elm creek
Watershed Management Commission

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September 7, 2016

Representatives
Elm Creek Watershed Management Commission
Hennepin County, MN

The meeting packet for this meeting may be found on the Commission's website:
http://www.elmcreekwatershed.org/minutes--meeting-packets.html

Dear Representatives:

A regular meeting of the Elm Creek Watershed Management Commission will be held on **Wednesday, September 14, 2016, at 11:30 a.m.** in the Mayor's Conference Room at Maple Grove City Hall, 12800 Arbor Lakes Parkway, Maple Grove, MN.

The Commission will suspend its regular meeting at 11:30 a.m. for the purpose of conducting a public hearing on the following improvements**:**

Project 2016-01 Fox Creek Streambank Stabilization Project;
Project 2016-02 Mississippi River Shoreline Repair and Stabilization Project;
Project 2016-03 Elm Creek Dam at the Mill Pond Project;
Project 2016-04 Rush Creek Main Stem Restoration Project; and
Project 2016-05 Fish Lake Alum Treatment Project Phase 1.

The regular meeting will resume immediately after the public hearing concludes.

Please email Kerstin at kerstin@jass.biz to confirm whether you or your Alternate will be attending the meeting. Thank you.

Regards,

Judie A. Anderson
Administrator
JAA:tim

Encls: Meeting Packet

cc: Alternates
Joel Jamnik
TRPD
Diane Spector
HCES
Third Gen TAC
TMDL TAC
BWSR
Met Council
Clerks
MPCA
DNR
Official Newspapers

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AGENDA
September 14, 2016

1. Call Regular Meeting to Order.
   a. Approve Agenda.*
2. Consent Agenda.
   a. Minutes last Meeting.*
   b. Treasurer's Report and Claims.**
3. Open Forum.

Suspend meeting

4. Public Hearing for Capital Improvement Projects **2016-01** Fox Creek Streambank Stabilization Project; **2016-02** Mississippi River Shoreline Repair and Stabilization Project; **2016-03** Elm Creek Dam at the Mill Pond Project; 2**016-04** Rush Creek Main Stem Restoration Project; and **2016-05** Fish Lake Alum Treatment Project Phase 1.
   a. Staff Report.*
   b. Feasibility Reports- *available for viewing at the hearing.*
   c. Commission discussion.
   d. Open Public Hearing.
      1) Receive comments from member cities.
      2) Receive comments from public.
   e. Close public hearing.
   f. Commission discussion.
   g. Consider Resolution 2016-02 Ordering 2016 Improvement Projects.**
   h. Approve Cooperative Agreements** with cities of Champlin (2), Maple Grove (2) and Rogers.

Resume meeting.

5. Action Items.
   a. Project Reviews – *also see Staff Report.**
6. Watershed Management Plan.
7. Elm Creek Watershed-wide TMDL.
   a. Response to comments.
8. New Business.
9. Communications.
   a. Buffer Update – August 2016.*

*in meeting packet
**available at meeting

10. Education.
11. Grant Opportunities.
12. Other Business.
13. Project Updates – *see Staff Report.**
14. Adjourn.

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*in meeting packet
**available at meeting

Project Reviews. (See Staff Report.*)					
			a.	2013-046	Woods of Medina, Medina.
			b.	2014-015	Rogers Drive Extension, Rogers.
			c.	2015-004	Kinghorn Outlet A, Rogers.
			d.	2015-006	Veit Building Expansion, Rogers.
			e.	2015-013	Wayzata High School, Plymouth.
			f.	2015-020	Strehler Estates, Corcoran.
			g.	2015-025	OP3 Outdoor Storage, Rogers.
			h.	2015-030	Kiddiegarten Child Care Center, Maple Grove.
			i.	2015-032	Rogers High School Auditorium Addition.
			j.	2016-001	CSAH 115/CR116 Reconstruction, Medina.
			k	2016-002	The Markets at Rush Creek, Maple Grove.
	E		l	2016-004	Park Storage Place, Corcoran.
A	**E**		m.	2016-005W	Ravinia Wetland Bank Plan, Corcoran.
			n.	2016-014	Balsam Apartments, Dayton.
			o.	2016-018	Cambridge Park, Maple Grove.
			p.	2016-019	Just for Kix, Medina.
			q.	2016-020	Ryan Meadows, Rogers.
			r.	2016-021	Diamond View Estates, Dayton.
			s.	2016-022	AutoZone, Maple Grove.
			t.	2016-023	Tri-Care, Maple Grove.
			u.	2016-026	Faithbrook Church, Dayton.
		R	v.	2016-027	Rogers Drive/Brockton Lane Intersection, Rogers.
		R	w.	2016-030	Elm Creek Meadows, Plymouth.
		R	x.	2016-032	CSAH 19 Cross Culvert, Corcoran.
			y.	2016-033	Dayton Public Works facility – site improvements, Dayton.
	E	**R**	z.	2016-034	French Lake Golf Course Industrial Project AUAR, Dayton.
			aa.	2016-035W	20070 Larkin Road – wetland violation, Corcoran.
			ab.	2016-036	K-Manufacturing 3rd Addition, Dayton.
			ac.	2016-037	Lanewood Estates, Plymouth.
			ad.	2016-038	AutoMotor Plex, Medina.
			ae.	2016-039	Sands Parcel, Plymouth.
			af.		
			ag.		
			ah.		
			ai.		

A = Action item E = Enclosure provided I = Informational update will be provided at meeting RPFI - removed pending further information
R = Will be removed RP= Information will be provided in revised meeting packet….. D = Project is denied

*in meeting packet
**available at meeting

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Technical Advisory Committee
and Regular Meeting
Minutes
August 10, 2016

I. A meeting of the **Technical Advisory Committee (TAC)** for the Elm Creek Watershed Management Commission was convened at 10:00 a.m., Wednesday, August 10, 2016, in the Mayor's Conference Room, Maple Grove City Hall, 12800 Arbor Lakes Parkway, Maple Grove, MN by Commission Vice Chair Elizabeth Weir.

In attendance were Todd Tuominen, Champlin; Rick Lestina and Mark Lahtinen, Maple Grove; Ben Scharenbroich, Plymouth; Andrew Simmons, Rogers; James Kujawa and Said Matan, Hennepin County Dept. of Environment and Energy (HCEE); Rich Brasch, Three Rivers Park District (TRPD); Jeff Weiss, Barr Engineering; Kate Drewry, DNR; and Judie Anderson, JASS.

Not represented: Corcoran, Dayton, and Medina.

Also present: Elizabeth Weir, Medina; Fred Moore, Plymouth; John Smyth, Stantec, for Project 2016-04; and Dave Haas, Fish Lake Area Residents Association (FLARA).

A. The **agenda** was approved by consensus.

B. **Consideration of 2016 CIPs.**

1. **Project 2016-01** Fox Creek Streambank Stabilization Project Phase 2.*
Cost | Proposed Levy: $321,250 | $80,312

Fox Creek is a three-mile long stream located in Rogers. Urbanization and development of the area surrounding the creek has resulted in significant erosion and depleted water quality throughout the system. Phase 1 of the project was completed in 2013. Phase 2, consists of stabilization of a 1300 linear foot stretch between Red Fox Road and Industrial Boulevard. It is an area of eroding stream banks, heavy tree cover, direct discharge of sump pumps, and railroad box culvert and ditch erosion. Fox Creek discharges to the Crow River. The majority of the surrounding watershed has been developed. The goal of this project is to restore the creek while minimizing further disturbances in its natural behavior. Motion by Kujawa, second by Scharenbroich to recommend to the Commission that this project, with the inclusion of associated phosphorus and TSS load reduction calculations, be moved forward to the public hearing in September. *Motion carried unanimously.*

2. **Project 2016-02** Mississippi River Shoreline Repair and Stabilization Project.*
Cost | Proposed Levy: $300,000 | $75,000

During intense rain events in June and July 2014, the flood waters of the Mississippi River caused damage to two stormwater outfalls to the river along East River Parkway and damaged the river banks at Stream Boat Landing and Mississippi River Point Park. A major disaster was declared for these impacted areas in Champlin. 1600 feet of shoreline will be repaired and armored with rip rap and the outfalls will be repaired. 85% of the project is in the Elm Creek watershed, with the majority of the land area being city property. A minor portion of the project is on land under easement. The City has determined that $300,000 is the Elm Creek Commission's pro rata share of this $402,795 project, which is currently underway. Motion by Lestina, second by Scharenbroich to recommend to the Commission that this project, with the inclusion of associated phosphorus and TSS load reduction calculations, be moved forward to the public hearing in September. *Motion carried unanimously.*

3. **Project 2016-03** Elm Creek Dam at the Mill Pond.*
Cost | Proposed Levy: $7,001,220 | $187,500

This project is a portion of a $7 million project to replace the Elm Creek Dam and Bridge, public access construction and flood mitigation at the Mill Pond location in Champlin. The project will construct a new spillway capable of conveying the 100-year peak discharge while providing a one-foot freeboard before overtopping. A new exterior weir capable of conveying 2840 cfs will

*in meeting packet

also be constructed. A 105-foot interior weir will contain low flows in a rock-lined channel. Four 10x8 box culverts will serve as an emergency spillway. The project addresses several safety issues related to the existing dam and is a collaboration between the City of Champlin, Hennepin County, DNR, the 2014 State bonding bill, West Mississippi WMC and the Elm Creek WMC. The City requested and received $62,500 from an ad valorem levy by the Elm Creek Commission in 2014 and is currently requesting an additional $187,500 at this time, bringing the total to the $250,000 maximum levy allowed under Commission rules. The City is the owner of the dam. Motion by Kujawa, second by Scharenbroich to recommend to the Commission that this project be moved forward to the public hearing in September. *Motion carried unanimously.*

4. **Project 2016-04** Rush Creek Main Stem Restoration.*
Cost | Proposed Levy: $300,000 | $75,000

This project will stabilize the erosional sites in a 2900 linear foot portion of Rush Creek in Maple Grove. Initial erosion was likely due to increased flows from the developing watershed. Erosion has caused encroachment into the adjacent woods and trees and other debris to fall into the creek, resulting in diversion of flows to the toe of slopes. This, in turn, has caused accelerated erosion in most outside bend locations, creating vertical flows that range in height from 4 to 10+ feet. The project involves removal of fallen trees and debris from channel, removal of select tree along the banks of the creek, and installation of stream barbs along many of the outside eroded bends. The barbs will allow sediment to naturally deposit upstream of the barbs, push the flows back to the center of the channel and create a hydraulic jump in the stream that will help dissipate energy and create pond habitat for fish. Motion by Tuominen, second by Scharenbroich to recommend to the Commission that this project, with the inclusion of associated phosphorus and TSS load reduction calculations, be moved forward to the public hearing in September. *Motion carried unanimously.*

5. **Project 2016-05** Fish Lake Alum Treatment Phase 1.*
Cost | Proposed Levy: $300,000 | $75,000

Conduct whole lake alum treatment based on findings of a 2013 UW Stout Study to estimate alum dosage scenarios to control anoxic sediment internal phosphorus loading in Fish Lake in the City of Maple Grove. The goal of treating the lake with alum is to reduce the phosphorus load affecting the lake by at least 310 lbs./yr. This reduction will meet the load reductions identified in the recently completed WRAPS/TMDL reports. Based on the proposed treatment, Brasch indicated a cost-effectiveness figure of no higher than $70/lb. phosphorus reduction. This is a cooperative project between the City, Three Rivers Park District as the technical lead, FLARA, and the Commission. The Commission has submitted a Clean Water Fund Grant Application for the full amount of this project less the Commission's $75,000 cost-share and a $25,000 cash match split between the City, FLARA and TRPD. Motion by Scharenbroich, second by Lestina to recommend to the Commission that this project be moved forward to the public hearing in September. *Motion carried unanimously.*

C. **Cost Share Policy.**

During the July Commission meeting the members discussed the Rush Creek Headwaters Subwatershed Assessment grant application. Much of the discussion centered on cooperative funding of the grant. It was noted that since the Commission does not have a policy for cost-sharing SWAs or other special projects, this should be a topic for discussion by the TAC.

In an email* dated August 2, 2016, Steve Christopher, BWSR, noted, *If the Commission chooses to include subwatershed assessments within its 'special studies' category as mentioned within **3.2.1 Commission** of its Watershed Management Plan, it would be a clarification and would not necessitate a plan amendment. As written, these are funded through the general fund. I would support this decision and maintain that the additional city contribution should take place at time of implementation.*

D. **Adjournment.**

The meeting of the Technical Advisory Committee of the Elm Creek Watershed Management Commission was adjourned at 11:20 a.m.

II. A regular meeting of the Elm Creek Watershed Management Commission was called to order at 11:30 a.m., Wednesday, August 10, 2016, in the Mayor's Conference Room, Maple Grove City Hall, 12800 Arbor Lakes Parkway, Maple Grove, MN by Vice Chair Elizabeth Weir.

*in meeting packet

Present were: Gerry Butcher, Champlin; Jon Bottema, Corcoran; Joe Trainor, Maple Grove; Elizabeth Weir, Medina; Fred Moore, Plymouth; Kevin Jullie, Rogers; James Kujawa and Said Matan, Hennepin County Dept. of Environment and Energy (HCEE); Rich Brasch, Three Rivers Park District (TRPD); Jeff Weiss, Barr Engineering; and Judie Anderson, JASS.

Not represented: Dayton.

Also present: Todd Tuominen, Champlin; Mark Lahtinen, Maple Grove; Ben Scharenbroich, Plymouth; Andrew Simmons, Rogers; Kate Drewry, DNR; and Dave Haas, Fish Lake Area Residents Association (FLARA).

A. Motion by Bottema, second by Butcher to approve the **revised agenda**.* *Motion carried unanimously.*

B. Motion by Bottema, second by Butcher to approve the **minutes*** of the July 13, 2016 regular meeting. *Motion carried unanimously.*

C. Motion by Moore, second by Bottema to approve the **August Treasurer's Report and Claims*** totaling $34,698.68. *Motion carried unanimously.*

D. Open Forum.

E. Action Items.

1. Project Reviews.

a. 2016-026 Faithbrook Church, Dayton.* This is 12.2 acre commercial development site located at 224 1st Avenue Northwest. It is bounded by Fernbrook Lane North to the west, Elm Creek Road to the south, and farmland to the north and east. The applicant is proposing to build a principal structure and create about 1.34 acres of impervious surface (driveways and parking lots). The site is currently vegetated with agricultural crops. The project was reviewed for compliance with the Commission's grading, erosion control, and stormwater management standards. In their findings dated July 25, 2016 Staff recommended approval with the following stipulation: If the pond will be maintained by the property owner, an operation and maintenance plan must be submitted to the City and the Commission for review and approval. The approved O&M plan must be recorded with the property within 90 days following final plat approval. Motion by Bottema, second by Butcher to approve Staff's recommendation. *Motion carried unanimously.*

[Trainor arrived 11:45 a.m.]

b. 2016-030 Elm Creek Meadows, Plymouth.* This project consists of three parcels on 28 acres proposed to be developed into 59 single-family townhomes. It is located on the east side of Elm Creek, north of CR 47. The project was reviewed for compliance with the Commission's grading, erosion control, floodplain, and stormwater management standards. In their findings dated August 9, 2016, Staff recommends approval of this project. Motion by Moore, second by Jullie to approve Staff's recommendations with the following: 1) provision of an O&M plan to be recorded with the property within 90 days following final plat approval; 2) a recommendation to the developer that irrigation be considered on this project, and 3) a requirement that the footbridge be removed, requiring an after-the-fact permit. *Motion carried, Bottema voting nay.*

2. 2016 CIPs. Motion by Moore, second by Butcher to approve the recommendations of the Technical Advisory committee regarding the five projects reviewed at their meeting preceding this meeting. (See pages 1 and 2 of these minutes.) The public hearing, scheduled for 11:30 a.m., Wednesday, September 14, 2016, prior to the Commission's regular meeting, has been duly noticed.

3. Special Projects Cost-Sharing Policy. As a follow up to discussion at the July meeting regarding cooperative funding for special projects such as subwatershed assessments, Staff was directed to draft a policy for consideration by the TAC at their October meeting.

4. Model Snow and Ice Policy.* The Commissioners received correspondence from Steve Woods, Executive Director of the Freshwater Society, asking if the Commission would be willing to join a consortium of other WMOs to provide a state-of-the-art model snow and ice removal policy for municipal use. A Technical Advisory Committee comprised of representatives from seven cities, three watershed districts, the Minnesota Nursery and Landscape Association, the Minnesota Pollution Control Agency, Fortin Consulting, and the Freshwater Society has been meeting and has crafted a third draft of the proposed policy. The Freshwater Society is asking the Commission to consider a financial contribution of $1500 to help fund

*in meeting packet

their scope of work. Motion by Moore, second by Bottema to table consideration of this request to the September to allow Commissioners time to review the draft policy with their city staffs. *Motion carried unanimously.*

F. Watershed Management Plan. See Item E.2., above.

G. Elm Creek Watershedwide TMDL. The public comment period for the draft TMDL and WRAPS Reports closed on August 4, 2016**.** Comments were received from MnDOT, Dept. of Agriculture, and the cities of Corcoran, Medina and Plymouth. Brasch is reviewing and responding to the comments.

H. New Business.

I. Communications.

1. August 2016 Buffer Update.*

J. Education.

1. Minnesota Water Resources Conference,* October 18-19, 2016, Saint Paul RiverCentre. Register at wrc.umn.edu/waterconf

2. Clean Water Summit, September 22, 2016, Minnesota Landscape Arboretum. Register at http://www.arboretum.umn.edu/2016cleanwatersummit.aspx

3. The **next WMWA meeting** is scheduled for Tuesday, September 13, 2016, at Plymouth City Hall. Commissioners are encouraged to attend.

K. Grant Opportunities.

Included in the meeting packet were copies of 2017 Clean Water Fund Grant applications for the following:

1. BWSR Projects and Practices Grant for **Internal Phosphorus Loading Control, Fish Lake*** in the amount of $200,000.

2. BWSR Accelerated Implementation Grant for **Rush Creek Headwaters Subwatershed Assessment*** in the amount of $50,280.

L. Other Business.

1. All 2016 **Commissioner appointments** have been received.

M. The following **projects** are discussed in the August Staff Report.* ("W" denotes wetland project.)

1. 2013-041 Jomico, Corcoran.
2. 2013-046 Woods of Medina, Medina.
3. 2014-015 Rogers Drive Extension, Rogers.
4. 2015-004 Kinghorn Outlet A, Rogers.
5. 2015-006 Veit Building and Parking Lot Addition, Rogers.
6. 2015-013 Wayzata High School, Plymouth.
7. 2015-020 Strehler Estates, Corcoran.
8. 2015-025 OP3 Outdoor Storage, Rogers.
9. 2015-030 Kiddiegarten Child Care Center, Maple Grove.
10. 2015-032 Rogers High School Auditorium Addition, Rogers.
11. 2015-038 Wealshire of Medina, Medina.
12. 2016-001 CSAH 115/CR 116 Reconstruction, Medina.
13. 2016-002 The Markets at Rush Creek, Maple Grove.
14. 2016-003W Park Place Storage Wetland Replacement Plan, Corcoran.
15. 2016-004 Park Place Storage Site Plans, Corcoran.
16. 2016-005W Ravinia Wetland Bank, Corcoran.
17. 2016-014 Balsam Apartments, Dayton.
18. 2016-018 Cambridge Park, Maple Grove.
19. 2016-019 Just for Kix, Medina.
20. 2016-020 Ryan Meadows, Rogers.

*in meeting packet

21. 2016-021 Diamond View Estates, Dayton.
22. 2016-022 AutoZone, Maple Grove.
23. 2016-023 Tri-Care, Maple Grove.
24. 2016-024 Dunkirk Gateway, Plymouth.
25. 2016-025 Killarney Glen 2nd Addition, Maple Grove.
26. 2016-026 Faithbrook Church, Dayton.*
27. 2016-027 Rogers Drive/Brockton Lane Intersection Improvements, Rogers.*
28. 2016-028 Ploceus Meadows, Maple Grove.
29. 2016-029 Camelot Nine at Begin, Plymouth.
30. 2016-030 Elm Creek Meadows, Plymouth.
31. 2016-031W 9735 Garden Lane, Corcoran.*
32. 2016-032 CSAH 19 Cross Culvert, Corcoran.
33. 2016-033 Dayton Public Works Garage, Dayton.
34. 2016-034 French Lake Golf Course AUAR, Dayton.
35. 2016-035W 20070 Larkin Road, Corcoran.*

N. Adjournment. There being no further business, motion by Bottema, second by Butcher to adjourn. *Motion carried unanimously.* The meeting was adjourned at 12:30 p.m.

Respectfully submitted,

Recording Secretary
JAA:tim
Z:\Elm Creek\Meetings\Meetings 2016\08 Reg and TAC Meeting Minutes.docx

*in meeting packet

Item 4a

3235 Fernbrook Lane
Plymouth, MN 55447
(763) 553-1144
Fax: (763) 553-9326
judie@jass.biz

To: Elm Creek Commissioners

From: Judie Anderson

Date: September 6, 2016

Subject: Public Hearing 2016 Levy

On February 10, 2016 the Elm Creek Watershed Management Commission's Technical Advisory Committee (TAC) recommended to the Commission that Table 4.5 of its Third Generation Plan Capital Improvement Program be revised in order to add five projects to the CIP and to update six projects already listed there. These new projects and project updates were submitted by the member cities. At its regular meeting that followed, the Commission approved the TAC's recommendation.

MN Rule 8410.0140 and Section 4.6 Plan Review, Update and Revision of the Commission's Third Generation Plan set forth the requirements for plan amendments. Steve Christopher, BWSR Board Conservationist, determined that the Commission could add/revise these projects with a Minor Plan Amendment. Following a public meeting conducted by the Commission on May 11, 2016, the Commission adopted Resolution 2016-01 Adopting a Minor Plan Amendment. The projects added/revised under the Minor Plan Amendment are described on the following page. The highlighted projects are those being proposed for the 2016 levy.

Doug Baines, representative from Dayton and Commission chair, was present at a meeting of a Committee of the Hennepin County Board on July 19, 2016, to answer questions regarding the amendment. The County Board approved the Minor Plan Amendment and adopted a 2016 maximum levy of $492,812 for the Elm Creek Commission on July 28, 2016.

The Commission called for a public hearing on September 14, 2016 to consider those projects. Member cities and the County have been notified and notice has been duly published.

Commission Action

The purpose of the public hearing is to present the proposed projects and proposed financing and to take comment from the member cities and the public. The recommended order of business is as follows:

1. Suspend regular meeting
2. Staff report on projects and proposed financing
3. Commission discussion
4. Open public hearing
5. Take comments from member cities
6. Take comments from public
7. Close public hearing
8. Commission discussion
9. Consider approving Resolution 2016-02 and Cooperative Agreements with the cities of Champlin (2), Maple Grove (2), and Rogers.
10. Resume regular meeting

Revisions to CIP

Description	New Revised Existing	Est Project Cost	2016	2017	2018	2019	2020-2024
Fox Creek at Creekview Restoration Project, Rogers *	R	~~150,000~~ 321,250	~~37,500~~ 80,312				
Mississippi Point Park Riverbank Repair, Champlin *	E	300,000	75,000				
Elm Creek Dam Miss River Shoreline Restoration, Champlin *	E	7,001,220	187,500				
Fish Lake Alum Treatment Phase 1, Maple Grove *	N	300,000	75,000				
Rush Creek Main Stem Restoration, Maple Grove *	N	1,650,000	75,000	75,000	75,000	25,000	
Fox Creek at Hyacinth Restoration Project, Rogers	E	360,000,		90,000			
Fox Creek at South Point Restoration Project, Rogers	E	90,000		22,500			
Mill Pond Fishery & Habitat Restora	E	5,000,000		250,000			
Tree Thinning and Bank Stabilization Project	R	50,000 annually	~~50,000~~	~~50,000~~	50,000	50,000	~~250,000~~ 300,000
Ranchview Wetland Restoration, Maple Grove	N	2,000,000		~~250,000~~	250,000		
Stonebridge Storm Sewer Retrofit, Maple Grove	R	200,000	~~50,000~~	50,000			
Rain Garden at Independence Avenue, Champlin	R	300,000	~~75,000~~	75,000			
Mill Pond Raingardens, Champlin	R	400,000		~~100,000~~	100,000		
Agricultural BMPs Cost Share	R	50,000 annually	~~50,000~~	~~50,000~~	50,000	50,000	~~100,000~~ 150,000
Stone's Throw Wetland	R	450,000		~~112,500~~	112,500		
Rush Creek South Stem Restoration, Maple Grove	N	675,000			168,750		
Downtown Pond Expansion & Reuse, Rogers	N	406,000			101,500		
TOTAL			**492,812**	562,500			

*Feasibility Report is included in meeting packet

Projects proposed to be certified for 2016 ad valorem tax levy

The Commission's Technical Advisory Committee (TAC) met on August 10, 2016, to consider the five projects and to make recommendations to the Commission regarding their disposition. Below are brief descriptions of the projects. Each is followed by the TAC's recommendation and the Commission's action.

PROJECT DESCRIPTIONS.

2016-01 Fox Creek at Creekview Restoration Project, Rogers

Fox Creek is a DNR public water stream located entirely within the City of Rogers. It is nearly three miles long and drains to the Crow River. The City has received complaints related to streambank erosion along multiple segments of Fox Creek over the past years and has worked on cleaning up the creek in segments. The segments with the most significant erosion have been identified and are currently incorporated into the Elm Creek Watershed Commission's capital improvements plan. The first phase of the streambank restoration was completed in 2013 near the segment of Fox Creek located between Edison Court and Fawn Trail.

This project is Phase 2 of the streambank restoration project. It involves approximately 1300 feet of Fox Creek from Red Fox Road to Industrial Boulevard and includes a railroad crossing. Heavy tree cover, eroding banks, and undermined trees are among the concerns with this segment of Fox Creek. Additionally, there are several properties with sump pumps discharging directly into the creek. Erosion along Fox Creek produces water quality issues within the creek itself and ultimately the Crow River. Resolving these issues will address these environmental issues and assist the City to meet future waste load reduction requirements that are anticipated to be implemented as part of the Crow River total maximum daily load (TMDL) study. Total project cost $321,250 | Proposed Levy $80,312.

Technical Advisory Committee: *Recommend to the Commission that Project 2016-01, with the inclusion of associated phosphorus and TSS load reduction calculations, be moved forward to the public hearing in September.*

Commission: *Approve the recommendation of the Technical Advisory Committee.*

2016-02 MISSISSIPPI POINT PARK RIVERBANK REPAIR, *renamed* **MISSISSIPPI RIVER SHORELINE REPAIR AND STABILIZATION PROJECT, CHAMPLIN**

The City of Champlin is proposing to begin repair of the Mississippi River shoreline between Mississippi Point Park and Steamboat Landing. The river's streambanks and two stormwater outfalls were damaged by torrential rains during June-July, 2014. The Champlin City Council identified 1600 feet of shoreline to be repaired and armored with rip rap and repair of two outfalls along East River Parkway just upstream of Mississippi Point Park.

Due to the nature of the repair area, the plan is to repair and protect the existing shoreline and minimize shoreline grading to preserve as many quality trees as possible. However, the City will implement tree thinning, removal of invasive trees; removal of trees under-cut by the flood event and clean-up debris in the project area. The project includes restoration of boat landing shoreline areas that were damaged with the storm events. Also, the project includes the placement of large boulders in several locations that will serve as viewing/fishing platforms and will be constructed above the OHW of 830.1. The primary area of work is located along Mississippi Point Park and the secondary area is Steamboat Landing (just up-stream of TH169 Bridge). Total project cost $300,000 | Proposed Levy $75,000.

Technical Advisory Committee: *Recommend to the Commission that Project 2016-02, with the inclusion of associated phosphorus and TSS load reduction calculations, be moved forward to the public hearing in September.*

Commission: *Approve the recommendation of the Technical Advisory Committee.*

2016-03 ELM CREEK DAM MISS RIVER SHORELINE RESTORATION, *renamed* **ELM CREEK DAM AT THE MILL POND PROJECT, CHAMPLIN**

This project is a portion of a $7 million project to replace the Elm Creek Dam and Bridge, construct public access and mitigate flooding at the Champlin Mill Pond. Project will construct new spillway capable of conveying the 100-year peak discharge while providing one-foot of freeboard before the embankment is overtopped. A new exterior weir capable of

conveying 2840 cfs will also be constructed. A 105-foot interior weir will contain the low flows in a rock-lined channel. Four box culverts will serve as an emergency spillway. The project addresses several safety issues related to the existing dam and allows for future maintenance of the Mill Pond. The City proposes to install a 25-foot, 48-inch reinforced concrete pipe to allow for the drawdown of the Mill Pond for maintenance of the impoundment and management of aquatic invasive species. Construction of the flood culvert and new dam will result in 45 acres being removed from the flood hazard area. Total project cost $7,001,220 | Proposed Levy $187,500. ($62,500 was previously levied by the Commission in 2014 for this project.)

The City has received partial funding assistance from FEMA and from the MN Department of Public Safety. In addition, the Minnesota legislature made Recover Funds available as part of the 2015 MN Special Session. This funding was made available through the Disaster Recovery Assistance Program that is administered through Hennepin County Environmental Services. They have also received funding through the DNR and the West Mississippi Watershed Management Commission.

Technical Advisory Committee: *Recommend to the Commission that Project 2016-03 be moved forward to the public hearing in September.*

Commission: *Approve the recommendation of the Technical Advisory Committee.*

2016-04 RUSH CREEK MAIN STEM RESTORATION, MAPLE GROVE

Stabilization of the erosional sites in a 2900 linear foot portion of Rush Creek within the proposed The Enclave on Rush Creek project. The initial erosion was likely due to increased flows from the developing watershed. Erosion has caused encroachment into the adjacent woods and trees and other debris to fall into the creek. The debris in the creek has resulted in diversion of flows to the toe of slopes, causing accelerated erosion in most outside bend locations. The erosion has created vertical slopes that range from 4-10+ feet in height.

Based on preliminary estimates there are 1,584 linear feet of creek channel that require improvements and stabilization. Control of the erosion at these sites will help minimize loss and encroachment into the woods and future adjacent lots and the planned regional trail. The approach for the channel improvements include: 1) Removal of fallen trees and debris from channel to eliminate diversion of flows to toe of slope; 2) Removal of select trees along the banks of the creek that appear to be a hazard and close to falling into the channel and causing additional accelerated erosion; 3) Installation of Stream Barbs along many of the outside bends to protect the bank by shifting the stream flows away from the streambanks experiencing erosion. The stream barbs allow sediment to naturally deposit upstream of the barbs, push the flows back to the center of the channel and create a hydraulic jump in the stream that will help dissipate energy and create some pool habitat for fish; and 4) Native seeding and shrub planting along the erosion sites to provide deep root structures and protect the slopes from erosion. Vertical slopes will be re-graded to less severe slopes (2:1) to allow for stabilization.
Total project cost $300,000 | Proposed Levy $75,000.

Technical Advisory Committee: *Recommend to the Commission that Project 2016-04, with the inclusion of associated phosphorus and TSS load reduction calculations, be moved forward to the public hearing in September.*

Commission: *Approve the recommendation of the Technical Advisory Committee.*

2016-05 FISH LAKE ALUM TREATMENT PHASE 1, MAPLE GROVE

This project is the first phase of a multi-year whole-lake alum treatment program based on findings included in "Alum Dosage Considerations for Fish Lake, Hennepin County, Minnesota," University of Wisconsin – Stout. The goal of treating the lake with alum is to reduce the phosphorus load affecting the lake by at least 310 lbs./yr. This reduction will meet the load reductions identified in the recently completed Elm Creek WRAPS/TMDL reports. A cost-effectiveness figure of no higher than $70/lb. phosphorus reduction is anticipated. Treatments would occur in years 2016 and subsequent years to be determined. This is a cooperative project between the City, Three Rivers Park District as the technical lead, the Fish Lake Area Residents Association (FLARA), and the Commission. Total project cost $300,000 | Proposed Levy $75,000.

Technical Advisory Committee: *Recommend to the Commission that Project 2016-05 be moved forward to the public hearing in September.*

Commission: *Approve the recommendation of the Technical Advisory Committee.*

Staff Recommendation

The Technical Advisory Committee has reviewed the feasibility reports for these projects and found them to be consistent with the Commission's requirements. Pending receipt of additional information pertaining to phosphorus and TSS load reduction calculations (projects 2016-01, 2016-02, and 2016-04), Staff recommends that the Commission

1. Approve the resolution that accepts the reports,
2. Order the projects,
3. Certify the Commission's share of the costs of the projects to the county levy, and
4. Approve the cooperative agreements with the cities of Champlin, Maple Grove and Rogers.

Item 4b1

CITY OF ROGERS

FEASIBILITY REPORT

FOX CREEK STREAMBANK STABILIZATION

AUGUST 11, 2016

Prepared for

The City of Rogers, Minnesota
22350 South Diamond Lake Road | Rogers, MN 55374

WSB Project No. 3193-200

WSB

EC|CIPs|2016 Projects|Fox Creek Streambank Stabilization

FEASIBILITY REPORT

FOX CREEK
STREAMBANK STABILIZATION

FOR THE
CITY OF ROGERS, MINNESOTA

August 11, 2016

Prepared By:

WSB & Associates, Inc.
701 Xenia Avenue South, Suite 300
Minneapolis, MN 55416
763-541-4800
763-541-1700 (Fax)

701 Xenia Avenue South | Suite 300 | Minneapolis, MN 55416 | (763) 541-4800

August 11, 2016

Honorable Mayor and City Council
City of Rogers
22350 South Diamond Lake Road
Rogers, MN 55374

Re: Feasibility Report
Fox Creek Streambank Stabilization
City of Rogers, MN
WSB Project No. 3193-200

Dear Mayor and City Council Members:

Transmitted herewith is a feasibility report addressing our review of the streambank erosion along approximately 1,300 linear feet of streambank along Fox Creek from Red Fox Road to Industrial Boulevard. Based on the results of our streambank assessment we are proposing a number of concepts to restore the streambanks along this segment of Fox Creek, enclosed is a summary of our recommendations.

We would be happy to discuss this report with you at your convenience. Please give us a call at 763-541-4800 if you have any questions.

Sincerely,

WSB & Associates, Inc.

Jennifer D. Edison, PE
Project Manager

Jesse Carlson
Water Resources Project Manager

Attachment

cc: John Seifert, City of Rogers

CERTIFICATION

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Jennifer D. Edison, PE

Date: August 11, 2016 Lic. No. 51721

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

Overview/Background

Fox Creek is a three-mile long DNR public water stream located in the City of Rogers, MN. Urbanization and development of the area surrounding Fox Creek has resulted in erosion problems and depleted water quality throughout the system. There are multiple instances of stream bank erosion along the Creek, and the City has been restoring the condition of the creek in segments. In 2013, Phase 1 of the streambank restoration was completed between Edison Court and Fawn Trail. The 1,300 linear feet of the Creek identified for improvements in Phase 2 consists of the stretch between Red Fox Road and Industrial Boulevard.

Purpose

The purpose of this feasibility study is to determine design solutions to stabilize approximately 1,300 linear feet of streambank along Fox Creek. Major concerns associated with this segment of Fox Creek include eroding stream banks, heavy tree cover, the direct discharge of sump pumps from multiple properties into the creek, railroad box culvert erosion, and eroding railroad ditches. Because Fox Creek discharges into the Crow River, erosion issues create water quality concerns that may be mitigated by the implementation of the proposed improvements outlined in this study.

This study analyzes this segment of the creek in sections denoted by station numbers, beginning at Station 0+00 at Red Fox Road.

2. AUTHORIZATION

This feasibility report was authorized by the City Council on April 12, 2016.

3. EXISTING CONDITIONS AND IMPROVEMENT OPTIONS

3.1 General

The streambanks of Fox Creek are experiencing significant erosion, which have depleted the water quality and may potentially lead to damage of adjacent structures. The Project Area Map is provided in ***Appendix A, Figure A1***.

Fox Creek is classified as a straight stream with an average slope of 0.7%. Fox creek is currently considered an unstable stream and is going through changes in its width and depth due to changes in the watershed.

The goal is to evaluate these existing problems to successfully restore the creek while minimizing further disturbance to its natural behavior. This feasibility report focuses only on qualitative improvement measures; numerical analysis with models will be completed as part of the project design.

Existing conditions and improvement options for each stretch of the Creek are outlined below by station segments. Photo exhibits of current conditions are summarized along the project area in ***Appendix A, Figures A2 and A3*** and design details are provided in ***Appendix B***.

3.2 Station 0+00 to 1+00

Existing Condition
The two-foot elevation drop at the Flared End Section (FES) at Station 0+00 (**Figure 1**) and high velocities around the bend (**Figure 2**) at 0+40 are producing erosion.

Proposed Improvements
Construct a drop structure and stilling basin at the FES outlet at Station 0+00 to reduce velocities entering the Creek at that location.

A boulder toe should be placed on the left bank (LB) at Station 0+40 to protect the material from high velocity flows around the bend.

Remove the tree at Station 0+75 to allow for reshaping of the channel geometry.

Regrade the slope back to 2:1 and reinforce with a coir fiber log and live staking. Vegetation should be chosen to handle the anticipated flow velocity and shear stresses.

Boulders should be placed at the toe of the LB from Stations 0+75 to 1+00.


Figure 1


Figure 2

3.3 Station 1+00 to 2+00

Existing Condition
Unstable bank slopes due to erosion.

Proposed Improvements
Insert a rock cross vane at Station 1+20 to direct flow toward the center of the channel, provide grade control and bank protection, and to avoid scour pool development.

A boulder toe should be placed on the right bank (RB) at Station 1+50 (**Figure 3**) to protect the material from high velocity flows around the bend.


Figure 3

3.4 Station 2+00 to 3+00

Existing Condition
Unstable banks due to erosion.

Proposed Improvements
Stabilize the RB slope at 2+25 (**Figure 4**) with a coir fiber log, erosion control blanket, and live staking; backfill behind the coir log.

Insert a rock cross vane at Station 2+40 with an elevation of 0.5 feet at the creek's center to direct flow toward the center of the channel, provide grade control and bank protection, and to avoid scour pool development.

Figure 4

3.5 Station 3+00 to 4+00

Existing Condition
Eroding banks cause excess sedimentation downstream. Scoured out bends in the creek

Proposed Improvements
Remove debris at Station 3+00 (**Figure 5**).

Insert a rock cross vane at Station 3+60 with an elevation of 0.5 feet at the creek's center to direct flow toward the center of the channel, provide grade control and bank protection, and to avoid scour pool development.

Figure 5

3.6 Station 4+00 to 5+00

Existing Condition
A storm sewer pipe discharging into the stream is experiencing erosion (**Figure 6**). Downstream of storm sewer the banks are experiencing erosion on the LB and RB (**Figure 7**).


Figure 6

Proposed Improvements
Construct a drop structure and stilling basin at the LB FES outlet at Station 4+10 to reduce velocities entering the Creek at that location.

From Station 4+25 to 4+75, regrade the slope on the RB to 2:1 and reinforce with a coir fiber log and live staking.

A boulder toe should be placed on the LB at Station 4+75 to protect the material from high velocity flows around the bend (**Figure 7**).


Figure 7

Insert a rock cross vane at Station 4+80 with an elevation of 0.5 feet at the creek's center to direct flow toward the center of the channel, provide grade control and bank protection, and to avoid scour pool development.

3.7 Station 5+00 to 6+00

Existing Condition
This segment is in good condition overall and is experiencing minimal erosion.

Proposed Improvements
Remove tree and debris at station 5+50 (**Figure 8**).


Figure 8

From Station 5+50 to 8+00 along both RB and LB: reinforce slope with a coir fiber log and live staking as needed, and backfill behind the coir log (**Figures 9 and 10**).

Figure 9

Figure 10

3.8 Station 6+00 to 7+00

Existing Condition
This segment is in good condition overall.

Proposed Improvements
Insert a rock cross vane at Station 6+00 with an elevation of 0.5 feet at the creek's center to direct flow toward the center of the channel, provide grade control and bank protection, and to avoid scour pool development.

3.9 Station 7+00 to 8+00

Existing Condition
This segment is in good condition overall.

Proposed Improvements
Insert a rock cross vane at Station 7+20 with an elevation of 0.5 feet at the creek's center to direct flow toward the center of the channel, provide grade control and bank protection, and to avoid scour pool development (**Figure 11**).

Figure 11

3.10 Station 8+00 to 9+00

Existing Condition
The Creek passes through a box culvert under the railroad. The channels running parallel to the railroad tracks that discharge into Fox Creek are eroded and material is deposited into the Creek.

