



PLANNING COMMISSION AGENDA

MARCH 5, 2018
7:00 pm

1. **CALL TO ORDER -**
2. **PLEDGE OF ALLEGIANCE –**
3. **OATH OF OFFICE – Lucia Wroblewski**
4. **ROLL CALL -**
 - Scott Patten (Vice-Chair)
 - a) Sally Doherty
 - b) Kris Kopitzke
 - c) Mark Nelson
 - d) Lucia Wroblewski
 - e) Jim Langan
 - f) Roger Bowman
5. **APPROVAL OF AGENDA –**
6. **APPROVAL OF MINUTES –**
 - A. February 5, 2018 Meeting Minutes
7. **ELECTION OF OFFICERS**
 - A. Chair
 - B. Vice-Chair
 - C. Secretary
8. **REPORTS AND PRESENTATIONS – None**
9. **PUBLIC HEARINGS –**
 - A. Matt Cooper Variance Application at 3988 River Road
 - B. Nicholas Squires Variance Application at 14641 Afton Boulevard
 - C. Afton Creek Preserve Application for Rezoning, Preliminary Plat and Conditional Use Permit for a Preservation and Land Conservation Development (PLCD) Subdivision to create 18 lots on 219 acres of land at 14220 60th Street and parcels with PID Numbers 33.028.20.32.0001, 32.028.20.41.0002, 32.028.20.42.0004, and 32.028.20.43.0001 and the parcel with PID Number to be assigned (33.028.20.33.000X described in document No. 4142813).
10. **NEW BUSINESS – None**
11. **OLD BUSINESS -**
 - A. Update on City Council Actions – Council Highlights from the February 20, 2018 Council meeting - attached.
12. **ADJOURN –**

-- This agenda is not exclusive. Other business may be discussed as deemed necessary. --

A quorum of the City Council or Other Commissions may be present to receive information.

CITY OF AFTON
DRAFT PLANNING COMMISSION MINUTES
February 5, 2017

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5 1. **CALL TO ORDER** – Chair Barbara Ronningen called the meeting to order at 7:00 PM
- 6
7 2. **PLEDGE OF ALLEGIANCE** – was recited.
- 8
9 3. **ROLL CALL** – Present: Chair Barbara Ronningen, Kris Kopitzke, Lucia Wroblewski, Mark Nelson, Jim
10 Langan, Scott Patten, Roger Bowman A Quorum was present. Absent was Sally Doherty (excused)
11 **ALSO IN ATTENDANCE** – City Council member Joe Richter, City Administrator Ron Moore, City Clerk
12 Julie Yoho
- 13
14 4. **APPROVAL OF AGENDA** – add item C “Renewal of terms”.
15 **Motion/Second: Nelson/Patten To approve the agenda of the February 5, 2018 Planning Commission**
16 **Regular Meeting. Passed 7-0-0.**
- 17
18 5. **APPROVAL OF MINUTES** –
19 A. **January 8, 2018 Meeting Minutes** – Several changes were noted.
20 **Motion/Second: Wroblewski/Langan To accept the January 8, 2018 meeting minutes of the**
21 **Planning Commission Regular Meeting as amended. Passed 7-0-0.**
- 22
23 6. **REPORTS AND PRESENTATIONS** – none
- 24
25 7. **PUBLIC HEARINGS** –
26 A. Updated Comprehensive Plan
27 Chair Ronningen opened the Public hearing at 7:06 pm.
28 No comments were received from the public
29 **Motion/Second: Langan/Wroblewski To close the public hearing. Passed 7-0-0.**
30 Public Hearing closed at 7:07pm
- 31
32 **Discussion**
33 Patten commented that he is proud of everyone’s work on the Comprehensive Plan.
34 Council member Richter also thanked the Planning Commission members for all of their hard work.
35 Nelson stated that the commitment to reduce greenhouse gas emissions by 80% was going to be a huge
36 commitment. Ronningen provided correction noting that the clause in the Energy Section actually reads
37 "Reduce community wide use of non-renewable energy sources attempting to meet state-wide standards
38 of 80% renewable by 2050" and put emphasis on "attempting".
39 Nelson presented a graph of Xcel's electrical load and stated all the community solar gardens and farms
40 built so far total 450 MW and Xcel's nighttime load is 2700 MW which is untouched by the solar
41 farms/gardens because none of them do storage. Ronningen asked what is included in the graph and
42 Nelson responded Xcel MN WIND and SD. Nelson questioned whether City would assume this or turn it
43 over to Xcel. Ronningen felt Xcel had assumed the commitment already. Nelson disagreed and referred to
44 MPCA bargraphs showing Transportation sector 39 Million tons of C02 equivalents, Agriculture 28 M,
45 Residential 9 M, and stated these three exceed Xcel's commitment for Electricity 56 M.
46 Nelson also presented a graph showing a reduction in US petroleum consumption from 17.5 million
47 barrels per day to 16.5 Mb/day which occurred from 1973 to 1984 when average efficiency of passenger
48 automobiles was improved from 14 miles per gallon to 27.2 mpg, a 93% improvement He stated the
49 graph shows the reduction lasted only until 2000. Nelson claims the population aspect of energy is being
50 overlooked and wonders how high US population will go. He gave as an example Germany with 82
51 million people in a territory the size of MN and WI which have 11 million. Nelson said he does not
52 oppose the energy commitment but wants to continue the discussion and suggested continuing the public
53 hearing to the March PC meeting. Ronningen responded the Comp Plan will be forwarded to the Council
54 and the public meeting would not be continued.
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Patten stated that this is a statewide goal.
Langan stated that it could be seen as a goal or target. Doubt 30% will be attainable. Meets state criteria for a goal
Kopitzke stated it is possible by 2050, at the local level
Planning Commission decided they are in favor of leaving the text as it is.

Motion/Second Patten/Kopitzke To send the Comprehensive Plan on to the City Council for review. Passed 7-0-0.

- B. Consideration of an interpretation question regarding whether a Preservation and Land Conservation Development (PLCD) as outlined in Article XII of the City’s Zoning Code, is a Planned Unit Development (PUD)

Chair Ronningen opened the Public hearing opened at 7:32 pm.

Administrator Moorse provided the following information:

Background

The Shoreland Management Article of the City’s Zoning Code (in Sec. 12-363) indicates that a Planned Unit Development (PUD) is not allowed in the Shoreland Overlay District. This has raised the question of whether the City’s Preservation and Land Conservation Development (PLCD) ordinance (and the Proposed Afton Creek Preserve PLCD subdivision) is a Planned Unit Development (PUD). The question involves an interpretation as to whether a Preservation and Land Conservation Development, as outlined in Article XII of the Zoning Code is or is not a PUD. The interpretation could have an impact on the Afton Creek Preserve PLCD proposal.

Use Interpretation Process

Sec. 12-364 of the Zoning Code, which addresses questions regarding use, as well as questions regarding the upgrading of inconsistent land use districts, requires that “When an interpretation question arises about whether a specific land use fits within a given "use" category, the interpretation shall be made by the City Council after a public hearing and a recommendation by the Planning Commission.” Based on this requirement, the Council referred the question regarding an interpretation of whether a PLCD is or is not a PUD to the Planning Commission for a public hearing and a recommendation.

Correspondence from the City Attorney and the City’s Planning Consultant

Both the City Attorney and the City’s Planning Consultant have provided written correspondence regarding the PLCD/PUD question. This correspondence is attached. The City Attorney’s opinion is part of a letter dated November 30, 2017 that addresses a number of items related to the Afton Creek Preserve PLCD application. The Attorney’s opinion regarding the PLCD/PUD is item number 9 on pages 6 to 8 of his letter. The Planning Consultant’s letter is dated December 18, 2017.

The City Attorney has indicated that there are a number of similarities between the PLCD and a PUD, but there are also differences that create sufficient ambiguity such that both an interpretation that a PLCD is a PUD and that a PLCD is not a PUD could be defended. The Planning Consultant has indicated that while the PLCD ordinance provides limited and specific flexibility in relation to development regulations, and requires variances for broader flexibility (requiring the demonstration of practical difficulty) a PUD provides broad flexibility in relation to development regulations and the flexibility is gained through a negotiated design process, not through a variance process. Therefore, the PLCD as outlined in Article XII of the Zoning Code is not a PUD.

Christian Dawson, 5888 Trading Post Trail. Encourages the commission to take your time as this is setting a big precedence. Would like to see less density in a sensitive area.

Perry Eggers, 13379 50th St, has been talking with people from Denmark township who are concerned about the damage to the trout stream.

Chair Ronningen specified this is a public hearing on the PLCD / PUD discussion only, not on the project Doug Parker, 4795 Trading Post Trail, history shows a change in terms. If intent was to replace the term, this is an oversight. If the point is trying to protect the land, the intent should be the most conservative view.

108 Pam Belz, 14023 50th St S, would like to hear the perspectives from the attorney and planning consultant.

109
110 **Motion/Second Patten/Nelson to close public hearing. Passed 7-0-0**

111 Public Hearing closed at 7:41 pm

112 Discussion

113 Attorney Knaak provided a brief summary of his position. He pointed out that the definition of PUD
114 typically includes a mix of structure types and land uses. There is ambiguity in the Afton Ordinance. It
115 comes down to the intent of the language.

116 Planning Consultant Stephen Gritman explained that a PUD is typically characterized by mixed uses and
117 types of buildings, and is process or way of staging what kind of development will occur. A PUD is
118 designed to accommodate flexibility and doesn't refer to specific zoning. PLCD does refer to specific
119 zoning and doesn't get used the same way. If the intent is to exclude development from sensitive areas, that
120 should be written into code so it's not left for interpretation.

121 Council member Richter asked if Knaak could read a definition of PLCD from other communities

122 Attorney Knaak responded that Afton is the only community he's aware of that uses PLCD. Others use
123 mix of cluster housing, PUD, other terms term that require some sort of interpretation.

124 Kopitzke pointed out that Afton has never had a PUD (mixed use, high density development). After looking
125 at MN rules he found they all relate to high density.

126 Nelson stated that by definition a PLCD cannot exceed the density of the underlying zoning district.

127 Chair Ronningen stated that this discussion on PLCD / PUD is more definitional

128 Kopitzke stated that when PUD language was developed, the intent was an Afton version of redistributing
129 density.

130 Patten stated that PLCD is our version of a PUD. Fits with the comprehensive plan and our Ordinances;
131 one in the same to me. It is hard to believe we would create an ordinance where we wouldn't want to protect
132 water. Always have chosen the more restrictive.

133 Council member Richter stated that Ordinance 06-2008 which changed PAUD to PLCD shows the intent.

134 Chair Ronningen stated that the motivation behind original PAUD was to allow farmers to develop their
135 land and add a road, increase density to 4 per quarter quarter. Don't recall why name was changed. At that
136 time cluster and rural by design were becoming popular. We don't have mixed use development in Afton
137 so we would never have the traditional PUD.

138 Langan stated he thinks the terms are different but PLCD is our version of a PUD.

139 Wroblewski asked if council sees this as a PUD then what?

140 Chair Ronningen answered that the area in the shoreland district would have to be excluded from
141 development

142 Attorney Knaack stated that the problem is that it is not spelled out in ordinance, so there is no process.
143 You do have process for PUD. No procedural distinction. PUD prohibits development in the shoreland
144 overlay district.

145 Kopitzke stated that when the trout stream language was added (12.363) we were thinking about PUD, now
146 called a PLCD. That was the intent.

147 **Motion/Second Kopitzke / Bowman To Recommend to the City Council that the PLCD be considered**
148 **as Afton's idea of a PUD.**

149 **Findings:**

- 150 1. Section 12-363 protects trout streams and prohibits PUDs
- 151 2. Planned Agricultural Unit Development PAUD was original verbiage
- 152 3. Afton does not allow mixed use development so that PUD criteria does not apply
- 153 4. Comprehensive plan emphasizes protection of water quality and waterways
- 154 5. Intent was more restrictions rather than fewer
- 155 6. Any development will affect trout stream temperature and quality
- 156 7. The PUD and PLCD are the same in Afton based on the nature of the original discussion of
- 157 the PAUD. The original and current intent was that these terms were interchangeable and
- 158 one in the same in the context of these ordinances.
- 159

Motion Vote, Passed 6-1-0 (Nelson nay)

8. NEW BUSINESS – none

9. OLD BUSINESS –

A. Afton Creek Preserve PLCD Subdivision Application

Chair Ronningen reported that last month the Planning Commission voted to recommend the council deny the application. The Council ignored the motion based on procedural issues.

Bowman stated that the reason for the Planning Commission is to preserve the Comprehensive Plan. This development is contrary to preserving agricultural land for agricultural use. The citizens are opposed. The Ag zone allows for lower property taxes to encourage agricultural use. We're supposed to protect the density and protect the features of the land. The Statute says protect, not protect with exceptions.

Wroblewski was at the City Council meeting. A procedural error was made in adding the item to the agenda. The Commission can vote again on what was discussed today.

Patten stated that now that we've defined "PLCD" and "PUD", we can send that recommendation to the City Council.

Chair Ronningen stated that what was in that motion were items for the council to consider in this application. Many are still valid even if they decide it's not a PUD. We want development to conform to our ordinances.

Motion/Second Ronningen/Patten to reiterate the same motion from last month and resend to the City Council. Motion as follows:

To recommend to the City Council that the preliminary plat application for a PLCD for Afton Creek Preserve be denied. Alternatively applicant should be asked to withdraw his preliminary plat application with refund of any application fees not used by the city and resubmit an application with one proposed preliminary plat drawing that meets the City of Afton's ordinances without the need for a rezoning or variances.

Findings:

- 1) **The application requires a variance for more than 9 lots on a cul-de-sac**
- 2) **The application requires a variance to join a lot to the PLCD that has already been subdivided to its maximum density which is disallowed by the PLCD ordinance**
- 3) **The question of rezoning a RR parcel so that it can be included in the PLCD has not been adequately addressed, but appears to be disallowed by the PLCD ordinance**
- 4) **The application has been incomplete and still lacks complete slope data that has been requested**
- 5) **The issue re: stormwater runoff has not been addressed adequately**
- 6) **The traffic issue has not been studied adequately with a traffic study taking place during a holiday week and while there was construction in the area**
- 7) **The traffic study did not adequately address the safety impacts of traffic increases along the Trading Post curve, the substandard road width along the Trading Post curve, the private driveway in the tangent of the curve, or the increased traffic speed if the road were to be paved**
- 8) **The traffic study did not adequately address the safety impacts traveling south on 60th Street from the proposed access point related to traffic increases, curves, substandard road width, inadequate sight lines, speed if the road were to be paved, or intersection quality at Oakgreen.**
- 9) **Currently, there are no less than 3 plans for this application. Applicant needs to submit one final and complete plan to be considered.**
- 10) **Lot sizes and lot layout are questionable with at least one lot having a very odd shape.**
- 11) **The issue of the field access road off of Trading Post has not been addressed (potentially leaving no purpose for the access road leading to its abandonment and regrowth in invasive species)**

- 209 12) **The southern boundary of the shoreland district boundary is not shown on the preliminary**
210 **plat application maps**
211 13) **The question of whether the PLCD is a PUD within Afton ordinances requiring the removal**
212 **of shoreland district acreage from the PLCD has not be adequately addressed or reflected on**
213 **the preliminary plat application maps.**
214 14) **Access road setbacks from the Graham property need to be confirmed so that the setbacks**
215 **are fully adhered to and do not place an encumbrance on the Graham property in the future.**
216

217 Kopitzke stated that our roll is to represent the public opinion and balance with the landowner's rights.
218 We've gotten considerable input and this development does not meet our ordinances. The motion passed is
219 a summary of what we've heard.

220 Patten pointed out that at no point have we said were not for development. We have asked only to do it
221 within the rules with no variances.

222 Chair Ronningen agreed stating that the neighbors have never said no development; they just want it to
223 comply with city ordinances.

224 **Motion Vote, Passed 7-0-0.**
225

226 B. Update on City Council Actions

227 1. Council highlights from the January 16, 2018

228 Council member Richter provided a summary of the Council meeting.
229

230 C. Expiring terms

231 Several terms are expiring, notify Administrator Moorse if you want to renew.

232 Chair Ronningen read a letter to the Planning Commission regarding her resignation. This will be her last
233 meeting and she will not be attending the next council meeting.
234

235 **10. ADJOURN**

236 **Motion/Second Nelson/Wroblewski To adjourn. Passed 7-0-0**
237

238 Meeting adjourned at 8:27pm.
239
240
241

242 Respectfully submitted by:

243
244
245 _____
246 Julie Yoho, City Clerk
247

248 **To be approved on March 5, 2018 as (check one): Presented: _____ or Amended: _____**

City of Afton
3033 St. Croix Trl, P.O. Box 219
Afton, MN 55001

Planning Commission Memo

Meeting: March 5, 2018

To: Vice-Chair Patten and members of the Planning Commission
From: Ron Moorse, City Administrator
Date: February 28, 2018
Re: Election of Officers

Background

The ordinance setting out the purpose and operation of the Planning Commission calls for an annual election of officers. The offices and current incumbents are as follows:

Chair: Vacant
Vice-Chair: Scott Patten
Secretary: Kris Kopitzke

The election process includes the nomination of members and a vote regarding those nominated, for each position.

PLANNING COMMISSION ACTION REQUESTED:

Election of the following Officers:

Chair
Vice-Chair
Secretary

City of Afton
3033 St. Croix Trl, P.O. Box 219
Afton, MN 55001

Planning Commission Memo

Meeting: March 5, 2018

To: Vice-Chair Patten and members of the Planning Commission

From: Ron Moorse, City Administrator

Date: February 27, 2018

Re: Matt Cooper Variance Application at 3988 River Road

Background

Matt Cooper, who has a purchase agreement on the property at 3988 River Road, has applied for variances necessary to allow an addition to the existing house to provide a two-stall garage with living space above.

Existing Substandard Structure

The existing house is substandard in regard to both the front yard setback and the bluff setback. The house has a front yard setback of 97 feet vs. the required 105 feet. Because the house is built into the bluff, it has essentially a zero bluff setback vs. the required 100 foot setback. Also, the driveway serving the existing garage has a slope of approximately 18% vs. the allowed slope of 12%. The house meets the 200 foot setback to the Ordinary High Water mark (OHW) of the river.

Proposal

The existing house has a small one-stall tuck-under garage with a deck above. The proposed garage addition would replace a portion of the existing garage and deck, would expand the footprint of the house to the north by approximately 22 feet, and would expand the garage apron to the north by approximately 40 feet. The new garage and living space above would mirror the two-story portion of the existing house, with the exception that the roof peak of the addition is proposed to be 2'4" higher than the existing two-story portion of the house, in order to allow a 9' ceiling height. The construction of the proposed addition and a retaining wall would require grading and excavation in an area with a slope greater than 12%. These grading activities would require erosion control measures. The additional impervious surface would require a drainage plan to manage and treat the drainage prior to flowing down to the street and to the river.

The variances necessary to allow the addition are as follows:

1. A variance to allow a front yard setback of 92.4 feet vs. the required 105 feet
2. A variance to allow a bluff setback of zero feet vs. the required 100 feet
3. A variance to allow grading in an area with a slope greater than 12%
4. A variance to allow a driveway with a slope of 15% vs. the required maximum slope of 12%.
5. A variance to allow the roof peak height on the addition to be 2'4" higher than highest roof peak on the existing house.

Public Hearing

The public hearing is an opportunity for the public to ask questions and provide comments regarding the application.

Findings

The following is a list of recommended findings. The Planning Commission may want to provide additional findings.

1. The existing house has substandard front yard and bluff setbacks
2. The house is built on the bluff and backs up to a steep bluff
3. The unique and difficult characteristics of the site were not caused by the property owner.
4. The roof peak of the proposed addition would be 2'4" higher than the highest peak of the existing house
5. While the existing and proposed roof height are within the maximum allowed 35 foot height, the St. Croix Bluffland ordinance does not allow the height of a substandard structure to be increased.
6. The existing driveway has a slope of 18%, and the proposed driveway has a slope of 15%, both of which are steeper than the 12% slope allowed.

Conditions

If the Planning Commission recommends approval of the subdivision application, the Commission may also place conditions on the approval to mitigate the impact of the variance. The following is a list of recommended conditions.

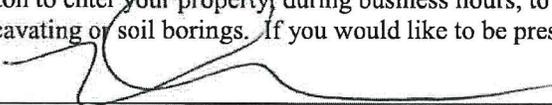
1. The retaining wall design shall be subject to review and approval by the City Engineer
2. The house shall conform to the submitted plans, subject to revisions as required or approved by the City.
3. Existing vegetative screening shall be maintained,
4. The applicant shall provide grading, drainage and erosion control plans, which shall be subject to review and approval by the City Engineer
5. The City Engineer's specifications and recommendations for all work shall be met for the duration of the permit.
6. The house color shall be earth tone.
7. The applicant shall comply with all conditions as may be specified by the Department of Natural Resources and the Valley Branch Watershed District.

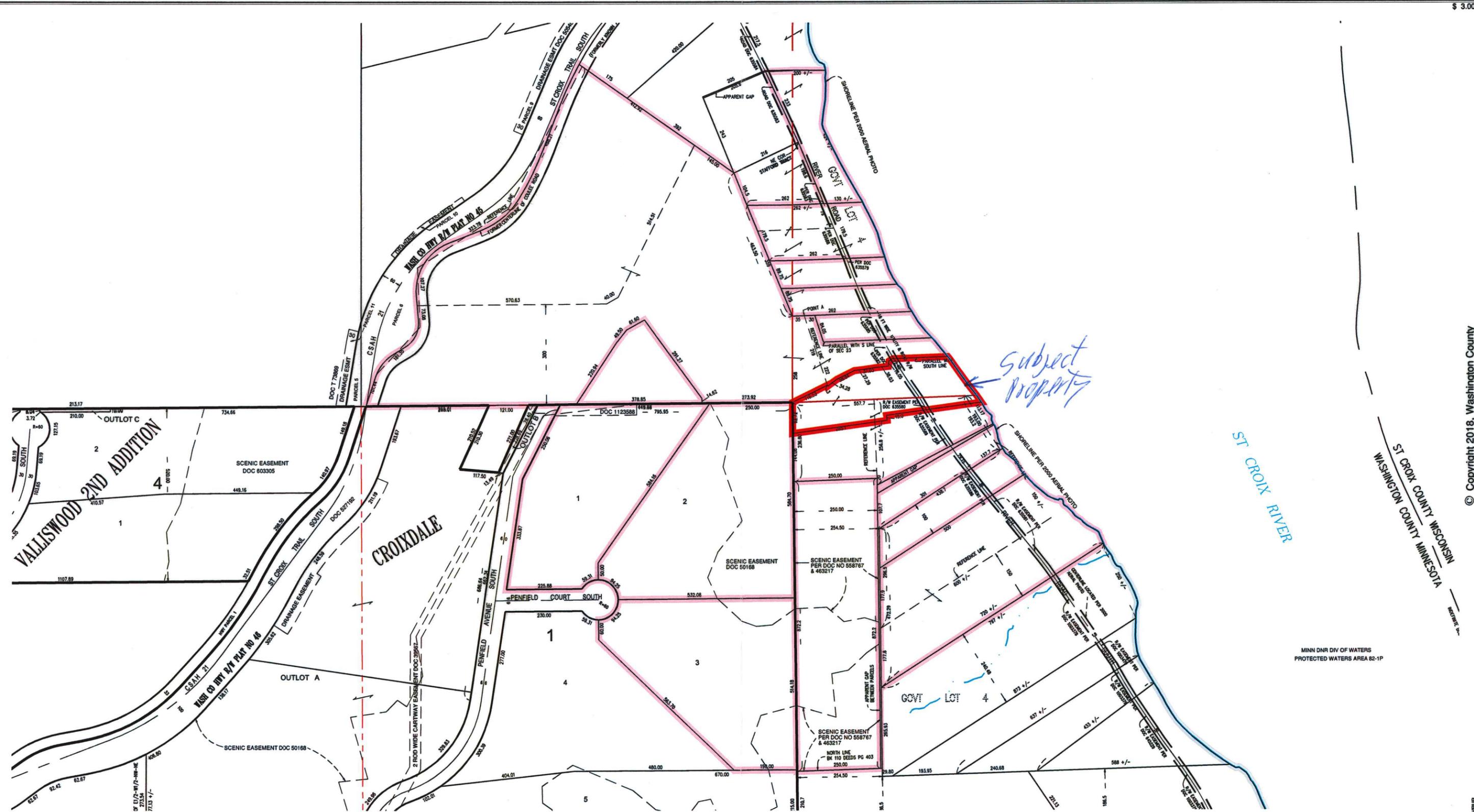
Planning Commission Recommendation Requested:

Motion regarding a recommendation concerning the Matt Cooper variance application at 3988 River Road, including findings, and conditions if applicable.

**CITY OF AFTON
VARIANCE APPLICATION**

(Reference Sections: 12-55, 12-77, 12-328 12-835, 12-1020, 12-1266, 12-1955, 12-2228)

Owner	Address	City	State	Zip	Phone
Applicant (if different than owner)	Address	City	State	Zip	Phone
<u>MATT COOPER</u>	<u>2337 BROOKE LN</u>	<u>HASTINGS</u>	<u>MN</u>	<u>55083</u>	<u>651.303.8925</u>
Project Address					
<u>3988 RIVER ROAD</u>		<u>AFTON</u>	<u>MN</u>	<u>55001</u>	<u>AUSTRALIA OR +6146741570</u>
Zoning Classification	Existing Use of Property	PID# or Legal Description			
<u>RESIDENTIAL</u>	<u>SINGLE FAMILY HOME</u>	<u>23.028.20.33.0011</u> <u>23.028.20.33.0003</u>			
Please list the section(s) of the code from which the variance(s) are requested.					
<u>SECTION 12-132 + SECTION 12-637</u>					
Description of Request					
<u>ADDITION OF 2 CAR GARAGE ON GROUND LEVEL WITH LIVABLE SPACE ABOVE GARAGE. WE ARE SEEKING A VARIANCE TO BUILD WITHIN THE SETBACK OF 105' FROM CENTER LINE OF ROAD. WE ARE SEEKING A VARIANCE TO BUILD/GRADE ON SLOPES GREATER THAN 12%.</u>					
By signing this application, the applicant agrees to pay all expenses incurred by the City of Afton. In connection with this request, your signature constitutes permission for a representative of the City of Afton to enter your property during business hours, to evaluate this request. This may involve minor excavating or soil borings. If you would like to be present during this evaluation, please contact the City.					
Signature of Owner/Applicant			Date		
			<u>2/4/2018</u>		
Make checks payable to: City of Afton					
If multiple variances are necessary from the applicant only <u>one</u> fee is required. However, the deposit fee must be multiplied by the number of variances sought.					
FEES:		ESCROWS:		TOTAL: <u>\$850.00</u>	
Variance	\$250	\$600	DATE PAID: _____		
Renewal/Extension	\$250	\$350	CHECK #: <u>wired</u>		
			RECVD BY: <u>[Signature]</u>		



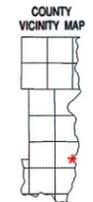
Washington County
 PUBLIC WORKS DEPARTMENT
 SURVEY DIVISION
 11660 Myron Road North
 Stillwater, Minnesota 55082
 (651) 430-4300
 surveyor@co.washington.mn.us
 www.co.washington.mn.us/surveyor

- LEGEND**
- DNR PROTECTED WATERS
 - DNR PROTECTED WETLAND
 - DNR PROTECTED WATERCOURSE
 - MUNICIPAL BOUNDARY
 - PARK BOUNDARY



SECTION-TOWNSHIP-RANGE INDEX

1502820	1402820	1302820
2202820	2302820	2402820
2702820	2602820	2502820



SECTION VICINITY MAP

22	21	12	11
NW	NE		
23	24	13	14
32	31	42	41
SW	SE		
33	34	43	44

PROPERTY IDENTIFICATION NUMBER FORMAT (GEOCODE)

SECTION NUMBER	TOWNSHIP NUMBER	RANGE NUMBER	QUARTER	SPECIFIC PARCEL
##	###	##	##	####

(0001) = LAST FOUR DIGITS OF PROPERTY IDENTIFICATION NUMBER

THIS DRAWING IS THE RESULT OF A COMPILATION AND REPRODUCTION OF LAND RECORDS AS THEY APPEAR IN VARIOUS WASHINGTON COUNTY OFFICES. WASHINGTON COUNTY IS NOT RESPONSIBLE FOR ANY INACCURACIES. PROPERTY LINES AS SHOWN ARE FOR REFERENCE PURPOSES AND MAY NOT REPRESENT ACTUAL LOCATIONS.

MAP LAST UPDATED: December 6, 2017

NO ADDITIONAL CHANGES HAVE BEEN REPORTED TO DATE

DATE OF CONTOURS: November, 2011 DATE OF PHOTOGRAPHY: None

Applicant(s): MATT & KRISTY COOPER
Phone: 651.303.8325 (+61 467 441 570 - AUSTRALIA)
Mailing Address: 2337 BROOKLE LN, HASTINGS, MN 55033
Property Address for variance: 3988 RIVER ROAD, AFTON, MN

Variance request description: ADDITION OF 2 CAR GARAGE ON GROUND LEVEL WITH LIVABLE SPACE ABOVE GARAGE.

City Ordinance Section number(s), that variance is requested for: SECTION 12-132 & SECTION 12-637

Answer the following questions to the best of your ability - based on the criteria found in section 12-77 of Afton's Code (Land Use, Appeals and Variances). Completing this questionnaire will help the Planning Commission and the City of Afton evaluate your application in light of the requirements of Afton's Variance Ordinance. It does not guarantee that your variance request will be approved. If needed use a separate page.

Background: This questionnaire is designed to help you and the City of Afton determine whether a variance should be granted. Please consult with the City Administrator who can help you with your variance application and explain the Variance Ordinance to you. The City Administrator will work with you to ensure that the variance you request is the minimum variance required to provide the same rights commonly enjoyed by other properties in the same zoning district. Because of special provisions for certain types of construction, the City Administrator will also determine whether the property is in the Flood Plain District. There are also special provisions for earth-sheltered construction.

Criteria #1 *The requested use, must be a reasonable use in order to receive a variance. Applicant -*

Please explain why the proposed use which requires a variance is a reasonable use for this property?

ADDITION OF A 2 CAR GARAGE IS REASONABLE & TYPICAL FOR A SINGLE FAMILY HOME. THIS IS TYPICAL FOR HOMES IN THIS NEIGHBORHOOD.

Criteria #2 *Exceptional or extraordinary circumstances apply to the property which do not apply generally to other properties in the same zone or vicinity, and result from lot size, shape, topography, or other circumstances over which the property owner, since enactment of this Ordinance, have had no control. Applicant -* What exceptional or extraordinary circumstances related to the property do not apply generally to other properties in the same zone or vicinity? Extraordinary circumstances would include lot size, irregular lot shape or topography. Are there other circumstances over which you, as the property owner, have no control?

Explain? WE HAVE NO CONTROL OVER THE PLACEMENT OF EXISTING HOME AND ARE LIMITED IN THE REAR OF THE HOUSE BY THE SEVERE SLOPE.

Criteria #3 That literal interpretation of the provisions of this Ordinance would deprive the applicant of rights commonly enjoyed by other properties in the same district under the terms of this Ordinance.

Applicant - How does the literal interpretation of the provisions of the Afton ordinance (from which you are requesting a variance) deprive you of rights commonly enjoyed by other properties in the same zoning district? Explain: IT WOULD DEPRIVE US OF AN ATTACHED 2 CAR GARAGE. THIS HAS BEEN A STANDARD OF LIVING FOR DECADES.

Criteria #4 The special conditions or circumstances do not result from actions of the applicant.

Applicant - How did these exceptional circumstances related to the property come about? Did actions by you create these circumstances? Explain: THEY CAME ABOUT WITH THE APPROVAL OF ORIGINAL CONSTRUCTION. WE DID NOT CREATE.

Criteria #5 That granting the variance requested will not confer on the applicant any special privilege that is denied by this Ordinance to owners of other lands, structures, or buildings in the same district.

Applicant - Will the granting of the requested variance confer on you, the applicant, any special privilege that is denied by this ordinance to owners of other lands, structures, or buildings in the same zoning district? Explain: NO. NONE KNOWN OF.

Criteria #6 The variance requested is the minimum variance which would alleviate the hardship.

Applicant - Is the variance you are requesting the minimum variance which would alleviate the practical difficulty or hardship for your property? Explain: YES WE ARE REQUESTING THE MINIMUM SIZE THAT WOULD FIT THE STRUCTURE & EXISTING CONDITIONS.

Criteria #7 The variance would not be materially detrimental to the purposes of this Ordinance, or to property in the same zone. **Applicant (Optional)** - Will the variance be materially detrimental to the purposes of this Ordinance, or to property in the same zone? How would the use of the property, if allowed by the variance, affect other properties in the vicinity?

Explain: THIS WOULD HAVE NO IMPACT ON OTHER PROPERTIES. THE PROPERTY WILL BE USED AS THE OTHER PROPERTIES. PERMANENT RESIDENCE - SINGLE FAMILY HOME.

Criteria #8 Economic conditions or circumstances alone shall not be considered in the granting of a variance request if a reasonable use of the property exists under the terms of the ordinance. **Applicant** - Is the requested variance for economic reasons?

Explain: NO.

Criteria #9 In the Flood Plain District, no variance shall be granted which permits a lower degree of flood protection than the Regulatory Flood Protection Elevation for the particular area or permits standards lower than those required by state law. **Applicant (optional), PC** - Is the property in a Flood Plain District? Yes No

Criteria #10 Variances shall be granted for earth-sheltered construction by state statutes when in harmony with this Ordinance. **Applicant** - Is the variance for earth-sheltered construction? Yes No

ADDITIONAL CRITERIA THAT MAY BE CONSIDERED BY THE PLANNING COMMISSION (PC) AND/OR CITY COUNCIL(CC)- Applicant responses to criteria #11 and criteria #12 are optional.

Criteria #11 Variances shall only be permitted when they are in harmony with the general purposes and intent of the ordinance. **Applicant (Optional), PC** - Is the requested variance in harmony with the Afton ordinances and code? How will this variance if granted (and the proposed use of the property allowed) affect the essential character of the area?

Explain: THIS WILL CONTINUE THE IMPROVEMENTS ALREADY STARTED AS SHOWN BY OTHER IMPROVEMENTS ON RIVER ROAD. THE REMODEL WILL BE IN CHARACTER OF EXISTING HOMES ON RIVER ROAD & ON THE ST. CROIX.

Criteria #12 Variances shall only be permitted when they are in harmony with the general purposes and intent of the Afton Comprehensive Plan. **Applicant (Optional), PC** - Is the requested variance in harmony with the Afton comprehensive plan?

Explain: YES. AS SHOWN BY OTHER WORK DONE ON RIVER ROAD.

Overall Objective:

The goal is to add a 2 car garage on the ground level with a living space above the garage. The footprint of the addition will be 24' x 31'. The placement of the river facing addition will be in line with the SE corner of the existing house. The addition will be placed adjoining the north side of the house. This addition will remove 4' of existing decking on the north side. The roofline peak of the new addition will be no higher than 2'6" higher than the existing roofline.

