.601	SITE GRADING	LUMP SUM	1	\$10,000.00	\$10,000.00
	2360.502	BITUMINOUS PAVEMENT PATCHING	SQ YD	50	\$75.00	\$3,750.00
	2501.502	18" RC PIPE APRON	EACH	1	\$1,500.00	\$1,500.00
	2503.503	18" RC PIPE SEWER	LIN FT	40	\$90.00	\$3,600.00
	2506.502	CASTING ASSEMBLY	EACH	1	\$1,100.00	\$1,100.00
	2506.503	CONST DRAINAGE STRUCTURE DES 48-4020	LIN FT	15	\$800.00	\$12,000.00
	2511.507	GRANULAR FILTER	CU YD	9	\$75.00	\$675.00
	2511.509	RIPRAP CLASS III (FIELDSTONE)	TON	51	\$90.00	\$4,590.00
	2531.503	CONCRETE CURB & GUTTER DESIGN B612	LIN FT	40	\$40.00	\$1,600.00
	2571.524	DECIDUOUS TREE 2.5" CAL B&B	EACH	5	\$850.00	\$4,250.00
	2573.503	FLOTATION SILT CURTAIN TYPE MOVING WATER	LIN FT	60	\$40.00	\$2,400.00
	2573.503	SEDIMENT CONTROL LOG TYPE WOOD FIBER	LIN FT	530	\$4.50	\$2,385.00
	2573.503	SILT FENCE, TYPE HI	LIN FT	275	\$5.00	\$1,375.00
	2573.602	ROCK DITCH CHECK	EACH	3	\$2,000.00	\$6,000.00
	2573.602	ROCK LOG DITCH CHECK	EACH	1	\$2,500.00	\$2,500.00
	2573.602	TEMPORARY ROCK CONSTRUCTION ENTRANCE	EACH	1	\$1,500.00	\$1,500.00
	2575.504	EROSION CONTROL BLANKETS CATEGORY 3N	SQ YD	410	\$3.00	\$1,230.00
	2575.508	SEED MX 25-131	POUND	29	\$8.00	\$232.00
	2575.508	SEED MX 34-181	POUND	2	\$300.00	\$600.00
	2575.508	SEED MX 34-271	POUND	5	\$100.00	\$500.00
	2575.603	ANCHORED SLOPE PROTECTION	LIN FT	71	\$60.00	\$4,260.00
	2575.505	SEEDING	ACRE	0.73	\$5,000.00	\$3,650.00
	2575.605	SEEDING SPECIAL	ACRE	0.09	\$10,000.00	\$900.00
	2577.502	LIVE STAKES, DOGWOOD	EACH	110	\$10.00	\$1,100.00
Schedule A Construction Total						\$134,028.00
Contingency Total (15%)						\$20,100.00
Schedule A Subtotal						\$154,128.00
Schedule B. Mt. Olivet Streambank Restoration - Optional Culvert Crossing						
	2105.601	SITE GRADING	LUMP SUM	1	\$2,000.00	\$2,000.00
	2501.502	28" SPAN GS PIPE-ARCH APRON	EACH	4	\$500.00	\$2,000.00
	2501.503	28" SPAN CS PIPE-ARCH CULVERT	LIN FT	60	\$95.00	\$5,700.00
	2105.504	GEOTEXTILE FABRIC TYPE 4	SQ YD	33	\$6.00	\$198.00
	2511.509	RIPRAP CLASS III (FIELDSTONE)	TON	31	\$90.00	\$2,790.00
	2575.607	LANDSCAPE ROCK	CU YD	2	\$150.00	\$300.00
Schedule B Construction Total						\$12,988.00
Contingency Total (15%)						\$1,950.00
Schedule B Subtotal						\$14,938.00
Schedule C. Parkers Lake Drainage Improvements						
	2021.501	MOBILIZATION	LUMP SUM	1	\$10,000.00	\$10,000.00
	2101.524	CLEARING	TREE	34	\$350.00	\$11,900.00
	2101.524	GRUBBING	TREE	35	\$250.00	\$8,750.00
	2104.609	REMOVE DEBRIS	TON	8	\$75.00	\$600.00
	2105.504	GEOTEXTILE FABRIC TYPE 4	SQ YD	51	\$6.00	\$306.00
	2105.507	COMMON EXCAVATION (LV)	CU YD	10	\$25.00	\$250.00
	2105.601	SITE GRADING	LUMP SUM	1	\$10,000.00	\$10,000.00
	2501.602	REPAIR TRASH RACK	EACH	1	\$300.00	\$300.00
	2511.507	GRANULAR FILTER	CU YD	19	\$75.00	\$1,425.00
	2511.509	RIPRAP CLASS III (FIELDSTONE)	TON	113	\$90.00	\$10,170.00
	2571.524	DECIDUOUS TREE 2.5" CAL B&B	EACH	5	\$850.00	\$4,250.00
	2573.503	FLOTATION SILT CURTAIN TYPE MOVING WATER	LIN FT	60	\$40.00	\$2,400.00
	2573.503	SEDIMENT CONTROL LOG TYPE WOOD FIBER	LIN FT	730	\$4.50	\$3,285.00
	2573.602	ROCK DITCH CHECK	EACH	4	\$2,000.00	\$8,000.00
	2573.602	ROCK LOG DITCH CHECK	EACH	1	\$2,500.00	\$2,500.00
	2573.602	TEMPORARY ROCK CONSTRUCTION ENTRANCE	EACH	2	\$1,500.00	\$3,000.00
	2575.504	EROSION CONTROL BLANKETS CATEGORY 3N	SQ YD	385	\$3.00	\$1,155.00
	2575.508	SEED MX 25-131	POUND	14	\$8.00	\$112.00
	2575.603	ANCHORED SLOPE PROTECTION	LIN FT	132	\$60.00	\$7,920.00
	2575.505	SEEDING	ACRE	0.06	\$5,000.00	\$300.00
	2575.605	SEEDING SPECIAL	ACRE	0.08	\$10,000.00	\$800.00
	2577.502	LIVE STAKES, DOGWOOD	EACH	100	\$10.00	\$1,000.00
Schedule C Construction Total						\$88,423.00
Contingency Total (15%)						\$13,260.00
Schedule C Subtotal						\$101,683.00