Proposed Improvements
Construct a riprap inflow channel on the RB directly upstream of the railroad crossing, at station 8+00 (**Figure 12**).

Construct a riprap inflow channel on both the RB and LB directly downstream of the railroad crossing, at station 8+60 (**Figure 13**).

Fill the scour pool downstream of the railroad crossing and install a stilling basin with riprap for protection at the outlet of the box culvert, at Station 8+60 (**Figure 14**).

Figure 12

Figure 13

Figure 14

3.11 Station 9+00 to 12+00

Existing Condition
Downstream of the railroad channel the banks are becoming steeper in nature and becoming more incised.

Proposed Improvements
The goal will be to mitigate the impact of the change in gradient due to the installation of the railroad box culvert through the installation of two larger rock vanes. The rock vanes will provide grade control downstream of the culvert.

Insert a rock cross vane at Station 9+00 with an elevation of 2 feet at the creek's center to direct flow toward the center of the channel, provide grade control and bank protection, and to avoid scour pool development (**Figure 15**).

Insert a rock cross vane at Station 9+50 with an elevation of 1 foot at the creek's center to direct flow toward the center of the channel, provide grade control and bank protection, and to avoid scour pool development.

For the segment between Stations 9+00 and 12+00, regrade the channel banks to establish a bankfull channel for the 1.5 year design flow. The goal would be to establish a floodplain and include riparian bench to convey high flow. The riparian bench will be established with native vegetation and the main channel reinforced with a boulder toe placed on the outside bends (**Figure 16**).

Figure 15

Figure 16

4. PROPOSED IMPROVEMENTS

4.1 Improvements

Table 4.1 provides a summary of the proposed improvements described in Section 3.

Table 4.1: Proposed Improvements by Station

Station	Bank	Proposed	Detail (Appendix B)
0+00	Center	Drop Structure and stilling basin at FES outlet	
0+40	LB	Boulder Toe	B4
0+75	RB	Remove tree, grade slope at 2:1	B3
0+75-1+00	LB	Boulder Toe	B4
1+20	C	Cross Vane	B2
1+50	RB	Boulder Toe	B4
2+25	RB	Coir Fiber Log and Live Staking, backfill behind coir log	B3
2+40	C	Cross Vane	B2
3+00	C	Debris removal	
3+60	C	Cross Vane	B2
4+10	LB	Drop Structure and Energy Dissipation	
4+25-4+75	RB	Grade to 2:1, coir log and live staking	B3
4+75	LB	Boulder Toe	B4
4+80	C	Cross Vane	B2
5+50	C	Tree/Debris Removal	
5+50-8+00	LB and RB	Coir Fiber Log and Live Staking, backfill behind coir log.	B3
6+00	C	Cross Vane	B2
7+20	C	Cross Vane	B2
8+00	RB	Riprap inflow channel	
8+60	LB & RB	Riprap inflow channel	
8+60	C	Fill and install stilling basin/riprap at culvert	B5
9+00	C	Cross vane	B1
9+50	C	Cross Vane	B1
9+00-12+00	Various banks	Regrade channel, boulder toe, plantings, and establish native vegetation	B6

4.2 Permitting

The project requires a permit from the Elm Creek Watershed Management Commission (ECWMC), Minnesota Department of Natural Resources (MNDNR), and the U.S. Army Corps of Engineers (USACE).

Elm Creek Watershed Management Commission

An Erosion and Sediment Control Plan for the project must be submitted to the Commission. Erosion control plans must comply with the following criteria:

a) Erosion and sediment control measures shall be consistent with best management practices as demonstrated in the most current version of the MPCA manual "Protecting Water Quality in Urban Areas," and shall be sufficient to retain sediment on-site.
b) Erosion and sediment controls shall meet the standards for the General Permit Authorization to Discharge Storm Water Associated with Construction Activity Under the National Pollutant Discharge Elimination System/State Disposal System Permit Program Permit MN R100001 (NPDES General Construction Permit) issued by the Minnesota Pollution Control Agency, except where more specific requirements are required.
c) All erosion and sediment controls shall be installed before commencing the land disturbing activity, and shall not be removed until completion
d) The activity shall be phased when possible to minimize disturbed areas subject to erosion at any one time.

The requirements for obtaining an ECWMC Erosion and Sediment Control Permit are listed in ***Appendix C***.

Minnesota Department of Natural Resources

Two types of Work in Public Waters Permits are available; this project is applicable to the general permit. General permits are pre-issued permits, categorized as:

- Emergency repair of public flood damages
- Multiple purposes
- Bridge and culvert projects
- Dry hydrants
- Bank/shore protection or restoration

The conditions of the Public Waters Work General Permit are listed in ***Appendix C.***

U.S. Army Corps of Engineers

This project must comply with USACE Nationwide Permit (NWP) 13-Bank Stabilization. The current set of USACE nationwide permits expires on March 18, 2017. The conditions of the USACE Permit are listed in ***Appendix C***.

5. FINANCING

5.1 Opinion of Probable Cost

A detailed opinion of probable cost for the proposed improvements to Fox Creek is located in ***Appendix D*** of this report. It is estimated that the overall cost for the restoration of Fox Creek will be $318,000.

5.2 Funding

Funding for this project may be available through a variety of grant and cost share programs.

Elm Creek Watershed Management Commission (ECWMC)
The ECWMC has included this project in the 2015 Watershed Management Plan. Fox Creek Streambank Stabilization is listed as a high priority stream restoration project. The CIP estimated project cost is $320,000. The ECWMC plans on providing $80,000 of funding in 2016 towards this effort. The Watershed Management Plan is found at http://www.elmcreekwatershed.org/ .

The Hennepin County Natural Resources Grant Program
Administered through Hennepin County Environmental Department, grants are available for projects that preserve and restore natural areas and reduce the amount of nutrients and sediment flowing into lakes, streams, and rivers while engaging residents in natural resource management issues. Opportunity grants are for larger projects seeking to leverage multiple funding sources from more than one partner. A typical grant amount is $25,000-$50,000 with a maximum amount of $100,000. Funding is available for:

- Environmental consulting fees,
- Materials
- Supplies
- Labor
- Inspection fees

State Cost-Share Program
The state program is administered locally by Hennepin County, providing financial and technical assistance to landowners who implement conservation practices that reduce soil erosion and/or sedimentation in order to improve water quality. Eligible projects must be designed for an effective life of at least ten years and meet one of the following objectives:

- Control nutrient runoff
- Stabilize critical eroding areas
- Control gully, rill, or sheet erosion
- Protect surface water and groundwater quality

Practices eligible for state cost-share may receive funding of up to 75% of the total eligible costs of a conservation practice.

The Clean Water Fund-BWSR Projects and Practices Program

The Clean Water Fund makes investments in on the ground projects that protect or restore water quality in lakes and rivers. The application deadline for 2016 is August 8, 2016.

Guidelines include:

- Minimum request of $30,000
- Projects must have measurable outcomes using scientifically credible methodology
- Must include long term maintenance plan
- LGU must have an approved water management plan
- 25% match

Ranking Criteria includes:

- Succinct project description and how it will result in pollution reduction
- Proposal based on priority protection or restoration actions from water management plan
- Proposal identifies critical pollution sources or risks impacting water resources identified in application
- Proposal has a quantifiable reduction in pollution
- Proposal lists a specific set of activities that can be implemented soon after award

6. PROJECT SCHEDULE

The proposed project schedule for this improvement is as follows:

Design ..... August – October 2016

Permitting.....September – November 2016

Construction..... December 2016 – July 2017

7. FEASIBILITY AND RECOMMENDATION

This project consists of implementing erosion control measures and stabilizing streambanks along Fox Creek to restore the health of the creek and improve water quality.

This project is feasible, necessary, and cost-effective from an engineering standpoint and can be constructed as proposed. It is our recommendation that the improvements to Fox Creek be implemented as outlined in this report

APPENDIX A

Project Location Maps

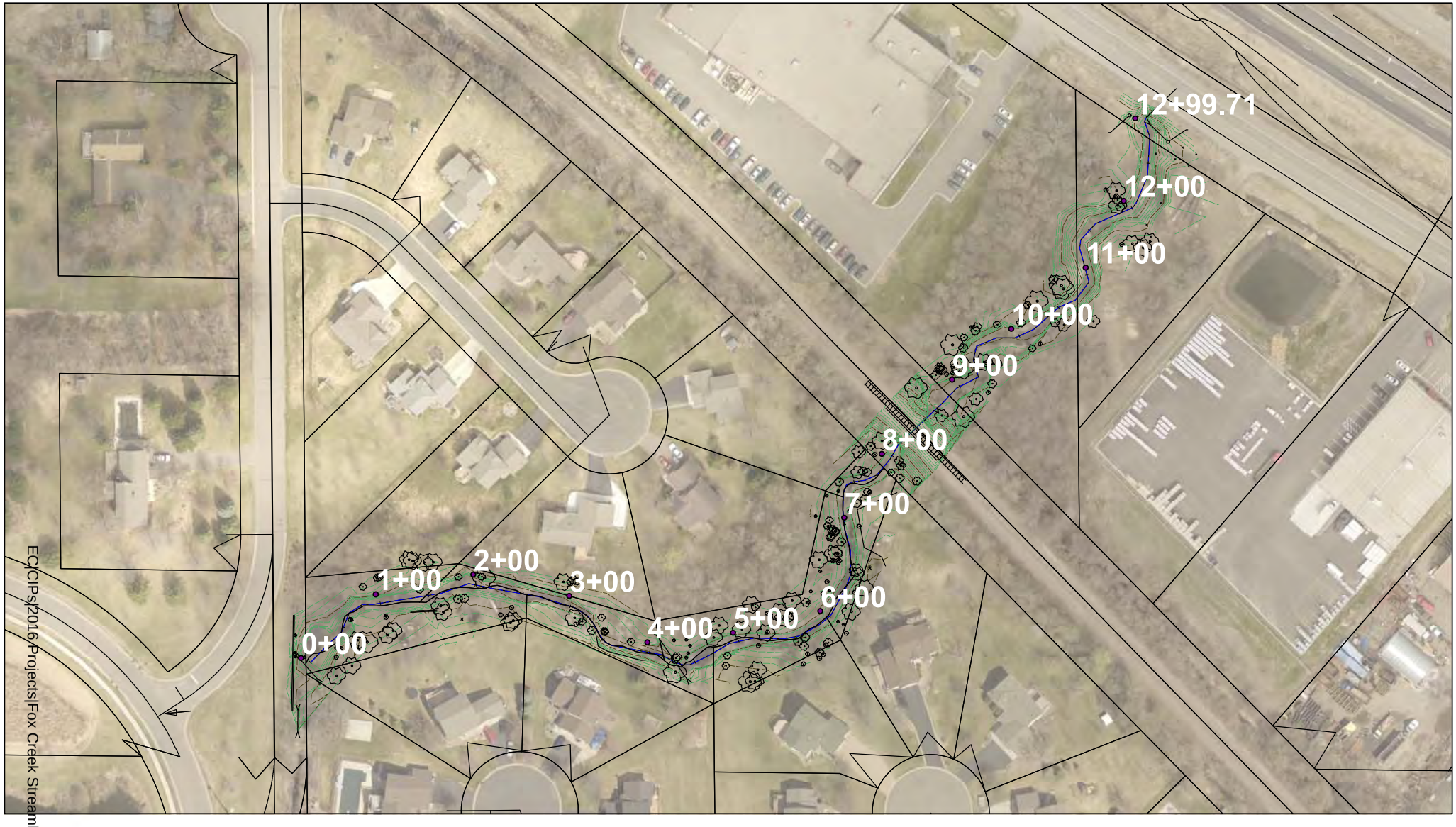


FIGURE A1-Project Area

STREAMBANK STABILIZATION FOX CREEK

ROGERS, MINNESOTA

N W E S

0 25 50 100 Feet

THE CITY OF ROGERS MINNESOTA

WSB

Item 4b

EC/CIPs/2016/Projects/Fox Creek Streambank Stabilization

K:\0313-2016\GIS\Maps

THE CITY OF ROGERS MINNESOTA

N

0 20 40 Feet

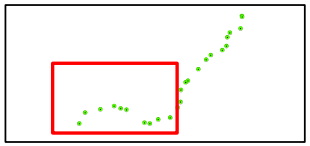
0 20 40 Feet

Figure A2-Field Exhibits Sta. 0+00-5+00

DRAINAGE IMPROVEMENT PROJECT

FOX CREEK

ROGERS, MINNESOTA



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Item 4b

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THE CITY OF ROGERS MINNESOTA

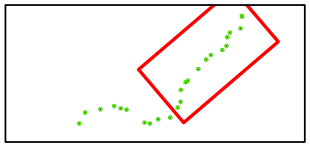
0 20 40 Feet

Figure A3-Field Exhibits Sta. 5+00-13+00

DRAINAGE IMPROVEMENT PROJECT

FOX CREEK

ROGERS, MINNESOTA



WSB

Item 4b

EC|CIPs|2016 Projects|Fox Creek Streambank Stabilization

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APPENDIX B

Design Details

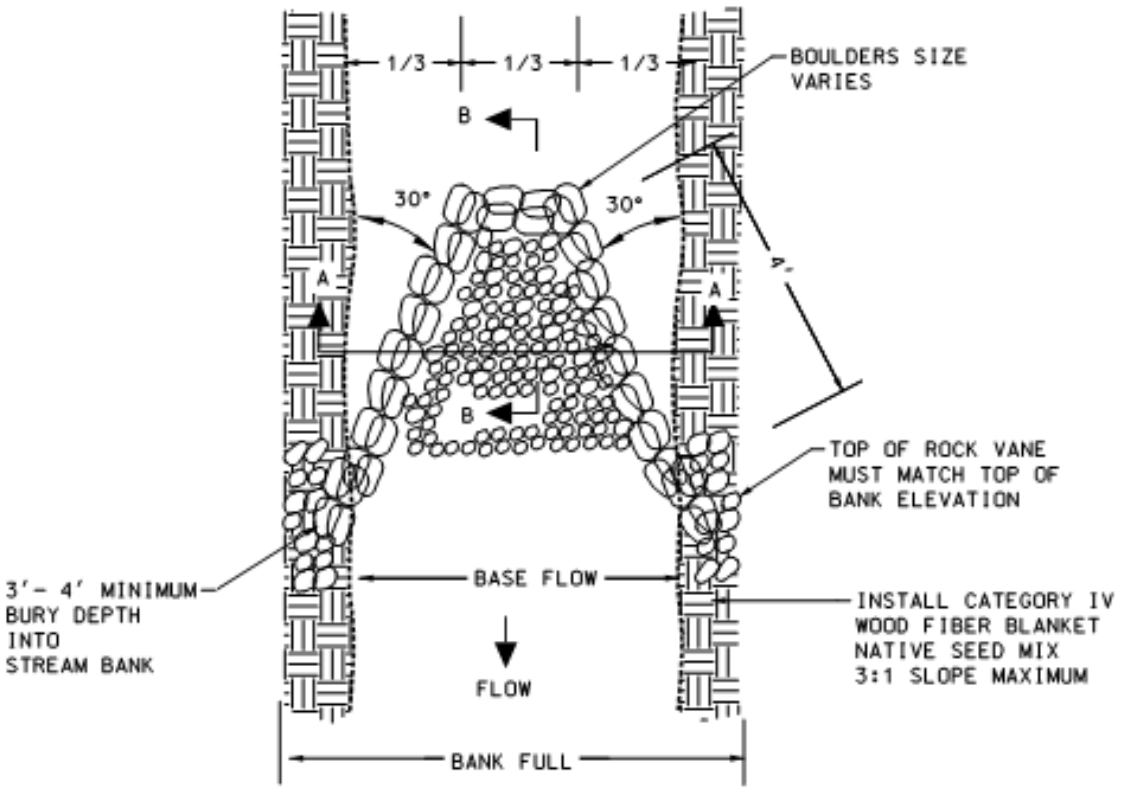

Figure B1: Cross Vane (Plan View)

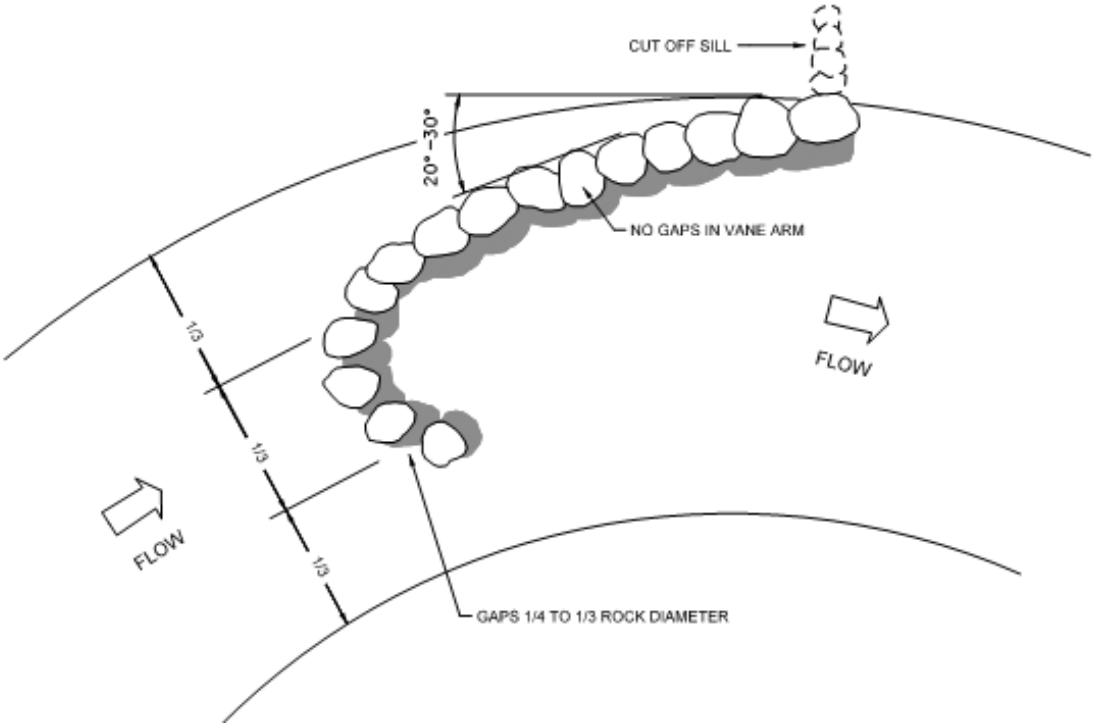

Figure B2: J Hook Vane (Plan View)
Rock Vanes to be 0.5 feet in height

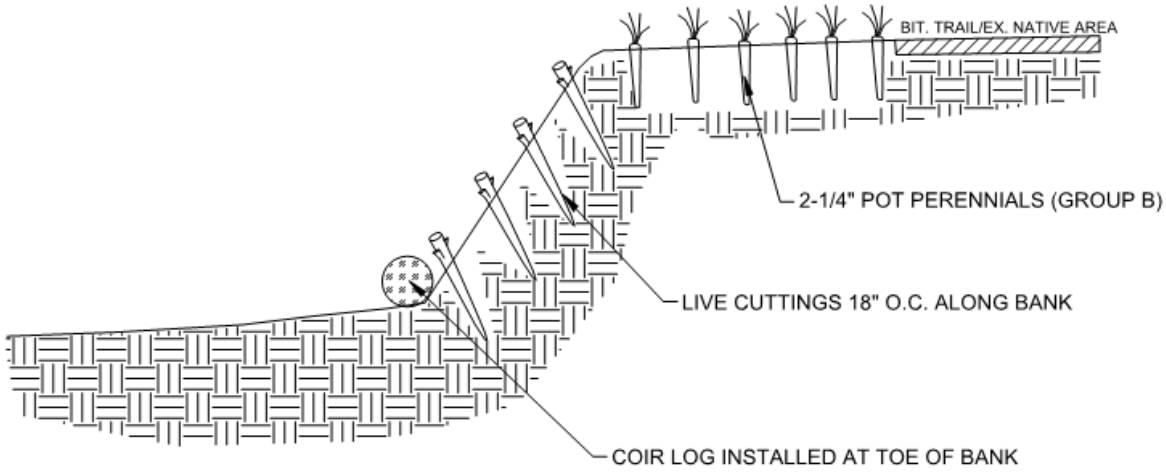

Figure B3: Live Staking/ Planting

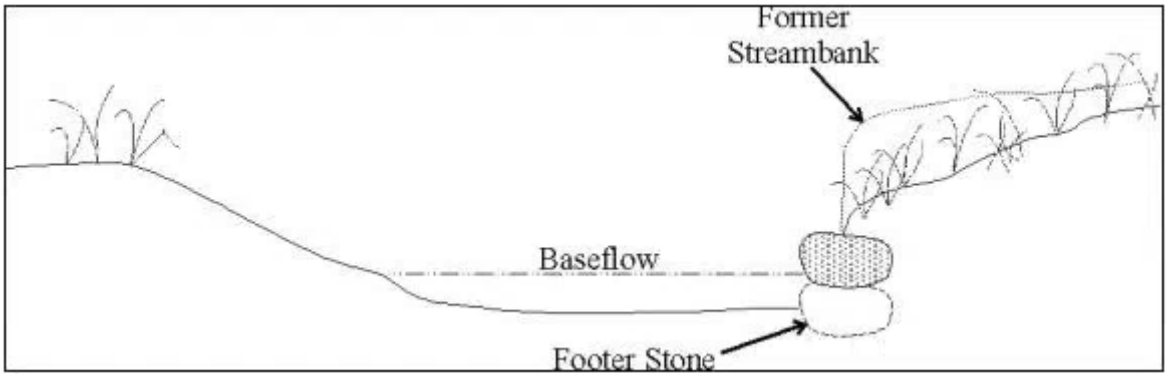

Figure B4: Boulder Toe

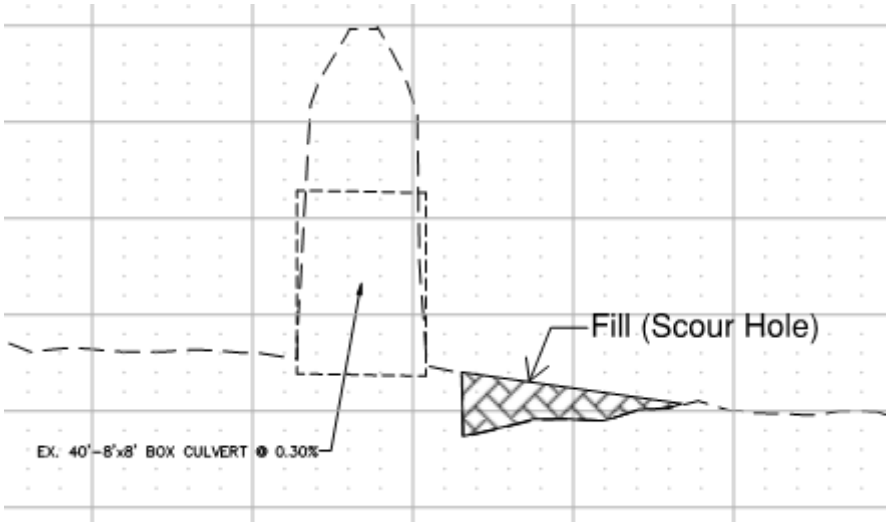

Figure B5: Fill in scour hole downstream of box culvert

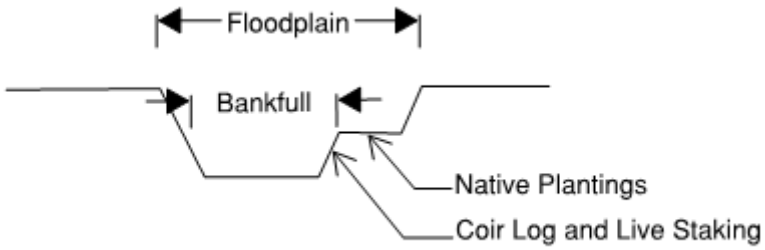

Figure B6: Excavate bankfull channel and create floodplain

Appendix C

Work Permits

Elm Creek
Watershed Management Commission

Rules and Standards

Adopted: October 8, 2014

Effective: January 1, 2015

RULE E. EROSION AND SEDIMENT CONTROL

1. **POLICY**. It is the policy of the Commission to control runoff and erosion and to retain or control sediment on land during land disturbing activities by requiring the preparation and implementation of erosion and sediment control plans.

2. **REGULATION**. No person or political subdivision shall commence a land disturbing activity or the development or redevelopment of land for which a project review is required under Rule D without first submitting to and obtaining approval of a project review from the Commission that incorporates an erosion and sediment control plan for the activity, development or redevelopment.

3. **CRITERIA**. Erosion and sediment control plans shall comply with the following criteria:

   a) Erosion and sediment control measures shall be consistent with best management practices as demonstrated in the most current version of the MPCA manual "Protecting Water Quality in Urban Areas," and shall be sufficient to retain sediment on-site.

   b) Erosion and sediment controls shall meet the standards for the General Permit Authorization to Discharge Storm Water Associated with Construction Activity Under the National Pollutant Discharge Elimination System/State Disposal System Permit Program Permit MN R100001 (NPDES General Construction Permit) issued by the Minnesota Pollution Control Agency, except where more specific requirements are required.

   c) All erosion and sediment controls shall be installed before commencing the land disturbing activity, and shall not be removed until completion.

   d) The activity shall be phased when possible to minimize disturbed areas subject to erosion at any one time.

4. **EXHIBITS**. The following exhibits shall accompany the project review application (one set full size, one set reduced to a maximum size of 11" x 17", and one electronic set in pdf format). Erosion and sediment control plans must be prepared by a qualified professional.

   a) An existing and proposed topographic map showing contours on and adjacent to the land, property lines, all hydrologic features, the proposed land disturbing activities, and the locations of all runoff, erosion and sediment controls and soil stabilization measures.

   b) Plans and specifications for all proposed runoff, erosion and sediment controls, and temporary and permanent soil stabilization measures.

c) Detailed schedules for implementation of the land disturbing activity, the erosion and sediment controls, and soil stabilization measures.

d) Detailed description of the methods to be employed for monitoring, maintaining and removing the erosion and sediment controls, and soil stabilization measures.

e) Soil borings if requested by the Commission.

5. **MAINTENANCE**. The project review applicant shall be responsible for proper operation and maintenance of all erosion and sediment controls and soil stabilization measures, in conformance with best management practices and the NPDES permit. The project review applicant shall, at a minimum, inspect and maintain all erosion and sediment controls and soil stabilization measures daily during construction, weekly thereafter, and after every rainfall event exceeding 0.5 inches, until vegetative cover is established.

ELM CREEK WATERSHED MANAGEMENT COMMISSION
RULES APPENDIX A
WET POND DESIGN STANDARDS

Permanent Pool Depth	Average 4', maximum 10'
Permanent Pond Surface Area	Greater of 2% of watershed's impervious area and 1% of the watershed
Permanent Pool Length to Width Ratio	3:1 or greater with an irregularly shaped shoreline
Side Slopes	10:1 for 10-foot bench centered on the normal water elevation and between 3:1 and 20:1 elsewhere
Side Slope Stabilization	Native seed with mix 33-261 (MnDOT 310), 34-271 (BWSR W2) or equivalent between NWL and HWL, provide 10' buffer where possible with mix 35-221 (MnDOT 330 (dry)) or mix 35-241 (MnDOT 350 (mesic))
Floatable Removal	Skimming device discharging at no greater than 0.5 fps during the 2-year event or a submerged outlet with a minimum 0.5 feet from the normal water level to the crown of the outlet pipe
Sediment Accumulation Area	Provide maintenance pads to remove sediment deltas at inlets
Permanent Pool Volume	A 4-foot mean depth and equal to 2.5-inch rain over the watershed
Source	Protecting Water Quality in Urban Areas (MPCA 2000)

SUMMARY

Elm Creek Watershed Management Commission
Management Rules and Standards*

	Standard	Purpose	Applicability
Project Reviews Required	A Stormwater Management Plan consistent with all applicable management rules and standards* must be reviewed and approved prior to commencement of land disturbing activities.	To control excessive rates and volumes of runoff; manage subwatershed discharge rates and flood storage volumes; improve water quality; protect water resources; and promote natural infiltration of runoff.	All development or redevelopment projects of the following types: • Projects disturbing more than one acre of land • Projects within the 100-year floodplain • Projects adjacent to or within a lake, wetland, or watercourse • Any land disturbing activity requested by a member city to be reviewed regardless of project size • Linear projects creating more than one acre of new impervious surface
Rate Control	Peak runoff rates may not exceed existing rates for the 2-year, 10-year, and 100-year critical storm event; or the capacity of downstream conveyance facilities; or contribute to flooding	To control excessive rates and volumes of runoff; manage subwatershed discharge rates and flood storage volumes	All projects disturbing more than one acre of land. Redevelopment projects disturbing less than 50 percent of the site must meet the requirement only for the disturbed area.
Volume Manage-ment	1.1 inch of impervious surface runoff must be abstracted on site within 48 hours	To control excessive rates and volumes of runoff; manage discharge rates and flood storage volumes; protect stream channels from erosion; and promote natural infiltration of runoff.	All projects disturbing more than one acre of land. Redevelopment projects disturbing less than 50 percent of the site must meet the requirement only for the disturbed area.
Erosion and Sediment Control	Erosion control plan using Best Management Practices (BMPs) and consistent with the NPDES General Construction Permit is required	To control erosion and sediment so as to protect conveyance systems and water quality	All projects requiring a project review
Floodplain Alteration	Compensating storage is required to mitigate floodplain fill	To prevent and control flooding damage	All development or redevelopment projects within the 100-year floodplain regardless of project size
Water Quality	No net increase in total phosphorus and total suspended sediment annual load	To protect water quality	All projects disturbing more than one acre of land. Redevelopment projects disturbing less than 50 percent of the site must meet the requirement only for the disturbed area.
Buffer Strips	Vegetated buffer strips average 50 foot, minimum 25 foot wide adjacent to Elm, Diamond, Rush, and North Fork Rush Creeks; average 25 foot, minimum 10 foot wide adjacent to lakes, wetlands and other watercourses	To protect water quality; reduce erosion and sedimentation; reduce pollutants from runoff and debris; and provide habitat	All projects requiring a project review that contain or abut a wetland or watercourse
Wetland	Wetlands may not be drained, filled, excavated, or otherwise altered without an approved wetland replacement plan from the local government unit (LGU) with jurisdiction	To preserve and protect wetlands for their water quality, stormwater storage, habitat, aesthetic, and other attributes	All land disturbing activity impacting a wetland as defined by the Wetland Conservation Act (WCA)

*Important Note: Approved TMDL Implementation Plans may have additional site-specific requirements.

October 8, 2014

MINNESOTA DEPARTMENT OF NATURAL RESOURCES

Limited/Amended

Public Waters Work General Permit

Expiration Date: 11/27/2018

General Permit Number

2004-0001

Pursuant to Minnesota Statutes, Chapter 103G, and on the basis of statements and information contained in the permit application, letters, maps, and plans submitted by the applicant and other supporting data, all of which are made part hereof by reference, **PERMISSION IS HEREBY GRANTED** to the applicant to perform actions as authorized below. This permit supersedes the original permit and all previous amendments.

Project Name:	County:	Watershed:	Resource:
MNDOT Statewide General Permit	All counties in Minnesota	All watersheds in Minnesota	All waters shown on the Public Waters Inventory

Purpose of Permit:	Authorized Action:
Bridge, culvert, or stormwater outfall repair or replacement.	Upon notification of approval by the DNR Transportation Hydrologist or Area Hydrologist, replace or repair of bridges, culverts, riprap, or stormwater outfalls on Public Waters, where all conditions and provisions specified herein are met.
Permittee:	**Authorized Agent:**
MN DEPARTMENT OF TRANSPORTATION CONTACT: CLARKOWSKI, LYNN, (651) 366-3602 OFFICE OF ENVIRONMENTAL STEWARDSHIP 395 JOHN IRELAND BLVD, MS 620 ST. PAUL, MN 55155 (651) 366-3600	N/A

Property Description (*land owned or leased or where work will be conducted*):

The Permittee or its authorized agent must own, control, or have permission to access and use all lands affected by the project.

Authorized Issuer:	Title:	Issued Date:	Effective Date:	Expiration Date:
Tom Hovey	Water Regulations Unit Supervisor	11/27/2013	11/27/2013	11/27/2018

This permit is granted **subject to** the following **CONDITIONS**:

APPLICABLE FEDERAL, STATE, OR LOCAL REGULATIONS: The permittee is not released from any rules, regulations, requirements, or standards of any applicable federal, state, or local agencies; including, but not limited to, the U.S. Army Corps of Engineers, Board of Water and Soil Resources, MN Pollution Control Agency, watershed districts, water management organizations, county, city and township zoning.

NOT ASSIGNABLE: This permit is not assignable by the permittee except with the written consent of the Commissioner of Natural Resources.

NO CHANGES: The permittee shall make no changes, without written permission or amendment previously obtained from the Commissioner of Natural Resources, in the dimensions, capacity or location of any items of work authorized hereunder.

SITE ACCESS: The permittee shall grant access to the site at all reasonable times during and after construction to authorized representatives of the Commissioner of Natural Resources for inspection of the work authorized hereunder.

TERMINATION: This permit may be terminated by the Commissioner of Natural Resources at any time deemed necessary for the conservation of water resources of the state, or in the interest of public health and welfare, or for violation of any of the conditions or applicable laws, unless otherwise provided in the permit.

CONDITIONS continued on next page...

GENERAL PERMIT CONDITIONS (*Continued from previous page*)

COMPLETION DATE: Construction work authorized under this permit shall be completed on or before the date specified above. The permittee may request an extension of the time to complete the project by submitting a written request, stating the reason thereof, to the Commissioner of Natural Resources.

WRITTEN CONSENT: In all cases where the permittee by performing the work authorized by this permit shall involve the taking, using, or damaging of any property rights or interests of any other person or persons, or of any publicly owned lands or improvements thereon or interests therein, the permittee, before proceeding, shall obtain the written consent of all persons, agencies, or authorities concerned, and shall acquire all property, rights, and interests needed for the work.

PERMISSIVE ONLY / NO LIABILITY: This permit is permissive only. No liability shall be imposed by the State of Minnesota or any of its officers, agents or employees, officially or personally, on account of the granting hereof or on account of any damage to any person or property resulting from any act or omission of the permittee or any of its agents, employees, or contractors. This permit shall not be construed as estopping or limiting any legal claims or right of action of any person other than the state against the permittee, its agents, employees, or contractors, for any damage or injury resulting from any such act or omission, or as estopping or limiting any legal claim or right of action of the state against the permittee, its agents, employees, or contractors for violation of or failure to comply with the permit or applicable conditions.

EXTENSION OF PUBLIC WATERS: Any extension of the surface of public waters from work authorized by this permit shall become public waters and left open and unobstructed for use by the public.

INVASIVE SPECIES - EQUIPMENT DECONTAMINATION: All equipment intended for use at a project site must be free of prohibited invasive species and aquatic plants prior to being transported into or within the state and placed into state waters. All equipment used in designated infested waters, shall be inspected by the Permittee or their authorized agent and adequately decontaminated prior to being transported from the worksite. The DNR is available to train inspectors and/or assist in these inspections. For more information refer to the "Best Practices for Preventing the Spread of Aquatic Invasive Species" at http://files.dnr.state.mn.us/publications/ewr/invasives/ais/best_practices_for_prevention_ais.pdf. Contact your regional Invasive Species Specialist for assistance at www.mndnr.gov/invasives/contacts.html. A list of designated infested waters is available at http://files.dnr.state.mn.us/eco/invasives/infested_waters.pdf. A list of prohibited invasive species is available at www.mndnr.gov/eco/invasives/laws.html#prohibited.

APPLICABLE PROJECTS: This permit applies only to the replacement, reconstruction, or repair (including associated minor channel or shoreline work) of existing bridges, culverts, stormwater outfalls, or riprap in Public Waters that are designed under the supervision of a registered professional engineer. A project not meeting applicable conditions of this permit or a project the DNR identifies as having the potential for significant resource impacts, is not authorized herein. Rather, such projects will require an individual permit application.

PROJECT AUTHORIZATION: This permit provides conditions to aid project planning and facilitate initial design to streamline DNR regulatory approval. A project must be reviewed by the DNR Transportation Hydrologist through the MnDOT Early Notification Memo (ENM) process in order for it to qualify for authorization under this permit. The existing framework of MnDOT environmental review by the applicable DNR personnel will be utilized to review projects at the earliest possible stage for permit needs and additional conditions. Additional design information may be required of MnDOT during this process. If a project can not meet the conditions of this permit, a separate individual permit will be required. If emergency or unforeseen projects arise that can not include the framework of the ENM process, the permittee shall contact the DNR Transportation Hydrologist or Area Hydrologist immediately to provide details and discuss project design and applicable standards for authorization under this permit. Work shall not commence until written approval that the project will meet these (and any additional written) permit conditions is received from the applicable DNR Hydrologist.

RESPONSIBILITY: The permittee is responsible for satisfying all terms and conditions of this permit. When a project is awarded to a said third party (contractor) for work to be completed, the permittee may notify the DNR in order to administratively amend the project authorization form to include the said third party as a co-permittee for joint responsibility in compliance with this permit.

ENVIRONMENTAL REVIEW: If the bridge/culvert construction is part of a road project that requires mandatory environmental review pursuant to MN Environmental Quality Board rules, then this permit is not valid until environmental review is completed.

DNR NOTIFICATION: The permittee shall notify the DNR Transportation Hydrologist or Area Hydrologist at least five days in advance of the commencement of the work. An email notification of the pre-construction meeting will suffice for this notification.

CONDITIONS continued on next page...

GENERAL PERMIT CONDITIONS (*Continued from previous page*)

PHOTOS AND AS-BUILTS: Upon completion of the authorized work, the permittee may be required to submit a copy of established benchmarks, representative photographs, and may be required to provide as-built surveys of Public Watercourse crossing changes.

STATE & FEDERAL LISTED SPECIES PROHIBITION: If there are unresolved concerns regarding impacts to federally or state listed species (endangered, threatened, or special concern), this general permit is not applicable, and the project must be submitted as a separate permit application. Compliance with DNR and federal guidelines established for a listed species (e.g. Topeka Shiner conditions) would constitute a resolved concern.

PRELIMINARY ENGINEERING: This permit authorizes preliminary engineering studies in the water associated with bridge planning (e.g., core sampling). All core holes must be sealed in accordance with Department of Health well sealing requirements. On designated infested waters, all equipment in contact with the water must be decontaminated per the Invasive Species condition.

HYDROLOGIC/HYDRAULIC DATA REPORTING: Unless waived by the DNR Transportation Hydrologist or Area Hydrologist, hydrologic modeling to show the impacts of the structure(s) on the 100-yr (1% chance) flood elevation is required. Calculations showing calculated velocities through the structures at 2-year peak flows may also be required.

NAVIGATION MAINTAINED OR IMPROVED: The structure's final design will not obstruct reasonable public navigation, as determined by the DNR. For bridges, three feet above the calculated 50-year flood stage ordinarily satisfies navigational clearance requirements. For culverts, three feet of clearance above the ordinary high water level (top of the bank) ordinarily satisfies navigational requirements.

STATE TRAILS: Projects proposed near an existing or proposed state trail system should be consistent therewith.

FLOWLINE/GRADIENT NOT CHANGED: Replacement of culverts or crossings are to follow (or be restored to) the natural alignment and profile of the stream. Changes from the existing flowline, gradient or alignment must be consistent with the Water Level Control and Fish Passage conditions and authorized by the DNR Transportation Hydrologist or Area Hydrologist.

FLOOD STAGES/DAMAGES NOT INCREASED: A. No approach fill for a crossing shall encroach upon a DNR approved community designated floodway. When a floodway has not been designated or when a floodplain management ordinance has not been adopted and approved, increases in flood stage in the regional flood of up to one-half of one foot shall be approved if they will not materially increase flood damage potential. Additional increases may be permitted if: a field investigation and other available data indicate that no significant increase in flood damage potential would occur upstream or downstream, and any increases in flood stage are reflected in the floodplain boundaries and flood protection elevation adopted in the local floodplain management ordinance as determined by the applicable DNR Hydrologist; B. If the existing crossing has a swellhead of one-half of one foot or less for the regional flood, the replacement crossing shall comply with the provisions for new crossings in (A). If the existing crossing has a swellhead of more than one-half of one foot for the regional flood, stage increases up to the existing swellhead may be allowed if field investigation and other available data indicate that no significant flood damage potential exists upstream from the crossing based on analysis of data submitted by the applicant. The swellhead for the replacement crossing may exceed the existing swellhead if it complies with the provisions found in (A) above.