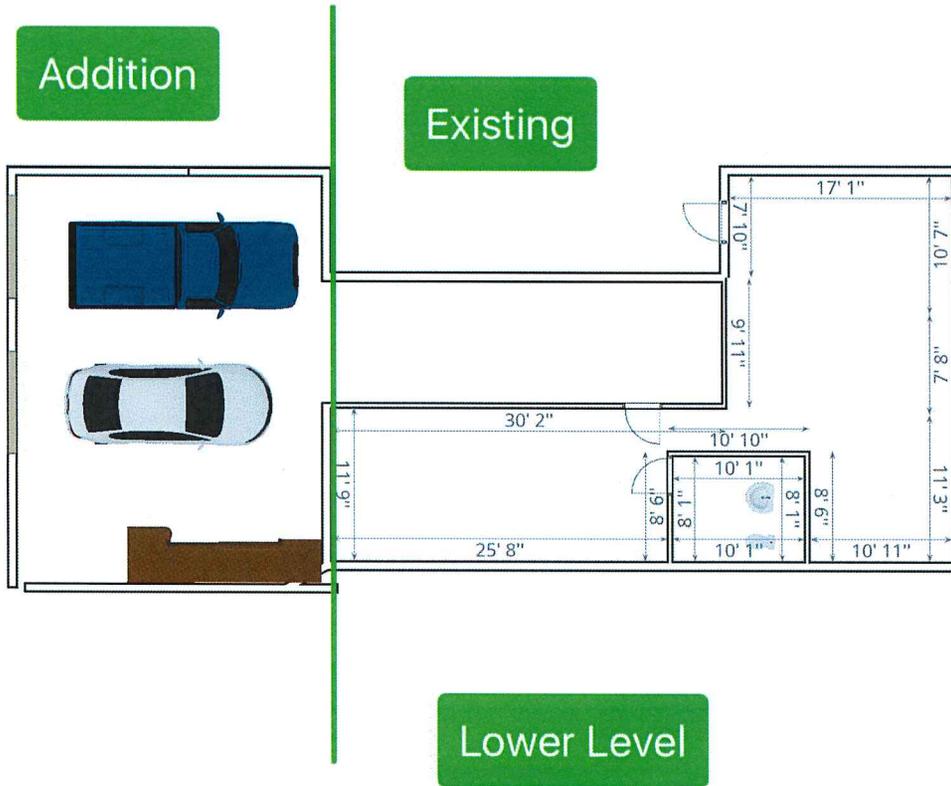
The roofline of the Northside of the house will be replaced and raised by approximately 2'6" to accommodate 9ft ceilings in the main living space of the remodel.

The new roofline will enclose the existing NE corner (currently exterior decking).

The exterior will be in keeping with recent remodel projects on River Road and on the St. Croix. See Below.



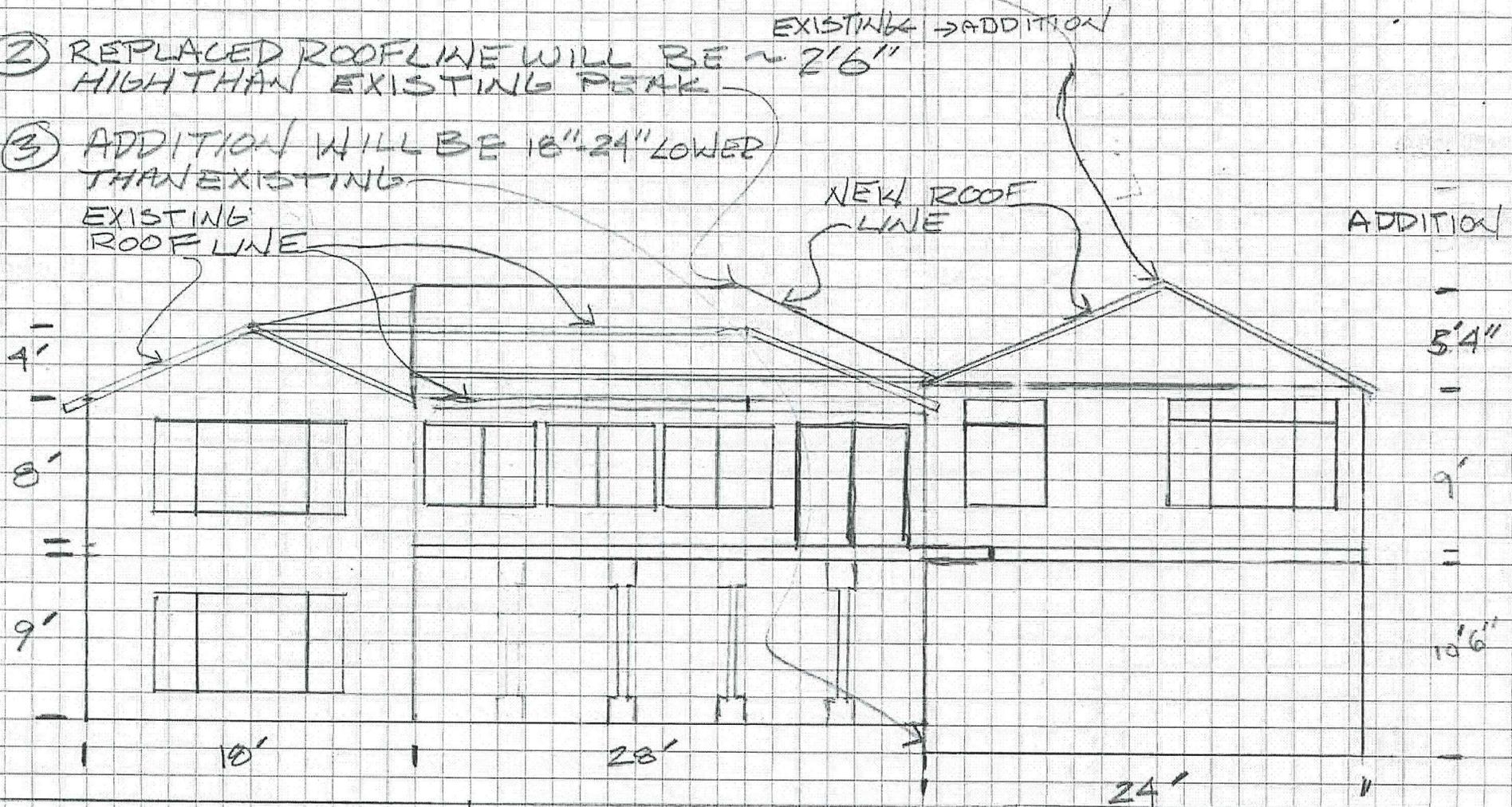




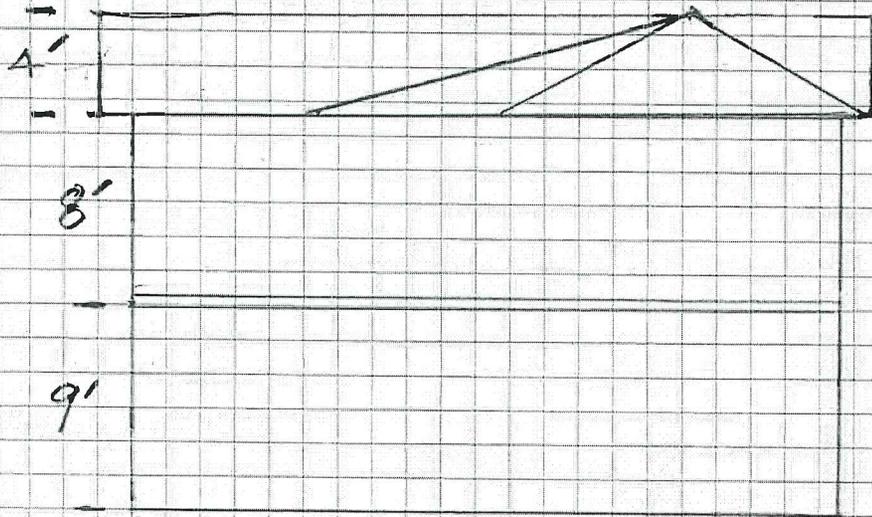
① NEW ROOFLINE WILL NOT EXCEED 2'6" HIGHER THAN EXISTING

② REPLACED ROOFLINE WILL BE ~ 2'6" HIGH THAN EXISTING PEAK

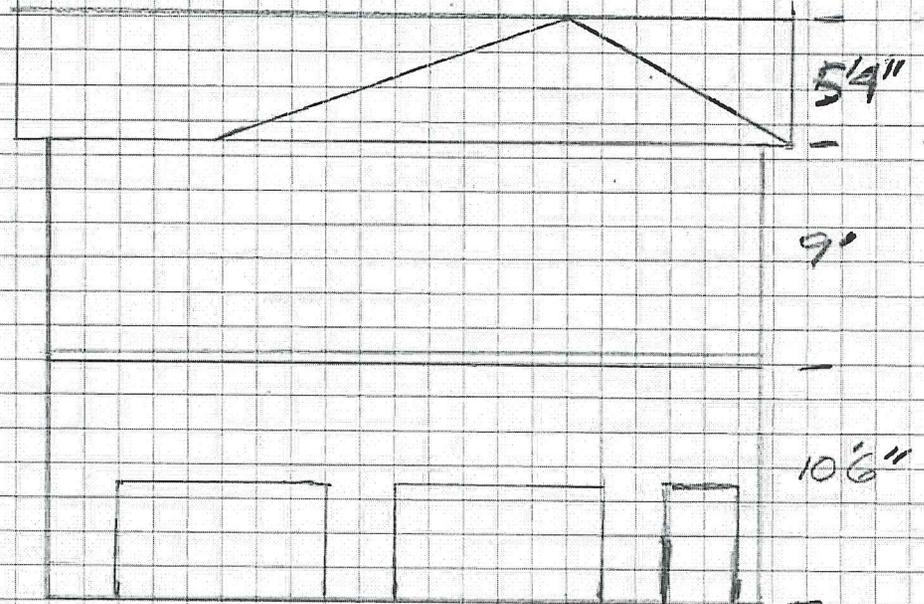
③ ADDITION WILL BE 18"-24" LOWER THAN EXISTING



3908 RIVER ROAD CONCEPT ADDITION - FRONT VIEW



SOUTH - EXISTING



NORTH - NEW

3988 RIVER ROAD CONCEPT ADDITION - SIDE VIEW

**CITY OF AFTON
PLANNING COMMISSION
NOTICE OF PUBLIC HEARING**

TO WHOM IT MAY CONCERN: Notice is hereby given that the City of Afton Planning Commission will convene on Monday, March 5, 2018 at 7:00 PM at Afton City Hall, 3033 St. Croix Trail S., to conduct the following public hearing:

To consider a variance application by Matt Cooper at 3988 River Road to enable the addition of an attached two-car garage with living space above on the north side of the existing house.

All interested persons are encouraged to attend the public hearing. Public hearings are held for the purpose of providing information regarding land use proposals and receiving comments and questions from the public regarding the proposals.

Materials will be available for viewing at Afton City Hall, 3033 St. Croix Trail, Afton MN and will be posted on the City website, at www.ci.afton.mn.us, on the Thursday prior to the meeting. Click on "City Commissions and Committees" and go into "Planning Commission Packets."

A quorum of the City Council or other Commissions may also be present to receive information at the meeting.

Ron Moorse
City Administrator
City of Afton



Etiquette de format 25 mm x 67 mm compatible avec Avery®5160/8160
label size 1" x 2 5/8" compatible with Avery®5160/8160

WARREN L LANGSTRAAT REV TRS ETAL
or Current Resident
3904 RIVER RD S
AFTON MN 55001

LANGSTRAAT KEVIN G & KIRSTEN J
or Current Resident
10790 AMHERST CT
INVER GROVE HEIGHTS MN 55077

XIONG KONG & YING THAO
or Current Resident
4123 PENFIELD CT S
AFTON MN 55001

RAEDEKE RONALD A & SUSAN K LOOMIS
or Current Resident
3936 RIVER RD S
AFTON MN 55001

YEUNG WING-WAH
or Current Resident
4099 PENFIELD CT S
AFTON MN 55001

JOHNSON MARVIN S & BRENDA M
or Current Resident
3403 PENNINGTON AVE S
AFTON MN 55001

BULGER DONALD A JR & VICKI S
or Current Resident
4004 RIVER RD S
AFTON MN 55001

REARDON ROBERT F & JULIANNE
or Current Resident
4117 PENFIELD CT S
AFTON MN 55001

HAKALA WILLIAM T & VICTORIA
or Current Resident
4111 PENFIELD CT S
AFTON MN 55001

LEONARD A EVANOFF JR TRS
or Current Resident
219 3RD AVE S
SOUTH SAINT PAUL MN 55075

ORNER JOHN E & KATHLEEN Q
or Current Resident
1490 WELLINGTON WAY
SAINT PAUL MN 55122

AMOTH GEORGE MILO DENNIS
or Current Resident
PO BOX 373
AFTON MN 55001

PERKINS ANNE E
or Current Resident
4042 RIVER RD S
AFTON MN 55001-9368

HUBERT J & HELEN L SCHNEIDER TRS
or Current Resident
3968 RIVER RD S
AFTON MN 55001

NATIONSTAR MTG LLC
or Current Resident
350 HIGHLAND DR
LEWISVILLE TX 75067



Etiquette de format 25 mm x 67 mm compatible avec Avery®5160/8160
label size 1" x 2 5/8" compatible with Avery®5160/8160

CERTIFICATE OF SURVEY

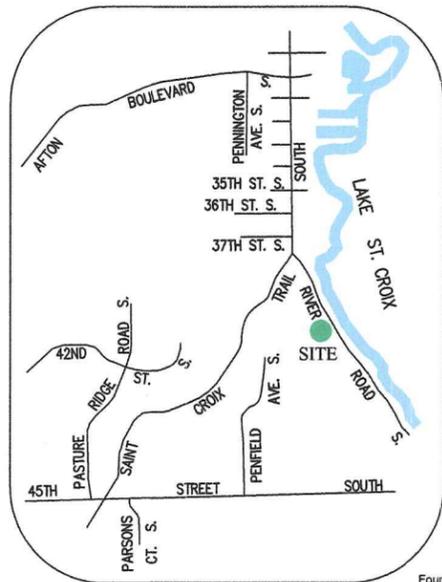
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PART OF GOVERNMENT LOT 4, SECTION 26, TOWNSHIP 28 NORTH, RANGE 20 WEST,
CITY OF AFTON, WASHINGTON COUNTY, MINNESOTA

SURVEY PREPARED FOR:
MATTHEW COOPER

SITE ADDRESS:
3988 River Road
Afton, MN 55001

OWNER:
JOHN E. & KATHLEEN Q. ORNER
499 Quinlan Avenue South
Lakeland, MN 55043

Washington County Parcel ID: 2302820330011



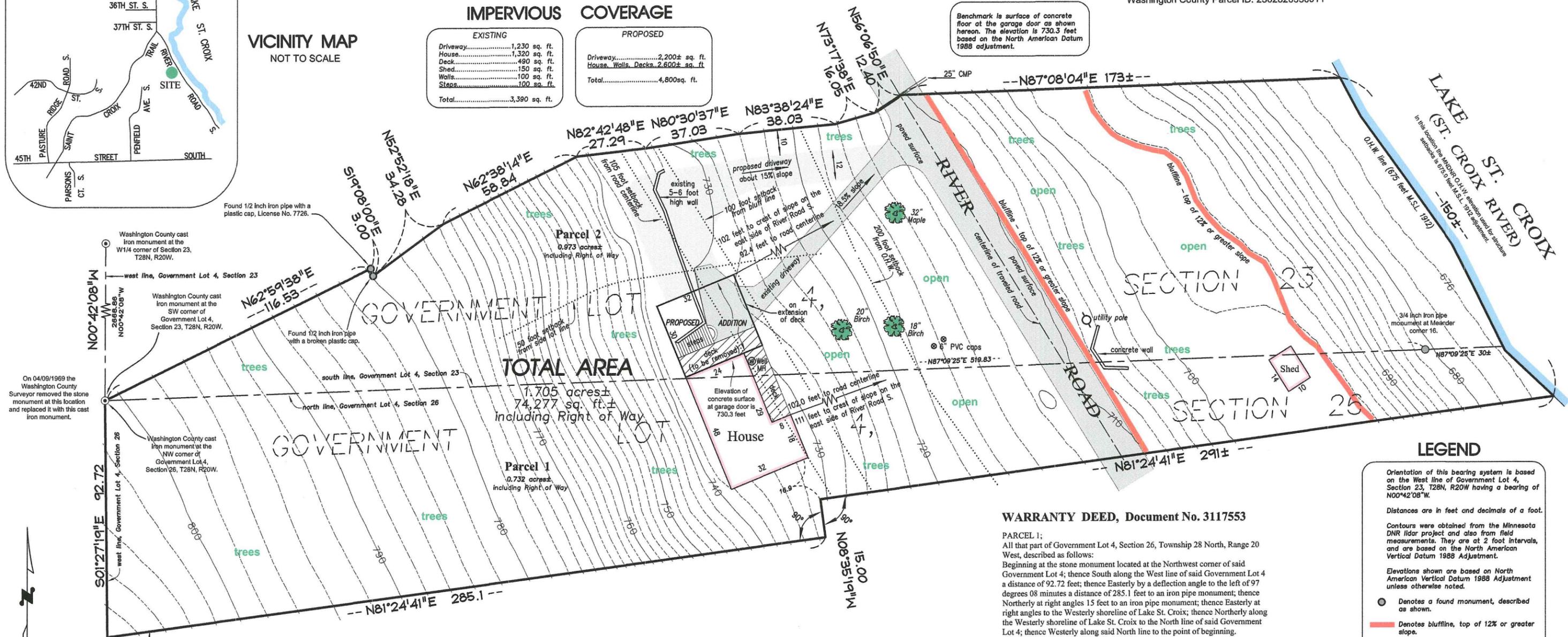
VICINITY MAP
NOT TO SCALE

IMPERVIOUS COVERAGE

EXISTING		PROPOSED	
Driveway	1,230 sq. ft.	Driveway	2,200± sq. ft.
House	1,320 sq. ft.	House Walls, Decks	2,600± sq. ft.
Deck	490 sq. ft.		
Shed	150 sq. ft.		
Walls	100 sq. ft.		
Steps	100 sq. ft.		
Total	3,390 sq. ft.	Total	4,800± sq. ft.

BENCHMARK

Benchmark is surface of concrete floor at the garage door as shown hereon. The elevation is 730.3 feet based on the North American Datum 1988 adjustment.



WARRANTY DEED, Document No. 3117553

PARCEL 1:
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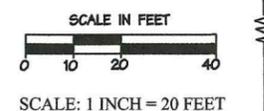
PHOTOGRAPH LOOKING EAST FROM AREA OF PROPOSED ADDITION



PHOTOGRAPH LOOKING SOUTHEAST FROM AREA OF PROPOSED ADDITION



PHOTOGRAPH LOOKING SOUTH FROM AREA OF PROPOSED ADDITION



SURVEY PREPARED BY:
Landmark Surveying, Inc.
21090 Olinda Trail North - P.O. Box 65
Scandia, Minnesota 55073

Office number: 651-433-3421
Cell number: 651-755-5760
E-mail address: info@landmark.net

Survey Report: The purpose of this survey is for a variance application with the City of Afton. The boundary mapped hereon is based on record mathematics.

Official copies of this map are crimp sealed.

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

Landmark Surveying Inc.
mil Hank
Milo B. Horak Minnesota License No. 52577
February 05, 2018
Date

CERTIFICATE OF SURVEY

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PART OF GOVERNMENT LOT 4, SECTION 26, TOWNSHIP 28 NORTH, RANGE 20 WEST,
CITY OF AFTON, WASHINGTON COUNTY, MINNESOTA

SURVEY PREPARED FOR:
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SITE ADDRESS:
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Washington County Parcel ID: 2302820330011

IMPERVIOUS COVERAGE

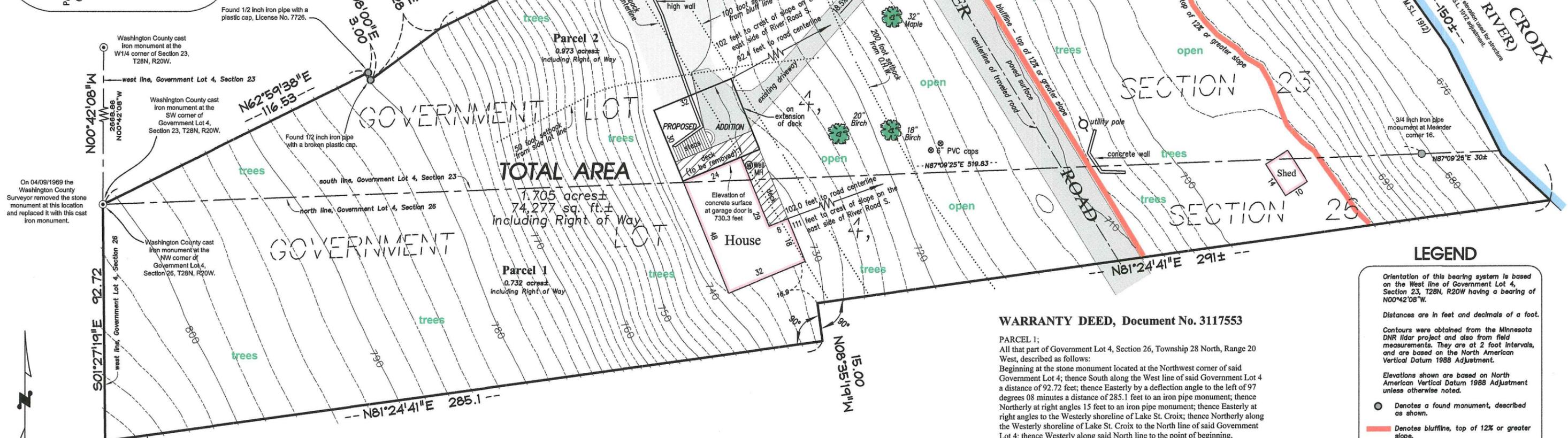
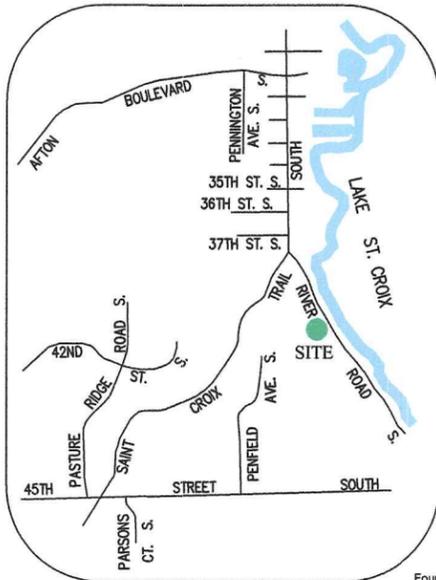
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Deck.....	490 sq. ft.		
Shed.....	150 sq. ft.		
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Total.....	3,390 sq. ft.	Total.....	4,800sq. ft.

BENCHMARK

Benchmark is surface of concrete floor at the garage door as shown hereon. The elevation is 730.3 feet based on the North American Datum 1988 adjustment.

VICINITY MAP

NOT TO SCALE



TOTAL AREA
7.705 acres±
74,277 sq. ft.±
including Right of Way

On 04/09/1969 the Washington County Surveyor removed the stone monument at this location and replaced it with this cast iron monument.

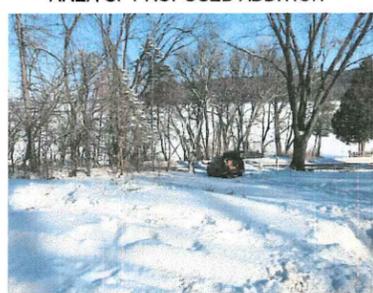
Washington County cast iron monument at the W1/4 corner of Section 23, T28N, R20W.

Washington County cast iron monument at the SW corner of Government Lot 4, Section 23, T28N, R20W.

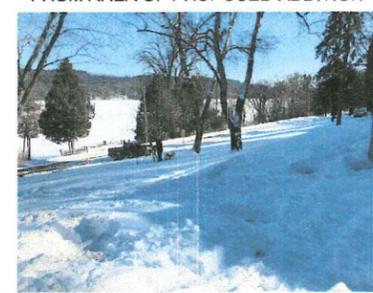
Washington County cast iron monument at the NW corner of Government Lot 4, Section 26, T28N, R20W.

Washington County cast iron monument at the W1/4 corner of Section 26, T28N, R20W.

PHOTOGRAPH LOOKING EAST FROM AREA OF PROPOSED ADDITION



PHOTOGRAPH LOOKING SOUTHEAST FROM AREA OF PROPOSED ADDITION



PHOTOGRAPH LOOKING SOUTH FROM AREA OF PROPOSED ADDITION



WARRANTY DEED, Document No. 3117553

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LEGEND

Orientation of this bearing system is based on the West line of Government Lot 4, Section 23, T28N, R20W having a bearing of N00°42'08"W.

Distances are in feet and decimals of a foot.

Contours were obtained from the Minnesota DNR lidar project and also from field measurements. They are at 2 foot intervals, and are based on the North American Vertical Datum 1988 Adjustment.

Elevations shown are based on North American Vertical Datum 1988 Adjustment unless otherwise noted.

● Denotes a found monument, described as shown.

— Denotes bluffline, top of 12% or greater slope.

O.H.W. Denotes Ordinary High Water.

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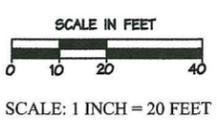
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I hereby certify that this survey, plan or report was prepared by me or under my direct supervision and that I am a duly Licensed Land Surveyor under the laws of the State of Minnesota.

Landmark Surveying Inc.

Milo B. Horak
Milo B. Horak Minnesota License No. 52577 February 05, 2018 Date



SURVEY PREPARED BY:
Landmark Surveying, Inc.
21090 Olinda Trail North - P.O. Box 65
Scandia, Minnesota 55073

Office number: 651-433-3421
Cell number: 651-755-5760
E-mail address: inthefield@frontiernet.net

CERTIFICATE OF SURVEY

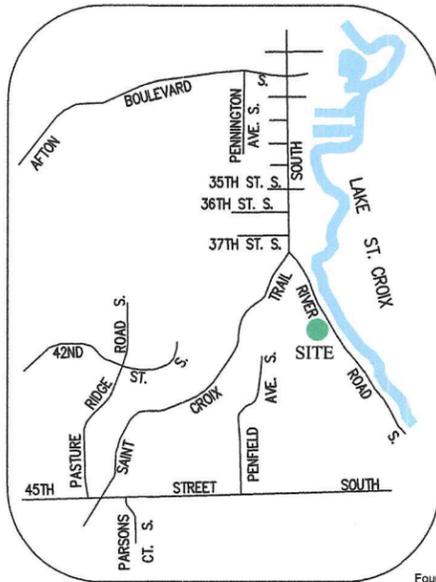
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Washington County Parcel ID: 2302820330011



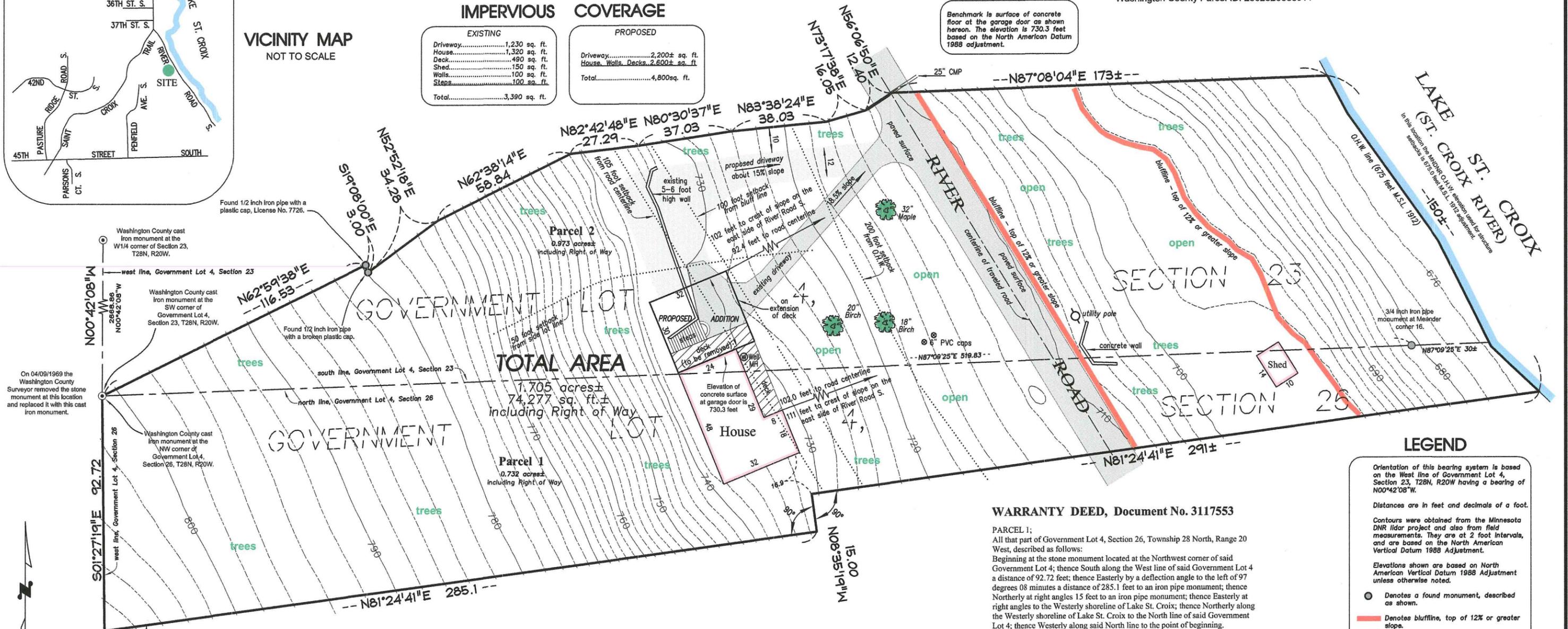
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Steps.....	100 sq. ft.		
Total.....	3,390 sq. ft.	Total.....	4,800sq. ft.

BENCHMARK

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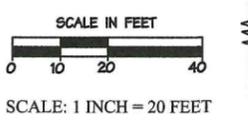
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February 05, 2018
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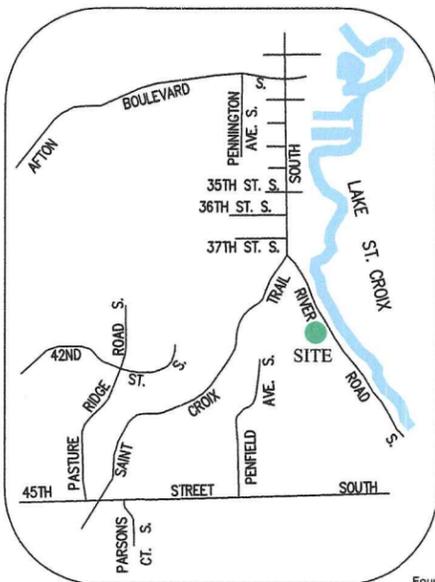
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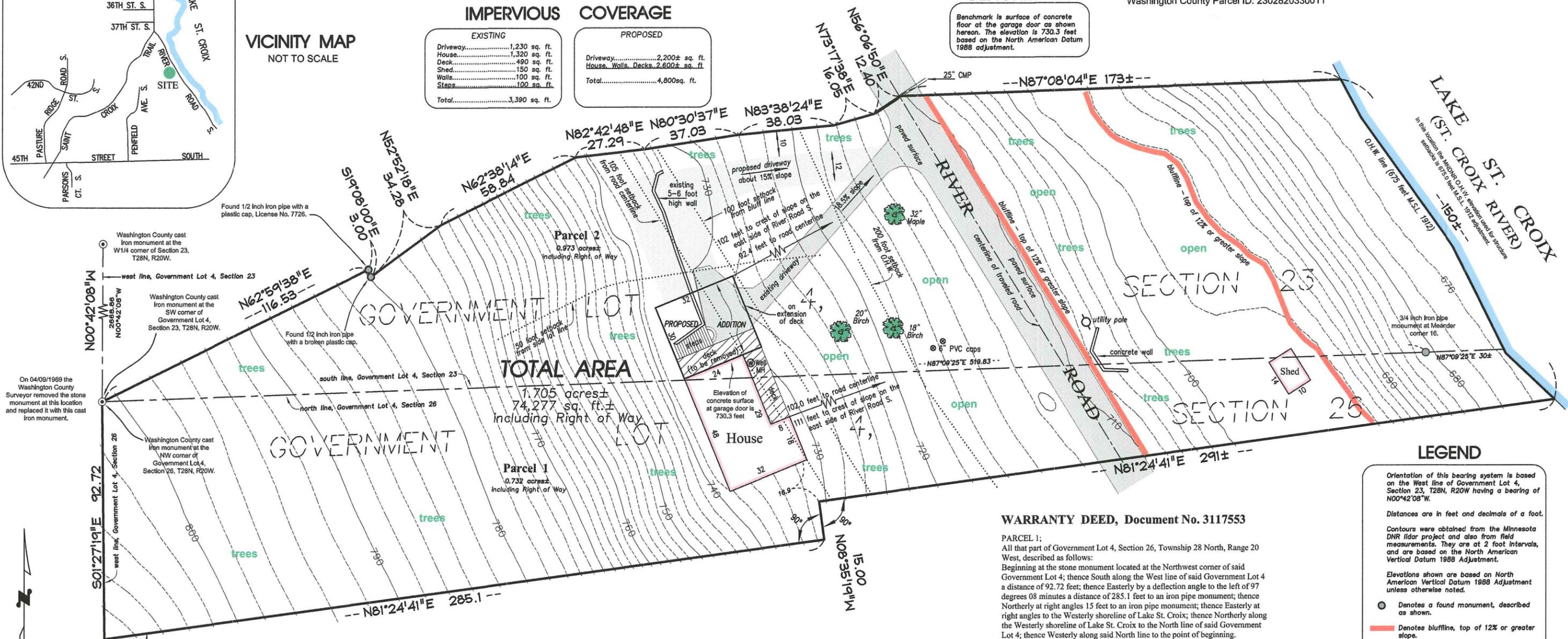
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TOTAL AREA
1.705 acres ±
74,277 sq. ft. ±
including Right of Way

Parcel 1
0.732 acres
including Right of Way

Parcel 2
0.973 acres
including Right of Way

LEGEND

- Orientation of this bearing system is based on the West line of Government Lot 4, Section 23, T28N, R20W having a bearing of N00°42'08"W.
- Distances are in feet and decimals of a foot.
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Beginning at the Southwest corner of said Government Lot 4; thence North 62 degrees 59 minutes 38 seconds East 116.53 feet (the West line of said Government Lot 4 has an assumed bearing of North 0 degrees 42 minutes 08 seconds West); thence South 19 degrees 08 minutes East 3.00 feet; thence North 52 degrees 52 minutes 18 seconds East 34.28 feet; thence North 62 degrees 38 minutes 14 seconds East 58.84 feet; thence North 82 degrees 42 minutes 48 seconds East 27.29 feet; thence North 80 degrees 30 minutes 37 seconds East 37.03 feet; thence North 83 degrees 38 minutes 24 seconds East 38.03 feet; thence North 73 degrees 17 minutes 38 seconds East 16.05 feet; thence North 56 degrees 06 minutes 50 seconds East 12.40 feet; thence North 87 degrees 08 minutes 04 seconds East to the Westerly shoreline of Lake St. Croix; thence Southeasterly along said Westerly shoreline to the South line of said Government Lot 4; thence Westerly along said South line to the point of beginning.