WATER LEVEL CONTROL: Permittee is responsible for maintaining existing water level control elevations.

FISH PASSAGE: Bridges, culverts and other crossings shall provide for fish movement unless the structure is intended to impede rough fish movement, aquatic invasive species movement, or the stream has negligible fisheries value as determined by the Transportation Hydrologist or Area Hydrologist in consultation with the Area Fisheries Manager. The accepted practices for achieving these conditions include: A. Where possible a single culvert or bridge shall span the natural bankfull width adequate to allow for debris and sediment transport rates to closely resemble those of upstream and downstream conditions. A single culvert shall be recessed in order to pass bedload and sediment load. Additional culvert inverts should be set at a higher elevation. All culverts should match the alignment and slope of the natural stream channel, and extend through the toe of the road side slope. "Where possible" means that other conditions may exist and could take precedence, such as unsuitable substrate, natural slope and background velocities, bedrock, flood control, 100-yr (1% chance) flood elevations, wetland/lake level control elevations, local ditch elevations, and other adjacent features. B. Rock Rapids or other structures may be used to retrofit crossings to mimic natural conditions.

TERRESTRIAL SPECIES MOVEMENT: Structures shall not be detrimental to significant wildlife habitat. If the crossing is located at a significant wildlife travel corridor as determined by DNR Wildlife or Ecological & Water Resources staff, the

CONDITIONS continued on next page...

GENERAL PERMIT CONDITIONS (*Continued from previous page*)

crossing shall be designed to minimize concerns. Typically this is accomplished with the presence of a walkable surface (dry ground) at normal flow conditions. For bridges this is known as a 'Passage Bench', which is incorporated into bridge abutment riprap. On multiple culvert installations, outer culvert inverts can be set at an elevation higher than normal flow to allow terrestrial species use during non-flood conditions. A Passage Bench design is incorporated into MnDOT Standard sheet (Figure 5-397.309) and available at http://www.dot.state.mn.us/bridge/cadd/files/bdetailspart2/pdf/fig7309e.pdf. Also see 'Passage Bench Design' as well as other species protection measures in Chapter 1 of the collection of "Best Practices for Meeting DNR General Public Waters Work Permit GP 2004-0001" http://www.dnr.state.mn.us/waters/watermgmt_section/pwpermits/gp_2004_0001_manual.html.

RESTORATION OF VEGETATION: On areas of disturbed soil adjacent to Public Waters, final vegetation plans should include native species suitable to the local habitat. This may include trees, shrubs, grasses, and/or forbs. Also see MnDOTs "Native Seed Mix Design for Roadsides" http://www.dot.state.mn.us/environment/erosion/pdf/native-seed-mix-dm.pdf.

TEMPORARY IMPACTS DURING CONSTRUCTION: Construction methods not finalized at the time of project review shall be submitted for review and approval at a later date. Temporary work below the Ordinary High Water (OHW) elevation, such as channel diversions, placement of temporary fill, structures for work pads/dock walls, bypass roads, coffer dams, or staging areas to aid in the demolition or construction of any authorized structure shall be submitted for review and approval in writing by the DNR Transportation Hydrologist or Area Hydrologist prior to beginning work. This is normal procedure for bridge or culvert projects as we recognize that final project designs are often posted for bid without final construction/ demolition plans. The following conditions must be met:

A. AQUATIC INVASIVE SPECIES - EQUIPMENT DECONTAMINATION: All equipment intended for use at a project site must be free of prohibited invasive species and aquatic plants prior to being transported into or within the state and placed into state waters. All equipment used in designated infested waters, shall be inspected by the Permittee or their authorized agent and adequately decontaminated prior to being transported from the worksite. The DNR is available to train inspectors and/or assist in these inspections. For more information refer to the "Best Practices for Preventing the Spread of Aquatic Invasive Species" at http://files.dnr.state.mn.us/publications/ewr/invasives/ais/best_practices_for_prevention_ais.pdf. Contact your regional Invasive Species Specialist for assistance at www.mndnr.gov/invasives/contacts.html. A list of designated infested waters is available at http://files.dnr.state.mn.us/eco/invasives/infested_waters.pdf. A list of prohibited invasive species is available at www.mndnr.gov/eco/invasives/laws.html#prohibited.

B. WORK EXCLUSION DATES FOR FISH SPAWNING AND MOVEMENT: Work within Public Waters may be restricted due to fish spawning and migration concerns. Dates of fish spawning and migration vary by species and location throughout the state. Specific dates for each DNR Region may be found on page 3 of Chapter 1 of the manual: Best Practices for Meeting DNR General Waters Work Permit GP2004-0001. http://www.dnr.state.mn.us/waters/watermgmt_section/pwpermits/gp_2004_0001_manual.html. Work in the water is not allowed within these dates. The DNR Transportation Hydrologist, Area Hydrologist, or Area Fisheries Supervisor shall be contacted about waiving work exclusion dates where work is essential or where MnDOT demonstrates that a project will minimize impacts to fish habitat, spawning, and migration.

C. HYDROLOGIC MODELING: Hydrologic modeling of temporary fill or temporary structures may be required by DNR Transportation Hydrologist or Area Hydrologist in order to evaluate impacts to the 100-yr (1% chance) flood elevation. Contingency plans may also be required to ensure all construction equipment and unsecured construction materials are moved out of the floodplain to prevent impacts to the 100-yr (1% chance) flood elevation or from being swept away by flood waters.

D. TEMPORARY FILL: If approved, temporary fill shall be free of organic material or any material that may cause siltation or pollute the waterbody. All such material shall be removed and the area restored to pre-existing profiles prior to project completion.

E. WETLAND PROTECTION: Should MnDOT or its contractors chose to do work in association with this project that is outside MnDOT project area right-of-way (EG excavation, grading, fill, vegetation alterations, utility installations, etc), they must obtain a signed statement from the property owner stating that permits required for work have been obtained or that a permit is not required, and mail a copy of the statement to the regional DNR Enforcement office where the proposed work is located. The Landowner Statement and Contractor Responsibility Form can be found at: http://www.bwsr.state.mn.us/wetlands/wca/index.html#general

F. STORAGE/STOCKPILES: Project materials must be deposited or stored in an upland area, in a manner where the

CONDITIONS continued on next page...

GENERAL PERMIT CONDITIONS (*Continued from previous page*)

materials will not be deposited into the public water by reasonably expected high water or runoff.

G. NAVIGATION: All work on navigable waters shall be so conducted that free navigation of waterways will not be interfered with, except as allowed by permits issued by the proper public authority. See MnDOT Standard Specifications for Navigable Waters (spec #1709) of MnDOT Standard Specifications for Construction, 2005 edition, or its successor: http://www.dot.state.mn.us/pre-letting/spec/2014/2014-Std-Spec-for-Construction.pdf.

H. EROSION PREVENTION AND SEDIMENT CONTROL: In all cases, erosion prevention and sediment control methods that have been determined to be the most effective and practical means of preventing or reducing sediment from leaving the worksite shall be installed in areas that are within 200 feet of the water's edge and drain to these waters, and on worksite areas that have the potential for direct discharge due to pumping or draining of areas from within the worksite (EG coffer dams, temporary ponds, stormwater inlets). These methods, such as mulches, erosion control blankets, temporary coverings, silt fence, silt curtains or barriers, vegetation preservation, redundant methods, isolation of flow, or other engineering practices, shall be installed concurrently or within 24 hours after the start of the project, and shall be maintained for the duration of the project in order to prevent sediment from leaving the worksite. DNR requirements may be waived in writing by the authorized DNR staff based on site conditions, expected weather conditions, or project completion timelines.

I. MPCA WATER QUALITY REQUIREMENTS: MPCA administers the requirements of the National Pollutant Discharge Elimination System and the State Disposal System (NPDES/SDS) requirements. To ensure state water quality standards during construction are not violated, check with the MPCA Stormwater Program www.pca.state.mn.us/stormwater for permit application requirements, pollution prevention guidance documents, and additional measures required for work in Special or Impaired Waters. For questions on MPCA requirements, contact the MPCA-MnDOT Liaison (Dan Sullivan at Dan.Sullivan@state.mn.us or 651-366-4294).

J. TEMPORARY DEWATERING: A separate water use permit is required for withdrawal of more than 10,000 gallons of water per day or 1 million gallons per year from surface water or ground water. GP1997-0005 (temporary water appropriations) covers a variety of activities associated with road construction and should be applied if applicable. An individual appropriations permit may be required for projects lasting longer than one year or exceeding 50 million gallons. Information is located at: http://www.dnr.state.mn.us/waters/watermgmt_section/appropriations/permits.html .

K. PROTECTION OF VEGETATION: If DNR Ecological & Water Resources staff determine that Native Plant Communities, Sites of Biodiversity Significance, other Areas of Environmental Sensitivity are present in or adjacent to Public Waters, precautions must be implemented to ensure protection and restoration of vegetation. MnDOT Standard Specifications for Protection and Restoration of Vegetation (spec #2572) of MnDOT Standard Specifications for Construction, 2005 edition, or its successor must be followed to minimize disturbance to such areas, see http://www.dot.state.mn.us/pre-letting/spec/2014/2014-Std-Spec-for-Construction.pdf. This may include, but is not limited to, the following: (1) During the project, parking, placement of temporary structures or material shall not be allowed outside the existing road right-of-way; (2) Place temporary fence at the construction limits and at other locations adjacent to vegetation designated to be preserved; (3) Minimize vehicular disturbance in the area (no unnecessary construction activities); (4) Leave a buffer of undisturbed vegetation between the critical resource and construction limits; (5) Precautions should be taken to ensure that borrow and disposal areas are not located within native plant communities; and (6) Revegetate disturbed soil with native species suitable to the local habitat.

L. NESTING BIRDS: MnDOT adherence to existing federal migratory bird protection programs will suffice for DNR concerns. Should active nests be encountered on the project (including swallow nests attached to bridges or culverts), contact MnDOT Office of Environmental Stewardship (Jason.Alcott@state.mn.us, ph; 651-366-3605), for specific guidance relating to Federal Threatened and Endangered Species and U.S. Fish and Wildlife Service coordination.

BEST PRACTICES - MNDOT: Please refer to the collection of "Best Practices for Meeting DNR General Public Waters Work Permit GP 2004-0001" for guidance to meeting the conditions of this General Permit. A PDF version is available at: http://www.dnr.state.mn.us/waters/watermgmt_section/pwpermits/gp_2004_0001_manual.html.

2012 Nationwide Permits, Conditions, District Engineer's Decision, Further Information, and Definitions (with corrections[1])

A. Index of Nationwide Permits, Conditions, District Engineer's Decision, Further Information, and Definitions

Nationwide Permits

1. Aids to Navigation
2. Structures in Artificial Canals
3. Maintenance
4. Fish and Wildlife Harvesting, Enhancement, and Attraction Devices and Activities
5. Scientific Measurement Devices
6. Survey Activities
7. Outfall Structures and Associated Intake Structures
8. Oil and Gas Structures on the Outer Continental Shelf
9. Structures in Fleeting and Anchorage Areas
10. Mooring Buoys
11. Temporary Recreational Structures
12. Utility Line Activities
13. Bank Stabilization
14. Linear Transportation Projects
15. U.S. Coast Guard Approved Bridges
16. Return Water From Upland Contained Disposal Areas
17. Hydropower Projects
18. Minor Discharges
19. Minor Dredging
20. Response Operations for Oil and Hazardous Substances
21. Surface Coal Mining Activities
22. Removal of Vessels
23. Approved Categorical Exclusions
24. Indian Tribe or State Administered Section 404 Programs
25. Structural Discharges
26. [Reserved]
27. Aquatic Habitat Restoration, Establishment, and Enhancement Activities
28. Modifications of Existing Marinas
29. Residential Developments
30. Moist Soil Management for Wildlife
31. Maintenance of Existing Flood Control Facilities
32. Completed Enforcement Actions
33. Temporary Construction, Access, and Dewatering
34. Cranberry Production Activities

[1] Corrections published in the *Federal Register* on March 19, 2012 (77 FR 16021) and September 21, 2012 (77 FR 58532).

13. Bank Stabilization. Bank stabilization activities necessary for erosion prevention, provided the activity meets all of the following criteria:

(a) No material is placed in excess of the minimum needed for erosion protection;

(b) The activity is no more than 500 feet in length along the bank, unless the district engineer waives this criterion by making a written determination concluding that the discharge will result in minimal adverse effects;

(c) The activity will not exceed an average of one cubic yard per running foot placed along the bank below the plane of the ordinary high water mark or the high tide line, unless the district engineer waives this criterion by making a written determination concluding that the discharge will result in minimal adverse effects;

(d) The activity does not involve discharges of dredged or fill material into special aquatic sites, unless the district engineer waives this criterion by making a written determination concluding that the discharge will result in minimal adverse effects;

(e) No material is of a type, or is placed in any location, or in any manner, that will impair surface water flow into or out of any waters of the United States;

(f) No material is placed in a manner that will be eroded by normal or expected high flows (properly anchored trees and treetops may be used in low energy areas); and,

(g) The activity is not a stream channelization activity.

This NWP also authorizes temporary structures, fills, and work necessary to construct the bank stabilization activity. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary structures, work, and discharges, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Temporary fills must consist of materials, and be placed in a manner, that will not be eroded by expected high flows. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The areas affected by temporary fills must be revegetated, as appropriate.

Invasive plant species shall not be used for bioengineering or vegetative bank stabilization.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity if the bank stabilization activity: (1) involves discharges into special aquatic sites; or (2) is in excess of 500 feet in length; or (3) will involve the discharge of greater than an average of one cubic yard per running foot along the bank below the plane of the ordinary high water mark or the high tide line. (See general condition 31.) (Sections 10 and 404)

Appendix D

Opinion of Probable Cost

Opinion of Probable Cost

WSB Project: Fox Creek Stream Restoration
Project Location: Rogers, MN
WSB Project No: 03193-200

Design By: JC
Checked By: JE
Date: 7/19/2016

Item No.	Description	Unit	Estimated Total Quantity	Estimated Unit Price	Estimated Total Cost
FOX CREEK STREAM RESTORATION					
1	MOBILIZATION	LS	1	$15,000.00	$15,000.00
2	WATER MANAGEMENT & DEWATERING	LS	1	$5,000.00	$5,000.00
3	TREE REMOVAL	LS	1	$3,600.00	$3,600.00
4	CHANNEL GRADING	LIN FT	800	$35.00	$28,000.00
5	COMMON EXCAVATION (P)	CY YD	500	$25.00	$12,500.00
6	TOPSOIL BORROW	CU YD	1,100	$25.00	$27,500.00
7	UTILITY COORDINATION	LS	1	$1,500.00	$1,500.00
8	RIPRAP, CL III	CU YD	30	$100.00	$3,000.00
9	RIPRAP, CL IV	CU YD	83	$110.00	$9,130.00
10	BOULDERS	TONS	340	$60.00	$20,408.89
11	ROCK STILLING BASIN	EACH	1	$2,500.00	$2,500.00
12	GEOTEXTILE FABRIC TYPE IV	SQ YD	42	$4.00	$168.00
13	LIVE STAKING	EACH	900	$5.00	$4,500.00
14	COIR LOG	LF	1,300	$15.00	$19,500.00
15	CROSS-VANE	EACH	9	$2,500.00	$22,500.00
16	PLANTINGS	EACH	100	$75.00	$7,500.00
17	SEWER PIPE	LIN FT	20	$60.00	$1,200.00
18	CONSTRUCT DRAINAGE STRUCTURE	LIN FT	10	$250.00	$2,500.00
19	FES	EACH	2	$200.00	$400.00
20	SEEDING	LS	1	$6,000.00	$6,000.00
21	EROSION CONTROL BLANKET	SQ YD	9,500	$2.50	$23,750.00
22	EROSION CONTROL	LS	1	$10,000.00	$10,000.00
23	LONG-TERM VEGETATION MAINTENANCE (3 YEARS)	LS	1	$15,000.00	$15,000.00
				Subtotal Schedule A Improvements	$241,156.89
				+ 10% Contingencies	$24,120.00
				Subtotal	$265,280.00
				+ 20% Indirect Cost	$53,100.00
				TOTAL	**$318,000.00**

Project: Mississippi River Shoreline Repair and Stabilization

The City of Champlin will soon be starting the repair of the Mississippi River shoreline between Mississippi Point Park and Steamboat Landing. The Mississippi River stream banks and storm water outfalls were damaged from torrential rains that impacted the much of Minnesota during the period between June 11, 2014 and July 11, 2014. These events caused severe weather conditions resulting in widespread flooding in which State rivers and streams crested near record levels. As a result of the rainfalls and flooding a major disaster was declared for impacted areas in Minnesota including Champlin.

The flood waters of the Mississippi River caused damage to two storm water outfalls to the Mississippi River (along East River Parkway). Also, damaged were the river banks at Stream Boat Landing and Mississippi River Point Park.

The City of Champlin has determined that the project is feasible. The City Champlin Council approved the plans and specifications for the Mississippi River Shoreline Stabilization, that identified 1,600 feet of the Mississippi River shoreline to be repaired and armored with rip rap. Also, the City will repair two storm water outfalls that were damaged. The estimated project cost estimated to be $402,795. The City is requesting $75,000 for funding from 2016 Elm Creek WMC Levy.

Item 4b2

EC|CIPs|2016 Projects|Miss River Shoreline Repair and Stabilization

Item 4b2

PROJECT Manual

City of Champlin

City of Champlin
11955 Champlin Drive • Champlin, MN 55316

December 14, 2015

Mississippi River Shoreline Stabilization

City of Champlin
Hennepin County, Minnesota

City of Champlin Project No. 21509
WSB Project No. 1934-34

WSB & Associates, Inc.
477 Temperance Street
St. Paul, MN 55101
Tel: (651) 286-8450 · Fax: (651) 286-8488
wsbeng.com

Item 4b2

PROJECT MANUAL

MISSISSIPPI RIVER SHORELINE STABILIZATION
CITY PROJECT NO. 21509

FOR THE CITY OF CHAMPLIN
HENNEPIN COUNTY, MINNESOTA

December 14, 2015

Prepared by:

WSB & Associates, Inc.
477 Temperance Street
St. Paul, MN 55101
(651) 286-8450
(651) 286-8488 (Fax)

Item 4b2

CERTIFICATION

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly licensed professional engineer under the laws of the State of Minnesota.

Tim Hanson, PE

Date: December 14, 2015 Reg. No. 19574

Quality Control Review By:

Justin G. Messner, PE

Date: December 14, 2015 Reg. No. 45857

Item 4b2

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Item 4b2

ADVERTISEMENT FOR BIDS

MISSISSIPPI RIVER SHORELINE STABILIZATION
CITY PROJECT NO. 21509

FOR THE CITY OF CHAMPLIN
HENNEPIN COUNTY, MINNESOTA

NOTICE IS HEREBY GIVEN that sealed bids will be received by the City of Champlin at the office of the City Clerk until 10:00 a.m. local time, Tuesday, January 19, 2016, at the City Hall located at 11955 Champlin Drive, Champlin, Minnesota 55316 and will be publicly opened and read at said time and place by representatives of the City of Champlin. Said proposals for the furnishing of all labor and materials for the construction, complete in-place, of the following approximate quantities of construction items:

1	EACH	18" FES with Headwall
1	EACH	12" FES with Headwall
1000	LF	Shoreline Restoration
300	TON	Class III Rip Rap
800	TON	Class IV Rip Rap - Granite

The bids must be submitted on the Proposal Forms provided in accordance with the Contract Documents, Plans, and Specifications as prepared by WSB & Associates, Inc., 477 Temperance Street, St. Paul, MN 55101, which are on file with the City Engineer of Champlin, 11955 Champlin Drive, Champlin, Minnesota 55316 and may be seen at the office of the Consulting Engineers or at the office of the City Engineer.

Complete digital Proposal Forms, Plans, and Specifications for use by Contractors submitting a bid are available at www.questcdn.com. You may download the digital plan documents for a nonrefundable fee of $20.00 by inputting Quest project # 4200471 on the website's Project Search page. Please contact QuestCDN.com at 952-233-1632 or info@questcdn.com for assistance in free membership registration, downloading, and working with this digital project information.

An optional paper set of Proposal Forms, Plans, and Specifications may be obtained from the consulting engineers, WSB & Associates, Inc., 477 Temperance Street, St. Paul, MN 55101, for a nonrefundable fee of $40.00 per set, check payable to WSB & Associates, Inc.

The provisions of Minn. Stat. 16C.285 Responsible Contractor are imposed as a requirement of this contract. All bidders and persons or companies providing a response/submission to the Advertisement for Bids/RFP of the City shall comply with the provisions of the statute.

No bids will be considered unless sealed and filed with the City Clerk of Champlin and accompanied by a cash deposit, cashier's check, or certified check, or bid bond made payable to the City of Champlin for five percent (5%) of the amount bid, to be forfeited as liquidated damages in the event that the bid be accepted and the bidder fails to enter promptly into a written contract and furnish the required bond.

No bids may be withdrawn for a period of sixty (60) days from the date of opening of bids. The City of Champlin reserves the right to reject any or all bids.

DATED: December 14, 2015

BY ORDER OF THE CITY COUNCIL

s/s Roberta Colotti
City Clerk
Champlin, MN

PUBLISHED IN THE:	Champlin-Dayton Press	December 24, 2015 and December 31, 2015
	Finance & Commerce	December 24, 2015 and December 31, 2015

Item 4b2

Bidder:	
Address:	Telephone No.:
City, State, Zip:	Fax No.:

PROPOSAL FORM

MISSISSIPPI RIVER SHORELINE RESTORATION
CITY OF CHAMPLIN PROJECT NO. 21509
WSB PROJECT NO. 1934-34

Opening Time: 10:00 a.m.
Opening Date: Tuesday, January 19, 2016

City of Champlin
11955 Champlin Drive
Champlin, MN 55316

Dear Council Members:

1. The following proposal is made for furnishing and installing all labor and materials necessary for the Mississippi River Shoreline Restoration, City Project No. 21509, for the City of Champlin, Minnesota.

2. The undersigned certifies that the Contract Documents listed in the Instructions to Bidders have been carefully examined, and that the site of the work has been personally inspected. The undersigned declares that the amount and nature of the work to be done is understood, and that at no time will misunderstanding of the Contract Documents be pleaded. On the basis of the Contract Documents, the undersigned proposes to furnish all necessary apparatus and other means of construction, to do all the work and furnish all the materials in the manner specified, and to accept as full compensation therefore the sum of the various products obtained by multiplying each unit price herein bid for the work or materials, by quantities thereof actually incorporated in the completed project, as determined by the Engineer. The undersigned understands that the quantities mentioned herein are approximate only, and are subject to increase or decrease, and hereby proposes to perform all work as either increased or decreased, in accordance with the provisions of the specification, at the unit prices bid in the following proposal schedule, unless such schedule designates lump sum bids.

3. PROPOSED SCHEDULE: The Bidder agrees to perform all work described in the specifications and shown on the plans for the following unit prices:

Item 4b2

No.	Mat. No.	Item	Units	Quantity	Unit Price	Total Price
		SCHEDULE A - East River Parkway - Headwalls				
1	2021.501	MOBILIZATION	LS	1	$_____	$_____
2	2101.502	CLEARING	TREE	4	$_____	$_____
3	2021.501	GRUBBING	TREE	4	$_____	$_____
4	2104.601	REMOVE CMP	LF	14	$_____	$_____
5	2104.601	REMOVE RC PIPE	LF	16	$_____	$_____
6	2104.6902	REMOVE RCP APRON	EACH	1	$_____	$_____
7	2105.522	SELECT GRANULAR BORROW (LV)	C Y	20	$_____	$_____
8	2123.610	STREET SWEEPER (WITH PICKUP BROOM)	HOUR	4	$_____	$_____
9	2501.602	PIPE TIES	EACH	6	$_____	$_____
10	2501.602	12" RC PIPE APRON W/ PILING	EACH	1	$_____	$_____
11	2501.602	18" RC PIPE APRON W/ PILING	EACH	1	$_____	$_____
12	2501.602	18" RC PIPE	LF	16	$_____	$_____
13	2501.602	CONNECT TO EXISTING CMP	EACH	1	$_____	$_____
14	2511.501	RIP RAP, CL IV	TON	16	$_____	$_____
15	2511.515	GEOTEXTILE FILTER TYPE IV	S Y	8	$_____	$_____
16	2575.604	SEEDING MIX 25-151 (INCL TOPSOIL, FERT, CAT 3B BLANKET)	L S	1	$_____	$_____
17	2575.505	SODDING TYPE LAWN	S Y	260	$_____	$_____
		Total SCHEDULE A - East River Parkway - Headwalls				$_____

Item 4b2

No.	Mat. No.	Item	Units	Quantity	Unit Price	Total Price
		SCHEDULE B - Mississippi Point Park & Colburn Street North - Shoreline Stabilization				
18	2021.501	MOBILIZATION	LS	1	$_____	$_____
19	2101.501	CLEARING	ACRE	0.55	$_____	$_____
20	2101.605	CLEARING	TREE	6	$_____	$_____
21	2105.506	GRUBBING	ACRE	0.55	$_____	$_____
22	2101.605	GRUBBING	TREE	6	$_____	$_____
23	2231.503	STREET SWEEPING	HOUR	3	$_____	$_____
24	2401.601	SLOPE PREPARATION	L F	1600	$_____	$_____
25	2433.604	DEBRIS REMOVAL	L S	1	$_____	$_____
26	2511.501	GRANITE RIP RAP CLASS III	TON	100	$_____	$_____
27	2511.501	GRANITE RIP RAP CLASS IV	TON	1280	$_____	$_____
28	2511.511	GRANULAR FILTER	C Y	40	$_____	$_____
29	2511.601	FISHING PLATFORM	EACH	4	$_____	$_____
30	2511.602	OUTCROPPING	TON	30	$_____	$_____
31	2573.505	FLOTATION SILT CURTAIN TYPE MOVING WATER	L F	2000	$_____	$_____
32	2575.523	EROSION CONTROL BLANKETS CATEGORY 4	S Y	4500	$_____	$_____
33	2575.605	SEEDING MIX 25-151 (INCL TOPSOIL, FERT, CAT 3B BLANKET)	L S	1	$_____	$_____
34	2573.533	SEDIMENT CONTROL LOG TYPE WOOD CHIPS	L F	1800	$_____	$_____
35	2575.605	SEEDING MIX 36-711 (INCL TOPSOIL, FERT, CAT 3B BLANKET)	L S	1	$_____	$_____
		Total SCHEDULE B - Mississippi Point Park & Colburn Street North - Shoreline Stabilization				$_____
		GRAND TOTAL BID				$_____

Mississippi River Shoreline Stabilization and Appurtenant Work for the City of Champlin, Minnesota

PLAN SYMBOLS

- PROPOSED SANITARY
- EXISTING SANITARY
- PROPOSED STORM
- EXISTING STORM
- PROPOSED CATCH BASIN
- EXISTING CATCH BASIN
- PROPOSED WATERMAIN
- EXISTING WATERMAIN
- PROPOSED HYDRANT
- EXISTING HYDRANT
- PROPOSED FACE OF CURB
- PROPOSED EDGE OF BITUMINOUS

GOVERNING SPECIFICATIONS

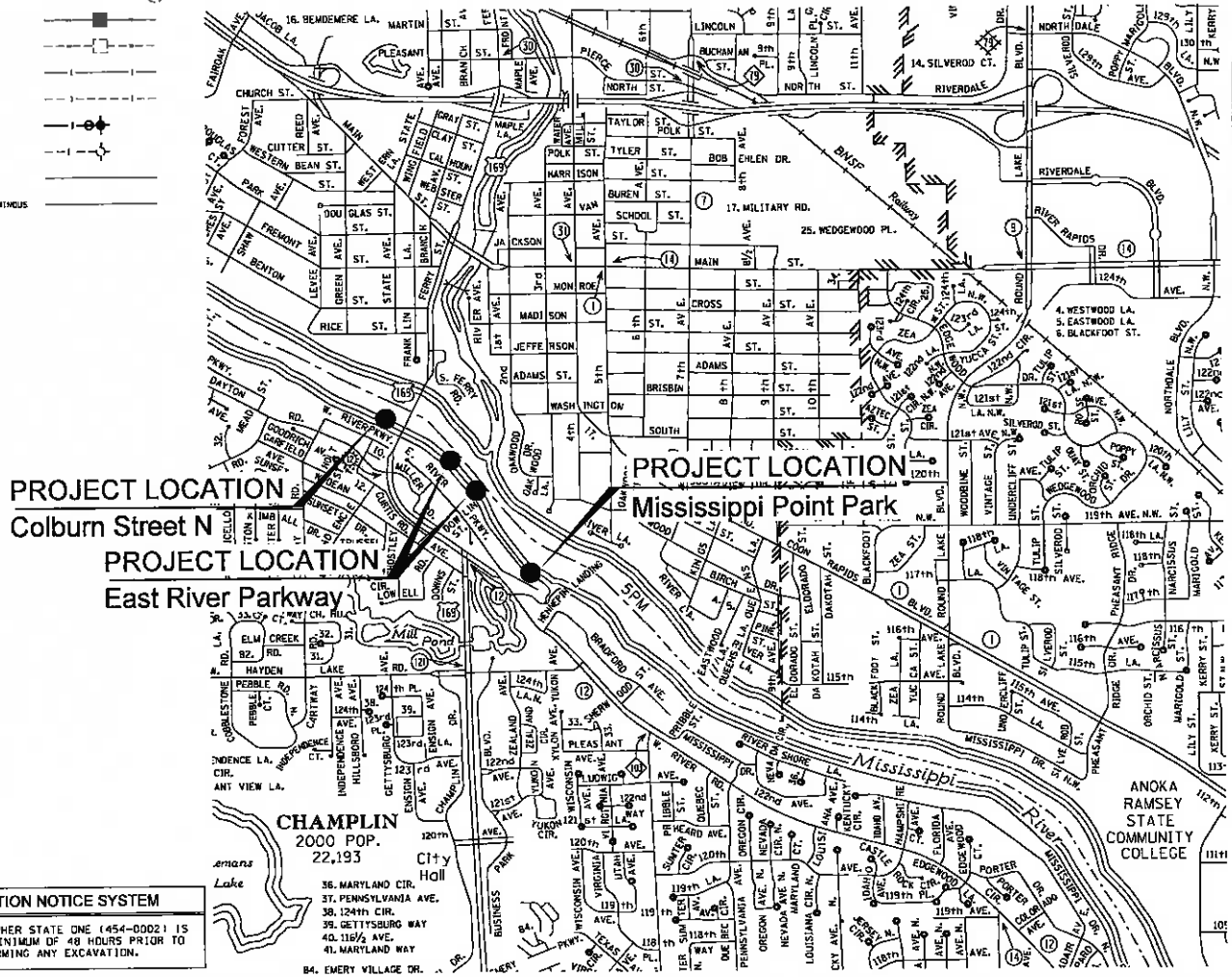
THE 2016 EDITION OF THE MINNESOTA DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR CONSTRUCTION SHALL GOVERN. SPECIAL PROVISIONS, AND ANY AMENDMENTS THERETO AND THE "STANDARD UTILITIES SPECIFICATION FOR TRENCH EXCAVATION AND BACK FILL/SURFACE RESTORATION AND STORM SEWER INSTALLATION" REFERENCED "CEAM" DATED 2013. OR AS MODIFIED IN THE PROJECT MANUAL.

ALL TRAFFIC CONTROL DEVICES AND SIGNING SHALL CONFORM TO THE MINNESOTA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES DATED MAY 2013, INCLUDING THE FIELD MANUAL FOR TEMPORARY TRAFFIC CONTROL ZONE LAYOUTS, DATED JANUARY 2014.

INDEX

THIS PLAN CONTAINS 8 SHEETS.

ALL APPLICABLE FEDERAL, STATE, AND LOCAL LAWS AND ORDINANCES WILL BE COMPLIED WITH IN THE CONSTRUCTION OF THIS PROJECT.



City of Champlin

THE SUBSURFACE UTILITY INFORMATION REPRESENTED ON THESE DRAWINGS CONCERNING TYPE AND LOCATION OF PRIVATE UTILITIES, AS OF THE PRINTED DATE, HAS BEEN DEPICTED TO THE BEST OF OUR KNOWLEDGE, FROM DRAWINGS SUPPLIED BY OWNERS. THIS INFORMATION IS FOR GENERAL USE ONLY AND NOT INTENDED TO BE USED FOR EXCAVATION PURPOSES.

THE SUBSURFACE UTILITY INFORMATION SHOWN ON THESE DRAWINGS CONCERNING TYPE AND LOCATION OF PRIVATE UTILITIES HAS BEEN DESIGNATED UTILITY QUALITY LEVEL D. THIS QUALITY LEVEL WAS DETERMINED ACCORDING TO THE GUIDELINES OF CI/ASCE 38-02, ENTITLED "STANDARD GUIDELINES FOR THE COLLECTION AND DEFINITION OF EXISTING SUBSURFACE DATA". THE INFORMATION SHOWN ON THESE DRAWINGS CONCERNING THE TYPE AND LOCATION OF PRIVATE UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. THE CONTRACTOR IS TO DETERMINE THE TYPE AND LOCATION OF PRIVATE UTILITIES AS MAY BE NECESSARY TO AVOID DAMAGE THERETO.

STATE LAW REQUIRES ANYONE DIGGING, GRADING OR EXCAVATING TO OBTAIN A FIELD LOCATE OF ALL UTILITIES.

EXCAVATION NOTICE SYSTEM

A CALL TO GOPHER STATE ONE (454-0002) IS REQUIRED A MINIMUM OF 48 HOURS PRIOR TO PERFORMING ANY EXCAVATION.

NO.	DATE	BY	CHK	REVISIONS

Design By: THC
Plan By: THC
Checked By: TCH
Approved By: TCH

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

TIMOTHY C HANSON PE
DATE: 12/14/15 LIC. NO. 43574

WSB & Associates, Inc.
477 Temperance Street
St. Paul, MN 55101
Tel: (651)696-8450 · Fax: (651)696-8488
wsbeng.com

Mississippi River Shoreline Stabilization and Appurtenant Work for the City of Champlin, Minnesota

WSB Project No. 01934-340
City Project No. 21506

Title Sheet

SHEET 1 OF 8

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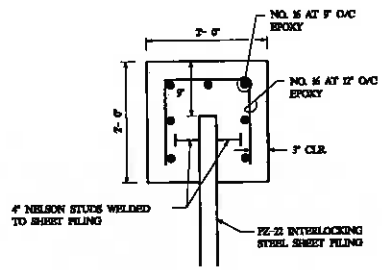
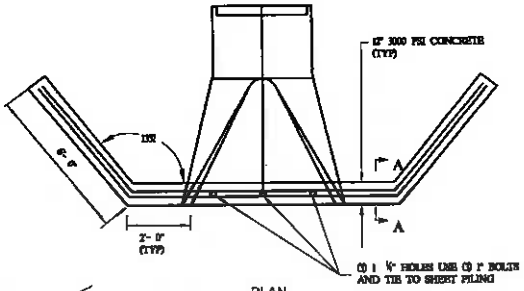
EC|CIPs|2016 Projects|Miss River Shoreline Repair and Stabilization

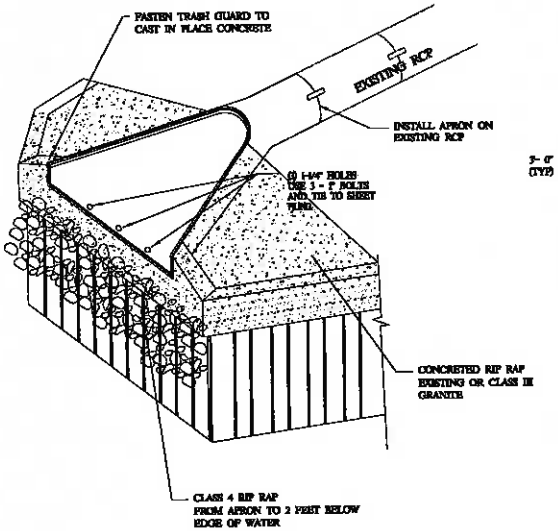


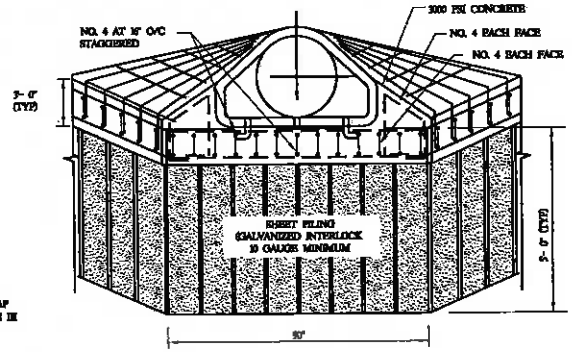
SECTION A - A

NO SCALE



PLAN





ELEVATION

PILING FOR FLARED END SECTION WITH SLOPE PROTECTION AT EAST RIVER ROAD

NO SCALE

NOTE:

1. SHEET PILING MUST BE DRIVEN TO A MINIMUM DEPTH OF 5 FEET OR TO REFUSAL.
2. CONSTRUCT COFFER DAM AROUND F.E.S.
3. DEWATER EXISTING PIPE.
4. INSPECT EXISTING RCP FOR JOINT SEPARATION
5. REPAIR STORM SEWER BY RELAYING PIPE IF NEEDED
6. CONSTRUCT SHEET PILE FOR F.E.S.

NO.	DATE	BY	CHK	REVISIONS

Design By: THC
Plan By: THC
Checked By: TCH
Approved By: TCH

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

TIMOTHY C HANSON PE

DATE 12/14/15 LIC. NO. 19574

WSB & Associates, Inc.
477 Temperance Street
St. Paul, MN 55101
Tel: (651)238-9459 • Fax: (651)238-9488
wsbeng.com

Mississippi River Shoreline Stabilization
and Appurtenant Work
for the City of
Champlin, Minnesota

WSB Project No. 01934-340
City Project No. 21506

Miscellaneous Details

SHEET 2 OF 8

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GENERAL NOTES:

1. SITE SURVEY AND BOUNDARY INFORMATION PROVIDED BY OWNER/ENGINEER.
2. CONTRACTOR SHALL VERIFY EXISTING CONDITIONS PRIOR TO BIDDING AND CONSTRUCTION START. CONTRACTOR IS RESPONSIBLE FOR ALL LOCATES. ALL LOCATES SHALL BE REVIEWED BY THE OWNER/ENGINEER PRIOR TO CONSTRUCTION START.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING STRUCTURES, UTILITIES, TREES, SITE AMENITIES, ETC. THAT ARE TO REMAIN FROM DAMAGE DURING CONSTRUCTION.
4. CONTRACTOR SHALL BE RESPONSIBLE FOR CORRECTING ANY DAMAGE TO EXISTING ITEMS TO REMAIN (AT CONTRACTOR'S EXPENSE) AND IS CONSIDERED INCIDENTAL TO THE CONTRACT.
5. DIMENSIONS TAKE PRECEDENCE OVER SCALE. DIMENSIONS ARE TO BACK OF CURB WHERE APPLICABLE. UNLESS STATED OTHERWISE. FIELD VERIFY (FV) ITEMS SHALL BE FIELD VERIFIED BY THE CONTRACTOR.
6. ANY DISCREPANCIES FOUND THAT AFFECT THE WORK SHALL BE REPORTED TO THE ENGINEER. FOR CLARIFICATION PRIOR TO ANY ADDITIONAL WORK BEING COMPLETED.

PROJECT LAYOUT NOTES:

1. THE LAYOUT INFORMATION PROVIDED IS FOR BIDDING PURPOSES AND VERIFICATION OF CRITICAL LAYOUT DIMENSIONS. THE ENGINEER RESERVES THE RIGHT TO REVISE THE PROJECT LAYOUT TO AVOID UNFORESEEN CONSTRAINTS, SUCH AS MATURE TREES, UNFORESEEN SOIL CONSTRAINTS, ETC. CHANGES IN BID QUANTITIES WILL BE BASED ON A PER UNIT BASIS FOR UNIT BID ITEMS LISTED ON THE BID FORM.

FIELD LOCATION NOTE:

1. ALL SITE IMPROVEMENTS SHALL BE FIELD STAKED AND THE CONTRACTOR SHALL MEET WITH THE ENGINEER TO REVIEW STAKES AND MAKE ADJUSTMENTS AS NECESSARY PRIOR TO ANY WORK BEING DONE.