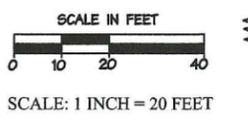
PHOTOGRAPH LOOKING EAST FROM AREA OF PROPOSED ADDITION



PHOTOGRAPH LOOKING SOUTHEAST FROM AREA OF PROPOSED ADDITION



PHOTOGRAPH LOOKING SOUTH FROM AREA OF PROPOSED ADDITION



SURVEY PREPARED BY:
Landmark Surveying, Inc.
21090 Olinda Trail North - P.O. Box 65
Scandia, Minnesota 55073

Office number: 651-433-3421
Cell number: 651-755-5760
E-mail address: inthefield@frontier.net

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mil Hank
Milo B. Horak Minnesota License No. 52577
February 05, 2018
Date

CERTIFICATE OF SURVEY

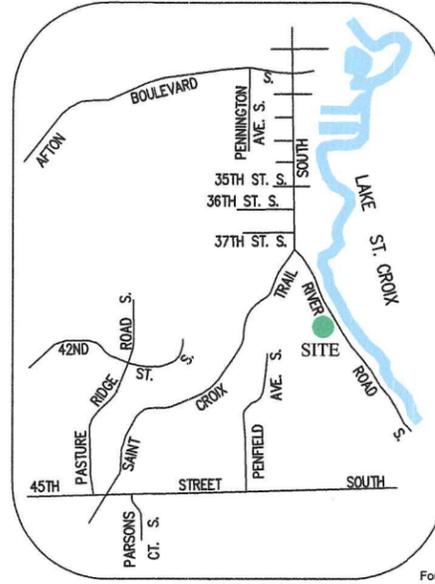
PART OF GOVERNMENT LOT 4, SECTION 23, TOWNSHIP 28 NORTH, RANGE 20 WEST,
PART OF GOVERNMENT LOT 4, SECTION 26, TOWNSHIP 28 NORTH, RANGE 20 WEST,
CITY OF AFTON, WASHINGTON COUNTY, MINNESOTA

SURVEY PREPARED FOR:
MATTHEW COOPER

SITE ADDRESS:
3988 River Road
Afton, MN 55001

OWNER:
JOHN E. & KATHLEEN Q. ORNER
499 Quinlan Avenue South
Lakeland, MN 55043

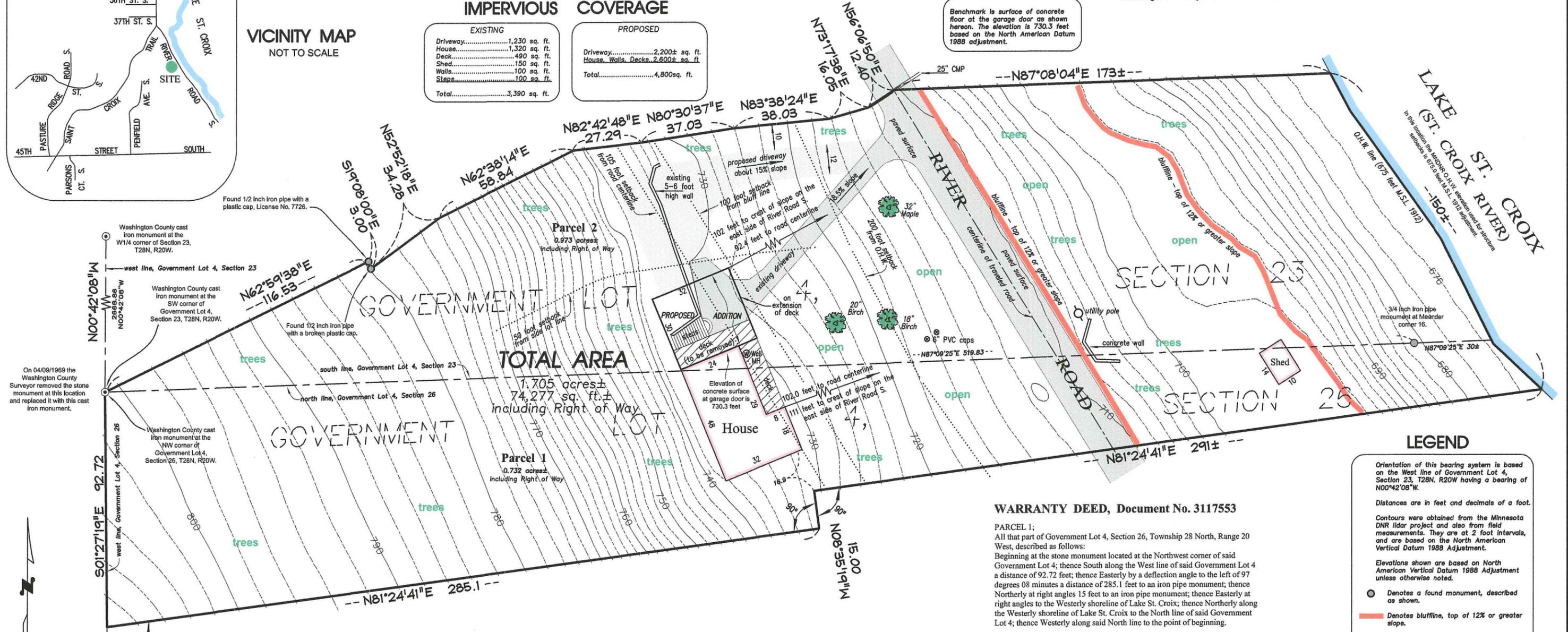
Washington County Parcel ID: 2302820330011



VICINITY MAP
NOT TO SCALE

IMPERVIOUS COVERAGE	
EXISTING	PROPOSED
Driveway.....1,230 sq. ft.	Driveway.....2,200± sq. ft.
House.....1,320 sq. ft.	House, Walls, Decks, 2,600± sq. ft.
Deck.....490 sq. ft.	
Shed.....150 sq. ft.	
Walls.....100 sq. ft.	
Steps.....100 sq. ft.	
Total.....3,390 sq. ft.	Total.....4,800sq. ft.

BENCHMARK
Benchmark is surface of concrete floor at the garage door as shown hereon. The elevation is 730.3 feet based on the North American Datum 1988 adjustment.



TOTAL AREA
1.705 acres±
74,277 sq. ft.±
including Right of Way

Washington County cast iron monument at the W1/4 corner of Section 23, T28N, R20W.

Washington County cast iron monument at the SW corner of Government Lot 4, Section 23, T28N, R20W.

On 04/09/1969 the Washington County Surveyor removed the stone monument at this location and replaced it with this cast iron monument.

Washington County cast iron monument at the NW corner of Government Lot 4, Section 26, T28N, R20W.

LEGEND

Orientation of this bearing system is based on the West line of Government Lot 4, Section 23, T28N, R20W having a bearing of N00°42'08"W.

Distances are in feet and decimals of a foot.

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● Denotes a found monument, described as shown.

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O.H.W. Denotes Ordinary High Water.

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WARRANTY DEED, Document No. 3117553

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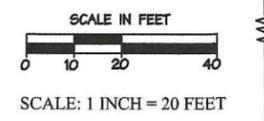
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mil Hork
Milo B. Hork Minnesota License No. 52577
February 05, 2018
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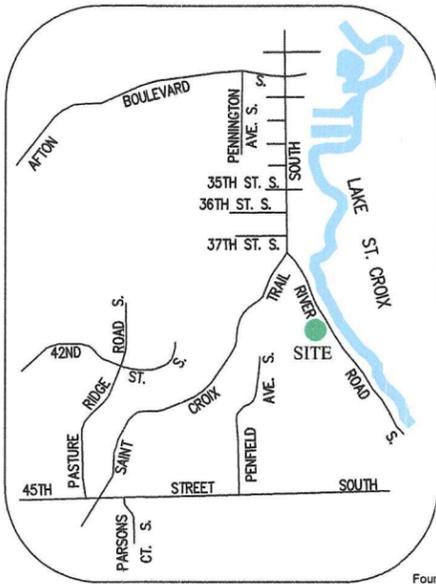
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CITY OF AFTON, WASHINGTON COUNTY, MINNESOTA

SURVEY PREPARED FOR:
MATTHEW COOPER

SITE ADDRESS:
3988 River Road
Afton, MN 55001

OWNER:
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499 Quinlan Avenue South
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Washington County Parcel ID: 2302820330011



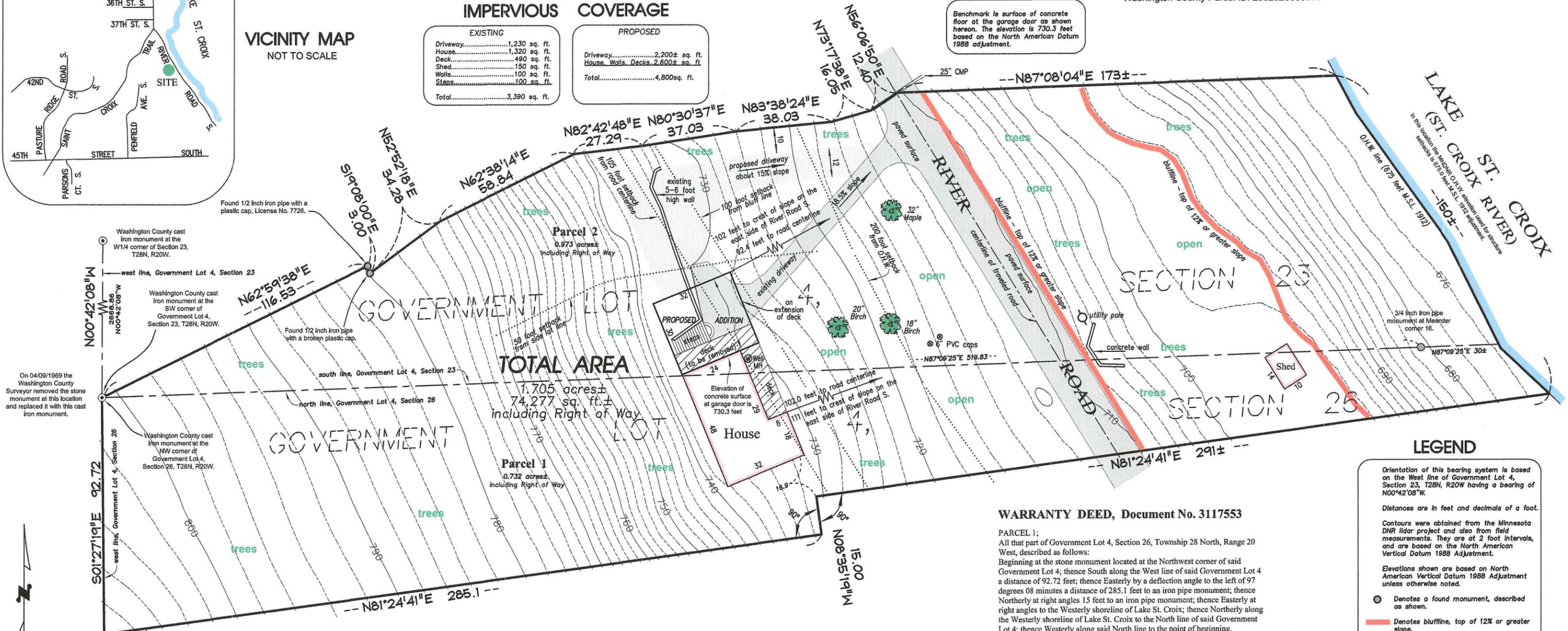
VICINITY MAP
NOT TO SCALE

IMPERVIOUS COVERAGE

EXISTING		PROPOSED	
Driveway	1,230 sq. ft.	Driveway	2,200± sq. ft.
House	1,320 sq. ft.	House, Walls, Decks	2,800± sq. ft.
Deck	490 sq. ft.		
Shed	150 sq. ft.		
Walls	100 sq. ft.		
Steps	100 sq. ft.		
Total	3,390 sq. ft.	Total	4,800sq. ft.

BENCHMARK

Benchmark is surface of concrete floor at the garage door as shown hereon. The elevation is 730.3 feet based on the North American Datum 1988 adjustment.



LEGEND

Orientation of this bearing system is based on the West line of Government Lot 4, Section 23, T28N, R20W having a bearing of N00°42'08"W.

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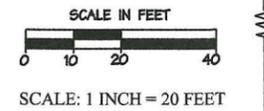
PHOTOGRAPH LOOKING EAST FROM AREA OF PROPOSED ADDITION



PHOTOGRAPH LOOKING SOUTHEAST FROM AREA OF PROPOSED ADDITION



PHOTOGRAPH LOOKING SOUTH FROM AREA OF PROPOSED ADDITION



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Office number: 651-433-3421
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Survey Report: The purpose of this survey is for a variance application with the City of Afton. The boundary mapped hereon is based on record mathematics.

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Landmark Surveying Inc.
mil Horak
Milo B. Horak Minnesota License No. 52577 Date February 05, 2018

CERTIFICATE OF SURVEY

PART OF GOVERNMENT LOT 4, SECTION 23, TOWNSHIP 28 NORTH, RANGE 20 WEST,
PART OF GOVERNMENT LOT 4, SECTION 26, TOWNSHIP 28 NORTH, RANGE 20 WEST,
CITY OF AFTON, WASHINGTON COUNTY, MINNESOTA

SURVEY PREPARED FOR:
MATTHEW COOPER

SITE ADDRESS:
3988 River Road
Afton, MN 55001

OWNER:
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Lakeland, MN 55043

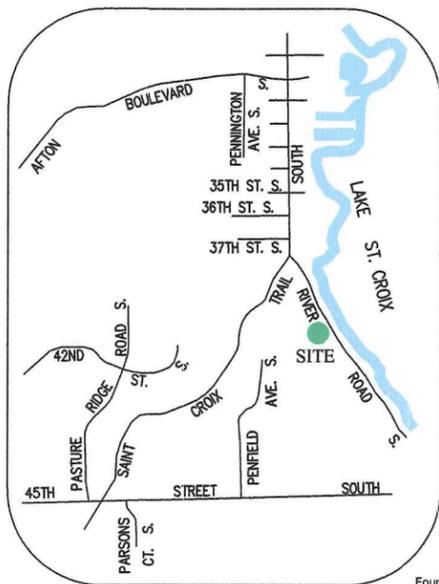
Washington County Parcel ID: 2302820330011

IMPERVIOUS COVERAGE

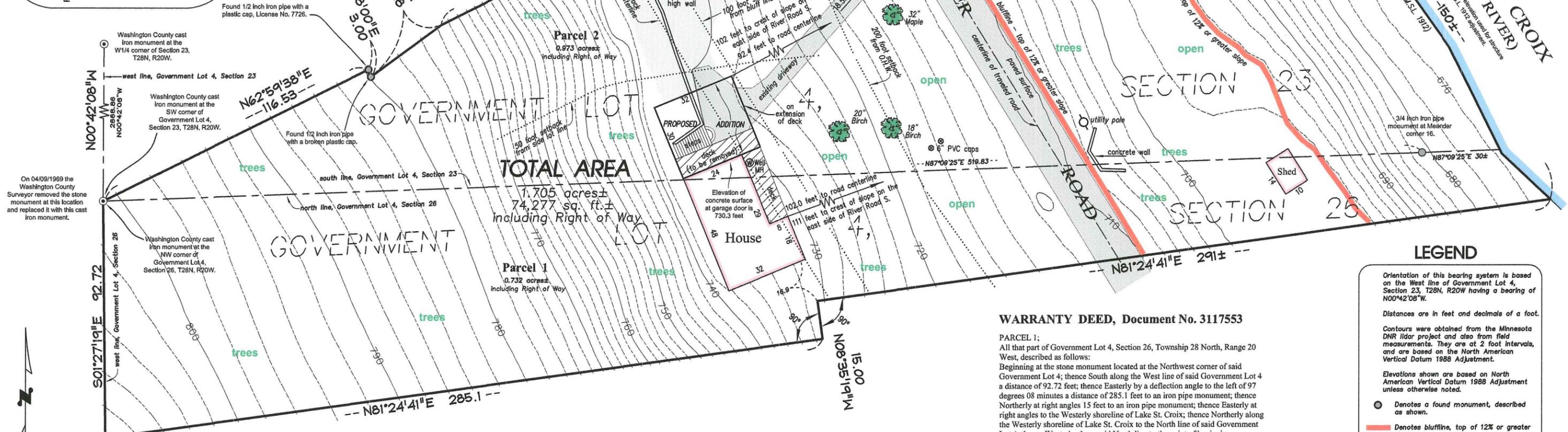
EXISTING		PROPOSED	
Driveway.....	1,230 sq. ft.	Driveway.....	2,200± sq. ft.
House.....	1,320 sq. ft.	House, Walls, Decks.....	2,600± sq. ft.
Deck.....	490 sq. ft.	Total.....	4,800sq. ft.
Shed.....	150 sq. ft.		
Walls.....	100 sq. ft.		
Steps.....	100 sq. ft.		
Total.....	3,390 sq. ft.		

BENCHMARK

Benchmark is surface of concrete floor at the garage door as shown hereon. The elevation is 730.3 feet based on the North American Datum 1988 adjustment.



VICINITY MAP
NOT TO SCALE



TOTAL AREA
7.705 acres±
74,277 sq. ft.±
including Right of Way

Parcel 1
0.732 acres±
including Right of Way

Parcel 2
0.973 acres±
including Right of Way

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LEGEND

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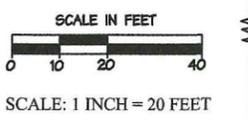
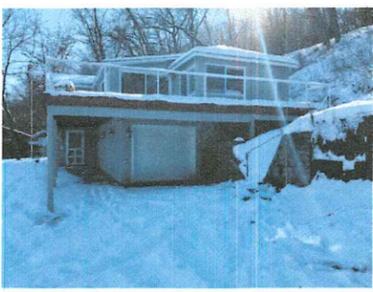
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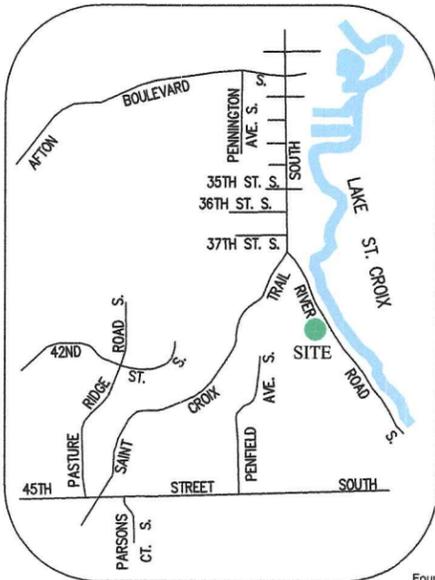
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IMPERVIOUS COVERAGE

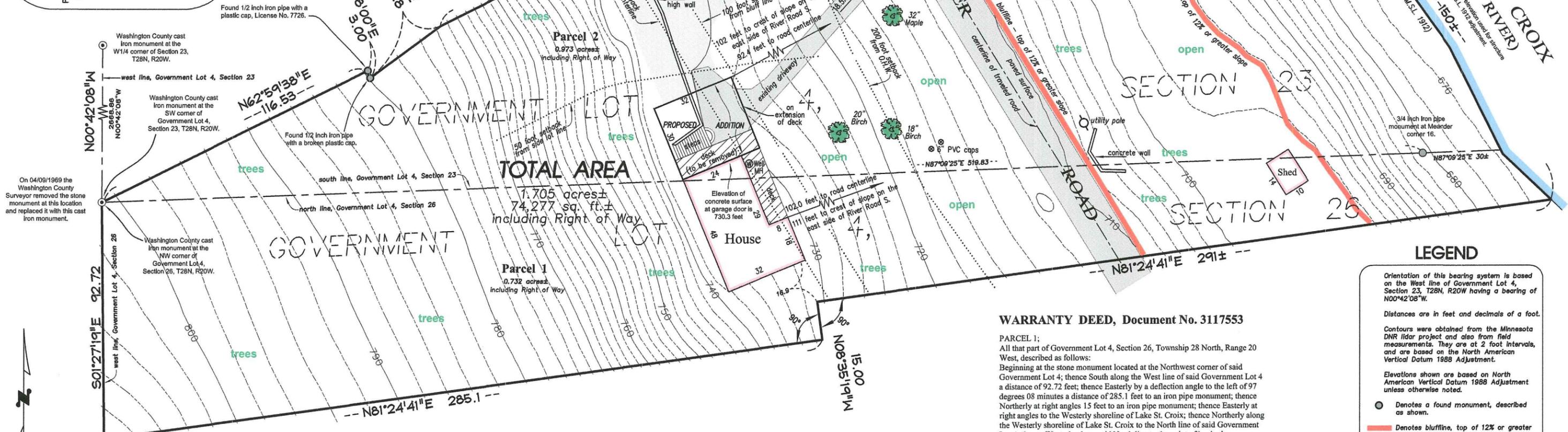
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BENCHMARK

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VICINITY MAP
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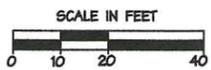


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mil Hank
February 05, 2018
Milo B. Horak Minnesota License No. 52577 Date



SCALE: 1 INCH = 20 FEET

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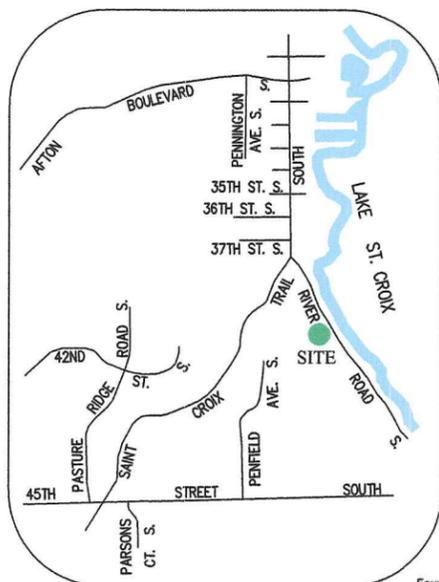
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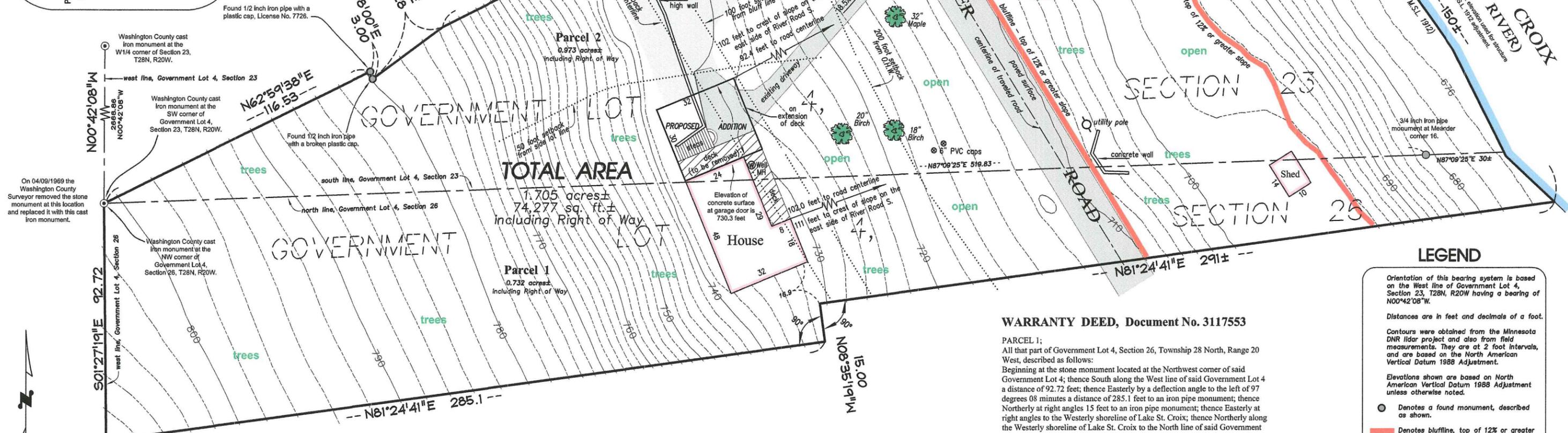
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NOT TO SCALE



TOTAL AREA
1.705 acres±
74,277 sq. ft.±
Including Right of Way

Parcel 1
0.732 acres±
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Parcel 2
0.973 acres±
Including Right of Way

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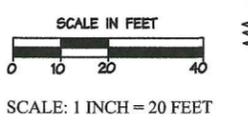
PHOTOGRAPH LOOKING EAST FROM AREA OF PROPOSED ADDITION



PHOTOGRAPH LOOKING SOUTHEAST FROM AREA OF PROPOSED ADDITION



PHOTOGRAPH LOOKING SOUTH FROM AREA OF PROPOSED ADDITION



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Landmark Surveying, Inc.
21090 Olinda Trail North - P.O. Box 65
Scandia, Minnesota 55073

Office number: 651-433-3421
Cell number: 651-755-5760
E-mail address: inthefield@frontiernet.net

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Landmark Surveying Inc.
mil Hank
February 05, 2018

Milo B. Horak Minnesota License No. 52577 Date

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CITY OF AFTON, WASHINGTON COUNTY, MINNESOTA

SURVEY PREPARED FOR:
MATTHEW COOPER

SITE ADDRESS:
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Afton, MN 55001

OWNER:
JOHN E. & KATHLEEN Q. ORNER
499 Quinlan Avenue South
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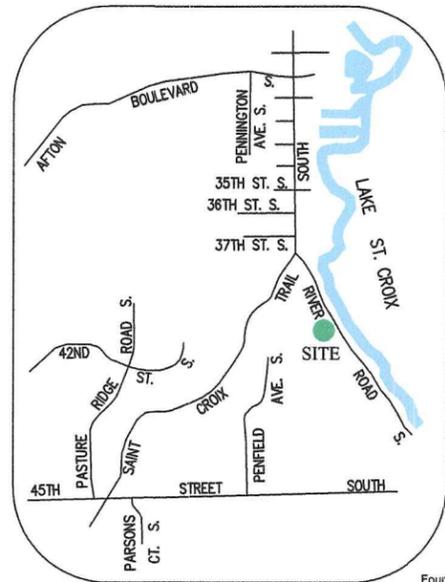
Washington County Parcel ID: 2302820330011

IMPERVIOUS COVERAGE

EXISTING		PROPOSED	
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Deck.....	490 sq. ft.		
Shed.....	150 sq. ft.		
Walls.....	100 sq. ft.		
Steps.....	100 sq. ft.		
Total.....	3,390 sq. ft.	Total.....	4,800sq. ft.

BENCHMARK

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VICINITY MAP
NOT TO SCALE



On 04/09/1969 the Washington County Surveyor removed the stone monument at this location and replaced it with this cast iron monument.

Washington County cast iron monument at the W1/4 corner of Section 23, T28N, R20W.

Washington County cast iron monument at the SW corner of Government Lot 4, Section 23, T28N, R20W.

Washington County cast iron monument at the NW corner of Government Lot 4, Section 26, T28N, R20W.

Washington County cast iron monument at the W1/4 corner of Section 26, T28N, R20W.

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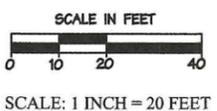
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Milo B. Horak Minnesota License No. 52577 Date February 05, 2018



SCALE: 1 INCH = 20 FEET

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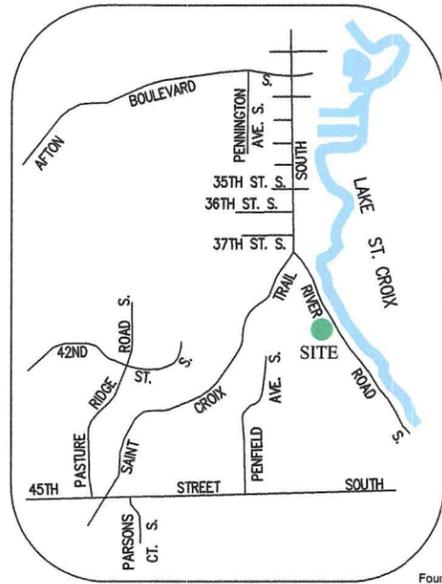
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Washington County Parcel ID: 2302820330011



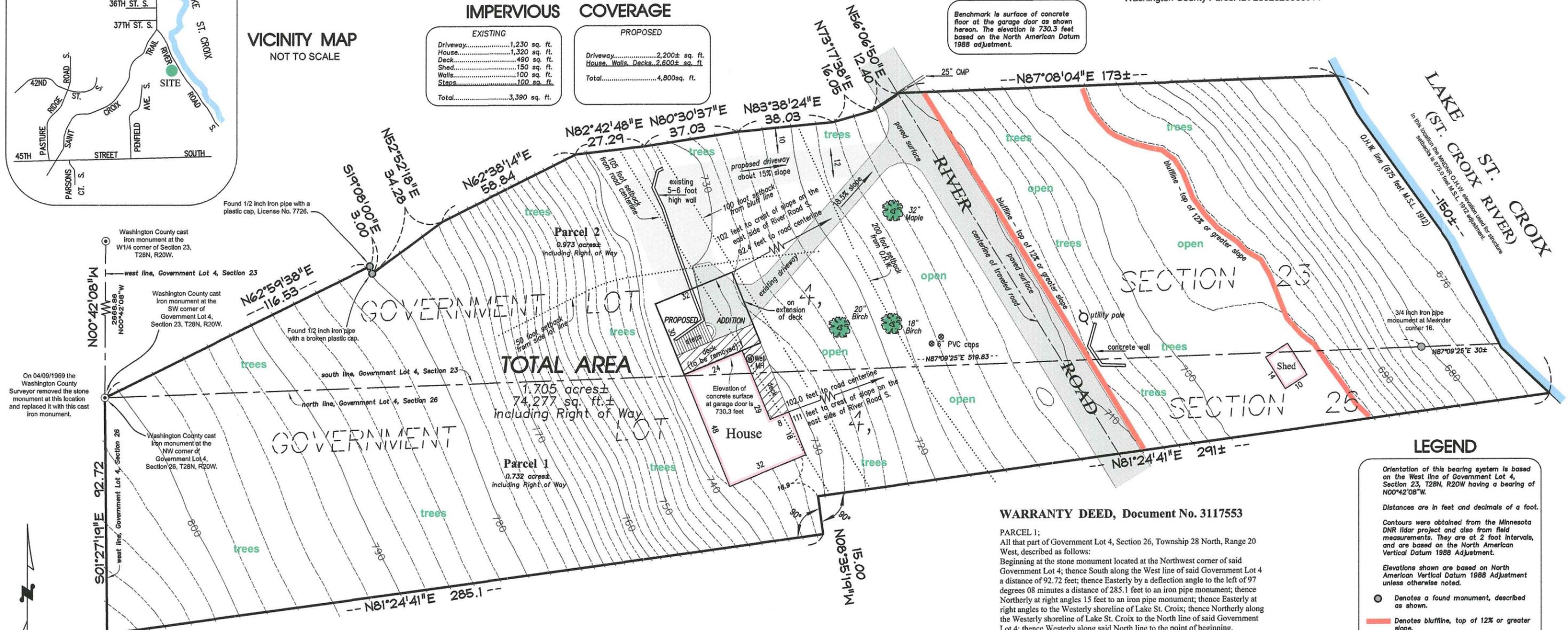
VICINITY MAP
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IMPERVIOUS COVERAGE

EXISTING		PROPOSED	
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TOTAL AREA
7.705 acres±
74,277 sq. ft.±
including Right of Way

Parcel 1
0.732 acres±
including Right of Way

Parcel 2
0.973 acres±
including Right of Way

WARRANTY DEED, Document No. 3117553

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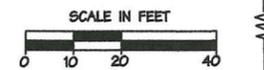
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SCALE: 1 INCH = 20 FEET

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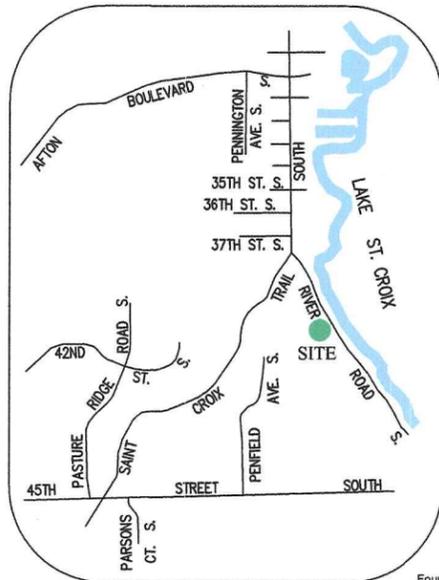
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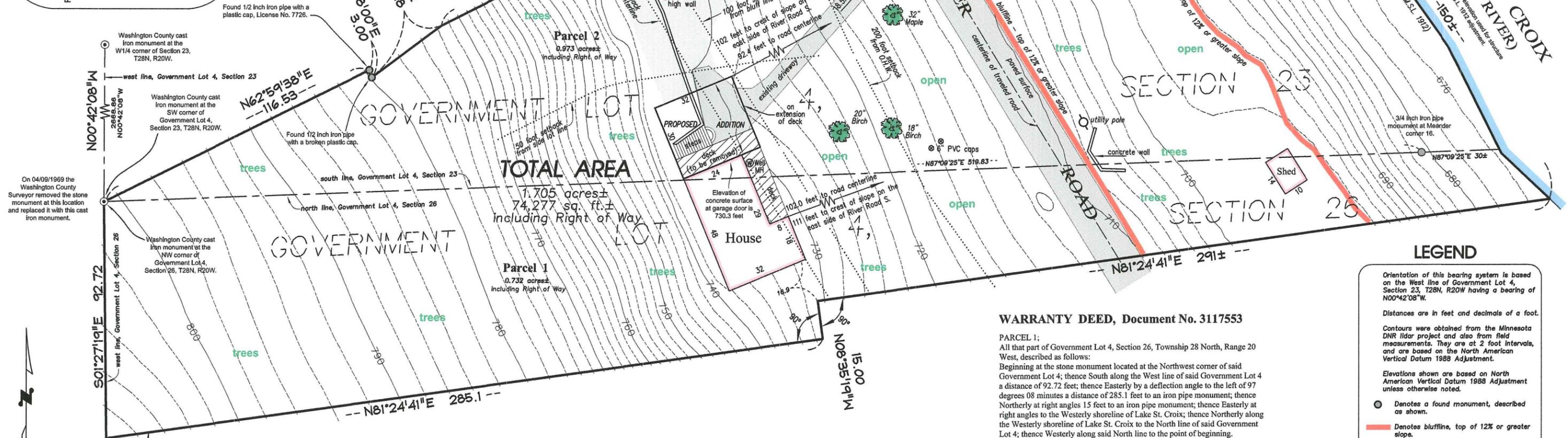
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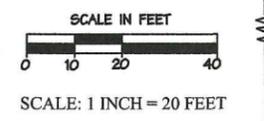
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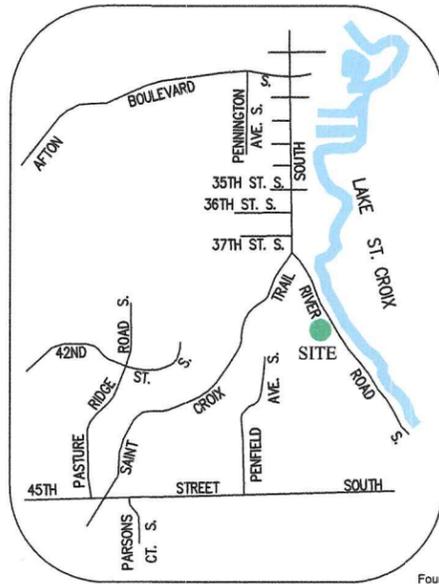
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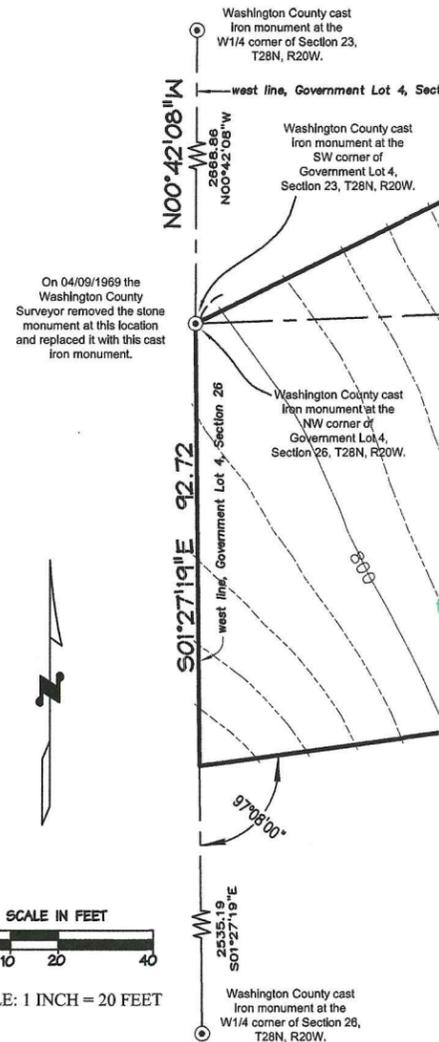
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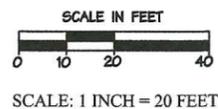
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February 05, 2018
Date

City of Afton
3033 St. Croix Trl, P.O. Box 219
Afton, MN 55001

Planning Commission Memo

Meeting: March 5, 2018

To: Vice-Chair Patten and members of the Planning Commission

From: Ron Moore, City Administrator

Date: February 27, 2018

Re: Nicholas Squires Variance Application at 14641 Afton Boulevard

Background

Nicholas Squires is proposing to construct a 1,920 square foot accessory building in the front yard of his property at 14641 Afton Boulevard. A photo showing the type of building proposed is attached.

The property does not have any frontage on Afton Boulevard, but is located at the end of a private driveway that serves several properties. The parcel is 11 acres, which allows an accessory building up to 2,500 square feet. The side and rear setbacks for an accessory building up to 1500 square feet are 50 feet. The setbacks for an accessory building greater than 1500 square feet are 100 feet.

While the required front yard setback is generally 105 feet from the centerline of a public road, the property does not have frontage on a public road. A relatively recently adopted ordinance requires the setback from the front property line for properties without frontage on a public road to equal the required rear yard setback. Also, locating an accessory building closer to the front lot line than the house requires the building to be screened from the public road and from neighboring properties. There is a substantial amount of screening between the proposed building location and the adjacent properties.

Because the proposed accessory building is larger than 1500 sq. ft., the required front and side yard setbacks are 100 feet. The accessory building is proposed to be located with sideyard setbacks of 300 feet and 250 feet, and a front yard setback of 54 feet. As shown on the attached site plan, only a relatively small portion of the property is suitable for a building site, due to topography. The existing house, drainfield and well take up a significant amount of the buildable area.

Variance Needed

To allow the proposed accessory building, a variance to allow a front yard setback of 54 feet vs. the required 100 feet is necessary.

Public Hearing

The public hearing is an opportunity for the public to ask questions and provide comments regarding the application.

Findings

The following is a list of recommended findings. The Planning Commission may want to provide additional findings.

1. The property and all surrounding property is zoned Rural Residential
2. The parcel is 11 acres, which allows an accessory building of up to 2,500 sq. ft.
3. The property is very oddly shaped, with triangular shaped property lines
4. Large portions of the property have slopes that are not suitable as building sites
5. An accessory building of up to 1500 sq. ft. could be constructed in the proposed building location without the need for a variance.
6. The perimeter of the property is heavily wooded.
7. The proposal would not disrupt the existing natural vegetation

Conditions

If the Planning Commission recommends approval of the variance application, the Commission may also place conditions on the approval to mitigate the impact of the variance.

1. The color of the building shall be earth tone
2. Existing vegetative screening shall be maintained

Planning Commission Recommendation Requested:

Motion regarding a recommendation concerning the Nicholas Squires variance application at 14641 Afton Boulevard, with findings, and conditions if applicable.

RECEIVED

FEB 14 2018

CITY OF AFTON

Z18-02

CITY OF AFTON
VARIANCE APPLICATION

(Reference Sections: 12-55, 12-77, 12-328 12-835, 12-1020, 12-1266, 12-1955, 12-2228)

Owner	Address	City	State	Zip	Phone
Nicholas A Squires	14641 Afton Blvd	Afton	MD	55001	651 436 6779
Applicant (if different than owner)	Address	City	State	Zip	Phone
####					651 343 2033 cell
Project Address					
14641 Afton Blvd S	AFTON	MN	55001		

Zoning Classification	Existing Use of Property	PID# or Legal Description
RR	primary residence	see attached

Please list the section(s) of the code from which the variance(s) are requested.

CD 12:46 10. A & C 100' set back

Description of Request

My practical difficulty is building an accessory structure of 1920 sq ft. Existing topography and lot dimensions do not permit 100' set back. I can fit a 32x40 (1300 sq ft) conforming structure 54' from property line. However this size is inadequate. Request variance for 48x40 structure.

By signing this application, the applicant agrees to pay all expenses incurred by the City of Afton. In connection with this request, your signature constitutes permission for a representative of the City of Afton to enter your property, during business hours, to evaluate this request. This may involve minor excavating or soil borings. If you would like to be present during this evaluation, please contact the City.

proposed building sit is 1000 f from street

Signature of Owner/Applicant

Date

2-12-18

Make checks payable to: **City of Afton**

If multiple variances are necessary from the applicant only **one** fee is required. However, the deposit fee must be multiplied by the number of variances sought.

FEES:

ESCROWS:

Variance	\$250	\$600
Renewal/Extension	\$250	\$350

TOTAL:

15850⁰⁰

DATE PAID:

2-14-18

CHECK #:

Cash

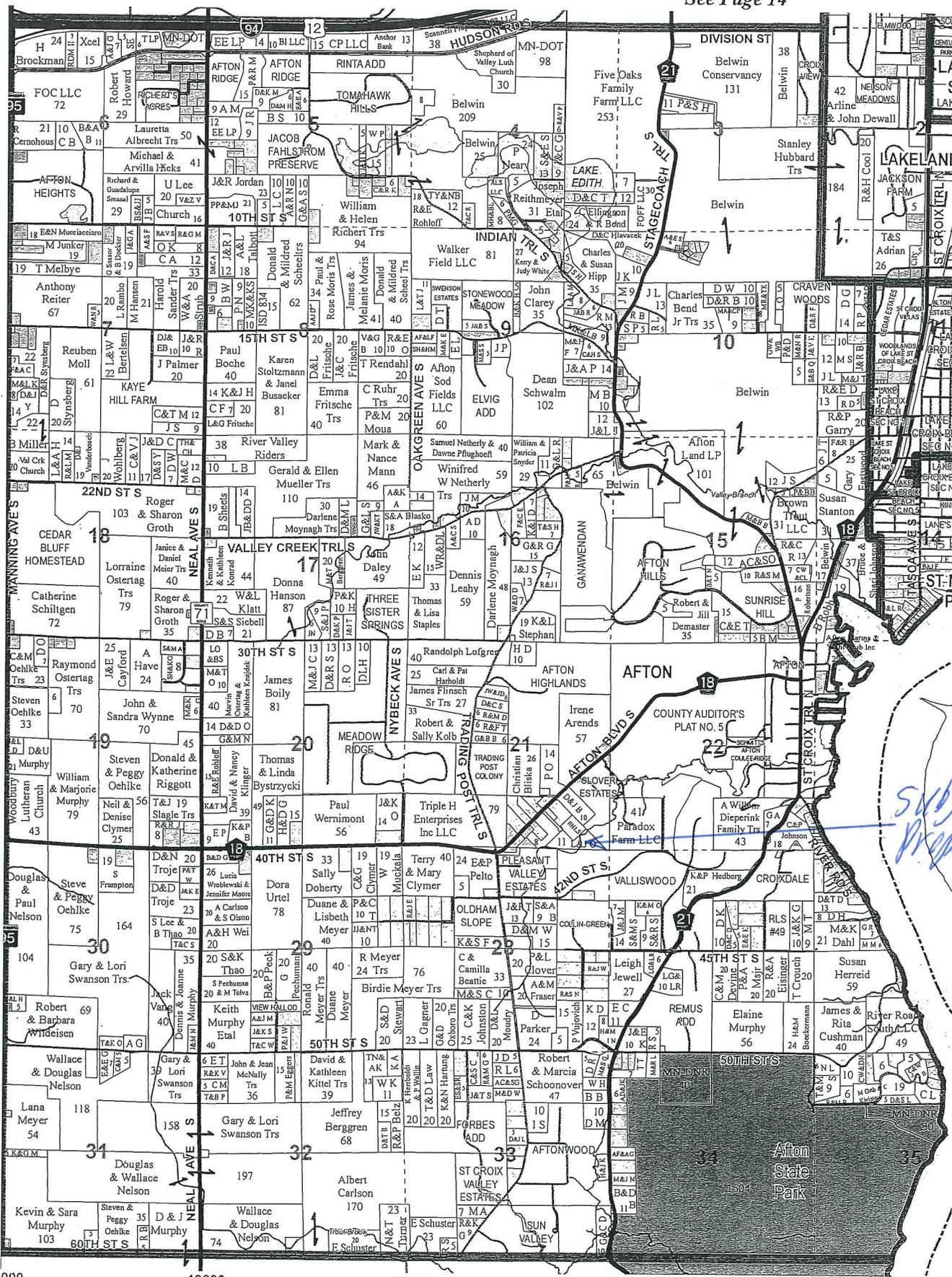
RECVD BY:

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Cities of Afton, St. Marys Point, Lakeland, Lake St. Croix Beach & Lakeland Shores



See Page 14



subject property

Applicant(s): Nicholas A Squires
 Phone: 651 343 7033
 Mailing Address: 14641 Afton Blvd S
 Property Address for variance: same

Variance request description: Request a 54' setback for 1920 sqft accessory building due to practical difficulty in obtaining 100' set back anywhere on property

City Ordinance Section number(s), that variance is requested for: CD. 12:46 A+C
100' setback accessory building over 1500 sqft

Answer the following questions to the best of your ability - based on the criteria found in section 12-77 of Afton's Code (Land Use, Appeals and Variances). Completing this questionnaire will help the Planning Commission and the City of Afton evaluate your application in light of the requirements of Afton's Variance Ordinance. It does not guarantee that your variance request will be approved. If needed use a separate page.

Background: This questionnaire is designed to help you and the City of Afton determine whether a variance should be granted. Please consult with the City Administrator who can help you with your variance application and explain the Variance Ordinance to you. The City Administrator will work with you to ensure that the variance you request is the minimum variance required to provide the same rights commonly enjoyed by other properties in the same zoning district. Because of special provisions for certain types of construction, the City Administrator will also determine whether the property is in the Flood Plain District. There are also special provisions for earth-sheltered construction.

Criteria #1 *The requested use, must be a reasonable use in order to receive a variance. Applicant - Please explain why the proposed use which requires a variance is a reasonable use for this property?*

Location is extremely well screened and ergonomic to the property. I would like to build a 2500 sqft building but for the purpose of being reasonable I'm requesting a smaller area

Criteria #2 *Exceptional or extraordinary circumstances apply to the property which do not apply generally to other properties in the same zone or vicinity, and result from lot size, shape, topography, or other circumstances over which the property owner, since enactment of this Ordinance, have had no control. Applicant - What exceptional or extraordinary circumstances related to the property do not apply generally to other properties in the same zone or vicinity? Extraordinary circumstances would include lot size, irregular lot shape or topography. Are there other circumstances over which you, as the property owner, have no control?*

Explain? property is 1000 ft from a public road, topography and lot dimensions limit location of accessory structure, A 1500 sqft 40x37.5 structure would be conforming in this location, however this size is inadequate for our needs, I'm requesting to add 10.5' in length (40x48). This is the minimum size to suit our needs.

Criteria #3 That literal interpretation of the provisions of this Ordinance would deprive the applicant of rights commonly enjoyed by other properties in the same district under the terms of this Ordinance.

Applicant - How does the literal interpretation of the provisions of the Afton ordinance (from which you are requesting a variance) deprive you of rights commonly enjoyed by other properties in the same zoning district? Explain: most people with 10+ acres can have an accessory building up to 2500 sq ft

provisions prior to 2014 ordinance change required only 100ft from street

Criteria #4 The special conditions or circumstances do not result from actions of the applicant. we are 1000ft

Applicant - How did these exceptional circumstances related to the property come about? Did actions by you create these circumstances? Explain: Existing lot dimensions and topography limit buildable locations / Irregular Lot

Criteria #5 That granting the variance requested will not confer on the applicant any special privilege that is denied by this Ordinance to owners of other lands, structures, or buildings in the same district.

Applicant - Will the granting of the requested variance confer on you, the applicant, any special privilege that is denied by this ordinance to owners of other lands, structures, or buildings in the same zoning district? Explain: no

Criteria #6 The variance requested is the minimum variance which would alleviate the hardship.

Applicant - Is the variance you are requesting the minimum variance which would alleviate the practical difficulty or hardship for your property? Explain: I would like to build a 2400 sq ft structure, 1500 sq ft will not accommodate our current parking & storage needs, let alone future growth.

1920 sq ft is the reasonable minimum

Criteria #7 The variance would not be materially detrimental to the purposes of this Ordinance, or to property in the same zone. **Applicant (Optional)** - Will the variance be materially detrimental to the purposes of this Ordinance, or to property in the same zone? How would the use of the property, if allowed by the variance, affect other properties in the vicinity?

Explain: The structure is not visible from any street or neighboring property, and is only for personal parking/storage

Criteria #8 Economic conditions or circumstances alone shall not be considered in the granting of a variance request if a reasonable use of the property exists under the terms of the ordinance. **Applicant** -

Is the requested variance for economic reasons?

Explain: partly, the cost per foot of an inadequate 1500 sq ft structure is much higher than the proposed 1920 sq ft building therefore to pay almost same \$ for a building knowing it will be

Criteria #9 In the Flood Plain District, no variance shall be granted which permits a lower degree of flood protection than the Regulatory Flood Protection Elevation for the particular area or permits standards lower than those required by state law. **Applicant (optional), PC** - Is the property in a Flood Plain District? Yes No

inadequate is not worth it

Criteria #10 Variances shall be granted for earth-sheltered construction by state statutes when in harmony with this Ordinance. **Applicant** - Is the variance for earth-sheltered construction? Yes No

ADDITIONAL CRITERIA THAT MAY BE CONSIDERED BY THE PLANNING COMMISSION (PC) AND/OR CITY COUNCIL(CC)- Applicant responses to criteria #11 and criteria #12 are optional.

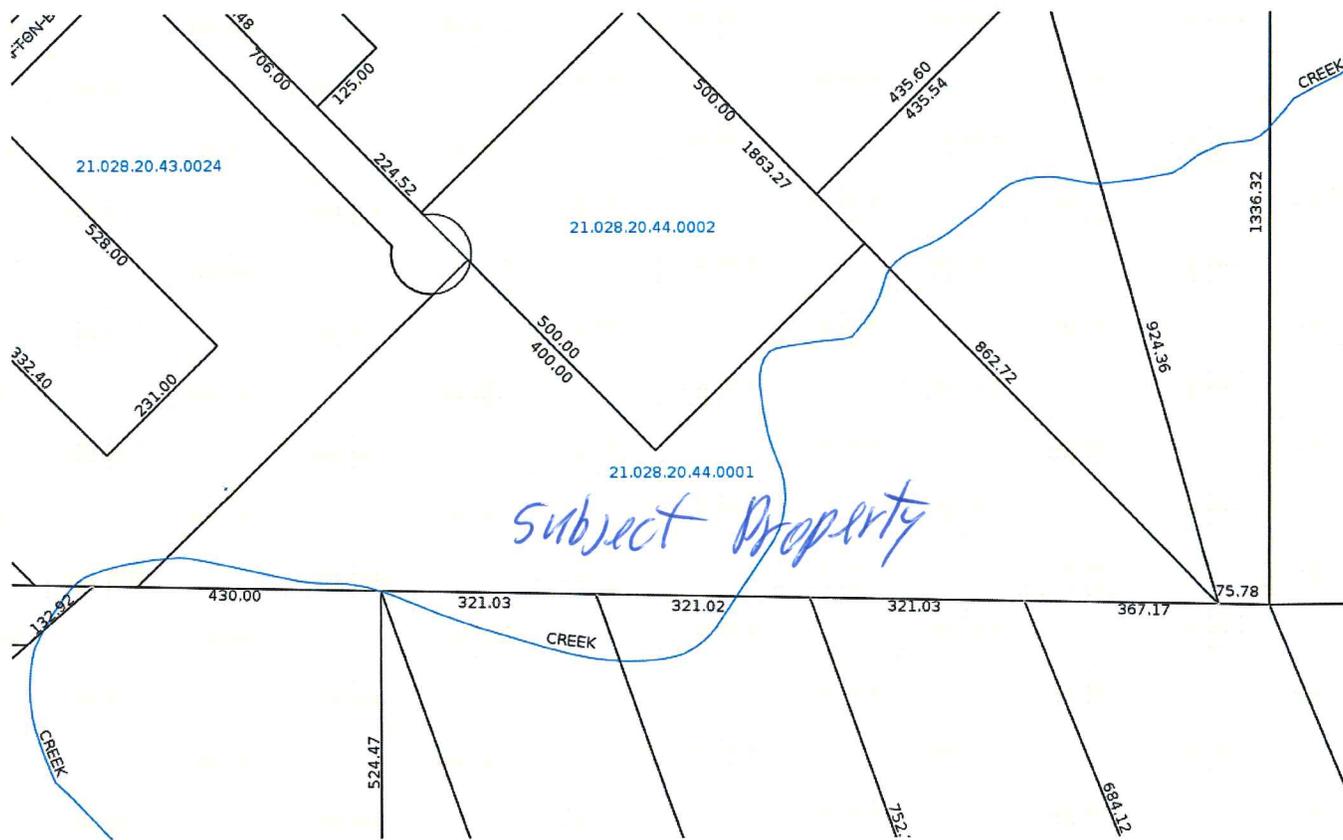
Criteria #11 Variances shall only be permitted when they are in harmony with the general purposes and intent of the ordinance. **Applicant (Optional), PC** - Is the requested variance in harmony with the Afton ordinances and code? How will this variance if granted (and the proposed use of the property allowed) affect the essential character of the area?

Explain: it is in harmony structure shall be well crafted/pleasant appearance and ergonomic to the property will not be visable to public or neighbors

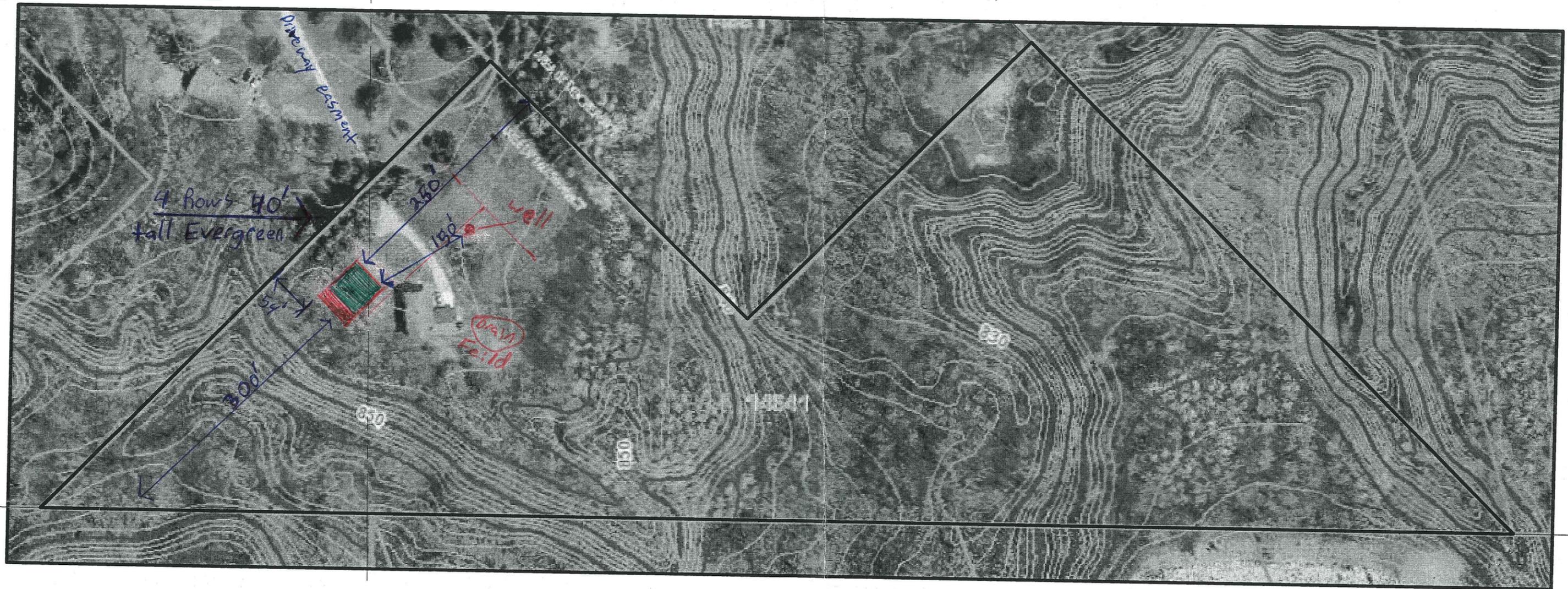
Criteria #12 Variances shall only be permitted when they are in harmony with the general purposes and intent of the Afton Comprehensive Plan. **Applicant (Optional), PC** - Is the requested variance in harmony with the Afton comprehensive plan?

Explain: yes





Afton Blvd
 approx 1,000 Feet
 from northern property line
 North



Green area represents 40x37.5 conforming building site

Red area represents 40x48 and the additional 420 sqft relating to the variance application

22' Between primary and accessory structures

Property is 11 acres heavily wooded

By Individual to Joint Tenants

No delinquent taxes and transfer entered; Certificate of Real Estate Value () filed () not required
 Certificate of Real Estate Value No. _____

_____ Date _____

_____ County Auditor _____

By _____ Deputy _____

(reserved for recording data)

DEED TAX DUE HEREON: \$ _____
Date: 2-5-2015

FOR VALUABLE CONSIDERATION, Janice Odegaard and Lester B. Odegaard, as Trustee(s) of the Janice Odegaard Revocable Trust U/A dated November 6, 2006, and any amendments thereto, Grantor(s), hereby conveys to Nicholas A. Squires and Brittany M. Darst, Grantee(s), as Joint Tenants, real property in Washington County, Minnesota, described as follows:

SEE ATTACHED LEGAL

together with all hereditaments and appurtenances belonging thereto.

Check box if applicable:

- The Seller certifies that the seller does not know of any wells on the described real property.
- A well disclosure certificate accompanies this document.
- I am familiar with the property described in this instrument and I certify that the status and number of wells on the described property have not changed since the last previously filed well disclosure certificate.

TRUSTEE(S)

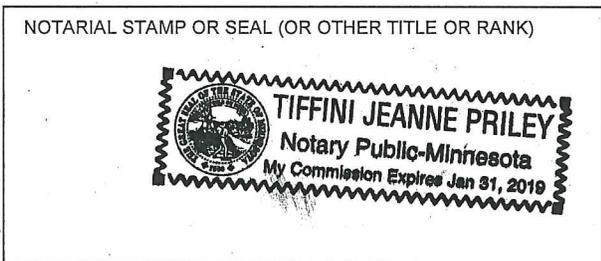
Janice Odegaard
Janice Odegaard

Lester B. Odegaard
Lester B. Odegaard

Affix Deed Tax Stamp Here

STATE OF MINNESOTA)
) ss.
 COUNTY OF WASHINGTON)

This instrument was acknowledged before me on January 27, 2015 by Janice Odegaard and Lester B. Odegaard, as Trustee(s) of the Janice Odegaard Revocable Trust U/A dated November 6, 2006, and any amendments thereto, Grantor(s).



Tiffini Priley
Signature of Person Taking Acknowledgment

Tax Statements for the real property described in this instrument should be sent to (Include name and address of Grantee):

THIS INSTRUMENT WAS DRAFTED BY (NAME AND ADDRESS)

Burnet Title
 5151 Edina Industrial Boulevard, Suite 500
 Edina, MN 55439

14-19143/

Nicholas A. Squires
 Brittany M. Darst
 14641 Afton Boulevard South
 Afton, MN 55001

All that part of the S $\frac{1}{2}$ of SE $\frac{1}{4}$ of Section 21, Township 28, Range 20, Washington County, Minnesota described as follows: Commencing at the SW corner of the SE $\frac{1}{4}$ of said Section 21; thence North along the West line of said SE $\frac{1}{4}$ to the center line of Minnesota Highway No. 95; thence Northeasterly along said center line to a point on said center line which is located 1860.76 feet Southwesterly of the intersection of said center line with the East line of said SE $\frac{1}{4}$; said distance being measured along said centerline; thence Southeasterly at right angles a distance of 1106 feet to the point of beginning of the land to be described; thence Southwesterly to a point on a line drawn at right angles to the center line of said Minnesota Highway No. 95 through a point on said center line located 1365.40 feet Northeasterly of the intersection of the West line of said SE $\frac{1}{4}$ with the center line of said Minnesota Highway No. 95, said point on said line being 1106 feet Southeast of the center line of said Minnesota Highway No. 95; thence Northwesterly along said line 400 feet; thence Southwesterly at right angles to a point on the South line of said SE $\frac{1}{4}$; thence East along the South line of said SE $\frac{1}{4}$ to the point of intersection with a line drawn at right angles to the center line of said Minnesota Highway No. 95 through a point on said center line located 1860.76 feet Southwesterly of the intersection of said center line with the East line of said SE $\frac{1}{4}$; thence Northwesterly along said line to the point of beginning.

City of Afton
3033 St. Croix Trl, P.O. Box 219
Afton, MN 55001

Planning Commission Memo

Meeting: March 5, 2018

To: Vice-Chair Patten and members of the Planning Commission

From: Ron Moorese, City Administrator

Date: February 27, 2018

Re: Afton Creek Preserve Application for Rezoning, Preliminary Plat and Conditional Use Permit for a Preservation and Land Conservation Development (PLCD) Subdivision to create 18 lots on 219 acres of land at 14220 60th Street and parcels with PID Numbers 33.028.20.32.0001, 32.028.20.41.0002, 32.028.20.42.0004, and 32.028.20.43.0001 and the parcel with PID Number to be assigned (33.028.20.33.000X described in document No. 4142813).

Attached is the Planning Consultant's report regarding the Afton Creek Preserve application for Rezoning, Preliminary Plat and Conditional Use Permit for a Preservation and Land Conservation Development (PLCD) Subdivision to create 18 lots on 219 acres of land. The report includes a number of exhibits provided by the applicant and the City Engineer. Also attached are letters from residents regarding the application.

Planning Commission Recommendation Requested:

Motion regarding a recommendation concerning the Afton Creek Preserve application for Rezoning, Preliminary Plat and Conditional Use Permit for a Preservation and Land Conservation Development (PLCD) Subdivision to create 18 lots on 219 acres of land at 14220 60th Street and parcels with PID Numbers 33.028.20.32.0001, 32.028.20.41.0002, 32.028.20.42.0004, and 32.028.20.43.0001 and the parcel with PID Number to be assigned (33.028.20.33.000X described in document No. 4142813), with findings, and conditions if applicable.



NORTHWEST ASSOCIATED CONSULTANTS, INC.

4150 Olson Memorial Highway, Ste. 320, Golden Valley, MN 55422
Telephone: 763.957.1100 Website: www.nacplanning.com

PLANNING REPORT

TO: Afton Mayor and City Council
Afton Planning Commission

FROM: Bob Kirmis

DATE: February 27, 2018

SUBJECT: Afton - Afton Creek Preserve - Rezoning, Preliminary Plat
and Conditional Use Permit (for PLCD)

CASE NO: 280.02 - 17.03

Date Application Determined Complete:	August 14, 2017
Planning Commission Meeting Date:	March 5, 2018
City Council Meeting Date:	March 20, 2018
Application Review Deadline:	April 12, 2018*

*On December 20, 2017, the applicant authorized an extension of the 60-day review deadline (from February 11 to April 12, 2018) for the rezoning and CUP applications

BACKGROUND

Joe Bush, on behalf of J.P Bush Homes, has requested preliminary plat approval of an 18 lot, preservation and land conservation development (PLCD) entitled "Afton Creek Preserve." The subject site overlays 219 acres of land located north of 60th Street South (along the City's southern boundary) and west of Trading Post Trail South.

Specifically, the following approvals are necessary to accommodate the project:

1. The rezoning of 5-acres of land located in the extreme southeast corner of the site (14220 60th Street) from RR, Rural Residential to AG, Agricultural.
2. Preliminary plat.
3. A conditional use permit to allow a PLCD in an AG, Agricultural zoning district.

Like the previously submitted preliminary plat, all proposed single family residential lots measure a minimum of 5 acres in size and are located primarily on the eastern half of the site. Of the 219 acres which comprise the subject site, 112 acres are proposed to

lie within a conservation easement (intended to protect a trout stream and protect open space).

The subject site overlays five individual parcels of land. To be noted is that the preliminary plat considered in October of last year was comprised of seven parcels of land. Since the time of the initial preliminary plat review, the applicant has combined three parcels of land located in the southeast area of the site. Included in the lot combination was a five-acre parcel of land located in the extreme southeast corner of the site (14220 60th Street) which retains an RR, Rural Residential zoning designation.

Apart from the 5-acre site referenced above, all parcels which comprise the subject site are zoned AG, Agricultural.

That portion of the site which overlays the trout stream lies within the City's Shoreland Management Area, the boundaries of which measure 300 feet from each side of stream banks.

Also, to be noted is that the trout stream, as well as an adjacent flowage, lies within the City's Conservancy Overlay District, the intent of which is to manage areas with unique natural and biological characteristics.

Attached for Reference:

- Exhibit A: Applicant Narrative and Miscellaneous Documents
- Exhibit B: Site Location
- Exhibit C: Zoning Map Detail
- Exhibit D: Existing Parcel Layout
- Exhibit E: Previous Preliminary Plat (October 2017)
- Exhibit F: Revised Preliminary Plat / Landscape Plan (February 2018)
- Exhibit G: Scenic Easements
- Exhibit H: Seeding Plan
- Exhibit I: Soil Test Locations
- Exhibit J: Grading, Drainage and Erosion Control Plan and Stormwater Pollution Prevention Plan
- Exhibit K: Stormwater Drainage Report
- Exhibit L: Homeowners Association Covenants
- Exhibit M: Traffic Assessment
- Exhibit N: City Engineer Stormwater and Traffic Technical Review Memorandum
- Exhibit O: City Engineer Afton Creek Preserve Preliminary Plat Plan Resubmittal Review Comments
- Exhibit P: Revised Preliminary Plat Overlaid on Aerial Photo
- Exhibit Q: Correspondence from Joe Bush regarding the 5550 Odell Avenue road right-of-way and park dedication proposal
- Exhibit R: Correspondence from Joe Bush regarding the farm access road
- Exhibit S: Letter from Jay Riggs, District Manager, Washington Conservation District
- Exhibit T: Letter and email from John Loomis, South Washington Watershed District

ISSUES AND ANALYSIS

Preliminary Plat Review History. The initial Afton Creek Preserve preliminary plat application was received in August of 2017. Since that time, a number of processing-related events have transpired. The following is a summary of such events:

October 2017. The preliminary plat was subject to initial Planning Commission and City Council consideration in October of 2017. A copy of the original plat drawing is attached as Exhibit E. At their October 2, 2017 meeting, the Planning Commission recommended denial of the various applications based on the finding that the subject site included a parcel of land which is not zoned for agricultural use (AG, Agricultural). The following was further recommended by the Planning Commission:

1. All land which comprises the subject site should be properly zoned to accommodate a PLCD.
2. An “oddly-shaped” lot in the extreme southeast corner of the site should be eliminated.
3. Additional information related to the cul-de-sac (number of allowed turnarounds, method of length calculation) and “Improved Lot” map should be provided.

At the City Council’s October 17, 2018 meeting, the Council referred the application back to the Planning Commission.

November 2017. Following the October Council meeting, the applicant prepared two concept plans which were intended to address concerns raised by City Officials, neighboring residents and City Staff at previous meetings. Specifically, the concepts were intended to reduce or eliminate the need for variances (determined to be necessary to accommodate the initial cul-de-sac configuration).

One concept was very similar to the plat design considered by City Officials in October 2017 except that a single turnaround area (rather than two turnarounds) were illustrated. While the concept eliminated the number of cul-de-sacs (turnarounds), a variance to allow more than nine lots along a cul-de-sac would still have been required.

The second concept called for an easterly roadway connection to Odell Avenue. To accomplish such access, the applicant secured a five-acre lot located between the eastern boundary of the preliminary plat site and Odell Avenue. Within such lot, a right-of-way connection to Odell Avenue and flanking park

land areas were proposed. An intent of the concept was to provide for a loop road rather than a cul-de-sac and to eliminate the need for variances.

December 2017. The described concept plan alternatives were brought before the Planning Commission and City Council in December of 2017 for feedback. Specifically, feedback was sought regarding a preferred plat design which could provide guidance for a revised plat design.

Feedback from the City Council on the two concepts included the following comments (per approved 12/5/17 City Council work session meeting minutes):

- One Councilmember stated that he did not support the loop road connection to Odell Avenue, as that concept was eliminated early in the sketch plan process.
- The same Councilmember stated that he would consider a trade-off of no lots on 60th Street for a variance to the number of lots on the cul-de-sac.
- Another Councilmember indicated that he was concerned about financial considerations, including the park dedication fee, the long-term maintenance of the vegetation in the open space area and the long-term maintenance of the stormwater ponds.
- A third Council member stated that he would not support a concept that would require a cul-de-sac variance unless it is supported by the neighbors.

Also, in December of 2017, the applicant authorized the extension of the 60-day action deadline for the zoning applications from February 11 to April 12, 2018.

January 2018. In January of 2018, three parcels of land located in the extreme southeast corner of the subject site were combined (by the applicant) into a single parcel. The intent of such lot combination was to resolve a previously cited concern related to the "joining" of the 5-acre parcel (zoned RR) to the PLCD.

Also, in January of 2018, informal discussions took place regarding whether the application in question should be considered a PUD, Planned Unit Development rather than a PLCD, Preservation and Land Conservation Development. Such discussion related to an Ordinance provision which prohibits PUD's in Shoreland districts.

February 2018. In February of 2018, a formal determination was made by the Afton City Council that the PLCD is not the same as a PUD and, as such, the application is not prohibited by the Ordinance provision noted above.

The revised preliminary plat design is substantially similar to the second concept plan alternative described above which incorporates a street connection to Odell Avenue. At the recent February City Council meeting, the applicant was cautioned that there are some members of the Council who may not be interested in accommodating the street connection to Odell Avenue.

Environmental Assessment Worksheet (EAW)

According to both Minnesota Statutes (Rules 4410.4300 Subpart 36) and the Afton City Code, an Environmental Assessment Worksheet (EAW) must be prepared for projects which result in the permanent conversion of 80 or more acres of agricultural, native prairie, forest, or naturally vegetated land to a more intensive developed land use.

As a qualifying project, an EAW was prepared for the proposed subdivision and such document was subject to review and comment by various agencies. To be noted is that EAW review considered impacts associated with the preliminary plat design considered by City Officials in October of 2017.

The purpose of the EAW process is to disclose information about potential environmental impacts of a project. Information disclosed in the EAW process is intended to determine whether a more detailed Environmental Impact Statement (EIS) is needed and to indicate how the project can be modified to lessen its environmental impacts.

Based upon a detailed review of the EAW and consideration of received comments from various agencies, the Afton City Council made a negative declaration regarding the need for an EIS at their September 19, 2017 Council meeting based on the following findings:

1. The City of Afton finds that the environmental effects of the project can be adequately anticipated, controlled and mitigated as a result of the environmental review, planning and permitting processes.
2. Environmental impact mitigation measures include the seeding of nearly all unwooded areas on the site to prevent erosion and create wildlife habitat, the establishment of conservation easements and scenic easements to protect wooded areas, steep slopes and the Trout Brook stream, and stormwater management facilities to control stormwater, protect water quality and prevent erosion.

To be noted is that the City Council's negative declaration for an EIS was made with an understanding that the following minimum conditions will be imposed to address environmental impacts:

1. Pre-development seeding will be provided on nearly all unwooded areas on the site.
2. Conservation easements and scenic easements will be established to protect wooded areas, steep slopes and the trout Brook Stream.

3. Storm water management facilities will be provided to control storm water, protect water quality and prevent erosion.

While the design of the preliminary plat has changed since the preparation of the EAW, its boundaries and area to be devoted to development (lots and right-of-way) are substantially similar to the preliminary plat version considered by the City last year. In addition, the City Engineer has indicated that, based on a review of the changes to the plan, the environmental impact associated with the project has been improved. Therefore an amendment to the EAW is not necessary.

Rezoning

As noted previously, one of the three parcels included in the recent lot combination is zoned RR, Rural Residential. While a newly configured parcel has been created, the prior zoning designations remain intact. To ensure that all property within the subdivision is afforded the same development rights (via zoning and CUP for the PLCD), a rezoning of the former 14220 60th Street parcel located in the extreme southeast corner of the site from RR, Rural Residential to AG, Agricultural is necessary.

The location of the former 5-acre parcel in question is illustrated on attached Exhibit C. As shown, the site is bordered by AG, Agricultural zoned property to the north and west, by RR, Rural Residential zoned property to the east and Denmark Township to the south.

With the exception of the referenced five-acre site, all lands which lie within the boundaries of the subject site (214 of 219 acres) are guided for "agricultural" use by the City's Land Use Plan. The "agricultural" land use designation directs a maximum density of one dwelling unit per 10 acres of land. In contrast, the Land Use Plan directs "Rural Residential" use of the five-acre site located in the extreme southeast corner of the site. Such land use designation imposes a minimum 5-acre lot size requirement with a minimum of 2.5 acres of contiguous buildable area.

While minimum lot area standards in the AG, Agricultural District for PLCD subdivisions are the same as those imposed within the RR, Rural Residential District (5 acres), it should be recognized that the zoning of the existing RR parcel remains in place and is tied to a former legal description. The submitted preliminary plat calls for the reconfiguration of the RR parcel such that it will include public right-of-way and portions of abutting Lot 1, Block 1 to the west and Lot 4, Block 3 to the north. Also, to be noted is that the RR District does not make an allowance for PLCDs.