SHORELINE STABILIZATION NOTES:

1. ALL WEEDS AND SEEDLINGS 1" CAL. AND SMALLER SHALL BE REMOVED PRIOR TO STONE INSTALLATION. CONTRACTOR SHALL KILL ALL WEEDS PRIOR TO REMOVING ALONG THE SHORELINE TO BE STABILIZED. CONTRACTOR SHALL LEAVE ALL SEEDLINGS AND TREES LARGER THAN 1" TO MAINTAIN STABILIZATION. UNLESS NOTED ON THE PLANS FOR REMOVAL. CONTRACTOR MUST WORK AROUND EXISTING PLANT MATERIAL.
2. CONTRACTOR SHALL VERIFY EXISTING CONDITIONS PRIOR TO BIDDING AND CONSTRUCTION START.

STONE SELECTION AND INSTALLATION NOTES:

1. STONE SELECTION INSPECTION - CONTRACTOR SHALL PROVIDE THE LANDSCAPE ARCHITECT, (WSB AND ASSOCIATES, INC.), WITH A NOTICE OF A MINIMUM OF 10 DAYS PRIOR TO SELECTING STONE FOR THE PROJECT. THE ENGINEER SHALL INSPECT AND APPROVE THE GENERAL CHARACTERISTICS OF THE STONE PROPOSED FOR USE IN THE PROJECT. INSPECTION SHALL BE AT THE SOURCE OF THE STONE.
2. OUTCROPPING BOULDERS SHALL BE GRANITE GLACIAL FIELDSTONE BOULDERS.
3. OUTCROPPING BOULDER SIZE - BOULDERS SHALL NOT BE LESS THAN A 2 TO 1, WIDTH TO HEIGHT RATIO, AS MEASURED BY THE EXPOSED VERTICAL FACE OF THE IN-PLACE STONE. BOULDERS SHALL BE 30" TO 36" AND NOT LESS THAN 48 CUBIC FEET IN VOLUME.
4. FLAGSTONE FISHING PLATFORM TYPE - FLAGSTONE FISHING PLATFORM SHALL BE NY BLUESTONE IRREGULAR FLAGGING. SIZES SHALL BE RANDOM WITH A MINIMUM OF 16 SQ. FT. SURFACE AREA AND A MAXIMUM OF 25 SQ. FT. SURFACE AREA. FLAGSTONE THICKNESS SHALL BE BETWEEN 3 AND 6 INCHES.
5. FLAGSTONE STEPS TYPE - FLAGSTONE STEPS FOR THE STONE FISHING PLATFORM SHALL BE NY BLUESTONE IRREGULAR FLAGGING. SIZES SHALL BE RANDOM WITH A MINIMUM OF 8 SQ. FT. SURFACE AREA AND A MAXIMUM OF 16 SQ. FT. SURFACE AREA. FLAGSTONE THICKNESS SHALL BE BETWEEN 5 AND 8 INCHES.

OUTCROPPING, FLAGSTONE STEPS AND FISHING PLATFORM SETTING BED

1. STONE OUTCROPPING SETTING BED - STONES SHALL BE SET ON A MINIMUM 6" BED OF 'FINE FILTER' AGGREGATE 'PEA ROCK'.
2. BOULDER OUTCROPPING, SHORELINE RESTORATION, AND COBBLE INSTALLATION - ALL STONES SHALL BE HAND SET. STONES SHALL BE PLACED IN A MANNER THAT MOST REALISTICALLY MIMICS A NATURAL CONDITION. STONES SHALL BE PLACED SO THAT THE WIDEST DIMENSION OF THE STONE IS PARALLEL TO THE GROUND PLANE. THE SETBACK OF SUCCEEDING LAYERS SHALL VARY GRADUALLY ACROSS THE FACE OF THE INSTALLATION. THE SET BACK OF THE STONES SHALL BE DETERMINED IN THE FIELD AND SHALL BE A FACTOR OF INDIVIDUAL STONE SIZE AND EXISTING LAND CONTOURS. STONES SHALL BE CHOSEN TO INSURE A SECURE FIT AND STABLE FINAL INSTALLATION.
3. SETTING BOULDERS AND COBBLES - BASE STONES AND BORDER STONES TO BE SET WITH A MINIMUM OF 20% OF THE STONE BURIED. BASE AND BORDER STONE SHALL APPEAR TO BE NATURALLY SET IN THE EARTH.
4. STONE VOIDS - VOIDS BETWEEN BOULDERS SHALL BE MINIMIZED. VOIDS GREATER THAN 3" IN SIZE SHALL NOT BE ACCEPTABLE. THE COBBLES SHALL BE WEDGED TIGHTLY INTO VOIDS AND REMAINING SPACES BETWEEN COBBLES AND BOULDERS SHALL BE PACKED WITH STONE SETTING BED MATERIAL.
5. INSTALLATION INSPECTION - CONTRACTOR SHALL PROVIDE THE LANDSCAPE ARCHITECT, (WSB AND ASSOCIATES, INC.), WITH A NOTICE OF A MINIMUM OF 10 DAYS PRIOR TO BEGINNING STONE INSTALLATION. THE LANDSCAPE ARCHITECT SHALL BE ON SITE DURING THE INITIAL DAY OF STONE INSTALLATION TO PROVIDE THE CONTRACTOR WITH ADDITIONAL AESTHETIC GUIDANCE IN PLACEMENT OF THE STONES.

SPECIAL NOTE
THE PLANS OUTLINED HEREIN GENERALLY DESCRIBE THE PROPOSED IMPROVEMENTS FOR THE MISSISSIPPI RIVER SHORELINE RESTORATION PROJECT.

AS PART OF CONSTRUCTION FOR THESE PROPOSED IMPROVEMENTS, THE CONTRACTOR IS EXPECTED TO WORK CLOSELY, IN THE FIELD, WITH THE OWNERS REPRESENTATIVE REGARDING THE FINAL EXTENT AND LOCATION TO WHICH THE PROPOSED IMPROVEMENTS ARE INSTALLED.

GENERAL CONSTRUCTION NOTES

1. EROSION CONTROL BLANKET SHALL BE MNDOT CATEGORY 3B OR AS SPECIFIED.
2. SEED BED SHALL BE PREPARED WITH A MINIMUM OF 4 INCHES OF TOPSOIL WITH NO EXTRANEOUS MATERIAL OVER ¾ INCHES ON THE SURFACE.
3. ALL DISTURBED AREAS MUST BE STABILIZED AFTER 48 HOURS OF INACTIVITY.
4. CONTRACTOR IS RESPONSIBLE TO LOCATE AND FIELD VERIFY ALL EXISTING UTILITIES PRIOR TO WORK.
5. ALL TREES WITH A DIAMETER OF 4 INCHES OR LARGER SHALL BE MARKED FOR REMOVAL BY OWNER OR OWNER'S REPRESENTATIVE. TREES REMOVED THAT ARE NOT MARKED SHALL BE REPLACED IN KIND AT CONTRACTORS EXPENSE.
6. EXISTING ROADS, PARKING LOTS, TRAILS, FENCES, SIGNS AND ALL OTHER ASSOCIATED AND EXISTING FACILITY SITE FEATURES SHALL BE PROTECTED DURING CONSTRUCTION. CONTRACTOR IS RESPONSIBLE FOR REPAIRING ALL DAMAGE THAT OCCURS TO EXISTING FACILITIES.
7. CONTRACTOR SHALL INSTALL ALL EROSION CONTROL BMPS PRIOR TO COMMENCEMENT OF GRADING FOR EACH MAINTENANCE SITE.
8. ALL GROUND DISTURBANCE GENERATED BY GRADING ACTIVITIES SHALL BE STABILIZED AND RESTORED BY FINISH GRADING WITH TOPSOIL, APPLYING SEED AND EROSION CONTROL BLANKET.
9. ACCESS SHALL BE GAINED PER LOCATIONS SHOWN OR DESCRIBED WITHIN THE PLANS OR AS DIRECTED BY THE ENGINEER.

RECOMMENDED CONSTRUCTION SEQUENCE

1. PROVIDE TRAFFIC CONTROL SIGNS AS NEEDED
2. INSTALL SEDIMENT CONTROL LOGS AND SILT CURTAIN
3. CLEAR AND GRUB TREES AS MARKED IN THE FIELD AND AS DIRECTED BY ENGINEER
4. LIMIT DISTURBANCE ALONG UPPER CHANNEL BANKS WHEN SHAPING LOWER SLOPES.
5. INSTALL FILTER AGGREGATE AND GEOTEXTILE FABRIC
6. INSTALL BOULDER TOE AS DIRECTED BY ENGINEER (SEE DETAIL)
7. FINISH GRADE DISTURBED AREAS, SPREAD TOPSOIL, AND SEED
8. INSTALL CATEGORY 3B EROSION CONTROL BLANKET
9. REMOVE SEDIMENT CONTROL LOGS, SILT CURTAIN, AND ANY MISCELLANEOUS DEBRIS THAT WAS REMOVED FROM THE BANK

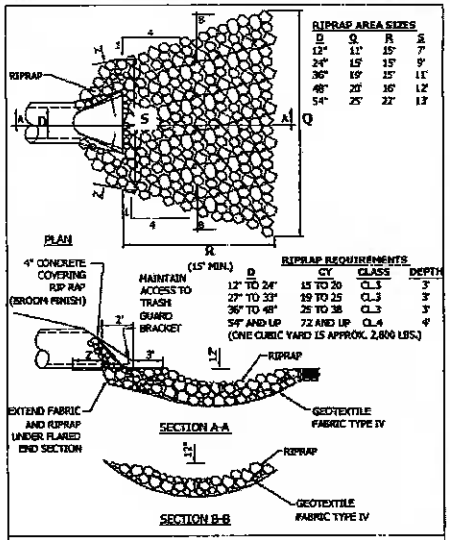
SEEDING SPECIFICATIONS:

TURF ESTABLISHMENT
RESHAPED AND DISTURBED AREAS IN PROJECT AREA WILL BE REESTABLISHED WITH THE FOLLOWING:

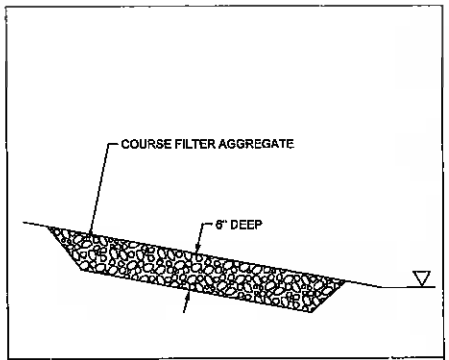
SEED MIX MNDOT 25-131 @ 220 LBS/AC
SEED MIX MNDOT 25-151 @ 220 LBS/AC
FERTILIZER MNDOT TYPE 3 @ 350 LBS/AC
EROSION BLANKET MNDOT TYPE 3B FOR (SLOPES GREATER THAN 4:1)
AREAS REQUIRING TURF ESTABLISHMENT WILL BE DIRECTED BY THE ENGINEER IN THE FIELD AND INCLUDE EITHER TYPE I MULCH MATERIAL OR CATEGORY 3B EROSION CONTROL BLANKET.

THE PLACEMENT OF THESE SEED MIXES WILL BE DIRECTED BY THE ENGINEER IN THE FIELD

ADDITIONAL TEMPORARY SEED: ADDITIONAL OATS OR WINTER WHEAT SHALL BE MIXED INTO MIXES @ 40 LBS/AC TO PROVIDE A FAST GROWING VEGETATIVE COVER.



Rip Rap at Outlets



COURSE FILTER AGGREGATE

NO.	DATE	BY	CHK	REVISIONS

Design By: THC
Plan By: THC
Checked By: TCH
Approved By: TCH

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

TIMOTHY C HANSON PE
DATE: 12/14/15 LIC. NO. 18574

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Mississippi River Shoreline Stabilization and Appurtenant Work for the City of Champlin, Minnesota

WSB Project No. 01934-340
City Project No. 21506

Miscellaneous Details

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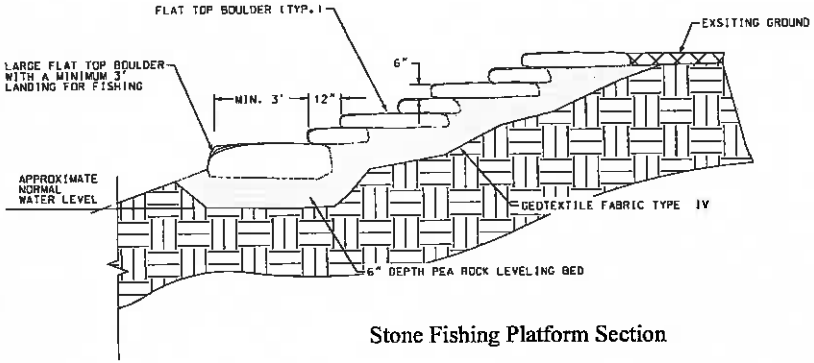
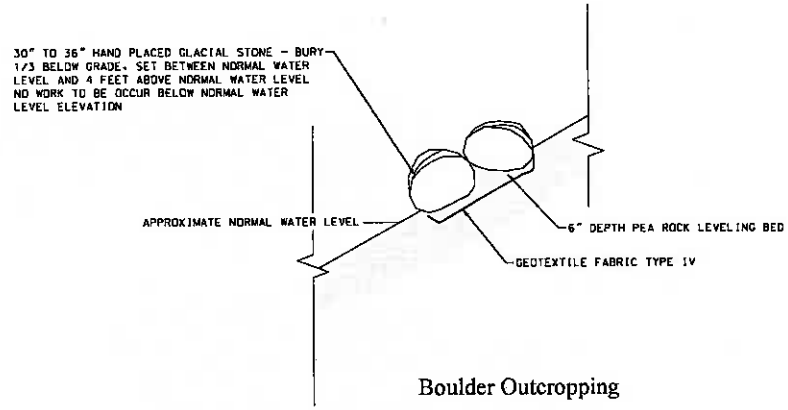
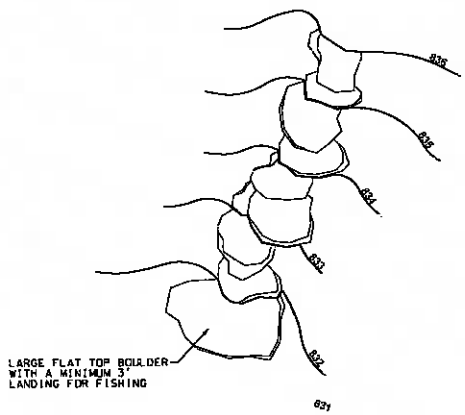


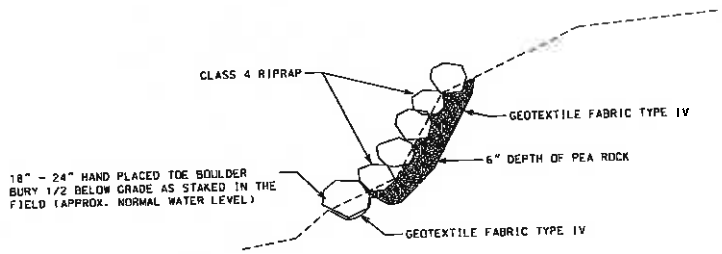
Stone Fishing Platform Section



Boulder Outcropping



Stone Fishing Platform Typical Plan



Typical Cross Section

CLASS III RIPRAP TO BE UTILIZED TO FILL GAPS AS NEEDED.

NO.	DATE	BY	CHK	REVISIONS

Design By: THC
Plan By: THC
Checked By: TCH
Approved By: TCH

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VINCENT C HANSON PE

DATE 12/14/15 LIC. NO. 19574

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WSB Project No. 01934-340
City Project No. 21506

Miscellaneous Details

SHEET 4 OF 8

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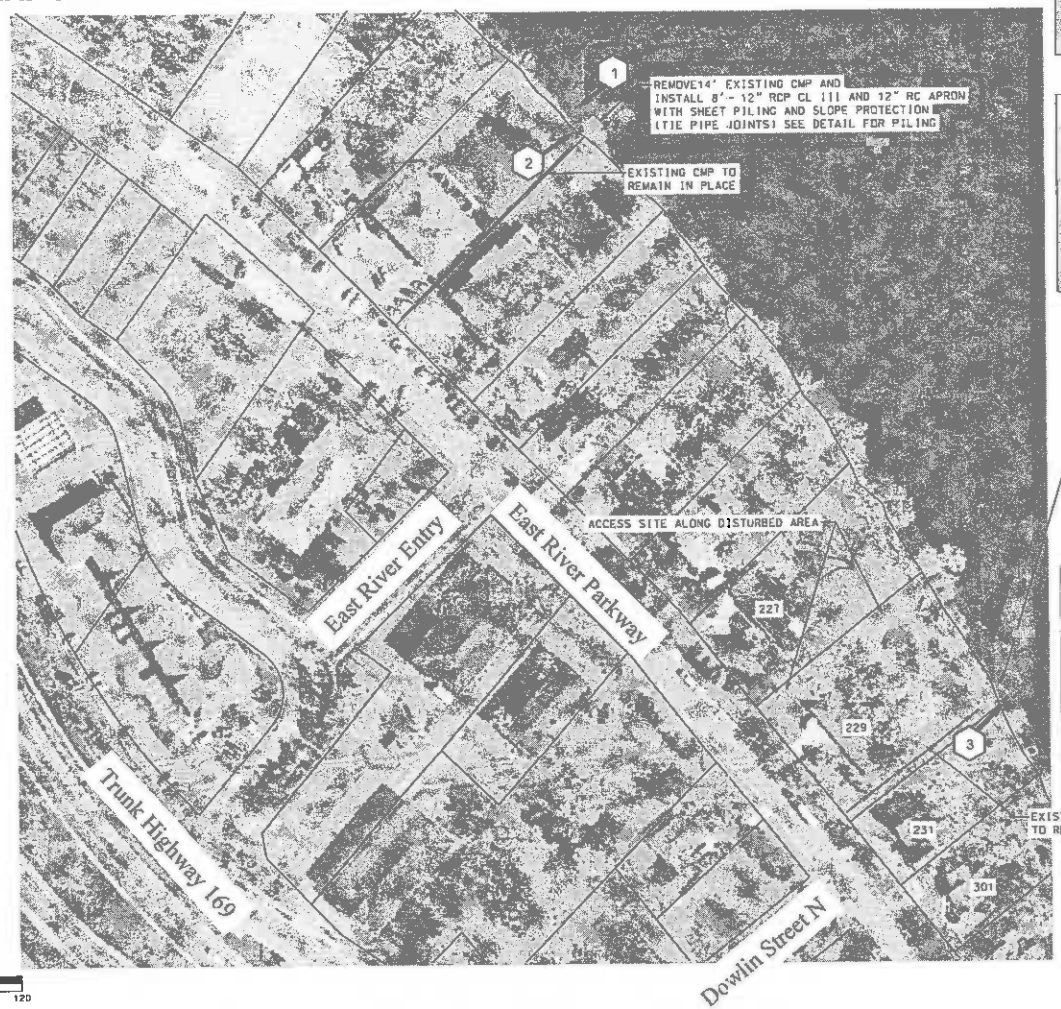
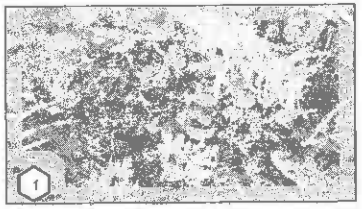
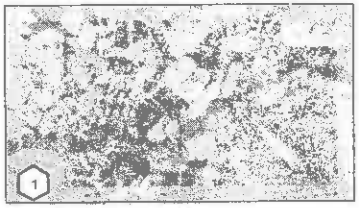
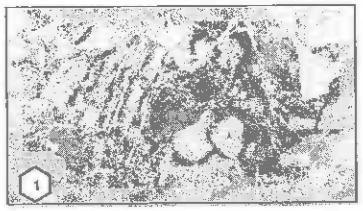
EC|CIPs|2016 Projects|Miss River Shoreline Repair and Stabilization

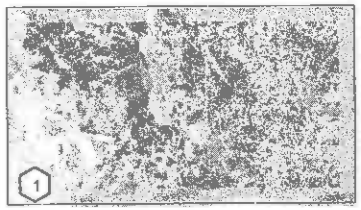
NOTES:
1. CONTRACTOR SHALL PROTECT EXISTING UTILITIES DURING CONSTRUCTION AT NO ADDITIONAL COMPENSATION.
2. THE EXISTING UTILITIES SHOWN ON THESE PLANS ARE APPROXIMATE IT IS THE CONTRACTORS RESPONSIBILITY TO VERIFY THEIR EXACT LOCATION AND ELEVATION.
3. SEED DISTURBED AREA WITH Mn/DOT SEED MIX 25-151 @ 220 lbs/acre AND TYPE 3 FERTILIZER @ 350 lbs/acre AND EROSION CONTROL BLANKET 3B NATURAL NET



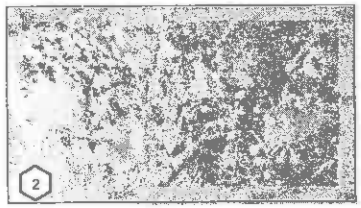


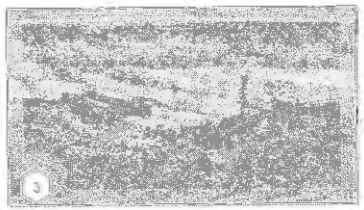






REMOVE EXISTING RC APRON AND 16'- 18" RCP INSTALL 16'- 18" RCP CL III AND 18" RC APRON WITH SHEET PILING AND SLOPE PROTECTION (TIE PIPE JOINTS) SEE DETAIL FOR PILING





EXISTING 18" RCP CLASS III TO REMAIN IN PLACE

NO.	DATE	BY	CHK	REVISIONS

Design By: THC
Plan By: THC
Checked By: TCH
Approved By: TCH

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JONATHAN C. HANSON PE
DATE 12/14/15 LIC. NO. 19574

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Mississippi River Shoreline Stabilization
and Appurtenant Work
for the City of
Champlin, Minnesota

WSB Project No. 01934-340
City Project No. 21506

East River Parkway

SHEET 5 OF 8

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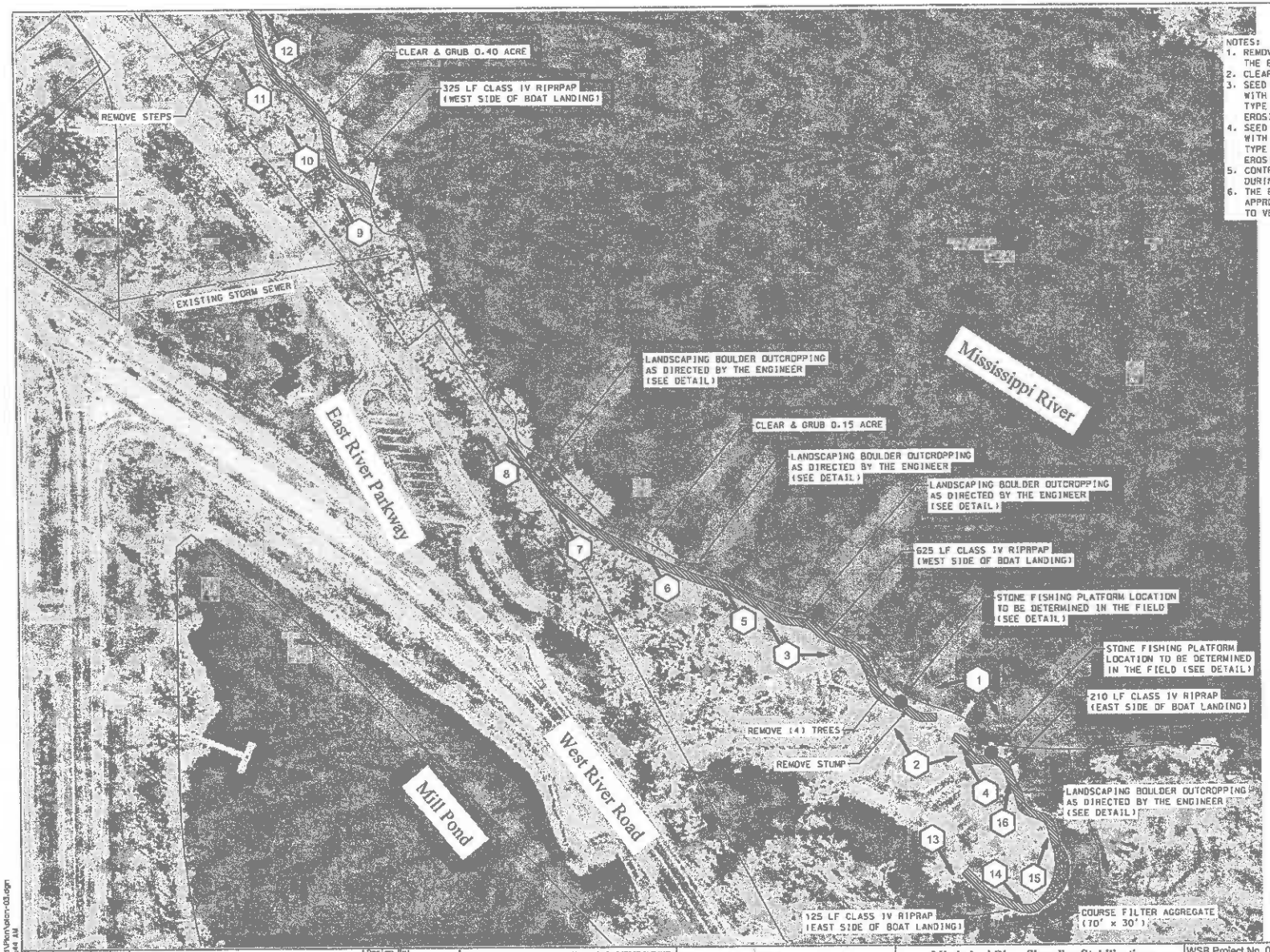
EC|CIPs|2016 Projects|Miss River Shoreline Repair and Stabilization



NOTES:

1. REMOVE DRIFT WOOD AND CONCRETE AS DIRECTED BY THE ENGINEER IN THE FIELD.
2. CLEARING AND GRUBBING AS DIRECTED BY THE ENGINEER.
3. SEED DISTURBED AREA WITHIN MAINTAINED PARK AREA WITH Mn/DOT SEED MIX 36-711 @ 35.5 lbs/acre AND TYPE 3 FERTILIZER 10-10-10 @ 250 lbs/acre AND EROSION CONTROL BLANKET 3B NATURAL NET
4. SEED DISTURBED AREA OUTSIDE MAINTAINED PARK AREA WITH Mn/DOT SEED MIX 25-151 @ 220 lbs/acre AND TYPE 3 FERTILIZER 10-10-10 @ 250 lbs/acre AND EROSION CONTROL BLANKET 3B NATURAL NET
5. CONTRACTOR SHALL PROTECT EXISTING UTILITIES DURING CONSTRUCTION AT NO ADDITIONAL COMPENSATION.
6. THE EXISTING UTILITIES SHOWN ON THESE PLANS ARE APPROXIMATE IT IS THE CONTRACTORS RESPONSIBILITY TO VERIFY THEIR EXACT LOCATION AND ELEVATION.

LEGEND

1 PICTURE NUMBER AND DIRECTION OF PHOTO (SEE SHEET 8)

NO.	DATE	BY	CHK	REVISIONS

Design By: THC
Plan By: THC
Checked By: TCH
Approved By: TCH

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TIMOTHY C HANSON PE

DATE: 12/14/15 LIC. NO: 19574

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Mississippi River Shoreline Stabilization
and Appurtenant Work
for the City of
Champlin, Minnesota

WSB Project No. 01934-340
City Project No. 21506

Mississippi Point Park
River Bank Restoration

SHEET 6 OF 8

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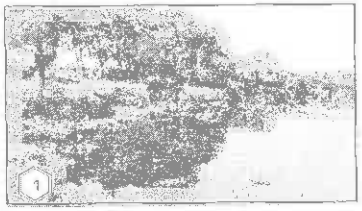

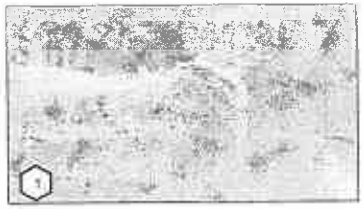

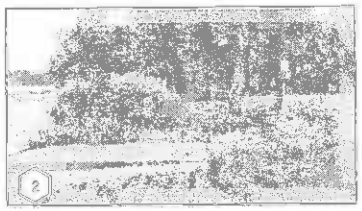

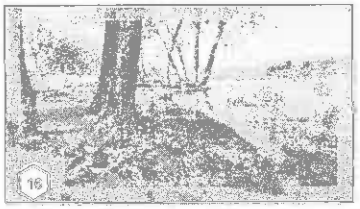

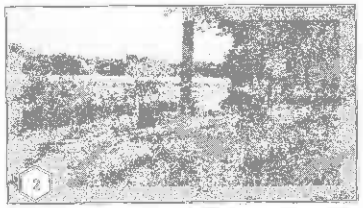

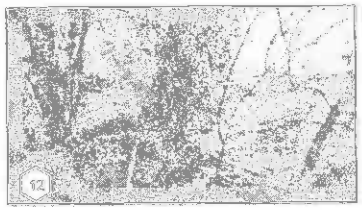

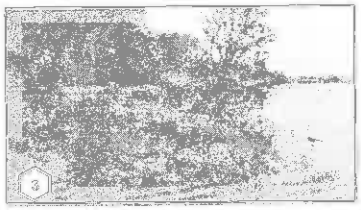

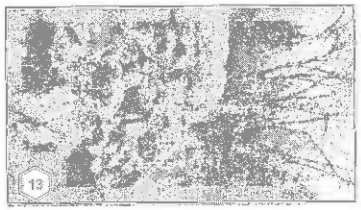

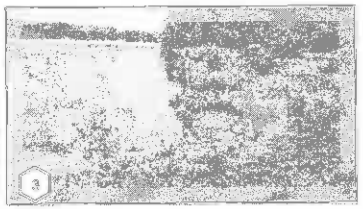

NO.	DATE	BY	CHK	REVISIONS

Design By: THC
Plan By: THC
Checked By: TCH
Approved By: TGM

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

TIMOTHY C HANSON PE

DATE: 12/14/15 LICENSE NO. 19834

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Mississippi River Shoreline Stabilization and Appurtenant Work for the City of Champlin, Minnesota

WSB Project No. 01934-340
City Project No. 21506

Mississippi Point Park
River Bank Restoration

SHEET 7 OF 8

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NOTES:
1. REMOVE DRIFT WOOD AND CONCRETE AS DIRECTED BY THE ENGINEER IN THE FIELD.
2. CLEARING AND GRUBBING AS DIRECTED BY THE ENGINEER.
3. SEED DISTURBED AREA WITH Mn/DOT SEED MIX 25-151 @ 220 lbs/acre AND TYPE 3 FERTILIZER @ 350 lbs/acre AND EROSION CONTROL BLANKET 3B NATURAL NET
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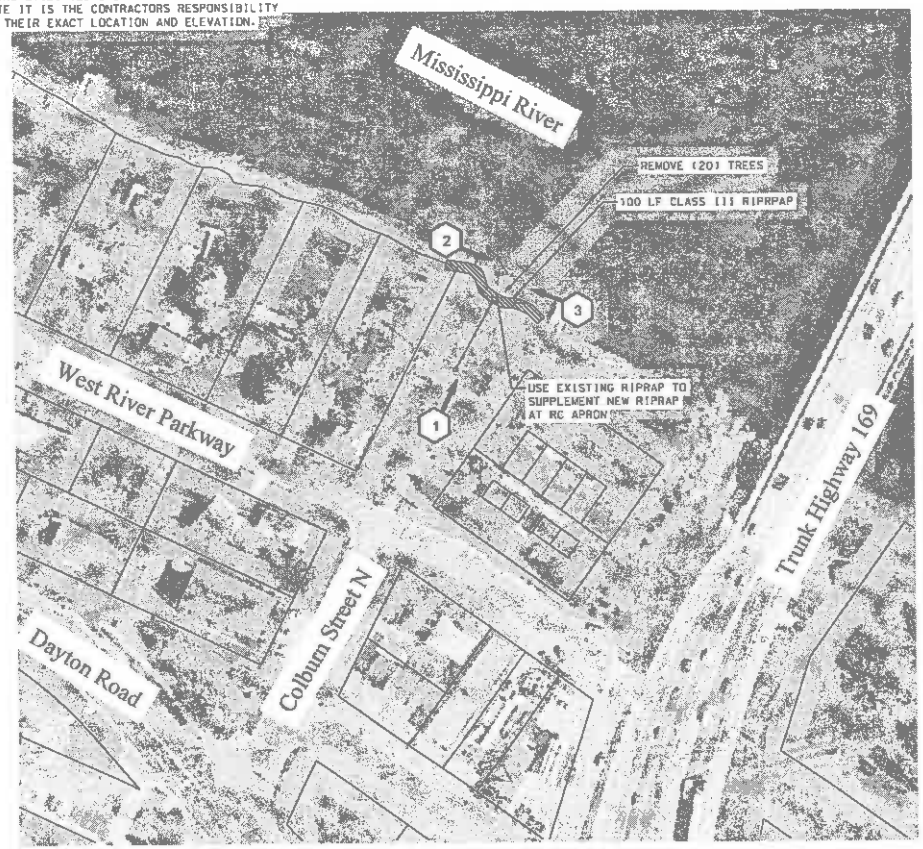

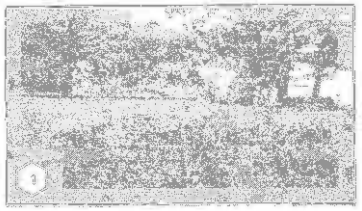

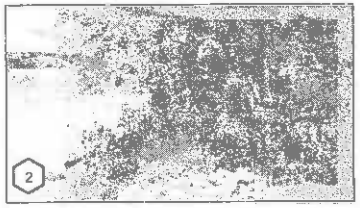

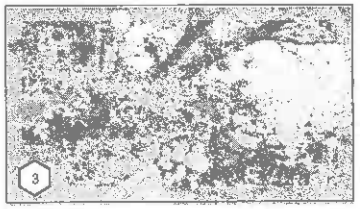

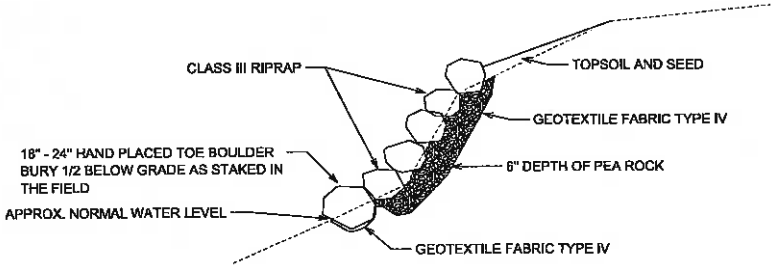

Typical Cross Section

NOTE:
SLOPE ALONG SHORELINE VARIES - PLACE RIPRAP TO MATCH EXISTING TERRAIN DO NOT EXCEED 1:1 SLOPE

N

0 60 120

NO.	DATE	BY	CHK	REVISIONS

Design By: THC
Plan By: THC
Checked By: TCH
Approved By: TCH

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA

TIMOTHY C HANSON PE

DATE: 12/14/15 LIC. NO. 19574

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Mississippi River Shoreline Stabilization and Appurtenant Work for the City of Champlin, Minnesota

WSB Project No. 01934-340
City Project No. 21506

Colburn Street N
River Bank Restoration

SHEET 8 OF 8

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EC|CIPs|2016 Projects|Miss River Shoreline Repair and Stabilization

Project: Elm Creek Dam at the Mill Pond

This project is a portion of a $7+ million project to replace the Elm Creek Dam and Bridge, public access construction, and flood mitigation at the Mill Pond location in Champlin. The project will construct a new spillway capable of conveying the 100-year peak discharge while providing one foot of freeboard before the embankment is overtopped. A new exterior weir capable of conveying 2,840 cfs, exceeding the design flow of 2,780 cfs will also be constructed. A 105-foot interior weir will contain low flows in a rock-lined channel. Four 10x8 box culverts will serve as an emergency spillway. The Elm Creek dam is collaborative project including: Champlin Hennepin County, DNR, 2014 Bonding Bill, West Mississippi WMC and the Elm Creek WMC. The City is requesting $187,500 from the 2016 Elm Creek WMC levy.

The project addresses several safety issues related to the existing dam, which was built in 1936, along with flooding issues, and also allows for future maintenance of the Mill Pond. As part of this project, the City proposes to install a 25-foot long, 48-inch, reinforced concrete pipe to allow for the drawdown of the Mill Pond for maintenance of the impoundment and management of aquatic invasive species. The extensive weed growth has caused various problems including problem odors, increased siltation within the Mill Pond, clogging of the Elm Creek Dam spillway, and blocking flows of Elm Creek at the TH 169 Bridge, all of which create potential safety concerns.

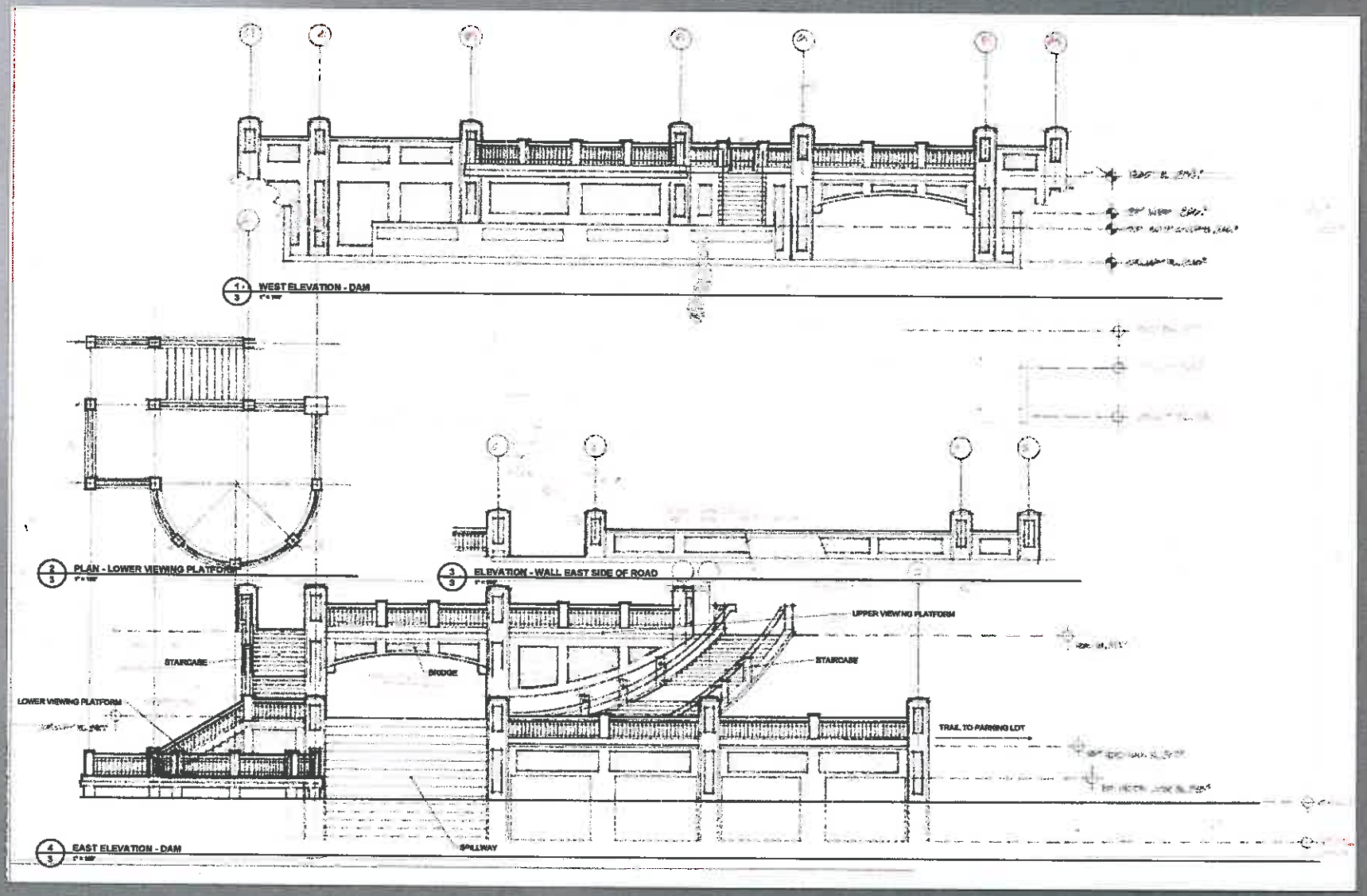
Because replacement of the dam is required to meet safety standards for the roadway, impacts above the OHW associated with the bridge/dam replacement are eligible for replacement through the BWSR Road Replacement Program. Wetland mitigation on the project will not be required.