The City Code does not establish a specific set of evaluation criteria for rezoning requests. It is believed however, that the following considerations justify the proposed zoning change:

1. Rezoning applications are to be considered independent of a specific proposal. That is why, generally, there are no conditions placed on rezoning actions. A key question to be answered regarding a rezoning is: Is this parcel appropriate for the

use(s) allowed in the proposed new zoning designation? In this case, is the parcel appropriate for the use(s) allowed in the AG, Agricultural zoning district? This parcel has historically been the homestead parcel for a family farm, which is an allowed agricultural use. It is proposed to be a part of a five-acre single-family residential lot, which is also an allowed agricultural use.

2. Neither the Zoning Code nor the Comprehensive Plan have specific criteria or standards for rezoning applications, except in the case of rezoning from AG to RR. In such cases, the Comprehensive Plan requires that, in order for a parcel to be rezoned from AG to RR, the parcel needs to be more than 50 percent contiguous to a RR zoning district. If this parcel was zoned AG, it would not be allowed to be rezoned to RR because it is not more than 50% contiguous to RR. The parcel is contiguous to AG on the north and the west. As shown on the zoning map, the five-acre parcel in question extends out of the RR zoned area into the AG zoned area, which raises the question of why such parcel was ever zoned RR (versus AG).
3. The rezoning from RR to AG is a down-zoning, which means the use allowed is less intensive or allows less density than the current use. The RR zone allows development at twice the density of the AG zone. The RR zone allows a maximum density of 2 lots per 10 acres. The AG zone allows a maximum density of 1 lot per 10 acres.
4. The City's Land Use Plan (map) designates the parcel in question for "Rural Residential" use, with minimum 5-acre lot sizes. No change to the existing use is proposed. Thus, the physical use of the land is consistent with its Land Use Plan designation.
5. The parcel in question lies between lands guided "Rural Residential" and "Agricultural" uses. An original intention of the Land Use Plan related to the desired separation of these uses would not change as a result of the rezoning.

In consideration of the preceding considerations, Planning Staff recommends approval of the rezoning.

Preliminary Plat

Streets

Access. As shown on Exhibit F, access to lots within the subdivision are proposed via street connections to 60th Street from the south (near Trading Post Trail) and Odell Avenue from the east. Unlike the previous preliminary plat, no lots are proposed to receive direct access from 60th Street.

To be noted is that the Odell Avenue right-of-way connection does not lie within the boundaries of the preliminary plat and is proposed to be dedicated as part of a separate approval. To ensure that the subdivision functions as proposed, it is

recommended that the Odell Avenue right-of-way connection be in place prior to City approval of the Afton Creek Preserve final plat.

In review of the previous preliminary plat application, the City Engineer found the proposed 60th street intersection location and associated sight distances were acceptable. Additional comment from the City Engineer should be provided related to the proposed Odell Avenue street connection.

Access-related issues should be subject to comment and recommendation by the City Engineer.

To be noted is that issues related to the proposed Odell Avenue access/right-of-way dedication will be addressed in a latter section of this report.

Traffic Assessment. As part of the preliminary plat application, an updated traffic assessment has been submitted. Traffic-related issues should be subject to comment and recommendation by the City Engineer. The City Engineer has determined that the project is technically feasible from a traffic engineering standpoint based on the current posted speed limit, projected traffic volumes, and additional speed data. This conclusion was based on preliminary plat documents meeting Minnesota Department of Transportation (MnDOT) guidelines which follows the American Association of State and Highway and Transportation Officials (AASHTO). The City Engineer's Stormwater and Traffic Technical Review Memorandum is attached as Exhibit N.

Cul-de-sac. As shown on the preliminary plat, nine lots within the subdivision are proposed to be accessed via a cul-de-sac. Thus, unlike the previous preliminary plat, the processing of a variance to allow more than nine lots on a cul-de-sac is not required.

According to the Subdivision Ordinance, a maximum cul-de-sac length requirement of 1,320 feet is imposed. Also, to be noted is that the Ordinance makes an allowance for cul-de-sac lengths within PLCD subdivisions which exceed the referenced cul-de-sac length requirement (provided that the preservation of the rural character and natural resources will result). The proposed cul-de-sac measures approximately 1,700 feet in length.

In review of the sketch plan associated with the previous preliminary plat, feedback was requested from City Officials related to the acceptability of the proposed cul-de-sac length (a cul-de-sac length of approximately 3,400 feet in length was proposed). As part of such consideration, Planning Staff highlighted pros and cons associated with excessive cul-de-sac lengths. Ultimately, City Officials expressed general support for the cul-de-sac lengths as illustrated on the preliminary plat.

In consideration of the revised final plat, the City Council should confirm that the proposed cul-de-sac length (1,700 feet), within the context of a PLCD, is considered acceptable.

Right-of-Way Width. Consistent with City Code requirements, right-of way widths of 60 feet are illustrated for the streets within the subdivision. Such right-of-way widths are consistent with local street classification requirements as outlined in the Subdivision Ordinance.

Street-related issues, including but not limited to right-of-way widths, should be subject to further comment by the City Engineer.

Construction Requirements. Details related to street construction and any necessary improvements, including but not limited to 60th Street and/or Trading Post Trail, should be subject to comment and recommendation by the City Engineer, and may be included in the conditions placed on an approval of the proposed subdivision.

Lots

Lot Area. The AG, Agricultural District imposes a minimum lot size requirement of five acres. In addition, a minimum width and depth requirement of 300 feet is imposed. All proposed lots meet minimum area, width and depth requirements of the AG, Agricultural District and Shoreland Management District.

The Zoning Ordinance states that each proposed single-family lot must have a buildable area of at least 2.5 acres. The Zoning Ordinance defines "buildable area" as land having a slope of 13 percent or less and having enough suitable soil for the installation of two on-site sewage treatment systems. The Ordinance also notes that "buildable area" may include required building setbacks. The submitted preliminary plat identifies the buildable area contained in each proposed lot. The buildable area within all lots has been found to exceed the minimum 2.5-acre requirement.

Lot Configuration. In regard to the proposed lot configuration, two design-related issues are considered worthy of notation:

Lot 4, Block 3. While Lot 4, Block 3 located in the southeast corner of the site, meets applicable lot area and width requirements of the Ordinance, it is oddly configured. In review of the previous preliminary plat, concern was raised by the Planning Commission that a portion of the lot (formerly Lot 18) was segregated from the buildable portion of the lot to the north. Also, to be noted is that a stormwater pond is proposed in such area.

To address this issue, that area of the lot which is devoted to stormwater storage is shown to lie within a drainage and utility easement. The acceptability of the drainage and utility easement and related maintenance responsibilities

should be subject to further comment and recommendation by the City Engineer.

Lot 2, Block 3. According to Section 12-1387 of the Subdivision Ordinance, side lot lines must be drawn substantially at right angles to straight street lines and radial to curved street lines. To satisfy this standard, it is recommended that the side lot lines of Lot 2, Block 3, be shifted slightly to meet Ordinance requirements.

Open Spaces. As shown on the preliminary plat, the two conservation easements are not legally described. As a condition of preliminary plat approval, such open space areas should be designated as outlots (as required by the PLCD provisions of the Ordinance).

The City will want to ensure that the conservation parcels are not tax forfeited to the County, which can occur when separate lots (or outlots) are created and unattached to other developed land. The applicant should identify the ownership and management of the proposed conservation areas to ensure they will be properly managed for the long-term and will not become a burden on City of Afton's taxpayers. This issue should be subject to further comment and recommendation by the City Attorney.

Setbacks. Within the AG, Agricultural District and the Shoreland Management District, the following minimum setbacks apply:

Side Yard:	50 feet
Front Yard:	105 feet (from roadway centerline)
Rear Yard:	50 feet
From OHWL of Trout Stream:	200 feet

It appears that all proposed lots illustrate an ability to meet the aforementioned setback requirements (via illustrated building pads).

Landscaping. Proposed landscaping within the subdivision is illustrated on the preliminary plat drawing (Exhibit F).

The landscape plan calls for a total of 42 trees to be dispersed within the front yards of proposed lots. To be noted is that no trees are proposed in the front yard of Lot 8, Block 2. It is assumed that existing vegetation on such lot does not lend itself to additional front yard tree plantings. This should however, be confirmed by the applicant.

Also, to be noted is that staggered rows of trees have been proposed along lot lines which border the horse farm (the exception parcel along 60th Street) and along the rear property lines of Lots 1 and 2, Block 3. Such landscaping efforts are intended to address previously cited neighborhood concerns (horse farm impacts and drainage concerns along the subject site's eastern boundary).

Proposed tree varieties (per the landscape plan) include the following:

- River Birch
- American Linden
- Blue Spruce
- White Pine
- Norway Spruce
- Sugar Maple
- Autumn Blaze maple
- Hackberry
- Red Oak
- Newport Flowering Plum
- Japanese Lilac
- Red Bud

To be noted is that the City Code does not impose minimum size requirements for proposed landscaping (including trees). As a condition of plat consideration however, the City may wish to impose a condition related to minimum planting sizes (to ensure that that the ornamental and screen plantings meet their intended purpose.

As noted previously, the City Council made a negative declaration regarding the need for an EIS with an understanding that pre-development seeding with a prairie grass/wildflower mix will be provided on all lots and on the open space parcels. The applicant has provided a pre-development seeding plan in addition to the landscape plan (attached as Exhibit H). As a condition of preliminary plat approval, potential maintenance responsibilities associated with the seeded areas should be addressed by the applicant (to the satisfaction of the City).

Wetlands. According to the EAW, wetlands comprise 13 acres of the 219-acre subject site. Such wetlands lie along the trout stream and presently lie within conservation easements. In this regard, the proposed lot layout is not expected to impact any existing wetlands.

Wetland-related issues should be subject to further comment and recommendation by the City Engineer.

Easements

Conservation Easements. According to the Subdivision Ordinance, conservation easements must be established over designated open space within PLCDs. Attached Exhibit G illustrates two proposed conservation easement locations. In total, the two easement areas are proposed which overlay a total of 112.02 acres of land. Specifically, the proposed westerly easement measures 99.73 acres in size while the smaller easement located on the eastern half of the site measures 12.29 acres in size.

As a condition of PLCD (conditional use permit) approval, proposed conservation easements must run with the land in perpetuity to the following:

- The City of Afton
- All owners of the lots within the PLCD
- Landowners within Afton which abut the PLCD
- Minnesota Land Trust

As a condition of final plat approval, conservation easement recording responsibilities should be defined. This issue should be subject to recommendation by the City Attorney.

Scenic Easements. In addition to the referenced conservation easements, Exhibit G also illustrates a number of scenic easements which overlay portions of proposed lots. Such easements correspond to existing woodland areas and will ensure that such areas will be protected from development.

Access Easements. Also proposed within the subdivision is a 20-foot wide access easement between Lots 5 and 6, Block 2. Such easement is intended to provide a pedestrian connection between the proposed cul-de-sac and the western open space area. The acceptability of the access easement width should be subject to recommendation by the City Engineer and/or Fire Chief.

Drainage and Utility Easements. According to Section 12-1384 of the Subdivision Ordinance, easements at least 20 feet wide, centered on rear and other lot lines, must be provided where necessary as recommended by the City Engineer. Further, the Ordinance states that easements for drainage must be provided of a sufficient width to provide for stormwater runoff.

Easements for drainage and utilities should be provided over individual lots as recommended by the City Engineer.

Septic Systems. Consistent with Section 12-413 of the Zoning Ordinance, the preliminary plat and related engineering plans illustrate “septic system testing area” locations upon individual lots. Primary and secondary septic sites are specifically illustrated on the attached Soil Test Locations map (Exhibit I).

As part of the consideration of the previous preliminary plat, the applicant provided a soil boring “report” which identified soils which are suitable for septic systems for the various lots. As a condition of preliminary plat approval, it is recommended that the soil boring “report” be modified, as determined necessary by the City Engineer and/or Washington County Department of Public Health, to reflect the revised plat design.

Permits for individual sewage treatment systems will be issued by the Washington County Department of Public Health. In this regard, review of proposed septic designs and final septic permits must be received from Washington County prior to building permit approval.

Park Dedication. According to Section 12-1270 of the Subdivision Ordinance, subdividers must dedicate to the City a reasonable portion of the land being subdivided for park purposes or in lieu thereof, a cash equivalent. The form of dedication, land or cash, (or any combination) must be decided by the City and dedicated or paid prior to the City signing the final plat.

As noted in the previous plat review, it is City Staff's position that the granting of a conservation easement over the permanent open space parcels within the plat is not considered fulfillment of the City's parkland dedication requirements. Rather, the granting of a conservation easement over the permanent open space provides the means to subdivide the subject property (agriculturally zoned) in the manner proposed.

The City's 2012 Park Plan does not illustrate any future parks or trails within the subject site. Also, the Parks Committee has recommended that, if the proposed public access is provided to the open space area, the park dedication requirement should be met by a cash contribution rather than by additional land dedication. With this in mind, a calculation of a possible cash contribution (as opposed to land dedication) is considered appropriate. According to the Ordinance, a cash park dedication fee, in lieu of land dedication, shall be equivalent to 7.5 percent of the predevelopment value of the land to be subdivided, subject to a minimum fee of \$5,000 per dwelling unit and a maximum fee of \$10,000 per dwelling unit.

Based in part upon the recommendations of the Parks Committee, the Planning Commission should recommend, and the City Council determine, desired park land dedication and/or equivalent cash contribution requirements.

While outside the boundaries of the preliminary plat site, it is important to note that parkland dedications are shown in the five-acre site within which the Odell Avenue right-of-way dedication is proposed. Specifically, a 2.84-acre parkland dedication is proposed on the north side of the right-of way and a 1.28-acre dedication is proposed on the south side. As it is not part of the PLCD, this dedication would not be factored into the applicant's park dedication requirements.

Development Agreement. As part of future final plat approval, the applicants will be required to enter into a development agreement with the City and post any financial securities required by it. This issue should be subject to further comment by the City Attorney.

Conditional Use Permit

Purpose of PLCD. In previous discussions, it has been determined that the proposed subdivision qualifies as a preservation and land conservation development (PLCD). Within the AG, Agricultural zoning district, PLCD's are listed as a conditional use. As a result, the approval of a conditional use permit is required.

According to the City Code (Section 12-2373), preservation and land conservation developments (PLCD), are intended to:

- A. *Permit subdivisions in the Agricultural Zoning District which require the construction of a new public street.*
- B. *Encourage a more creative and efficient development of land and its improvements through the preservation of agricultural land, natural features and amenities than is possible under the more restrictive application of zoning requirements, while at the same time, meeting the standards and purposes of the comprehensive plan and preserving the health, safety, and welfare of the citizens of the City.*
- C. *Preserve open space, to preserve the natural resources of the site and to preserve wildlife habitat and corridors.*
- D. *Facilitate the economical provision of streets and public utilities.*
- E. *Allow the transfer of development rights (density) within a subdivision in order to preserve agricultural land, open space, natural features and amenities.*

The Conditional Use Permit process enables the City to place conditions on the development to ensure the development meets the objectives of the PLCD ordinance. Provided certain conditions are adequately addressed, Staff believes that the proposed subdivision will fulfill the preceding PLCD objectives.

Development Density. Within PLCD developments, certain density requirements are imposed. Specifically, at least 50 percent of the total site must be preserved as an undeveloped parcel. Further, the maximum density of the underlying zoning district must not be exceeded.

As shown on the preliminary plat, a total of 18 lots are proposed upon the 218.55 acres subject site. The AG, Agricultural District imposes a minimum density requirement of one dwelling unit per 10 acres of land. The development density requirements of the Ordinance have been satisfied (218.55 acres / 18 units = 12.14 acres per unit).

Use of Open Space. As part of formal subdivision processing, the intended use of the designated open space should be identified by the applicant. Of specific interest are any intended recreational purposes and the future construction of facilities intended to accompany such uses.

According to the PLCD requirements of the Ordinance (Section 12-2383), buildings, structures and improvements located upon the undeveloped parcel (conservation easement areas) must be designed in a manner which conserve and enhance the amenities of the parcel about its topography and its unimproved condition.

Also, to be noted is that Section 12-2381 of the Ordinance stipulates that construction of recreational facilities shown on the PLCD development plan must proceed at the same time as the construction of the dwelling units.

Homeowner's Association Requirements. Section 12-2382 of the Ordinance states that, if a homeowner's association is to be created, its various requirements (ownership requirements, bylaws, etc.) must be submitted as part of the PLCD for City review.

The applicant has provided a copy of proposed covenants, restrictions and conditions which would apply to property owners within the subdivision. Requirements include, but are not limited to, the following:

- Association duties
- Assessments
- Architectural controls
- Use of common properties
- Prohibited uses
- Water maintenance/management

Homeowner's association-related issues should be subject to further comment by the City Attorney.

Odell Avenue Right-of-Way Dedication

The applicant has proposed to dedicate the 5-acre parcel at 5550 Odell Avenue to the City as parkland, with the reservation of a 60 foot wide public road right-of-way through the parcel to provide access from Odell Avenue to the proposed development. The City's Park Plan does not anticipate a park in this location. The Parks Committee is scheduled to discuss the proposed land dedication at their February 28, 2018 meeting. Because such meeting follows the date of this report, supplemental information regarding the recommendations of the Committee will be provided to the Planning Commission and City Council.

While the Odell Avenue right-of way dedication lies outside the boundaries of the preliminary plat, its establishment is critical to the intended functioning of the PLCD subdivision. The City Attorney has indicated that separate approval of the right-of-way dedication is an acceptable course of action provided that such right-of-way is dedicated prior to City approval of the Afton Creek Preserve final plat. With this in mind, it is recommended that, as a condition of preliminary plat approval, the Odell Avenue right-of way be dedicated prior to City approval of the Afton Creek Preserve final plat.

It should be understood that City denial of the proposed Odell Avenue street right-of way dedication and connection would make the proposed subdivision unfeasible, as conditions of subdivision approval could not be satisfied.

Recognizing that the Odell Avenue connection is vital to the functioning of the plat as currently designed, the Planning Commission should provide a recommendation related to the acceptability of the park dedication, the public street right-of-way dedication and the connection to Odell Avenue.

FINDINGS

The following are suggested findings of fact for consideration by the Planning Commission. The Commission may want to provide additional findings.

1. The PLCD design results in a land use density which is below the applicable AG, Agricultural zoning district density requirement.
2. The proposed land use is consistent with the City's overall land use plan for the area.
3. The proposed land use is consistent with the proposed land use in the City's 2040 Comprehensive Plan.
4. The PLCD design results in the ability to protect the sensitive environmental features on the site by preserving all lands near the trout stream.
5. Proposed lot sizes in the PLCD design are consistent with, or greater than, the lot size in surrounding neighborhoods.
6. The proposed street connection to Odell Avenue provides for additional options for traffic access and distribution.
7. The preservation and conversion of the conservation area to native habitat would be beneficial for stormwater, groundwater, and wildlife habitat and would be a positive amenity for the community.
8. Zoning Ordinance requirements imposed upon PLCD developments have been satisfied.
9. Traffic generated by the project is within the capabilities of streets which serve or will serve the subdivision.
10. The proposed plat incorporates an intersection with 60th Street near a curve on Trading Post Trail that is substandard in terms of width and geometry.
11. The proposed street connection to Odell Avenue introduces a new street into an existing, settled neighborhood.
12. The project would place lots adjacent to the adjoining horse farm, replacing the existing agricultural use.
13. The grading necessary to accommodate the roadway proposed for access to the development from 60th Street would impact existing vegetation and sensitive slopes.
14. The amount of development on the parcel would impact both stormwater and groundwater.
15. The proposed development would add traffic to Odell Avenue, 60th Street and Trading Post Trail.
16. The City has not identified a need for park land in the area of the Odell access street. In this regard, the plat is inconsistent with the City's 2012 Park Plan.

RECOMMENDATION

The proposed preliminary plat design reflects an attempt by the applicant to respond to received feedback and eliminate necessary variance approvals. Unlike the previous plat submission, no variance approvals are required. As indicated above, the proposed Odell Avenue street right-of way dedication and connection is critical to the intended functioning of the PLCD subdivision. If the city is inclined to accept the Odell parcel public road right-of-way dedication, the following are planning staff recommendations.

Rezoning

Approval of the rezoning of five-acre site located in the extreme southeast corner of the subject property (formerly described as 14220 60th Street) from RR, Rural Residential to AG, Agriculture.

Preliminary Plat

Approval of the submitted Afton Creek Preserve preliminary plat is recommended subject to the following conditions:

1. The City approve the rezoning of the property formerly described as 14220 60th Street from RR, Rural Residential to AG Agriculture.
2. Access and traffic related issues shall be subject to further comment and recommendation by the City Engineer.
3. The Odell Avenue right-of way be dedicated to the City prior to City approval of the Afton Creek Preserve final plat.
4. The City Council confirm that the proposed cul-de-sac length (1,700 feet), within the context of a PLCD, is considered acceptable.
4. Street-related issues, including but not limited to right-of-way width, shall be subject to further comment and recommendation by the City Engineer.
5. The acceptability of the drainage and utility easement within Lot 4, Block 3 and related maintenance responsibilities shall be subject to further comment and recommendation by the City Engineer.
6. The plat drawing shall be modified such that the side lot lines of Lot 2, Block 3 shall be drawn substantially at right angles to straight street lines and radial to curved street lines.
7. The two open space parcels shall be designated as outlots.

8. The applicant identify the proposed ownership and management of the conservation areas. This issue should be subject to further comment and recommendation by the City Attorney.
9. The applicant provide explanation (acceptable to the City) regarding the lack of proposed front yard tree plantings for Lot 8, Block 2.
10. In accordance with the submitted seeding plan, pre-development seeding with a prairie grass/wildflower mix shall be provided on all lots and on the open space parcels. Maintenance responsibilities associated with the seeded areas shall also be addressed by the applicant (to the satisfaction of the City).
11. Wetland-related issues shall be subject to further comment and recommendation by the City Engineer.
12. The proposed 20-foot wide access easement width between Lots 5 and 6, Block 2 shall be determined acceptable to the City Engineer and/or Fire Chief.
13. Easements for drainage and utilities shall be provided over individual lots as recommended by the City Engineer.
14. The City Engineer and/or Washington County Department of Public Health provide comment and recommendation regarding the need to update the previously provided soils report to correspond to the updated plat drawing.
15. Review of proposed septic designs and final septic permits shall be received from Washington County prior to building permit approval.
16. City Officials determine desired park land dedication and/or equivalent cash contribution requirements.
17. The applicant shall pave 60th Street from Trading Post Trail to Neal Avenue.
18. Comments of other City Staff.

Conditional Use Permit

Approval of the conditional use permit to allow a PLCD within an AG, Agriculture Zoning District is recommended subject to the following conditions:

1. The City approve the Afton Creek Preserve preliminary plat and satisfy all required conditions of such approval.

2. City approval the Afton Creek Preserve final plat shall precede the recording of the conditional use permit.
3. The Odell Avenue right-of way shall be dedicated to the City prior to the recording of the conditional use permit.
4. Proposed conservation easements shall run with the land in perpetuity to the following:
 - The City of Afton
 - All owners of the lots within the PLCD
 - Landowners within Afton which abut the PLCD
 - Minnesota Land Trust
5. Intended use (or uses) of conservation easement areas shall be described by the applicant, approved by the City and made conditions of conditional use permit approval.
6. Buildings, structures and improvements located within conservation easement areas shall be designed in a manner which conserve and enhance the amenities of the parcel about its topography and its unimproved condition.
7. Construction of recreational facilities within conservation easement areas shall proceed at the same time as the construction of the dwelling units.
8. Homeowner's association-related issues shall be subject to further comment by the City Attorney.
9. Comments of other City Staff.

pc. Ron Moore, City Administrator



J.P. Bush H O M E S

February 5th, 2018

City of Afton Preliminary Plat, Rezoning, CUP Application Narrative.

Property: 14220 60th St S Afton MN 55001
Will Carlson owned 218.6 Acres

Usage: Previously operated under Agriculture Zoning.
Request to Use Ordinance Article XII Sec. 12-2371
PRESERVATION AND LAND CONSERVATION DEVELOPMENT

Proposer: Will Carlson, Land Owner.
JP Bush Homes, Developer.

AFTON CREEK PRESERVE describes this PRESERVATION AND LAND CONSERVATION DEVELOPMENT (PLCD) in its own title. The developer has been working with City of Afton staff, Minnesota land Trust, South Washington County Watershed, Minnesota DNR, Neighbors, engineers and specialized contractors to ensure preservation of agricultural land, woodland, wildlife habitat vistas, ground water recharge areas, areas with sensitive soils or geological limitations and areas identified in the Comprehensive Plan.

BENEFITS TO THE CITY OF AFTON

Preserved for perpetuity.

- A. 112 acres of open space. (Minnesota Land Trust)
- B. Lands within the Shore Land Management area.
- C. Sensitive slope areas & unique features.
- D. Conservation overlay areas and woodlands, (Scenic Easements).
- E. Trout Brook and all downstream waterways.
- F. Trout Brook Drainage Contributors and critical water recharge supplies.
- G. Wildlife, Bird nesting areas, Bee Colonies, Small Game refuge areas, Insects and pollinators, Wetland species.

Costs of Development Paid by Carlson Family (Land Owners).

- A. Installations of all Roads, intersection, utilities and infrastructure.
- B. Installation of Storm Water Basins, and Storm water control easements.
- C. Immediate plantings of DNR, Watershed approved Hybrid Wild Flower grasses throughout.
- D. Prepaid extended Maintenance contract with Prairie Restorations.
- E. Conservation Walking paths for Public use.

- F. Scenic overlook with Veranda seating, and Educational Signage off 60th St.
- G. Open Space Conservation perimeter monuments with educational information.
- H. Landscape Screening, Turner Horse pasture, Rickard, McConnel, Dawson, and Graham Property Site Line Gaps.
- I. Landscape for Open/Passive Park dedication at Odell entry Boulevards.
- J. Mature Tree plantings in Boulevards of Prairie Wind Court and Prairie Wind Drive.
- K. Minnesota land Trust Contract Funding.
- L. Park Dedication Fees.
- M. 60th St. Asphalt Paving Installation budget.
- N. Costs to Establish Homeowners Association.
- O. Developers Agreement and Escrow funds with City of Afton, 125% of Development costs in escrow to ensure development completion.

Information Packets Included in This Submission

Preliminary Plat Documents

A. Misc. Documents.

- City Application Documents.
- Septic System Approval Washington County.
- No EIS required. (City Documents)
- Prairie Grass Contracts, (Prairie Restoration)
- Proposed Restrictive Covenants and HOA.
- Minnesota Land Trust Acknowledgment.
- Odell Road Dedication and Open/Passive Park.
- Farm Road Access Relationships.
- Copy of Sec. 12-1387 (Page 174 Letter A.)
- Copy of Sec. 12-2376 (Page 212 Letter B.) Reference Video. City Council Meeting Video 10-17-17. Watch from 2hrs-40min. until 2hrs-46min. 6 minutes Council conversation related to Irregular shaped lots.
- Copy of Sec. 12-2377 (Page 212 Letter C.) Parcels No Longer contain maximum Density.
- Copies of PID/Land Merger Maps. (2 Maps Before & 2 Maps After Merger)
- Washington County Deed Creation and Recording. (PID/Land Merger) 6 pages.

B. Traffic Study. (Spack Consulting)

C. Rezoning Application.

- Copy of Sec. 12-140 (Page 62 letter L.)
- Comprehensive Plan (Page 27 Number 7.)

D. Survey Documents from (Landmark Registered Surveyor).

- Preliminary Plat map. (Main Document Map)
- Existing Parcel Layout (PID Map) Exhibit "A"
- Scenic Easements Map. Exhibit "B"

- Prairie Grass Seeding Map. Exhibit "C"
- Septic Soil Test Site Maps. Exhibit "D"
- E. **Grading, Drainage and Erosion Control** Maps, (Plowe Engineering).
 - 13 Pages of full size Maps, Road install, Storm water Basins, Drainage Management.
 - 80 Page Storm Water Drainage Report.
 - 39 Page Geotechnical Soil Borings Report.

The Developer and the Carlson Family present all the Above Documents for the Planning Commission and City Council review and voting for Approval.

JP Bush Homes.



J. P. Bush
H O M E S

MISC. DOCUMENTS
FOR PRELIMINARY
PLAT

RECEIVED

AUG 14 2017

CITY OF AFTON

CITY OF AFTON SKETCH AND PRELIMINARY PLAT FOR MAJOR SUBDIVISION APPLICATION

Owner	Address	City	State	Zip	Phone
ALBERT WILMER CARLSON	2534 STAGE COACH TR	MN	AFTON		

Applicant (if different than owner)	Address	City	State	Zip	Phone
J.P. ROSS HOMES	1930 QUASAN AVE S.	LAKELAND	MN		651-775-4222

Project Address
14220 60TH ST AFTON MN 55001

Zoning Classification	Existing Use of Property	PID# or Legal Description
	AG	SEE SITE PLAN

Description of Request
DEVELOPE 1218 ACRES FROM AG TO PLCD

By signing this application, the applicant agrees to pay all expenses incurred by the City of Afton.
In connection with this request, your signature constitutes permission for a representative of the City of Afton to enter your property, during business hours, to evaluate this request. This may involve minor excavating or soil borings. If you would like to be present during this evaluation, please contact the City.

	8/14/17
Signature of Owner/Applicant	Date

Make checks payable to: **City of Afton**

<u>FEES: (Major Subdivision)</u>	<u>DEPOSITS:</u>	<u>TOTAL:</u>
0-5ac \$500 + \$100/lot	\$2,500	_____
6-40ac \$1,000 + \$100/lot	\$5,000	_____
41-80ac \$2,000 + \$100/lot	\$7,500	_____
81+acres <u>\$5,000</u> + <u>\$100/lot x 19 lots</u>	<u>\$10,000</u>	<u>\$16,900</u>

Other _____ DATE PAID: 8-14-17
CHECK #: 0221
RECVD. BY: [Signature]

ATTACH COPY OF DEED OR PROOF OF OWNERSHIP TO APPLICATION

RECEIVED
 AUG 14 2017
 CITY OF AFTON

City of Afton
 ZONING PERMIT APPLICATION

REZONING APPLICATION
 (Reference Code Section: 12-80)

Owner	Address	City	State	Zip	Phone
ALBERT W. L. M. P. CARLSON	2534 STAGE COACH TRL	AFTON			

Applicant (if different than owner)	Address	City	State	Zip	Phone
JPRUSH HOMES	1780 QUARAN AVE S	LAKELAND	MN		651-775-4222

Project Address
 14220 60TH ST AFTON MN 55001

Zoning Classification	Existing Use of Property	PID# or Legal Description
	RR	SEE SITE PLAN

Description of Request
 REZONE EXISTING HOMESTEAD ZONED RR TO PLCD

By signing this application, the applicant agrees to pay all expenses incurred by the City of Afton. In connection with this request, your signature constitutes permission for a representative of the City of Afton to enter your property, during business hours, to evaluate this request. This may involve minor excavating or soil borings. If you would like to be present during this evaluation, please contact the City.

Signature of Owner/Applicant: *[Signature]* Date: 8/14/17

FEES:	ESCROW:	
Rezoning Fee	Rezoning Escrow	TOTAL: \$1850.00
\$350.00	\$1500.00	DATE PAID: 8-14-17
		CHECK #: 6221
Make checks payable to: City of Afton		RECVD. BY: <i>[Signature]</i>

ATTACH COPY OF DEED OR PROOF OF OWNERSHIP TO APPLICATION

I understand and hereby agree that the work for which the permit is issued shall be performed according to the following: (1) the conditions of the permit, (2) the approved plans and specifications, (3) the applicable city approvals, ordinances and codes, and (4) the state building code.

I understand that the permit will expire if work is not started within 180 days, or if work is suspended or abandoned for a period of 180 anytime after work has commenced; and that I am responsible for ensuring that all required inspections are requested in conformance with the state building code.

RECEIVED
AUG 14 2017
CITY OF AFTON

CITY OF AFTON CONDITIONAL USE PERMIT APPLICATION

Owner	Address	City	State	Zip	Phone
ALBERT WILMER CARLSON 2534 STAGE COACH TRL AFTON					
Applicant (if different than owner)	Address	City	State	Zip	Phone
J.P. BUSH HOMES 1980 QUASAR AVE S, LAWELAND 651-775-9222					
Project Address					
14220 GO TH ST.		AFTON	MN	55001	
Zoning Classification	Existing Use of Property	PID# or Legal Description			
	AG	SEE SITE PLAN			
Description of Request					
DEVELOPE 218 ACRES TO PKD					
<p>By signing this application, the applicant agrees to pay all expenses incurred by the City of Afton. In connection with this request, your signature constitutes permission for a representative of the City of Afton to enter your property, during business hours, to evaluate this request. This may involve minor excavating or soil borings. If you would like to be present during this evaluation, please contact the City. If work authorized by this Conditional Use Permit is not started within 12 months of the date issued, this CUP will EXPIRE and be INVALID.</p>					
					
Signature of Owner/Applicant					Date
Make checks payable to City of Afton :					
FEES:		ESCROW DEPOSIT:			
CUP	\$250	CUP Escrow	\$600	TOTAL:	\$850
Amended CUP	\$250	Amend CUP Escrow	\$350	DATE PAID:	8-14-17
City Engineer	_____	Engineer Escrow	_____	CHECK #:	6221
Other	_____	Other	_____	RECVD. BY:	
ATTACH COPY OF DEED OR PROOF OF OWNERSHIP TO APPLICATION					



Department of Public Health and Environment

Lowell Johnson
Director

Sue Hedlund
Deputy Director

October 3, 2017

GEO Code: 33.028.20.33.0002

JP Bush Homes
1980 Quasar AVE S
Lakeland MN 55043

SUBDIVISION APPROVAL

On August 14, 2017, the Department received a Septic Permit Application for a 10 Lot Subdivision located at 14220 60th ST S in the City of Afton, Minnesota, GeoCode 32.028.20.33.0002 On September 22, 2017 the Department conducted a site review of the proposed lots. Based on the observations on September 22, 2017, and Brian Humpal's soil observation logs on each lot, the proposed subdivision appears to have suitable soil for individual sewage treatment systems and the Department is approving the proposed subdivision as suitable to accommodate long-term sewage treatment.

It should be noted that the soil testing conducted by Brian Humpal was preliminary and was conducted only for the purpose of determining suitability of this lot to support long-term sewage treatment. Section 9.5 of the Washington County Development Code, Chapter Four, Individual Sewage Treatment System Regulations (Washington County Ordinance #179) states:

Complete testing on each individual lot will be required prior to permit issuance independent of any prior approved subdivision testing. A minimum of four (4) satisfactory soil borings outlining an area of 5,000 square feet are required.

Before permits will be issued by this Department for a specific subsurface sewage treatment system design on a specific lot, at least four additional soil borings and at least one percolation test must be conducted by a designer licensed by the Minnesota Pollution Control Agency. The preliminary soil borings conducted by Brian Humpal may not be used by another designer for a specific SSTS design.

For each lot, rope off and protect the area reserved for the primary and secondary individual sewage treatment system from all traffic. Any excavation in the primary and secondary individual sewage treatment system would nullify this approval and may subsequently cause the lot to be declared unbuildable. The minor subdivision is approved only for the lot configuration submitted in the application. Any changes to the lot configurations will nullify this approval.

If you have any questions or comments, please contact me at 651-430-6673.

Sincerely,

Christopher W. LeClair, R.E.H.S.
Senior Environmental Specialist
Washington County Department of
Public Health & Environment
Chris.LeClair@co.washington.mn.us

Record of Decision *NO EIS*

Afton Creek Preserve

City of Afton

July 24, 2017

Prepared by:

Wayne E Jacobson
Jacobson Environmental, PLLC
Brooklyn Center, Minnesota

RESOLUTION NO. 17 -XXX

A RESOLUTION ISSUING A NEGATIVE DECLARATION OF NEED FOR AN ENVIRONMENTAL IMPACT STATEMENT FOR THE AFTON CREEK PRESERVE PROJECT

- WHEREAS, pursuant to Minnesota Environmental Quality Board (EQB) Rules, Chapter 4410, part 4410.1000, Subpart 2, the City of Afton as the responsible governmental unit completed an Environmental Assessment Worksheet (EAW) for the Afton Creek Preserve project; and
- WHEREAS, pursuant to Minnesota EQB Rules, Chapter 4410.4300 Subpart 36, the project meets the thresholds for an EAW for projects resulting in the permanent conversion of 80 or more acres of agricultural, native prairie, forest, or naturally vegetated land; and
- WHEREAS, copies of the EAW were distributed to all persons and agencies on the official EQB mailing list prior to April 17, 2017; and
- WHEREAS, notice of the availability of the EAW for public review for a 30-day comment period was published in the *EQB Monitor* on April 24, 2017; and
- WHEREAS, a press release was published in the *St. Paul Pioneer Press* on April 17, 2017 to announce the availability of the EAW to interested parties; and
- WHEREAS, the 30-day comment period ended on May 24, 2017 and all comments received have been considered; and
- WHEREAS, the EAW, in conjunction with comment responses, identified that the establishment of 60 foot buffers on all lots and woodland conservation easements on lots 10-16, if met, will address environmental effects caused as a result of the project.