The construction of the flood culvert and the new dam will result in 45 acres being removed from the flood hazard area. The flood reduction culvert will be installed at an elevation that is similar to that of the natural channel of Elm Creek. The invert and dimensions of the culvert are necessary to reduce the high water level upstream.

The total project bid exceeded the original Engineering estimates. The factors that contributed for the increased cost included changes to construction market that impacted the price of concrete work throughout the metro. In addition, the bids received reflected greater sense of risk for the cost of dewatering and stream diversion compared to the engineering cost estimates. Champlin's total cost for the project is estimated at $2,100,220. The City of Champlin has request funding from the Elm Creek Watershed in the amount of $250,000. 2014 Levy $62,500 and 2016 Levy $187,500.

Item 4b3

Elm Creek Dam



EC|CIPs|2016 Projects|EC Dam at Mill Pond

Item 4b3

Elm Creek Floodway /Floodplain

EC|CIPs|2016 Projects|EC Dam at Mill Pond

ELM CREEK DAM
EMBANKMENT AND SPILLWAY REHABILITATION STUDY

FOR THE
CITY OF CHAMPLIN
AND HENNEPIN COUNTY

December 1, 2010

Prepared By:

WSB & Associates, Inc.
701 Xenia Avenue S., Suite 300
Minneapolis, MN 55416
(763) 541-4800
(763) 541-1700 (Fax)

CERTIFICATION

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Steven G. Gurney, PE

Date: December 1, 2010 Lic. No. 40497

Quality Control Review By:

Peter R. Willenbring, PE

Date: December 1, 2010 Lic. No. 15998

TABLE OF CONTENTS

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1. INTRODUCTION AND PURPOSE

Franklin Delano Roosevelt's New Deal program was responsible for building 361 dams in Minnesota during the 1930's. A 2003 United States Army Corp of Engineers report recommended nine of these dams be remediated including the Elm Creek Dam in Champlin. The Minnesota Department of Natural Resources (DNR) has identified the Elm Creek Dam as a high priority improvement project.

This report explores the conditions of the Elm Creek Dam, and identifies reconstruction and repair options for the nearly 75-year old dam. The chief goal of this report, funded by the City of Champlin and Hennepin County, is to establish a plan to address the safety concerns with the dam. The report also attempts to identify solutions to area floodplain issues caused, in part, by the dam.

2. BACKGROUND

Champlin's current Elm Creek Dam was built in the 1936 as part of the Works Progress Administration (WPA) program. The dam is owned by Hennepin County. The dam and the surrounding area are shown on ***Figure 1***. The existing primary spillway consists of three major components:

- Twin 10'x8' box culverts under West River Road
- A concrete, stair-stepped spillway
- Wooden stop logs to raise the normal operating pool of the pond

The Elm Creek Dam was constructed with no dedicated secondary spillway. During a typical year, the spillway operates with no or low flows, except during spring runoff. If the capacity of the primary spillway is exceeded, water will overtop the entire 900-foot embankment, which functions as an overflow weir. The downstream face of the embankment consists of steep slopes (steeper than 2H:1V.) Approximately 300 feet of this embankment has a vertical drop of greater than 20 feet. The steep slopes and long vertical drop make the downstream face of the embankment susceptible to erosion if the dam were overtopped. This erosion most likely would cut through the embankment, resulting in failure of the dam.

The dam is classified as a significant-hazard dam by the DNR because West River Road traverses the longitudinal axis of the dam. Based on Hennepin County data, an average of 8,550 vehicles travel this road daily. With traffic exposed to the overtopping flow, there is an increased potential for loss of life. The current road surface consists of a rural section road with no curb and gutter. A pedestrian trail, parallel to the road, is being undermined by runoff from the road.

The following reports and studies have been reviewed in preparation for this report. This information has aided us in defining the goals of the project and creating a repair plan that will meet those goals.

- Flood Insurance Study (FIS), prepared by FEMA, dated September 2, 2004.
- *Section 524 Inventory and Assessment Report, WPC Dams in Minnesota* prepared by the US Army Corps of Engineers, dated March 6, 2003
- Dam inspection report prepared by DNR, dated May 29, 2002.
- Bridge inspection report prepared by Hennepin County, dated September 18, 2008
- *Elm Creek Watershed Management Commission Comprehensive Watershed Management Plan*, prepared by WSB, dated April, 2003.
- *City of Champlin Storm Water Management Plan*, prepared by WSB, dated March 2009.
- Survey data provided by Hakanson Anderson Associates, Inc., dated October 31, 2008.
- *Feasibility Analysis for Elm Creek Restoration*, prepared by WSB, dated January 15, 2009.

Additionally, multiple field visits were conducted by various individuals to assess the condition of the dam. These activities are discussed in the following section.

3. INVESTIGATIVE WORK COMPLETED

This section describes the work done to evaluate the current condition of the dam. The work includes field investigations and detailed calculations to evaluate the current condition the dam. A brief description of the procedures and methods utilized for each evaluation is presented below. Findings of each evaluation are discussed in ***Section 4*** and the full reports are included in the appendices.

3.1 Hydrologic/Hydraulic Evaluation

To begin the hydrologic/hydraulic investigation process, we reviewed existing studies completed for Elm Creek and the Elm Creek Dam. We obtained the current hydrology model from the Hennepin Conservation District (HCD). The HCD model is based off of the 1970's TR-20 model originally used to predict peak flows in Elm Creek. The HCD converted the old model to a HydroCAD format, and updated the model to reflect changes in the Elm Creek Watershed since 1970. This was done for purposes of evaluating the Elm Creek channel.

To verify the model, we compared the definition and routing of the subwatershed areas of the HydroCAD model to those of the TR-20 input data. The updated HCD model was found to be consistent with the 1970's study. We then evaluated several different storm events, including the 100-year, 10-day snow melt and the 100-year and 500-year, 24-hour rainfall events.

Based on the results of the modified HCD model, the peak flow rates for Elm Creek were slightly lower than the peak flow rates published in the FEMA study. The peak flow rates were submitted to the Dam Safety Office of the Minnesota Department of Natural Resources (DNR) for review. At the direction of the DNR, we are using the previously published flow rates from the 1970 study. Since these flow rates are based on the spring snow melt event, in which all ground is considered frozen, changes in land cover within the watershed will have no impact on peak flows. See ***Appendix B*** for DNR correspondence and excerpts from the 1970 study.

3.2 Geotechnical Evaluation of the Existing Embankment

As part of our scope of services, we coordinated the geotechnical evaluation of the Elm Creek Dam embankment. This work was begun by American Engineering and Testing, Inc. (AET) on April 13-14, 2010. At that time, soil borings were drilled and samples taken. The samples were submitted to the AET laboratory for classification in accordance with the Unified Soil Classification System. The borings noted fill materials to a depth of approximately 10 feet with the existing underlying materials being generally permeable materials. Their entire report is included as ***Appendix C***.

3.3 Structural Evaluation of Existing Concrete Spillway

On April 21, 2010, we completed an onsite structural evaluation. This evaluation focused on the condition of the concrete spillway and its foundation. Along with a visual inspection of the primary spillway components, an underwater inspection of both the forebay and stilling basin was performed. Pictures documenting the condition of each component were taken using an underwater camera. The entire report is included in ***Appendix D***.

4. FINDINGS / RESULTS

This section highlights the findings of the field investigations and suggests improvements based on each individual evaluation. The recommendations of each evaluation interact with each other; therefore, these recommendations should not be taken individually. The recommendations outlined in ***Section 8*** have been developed based on an overall view of the project.

4.1 Hydraulic Capacity of Spillway

The hydraulic capacity of the spillway does not meet current design standards and spillway capacity must be increased.

Lack of hydraulic capacity is typical of WPA-built dams. The twin box culverts are capable of conveying approximately 1,400 cfs before the embankment is overtopped. This corresponds to a 10-year flood event when compared to the flow rates published in the 2004 FIS for Hennepin County.

The following table shows the peak flows for both the FEMA study and our separate analysis. The design flow rates are highlighted. Because these flow rates are based on the 10-day snow melt event, they will not be impacted by future development in upstream areas.

Storm Event	*Computed Peak Flow Rate (cfs)*	*Peak Flow Rates from FIS (cfs)*
100-year	2,600	**2,780**
500-year	4,000	**4,350**

Because the Elm Creek Dam is classified by the DNR as a significant-hazard dam, the primary spillway must be capable of conveying the peak 500-year flow rate, 4,350 cfs in order to meet current design standards. If an open-channel spillway is chosen for the replacement structure, a 75-foot wide spillway would be needed if the elevations of the existing spillway's outlet weir are maintained.

Alternatively, if traffic was removed from the dam, the dam would be re-classified as a low-hazard dam, which requires a spillway large enough to convey the 100-year peak flow rate. In order to convey this rate, a 50-foot wide spillway with a 100-foot weir would need to be constructed.

In order to meet design standards, the new spillway widths listed above provide 1 foot of freeboard before the embankment is overtopped.

4.2 Integrity of Earthen Embankment

The existing embankment is in need of repairs to bring it up to current standards and prevent further degradation of its structural integrity of the embankment. These include:

- either flattening or reinforcement of the downstream slope
- removal of trees and other vegetation
- redirection of road drainage away from slopes.

These recommendations are based on general dam-safety guidelines and is based on these findings of the investigation into the integrity of earthen embankment:

- AET's soil borings indicate that the dam's earthen embankment does not contain an impermeable core to limit seepage through the embankment. While this is not a fatal flaw, it is not the way new dams are constructed. No noticeable seepage was observed on the downstream face of the embankment during this inspection. The 2003 COE report, however, noted seepage was present north of the spillway.
- The downstream slope (1.2H:1V) of the existing berm is steeper than recommended slope (2H:1V) for grassed slopes.

- Immediately north of the spillway, a veneer-type slope movement involving the outer 2 to 3 feet was noted. As noted on page 4 of the report, this type of slide is progressive, and the rate of slope material movement is a function of the moisture condition in the outer slope material.
- To repair the veneer-type slope movement, it is recommended that the embankment be reconstructed to flatten the slopes, repair existing erosion, and repair holes from removed trees. The reconstructed cross section should consist of a three-layer aggregate face that will serve two purposes. First, it will intercept seepage that may migrate through the embankment and, second, it will provide protection from erosion on the surface of the embankment slope.
- The existing road surface does not have curb and gutter. Lacking this edge control, storm water runoff is not conveyed to the CMP culverts. This runoff has exacerbated the slope movement by over saturating the slope.
- There are numerous trees growing on the embankment. This can impact the integrity of the embankment by providing locations for water to seep through the embankment. Over time, flow through these areas may erode the embankment. Animal burrows pose a similar concern with potential erosion. Fortunately, there were no signs of animal burrows on the embankment.
- There is significant erosion behind the wing walls at the base of the spillway.

4.3 Structural Integrity of Existing Concrete Spillway

The existing concrete spillway is in fair structural condition compared to similar structures of this age. Generally, concrete structures have an expected lifespan of 75 to 100 years, meaning this structure is reaching the end of its useful life. Repairs to the spillway could be made, but they will most likely only add 15 to 20 years to the spillway's lifespan.

WSB's field evaluation found the following:

- The primary structural elements are sound but may have some cracking and spalling.
- The face of the concrete box culverts shows signs of spalling and some rebar is exposed.
- The existing wooden stop logs at the culvert inlet are starting to deteriorate and should be replaced.
- The maintenance bridge over the culvert/spillway inlet is in poor shape and should be removed. At a minimum, the bridge should be fenced off to prevent unauthorized personnel from using the structure.
- A small amount of erosion was noted under the stilling basin.

5. DESIGN OPTIONS

Four design options were identified that could be considered to address issues related to the dam. For all of the design options, a number of activities have been identified that are common to each of these options. These activities include:

- Removal of trees from the existing embankment
- Re-grading of the embankment slopes and hard armoring these slopes at the downstream water edge to protect the slope from erosion
- Installation of a lake bottom withdrawal system upstream of the dam to allow for the periodic upstream draw down of the basin and management of base flow discharge rates through the structure during low flow conditions
- Installation of trails, and overlook/viewing platforms

The four options are discussed below. Detailed cost estimates for each option are included in ***Appendix E***.

5.1 Option 1: Repair Existing Structure and Armor Embankment to Accommodate 500-year Event Without Washout

This project consists of completing structural repairs to the existing dam to allow its service life to be extended 15 to 20 years, and stabilizing the existing embankment to prevent a washout should high flows overtop the roadway.

Notes/Features:

- Seal cracks in the concrete spillway chute
- Complete surface patching of box culvert
- Raise wing walls at base of spillway
- Armor downstream embankment to prevent washout should water overtop road and flow across downstream slope
- Existing structure only has capacity to accommodate 1,400 cfs, and road will overtop for events greater than 10-year return frequency
- Due to hydraulic design deficiency, obtaining outside funding for "repairs" to structure may be difficult

Estimated Cost:

$1,900,000

5.2 Option 2: Replace Existing Dam with New Dam

This project will replace existing dam with new dam capable of passing 500-year peak flow (4,300 cfs) without overtopping the roadway.

Notes/Features:

- A dam similar to the existing one would be constructed, however, spillway width would be increased from 20 feet wide to 75 feet
- Bridge spanning 75-foot wide spillway would be installed
- Design will lower 100-year flood plain elevation in upstream watershed by one foot when compared to existing structure

Estimated Cost:

$3,300,000 – City Road Design Option (36-foot wide bridge)
$4,000,000 – County Road Design Option (64-foot wide bridge)

5.3 Option 3: Replace Existing Dam with Multiple Culverts, Eliminating Open Spillway

This option consists of replacing the open spillway with multiple culverts capable of passing the 500-year peak flow. The roadway would be constructed over these culverts without the need for a bridge.

Notes/Features:

- Will reduce the 100-year flood profile upstream by one foot with that of existing conditions
- Open spillway appearance would be eliminated
- This is the most inexpensive and lowest maintenance design option
- Limited aesthetic features are associated with this option

Estimated Cost:

$2,100,000 – City Road Design Option (36-foot total width for roadway and trails)
$2,200,000 – County Road Design Option (64-foot total width for roadway and trails)

5.4 Option 4: Construct Hybrid of Option 2 and 3

This option, similar to Option 3, installs culverts to pass the 500-year overflow but also incorporates an open channel/bridge to pass flows up to 250 cfs (covers flow rates observed during typical year), to create/maintain aesthetic benefits of open spillways.

Notes/Features:

- Design will reduce 100-year flood elevation by one foot compared to existing structure
- Includes an option for construction of an aesthetically-enhanced rock lined spillway/waterfall that would be designed to pass typical flows in an aesthetically pleasing manner
- If the option to construct a rock-lined spillway is not selected, a spillway similar to the existing structure would be constructed to pass typical flows
- Construction of a shorter 25 to 30 foot bridge over the spillway/waterfalls to further improve the aesthetic benefits of the design

Estimated Cost:

$2,800,000 – City Road Design Option (36-foot wide bridge)
$3,200,000 – County Road section (64-foot wide bridge)

6. CONSIDERATIONS FOR WATER QUALITY MANAGEMENT

During the preparation of the feasibility analysis that looked at water quality for Elm Creek, several construction improvements were recommended that would improve water quality within the impoundment of the Elm Creek dam. While the majority of these items can still be constructed as a stand-alone project, there may be some benefit to constructing some of them as part of a dam repair project. The most notable improvement that should be constructed as part of the dam improvements is the lake bottom withdrawal system. This system consists of a 48-inch reinforced concrete pipe that would be extended out into the impoundment area, providing a submerged intake that would allow for the withdrawal of water from just above the bottom of the pond. Costs for this item are included in all of options as discussed in ***Section 5***.

7. FLOODPLAIN MANAGEMENT WITH A NEW DAM

Options 2-4 will impact flood plain boundaries by lowering the flood profile. In order to meet current design standards, one foot of freeboard will be provided between the high water level and the embankment overtopping elevation. This will result in a maximum high water elevation of 850 during the 100-year flood event. This elevation is approximately 2 feet lower than the starting elevations of the existing flood profile analysis. Based on a cursory review, it appears

that this lower starting elevation will result in areas being removed from the flood plain as shown in ***Figure 10***.

8. HISTORICAL CONSIDERATIONS

The 2003 study by the Corps of Engineers identified the Elm Creek Dam as one of the more significant dams constructed during the Work Progress Administration (WPA.) Based on this, further discussion with the State Historic Preservation Officer (SHPO) should be undertaken to determine what, if any, archeological requirements may apply to this project.

Fortunately, Option 4 provides for reconstruction of the spillway with similar characteristics and dimensions. It is believed that this will meet any SHPO requirements that may be come out of their review process.

9. RECOMMENDATION

The City has indicated the desire to proceed with Option 4, which consists of constructing a new open spillway for low flow events with a multiple-culvert overflow spillway capable of conveying the 500-year peak flow. The preferred finish for the spillway is a stepped concrete configuration similar to the existing spillway. A photo rendering of this alternative is shown in ***Figure 10***. This option allows the top of the dam to continue to be used as a road carrying traffic from one side to the other.

We have started to meet with concerned stakeholders to develop funding for the project. The DNR indicated that the bonding bill passed this last session contained $250,000 in matching funds for this work. They also indicated that they are willing to include a request for additional funding in the 2012 bonding bill.

At this time, it may be advantageous to consider incorporating some or all aspects of the water quality study into this improvement project. As the design moves forward, a Conditional Letter of Map Revision (CLOMR) should be prepared to document the potential reduction in flood plain limits can be explored. The existing WPA dam most likely has historical significance. The SHPO should be contacted to determine the level to which the existing structure must be documented before it is removed. Both of these activities are outside of our current scope of work.

City of Champlin

Hennepin

OPTION 4: CONSTRUCT HYBRID OF OPTIONS 2 AND 3

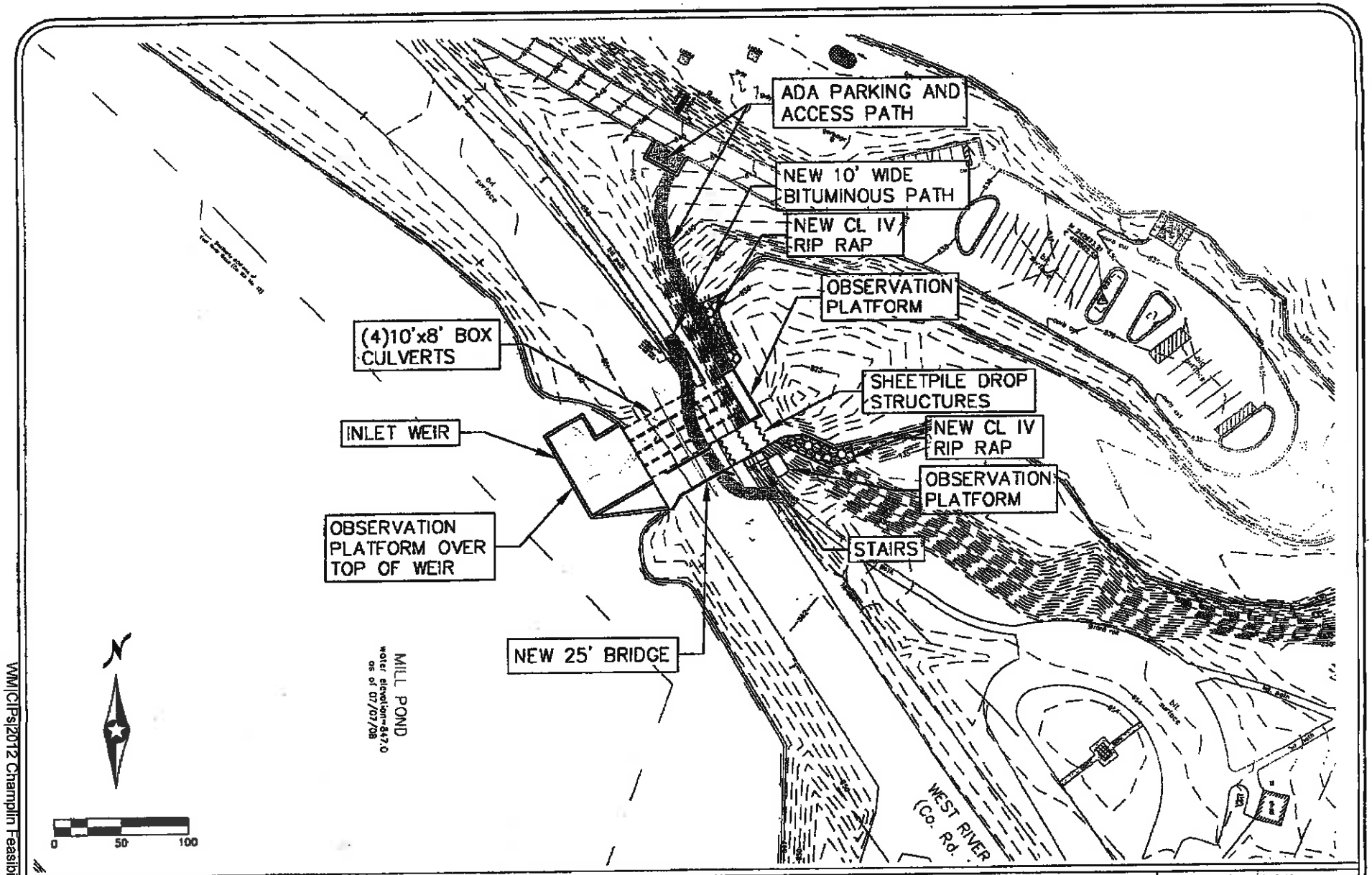
(NOT TO SCALE) DECEMBER 2010

701 Xenia South, Suite 300
Minneapolis, MN 55416
www.wsbeng.com

WSB & Associates, Inc.

FIGURE 9

WM|CIPs|2012 Champlin Feasibility Study Extract



WSB & Associates, Inc.
701 Xenia Avenue South, Suite 300
Minneapolis, MN 55416
www.wsbeng.com
763-541-4800 - Fax 763-541-1700
INFRASTRUCTURE » ENGINEERING » PLANNING » CONSTRUCTION

OPTION 4
CONSTRUCT HYBRID OF OPTIONS 2 AND 3

ELM CREEK DAM REHABILITATION STUDY
CHAMPLIN, MN.

City of Champlin

WSB Project No. 01684-48

Hennepin

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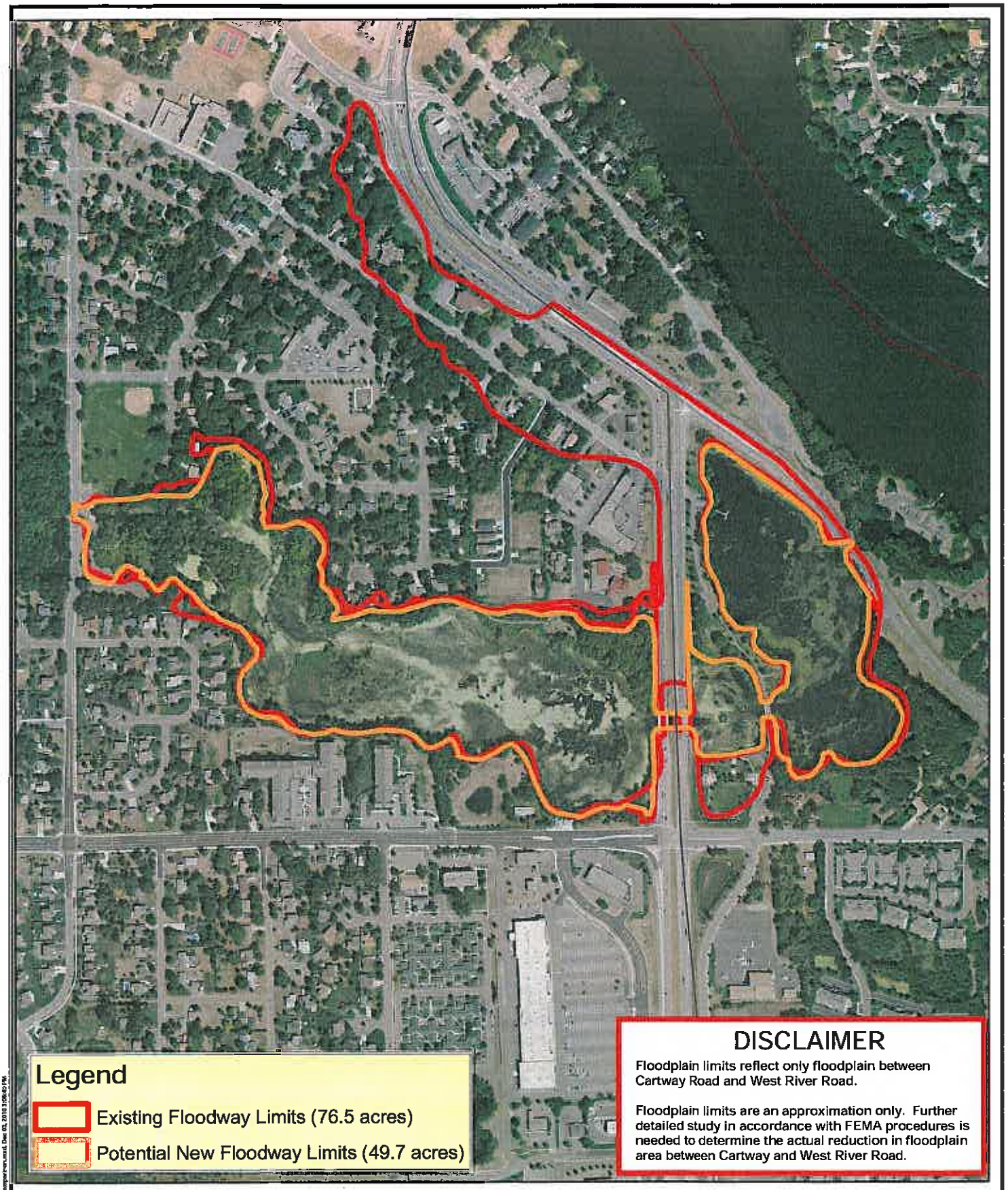


City of Champlin

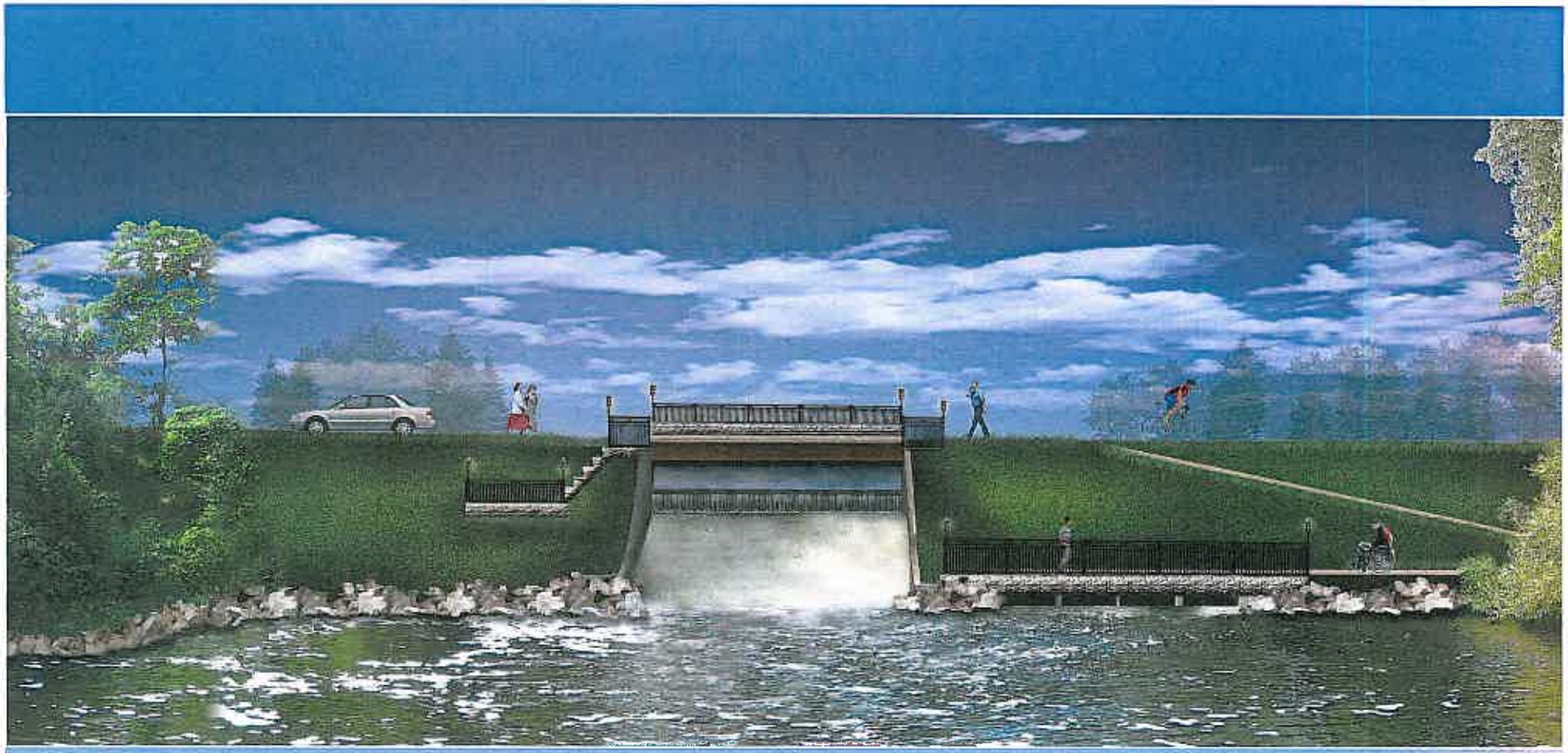
Figure 10
Elm Creek Floodplain
Champlin, MN

1 inch = 520 feet

N

WSB & Associates, Inc.

WM|CIPs|2012 Champlin Feasibility Study Extract
EC|CIPs|2016 Projects|EC Dam at Mill Pond



City of Champlin

Hennepin

PREFERRED CONCEPT PLAN - ELM CREEK DAM

(NOT TO SCALE) DECEMBER 2010

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Minneapolis, MN 55416
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WSB & Associates, Inc.

FIGURE 11

WM|CIPs|2012 Champlin Feasibility Study Extract

Embankments

Minor erosion is occurring at the upstream embankments at the ends of the wingwalls

The downstream slopes have experienced severe erosion and are no longer stable. There is bituminous paving on areas of the slope that is being undermined and is failing. The slopes should be repaired and restored.

Eroded Downstream Slopes

Eroded Downstream Slopes

Elm Creek Dam Project Cost

- Total Estimated Cost: $3,437,300
- Cost Eligible for Reimbursement by Elm Creek WMC:
  - Down Stream Bank Stabilization: $268,175
  - Emergency Spillway and Flood Control Structures: $240,000
  - Mobilization(Stabilization and Flood Control): $ 15,000

Subtotal $ 523,175

Requested Amount $250,000

Initial Request ($62,500)

2016 Funding Request ***$187,500***

FEASIBILITY REPORT For

The Enclave on Rush Creek

Prepared for:

City of Maple Grove, Minnesota
City Project No. 16-05

January 2016

Stantec Project No. 193803313

Stantec

January 19, 2016

Honorable Mayor and City Council
City of Maple Grove
12800 Arbor Lakes Parkway
Maple Grove, MN 55369

Re: The Enclave on Rush Creek
Maple Grove, MN
City Project No. 16-05
Stantec Project No. 193803313

Dear Mayor and Council:

Enclosed for your review is the Feasibility Report for The Enclave on Rush Creek.

This report describes the improvements necessary to provide municipal utilities and streets for a 67 lot single family home development. A cost summary and proposed assessments are presented in the Cost and Assessment Summary section of the report.

We would be pleased to meet with the City Council and Staff to discuss our report at any mutually convenient time.

Respectfully submitted,

STANTEC CONSULTING SERVICES INC.

Darren T. Amundsen, P.E.

I hereby certify that this Report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Darren T. Amundsen, P.E.
Date: January 19, 2016 Reg. No. 40924

Table of Contents

CITY OF MAPLE GROVE

Recommendations

The construction of municipal utilities and streets to serve The Enclave on Rush Creek development is feasible from an engineering standpoint. The following recommendations are presented.

Adopt a resolution accepting the Feasibility Report and ordering plans and specifications.

Provide staff direction on trunk water main options.

Hold a public hearing or hearings for improvements in the following amounts:

The Enclave on Rush Creek	**$3,683,341.57**
Territorial Road Improvement Project	**$116,000.00**

Notify the following parcels of the public hearing(s):

The Enclave on Rush Creek Property 0411922210001*

Territorial Road Improvement Properties

0411922120003	0411922240001
0411922140004	0411922240008
0411922210001*	0411922240011
0411922220003	0411922240012
0411922220004	0411922410001
0411922220005	0411922420005
0411922220006	0411922420009
0411922220007	0411922420010
0411922230002	0511922110002
0411922230003	0511922110004
0411922230005	0511922110005
0411922230007	0511922110006

*The Enclave on Rush Creek Property is included in the Territorial Road assessments.

Project Description

This report investigates the feasibility to provide municipal infrastructure to support the proposed residential development The Enclave on Rush Creek. The development is comprised of 67 single family units, a community pool and pool house, and trail connection. The development is located on the border of Maple Grove and Dayton west of Fernbrook Lane and north of Territorial Road. The project location is detailed in Figure 1. Unique topography and Rush Creek creates an isolated condition where access to the development will route through the City of Dayton's Sundance Woods development. This project also considers trunk water main improvements along Fernbrook Lane or Territorial Road providing water system connection to the City of Dayton discussed later in the report.

Proposed Development Improvements

Sanitary Sewer and Water Main

The proposed development improvements are shown on Figure 2. An eight-inch sanitary sewer is proposed to serve The Enclave on Rush Creek development. An eight-inch diameter sanitary sewer will be installed which will gravity drain from the north end of the plat to a lift station located on the southernmost outlot. The lift station will then pump the sanitary north via force main into Dayton's eight-inch diameter sanitary system. The proposed lift station will be designed to have sufficient capacity for 25-acres of future medium density residential developments to the east and north of Rush Creek. A minimum of eight-inch diameter water main will be provided throughout the development. The new water main will connect to the existing water system from Dayton at the current north end of the Plat. Sanitary sewer and water services will be provided throughout the development. A four-inch sanitary sewer service and one-inch water service will be extended nine feet into each lot. Trunk water main may run through the development and is discussed further in the upcoming Trunk Water Main section.

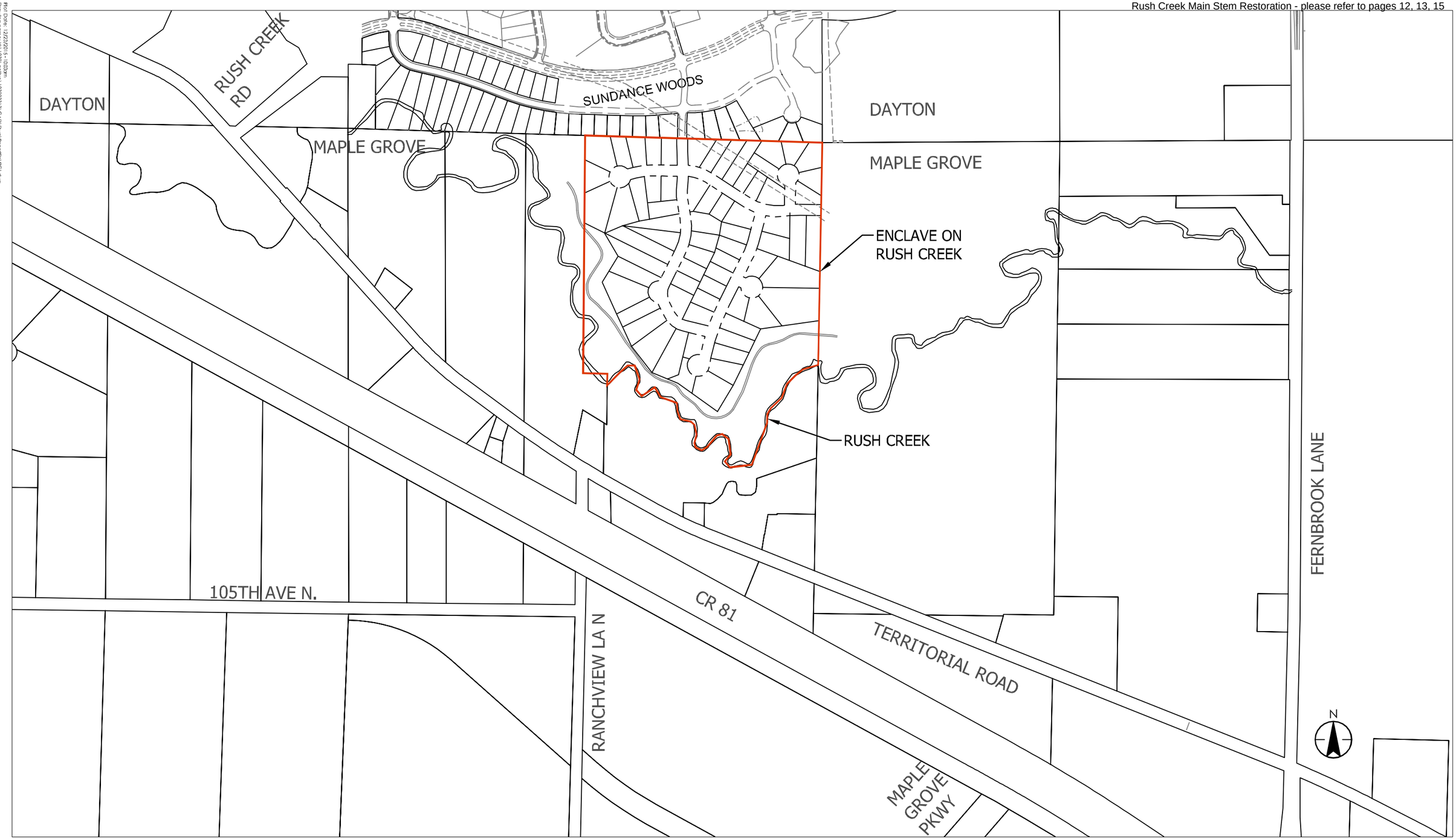
Storm Sewer

The proposed improvements are shown on Figure 3. An existing storm water pond is located just north of the proposed development in Dayton and drains into development's storm water system. The north half of the proposed development is routed to a pond and filtration basin located along the eastern property line. This pond outlets to an existing drainage way and flows to Rush Creek. The southern half of the proposed development is routed to a pond and filtration basin at the southern end of the property near Rush Creek. The storm water infrastructure will be constructed to retain and treat the storm water according to Maple Grove, Minnesota Pollution Control Agency, and Elm Creek Watershed requirements.

Streets and Sidewalks

The proposed improvements are shown on Figure 4. The project's only connection to an existing street will be from West Cattail Trail in Dayton. A future Street is planned to extend easterly providing access to the adjacent property. Streets within the development will be thirty-one feet wide with surmountable concrete curb and gutter. Five foot wide concrete sidewalk will be installed along both sides. The sidewalks will be terminated once they reach the new Cul de Sacs. The streets will be constructed per Maple Grove's typical street section which is one and a half inches of bituminous wear, two inches of bituminous base, six inches of class five aggregate base and twelve inches of select granular borrow.

Rush Creek Main Stem Restoration - please refer to pages 12, 13, 15



LOCATION MAP

CITY OF MAPLE GROVE

ENCLAVE ON RUSH CREEK CP 16-05

FIGURE 1

DATE: DEC. 2015 PROJ. NO. 193803313

Stantec
2335 Highway 36 W
St. Paul, MN 55113
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Rush Creek Main Stem Restoration - please refer to pages 12, 13, 15

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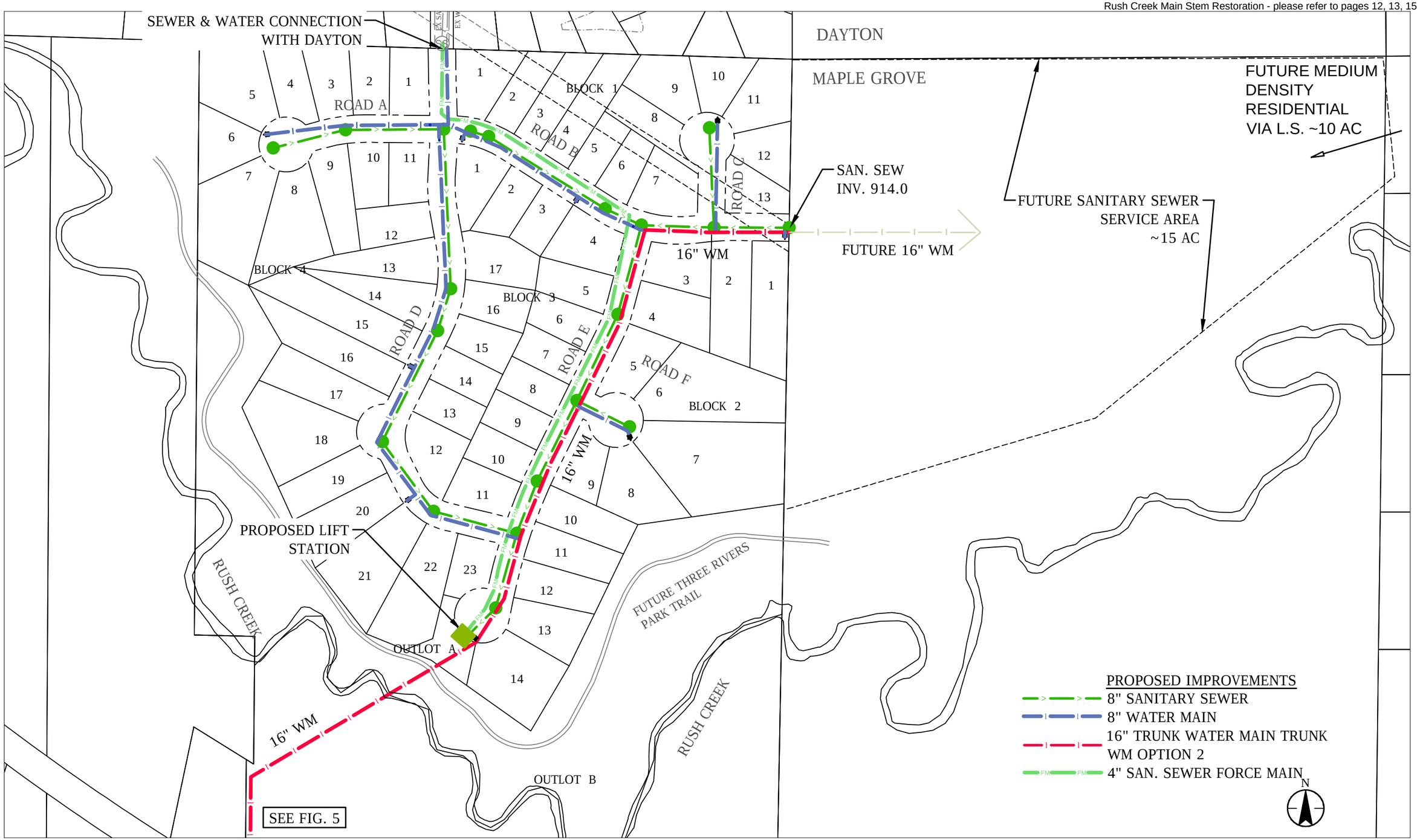

SANITARY SEWER AND WATER MAIN IMPROVEMENTS

CITY OF MAPLE GROVE

ENCLAVE ON RUSH CREEK CP 16-05

FIGURE 2

DATE: DEC. 2015 PROJ. NO. 193803313

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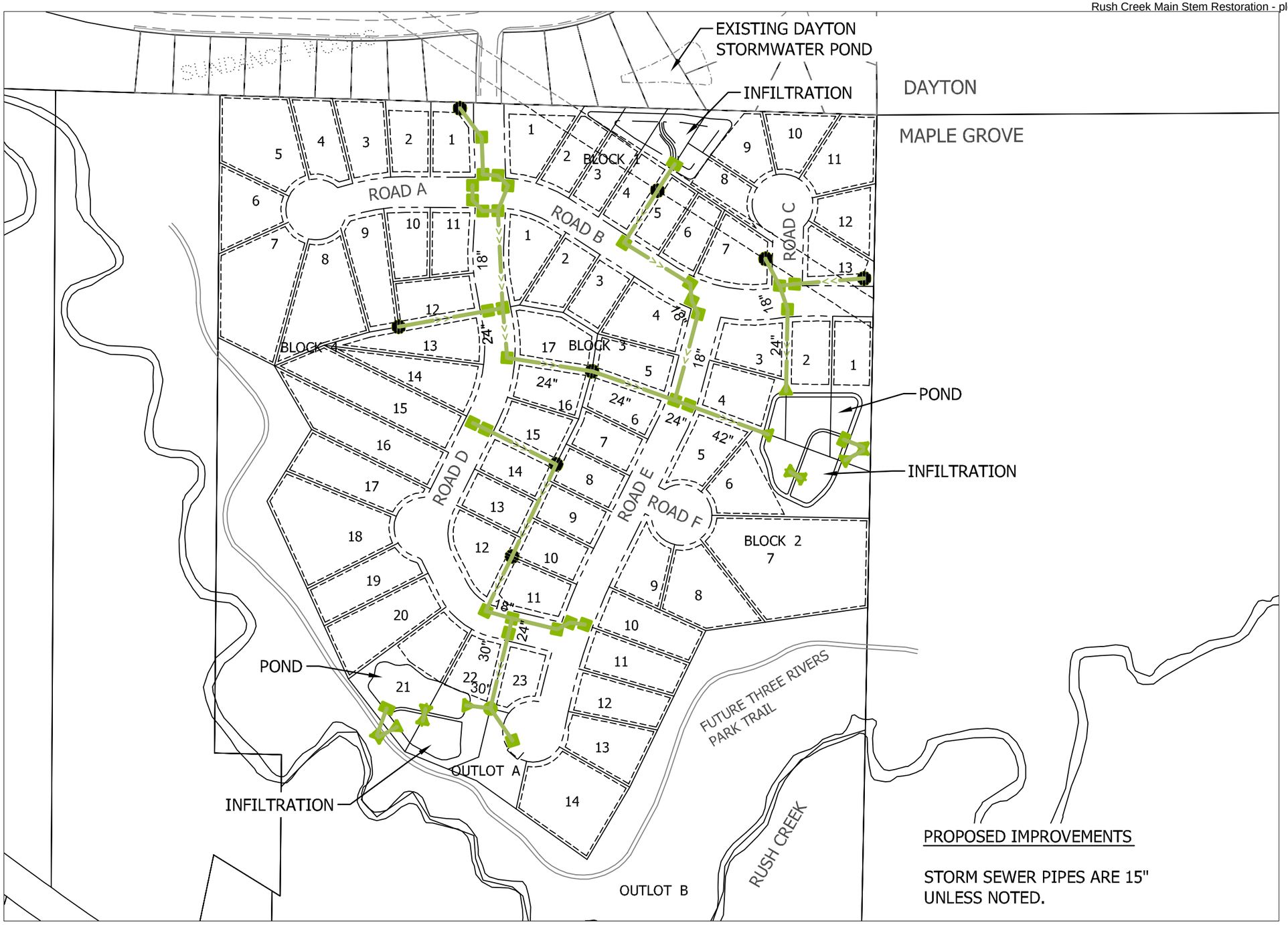
Rush Creek Main Stem Restoration - please refer to pages 12, 13, 15



STORM SEWER IMPROVEMENTS

CITY OF MAPLE GROVE

ENCLAVE ON RUSH CREEK CP 16-05

FIGURE 3

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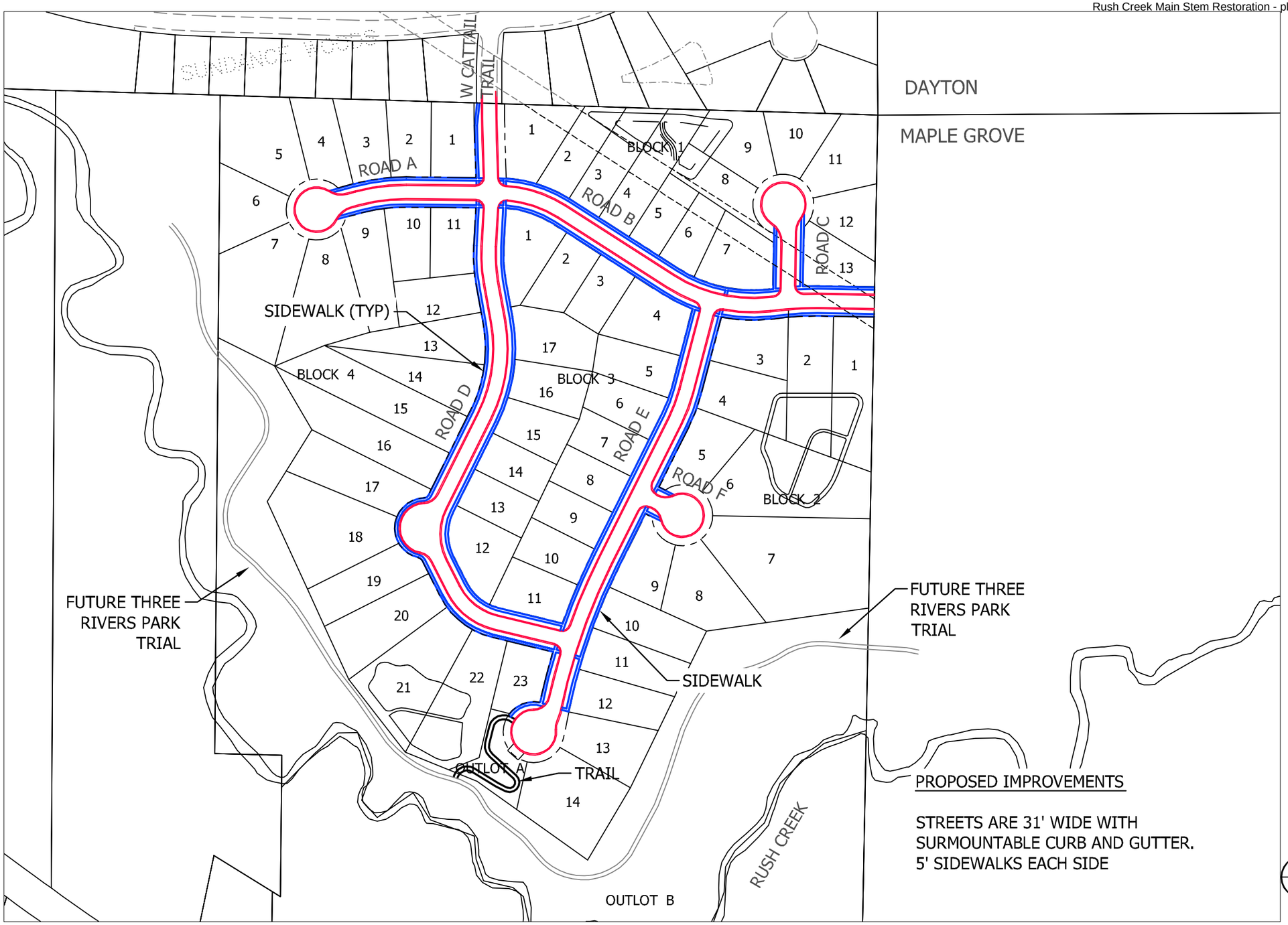

STREET IMPROVEMENTS

CITY OF MAPLE GROVE

ENCLAVE ON RUSH CREEK CP 16-05

FIGURE 4

DATE: DEC. 2015 PROJ. NO. 193803313

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Proposed Trunk Water Main Improvements

Part of the scope of this project is providing a trunk water main connection to the City of Dayton. The existing 36-inch trunk water main terminates at the Fernbrook Lane and Territorial Road intersection. A 16-inch water main will be brought to the northern border of Maple Grove for a connection to the City of Dayton. Two options are explored within this report. The proposed improvements are shown on Figure 5.

Trunk Water Main Improvements Option 1 – Fernbrook Lane Route

This option routes the 16-inch trunk water main directly north to Dayton city limits along the west side of Fernbrook Lane. This option would be consistent with the Comprehensive Water Plan routing. The water main is proposed to be placed in a location relative to the future and wider Fernbrook Lane. This option requires easements to be acquired from seven properties.

Trunk Water Main Improvements Option 2 - Territorial Road Route

This option will provide current and future lateral benefits by routing the 16-inch trunk water main west within Territorial Road and then north through The Enclave on Rush Creek development. In the future, the 16-inch trunk water main will continue easterly to through the adjacent property connecting to the Maple Grove or Dayton trunk water main system. The trunk water main alignment between Territorial Road and the southern development will require a new 20-foot utility easement. This easement is located entirely within the development property and is noted on Figure 5.

Repair of the currently deficient Territorial Road would be a supplemental benefit of this option. The road repair adjacent to the trunk water main installation would be considered a trunk water main cost and the remainder of road repair costs would be split equally between the benefiting property owners and the City of Maple Grove. The project would remove the existing surface by reclaiming the existing bituminous pavement. The reclaimed pavement will be utilized as aggregate base and the road will be repaved. This repair project is proposed to have a 20-year lifespan. Figure 6 shows the road repair project and the benefitting properties for assessments.

Rush Creek Main Stem Restoration - please refer to pages 12, 13, 15

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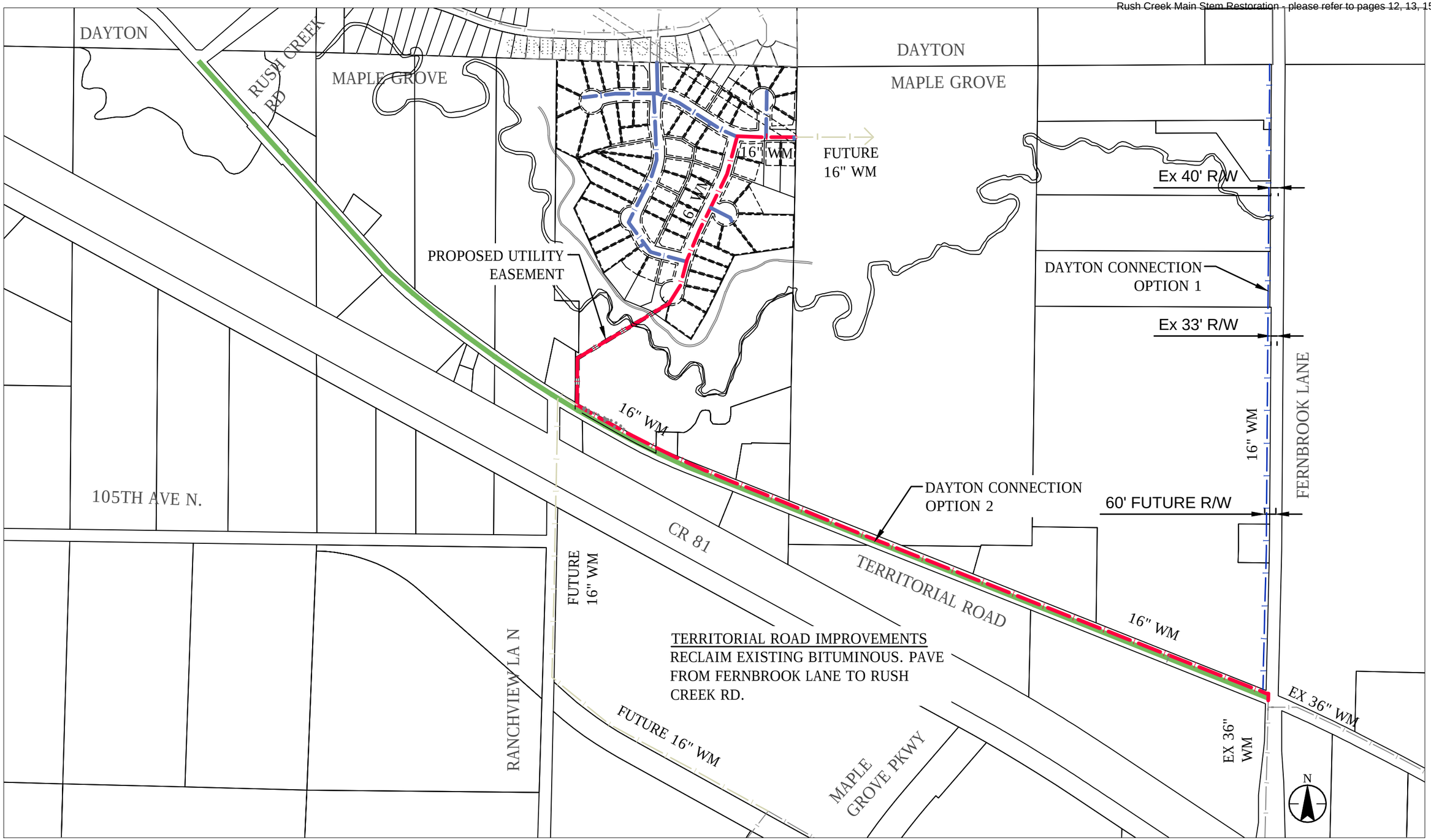

TRUNK WATER MAIN AND TERRITORIAL RD IMPROVEMENTS

CITY OF MAPLE GROVE

ENCLAVE ON RUSH CREEK CP 16-05

FIGURE 5

DATE: DEC. 2015 PROJ. NO. 193803313

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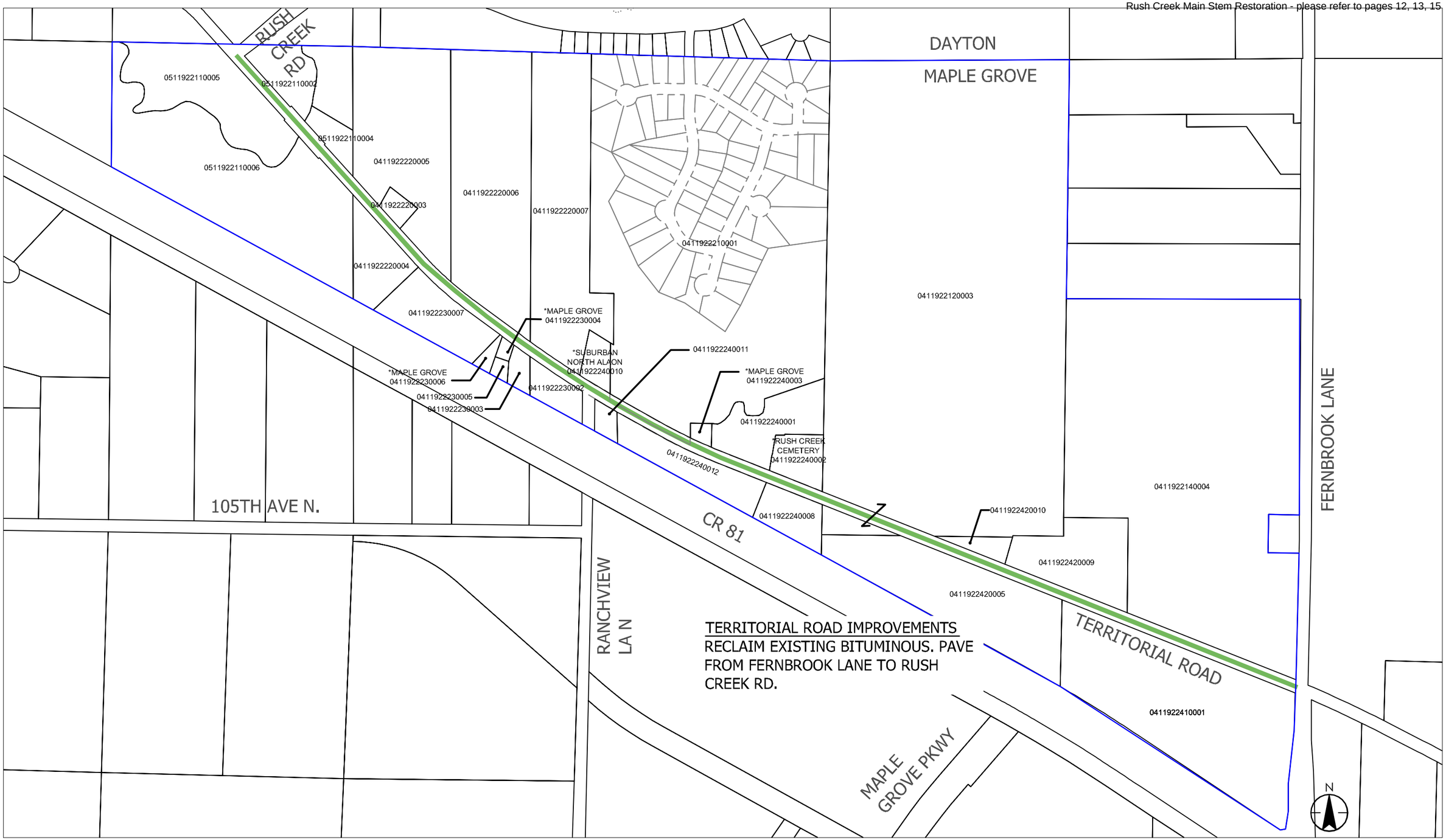
Rush Creek Main Stem Restoration - please refer to pages 12, 13, 15



TERRITORIAL ROAD IMPROVEMENTS
RECLAIM EXISTING BITUMINOUS. PAVE FROM FERNBROOK LANE TO RUSH CREEK RD.

ASSESSMENT AREA

* NON-ASSESSED PROPERTY

CITY OF MAPLE GROVE

ENCLAVE ON RUSH CREEK CP 16-05

FIGURE 6

Stantec
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St. Paul, MN 55113
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DATE: DEC. 2015 PROJ. NO. 193803313

Rush Creek Restoration

This project involves the stabilization of the erosional sites in a 2900 linear foot portion of Rush Creek within the proposed The Enclave on Rush Creek project. The initial erosion was likely due to increase flows from the developing watershed. Erosion has caused encroachment into the adjacent woods and trees and other debris to fall into the creek. The debris in the creek has resulted in diversion of flows to the toe of slopes causing accelerated erosion in most outside bend locations. The erosion has created vertical slopes that range in height from 4 to 10 plus feet.

Slope loss can be as high as 10 feet in some areas along Rush Creek.

Based on the preliminary estimates there are 1,584 linear feet of creek channel that require improvements and stabilization. Control of the erosion at these sites will help minimize loss and encroachment into the woods and future adjacent lots and the planned regional trail. The approach for the channel improvements include:

- Removal of fallen trees and debris from channel to eliminate diversion of flows to toe of slope.
- Removal of select trees along the banks of the creek that appear to be a hazard and close to falling into the channel and causing additional accelerated erosion.
- Installation of Stream Barbs along many of the outside bends with erosion. Stream Barbs protect the bank by shifting the stream flows away from the stream bank experiencing erosion. The stream barbs are a stream restoration design that will allow sediment to naturally deposit upstream of the barbs, push the flows back to the center of the channel and create a hydraulic jump in the stream that will help dissipate energy and create some pool habitat for fish.

- Native seeding and shrub planting along the erosion sites will also be done to provide deep root structures and protect the slopes from erosion.
- Vertical slopes will be re-graded to less severe slopes (2:1) to allow for stabilization.

The above discussed approach was used successfully in the Rush Creek Improvement project completed in 2006 under the City Project Number 06-16 within the Dunlavin Woods development.

Stream Barbs and Shrubs from 2006 project still functioning to protect slopes along Rush Creek (photo December 2015).

Cost and Assessment Summary

Table 1 summarizes the assessments for the project.

Table 1 - Proposed Assessment Summary

Item	Amount
The Enclave on Rush Creek Assessments CP 16-05	**$3,683,341.57**
Territorial Road Assessments	
0411922120003	$4,833.33
0411922140004	$4,833.33
0411922210001 - The Enclave on Rush Creek Property	$4,833.33
0411922220003	$4,833.33
0411922220004	$4,833.33
0411922220005	$4,833.33
0411922220006	$4,833.33
0411922220007	$4,833.33
0411922230002	$4,833.33
0411922230003	$4,833.33
0411922230005	$4,833.33
0411922230007	$4,833.33
0411922240001	$4,833.33
0411922240008	$4,833.33
0411922240011	$4,833.33
0411922240012	$4,833.33
0411922410001	$4,833.33
0411922420005	$4,833.33
0411922420009	$4,833.33
0411922420010	$4,833.33
0511922110002	$4,833.33
0511922110004	$4,833.33
0511922110005	$4,833.33
0511922110006	$4,833.33
Territorial Road Total Assessments	**$116,000.00**

The Enclave on Rush Creek assessments are based on the proposed public improvements and associated area charges for the development. Detailed cost estimates are provided in Appendix A and are summarized in Table 2. The estimates include construction and a 35% allowance for indirect costs.

The Territorial Road assessments are based on benefiting properties location and a 50/50 cost sharing of Territorial Road repairs (West Road Project) beyond the trunk water main installation area.

Table 2 shows the proposed improvement cost summary.

Table 2 Proposed Improvement Cost Summary

The Enclave on Rush Creek Improvements	Fernbrook WM	Territorial WM
Sanitary Sewer	$330,600	$330,600
Water Main	$262,300	$262,300
Services	$218,000	$218,000
Storm Sewer	$402,800	$402,800
Streets	$963,400	$963,400
Erosion Control	$46,300	$46,300
Total Improvements Segal	**$2,223,400**	**$2,223,400**

City of Maple Grove	Fernbrook WM	Territorial WM
Lift Station and Forcemain	$464,500	$464,500
Trunk Watermain	$873,600	$662,400
Trunk Watermain Upsize through Development	$0	$82,500
Territorial Road Repair - Trunk Water Cost	$0	$530,800
Territorial Road Repair City Portion (50% of West Rd Project)	$0	$116,000
Rush Creek Restoration	$442,300	$442,300
Total Improvements City of Maple Grove	**$1,780,400**	**$2,298,500**

Territorial Road Assessment Properties	Fernbrook WM	Territorial WM
Territorial Road (50% of West Rd Project)	$0	$116,000
Total Improvements Assessed Properties	$0	**$116,000**
Total Project	**$4,003,800**	**$4,637,900**

The proposed area charges are assigned to the net assessable acres. Table 3 presents a summary of the area charges.

Table 3 - Proposed Area Charges

Total Acres	43.09	Acres
Less Outlot A (Lift Station)	0.28	Acres
Less Outlot B (Trail Corridor)	10.08	Acres
Less Bluff and Creek Areas	1.08	Acres
Pipe Easement	0.87	Acres
Total Assessable Area	30.78	Acres

	Units	Amount	Rate	Assessment
Maple Grove Trunk Sanitary Sewer	AC	30.78	$6,828.90	$210,193.54
Trunk Storm Sewer	AC	30.78	$6,576.55	$202,426.21
Trunk Transportation	AC	30.78	$22,191.35	$683,049.75
Right of Way	AC	30.78	$11,834.70	$364,272.07
Total Area Charges				$1,459,941.57

Table 4 presents unit cost allocations.

Table 4 - Proposed Unit Cost Allocation

Item	Units	Amount	Unit Cost
Sanitary Sewer	67	$330,600	$4,934
Water Main	67	$262,300	$3,915
Services	67	$218,000	$3,254
Storm Sewer	67	$402,800	$6,012
Streets	67	$963,400	$14,379
Erosion Control and Restoration	67	$46,300	$691
Area Charges	67	$1,459,941.57	$21,790
Proposed Unit Cost	67	**$3,683,341.57**	**$54,975**

Appendix A

Rush Creek Main Stem Restoration - please refer to pages 12, 13, 15

PART 1 - SANITARY SEWER

ITEM	UNITS	EST QTY	UNIT PRICE	TOTAL
MOBILIZATION	LS	1	$10,000.00	$10,000
TRAFFIC CONTROL	LS	1	$2,000.00	$2,000
QUALITY SERVICE LOCATES	LS	1	$10,000.00	$10,000
CONNECT TO EXISTING SANITARY SEWER	LS	1	$3,000.00	$3,000
8" PVC SANITARY SEWER, SDR 35, 5'-10' DEEP	LF	600	$30.00	$18,000
8" PVC SANITARY SEWER, SDR 35, 10'-15' DEEP	LF	2230	$34.00	$75,820
8" PVC SANITARY SEWER, SDR 35, 15'-20' DEEP	LF	600	$38.00	$22,800
8" DIP SANITARY SEWER	LF	20	$75.00	$1,500
4' DIAMETER SANITARY MH, 8' DEEP	EA	21	$2,500.00	$52,500
4' DIAMETER SANITARY MANHOLE OVERDEPTH	LF	116	$115.00	$13,340
DROP SECTION FOR DROP MANHOLES	EA	1	$1,300.00	$1,300
PIPELINE CROSSING	LS	1	$30,000.00	$30,000
MANHOLE PROTECTIVE COATING	LF	20	$230.00	$4,600
TOTAL CONSTRUCTION				**$244,860**
INDIRECT COSTS - 35%				**$85,701**
TOTAL PART 1				**$330,600**

PART 2 - WATER MAIN

ITEM	UNITS	EST QTY	UNIT PRICE	TOTAL
CONNECT TO EXISTING WATER MAIN	EA	1	$1,500.00	$1,500
8" WATER MAIN	LF	3,908	$30.00	$117,240
6" WATER MAIN	LF	90	$35.00	$3,150
8" GV & BOX	EA	13	$1,900.00	$24,700
6" GV & BOX	EA	9	$1,300.00	$11,700
HYDRANT	EA	9	$4,000.00	$36,000
TOTAL CONSTRUCTION				**$194,290**
INDIRECT COSTS - 35%				**$68,002**
TOTAL PART 2 - WATER MAIN				**$262,300**

PART 3 - SERVICES	UNITS	EST QTY	UNIT PRICE	TOTAL
1" HDPE WATER SERVICE	LF	2730	$18.00	$49,140
1" CURB STOP AND BOX	EA	65	$425.00	$27,625
SERVICE TAP	EA	65	$300.00	$19,500
8"X4" PVC WYE	EA	65	$225.00	$14,625
4" PVC, SCH. 40 SERVICE PIPE	LF	2730	$18.00	$49,140
4" PVC, SCH. 40 RISER PIPE	LF	48	$30.00	$1,440
TOTAL CONSTRUCTION				**$161,470**
INDIRECT COSTS - 35%				**$56,515**
TOTAL PART 3 - SERVICES				**$218,000**

PART 4 - STORM SEWER

ITEM	UNITS	EST QTY	UNIT PRICE	TOTAL
CONNECT TO EXISTING MANHOLE	EA	0	$1,500.00	$0
CONNECT TO EXISTING PIPE	EA	0	$1,500.00	$0
6" PPVC DRAIN TILE	LF	400	$15.00	$6,000
4" PVC DRAIN TILE	LF	800	$12.00	$9,600
15" STORM SEWER	LF	2131	$36.00	$76,716
18" STORM SEWER	LF	503	$38.00	$19,114
21" STORM SEWER	LF	0	$40.00	$0
24" STORM SEWER	LF	664	$42.00	$27,888
27" STORM SEWER	LF	0	$45.00	$0
30" STORM SEWER	LF	203	$48.00	$9,744
42" STORM SEWER	LF	168	$60.00	$10,080
2' X 3' CATCH BASIN	EA	8	$1,900.00	$15,200
4' DIAMETER STORM CBMH	EA	28	$2,500.00	$70,000
4' DIAMETER STORM MH	EA	0	$2,500.00	$0
4.5' DIAMETER STORM MH	EA	2	$2,800.00	$5,600
5' DIAMETER STORM MH	EA	0	$3,600.00	$0
15" FLARED END SECTION	EA	10	$1,200.00	$12,000
24" FLARED END SECTION	EA	1	$1,500.00	$1,500
30" FLARED END SECTION	EA	1	$1,900.00	$1,900
42" FLARED END SECTION	EA	1	$2,500.00	$2,500
OUTLET CONTROL STRUCTURE	EA	3	$6,000.00	$18,000
RIP RAP	CY	100	$125.00	$12,500
TOTAL CONSTRUCTION				**$298,342**
INDIRECT COSTS - 35%				**$104,420**
TOTAL PART 4 - STORM SEWER				**$402,800**

PART 5 - STREETS

ITEM	UNITS	EST QTY	UNIT PRICE	TOTAL
MOBILIZATION	LS	1	$25,000.00	$25,000
SUBGRADE EXCAVATION	CY	1377	$15.00	$20,655
GEOTEXTILE FABRIC, TYPE V	SY	16516	$1.60	$26,426
SELECT GRANULAR BORROW (CV)	CY	5505	$22.00	$121,117
AGGREGATE BASE, CLASS 5 (CV)	CY	2740	$26.00	$71,248
BITUMINOUS BASE COURSE - 2"	SY	13367	$7.75	$103,591
BITUMINOUS WEAR COURSE, - 1 1/2"	SY	13367	$7.00	$93,566
BITUMINOUS MATERIAL FOR TACK COAT	GAL	1069	$4.25	$4,545

SURMOUNTABLE CONCRETE CURB AND GUTTER	LF	7580	$12.00	$90,960
B618 CONCTETE CURB AND GUTTER	LF	0	$12.00	$0
5" CONCRETE SIDEWALK	SF	32235	$3.90	$125,717
TRUNCATED DOME PANEL	SF	248	$45.00	$11,160
BITUMINOUS TRAIL	SY	325	$18.00	$5,850
ADJUST MH	EA	21	$350.00	$7,350
ADJUST VALVE BOX	EA	15	$300.00	$4,500
STREET SWEEPER WITH PICK UP BROOM WITH OPERATOR	HR	8	$130.00	$1,040
SKIDSTEER WITH OPERATOR	HR	8	$110.00	$880
TOTAL CONSTRUCTION				**$713,604**
INDIRECT COSTS - 35%				**$249,761**
TOTAL PART 5 - STREETS				**$963,400**

PART 6 - EROSION CONTROL AND RESTORATION

ITEM	UNITS	EST QTY	UNIT PRICE	TOTAL
STABILIZED CONSTRUCTION EXIT	EA	1	$1,500.00	$1,500
INLET PROTECTION OF CATCH BASIN STREET	EA	30	$150.00	$4,500
INLET PROTECTION OFF CATCH BASIN IN BACKYARD	EA	8	$150.00	$1,200
SILT FENCE, REGULAR	LF	5100	$2.00	$10,200
SODDING, LAWN TYPE WITH 4" OF TOPSOIL	SY	1023	$6.00	$6,139
SEEDING	AC	2	$1,500.00	$3,000
MNDOT SEED MIX 250	LBS	150	$3.00	$450
FERTILIZER	LB	400	$0.65	$260
MULCH MATERIAL, TYPE 1	TN	4	$200.00	$800
EROSION CONTROL BLANKET	SY	5000	$1.25	$6,250
TOTAL CONSTRUCTION				**$34,299**
INDIRECT COSTS - 35%				**$12,005**
TOTAL PART 6 - EROSION CONTROL AND RESTORATION				**$46,300**

PART 7 - LIFT STATION AND FORCEMAIN

ITEM	UNITS	EST QTY	UNIT PRICE	TOTAL
MOBILIZATION	LS	1	$14,000.00	$14,000
LIFT STATION	LS	1	$225,000.00	$225,000
3-PHASE ELECTRICAL TO LIFT STATION	LS	1	$50,000.00	$50,000
6" HDPE SANITARY FORCE MAIN	LF	1625	$30.00	$48,750
6" OR 4" HDPE FORCEMAIN FITTINGS	LS	1	$1,000.00	$1,000
AIR RELEASE MANHOLE	LS	1	$3,500.00	$3,500

MANHOLE PROTECTIVE COATING	LF	8	$230.00	$1,840
TOTAL CONSTRUCTION				**$344,090**
INDIRECT COSTS - 35%				**$120,432**
TOTAL PART 7 - LIFT STATION AND FORCEMAIN				**$464,500**

PART 8A - TRUNK WATER MAIN - FENBROOK LANE

ITEM	UNITS	EST QTY	UNIT PRICE	TOTAL
MOBILIZATION	LS	1	$25,000.00	$25,000
TRAFFIC CONTROL	LS	1	$15,000.00	$15,000
CONNECT TO EXISTING WATER MAIN	EA	1	$2,500.00	$2,500
EASEMENT COST	SF	81,632	$1.00	$81,632
16" WATER METER VAULT	EA	1	$175,000.00	$175,000
6" WATER MAIN	LF	30	$60.00	$1,800
16" WATER MAIN	LF	1,350	$65.00	$87,750
16" WATER MAIN - DIRECTIONAL DRILL	LF	2,050	$90.00	$184,500
16" BUTTERFLY VALVE AND BOX	EA	4	$4,000.00	$16,000
6" GATE VALVE AND BOX	EA	3	$1,300.00	$3,900
HYDRANT	EA	3	$4,000.00	$12,000
SILT FENCE	LF	7,000	$3.00	$21,000
SEEDING	AC	2	$3,000.00	$6,000
MISC EROSION CONTROL	LS	1	$15,000.00	$15,000
TOTAL CONSTRUCTION				**$647,082**
INDIRECT COSTS - 35%				**$226,479**
TOTAL PART 8A - TRUNK WATER MAIN - FENBROOK LANE				**$873,600**

PART 8B - TRUNK WATER MAIN TERRITORIAL ROAD

ITEM	UNITS	EST QTY	UNIT PRICE	TOTAL
MOBILIZATION	LS	1	$25,000.00	$25,000
TRAFFIC CONTROL	LS	1	$12,000.00	$12,000
CLEARING	LS	1	$15,000.00	$15,000
CONNECT TO EXISTING WATER MAIN	EA	2	$2,500.00	$5,000
12" METER STATION	LS	-	$150,000.00	(future)
16" WATER MAIN	LF	4,240	$65.00	$275,600
12" WATER MAIN	LF	-	$60.00	$0
6" WATER MAIN	LF	40	$60.00	$2,400
HDD 16" WATER MAIN	LF	650	$90.00	$58,500
16" BUTTERFLY VALVE AND BOX	EA	10	$4,000.00	$40,000
12" BUTTERFLY VALVE AND BOX	EA	-	$3,500.00	$0
6" GV & BOX	EA	4	$1,300.00	$5,200

HYDRANT	EA	4	$4,000.00	$16,000
SILT FENCE	LF	6,000	$3.00	$18,000
SEEDING	AC	1	$3,000.00	$3,000
MISC EROSION CONTROL	LS	1	$15,000.00	$15,000
TOTAL CONSTRUCTION				**$490,700**
INDIRECT COSTS - 35%				**$171,745**
TOTAL PART 8B - TRUNK WATER MAIN TERRITORIAL ROAD*				**$662,400**

*Does not include future meter station located east of the project

*Assumes easements will be negotiated with the developer

PART 9 -TRUNK WATER MAIN UPSIZE THROUGH DEVELOPMENT

ITEM	UNITS	EST QTY	UNIT PRICE	TOTAL
16" WATER MAIN	LF	1,300	$35.00	$45,500
12" WATER MAIN	LF	-	$30.00	$0
16" BUTTERFLY VALVE AND BOX	EA	5	$2,100.00	$10,500
12" BUTTERFLY VALVE AND BOX	EA	-	$2,000.00	$0
SERVICE TAP (16")	EA	17	$300.00	$5,100
SERVICE TAP (12")	EA	-	$275.00	$0
TOTAL CONSTRUCTION				**$61,100**
INDIRECT COSTS - 35%				**$21,385**
TOTAL PART 9 -TRUNK WATER MAIN UPSIZE THROUGH DEVELOPMENT				**$82,500**

PART 10 - TERRITORIAL ROAD EAST (WM AREA)

ITEM	UNITS	EST QTY	UNIT PRICE	TOTAL
MOBILIZATION	LS	1	$20,000.00	$20,000
TRAFFIC CONTROL	LS	1	$13,000.00	$13,000
SILT FENCE, MACHINE SLICED	LF	11480	$3.00	$34,440
DITCH CHECK SEDIMENT CONTROL LOG	LF	1227	$5.00	$6,135
FULL DEPTH RECLAMATION	SY	11,452	$3.00	$34,356
CLEAR AND GRUB	LS	1	$4,000.00	$4,000
24" RCP CULVERT	LF	40	$50.00	$2,000
24" RCP FLARED END SECTION	EA	2	$1,200.00	$2,400
RIP RAP, CLASS 3	CY	30	$100.00	$3,000
COMMON EXCAVATION (EV)	CY	0	$15.00	$0
SUBGRADE EXCAVATION (EV)	CY	1,060.37	$15.00	$15,906
SHAPE AND COMPACT RECLAIM MATERIAL	CY	4,400.00	$5.00	$22,000
COMMON TOPSOIL BORROW (LV)	CY	500	$15.00	$7,500
GEOTEXTILE FABRIC	SY	0	$1.50	$0
SUBGRADE PREPARATION	RD STA	12,724	$1.00	$12,724