NOW, THEREFORE, BE IT RESOLVED, by the City Council of the City of Afton:

That it should and hereby does make a negative declaration on the need for an Environmental Impact Statement for the improvements included in the Afton Creek Preserve EAW, provided all mitigation measures of the EAW are implemented by the developer as part of the project, and all local, state, and federal environmental standards are followed and incorporated into the final site plans for the project.

I. ADMINISTRATIVE BACKGROUND

Pursuant to Minnesota Rule 4410.4500, the City of Afton has prepared an Environmental Assessment Worksheet (EAW) for the proposed Afton Creek Preserve. This Record of Decision addresses State of Minnesota environmental review requirements as established in Minnesota Rule 4410.1700. The City of Afton is the project proposer for this project. The City of Afton is also the Responsible Governmental Unit (RGU).

The EAW was filed with the Minnesota Environmental Quality Board (EQB) and circulated for review and comments to the required EAW distribution list. A Notice of Availability for the initial EAW was published in the EQB Monitor on April 24, 2017. Notices of Availability and Press Releases were published in the *St. Paul Pioneer Press* on April 17, 2017.

The public comment period ended May 24, 2017. Comments were received from the Minnesota Pollution Control Agency, the Metropolitan Council, Northwest Associated Consultants, the Southwest Washington Watershed District, and the Minnesota Department of Natural Resources. All comments were considered in determining the potential for significant environmental impacts. Summaries of the comments received, and the City of Afton's responses to those comments, are provided in Section III, below.

II. FINDINGS OF FACT AND CONCLUSIONS

As to the need for an Environmental Impact Statement (EIS) on this project and based on the record in this matter, including the EAW and comments received, the City of Afton makes the following Findings of Fact and Conclusions:

A. PROJECT DESCRIPTION

The Afton Creek Preserve project is a 20 lot single family clustered development on 218.6 acres with 109.7 acres of conservation easement to protect Trout Brook. The development will have individual wells and septic systems, and special vegetative buffers protecting steep slopes against erosion. Currently no wetland impacts are planned and over 50% of the area will remain in open space.

B. PROJECT HISTORY

- The project was subject to a mandatory EAW per Minnesota Rule 4410.4300 Subpart 36.
- The EAW was distributed to the EQB and to the EQB mailing list on April 17, 2017.
- Public notices containing information about the availability of the EAW for public review were provided to the *St. Paul Pioneer Press* for publication in the April 17, 2017 papers.
- Hard copies of the EAW were provided for public review at Afton City Hall.
- A notice was published for the EAW in the April 24, 2017 EQB Monitor. The public comment period ended May 24, 2017. Comments were received from the Minnesota Pollution Control Agency, the Metropolitan Council, Northwest Associated Consultants, the Southwest Washington Watershed District, and the Minnesota Department of Natural Resources. Copies of these comment letters are hereby incorporated for reference and included in **Attachment A**.

- Corrections to the EAW – None

C. CRITERIA FOR DETERMINING THE POTENTIAL FOR SIGNIFICANT ENVIRONMENTAL EFFECTS.

Minnesota Rule 4410.1700, subp. 1, states "An EIS [Environmental Impact Statement] shall be ordered for projects that have the potential for significant environmental effects." In deciding whether a project has the potential for significant environmental effects, the City of Afton must consider the four factors set out in Minnesota Rule 4410.1700, subpart. 7. With respect to each of these factors, the City of Afton finds the following:

1. MINNESOTA RULE 4410.1700, SUBP. 7.A - TYPE, EXTENT, AND REVERSIBILITY OF ENVIRONMENTAL EFFECTS

- a. The type of environmental impacts and mitigation efforts anticipated as part of this project include:

A summary of mitigation measures includes the establishment of 60 foot buffers on all lots and woodland conservation easements on lots 10-16.

- b. The mitigation measures were put into place to better control erosion and protect water quality while protecting and enhancing wildlife habitat on the project in an effort to make the post project condition better than the pre project condition in these key areas.

2. MINNESOTA RULE 4410.1700, SUBP. 7.B - CUMULATIVE POTENTIAL EFFECTS OF RELATED OR ANTICIPATED FUTURE PROJECTS

There are no future projects planned and no negative cumulative effects were identified in the EAW.

3. MINNESOTA RULE 4410.1700, SUBP. 7.C - THE EXTENT TO WHICH ENVIRONMENTAL EFFECTS ARE SUBJECT TO MITIGATION BY ONGOING PUBLIC REGULATORY AUTHORITY

- a) The following permits or approvals will be required for the project:

Unit of government	Type of application	Status
City of Afton	Plat approval	Pending
City of Afton	Septic system approval	Pending
Washington County	Plat/Access approval	Pending
Washington County Highway	Plan review	Pending
South Washington Watershed	Erosion/stormwater permit	Pending
MPCA	NPDES permit	Pending
MDH	Well permit	Pending

- b) The City of Afton finds that the potential impacts identified as part of the proposed Afton Creek Preserve project are minimal and can be addressed through the regulatory agencies as part of the permitting process. As a result, additional analysis of these impacts is not required.

4. MINNESOTA RULE 4410.1700, SUBP. 7.D - THE EXTENT TO WHICH ENVIRONMENTAL EFFECTS CAN BE ANTICIPATED AND CONTROLLED AS A RESULT OF OTHER AVAILABLE ENVIRONMENTAL STUDIES UNDERTAKEN BY PUBLIC AGENCIES OR THE PROJECT PROPOSER, INCLUDING OTHER EISs.

The City finds:

1. The Afton Creek Preserve project is similar in scope or nature to other nearby small housing projects.
2. An EIS has not been developed for similar small housing projects nearby recently
3. In light of the results of environmental review and permitting processes for similar projects, the City of Afton finds that the environmental effects of the project can be adequately anticipated, controlled, and mitigated.

The City of Afton finds that the environmental effects of the project can be anticipated and controlled as a result of the environmental review, planning, and permitting processes.

D. CONCLUSIONS

The Afton Creek Preserve EAW and comments received have generated information adequate to determine that the proposed project does not have the potential for significant environmental effects.

The EAW has identified areas where the potential for environmental effects exist; appropriate mitigation measures have been incorporated into the project plans and the required approvals and permits to mitigate these effects are being obtained. The project will comply with all county, city, and federal review agency requirements.

Based on the criteria established in Minnesota Rule 4410.1700, the project does not have the potential for significant environmental effects.

Based on the Findings of Fact and Conclusions, the project does not have the potential for significant environmental impacts.

Therefore, an EIS is not required for the Afton Creek Preserve project.

III. AGENCY COMMENTS AND CITY OF AFTON'S RESPONSES

A 30-day comment period for the above-referenced EAW ended on May 24, 2017. Comments were received from the Minnesota Pollution Control Agency, the Metropolitan Council, Northwest Associated Consultants, the Southwest Washington Watershed District, and the Minnesota Department of Natural Resources. On behalf of the City of Afton as the RGU, comment responses are provided below.

These letters and a response letter is included in **Attachment A**. Comments received and responses are summarized in **Attachment A**.

PRAIRIE GRASS
CONTRACT.

Date: 8/11/2017

Proposal to Create a Native Landscape at the
Afton Creek Park Reserve
Afton, MN

Prepared for:
Joe Bush – Developer

Site Address:
14220 60th St
Afton, MN

Prepared by:
Jeff West
Site Manager
jwest@prairieresto.com

Project Area:
Conservation Easement Area: Approx 60 acres
Future Residential Area: Approx 75 acres

Prairie Restorations, Inc. 

Two Oaks Office
PO Box 95
Scandia MN 55073
www.prairieresto.com

A. Company Background: <http://www.prairieresto.com/mission.shtml> (Follow the blue links to learn more)

Prairie Restorations, Inc. (PRI) has been dedicated to the restoration and management of native plant communities for over 40 years. We are fortunate to have worked with thousands of clients on a wide variety of projects in both the public and private sectors throughout the Upper Midwest.

The PRI staff currently consists of 54 full-time professionals and about an equal number of seasonal employees which operate out of six Minnesota locations. Most of the staff has B.S. degrees in natural resource related fields such as biology, forestry, horticulture or wildlife. As a full service restoration company, PRI is able to provide our clients expertise and service in all facets of native landscape restoration. Along with consulting, design, installation and land management services, we also produce our own local ecotype seed and plant materials which are used on all of our projects.

The PRI Team is committed to and passionate about protecting and enhancing our valuable natural resources. It is this dedication that is brought to each and every one of our projects. We are proud to offer the best expertise, services and products available in the industry and appreciate the opportunity to provide you with this proposal.

B. Project Overview:

1. Establishing a native landscape (http://www.prairieresto.com/establish_landscapes.shtml) in this area will provide a long term, ecologically sound landscape that is adapted to the existing conditions of the site. This native landscape will not require irrigation, black dirt or other soil amendments. It will add a distinctive look to the property as well as provide valuable habitat for songbirds, butterflies, bees and other pollinators.
2. To establish this planting, the site will be seeded using a drill seeder after the row crops are removed. Only areas currently in row crops will be seeded at this time. If additional weedy or fallow areas need to be seeded a different process may be required.
3. An estimate for 3 years of Establishment Period Vegetation Management is included in this proposal.

C. Project Dimensions and Planting Zones:

1. For purposes of vegetation restoration, the project area is separated into two zones, the **Conservation Easement Area** and the **Residential Lots Area**.
2. **The Conservation Easement Area** in total is 109.7 acres. Approximately 60 of these acres are currently in row crops and will be seeded.
3. **The Residential Lots Area** in total is 100.6 acres. Approximately 75 of these acres are currently in row crops and will be seeded as a part of this plan. As the lots are developed the construction disturbance will be limited to less than 50% of the prairie area leaving the remaining in prairie. Areas beyond the 50% can and will be reseeded as necessary after construction of each house/property.

D. Site preparation: http://www.prairieresto.com/installation_preparation.shtml

1. The project area will be harvested for crops before seeding. In addition it should be stalk chopped (especially the corn) to allow for easier seeding. If possible the corn field areas could be baled to remove crop residue as the corn leaves much more debris behind than the bean fields and this can cause issues with the seeding.

E. Seed and Seeding: http://www.prairieresto.com/installation_seeding.shtml

1. Acceptable seeding dates for native species are in the spring or summer before August 10th or in the fall between September 20th and freeze-up.
2. All grass seed will be applied with a seed drill designed for native seeding (Truax[®] or equivalent).
3. All flower seed will be broadcast with a tractor broadcast seeder designed for native seeding (Vicon[®] or equivalent).

4. The seed mixes will consist of the following species and amounts:

Grass Seed **lbs / acre**

PRI Mixed Height Mesic Grass Mix:

35% Big bluestem, 23% Little bluestem, 22% Indian grass,	
12% Side oats grama, 5% Canada wild rye, 2% June grass,	
1% Switch grass all by PLS weight.....	10

<http://www.prairieresto.com/CategoryList.php?clD=12>

Note: A cover crop will be sown along with the native grasses at a rate of approximately 25 lbs./acre. Cover crop is an annual grass species that germinates quickly and will reduce the risk of soil erosion on the site. Oats will be used for a spring or summer seeding, and winter wheat will be used for a fall seeding.

Wildflower Seed **oz / acre**

Butterfly weed (<i>Asclepias tuberosa</i>).....	1/4
Partridge pea (<i>Chamaecrista fasciculata</i>)	1/2
Wild lupine (<i>Lupinus perennis</i>)	1
Yellow coneflower (<i>Ratibida pinnata</i>)	1/2

PRI Mixed Height Mesic Wildflower Mix:

19% Purple prairie clover, 18% Hoary vervain, 15% Black-eyed Susan,	
10% Leadplant, 8% Common ox-eye, 6% Golden Alexander,	
3% Canada milk vetch, 3% White prairie clover, 3% Canada tick trefoil,	
3% Wild bergamot, 3% Stiff goldenrod, 3% Blue vervain,	
2% Common milkweed, 1% Yarrow, 1% Prairie rose,	
1% Gray goldenrod, 1% Western spiderwort, all by PLS weight.....	24

<http://www.prairieresto.com/CategoryList.php?clD=13>

- F. **Erosion Control:** http://www.prairieresto.com/installation_erosion.shtml

1. Cover crop will be sown along with the native grasses.

G. Management: http://www.prairieresto.com/management_overview.shtml

1. Management (maintenance) plays a vital role in the eventual success of any native landscape installation, especially during the establishment period. Active management of your native landscape is highly recommended to give the project the best opportunity for long term success.
2. During the germination year, the project area may need to be mowed to control annual weed development. If a “closed” canopy of weed cover develops, it should be mowed to aid in the growth of the prairie seedlings by reducing competition. Mowing may also be necessary if the weeds are about to set seed. Optimum cutting height, depending on the wildflower species present, is typically 4 to 6 inches. It is important that the clippings are finely mulched in order to prevent smothering. PRI can provide the mowing services if desired. Please refer to the cost section of this proposal for a mowing quote.
3. In years following the first growing season, Integrated Plant Management (IPM) services are utilized to control annual, biennial and perennial weed species within the developing native landscape. Typical IPM services include spot herbicide spraying, spot mowing, herbicide wicking or hand weeding. These services are billed on a per trip cost agreed upon prior to the growing season. Rough estimates are provided in the cost section of this proposal for these future management activities.
4. Prescribed burning is a highly effective management tool and may be recommended for your project as it matures. Burning stimulates native species to grow more robustly and also help to deter the presence of many non-native and/or woody species. Prescribed burning, when recommended, will be provided as a separate lump sum cost.
5. In lieu of burning, or during years when the site is not burned, a Spring Dormant Mowing can be used to “clean up” previous year’s growth and set the table for the new growing season. This mowing would occur early in the spring, as soon as conditions permit. Spring Dormant Mowing, when recommended, will be provided as a separate lump sum cost.

H. Anticipated Management:

The following table conveys the anticipated management procedures for your project during the first 4 growing seasons. Estimates for these procedures are provided in the cost section of this proposal.

Year	Projected Management Procedures
2018	Complete site mowings to control annual weed canopy (2 or 3 mowings as needed). Project monitoring
2019	Complete site mowing Integrated Plant Management (IPM) – includes spot spraying, spot mowing, wicking, hand weeding, and other techniques to control weeds and invasive species (3 visits are typical) Project monitoring
2020	Integrated Plant Management (IPM) – includes spot spraying, spot mowing, wicking, hand weeding, and other techniques to control weeds and invasive species (3 visits are typical) Project monitoring
2021	Spring burn to encourage native plant growth and to help deter the presence of non-native and woody species. Integrated Plant Management (IPM) – 3 visits are typical Project monitoring

I. Costs:

Project Installation:

Unit Pricing

Seeding.....	\$175 / acre
Seed as specified	\$625 / acre
Erosion blanket (if necessary)	\$1.25 / sq yd
Straw Mulching (if necessary)	\$850 / acre

Conservation Easement Area (est 60 acres)

Seeding 60 acres @ \$175/acre.....	\$10,500
Seed as specified 60 acres @ \$625/acre	\$37,500

Conservation Easement Installation Total.....\$48,000

Residential Lots Area (est 75 acres)

Seeding 75 acres @ \$175/acre.....	\$13,125
Seed as specified 75 acres @ \$625/acre	\$46,875

Residential Lots Installation Total.....\$60,000

Conservation Easement Vegetation Management:

Germination year management quote (2018):

Complete site mowings as needed (1-3 is typical)	\$100/acre
Full site mow (60 acres @ \$90/acre).....	\$6,000

Future Management Estimates:

Growing season 2019 (assumes 3 IPM visits).....	\$30,000
Growing season 2020 (assumes 3 IPM visits).....	\$30,000
Growing season 2021 (assumes 3 IPM visits and a prescribed burn)	\$36,000

Please note: The *Future Management Estimates* are meant to convey typical management costs for projects of similar size and characteristics. Prior to each growing season, you will receive a specified quote from your project manager detailing the recommended management strategies and associated costs for your project.

PRI will provide a follow-up consultation approximately 1 month after the completion of the project (if the project was seeded in the fall, the consultation will occur the following spring). The Restorationist (or salesperson) will meet with the project owner to assess the status of the project, answer any questions, and provide any necessary recommendations. This follow-up consultation will be provided at no additional cost.

- J. Guarantee:** Prairie Restorations, Inc. (PRI) has a great tradition of successfully installing native landscapes throughout the Upper Midwest. We feel our expertise in this industry is second to none and we stand behind every one of our projects. Because we are confident in our abilities to provide you with the best possible materials and services, we are proud to offer the following guarantee:

On projects installed by PRI crews within the specified dates, we will guarantee successful establishment within three full growing seasons, given the following conditions:

- 1. That PRI materials and PRI installation services are used on the project.*
- 2. That the failure of the project is not due to the actions of others.*
- 3. That PRI staff has been consistently involved with the maintenance of the project (consultation with the client or direct utilization of PRI management services) from the time of germination until the end of the third growing season (i.e. mowing, spot spraying, and controlled burning).*

This outline provides a step-by-step plan for accomplishing the restoration of this site. If successful establishment does not occur within three full growing seasons, all necessary steps will be taken to ensure the eventual success of the project, at no additional charge. For purposes of this guarantee, successful establishment is defined as follows: That the presence of at least 75% of the original seeded or planted species can be found on site, and that the overall density of vegetation is comprised of no less than 75% native species.

K. Contract:

If you accept the proposal as written and want to proceed with the project, please sign the contract below.

Owner (print): _____ **Date:** _____

Signed: _____ **Title:** _____

Project Name: _____ **Contract Value: \$** _____

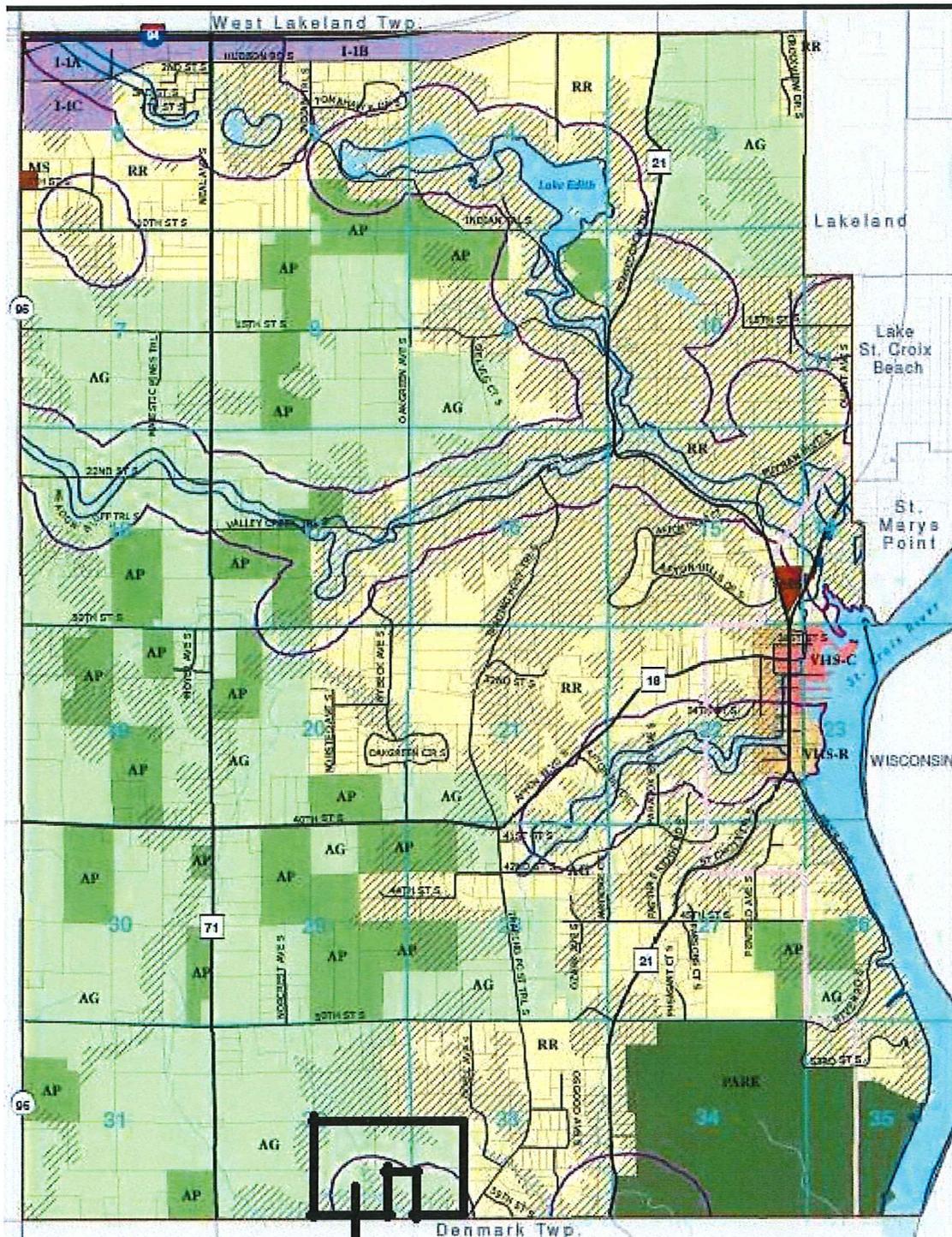
Contractor: *Prairie Restorations, Inc.*

Signed: _____ **Date:** _____

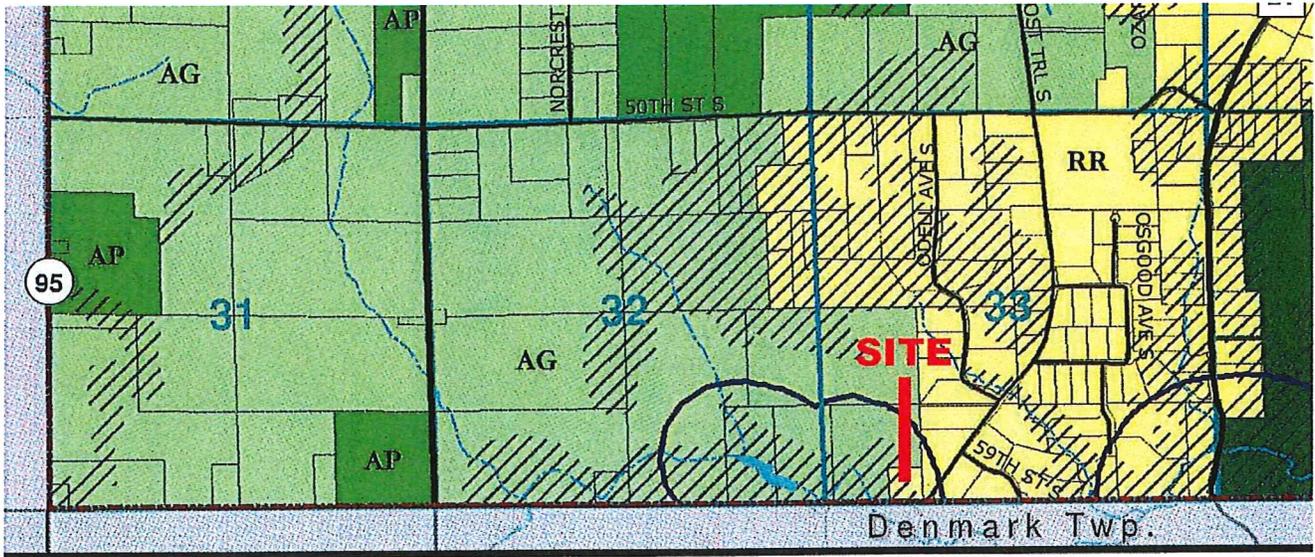
Jeff West – Site Manager
Prairie Restorations, Inc.
PO Box 95
21120 Ozark Court North
Scandia MN 55073

- L. Notes:** Please note that this proposal is valid for 1 month (from the date on the proposal). If the proposal is accepted after the 1 month period, PRI reserves the right to modify the proposal based on cost fluctuations and material availability.

Restoration outline prepared by Prairie Restorations, Inc. (PRI), Princeton, Minnesota



SUBJECT SITE



Zoning Districts

- Agriculture
- Ag Preserve
- Village Historic Site- Commercial
- Industrial
- Village Historic Site- Residential
- Rural Residential

- State Park
- Marina Services
- Conservancy Overlay
- St. Croix River Bluffland
- Floodplain Overlay (100 Year)
- Shoreland Management Areas

- City of Afton
- Parcel Boundaries
- Section Lines
- Major Road
- Local Road
- Lakes & Rivers
- Streams

AFTON CREEK PRESERVE - EXISTING PARCEL LAYOUT - EXHIBIT A

Part of the Southeast Quarter of Section 32 and part of the Southwest Quarter of Section 33,
all in Township 28 North, Range 20 West, City of Afton, Washington County, Minnesota

Developer:



J.P. Bush
HOMES
Lakeland, Minnesota

Property Owner: Will Carlson

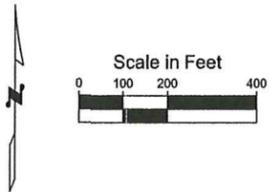
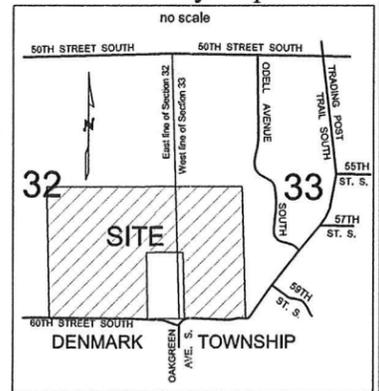
Property Identification Numbers

- 32.028.20.41.0002
- 32.028.20.42.0004
- 32.028.20.43.0001
- 33.028.20.33.000X (TO BE ASSIGNED)
- 33.028.20.32.0001

Legend

33.028.20.33.0004	Denotes existing parcel identification number per Washington County online tax records, as of January 24, 2018, unless otherwise noted.
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Vicinity Map



PID: TO BE ASSIGNED
33.028.20.33.000X
REAL PROPERTY DESCRIBED
IN DOCUMENT No. 4142813
(ON FILE AND OF RECORD IN THE OFFICE OF THE COUNTY RECORDER,
WASHINGTON COUNTY, MINNESOTA)

Landmark Surveying, Inc.
21090 Olinda Trail North
P.O. Box 65
Scandia, Minnesota 55073
Office number: 651-433-3421
Cell number: 651-755-5760
E-mail: intheheld@frontiernet.net

OFFICIAL COPIES OF THIS MAP ARE CRIMP SEALED
I hereby certify that this survey, plan or report was prepared by me or under my direct supervision and that I am a duly Licensed Land Surveyor under the laws of the State of Minnesota.
Landmark Surveying, Inc.
Milo B. Horak
Milo B. Horak, Minnesota License No. 52577
Date: January 24, 2018

PRELIMINARY PLAT - AFTON CREEK PRESERVE

Part of the Southeast Quarter of Section 32 and part of the Southwest Quarter of Section 33,
all in Township 28 North, Range 20 West, City of Afton, Washington County, Minnesota

Developer:



TOTAL PARCEL AREA = 218.55 acres

Proposed Conservation Easements
OPEN SPACE = 112.02 acres
(51.3% gross parcel area)

Proposed Buildable Lots (16 total) = 97.43 acres

Proposed Road Right of Way = 9.10 acres

Proposed Road Right of Way Width = 60 feet

Proposed Road Right of Way Width (60th Street South) = 33+ feet from center line

Proposed Length of Cul-De-Sac = 172.1 feet

Proposed Road Type = 24 foot wide rural section

Owner: ALBERT CARLSON TRUST
2534 Stoughton Trail South
Afton, WI 53501

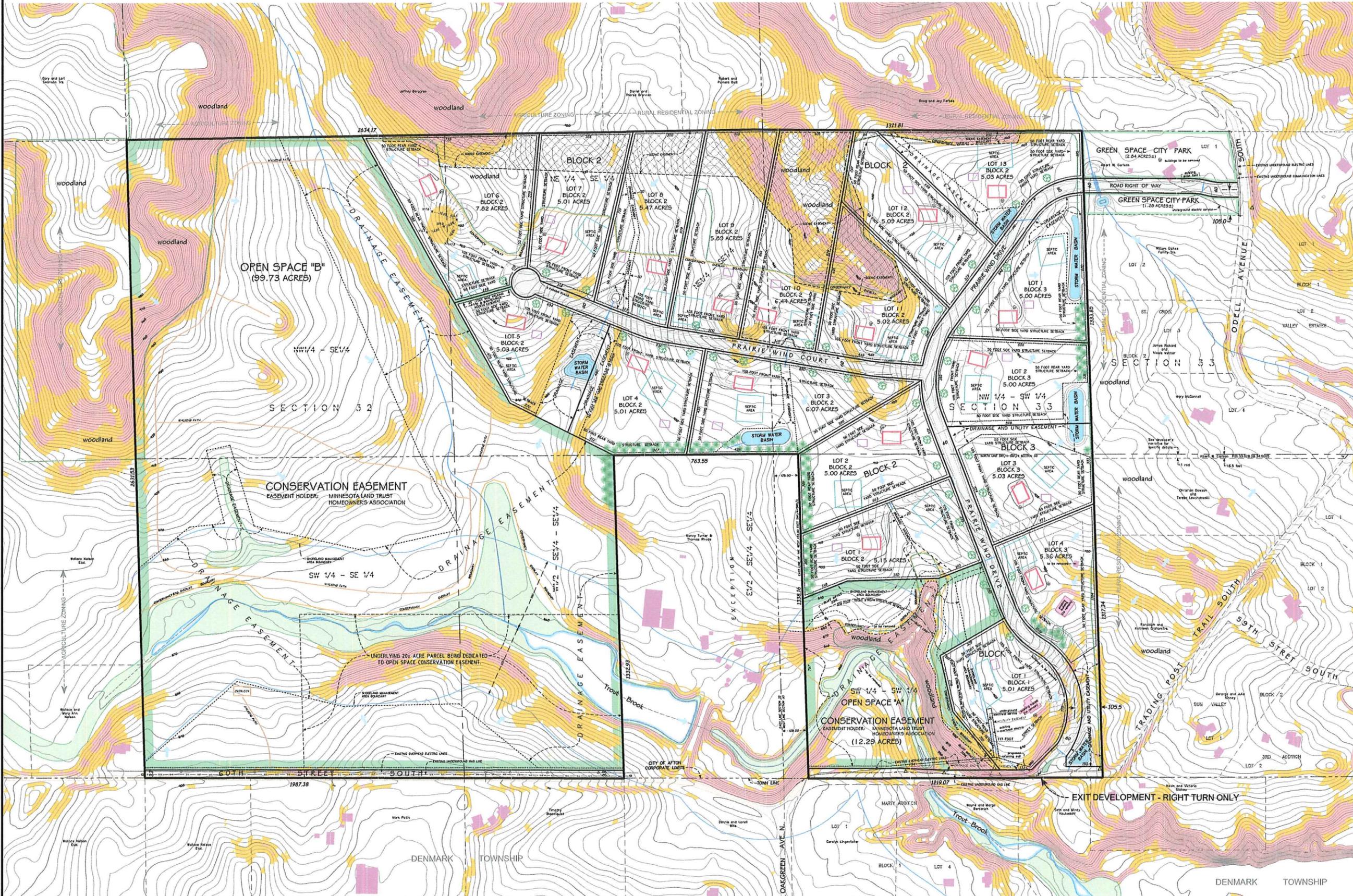
Developer: J.P. BUSH HOMES
1800 Quaker Avenue South
Lakeland, WI 53043
(608) 774-4222

Engineering: FLOWE ENGINEERING INC.
6776 Lake Drive, Suite 110
Lima Lake, WI 53041
(608) 351-8210

Environmental: JACOBSON ENVIRONMENTAL
5221 Humboldt Avenue North
Brooklyn Center, MN 55430
(612) 602-6619

Soil Testing: MOWSETT SOIL TESTING
PO BOX 383
Hugo, MN 55028
(651) 493-2682

Traffic: BRACK CONSULTING
PO BOX 18269
St. Louis Park, MN 55416
(651) 232-5512



Legend

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- Double

SCENIC EASEMENTS - AFTON CREEK PRESERVE - EXHIBIT B

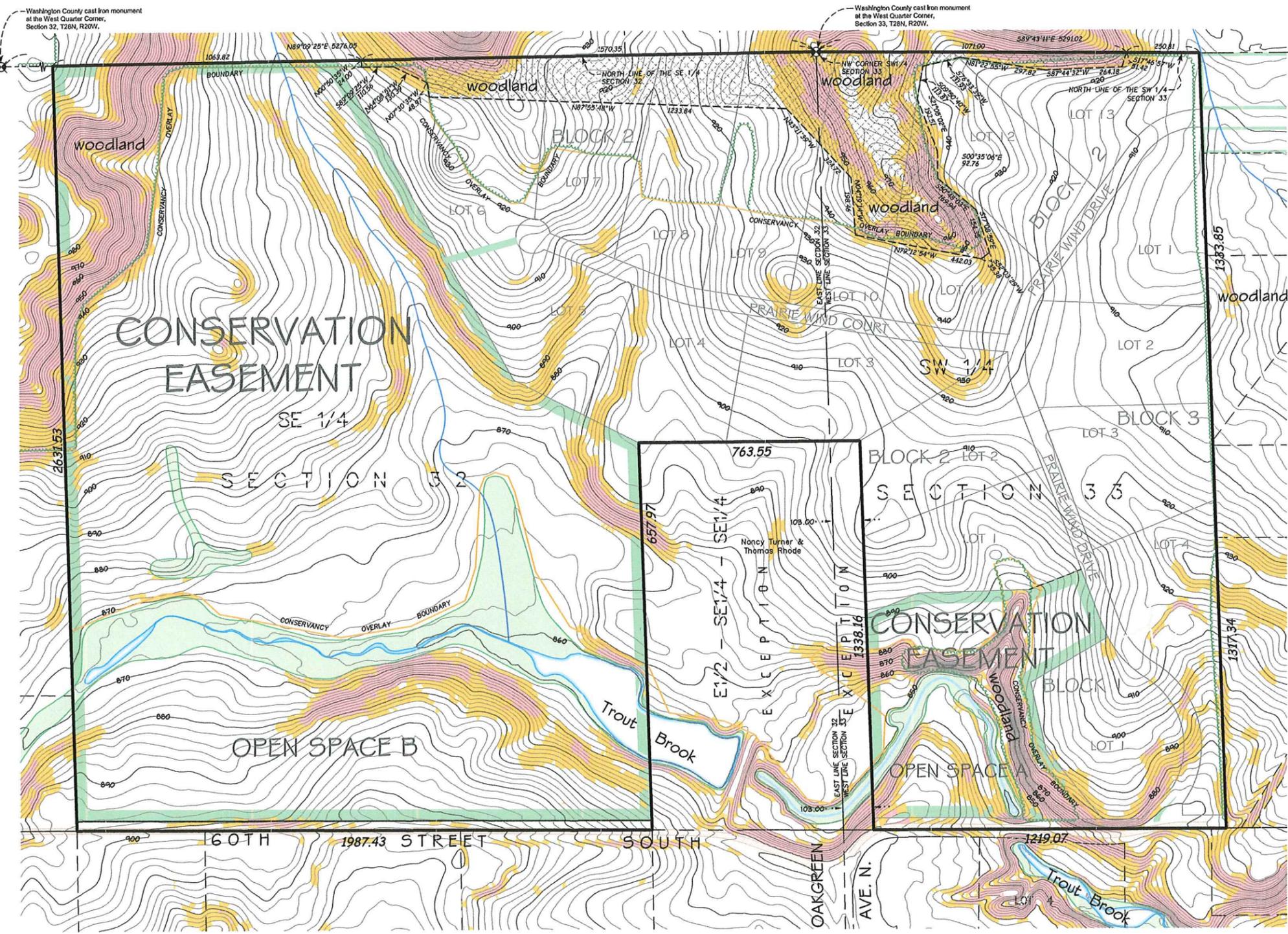
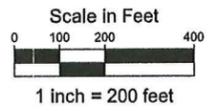
Part of the Southeast Quarter of Section 32 and part of the Southwest Quarter of Section 33,
all in Township 28 North, Range 20 West, City of Afton, Washington County, Minnesota

Developer:



J.P. Bush
HOMES
Lakeland, Minnesota

Property Owner: Will Carlson



PROPOSED SCENIC EASEMENT

All that part of the Southwest Quarter of Section 33, and all that part of the Southeast Quarter of Section 32, all in Township 28 North, Range 20 West, Washington County, Minnesota, described as follows:

Commencing at the northwest corner of said Southwest Quarter of Section 33; thence South 89 degrees 43 minutes 11 seconds East, bearings are based on the Washington County Coordinate System, NAD 83, 1986 Adjustment, along the north line of said Southwest Quarter of Section 33, a distance of 1071.00 feet; thence South 17 degrees 46 minutes 57 seconds West a distance of 51.42 feet; thence South 87 degrees 44 minutes 32 seconds West a distance of 264.18 feet; thence North 81 degrees 22 minutes 55 seconds West a distance of 297.82 feet; thence South 76 degrees 33 minutes 39 seconds West a distance of 131.93; thence South 09 degrees 50 minutes 40 seconds West a distance of 113.87 feet; thence South 21 degrees 05 minutes 02 seconds East a distance of 193.51 feet; thence South 00 degrees 35 minutes 06 seconds East a distance of 92.76 feet; thence South 50 degrees 48 minutes 03 seconds East a distance of 169.94; thence South 17 degrees 08 minutes 59 seconds East a distance of 154.35 feet; thence South 52 degrees 03 minutes 29 seconds West a distance of 35.38 feet; thence North 79 degrees 12 minutes 54 seconds West a distance of 442.03 feet; thence North 04 degrees 19 minutes 14 seconds West a distance of 198.46 feet; thence North 43 degrees 11 minutes 39 seconds West a distance of 324.72 feet; thence North 87 degrees 55 minutes 48 seconds West a distance of 1233.84 feet; thence North 07 degrees 30 minutes 35 seconds West a distance of 48.97 feet; thence North 64 degrees 08 minutes 51 seconds West a distance of 130.39 feet; thence South 89 degrees 09 minutes 25 seconds West a distance of 110.56 feet; thence North 00 degrees 50 minutes 35 seconds West a distance of 24.00 feet to its intersection with the north line of said Southeast Quarter of Section 32; thence North 89 degrees 09 minutes 25 seconds East, along said north line of the Southeast Quarter of Section 32, a distance of 1570.35 feet, more or less, to the point of beginning.

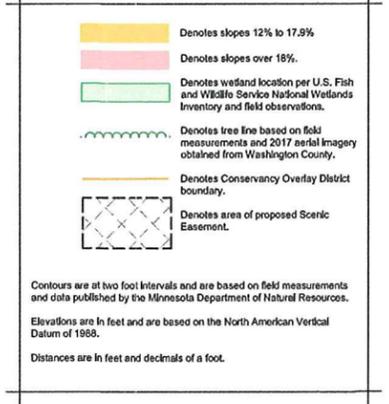
OPEN SPACE NOTE:

Proposed OPEN SPACE A and proposed OPEN SPACE B contain slopes greater than 18% and wooded areas on slopes greater than 12%. These areas will be protected with a conservation easement more restrictive than a scenic easement. At this time, no other scenic easements proposed other than mapped herein.

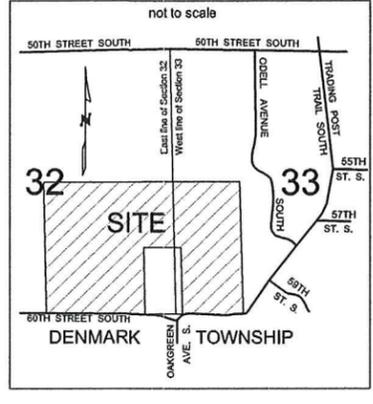
LOT 1, BLOCK 1 NOTE:

Proposed Lot 1, Block 1 contains slopes greater than 18%. These slopes appear to be the result of past landscaping activities. No Scenic Easement is proposed over these areas.

Legend



Vicinity Map



Landmark Surveying, Inc.
21090 Olinda Trail North
P.O. Box 65
Scandia, Minnesota 55073
Office number: 651-433-3421
Cell number: 651-755-5760
E-mail: info@landmark.net

OFFICIAL COPIES OF THIS MAP ARE CRIMP SEALED
I hereby certify that this survey, plan or report was prepared by me or under my direct supervision and that I am a duly Licensed Land Surveyor under the laws of the State of Minnesota.
Landmark Surveying, Inc.
Milo B. Horak
Milo B. Horak, Minnesota License No. 52577
February 04, 2018
Date

AFTON CREEK PRESERVE - SEEDING PLAN - EXHIBIT C

Part of the Southeast Quarter of Section 32 and part of the Southwest Quarter of Section 33,
all in Township 28 North, Range 20 West, City of Afton, Washington County, Minnesota

60.0 acres ± to be seeded in
Conservation Easement areas.

75.0 acres ± to be seeded in
Residential area.

Final calculations will be determined
at or or above those shown hereon by
the South Washington Watershed
District at the time of installation.

Developer:



J.P. Bush
HOMES

Property Owner: Will Carlson

Seed mixes, species
and amounts

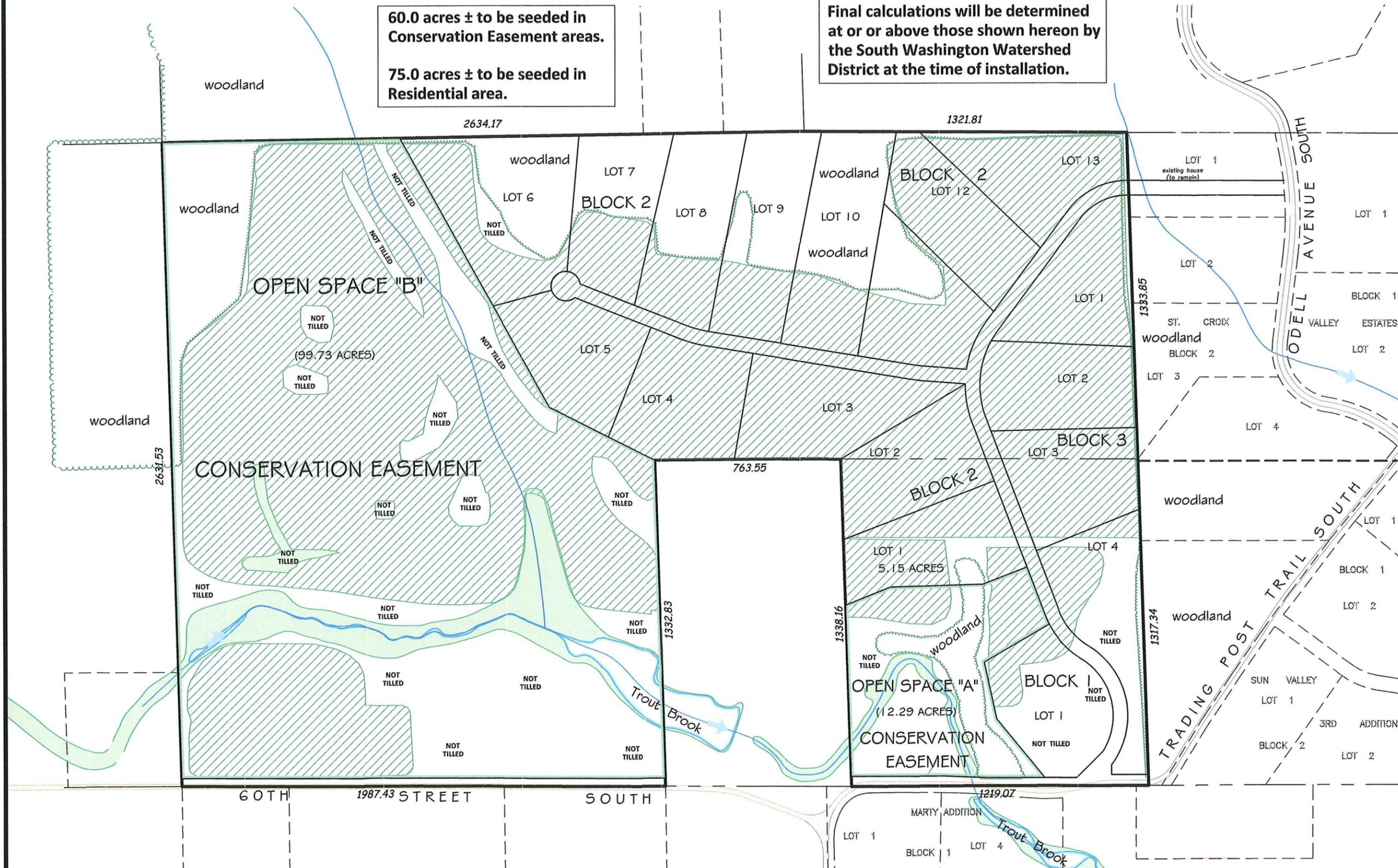
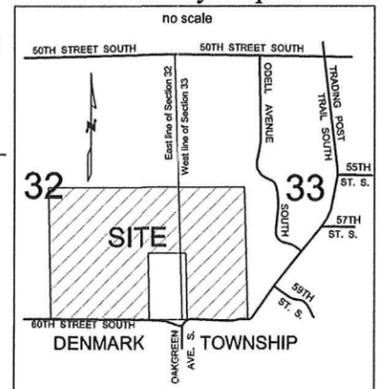
Grass Seed lbs / acre	
PRI Mixed Height Mesic Grass Mix:	
35% Big bluestem, 23% Little bluestem, 22% Indian grass,	
12% Side oats grama, 5% Canada wild rye, 2% June grass,	
1% Switch grass all by PLS weight	10
Note: A cover crop will be sown along with the native grasses at a rate of approximately 25 lbs./acre. Cover crop is an annual grass species that germinates quickly and will reduce the risk of soil erosion on the site. Oats will be used for a spring or summer seeding, and winter wheat will be used for a fall seeding.	
Wildflower Seed oz / acre	
Butterfly weed (<i>Asclepias tuberosa</i>)	1/4
Partridge pea (<i>Chamaecrista fasciculata</i>)	1/2
Wild lupine (<i>Lupinus perennis</i>)	1
Yellow coneflower (<i>Ratibida pinnata</i>)	1/2
PRI Mixed Height Mesic Wildflower Mix:	
19% Purple prairie clover, 18% Hoary vernalis, 15% Black-eyed Susan,	
10% Leadplant, 8% Common ox-eye, 6% Golden Alexander,	
3% Canada milk vetch, 3% White prairie clover, 3% Canada tick trefoil,	
3% Wild bergamot, 3% Stiff goldenrod, 3% Blue vernalis,	
2% Common milkweed, 1% Yarrow, 1% Prairie rose,	
1% Gray goldenrod, 1% Western spicewort, all by PLS weight	24

Legend

- Denotes wetland location see note below.
- Denotes stream.
- Denotes area currently in row crop and to be seeded.

Wetland locations are approximate and are based on field observations and data obtained through the National Wetlands Inventory - V2 online interface.

Vicinity Map



Landmark Surveying, Inc.
21090 Olinda Trail North
P.O. Box 65
Scandia, Minnesota 55073

Office number: 651-433-3421
Cell number: 651-755-5760
E-mail: mthefield@ironbnet.net

AFTON CREEK PRESERVE - SOIL TEST LOCATIONS - EXHIBIT D

Part of the Southeast Quarter of Section 32 and part of the Southwest Quarter of Section 33,
all in Township 28 North, Range 20 West, City of Afton, Washington County, Minnesota

SOIL TEST LOCATIONS - PNEZD FORMAT

Point Number, Northing, Easting, Elevation, Description

Coordinates are based on the Washington County
Coordinate System, NAD 83, 1988 Adjustment.

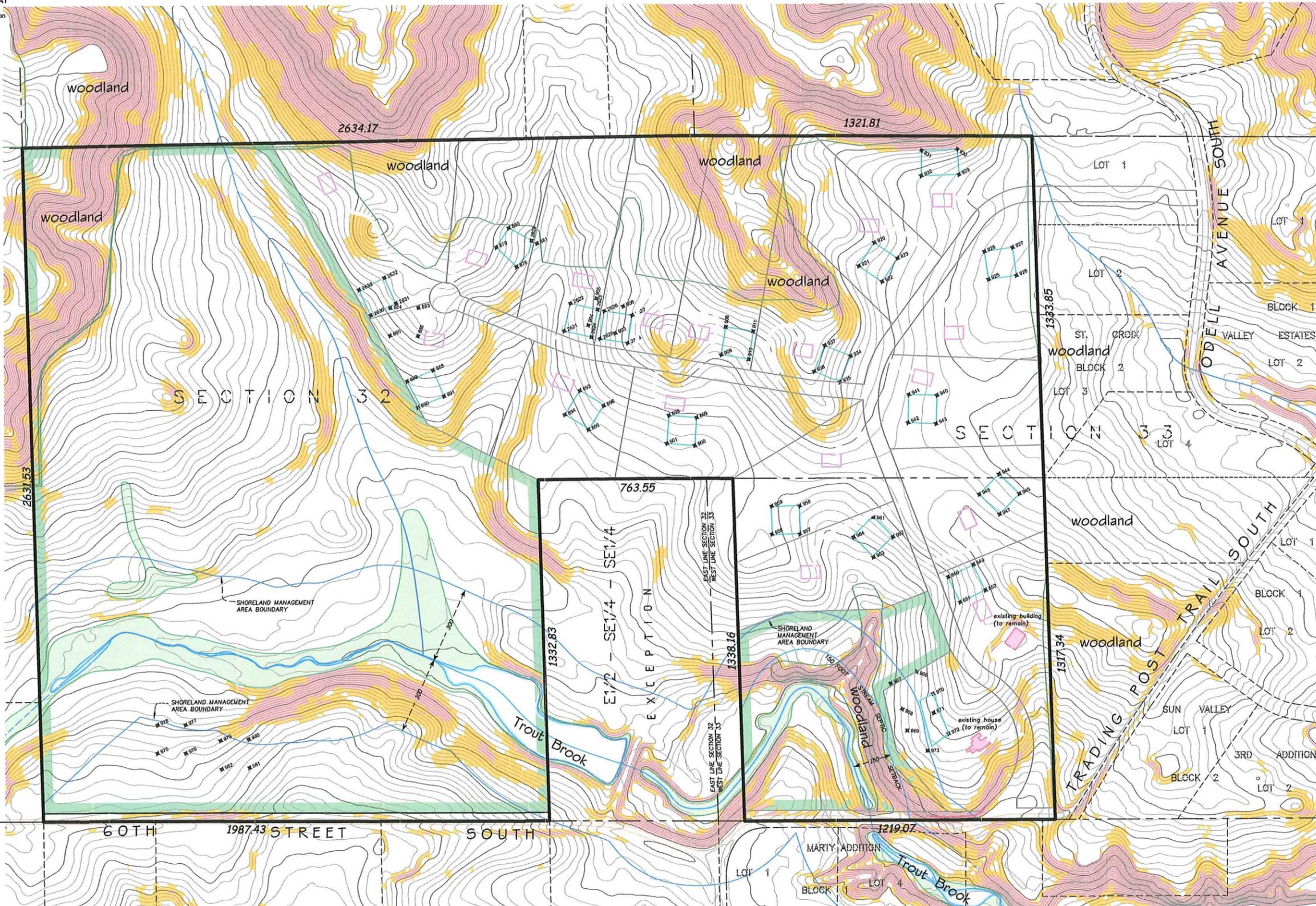
Elevations are based on the North American Vertical
Datum of 1988

Existing soil test locations

852	143223.9	504057.1	919.0	SET LATH
878	144400.9	502219.5	911.0	SET LATH
879	144507.8	502140.7	919.6	SET LATH
880	144643.2	502189.2	919.0	SET LATH
881	144582.2	502300.3	908.9	SET LATH
883	144332.7	501835.8	917.8	SET LATH
884	144332.2	501725.1	911.9	SET LATH
885	144223.8	501723.8	905.5	SET LATH
886	144222.4	501834.3	912.5	SET LATH
888	144089.0	501891.8	902.1	SET LATH
889	144045.3	501790.4	898.4	SET LATH
890	143943.4	501833.7	892.2	SET LATH
891	143986.8	501934.6	896.0	SET LATH
893	144006.6	502467.4	902.9	SET LATH
894	143913.1	502408.8	897.7	SET LATH
895	143954.1	502501.2	901.6	SET LATH
896	143947.3	502560.9	905.7	SET LATH
898	143908.9	502815.4	909.5	SET LATH
899	143900.9	502924.3	909.6	SET LATH
900	143791.5	502917.1	904.5	SET LATH
901	143789.1	502807.3	904.5	SET LATH
903	144230.2	502806.4	918.0	SET LATH
904	144261.2	502501.5	909.4	SET LATH
905	144386.3	502832.2	911.0	SET LATH
906	144335.1	502837.6	919.3	SET LATH
908	144254.7	503039.3	928.7	SET LATH
909	144148.2	503021.0	921.8	SET LATH
910	144128.4	503129.6	925.1	SET LATH
911	144237.3	503147.0	930.5	SET LATH
920	144582.2	503622.1	927.8	SET LATH
921	144490.4	503581.2	926.9	SET LATH
922	144428.2	503652.8	921.2	SET LATH
923	144520.7	503713.2	920.1	SET LATH
925	144436.7	504069.9	904.2	SET LATH
926	144545.5	504054.0	906.9	SET LATH
927	144561.3	504163.3	902.8	SET LATH
928	144452.1	504178.3	901.7	SET LATH
929	144846.7	503954.1	914.0	SET LATH
930	144944.9	503947.2	925.2	SET LATH
931	144940.7	503807.7	928.0	SET LATH
932	144842.2	503806.4	918.6	SET LATH
934	144139.2	503528.8	929.6	SET LATH
935	144037.5	503486.6	930.7	SET LATH
936	144080.1	503385.3	940.5	SET LATH
937	144180.7	503427.7	941.0	SET LATH
940	143985.4	503667.1	913.1	SET LATH
941	143988.2	503757.1	915.7	SET LATH
942	143878.4	503753.7	915.2	SET LATH
943	143878.4	503883.2	912.9	SET LATH
944	143676.9	504109.7	911.0	SET LATH
945	143600.3	504189.3	910.9	SET LATH
948	143596.1	504033.0	915.8	SET LATH
947	143520.5	504111.6	916.7	SET LATH
956	143444.9	503218.7	911.9	SET LATH
957	143445.8	503328.4	906.2	SET LATH
958	143555.5	503328.1	907.7	SET LATH
959	143554.4	503217.9	910.7	SET LATH
961	143510.0	503616.3	907.5	SET LATH
962	143433.0	503694.1	907.2	SET LATH
963	143353.7	503617.4	898.2	SET LATH
964	143432.1	503539.4	900.8	SET LATH
966	142906.8	503788.2	896.6	SET LATH
967	142861.4	503684.7	888.4	SET LATH
968	142761.1	503730.3	892.5	SET LATH
969	142877.0	503750.2	893.8	SET LATH
970	142820.2	503851.0	901.8	SET LATH
971	142745.8	503853.1	900.9	SET LATH
972	142664.0	503911.7	901.3	SET LATH
973	142696.1	503829.7	895.9	SET LATH
975	142596.8	500807.2	886.2	SET LATH
976	142596.9	500918.1	887.5	SET LATH
977	142707.2	500917.7	878.4	SET LATH
978	142707.4	500807.8	878.9	SET LATH
979	142645.2	501053.8	888.1	SET LATH
980	142650.2	501164.6	891.6	SET LATH
981	142539.4	501167.8	897.7	SET LATH
982	142533.8	501058.4	893.0	SET LATH

Proposed soil test locations

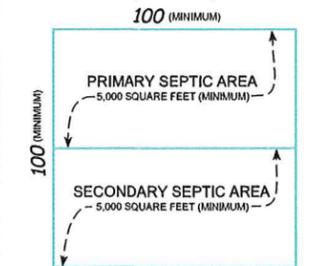
2621	144239.4	502408.6	903.1	SET LATH
2622	144347.3	502431.2	903.9	SET LATH
2623	144322.9	502388.2	911.8	SET LATH
2624	144215.2	502513.9	910.0	SET LATH
2625	144208.0	502546.2	912.1	SET LATH
2626	144316.7	502563.9	913.6	SET LATH
2627	144300.1	502672.5	922.6	SET LATH
2628	144191.1	502654.6	921.7	SET LATH
2629	144593.0	502279.4	909.5	SET LATH
2630	144303.8	501948.1	905.5	SET LATH
2631	144340.5	501748.0	914.4	SET LATH
2632	144449.5	501701.9	915.4	SET LATH
2633	144403.5	501602.4	908.3	SET LATH



SURVEY REPORT:

The purpose of this survey is to document soil test locations, both existing and proposed, for review by the Washington County Public Health Department and the preparation of a preliminary plat. Soil tests were performed by Brian Humpal, Midwest Soil Testing. As of the date of this survey, the depicted subdivision is a concept only, and has not been approved by any governing agencies. The smallest septic area tested on this survey was 11,500 square feet.

Minimum Standards Proposed Septic Areas (NOT TO SCALE)

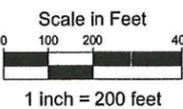


Legend

- Denotes slopes 12%-18%
- Denotes slopes over 18%
- Denotes wetland location.
- Denotes stream.
- X 947 Denotes set lath and corresponding point number for soil test location.
- Denotes proposed house site.
- Denotes proposed septic area.
- Denotes proposed driveway location.

Contours are at two foot intervals and are based on field measurements and data provided by the Minnesota Department of Natural Resources.

Wetland locations are approximate and are based on data obtained through the National Wetlands Inventory - V2 online interface and the City of Afton Zoning Map (MAP 11).



OFFICIAL COPIES OF THIS MAP ARE CRIMP SEALED

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

Landmark Surveying, Inc.
Milo B. Horak, Minnesota License No. 52577
Date

Landmark Surveying, Inc.
21090 Olinda Trail North
P.O. Box 65
Scandia, Minnesota 55073
Office number: 651-433-3421
Cell number: 651-755-5760
E-mail: mthefield@ironbnet.net

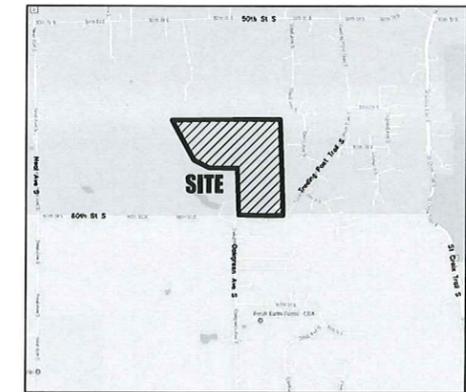
AFTON CREEK PRESERVE

TITLE SHEET, NOTES & LEGEND

GRADING, DRAINAGE AND EROSION CONTROL

AFTON, MINNESOTA

VICINITY MAP



N.T.S.



GENERAL NOTES

THE INFORMATION SHOWN ON THESE DRAWINGS CONCERNING TYPE AND LOCATION OF EXISTING UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. THE CONTRACTOR IS RESPONSIBLE FOR MAKING HIS OWN DETERMINATION AS TO TYPE AND LOCATION OF UTILITIES AS NECESSARY TO AVOID DAMAGE TO THESE UTILITIES.

CALL "811" FOR EXISTING UTILITIES LOCATIONS PRIOR TO ANY EXCAVATIONS.

THE CONTRACTOR SHALL FIELD VERIFY SIZE, ELEVATION, AND LOCATION OF EXISTING STORM SEWER AND NOTIFY ENGINEER OF ANY DISCREPANCIES PRIOR TO THE START OF INSTALLATIONS.

INSTALLATIONS SHALL CONFORM TO THE CITY STANDARD SPECIFICATIONS AND DETAIL PLATES.

STORAGE OF MATERIALS OR EQUIPMENT SHALL NOT BE ALLOWED ON PUBLIC STREETS OR WITHIN PUBLIC RIGHT-OF-WAY.

NOTIFY CITY A MINIMUM OF 48 HOURS PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.

ALL ELECTRIC, TELEPHONE, AND GAS EXTENSIONS INCLUDING SERVICE LINES SHALL BE CONSTRUCTED TO THE APPROPRIATE UTILITY COMPANY SPECIFICATIONS. ALL UTILITY DISCONNECTIONS SHALL BE COORDINATED WITH THE APPROPRIATE UTILITY COMPANY.

LEGEND

- OHW — EXISTING OVERHEAD ELECTRIC
- EXISTING ELECTRICAL PEDESTAL
- EXISTING CABLE PEDESTAL
- EXISTING UTILITY POLE
- >— EXISTING STORM SEWER
- EXISTING CATCH BASIN
- ▲ EXISTING FLARED-END SECTION
- ⊙ EXISTING WELL
- 930 EXISTING CONTOUR
- × 920.55 EXISTING SPOT ELEVATION
- 🌳 EXISTING TREES
- ✂ EXISTING TREES (TO BE REMOVED)
- X — EXISTING FENCE
- WET — EXISTING WETLAND
- S — PROPOSED STORM SEWER PIPE
- ⊙ PROPOSED STORM MANHOLE
- PROPOSED CATCH BASIN
- ▲ PROPOSED FLARED-END SECTION
- 928 PROPOSED CONTOUR
- 930 PROPOSED CONTOUR
- × 920.60 PROPOSED SPOT ELEVATION (OUTLET, BITUMINOUS SURFACE OR GROUND SURFACE UNLESS OTHERWISE INDICATED)
- S — PROPOSED SILT FENCE
- 4.0% PROPOSED DIRECTION OF DRAINAGE
- ▨ PROPOSED RIP-RAP
- ▨ PROPOSED ENKAMAT

SHEET INDEX

- C1 TITLE SHEET, NOTES & LEGEND
- C2.1 GRADING, DRAINAGE & EROSION CONTROL PLAN
- C2.2 GRADING, DRAINAGE & EROSION CONTROL PLAN
- C2.3 GRADING, DRAINAGE & EROSION CONTROL PLAN
- C2.4 GRADING, DRAINAGE & EROSION CONTROL PLAN
- C3.1 STREET PLAN & PROFILE - PRAIRIE WIND DRIVE (0+00 TO 10+00)
- C3.2 STREET PLAN & PROFILE - PRAIRIE WIND DRIVE (10+00 TO 23+50)
- C3.3 STREET PLAN & PROFILE - PRAIRIE WIND DRIVE (23+50 TO 35+79)
- C3.4 STREET PLAN & PROFILE - PRAIRIE WIND DRIVE (35+79 TO 48+00)
- C3.4 STREET PLAN & PROFILE - PRAIRIE WIND COURT (0+00 TO 10+00)
- C3.4 STREET PLAN & PROFILE - PRAIRIE WIND COURT (10+00 TO 17+81)
- C4 DETAILS
- C5.1 STORMWATER POLLUTION PREVENTION PLAN
- C5.2 STORMWATER POLLUTION PREVENTION PLAN

DRAWN BY:	DESIGN BY:
C.M.	C.W.P.
CHKD BY:	PROJ. NO.
C.W.P.	17-1707
ORIGINAL DATE:	
AUGUST 14, 2017	
DATE	REVISION DESCRIPTION
9/5/17	ADDED WALKING PATH & PARKING
9/21/17	PONDS ADDED/GRADING REVISIONS
2/5/18	STREET/LOT LAYOUT & GRADING REVISION

I hereby certify that this plan 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.

Charles W. Plowe
 CHARLES W. PLOWE
 LIC. NO. 18227
 DATE: 02.05.2018

AFTON CREEK PRESERVE
 AFTON, MINNESOTA
 TITLE SHEET, NOTES & LEGEND
 GRADING, DRAINAGE
 AND EROSION CONTROL

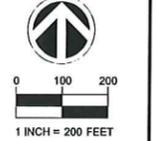
PREPARED FOR:
JOE BUSH



PLOWE
 ENGINEERING, INC.

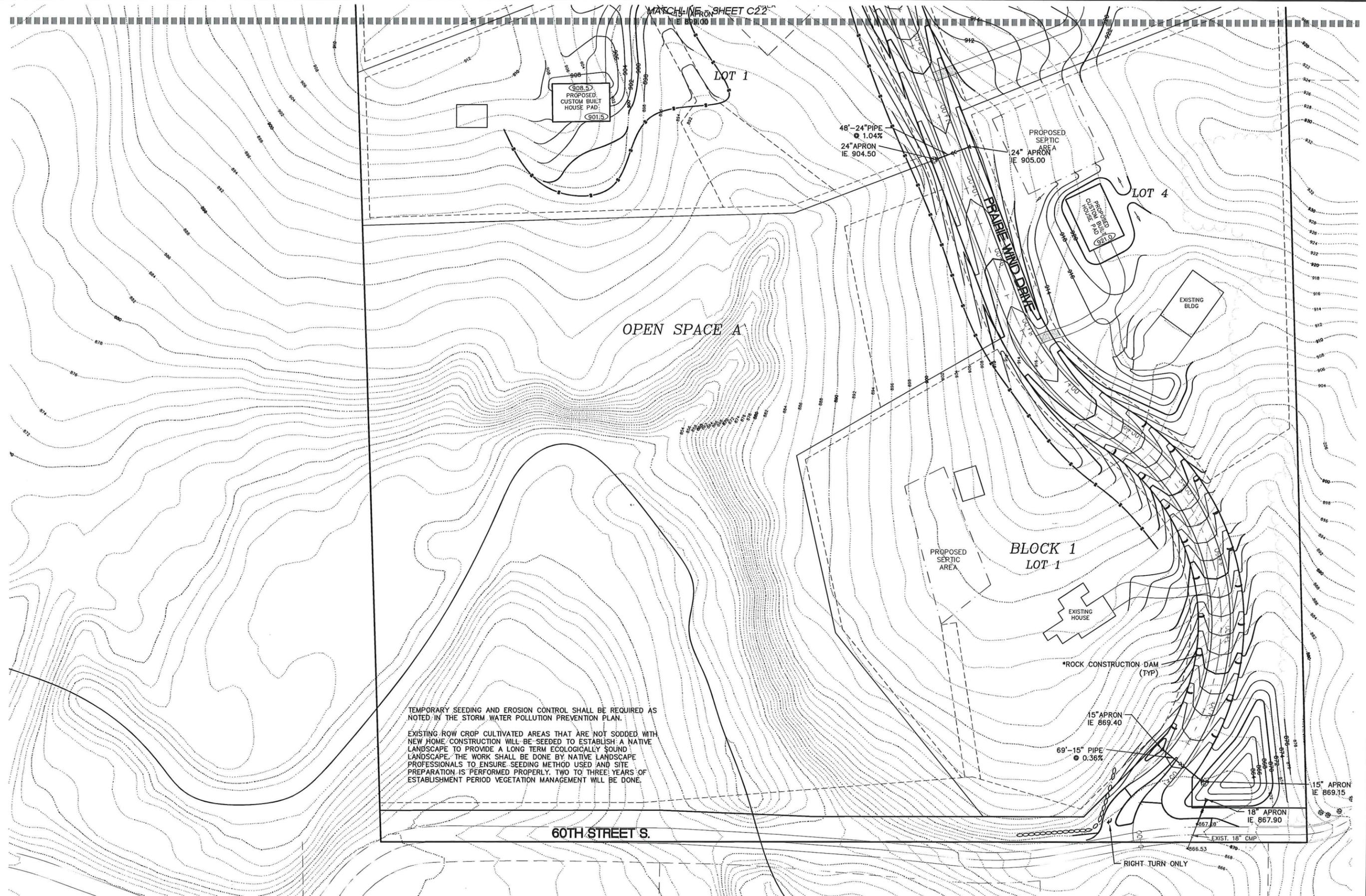
6776 LAKE DRIVE
 SUITE 110
 LINO LAKES, MN 55014
 PHONE: (651) 361-8210
 FAX: (651) 361-8701

NORTH



C1





DRAWN BY: C.M.
 DESIGN BY: C.W.P.
 CHECKED BY: C.W.P.
 PROJ. NO. 17-1707
 ORIGINAL DATE: AUGUST 14, 2017

DATE	REVISION DESCRIPTION
9/5/17	REVISED ENTRANCE
8/21/17	PONDS ADDED/GRADING REVISIONS
2/9/18	STREET/LOT LAYOUT & GRADING REVISION

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 CHARLES W. PLOWE
 DATE: 02.05.2018 LIC. NO. 18227

AFTON CREEK PRESERVE
 AFTON, MINNESOTA
 GRADING, DRAINAGE & EROSION CONTROL PLAN

PREPARED FOR:
 JOE BUSH

SITE PLANNING & ENGINEERING
PLOWE ENGINEERING, INC.
 6776 LAKE DRIVE
 SUITE 110
 LINO LAKES, MN 55014
 PHONE: (651) 361-8210
 FAX: (651) 361-8701

NORTH

 0 30 60
 1 INCH = 60 FEET

C2.1

TEMPORARY SEEDING AND EROSION CONTROL SHALL BE REQUIRED AS NOTED IN THE STORM WATER POLLUTION PREVENTION PLAN.
 EXISTING ROW CROP CULTIVATED AREAS THAT ARE NOT SODDED WITH NEW HOME CONSTRUCTION WILL BE SEED TO ESTABLISH A NATIVE LANDSCAPE TO PROVIDE A LONG TERM ECOLOGICALLY SOUND LANDSCAPE. THE WORK SHALL BE DONE BY NATIVE LANDSCAPE PROFESSIONALS TO ENSURE SEEDING METHOD USED AND SITE PREPARATION IS PERFORMED PROPERLY. TWO TO THREE YEARS OF ESTABLISHMENT PERIOD VEGETATION MANAGEMENT WILL BE DONE.

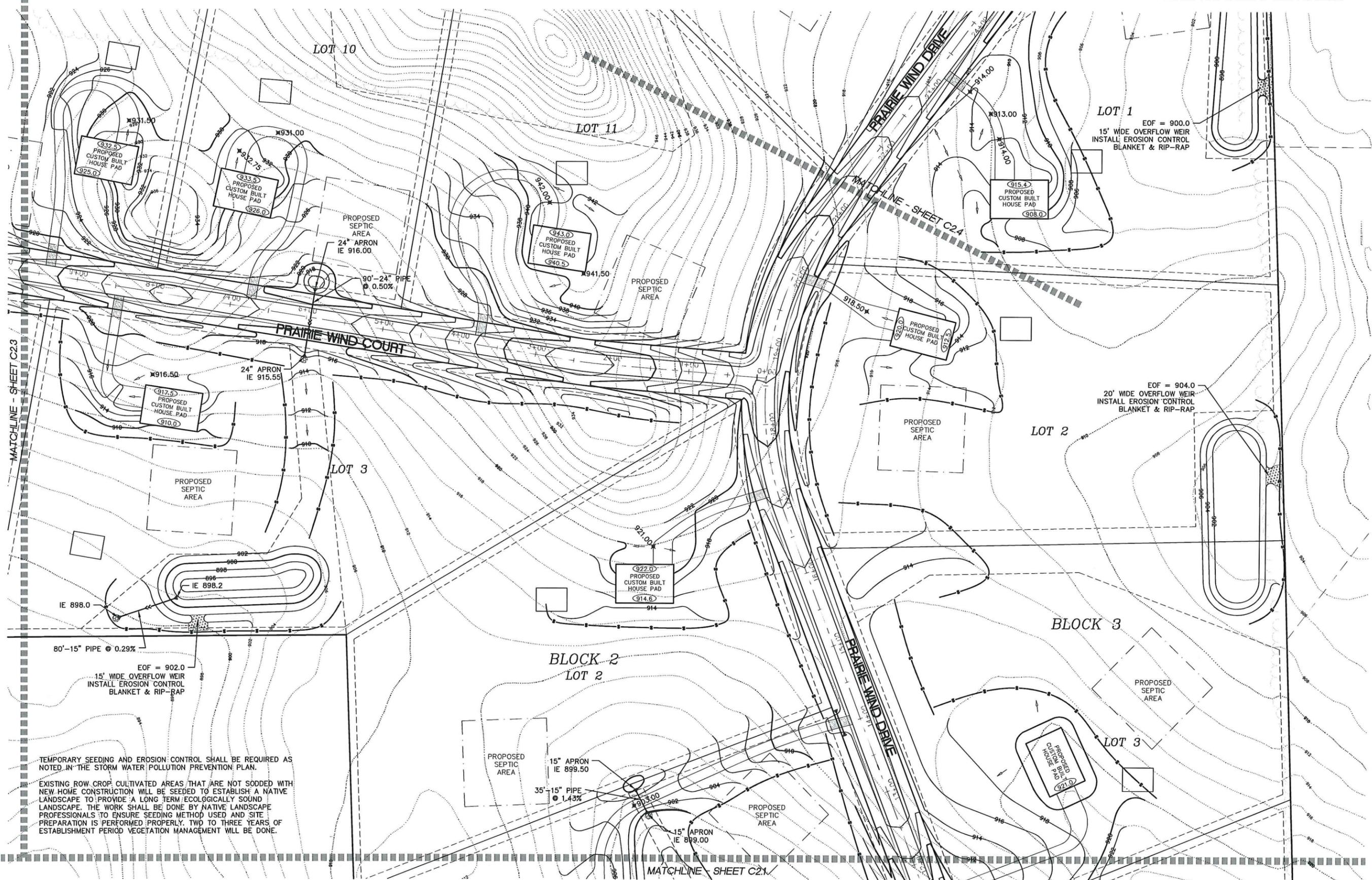
NOTE: HOUSE PAD GRADING CONCEPTUAL ONLY. FINAL GRADING TO BE DETERMINED WITH ACTUAL HOUSE PLAN AND LOCATION.