AGGREGATE BASE, CLASS 5	CY	1,060.37	$26.00	$27,570
AGGREGATE SHOULDERING, CLASS 2	CY	405.97	$30.00	$12,179
BITUMINOUS BASE COURSE - 2"	SY	11,452	$7.50	$85,890
BITUMINOUS WEAR COURSE, - 1 1/2"	SY	11,452	$6.00	$68,712
BITUMINOUS MATERIAL FOR TACK COAT	GAL	916	$3.20	$2,932
4" SOLID LINE, WHITE EPOXY	LF	8200	$1.50	$12,300
4" DOUBLE SOLID LINE, YELLOW EPOXY	LF	4100	$0.50	$2,050
24" SOLID LINE, STOP BARS, WHITE EPOXY	LF	12	$10.00	$120
SALVAGE AND REINSTALL SIGN	EA	0	$150.00	$0
SIGN PANELS, TYPE C, HIGH INTENSITY	SF	0	$150.00	$0
SEED AND HYDROMULCH	AC	1	$4,000.00	$4,000
TOTAL CONSTRUCTION				**$393,213**
INDIRECT COSTS - 35%				**$137,625**
TOTAL PART 10 - TERRITORIAL ROAD EAST (WM AREA)				**$530,800**

PART 11 - TERRITORIAL ROAD WEST

ITEM	UNITS	EST QTY	UNIT PRICE	TOTAL
MOBILIZATION	LS	1	$1,000.00	$1,000
TRAFFIC CONTROL	LS	1	$500.00	$500
SILT FENCE, MACHINE SLICED	LF	1262	$3.00	$3,786
DITCH CHECK SEDIMENT CONTROL LOG	LF	575	$5.00	$2,875
FULL DEPTH RECLAMATION	SY	6,440	$3.00	$19,320
CLEAR AND GRUB	LS	1	$2,000.00	$2,000
COMMON EXCAVATION (EV)	CY	0	$15.00	$0
SUBGRADE EXCAVATION (EV)	CY	221.48	$15.00	$3,322
SHAPE AND COMPACT RECLAIM MATERIAL	CY	3,100.00	$4.00	$12,400
COMMON TOPSOIL BORROW (LV)	CY	400	$15.00	$6,000
GEOTEXTILE FABRIC	SY	0	$1.50	$0
SUBGRADE PREPARATION	SY	6644	$1.00	$6,644
AGGREGATE BASE, CLASS 5	CY	221.48	$26.00	$5,759
AGGREGATE SHOULDERING, CLASS 2	CY	228.30	$30.00	$6,849
BITUMINOUS BASE COURSE - 2"	SY	6,440	$7.50	$48,300
BITUMINOUS WEAR COURSE, - 1 1/2"	SY	6,440	$6.00	$38,640
BITUMINOUS MATERIAL FOR TACK COAT	GAL	515	$3.20	$1,649
4" SOLID LINE, WHITE EPOXY	LF	5778	$0.75	$4,334
4" DOUBLE SOLID LINE, YELLOW EPOXY	LF	2890	$1.50	$4,335
24" SOLID LINE, STOP BARS, WHITE EPOXY	LF	12	$10.00	$120
SALVAGE AND REINSTALL SIGN	EA	0	$150.00	$0
SIGN PANELS, TYPE C, HIGH INTENSITY	SF	0	$150.00	$0
SEED AND HYDROMULCH	AC	1	$4,000.00	$4,000

TOTAL CONSTRUCTION	**$171,832**
INDIRECT COSTS - 35%	**$60,141**
TOTAL PART 11 - TERRITORIAL ROAD WEST	**$232,000**

PART 12 - RUSH CREEK RESTORATION

ITEM	UNITS	EST QTY	UNIT PRICE	TOTAL
MOBILIZATION	LS	1	$4,000.00	$4,000
CLEAR AND GRUB	TREE	160	$200.00	$32,000
COMMON CHANNEL EXCAVATION	LS	1	$20,000.00	$20,000
SLOPE IMPROVEMENTS 6' BANK	LF	140	$30.00	$4,200
SLOPE IMPROVEMENTS 4' BANK	LF	460	$25.00	$11,500
SLOPE IMPROVEMENTS 3' BANK	LF	68	$20.00	$1,360
SLOPE IMPROVEMENTS 2' BANK	LF	199	$15.00	$2,985
CLASS III RANDOM RIPRAP	TN	2530	$60.00	$151,800
GEOTEXTILE FABRIC	SY	4260	$5.60	$23,856
SEEDING WITH BONDED FIBER MATRIX MULCH	SY	3370	$3.00	$10,110
REDOSIER DOGWOOD, #2 POTS	EA	994	$25.00	$24,850
ACCESS RESTORATION	LS	1	$20,000.00	$20,000
FLOATING SILT CURTAIN, HIGH VELOCITY	LF	200	$50.00	$10,000
TEMPORARY ROCK CONSTRUCTION ENTRANCE	EA	2	$1,500.00	$3,000
SEEDING WITH EROSION CONTROL BLANKETS, CATEGORY 3	AC	1	$8,000.00	$8,000
CONSTRUCTION PART				**$327,661**
INDIRECT COSTS - 35%				**$114,681**
TOTAL PART 12 - RUSH CREEK RESTORATION				**$442,300**

Project Cost Summary

The Enclave on Rush Creek Improvements		Fernbrook WM	Territorial WM
PART 1 - SANITARY SEWER		$330,600	$330,600
PART 2 - WATER MAIN		$262,300	$262,300
PART 3 - SERVICES		$218,000	$218,000
PART 4 - STORM SEWER		$402,800	$402,800
PART 5 - STREETS		$963,400	$963,400
PART 6 - EROSION CONTROL AND RESTORATION		$46,300	$46,300
Total Improvements		**$2,223,400**	**$2,223,400**

City of Maple Grove		Fernbrook WM	Territorial WM
PART 7 - LIFT STATION AND FORCEMAIN		$464,500	$464,500
PART 8A/8B - TRUNK WATER MAIN		$873,600	$662,400
PART 9 -TRUNK WATER MAIN UPSIZE THROUGH DEVELOPMENT		$0	$82,500
PART 10 - TERRITORIAL ROAD EAST (WM AREA)		$0	$530,800
PART 11 - TERRITORIAL ROAD WEST	(50%)	$0	$116,000
PART 12 - RUSH CREEK RESTORATION		$442,300	$442,300
Total Improvements		**$1,780,400**	**$2,298,500**

Territorial Road Assessment Properties		Fernbrook WM	Territorial WM
PART 11 - TERRITORIAL ROAD WEST	(50%)	$0	$116,000
Total Improvements Assessed Properties		$0	**$116,000**
Total Project		**$4,003,800**	**$4,637,900**

Alum Dosage Considerations for Fish Lake, Hennepin County, Minnesota

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OBJECTIVES

The objectives of these investigations were to estimate alum dosage scenarios to control anoxic sediment internal phosphorus (P) loading in Fish Lake, Hennepin County, Minnesota. The specific outcomes and deliverables of this research were to,

1. examine vertical variations in biologically-labile phosphorus fractions (i.e., subject to recycling via Eh, pH, and bacterially-mediated reactions in the sediment; loosely-bound, iron-bound, and labile organic P) from various stations in the lake to estimate the thickness of the sediment layer potentially active in anoxic sediment internal P loading,
2. estimate alum (as aluminum; Al) dosage scenarios for binding redox-sensitive P (i.e., the loosely-bound and iron-bound P fractions) in the upper sediment layer, and,
3. provide cost estimates for alum dosage scenarios based on treatment areas in the lake.

APPROACH

Phosphorus profiles in the sediment: Undisturbed sediment cores were collected from two stations that were established at depths of ~ 30 ft in the lake (Figure 1) using a gravity coring device and acrylic core liners (Aquatic Scientific Instruments, Hope, ID). One set of cores was sectioned at 1-cm intervals over the upper 6 cm and at 2-cm intervals down to the 10-cm sediment depth for analysis of moisture content (%), sediment and bulk density (g/cm^3), loss-on-ignition (i.e., organic matter content, %), loosely-bound P, iron-bound P, and labile organic P (all expressed at mg/g). A known volume of sediment was dried at 105 ^{o}C for determination of moisture content, sediment, and bulk density and burned at 500 ^{o}C for determination of loss-on-ignition organic matter content (Håkanson and Jansson 2002).

Phosphorus fractionation was conducted according to Hieltjes and Lijklema (1980), Psenner and Puckso (1988), and Nürnberg (1988) for the determination of ammonium-chloride-extractable P (loosely-bound P), bicarbonate-dithionite-extractable P (i.e., iron-bound P), and sodium hydroxide-extractable P (i.e., aluminum-bound P). A subsample of the sodium hydroxide extract was digested with potassium persulfate to determine nonreactive sodium hydroxide-extractable P (Psenner and Puckso 1988). Labile organic P was calculated as the difference between reactive and nonreactive sodium hydroxide-extractable P.

The loosely-bound and iron-bound P fractions are readily mobilized at the sediment-water interface as a result of anaerobic conditions that lead to desorption of P from sediment and diffusion into the overlying water column (Mortimer 1971, Boström 1984, Nürnberg 1988). The sum of the loosely-bound and iron-bound P fraction represents redox-sensitive P (i.e., the P fraction that is active in P release under anaerobic and reducing conditions; redox-P). In addition, labile organic P can be converted to soluble P via bacterial mineralization (Jensen and Andersen 1992) or hydrolysis of bacterial polyphosphates to soluble phosphate under anaerobic conditions (Gächter et al. 1988, Gächter and Meyer 1993, Hupfer et al. 1995). The sum of redox-sensitive P and labile organic P collectively represent biologically-labile P. This fraction is active in recycling pathways that result in exchanges of phosphate from the sediment to the overlying water column and potential assimilation by algae. In contrast, aluminum-bound, calcium-bound, and refractory organic P fractions are more chemically inert and subject to burial rather than recycling.

Al dosage determination: Mixed sediment from the upper 10-cm section of an additional sediment core collected at each station in the lake (Figure 1) was subjected to a range of aluminum sulfate (as Al) concentrations to determine the dosage required to inactivate the redox-P fraction (Rydin and Welch 1999). Alum (as aluminum sulfate; $Al_2(SO_4)_3 \cdot 18 H_2O$) was combined with 0.1 M sodium bicarbonate ($NaHCO_3$) to a concentration of 0.7 g Al/L to form an aluminum hydroxide ($Al(OH)_3$) floc. Aliquots of this solution, diluted to a final volume of 10 mL with distilled water, were added to centrifuge tubes containing

the equivalent of 0.025 g dry weight (DW) of fresh sediment to obtain Al concentrations ranging from 0 (i.e., control) to ~ 30 mg Al/g DW sediment. The assay tubes were shaken for a minimum of 2 hours at 20 ^{o}C in a darkened environmental chamber, centrifuged at 500 g to concentrate the sediment, and decanted for redox-P determination (see method description above).

Al dosage was estimated as the concentration (g/m^2) required to bind at least 90% of the redox-P. The dry mass concentration of redox-P (mg/g) was converted to an areal concentration (g/m^2) as,

$$\text{Redox-P (g/m}^2\text{)} = \text{Redox-P (mg/g)} \cdot \rho\ \text{(g/cm}^3\text{)} \cdot \theta \cdot h\ \text{(m)} \cdot 1{,}000{,}000\ \text{(cm}^3\text{/m}^3\text{)} \cdot 0.001\ \text{(g/mg)} \qquad 1)$$

where, ρ is sediment bulk density (g/cm^3), θ is the percentage of sediment solids (100 – percent moisture content; dimensionless), and h is sediment thickness (m). The Al concentration (g/m^2) was estimated as,

$$\text{Al (g/m}^2\text{)} = \text{Redox-P (g/m}^2\text{)} \cdot \text{Al:P}_{90\%} \qquad 2)$$

where, Al:P$_{90\%}$ is the binding ratio required to adsorb at least 90% of the redox- P in the sediment.

Maximum allowable Al dosage based on alkalinity and pH in the lake: Addition of aluminum sulfate to a lake leads to hydrolysis and the liberation of hydrogen ions which lowers the pH of the water column. Since Al toxicity to the biota can occur if the pH falls below ~4, maintaining a pH $\geq$ 6.0 as a margin of safety should also be considered in dose determination (Cooke et al. 2005). For situations where alkalinity is low or the required dosage exceeds the maximum allowable dosage to maintain pH $\geq$ 6.0, a buffered aluminum sulfate-sodium aluminate treatment will be needed to maintain pH near neutrality. Surface water collected from the lake was analyzed for total alkalinity and pH according to APHA (2005). A titration procedure was used to determine the maximum allowable dosage of aluminum sulfate that can be added and yet maintain pH above 6.0

(Cooke et al. 2005). A 1.25 g Al/L solution of $Al_2(SO_4)_3 \cdot 18\ H_2O$ was used as the titrant and 1.0 mL additions to 500 mL of lake water were each equivalent to 2.5 mg Al/L. Lake water was titrated with the Al solution until an endpoint of pH 6 was reached. A 1.0 mL aliquot of this solution added to 500 mL of lake water is equivalent to 2.5 mg Al/L. The total volume of Al solution needed to titrate lake water to pH 6 was multiplied by 2.5 mg Al/L to estimate the maximum allowable concentration. This calculation was then compared with estimates based on sediment redox-P to ensure that the latter was at or below the maximum allowable dosage. Caution needs to be used because a vertical alkalinity and pH profile over the entire vertical water column needs to be estimated in order to more accurately evaluate the maximum allowable dosage.

RESULTS AND INTERPRETATION

Sediment characteristics and phosphorus profiles

Sediment textural characteristics were somewhat different at the two stations (Figure 2 and Table 1). At station 1, moisture content was greater than 90% over the upper 6 cm and declined slightly to 88% below that depth. In particular, it was greater that 93% in the upper 3 cm layer, indicating very flocculent, fine-grained sediment with relatively high porosity (i.e., high interstitial volume). Bulk density was less than 1.03 g/cm^3 within this layer. Although sediments at station 2 also exhibited high moisture content in the upper 2-cm layer, it declined to less than 90% below the 3-cm depth. This vertical pattern, typically observed in lake sediments, is probably due to compaction as sediments become buried with new sediment layers over time. Thus, there was a distinct 2-cm layer of flocculent sediment over more compacted sediment at station 2. Sediment organic matter content at station 2 was high and exceeded 40% in this upper sediment layer, declining to 20-30% below that depth. In contrast, sediment organic matter content for station 1 sediment was ~ 34% near the sediment surface and declined gradually to ~ 25% at the 10-cm depth.

The iron-bound P fraction accounted for much of the biologically-labile P over the upper 10-cm sediment layer while labile organic P represented the second highest concentration for all cores (Figure 2). However, distinct vertical patterns in concentration were not clearly evident, especially at station 1, where biologically-labile P gradually decreased in concentration between the sediment surface and the 10-cm depth. Typically, sediment redox-P concentrations are elevated and exhibit a distinct maxima in the upper 4 to 6-cm layer versus deeper layers of eutrophic lake sediments due to accumulation of sediment P that is recycled in excess of burial and diagenesis (Carey and Rydin 2011). Although concentrations of the three biologically-labile constituents were generally highest in the upper 1- to 2-cm sediment layer, there was not a sharp concentration gradient (Figure 3).

Overall, iron-bound P concentrations were moderately high in the sediment profile at both stations, ranging between ~0.27 and 0.41 mg/g (Figure 2), and likely play an important role in driving high rates of P release from sediment under anoxic conditions. The predicted anoxic P release rate from sediments, derived from regression relationships between iron-bound P concentration and the anoxic P release rate developed by Nürnberg (1988), was high at 6.3 and 8.9 mg/m^2 d for stations 1 and 2, respectively. Integrated over the 10-cm layer, iron-bound P represented greater than 50% of the biologically-labile P in the sediment, followed by the labile organic P fraction at ~ 41% to 45% (Figure 4). The loosely-bound P fraction was relatively low and accounted for only ~ 2% to 4% of the biologically-labile P. This fraction represents P in interstitial water and concentrations are typically low relative to other sediment P fractions.

Aluminum sulfate dosage and cost scenarios

The alum (as Al) dosage required to bind at least 90% of the redox-sensitive P (i.e., the sum of the loosely-bound and iron-bound P fraction) was ~ 16 and 17 mg Al/g DW sediment, while the Al:P ratio (i.e., parts of Al required to bind one part of redox-sensitive P) was ~ 43:1 (Figure 5). The Al concentration and Al:P ratio determinations were also essentially the same for each station. By comparison, the measured Al:P ratio

for Fish Lake sediments was low relative to regression relationships developed from several lakes in the region, but fell near the lower 95% confidence interval (Fig. 6). The predicted Al:P ratio (from Figure 6) was ~ 66:1.

Al dosage and cost scenarios are shown in Tables 2 to 4. Because sediment profiles did not show a distinct redox-sensitive P peak in the sediment, I considered in Table 2 an Al dosage to inactivate redox-sensitive P in the upper 6-, 8-, or 10-cm sediment layer. Al dosage and costs increase with increasing thickness of the sediment layer to be inactivated. A minimum Al concentration of 80 g/m^2 would be needed to account for redox-sensitive P in the upper 6-cm sediment layer. By comparison, binding of redox-sensitive P in the upper 8- and 10-cm sediment layer would require dosages of ~ 115 g Al/m^2 and 150 g Al/m^2, respectively.

Another consideration in Al cost was the treatment area in the lake. Seasonal anoxia and, thus, the potential of anoxic P release from sediments, extended from the lake bottom to the 5 to 6 m (i.e., ~ 20 foot contour) depth by mid-summer in 2011 and 2012 (Figure 7). Textural and P characteristics (and anoxic P release rates) were quantified for sediments located between the 20 and 30 ft depth contour so there is uncertainty in extrapolating dosage results for sediments collected at deeper depths to this area of the lake with confidence. For instance, sediment P concentrations tend to increase with increasing lake depth (James et al. 2000) due to a process called sediment focusing (i.e., accumulation of fine-grained, P rich sediment to the deepest basins of a lake). Thus, redox-sensitive P concentrations and Al dosage (and cost) per square meter of sediment area would generally be highest in the deepest basins. Costs to treat sediment contained within the 20 ft depth contour (i.e., extent of anoxia) with a uniform Al dose ranged between ~$290,000 and ~$540,000, depending on the thickness of the sediment layer to be treated (Table 2). Treatment costs to control sediment anoxic P flux below the 30-ft contour only were considerably less due to a much smaller treatment area and ranged between ~$103,000 and ~$186,000 (Table 3).

A stratified dosage strategy could also be considered, particularly when more information becomes available on textural and P characteristics of sediment located at shallower depths in the lake. An example of a stratified treatment is shown in Table 4. In this example, the sediment located between the 20- and 30-ft depth contours would be treated with a lower 80 g Al/m^2 dose while sediments deeper than 30 ft would be treated at a higher 150 g Al/m^2 dose. Total treated sediment acreage in this scenario is ~ 130 ac. The estimated cost, including setup, is ~ $375,000 in this example. Similarly, Half Moon Lake, an isolated shallow oxbow lake located in Eau Claire, Wisconsin, was recently treated (2011) using a stratified approach, with 150 g Al/m^2 and 75 mg Al/m^2 applied to the western arm and eastern and southern arms, respectively. Cost to treat 110 ac was ~ $354,000, including setup and delivery of aluminum sulfate and sodium aluminate. However, more information is needed to provide a more precise 2-tiered dosage and cost estimate for Fish Lake.

Recent lake Al treatments that have resulted in very effective and successful control of sediment internal P loading and improved water quality have generally ranged between ~ 95 g Al/m^2 and ~140 g Al/m^2 (Table 5). These observations suggest that higher dosages on the order of at least 100 g Al/m^2 on average should be considered for Fish Lake. In addition, multiple treatments of lower Al concentrations over a period of years (i.e., 2-3 year intervals) have been successful (Tiefwarensee, Germany) and have merit as a viable treatment scenario. For instance, Al dosage could be based on treatment of the upper 3-4 cm sediment layer at 3-year intervals for a total of three treatments. This treatment scenario would be equivalent to a single application that targets the upper 10-cm sediment layer, but has several advantages. Costs are spread out over a period of several years and because each incremental dosage is low relative to the target, the Al floc has a greater chance of becoming saturated with sediment P immediately after application. Other research has suggested that Al binding efficiency for P declines with time as the Al reacts to form more orderly Al~(OOH) polymer chains (Berkowitz et al. 2005, de Vicente et al. 2008). Sediment redox-P and aluminum-bound P could be monitored after each application for effectiveness in control of sediment P. Subsequent Al applications

might ultimately be lower if previously applied alum flocs have efficiently inactivated most of the redox-P in the surface sediment layers, resulting in overall cost savings.

The total alkalinity for Fish Lake was relatively high at 143 mg $CaCO_3$/L, suggesting a high buffering capacity for moderating pH during alum application. Al binding of P is most efficient within a pH range of 6 to 8. As pH declines below 6, Al becomes increasingly soluble (as Al^{3+}) and toxic to biota. The maximum allowable Al dosage for Fish Lake, determined via jar tests (Cooke et al. 2005), was high at 20 mg Al/L (Table 6). Treatment of sediment with a maximum dosage of 150 g Al/m^2 over the 20-ft and 30-ft depth contour would be equivalent to volumetric dosages of 17 and 13 mg/L, respectively, and thus, would not exceed the maximum allowable dosage. Cooke et al. (2005) reported that treatment longevity (i.e., years of successful P control) generally coincided with Al dosages greater than ~ 12 to 18 g/m^3 for stratified lakes (range = 11.7 to 30 g/m^3; Table 6). The estimated volume-based Al dosage for Fish Lake fell within the lower to median portion of that reported finding. An additional alkalinity-pH vertical profile would need to be examined during the spring to early summer period to verify and refine the maximum allowable Al dose.

Finally, alum dosage scenarios for Fish Lake accounted for binding of the more rapidly mobilized redox-sensitive P and did not account for gradually released labile organic P and slower P diffusion upward from deeper sediments or downward from sediment freshly deposited on top of the Al floc. There is currently some uncertainty regarding whether simply increasing Al dosage to account for these future P sources will result in the desired longer-term control. de Vicente et al. (2008) showed that aging of the $Al(OH)_3$ floc without previously sorbed PO_4^{-3} could result in substantially reduced future binding efficiency (up to 75% reduction in adsorption capacity over 90 d) due to changes in crystalline structure of the floc (Berkowitz et al. 2005). They suggested that smaller doses spread out over several years, versus one large dose, might maintain higher binding efficiencies for these future P sources. For Fish Lake, Al dosage could be adjusted to account for these potential additional sources of P, but more research is needed to clarify

both dosage estimation and application strategies for longer-term control of labile organic P and P diffusion from adjacent sediment layers.

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Table 1. Vertical variations in physical-textural characteristics, loosely-bound phosphorus (Loose-P), iron-bound P (Fe-P), labile organic P, aluminum-bound P (Al-P), redox-sensitive P (i.e., the sum of the loosely-bound and iron-bound P fractions; redox-P, and biologically-labile P (i.e., redox-P plus labile organic P) at sediment sampling stations 1 and 2 in Fish Lake.

Station	Section Top (cm)	Section Bottom (cm)	Sediment Depth (cm)	Moisture content (%)	Sediment density (g/cm^3)	Bulk density (g/cm^3)	Organic matter (%)	Loose-P (mg/g)	Fe-P (mg/g)	Labile org P (mg/g)	Al-P (mg/g)	Redox-P (mg/g)	Biol-labile P (mg/g)
1	0	1	-0.5	94.70	0.060	1.022	33.6	0.080	0.363	0.287	0.060	0.443	0.730
	1	2	-1.5	93.39	0.073	1.028	33.0	0.016	0.346	0.243	0.057	0.362	0.605
	2	3	-2.5	92.88	0.072	1.032	29.2	0.006	0.331	0.237	0.052	0.337	0.574
	3	4	-3.5	92.67	0.074	1.032	32.0	0.025	0.293	0.221	0.047	0.318	0.539
	4	5	-4.5	93.06	0.071	1.030	31.2	0.010	0.301	0.198	0.037	0.311	0.509
	5	6	-5.5	91.84	0.096	1.038	26.3	0.015	0.298	0.227	0.045	0.313	0.540
	6	8	-7	90.87	0.096	1.042	27.7	0.007	0.311	0.245	0.043	0.318	0.563
	8	10	-9	88.18	0.127	1.058	24.8	0.010	0.283	0.193	0.042	0.293	0.486
2	0	1	-0.5	93.52	0.067	1.029	29.6	0.066	0.303	0.279	0.053	0.369	0.648
	1	2	-1.5	94.85	0.057	1.017	47.0	0.045	0.406	0.398	0.098	0.451	0.849
	2	3	-2.5	90.13	0.107	1.050	21.0	0.032	0.276	0.243	0.032	0.308	0.551
	3	4	-3.5	89.66	0.106	1.052	21.8	0.035	0.289	0.213	0.032	0.324	0.537
	4	5	-4.5	89.36	0.108	1.052	24.6	0.023	0.281	0.214	0.040	0.304	0.518
	5	6	-5.5	89.39	0.123	1.047	30.8	0.016	0.299	0.177	0.024	0.315	0.492
	6	8	-7	86.83	0.156	1.069	20.6	0.010	0.269	0.179	0.050	0.279	0.458
	8	10	-9	84.55	0.171	1.084	18.6	0.010	0.293	0.172	0.037	0.303	0.475

Table 2. Approximate cost scenarios to treat sediment below the 20-ft (~130 ac) with aluminum sulfate.

Sediment Layer (cm)	Redox-P (g/m^2)	Al dosage (g/m^2)	Alum ($)	Setup ($)	Total ($)
6	1.86	80	$283,215	$7,000	$290,215
8	2.67	115	$407,121	$7,000	$414,121
10	3.49	150	$531,028	$7,000	$538,028

Table 3. Approximate cost scenarios to treat sediment below the 30-ft (~45 ac) with aluminum sulfate.

Sediment Layer (cm)	Redox-P (g/m^2)	Al dosage (g/m^2)	Alum ($)	Setup ($)	Total ($)
6	1.86	80	$95,752	$7,000	$102,752
8	2.67	115	$137,643	$7,000	$144,643
10	3.49	150	$179,534	$7,000	$186,534

Table 4. Approximate cost scenario to treat two sediment areas with different concentrations of aluminum sulfate.

Variable	Sediment area	
	20-30 ft contour (ac)	> 30 ft contour (ac)
Redox-P (g/m^2)	1.86	3.49
Al dosage (g/m^2)	80	150
Alum ($)	$187,463	$179,534
Setup ($)	$7,000	
Total ($)	$373,997	

Table 5. Recent and proposed alum (as Al) dosages for various lakes. An asterisk denotes a future treatment.

Lake	Alum Dose ($g\ Al\ m^{-2}$)	Reference
Tiefwarensee, Germany	137	Wauer et al. (2009)
East Alaska, Wisconsin	132	Hoyman (2012)
Squaw, Wisconsin*	120	James (unpubl. Data)
Half Moon, Wisconsin[1]	115	James (2011)
Susser See, Germany	100	Lewandowski et al. (2003)
Green, Washington	94	Dugopolski et al. (2008)

[1]West and east arm dosages were 150 and 75 g/m^2, respectively

Table 6. A comparison of the maximum allowable Al dose, based on a titration assay (Cooke et al. 2005) and the the areal sediment redox-P based Al dosage converted to a concentration for Fish Lake. Al dosages and longevity for other unstratified and stratified lakes are from Cooke et al (2005).

Lake		Al Dose ($g\ Al/m^3$)	Observed Longevity (years)
Fish Lake	Maximum allowable	20	
	150 $g\ Al/m^2$ below 20-ft contour	17	
	150 $g\ Al/m^2$ below 30-ft contour	13.2	
Unstratified			
	Long Kitsap Co.	5.5	11 (30%)
	Pickerel	7.3	<1
	Long Thurston Co. North	7.7	>8 (56%)
	Pattison North	7.7	7 (29%)
	Wapato	7.8	<1
	Erie	10.9	>8 (75%)
	Campbell	10.9	>8 (46%)
Stratified			
	Eau Galle	4.5	<2
	Morey	11.7	8 (60%)
	Cochnewagon	18	6 (0%)
	Dollar	20.9	18 (68%)
	Annabessacook	25	13 (41%)
	West Twin	26	18 (66%)
	Irondoquoit Bay	28.7	5 (24%)
	Kezar	30	9 (37%)

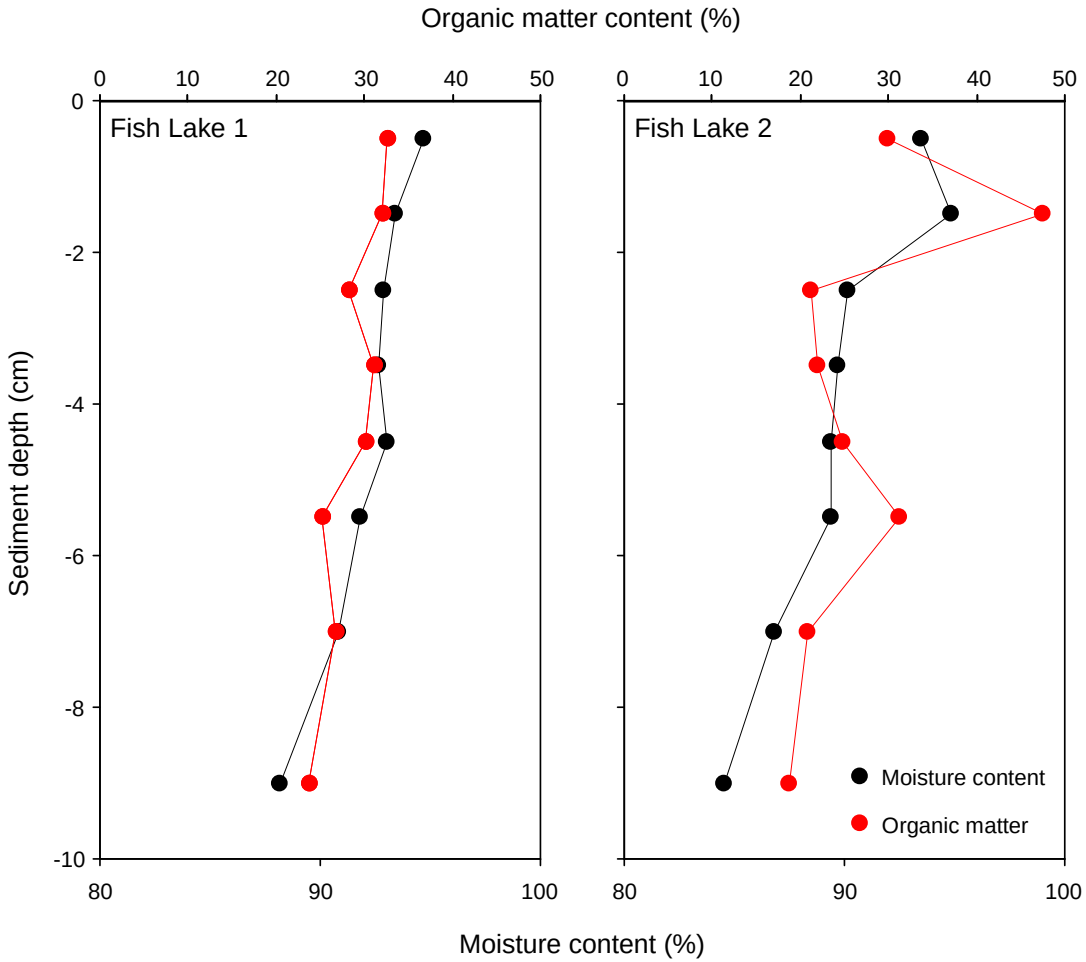

Figure 1. Vertical variations in sediment moisture and organic matter content at stations 1 and 2, Fish Lake.

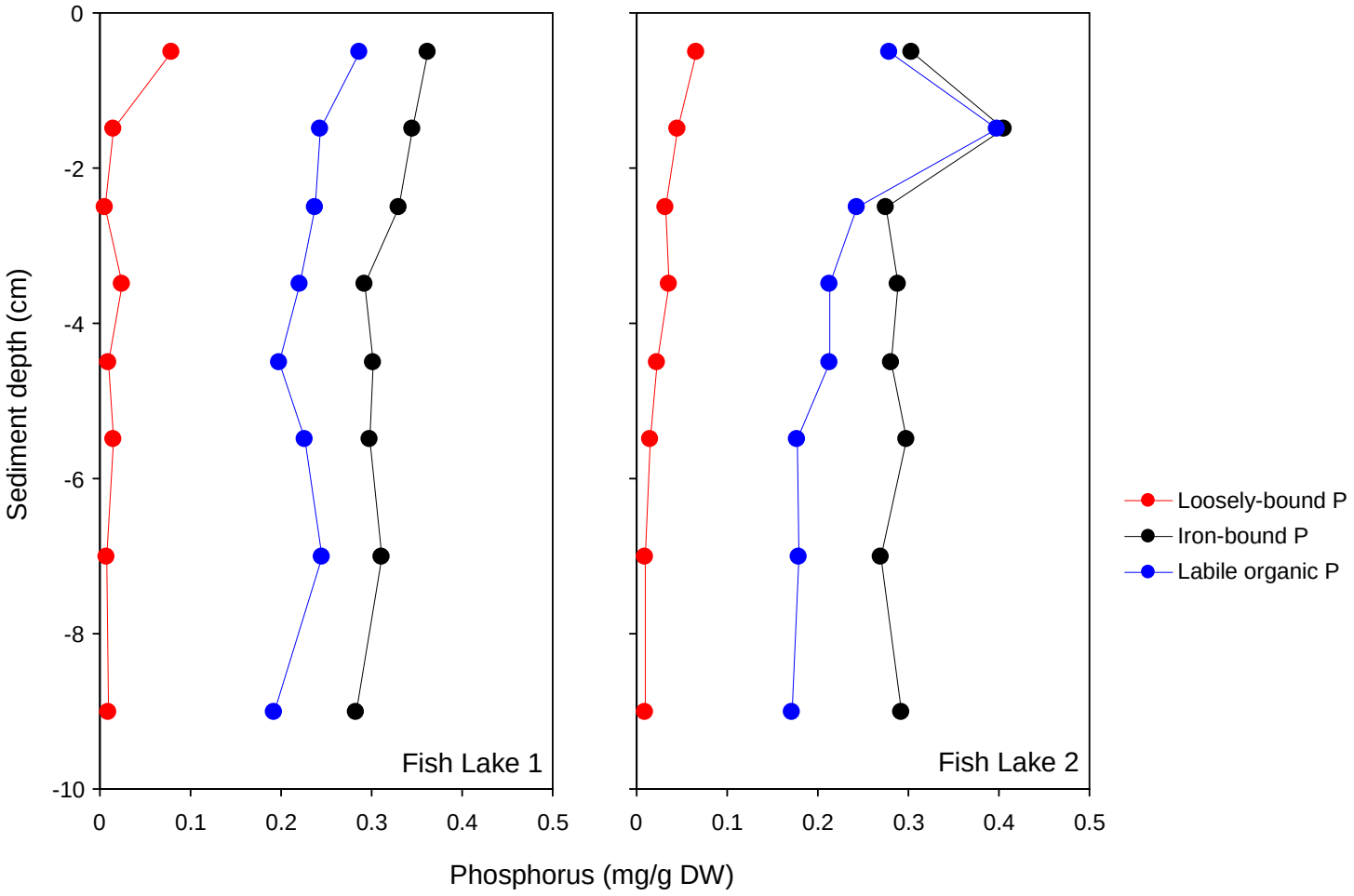

Figure 2. Vertical variations in loosely-bound phosphorus (P), iron-bound P, and labile organic P concentrations in sediments collected at stations 1 and 2, Fish Lake.

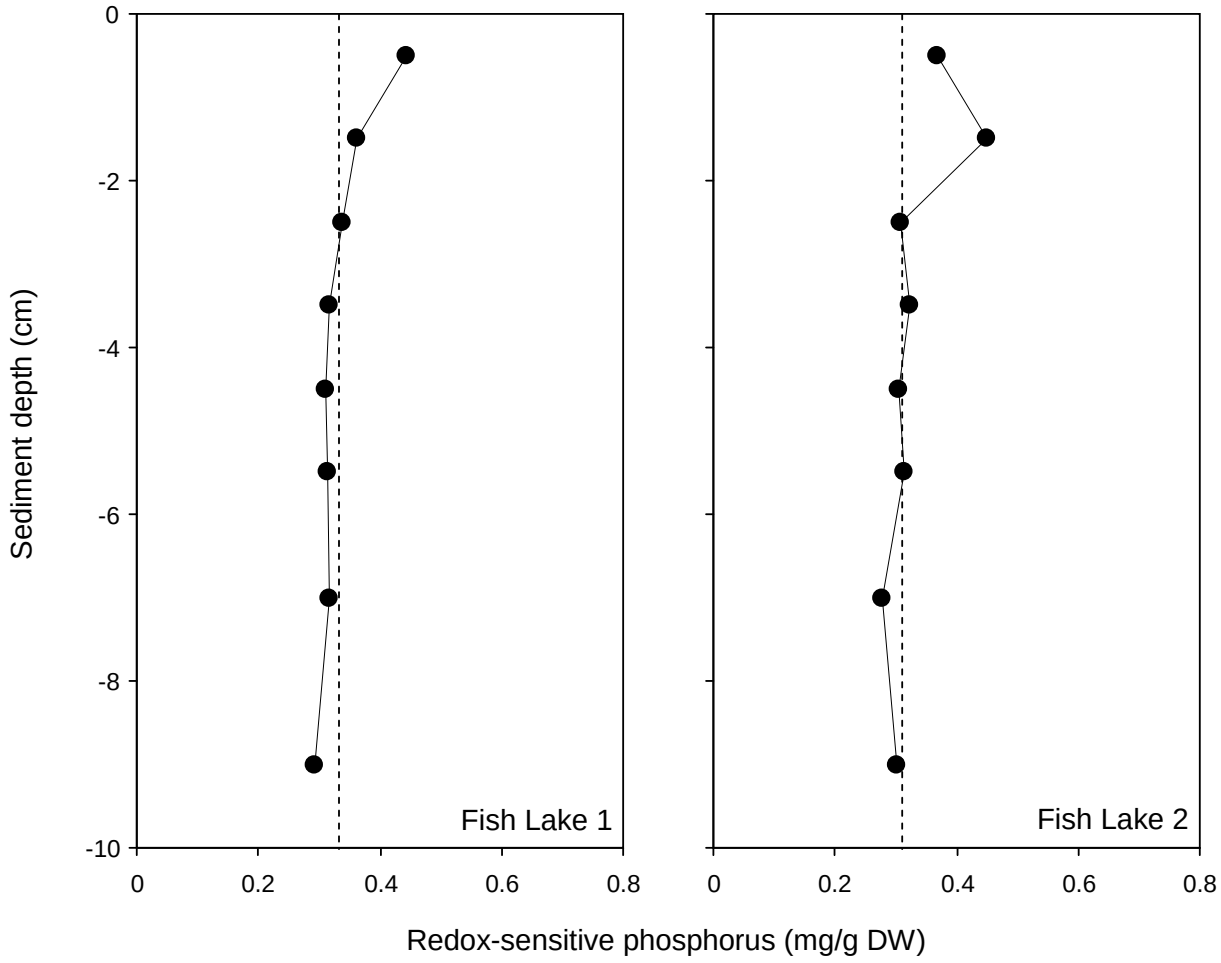

Figure 3. Vertical variations in redox-sensitive phosphorus (i.e., the sum of the loosely-bound and iron-bound phosphorus fractions) in sediments collected at stations 1 and 2, Fish Lake. Dashed line represents the integrated mean concentration over the entire 10-cm sediment layer.

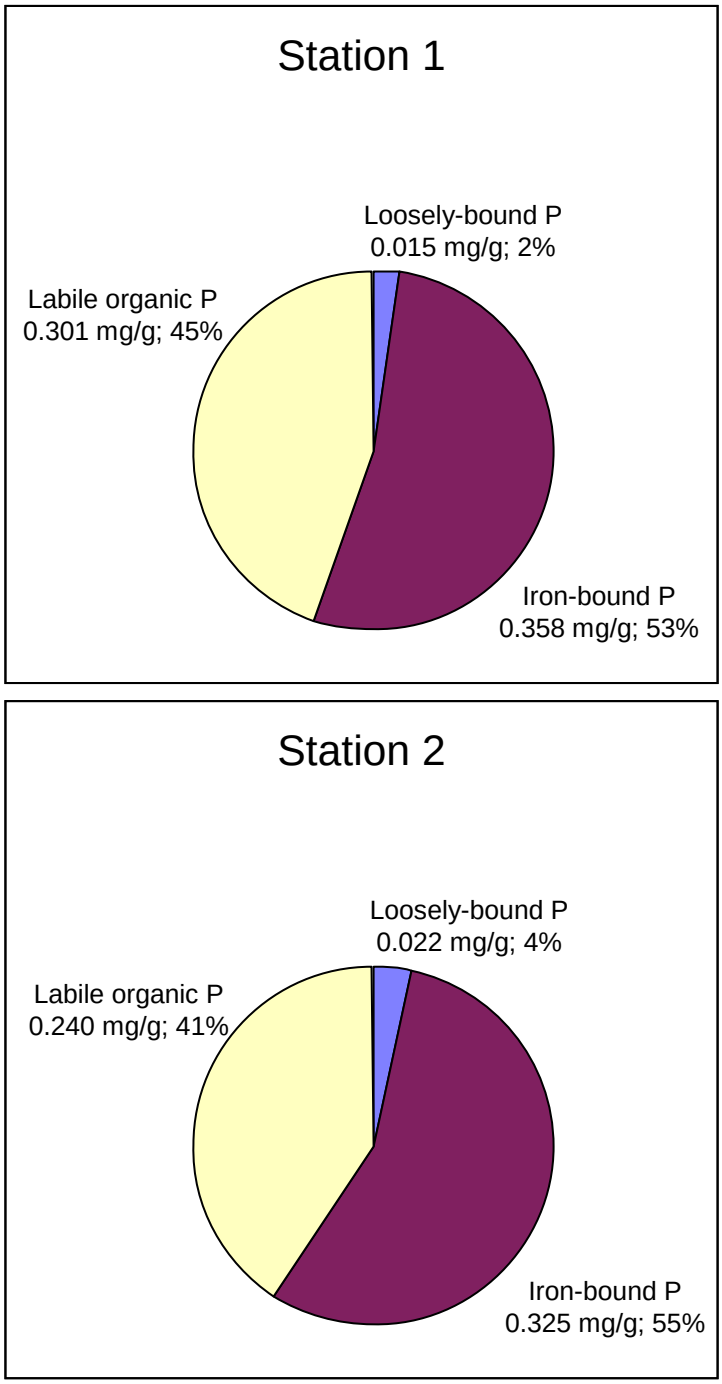

Figure 4. Composition of the biologically-labile phosphorus (P) pool in the upper 10-cm sediment layer.

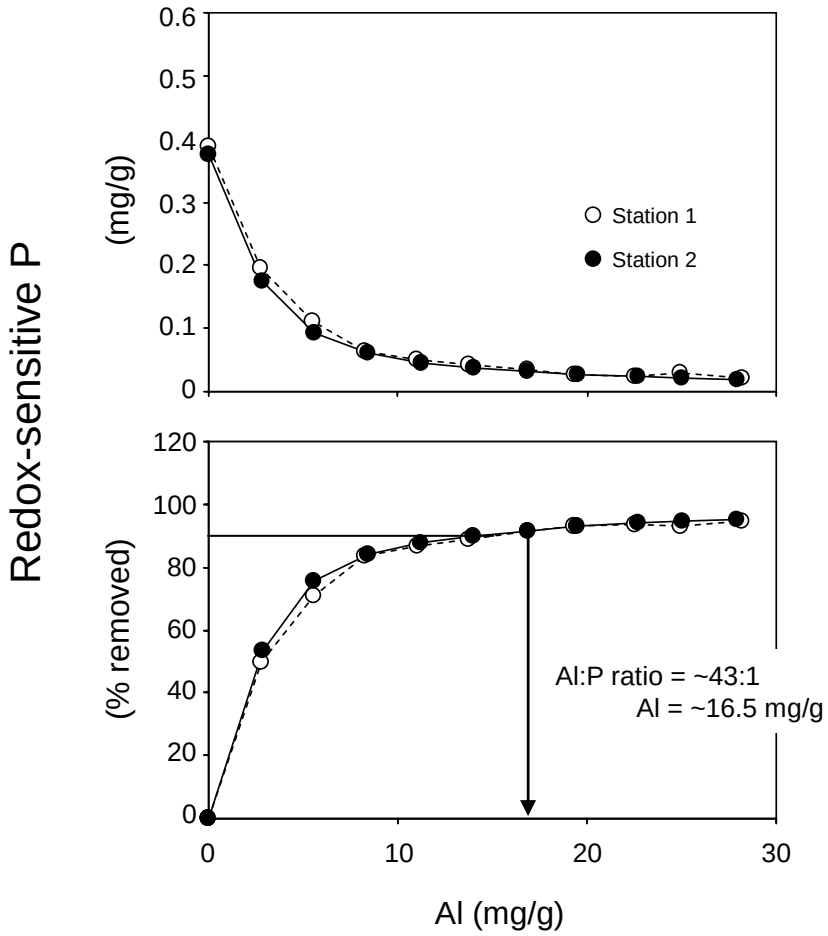

Figure 5. Variations in the concentration of redox-sensitive phosphorus (P; upper panel) and percent removed or adsorbed to the aluminum (Al) floc (lower panel) as a function of increasing Al concentration.

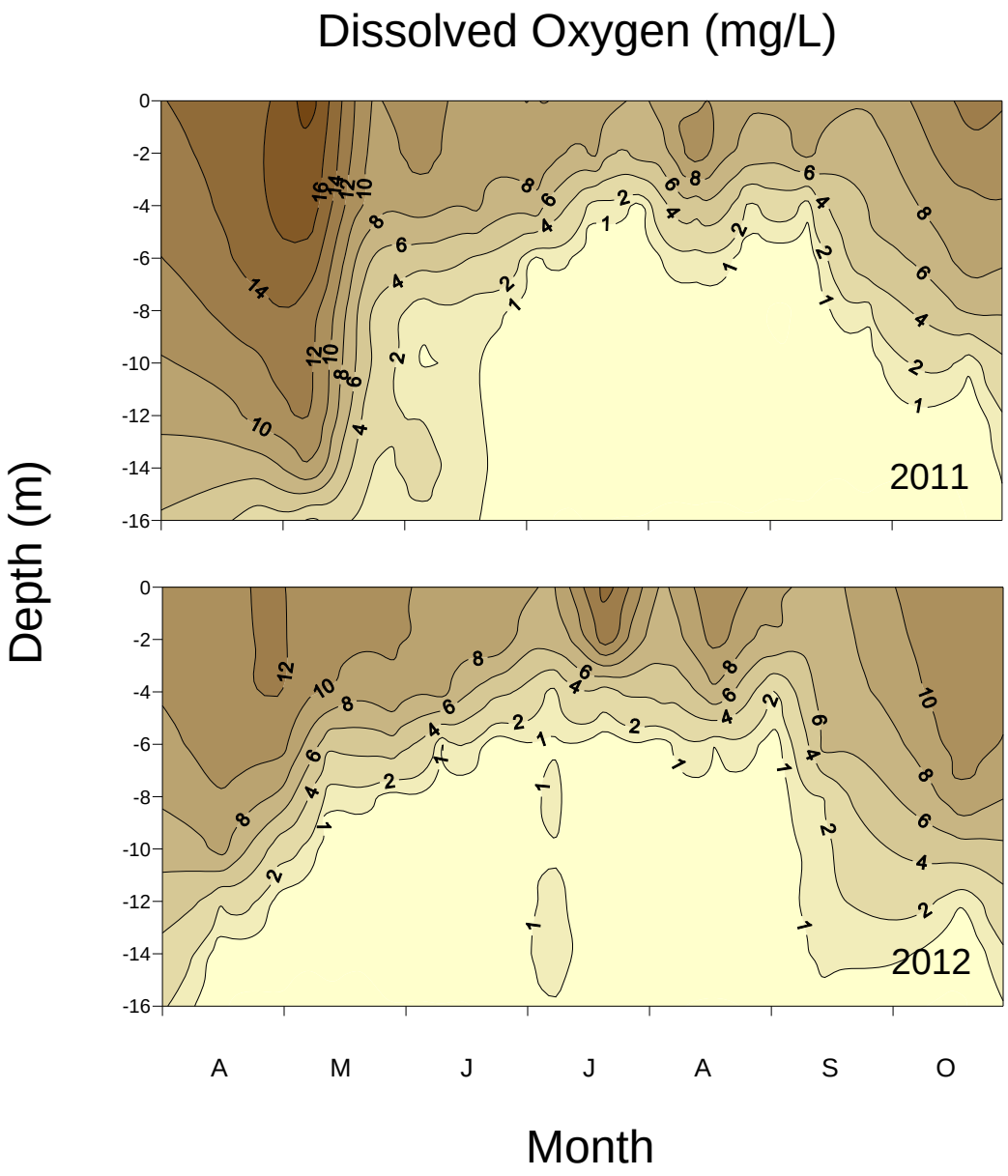

Figure 6. Seasonal and vertical variations in dissolved oxygen concentration (mg/L) in Fish Lake in 2011 and 2012. Concentrations less than 1 mg/L (i.e., light yellow area) are considered anoxic and under reducing conditions.

elm creek
Watershed Management Commission

ADMINISTRATIVE OFFICE
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STAFF REPORT
September 7, 2016

2013-046 Woods of Medina. Medina. This is two parcels totaling 9.5 acres located east of CR 116 and south of Hackamore Road. The site is proposed to be developed into 16 single-family residential lots. At its January 13, 2015, meeting the Commission approved this project with two conditions: 1) a pond operations and maintenance agreement must be provided, approved by the City and the Commission, and recorded on the title to the property. The recording must be done within 90 days of the final plat approval; and 2) a copy of the approved wetland replacement plan must also be provided. Final platting will be done when the landowner sells the property or decides to develop it himself. On August 3, 2016, Staff contacted the City seeking an update on the status of this project.

2014-015 Rogers Drive Extension, Rogers. This project involves improvements along Rogers Drive, extending from Vevea Lane to Brockton Lane. The project is located east of I-94, south of the Cabela development. The total project area is 8.0 acres; proposed impervious surfaces total 5.6 acres. Site plans received July 1, 2014 meet the requirements of the Commission with the exception of the nutrient control. Due to limited options to treat the nutrient loads on the east 1.7 acre portion of Rogers Drive, the Commission approved the site plan contingent upon the City deferring 4.6 pounds of phosphorus for treatment in future ponding opportunities as the easterly corridor of Rogers Drive develops. 2.3 pounds will be accounted for in the Kinghorn Spec. Building site plan with 2.3 pounds still outstanding. This item will remain on the report until the total deferral is accounted for.

2015-004 Kinghorn Outlot A, Rogers. This is a 31 acre site located between the Clam and Fed Ex sites in Rogers on the west side of Brockton Road and I-94. The proposed site will have two warehouse buildings, 275,000 and 26,000 SF in size, with associated parking and loading facilities. The Commission standards require review of stormwater management, grading and erosion controls and buffers. A complete plan was received May 14, 2015. At their June 2015 meeting the Commission approved this project with three conditions. Numerous revised plans have been received for Staff review. Once Rogers has authorized Staff to proceed, Staff will provide updated findings once the conditions are met.

2015-006 Veit Building and Parking Lot Addition, Rogers. This site is located at the Veit Headquarters Building, 14000 Veit Place. It is bound by I-94 to the north and Industrial Boulevard to the south and east. Fox Creek/DNR wetland #27-02920 is west of this property. The owner proposes to extend the main building entrance with a 6,500 SF building expansion. The existing surface lot adjacent to the main building entrance will be reconfigured and relocated slightly east of its current location. Soil boring tests performed since the Commission meeting determined infiltration will not work on this pond. Reducing the impervious area on site by 0.74 acres and installing a SAFL-Baffle weir in the storm sewer system will combine to meet the Commission standards for this site. The project was approved by the Commission at their May meeting pending the SAFL-Baffle weir being covered by an easement and the appropriate operation and maintenance agreement being obtained and recorded with the property. The applicant's agent indicated the O&M plan has been submitted to Rogers for approval. On August 3, 2016, Staff contacted the City seeking an update on the status of this project. The City responded that they are working with Veit to obtain additional easements to a wetland restoration project that took place adjacent to their property. The only access to the restored wetland is through their property. The City will continue to push them to finalize the easement and O&M.

2015-013 Wayzata High School, Plymouth. An application for the Wayzata High School addition and expansion was received on April 29, 2015. The plan includes additions to the high school building, new and/or expanded parking areas, new driveway, new playing fields, and new and/or modified stormwater ponds. The total disturbance area is approximately 44 acres, of which approximately 22 acres will be new impervious area. At the July 8, 2015 meeting, the

Commission approved the project with the conditions of the applicant providing a detailed irrigation plan and an O&M plan for the stormwater ponds. The applicant has provided the irrigation plan. The O&M plan has been completed; however, as of the date of this report, final recording of the plan has not yet been completed. *On September 8, 2016, Staff contacted the City seeking an update on the status of this project.*

2015-020 Strehler Estates, Corcoran. This is an 80-acre parcel currently made up of cropland, meadow and woods. It is located north of Strehler Road, approximately 0.75 miles east of CR 19. It is proposed to be developed into four rural residential lots, 9.1, 5.5, 5.8 and 59.2 acres in size. Site work will consist of grading a shared, private driveway (1,200 feet long) and construction of two stormwater ponds and drainage swales to those ponds. At its January 10, 2015 meeting the Commission approved this project contingent upon a conservation easement being recorded on the property title. On August 3, 2016, Staff contacted the City seeking an update on the status of this project.

2015-025 OP3 Outdoor Storage, Rogers. This ~2.5-acre vacant industrial site, located between I-94 and Industrial Boulevard, is proposed to be developed into a paved outdoor storage facility. About 0.9 acres of existing impervious area from the east adjacent lot will be added to the proposed new 1.9 acres of impervious surface. A stormwater pond is proposed on the west side of the parcel. A complete application was received August 28, 2015. Commission approved the project with Staff recommendations. A stormwater pond operation and maintenance plan must be submitted for review and approval and recorded. On August 3, 2016, Staff contacted the City seeking an update on the status of this project.

2015-030 Kiddiegarten Child Care Center, Maple Grove. This is a 2.2-acre undeveloped/vacant parcel platted with the Dalton Commons PUD. The applicant proposes to build a kindergarten that will have about 50% impervious cover. The PUD was approved in the early 2000s for 75% impervious cover. The site was designed to drain to Target Pond, which is located south of CSAH 30 and west of I-94. This project was approved by the Commission at their December 9, 2015 meeting with three conditions. No new information has been received. On August 3, 2016, Staff contacted the City seeking an update on the status of this project.

2015-032 Rogers High School Auditorium Addition, Rogers. This site is approximately 77 acres in size located north of CSAH 144, 1/4 mile east of the Highway 101 intersection. The auditorium addition will disturb 7.0 acres of existing lawn and driveway/drop-off areas. The modifications will include the auditorium addition, a parking lot expansion and driveway modifications. 2.64 acres of new impervious areas will be created with this project. A complete plan was received November 3, 2015. At their December meeting, the Commission approved this project contingent upon; a) Staff approval of an operation and maintenance agreement on the catch basin inlets and underground system with the City. Said agreement shall be recorded on the title to this property within 90 days after City approval of the site plans, b) Baffles provided on catch basins 2 through 5 and c) A snout, oil-water-debris separator provided on catch basins 1, 10, and 11. Revisions received December 10, 2015 addressed all the conditions with the exception of the recorded agreement. This project will remain open until the agreement is recorded. On August 3, 2016, Staff contacted the City seeking an update on the status of this project.

2016-001 CSAH 115/CR 116 Reconstruction, Medina. This project will include reconstruction of the roadway, including widening the road from the existing two-lane roadway, constructing dedicated turn lanes, drainage improvements, and construction of a paved pedestrian and bicycle trail. The project will increase the capacity of the intersection and improve mobility and safety for all transportation system users. It includes removal of the existing roadway and storm sewer; grading; placement of aggregate base and a new bituminous base and surface; addition of curb and gutter, storm sewer, and stormwater management facilities; and new signals, lighting, and related pedestrian facilities. A complete application was submitted on April 1, 2016. The Commission approved this project at their April 2016 meeting pending minor design modifications to reduce the 2-year peak flow; completion of the wetland mitigation plan and approval by the LGU; and final document recordings of the O & M plans/agreements. The design has been modified to reduce the 2-year peak flow. *The wetland mitigation plans were noticed in August but have yet to be approved by the LGU. The stormwater O & M recording has not been completed.*

2016-002 The Markets at Rush Creek, Maple Grove. This is a proposal to develop 40 acres of a 123 acre planned unit development located on the southwest quadrant of the intersection of CSAH 101 and CSAH 10. County Ditch 16 (Maple Creek) runs along the south property line on this project. The 40-acre project area includes a Hy-Vee grocery store (16.8 acres), a Hy-Vee gas station (2.5 acres) and 11 outlots (18.76 acres). Right-of-way accounts for the remaining 2.3 acres. The remaining acreage (83 acres) consists of 5 outlots and right-of-way. The additional outlot areas are not part of the

stormwater review for this project but will be reviewed for compliance with the Commission's buffer and floodplain requirements. At their May 2016 meeting, the Commission granted Staff authority to administratively approve the project and report any updates. On August 3, 2016, Staff contacted the City seeking an update on the status of this project. *The project has been placed on hold by Hy-Vee for the time being.*

2016-004 Park Place Storage Site Plans, Corcoran. The applicant is proposing to develop a 22-acre site in the southwest portion of the city into a multi-unit storage facility with associated access roads, utilities, and stormwater features. This will be an addition to the existing storage facility located west of the proposed project. New wetland permit revisions were received on May 25, 2016 and approved by the Commission at their July 2016 meeting contingent upon final escrow and easement establishment for the wetlands during the site plan review process. *New site plan information has been received but still does not meet the Commission standards.* The applicant extended the 15.99 deadline to October 8, 2016. *Another extension will be necessary from the applicant or Staff will deny the project prior to the October 8 deadline.*

2016-005W Ravinia Wetland Bank, Corcoran. In February, Lennar Corporation submitted a Wetland Banking Concept Plan for Phase II of their Ravinia Development in Corcoran. This plan has since been withdrawn in favor of an onsite wetland replacement plan. Wetland impacts from the final phases of this development will be 1.17 acres. They are proposing to restore, enhance and create 3.3 acres of wetland credits and 1.24 acres upland buffer credits on site. The original wetland delineation was approved by the LGU September 9, 2013. The project was been noticed per MN WCA requirements on August 27. Comments will be accepted until September 30, 2016. This will be an action item at the next Commission meeting.

2016-014 Balsam Apartments, Dayton. This is an existing 2.5 acre commercial lot located near the SE corner of Balsam Lane and Dayton River Road (CSAH 12). The project will consist of a multi-story apartment complex, an underground parking garage, parking lot, two rain gardens and related utilities. Site plans must conform to the Commission's Third Generation Management Plan. The Commission approved Staff's findings and recommendations at their April 2016 meeting. Operation and maintenance agreements with an O&M plan must be recorded on the property. On August 3, 2016, Staff contacted the City seeking an update on the status of this project. The City's engineer responded that the City has received a draft agreement from the applicant, but has not yet received a final/signed copy. The applicant is currently under building permit review; receipt of an executed agreement is a condition of permit approval.

2016-018 Cambridge Park, Maple Grove. This project involves three large residential lots (16.4 total acres) located in the northwest corner of the intersection of County Road 30 and Lawndale Lane. The predominant land cover is woods and wetland. The site is proposed to be developed into 94 row townhomes. Staff's initial review determined the project was not in compliance with the Commission's requirements for stormwater management, erosion and sediment controls and buffer strips. At their July 2016 meeting the Commission approved this project subject to recorded preservation easements and pond maintenance provided by the City of Maple Grove or through an approved operation and maintenance agreement recorded on the property title. *No new information has been received this month.*

2016-019 Just for Kix, Medina. This is a proposal to redevelop 2.2 acres from an existing residential lot to a new commercial facility located on State Highway 55. The applicant proposes to construct a 18,040 SF dance studio, 74-stall parking lot, two filtration basins, and related utilities. Currently, site drains directly into Elm Creek. The project is being reviewed for compliance with the Commission's grading and erosion control standards, stormwater management standards, buffer and floodplain requirements. The Commission approved this project with the conditions cited by Staff in their findings dated June 6, 2016, namely: 1) a final electronic copy of the signed revised plans, showing the revision dates, must be submitted to the Commission and the City of Medina; and 2) the corrected O & M plan agreement for the bio-filtration basins must be submitted to the Commission and the City of Medina. The O & M plan must be recorded within 90 days of the final plat approval.

2016-020 Ryan Meadows, Rogers. This is an existing 10-acre residential lot located south of 129th Avenue. The applicant proposes to develop 12 single-family residential lots with one outlot on approximately 6 of the 10 acres. The existing home on 129th Avenue with approximately 4 acres will remain undeveloped at this time. At their June meeting the Commission accepted Staff's findings dated June 1, 2016, approving the project contingent upon an operations and maintenance agreement being approved by the City and the Commission and recorded on the property title within 90

days after final plat recording. On August 3, 2016, Staff contacted the City seeking an update on the status of this project. *No new information has been received.*

2016-021 Diamond View Estates, Dayton. This project involves four large residential lots on approximately 40 acres proposed to be developed into 73 residential lots. It is located on North Diamond Lake Road approximately one mile west of CSAH 12. At their June 8, 2016 meeting the Commission approved Staff findings and recommendations dated June 6, 2016. The approval is contingent that, if the City of Dayton/homeowners are to maintain the ponds and the bio-filtration basin, an operation and maintenance plan agreement must be submitted for approval to the City of Dayton and the Commission and recorded within 90 days of the final plat approval. On August 3, 2016, Staff contacted the City seeking an update on the status of this project. The City Engineer responded that he will follow up on the recordation.

2016-022 AutoZone, Maple Grove. AutoZone is proposing to construct a 7,147 SF retail store located at the northeast corner of Garland Lane and 95th Avenue North (CR 30). The existing site is 1.36 acres, including some off-site area on the north. This parcel is being platted from the 87-acre Tri-Care property located at Garland Lane, north of 95th Avenue. During the last 15 years this site has been subject to conversion from a nursery, rough grading and stockpiling of dirt. The proposed development consists of the construction of a retail store, associated parking, landscaping, and a stormwater management facility (bio-filtration basin) to provide stormwater treatment and rate control. The project will create 0.74 acres of new impervious surface. Staff review was for compliance to the Commission's Third Generation SWMP requirements for erosion and sediment controls. Staff issued comments and request for review on May 18, 2016. Revised plans were received on May 26, 2016. At their June 8, 2016 meeting, the Commission approved Staff's findings dated June 1, 2016, with the condition of recording an approved O & M Plan within 90 days of the final plat approval.

2016-023 Tri-Care, Maple Grove. Plans were submitted on May 13, 2106 for this project located along the north side of County Road 30, at Garland Lane (northeast corner of Garland Lane and CR 30). The project will disturb approximately 10.3± acres. The project consists of constructing a stormwater pond, temporary road and utilities. The site currently is mostly grass-covered and was previously used as farm field. There is a wetland on the west end of the site. Staff will extend the decision timeline 60-days to September 10, 2016. Revised site plans were received July 6. During a site visit Staff observed this project has already been constructed and is functioning. Staff requested the applicant provide the Commission with as-builts along with proof and certification that the stormwater filtration pond will meet its abstraction volume requirements. *A visual inspection of the filtration pond verifies it does not filter enough volume during a 48 hour period to meet Commission requirements. Staff have asked the developer for their resolution to the issue.*

2016-026 Faithbrook Church, Dayton. This is 12.2 acre commercial development site located at 224 1st Avenue Northwest. It is bounded by Fernbrook Lane North to the west, Elm Creek Road to the south. The project will build a principal structure and create about 1.34 acres of impervious surface (driveways and parking lots). The site is currently vegetated with agricultural crops. The Commission approved this project based on Staffs findings dated July 25, 2016 with the stipulation that an approved O&M plan must be recorded with the property within 90 days following final plat approval.

2016-027 Rogers Drive, Brockton Lane Intersection Improvements, Rogers. The City of Rogers is proposing to construct intersection improvements, including grading, bituminous paving, signals and storm sewer from approximately 1000 feet south of David Koch Drive to 275 feet north of 124th Avenue on Brockton Lane (CSAH 13). The project will disturb a 2.45 acre area and increase impervious area by 0.76 acres. This project does not trigger a stormwater management review and was administratively approved by Staff. *This item will be removed from the report.*

2016-030 Elm Creek Meadows, Plymouth. This is three parcels on 28 acres proposed to be developed into 59 single-family townhomes. It is located on the east side of Elm Creek, north of CR 47. At their August meeting the Commission approved Staff's recommendations dated August 9, 2016, with the following conditions: 1) provision of an O&M plan to be recorded with the property within 90 days following final plat approval; 2) a recommendation to the developer that irrigation be considered on this project, and 3) a requirement that the footbridge be removed, requiring an after-the-fact permit. *Since that time, the City has agreed to the operation and maintenance of the*

pond. All other requirements have been forwarded to the applicant and City. They have agreed to remove the bridge during grading operations. This item will be removed from the report.

2016-032 CSAH 19 Cross Culvert, Corcoran. Hennepin County is requesting permission to lower a culvert on County Road 19 just south of Burschville. According to documentation, this culvert was inadvertently installed one foot too high when CSAH 19 was reconstructed in 2008. *Staff approved the request under the Commission's general permit with Hennepin County. This item will be removed from the report.*

2016-033 Dayton Public Works Garage, Dayton. This is a 17-acre farm field located on the east side of Zanzibar Lane about half-way between North and South Diamond Lake Roads. It will be developed into a public works facility with a new building and parking lot area. Staff will review for compliance with the Third Generation SWMP and provide a recommendation to the Commission.

2016-034 French Lake Golf Course AUAR, Dayton. This is four parcels totaling 74.4 acres proposed to be combined for an industrial park south of French Lake. Altogether, upon completion, the site is proposed to house 1,140,670 square feet of industrial warehousing. While the land is guided for this land use type, the proposed size and extent of the facility triggers a mandatory environmental review. The RGU has elected to prepare an AUAR to fulfill this requirement. *Staff provided comments based on the Third Generation Plan. This item will be removed from the report*

2016-035W 20070 Larkin Road, Corcoran. This is a wetland violation where filling occurred during site improvements at the back of an existing storage facility. *Work appears to have been done around the week of July 18. Filling was done to accommodate additional outside storage area. A TEP was held on site September 6. It was determined approximately 4,125 sq. ft. of wetland was filled. A restoration order will be issued for the violation and for the landowner to comply with the Commission and WCA requirements.*

2016-036 K-Manufacturing 3rd Addition, Dayton. *After preliminary review of the site and stormwater management plans on this project, Staff determined it does not fall under the threshold for a Commission review. Although the amount of disturbance is just over 1.0 acre (1.07 ac), approximately 1/3 of the disturbance is the building addition that is occurring over an existing parking area and minimal new impervious areas are being created. With the proposed biofiltration basin, construction erosion controls and site restoration plans, Staff discussed this project with the City Engineer. Staff are confident this site plan meets the spirit and intent of the Commission's standards and that the City of Dayton will take the appropriate measures to assure water quality and natural resources are protected.* Staff *recommend a refund the project review fees (minus the $50 application fee) to the applicant.*

2016-037 Lanewood Estates, Plymouth. *This is a 5.9 acre site located north of County Road 47, at the extension of Lanewood Lane (PID 0411822120006), within the Taryn Hills community. Current use of the property is a single house and barn on the property with a large lawn. Surrounding land use on the north, west and south is single family houses and vacant on the east. About one-third of the northeast portion of the parcel is wetland which is also a Public Water Wetland. The applicant is proposing to build 7 single-family houses. On August 30, 2016, Staff requested revisions to complete the review. Revisions were submitted on September 7, 2016, and Staff is reviewing them. If the review is completed, recommendations will be available at the meeting.*

2016-038 AutoMotorPlex, Medina. *This 22.17 site owned by Loram is located on the northeast corner of County Roads 115 and 118. The site will be re-platted into two lots, 19.17 acres and 3 acres. At this phase only the northern 19.17 acres will be developed into commercial automobile condominiums and retail area. Staff requested revisions on September 1, 2106.*

2016-039 Sands Parcel, Plymouth. *This is a 20.5 acre site located on the north side of the intersection of County Road 47 and Troy Lane North. The site is proposed for a 46 single-residential home development. Staff is currently reviewing the project.*

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Minnesota Wetland Conservation Act
Notice of Application

Local Government Unit (LGU)	Address
Elm Creek Watershed Management Commission	**c/o JASS** **3235 Fernbrook Lane,** **Plymouth, MN 55447**

1. PROJECT INFORMATION

Applicant Name	Project Name	Date of Application	Application Number
Lennar Corporation; Attn: Joe Jablonski and Paul Tabone	**Ravinia Wetland Bank Replacement Plan**	**8/26/2016**	**2016-004W**

Type of Application (check all that apply):

☐ Wetland Boundary or Type ☐ No-Loss ☐ Exemption ☐ Sequencing
☒ Replacement Plan ☐ Banking Plan

Summary and description of proposed project (attach additional sheets as necessary):

In February, Lennar Corporation submitted a Wetland Banking Concept Plan for Phase II of their Ravinia Development in Corcoran. This plan has since been withdrawn in favor of an onsite wetland replacement plan. Wetland impacts from the final phases of this development will be 1.17 acres. They are proposing to restore, enhance and create wetlands and upland buffers on site. Wetland replacement credits are estimated to be 3.3 acres of wetland and 1.24 acres of buffer. The original wetland delineation was approved by the LGU September 9, 2013. This site is located in Hennepin County PIDs 3611923240002, 3611923210002, 3611923130011, 3611923420042,3611923430003, 3611923430002, 3611923410052. Section 36, T119N, R23W

2. APPLICATION REVIEW AND DECISION

Signing and mailing of this completed form to the appropriate recipients in accordance with 8420.0255, Subp. 3 provides notice that an application was made to the LGU under the Wetland Conservation Act as specified above. A copy of the application is attached. Comments can be submitted to:

Name and Title of LGU Contact Person	Comments must be received by (minimum 15 business-day comment period):
James C. Kujawa. **Technical Advisor to the Commission**	**September 30, 2016**
Address (if different than LGU) **701 4th Ave. S., Suite 700** **Minneapolis, MN 55415**	Date, time, and location of decision: **October 12, 2016; 11:30 AM Maple Grove City Hall, 12800 Arbor Lakes Pkwy., Maple Grove, MN 55369**
Phone Number and E-mail Address **612-348-7338** **James.kujawa@hennepin.us**	Decision-maker for this application: ☐ Staff ☒ Governing Board or Council

Signature: _____ **Date:** **August 27, 2016**

3. LIST OF ADDRESSEES

☒ SWCD TEP member: **(email only) Stacey. Lijewski@hennepin.us**
☒ BWSR TEP member: **(email only) ben.meyer@state.mn.us**
☐ LGU TEP member (if different than LGU Contact):
☒ DNR Regional Office (if different than DNR TEP member) **leslie.parris@state.mn.us (email)**
☒ Applicant (notice only) and Landowner (if different) **Joe Jablonski (joe.jablonski@lennar.com) Paul Tabone (paul.tabone@lennar.com) (email only)**
☒ Members of the public who requested notice (notice only): **City of Corcoran: Brad Martens (bmartens@ci.corcoran.mn.us); Kendra Lindahl (klindahl@landform.net); Ben Carlson (ben@kjolhaugenv.com) (email only)**
☒ Corps of Engineers Project Manager (notice only) **Melissa.M.Jenny@usace.army.mil (email only)**
☐ BWSR Wetland Bank Coordinator (wetland bank plan applications only)

4. MAILING INFORMATION

- For a list of BWSR TEP representatives: www.bwsr.state.mn.us/contact/WCA_areas.pdf
- For a list of DNR TEP representatives: www.bwsr.state.mn.us/wetlands/wca/DNR_TEP_contacts.pdf
- Department of Natural Resources Regional Offices:

NW Region:	NE Region:	Central Region:	Southern Region:
Reg. Env. Assess. Ecol. Div. Ecol. Resources 2115 Birchmont Beach Rd. NE Bemidji, MN 56601	Reg. Env. Assess. Ecol. Div. Ecol. Resources 1201 E. Hwy. 2 Grand Rapids, MN 55744	Reg. Env. Assess. Ecol. Div. Ecol. Resources 1200 Warner Road St. Paul, MN 55106	Reg. Env. Assess. Ecol. Div. Ecol. Resources 261 Hwy. 15 South New Ulm, MN 56073

For a map of DNR Administrative Regions, see: http://files.dnr.state.mn.us/aboutdnr/dnr_regions.pdf

- For a list of Corps of Project Managers: www.mvp.usace.army.mil/regulatory/default.asp?pageid=687
  or send to;

  US Army Corps of Engineers
  St. Paul District, ATTN: OP-R
  180 Fifth St. East, Suite 700
  St. Paul, MN 55101-1678

- For Wetland Bank Plan applications, also send a copy of the application to:

  Minnesota Board of Water and Soil Resources
  Wetland Bank Coordinator
  520 Lafayette Road North
  St. Paul, MN 55155

5. ATTACHMENTS

In addition to the application, list any other attachments:
☒ **Ravinia Final Phases, Wetland Permit Application.**
☐
☐
☐

Planting the Seeds: Establishing a state buffers program

August 2016 Snapshots

In June of 2015, Governor Dayton signed into law a new buffer initiative aimed at enhancing protection of Minnesota's waters. The law was further clarified in 2016, and the Board of Water and Soil Resources (BWSR) is currently in the middle of a deliberate and transparent process to develop program policies and supporting guidance for its statewide implementation.

The law designates an estimated 110,000 acres of land for water quality buffer strips statewide on which new perennial vegetation buffers of up to 50 feet along rivers, streams, and ditches will be established to help filter out phosphorus, nitrogen, and sediment. It also provides flexibility and financial support for landowners to install and maintain buffers, and boost compliance with buffer laws across Minnesota.

In March, BWSR staff began gathering insight from stakeholders and the public on program development. Comments received during this process were posted on the BWSR website, and were used to help inform program development. BWSR has also been working closely with our local government partners throughout the process, as they are tasked with implementing the law.

Seven draft policies were posted on the website in late June so that stakeholders and the public would have another opportunity to review pieces of the program's development and provide comments about the process. These policies will lay the foundation for the development and delivery of a host of supporting guidance which local partners and the public can use to make progress towards compliance with the law.

Buffer and Soil Loss Program Coordinator Tom Gile talks buffer implementation with local government staff in Detroit Lakes earlier this summer.

Feedback will be incorporated and it's anticipated that the BWSR Board will adopt a series of policy documents at its August meeting which will ultimately guide the remainder of program development and guidance. The process is moving swiftly in an effort to get the information completed and in the hands of those who are implementing the law as soon as possible.

With the release of the DNR Buffer Map in early July, Soil and Water Conservation Districts are meeting with landowners around the state to help them understand what their responsibilities are in terms of implementation. BWSR continues to develop tools and guidance for our partners to help facilitate this process.

"In my travels around the state participating in workshops and Q&A sessions with our local government partners, it's clear that everyone is working as hard as they can to make sure the implementation process works for landowners as smoothly as possible," Buffer and Soil Loss Program Coordinator Tom Gile said. "People are ready to get started."

BWSR's ultimate goal is a well-established program that makes a difference for Minnesota's water quality. Many landowners are not waiting for the compliance deadlines – November 1, 2017 for public waters and November 1, 2018 for public drainage ditches – to begin implementing buffers on their land. Contact your local SWCD for more information about how the buffer law applies to you and your property. For more information on the new buffer law, please visit: www.bwsr.state.mn.us/buffers/. The DNR map and more information about their process can be found at http://dnr.state.mn.us/buffers/index.html.

elm creek
Watershed Management Commission

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Park Place Storage Site Plan
Corcoran, Project #2016-004

Project Overview: Park Place Storage is proposing to develop a 22-acre site in the southwest portion of City of Corcoran into a multi-unit storage facility with associated access roads, utilities, and stormwater features. This will be an addition to the existing storage facility located west of the proposed project. A wetland replacement plan for this site was approved by the Commission at their July 2016 meeting. This review is for the site plan's conformance to the Commission's stormwater, grading and erosion control requirements.

Applicant: Paul Jorgensen, P.O. Box 326, County Road 19, Corcoran, MN 55357. Phone: 612-670-3077. Email: paulj@parkplacestorage.net

Agent/Engineer: Landform, Glenn Huebner, 105 South Fifth Avenue, Suite 513, Minneapolis, MN 55401. Phone: 612-252-9070. Email: ghuebner@landform.net

Exhibits:
1) ECWMC Request for Plan Review and Approval for Park Place Storage site and wetland replacement plan. Received February 9, 2016.
2) ECWMC project 2016-003W, Park Place Storage Wetland Replacement Plan project file, findings (dated July 7, 2016) and Commission actions (minutes from July 8, 2016 Commission meeting)
3) MN Statute 15.99 extensions to October 8, 2016.
4) Park Place Hydrology design information submittal, received August 16, 2016.
5) Park Place site plan submittal, received August 22, 2016.

Findings;
1) The original application was received February 9, 2016. Subsequent layout and plan revisions have resulted in staff and landowner decision deadline extensions (per MN Statute 15.99) to October 8, 2016.
2) This site drains south through a series of wetlands and depressions before reaching Loretto Creek, which drains to Lake Sarah. Water from this site travels approximately 2.6 miles before reaching Lake Sarah.
3) At their July meeting, the Commission approved the wetland replacement plan (pending escrow and bank account withdrawals).
    a. 0.24 acres of impacts

b. 0.48 acres of mitigation
   i. 0.24 acres from bank account #1560 in Plymouth
   ii. 0.24 acres from bank account #1183 in Stearns County.

4) Eight (8) new storage buildings totaling 222,420 sq. ft. (5.1 ac.) are proposed in four phases of construction
5) Project Site Area = 20.9 acres
6) Net new impervious = 10.7 acres
7) Abstraction requirements will be 42,725 cubic feet. Abstraction is proposed by constructing two ponds that will drain into biofiltration basins. These basins do not meet the MPCA biofiltration standards for water table separations and cannot be approved by the Commission.
   a. The wetland elevation adjacent to the west biofiltration pond is at an elevation of approximately 1050. The assumed water table would be at that elevation.
   b. The wetland elevation adjacent to the east biofiltration pond is at an elevation of approximately 1049/1048. The assumed water table would be at that elevation.
   c. MPCA biofiltration standards require a 3 foot separation between the bottom of the filter and the water table. This does not occur on either biofiltration basin.
8) Where grading occurs within the Commissions buffer requirements, additional buffer areas will be required when slopes exceed 6:1. This will occur in a substantial area of this development. A buffer detail map and accounting is necessary for this site.
9) Post development nutrient and TSS loads must be less than pre-development loads. No calculations were not provided with the submittal.
10) Ponds and basins must have a long term operation and maintenance plan. If the City of Corcoran does not agree to the operation and maintenance, an agreement between the City and landowner must identify who and how this work will be conducted and who will pay for it. This agreement and O &M schedule must be recorded on the land title. The Commission must be provided a copy of the recorded document.
11) Skimming must be provided on these systems.
12) Detailed biofiltration draintile information and elevations must be provided with the utility plans. Cleanouts must be shown on the plan.

Recommendation; None at this time.

Hennepin County
Department of Environmental Services

July 7, 2016
Date

James C. Kujawa
Advisor to the Commission

Project Location

elm creek
Watershed Management Commission

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August 17, 2016

Ms. Tina Goodroad, AICP
Planning and Development Director
City of Dayton
12260 S. Diamond Lake Road
Dayton, MN 55327

Re: French Lake Golf Course Industrial Project, Draft AUAR

Dear Ms. Goodroad;

On behalf of the Elm Creek Watershed Management Commission I would like provide the following comments on the French Lake Golf Course Industrial Project Draft AUAR.

- Wetlands. The project layout and building footprint is premised on the assumption that 1.5 acres of wetland impacts will occur.
    - Wetland impacts cannot occur until MN WCA Rule Chapter 8420.0520 is satisfied.
    - The site layout and building footprints cannot be assumed until WCA sequencing is approved by the LGU.
    - The Elm Creek WMC recommends the LGU replace impacted wetland in the following order of descending priority;
        - On site
        - Within the same subwatershed (French Lake Basin)
        - Within the Elm Creek Watershed
    - The project wetlands must meet the Commission buffer standard Appendix O, Rule I
- Stormwater. The project must meet the Elm Creek WMC rules and standards per Appendix O.
    - Abstraction of 1.1" of runoff from the new impervious areas will be necessary
        - The report assumes stormwater volume abstraction to be available only from infiltration based on soil capability on site. Other methods for abstraction credits must also be considered, including, but not limited to; limits to the building footprints and parking lot layouts, permeable pavement, stormwater reuse from the ponds for irrigation and preservation of woodland and grassland.

Thank you for the opportunity to comment on this project.

Sincerely,

James C. Kujawa
Technical Advisor to the Commission.

cc Judie Anderson
Ali Durgunoglu