—s— PROPOSED SILT FENCE
 PROPOSED ROCK CONSTRUCTION ENTRANCE*
 *TO BE INSTALLED PRIOR TO START OF HOUSE PAD GRADING

S:\afton\creek\lino\17-1707 CAD\17-1707 E&S & S&S 2/9/2018

NOTE: HOUSE PAD GRADING CONCEPTUAL ONLY.
FINAL GRADING TO BE DETERMINED WITH
ACTUAL HOUSE PLAN AND LOCATION.

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DRAWN BY:	DESIGN BY:
C.M.	C.W.P.
CHKD BY:	PROJ. NO.
C.W.P.	17-1707
ORIGINAL DATE:	
AUGUST 14, 2017	
DATE	REVISION DESCRIPTION
8/5/17	ADDED WALKING PATH & PARKING
9/21/17	PONDS, ADDED GRADING REVISIONS
2/5/18	STREET/LOT LAYOUT & GRADING REVISION

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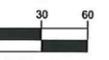
Charles W. Plowe
 CHARLES W. PLOWE
 LIC. NO. 18227
 DATE: 02.05.2018

AFTON CREEK PRESERVE
AFTON, MINNESOTA
 GRADING, DRAINAGE & EROSION CONTROL PLAN

PREPARED FOR:
JOE BUSH


 SITE PLANNING & ENGINEERING
PLOWE ENGINEERING, INC.
 6776 LAKE DRIVE
 SUITE 110
 LINDO LAKES, MN 55014
 PHONE: (651) 361-8210
 FAX: (651) 361-8701

NORTH


 1 INCH = 60 FEET

C2.2

DATE	REVISION DESCRIPTION
9/5/17	ADDED WALKING PATH & PARKING
9/21/17	PONDS ADDED/GRADING REVISIONS
2/15/18	STREET/LOT LAYOUT & GRADING REVISION

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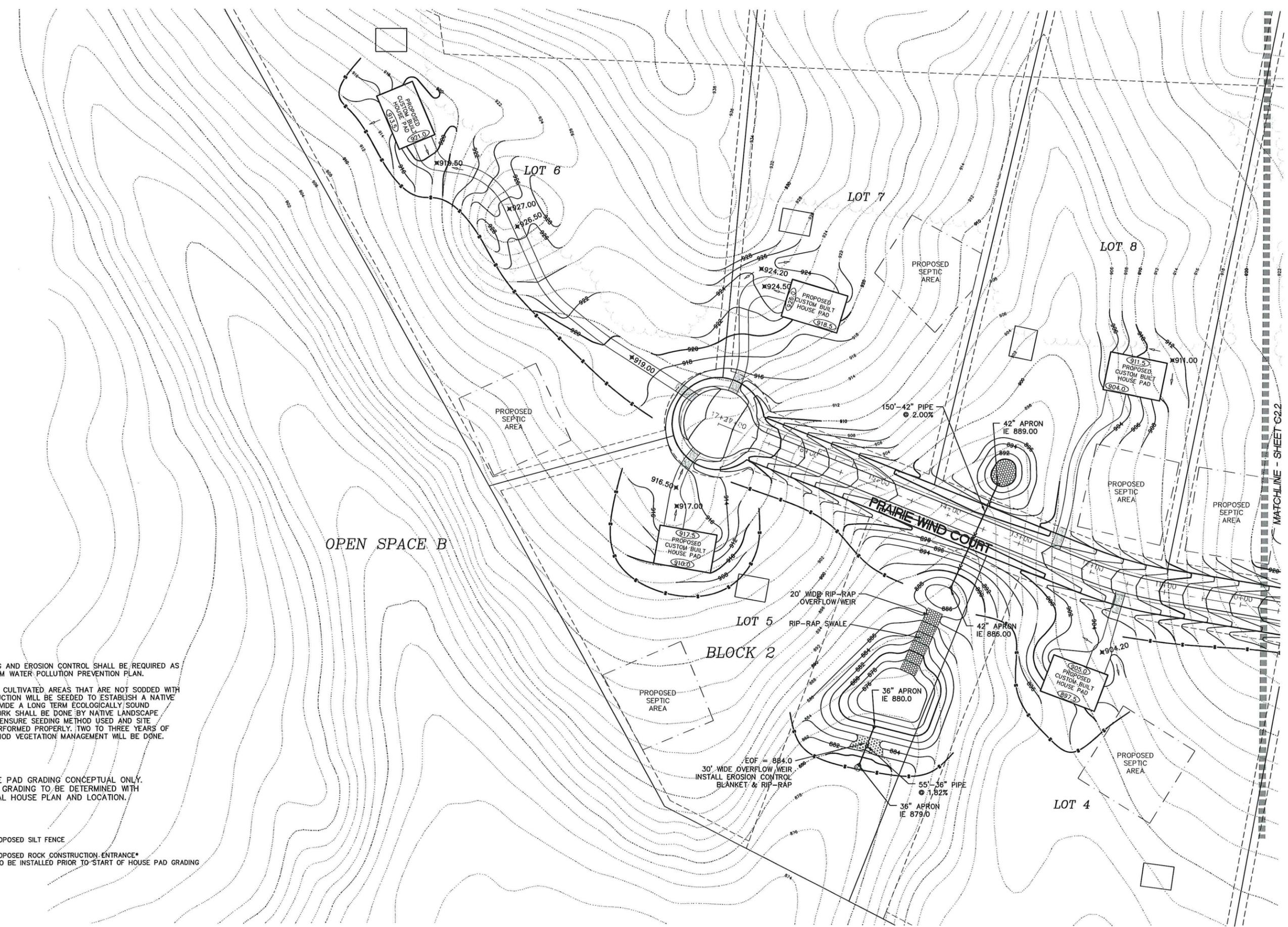
AFTON CREEK PRESERVE
 AFTON, MINNESOTA
 GRADING, DRAINAGE & EROSION CONTROL PLAN

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 SITE PLANNING & ENGINEERING
 6776 LAKE DRIVE
 SUITE 110
 LINDO LAKES, MN 55014
 PHONE: (651) 361-8210
 FAX: (651) 361-8701



C2.3



TEMPORARY SEEDING AND EROSION CONTROL SHALL BE REQUIRED AS NOTED IN THE STORM WATER POLLUTION PREVENTION PLAN.

EXISTING ROW CROP CULTIVATED AREAS THAT ARE NOT SODED WITH NEW HOME CONSTRUCTION WILL BE SEED TO ESTABLISH A NATIVE LANDSCAPE TO PROVIDE A LONG TERM ECOLOGICALLY SOUND LANDSCAPE. THE WORK SHALL BE DONE BY NATIVE LANDSCAPE PROFESSIONALS TO ENSURE SEEDING METHOD USED AND SITE PREPARATION IS PERFORMED PROPERLY. TWO TO THREE YEARS OF ESTABLISHMENT PERIOD VEGETATION MANAGEMENT WILL BE DONE.

NOTE: HOUSE PAD GRADING CONCEPTUAL ONLY. FINAL GRADING TO BE DETERMINED WITH ACTUAL HOUSE PLAN AND LOCATION.

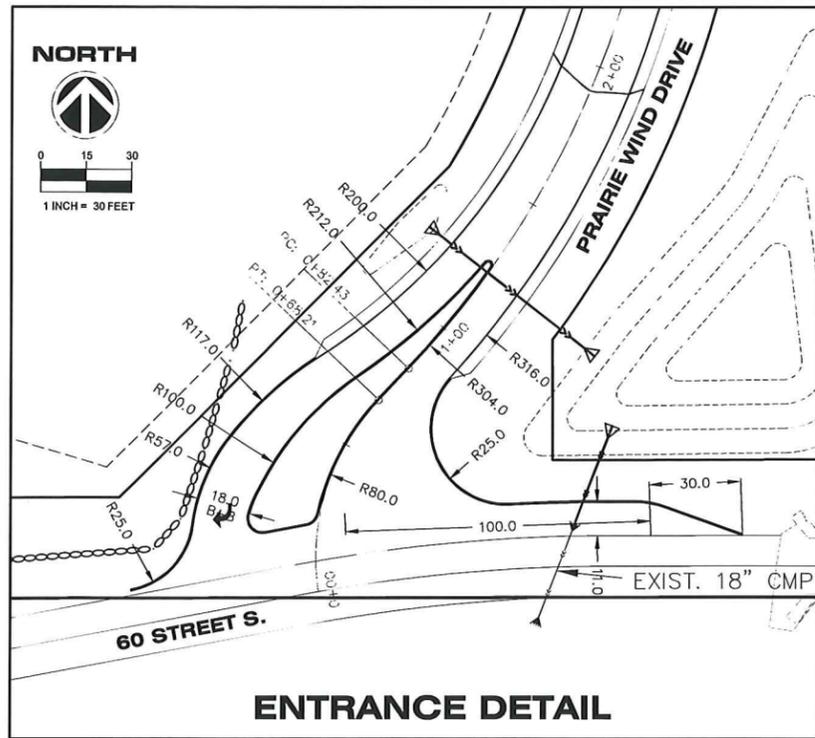
- s— PROPOSED SILT FENCE
- ▨ PROPOSED ROCK CONSTRUCTION ENTRANCE*
 *TO BE INSTALLED PRIOR TO START OF HOUSE PAD GRADING

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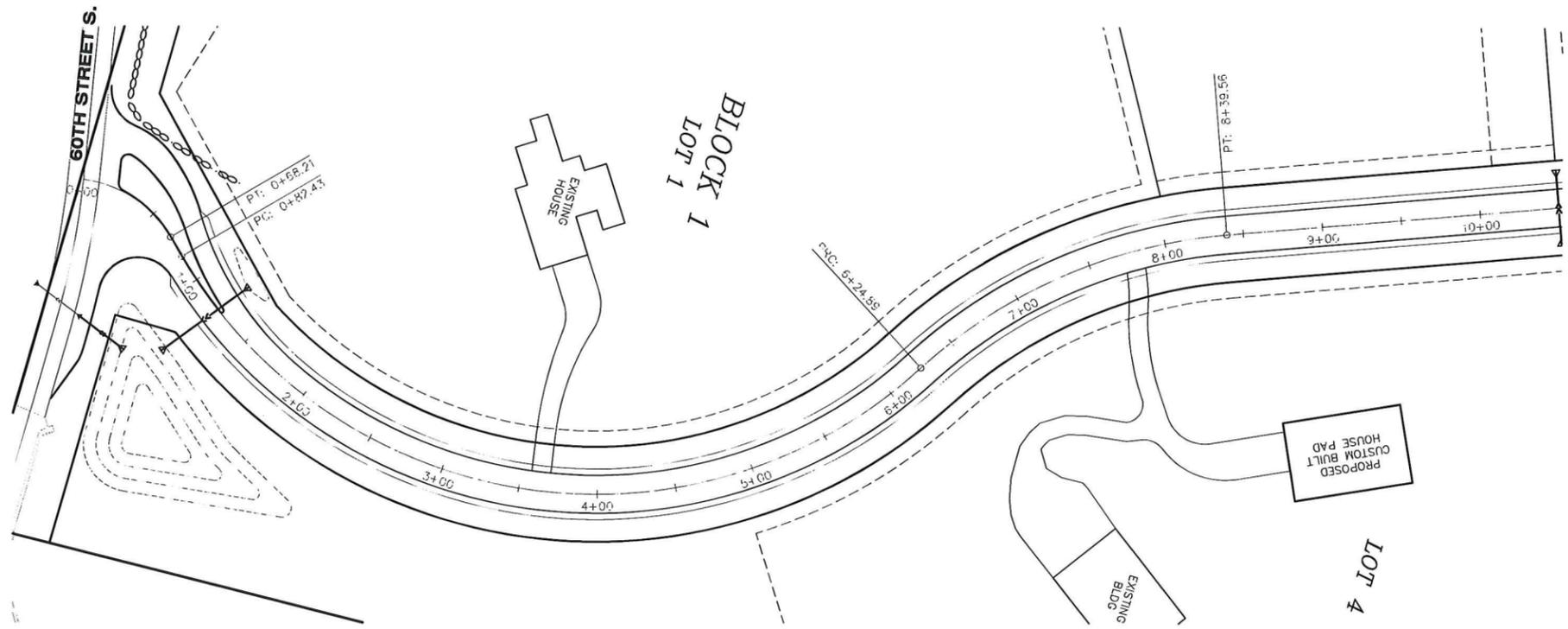
NORTH



1 INCH = 30 FEET

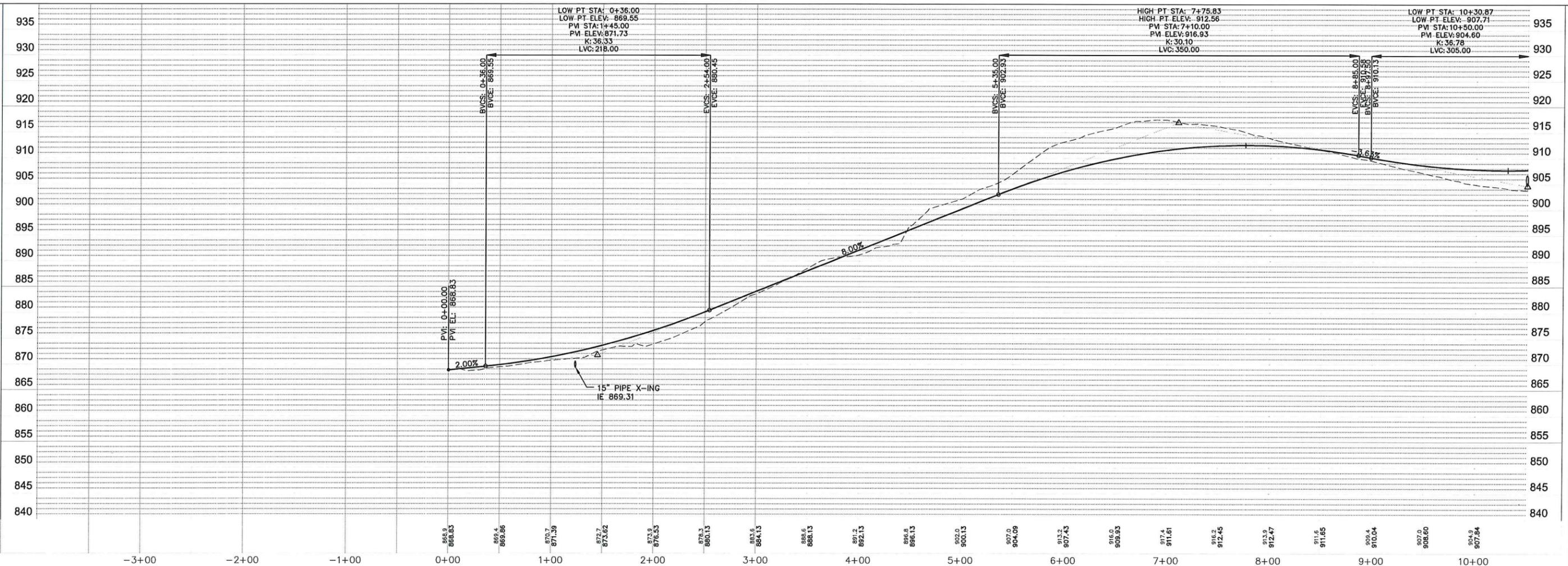
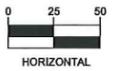
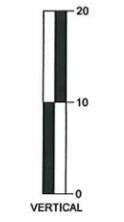


ENTRANCE DETAIL



PRAIRIE WIND DRIVE

NORTH



PLAN & PROFILE - PRAIRIE WIND DRIVE (0+00 TO 10+00)
AFTON CREEK PRESERVE

DRAWN BY: C.M.
DESIGN BY: C.W.P.
CHKD BY: C.W.P.
PROJ. NO.: 17-1707

ORIGINAL DATE: AUGUST 14, 2017

DATE	REVISION DESCRIPTION
9/5/17	REVISED ENTRANCE
9/21/17	MISC. REVISIONS
2/15/18	STREET/LOT LAYOUT & GRADING REVISION

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Charles W. Plowe
CHARLES W. PLOWE
LIC. NO. 18227
DATE: 02.05.2018

AFTON CREEK PRESERVE
AFTON, MINNESOTA
PLAN & PROFILE
PRAIRIE WIND DRIVE (0+00 TO 10+00)

PREPARED FOR:
JOE BUSH



SITE PLANNING & ENGINEERING

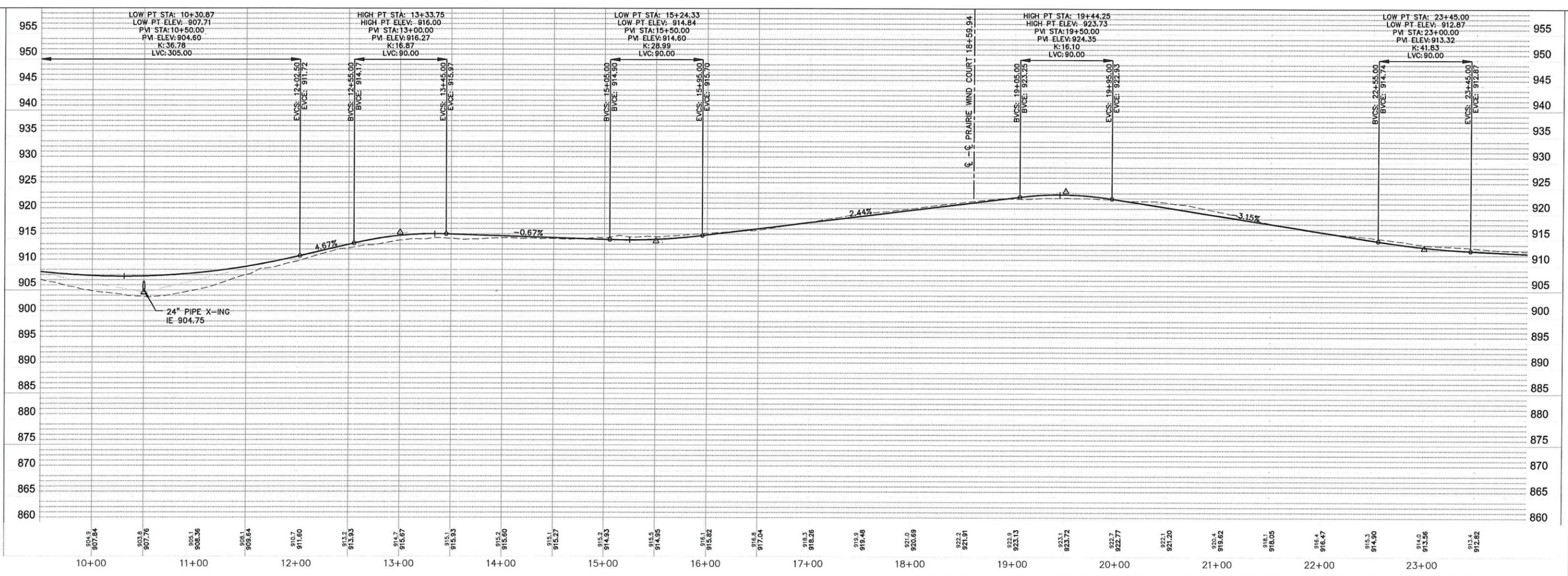
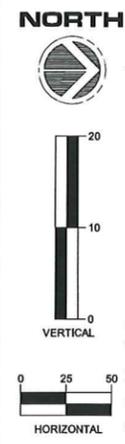
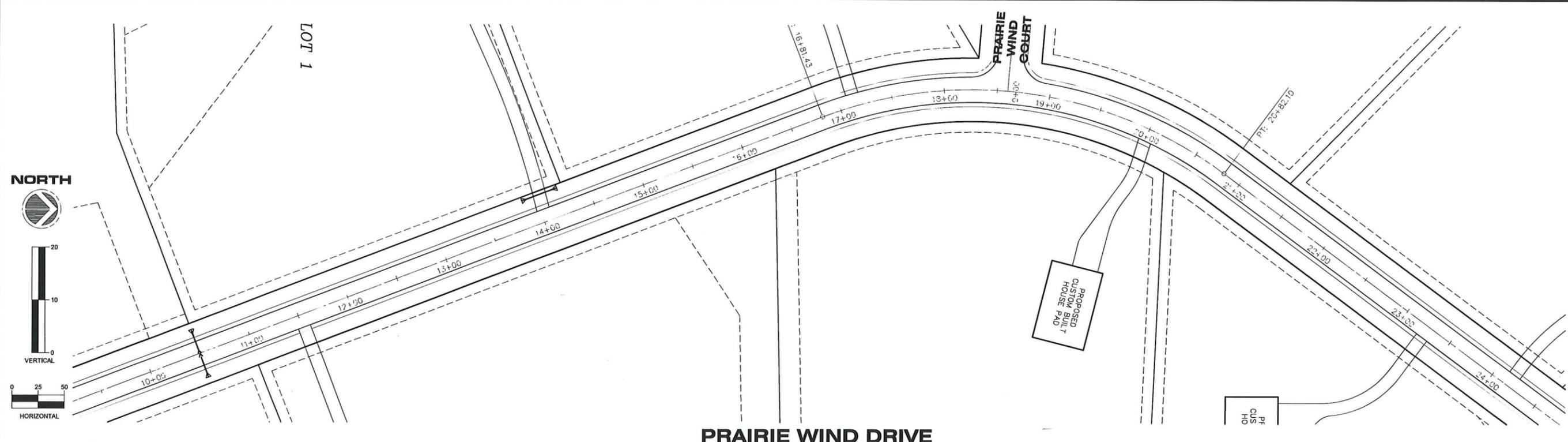
PLOWE
ENGINEERING, INC.

6776 LAKE DRIVE
SUITE 110
LINO LAKES, MN 55014
PHONE: (651) 361-8210
FAX: (651) 361-8701

C3.1

DATE	REVISION DESCRIPTION
9/11/17	ADDED DIMENSIONS
9/21/17	MISC. REVISIONS
2/15/18	STREET/LOT LAYOUT & GRADING REVISION

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Charles W. Plowe
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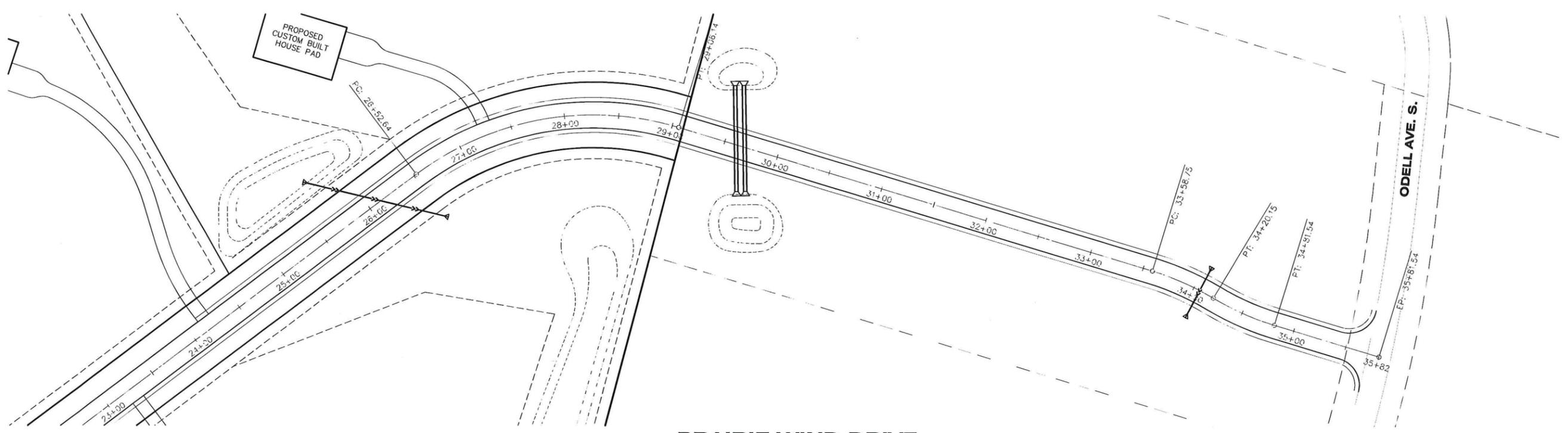
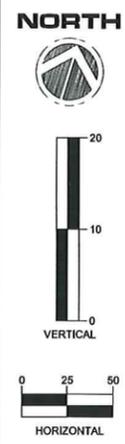


AFTON CREEK PRESERVE
 AFTON, MINNESOTA
 PLAN & PROFILE
 PRAIRIE WIND DRIVE (10+00 TO 23+50)

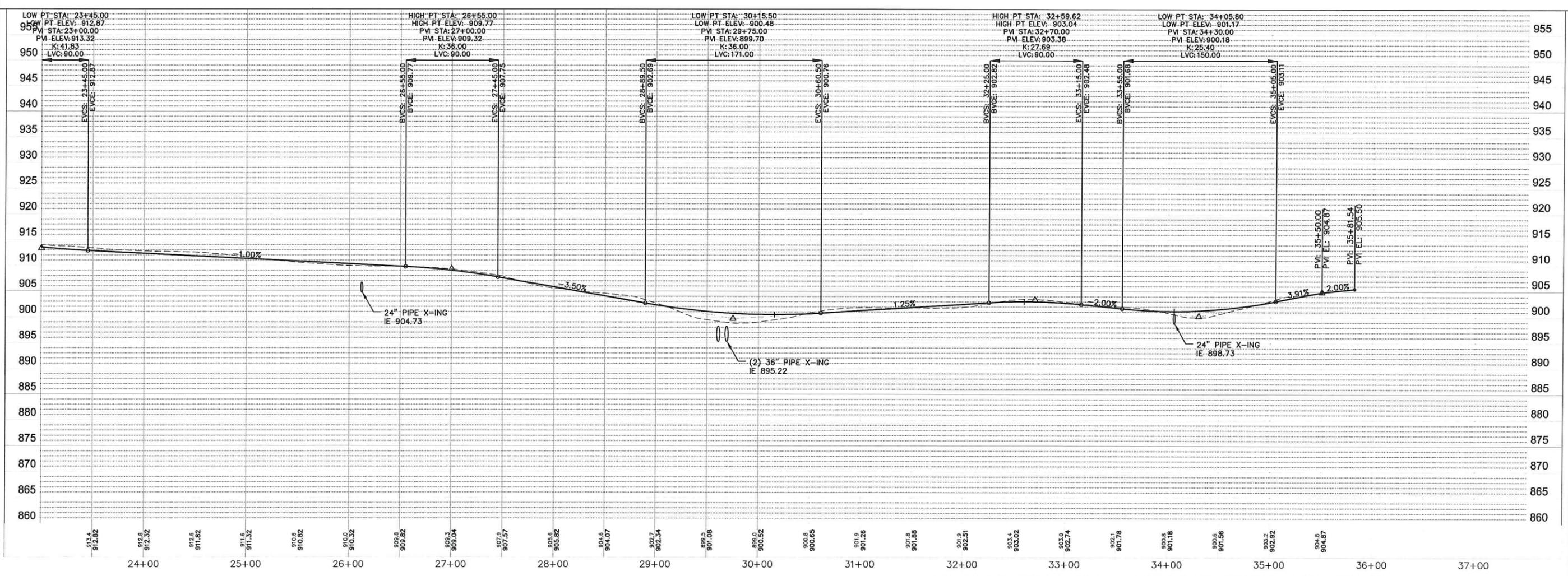
PREPARED FOR:
 JOE BUSH

SITE PLANNING & ENGINEERING
PLOWE ENGINEERING, INC.
 6776 LAKE DRIVE
 SUITE 110
 LINO LAKES, MN 55014
 PHONE: (651) 361-8210
 FAX: (651) 361-8701

DRAWN BY:	DESIGN BY:
C.M.	C.W.P.
CHKD BY:	PROJ. NO.
C.W.P.	17-1707
ORIGINAL DATE:	
AUGUST 14, 2017	
DATE	REVISION DESCRIPTION
9/5/17	ADDED WALKING PATH & PARKING
8/21/17	MISC REVISIONS
2/5/18	STREET/LOT LAYOUT & GRADING REVISION



PRAIRIE WIND DRIVE



PLAN & PROFILE - PRAIRIE WIND DRIVE (23+50 TO 35+79)
AFTON CREEK PRESERVE

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Charles W. Plowe
 CHARLES W. PLOWE
 LIC. NO. 18227
 DATE: 02.05.2018

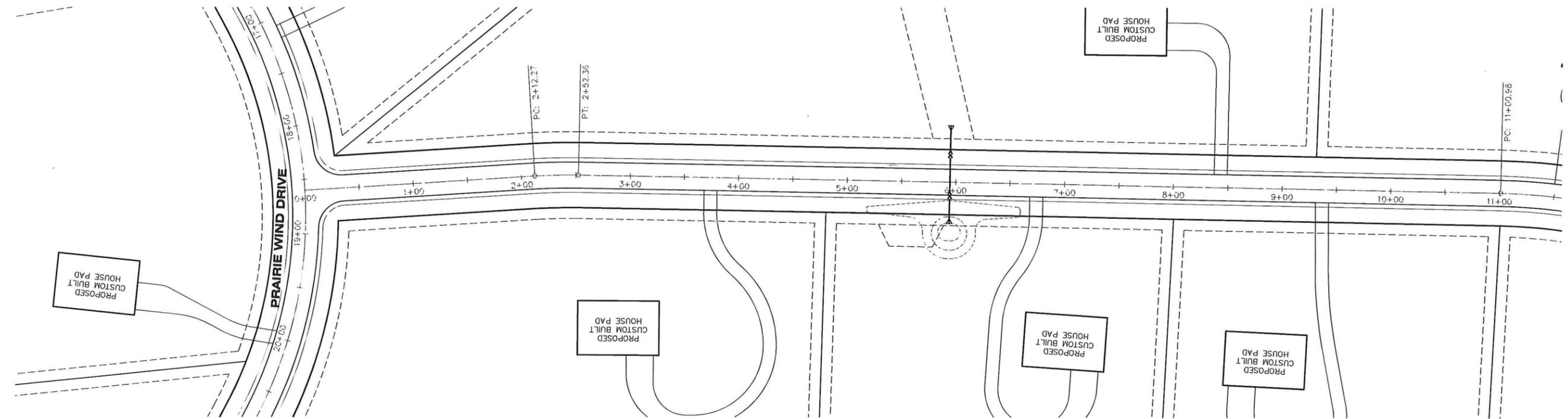
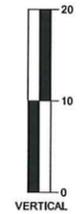
AFTON CREEK PRESERVE
AFTON, MINNESOTA
 PLAN & PROFILE
 PRAIRIE WIND DRIVE (23+50 TO 35+79)

PREPARED FOR:
JOE BUSH

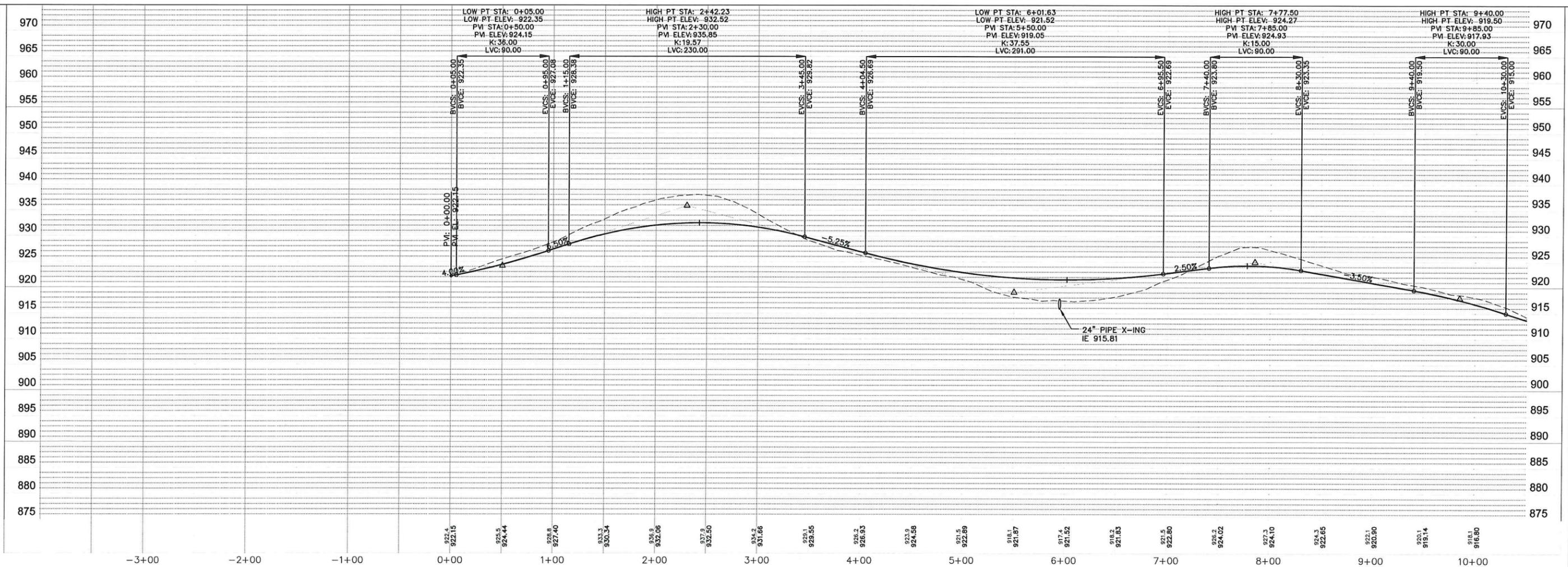
PLOWE ENGINEERING, INC.
 6776 LAKE DRIVE
 SUITE 110
 LINDO LAKES, MN 55014
 PHONE: (651) 361-8210
 FAX: (651) 361-8701

C3.3

NORTH



PRAIRIE WIND COURT



PLAN & PROFILE - PRAIRIE WIND COURT (0+00 TO 10+00)
AFTON CREEK PRESERVE

DRAWN BY: C.M.
DESIGN BY: C.W.P.
CHKD BY: C.W.P.
PROJ. NO. 17-1707

ORIGINAL DATE:
AUGUST 14, 2017

DATE	REVISION DESCRIPTION
9/11/17	ADDED DIMENSIONS
9/21/17	MISC. REVISIONS
2/15/18	STREET/LOT LAYOUT & GRADING REVISION

I hereby certify that this plan 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.

Charles W. Plowe
 CHARLES W. PLOWE
 LIC. NO. 18227
 DATE: 02.05.2018

AFTON CREEK PRESERVE
AFTON, MINNESOTA
 PLAN & PROFILE
 PRAIRIE WIND COURT (0+00 TO 10+00)

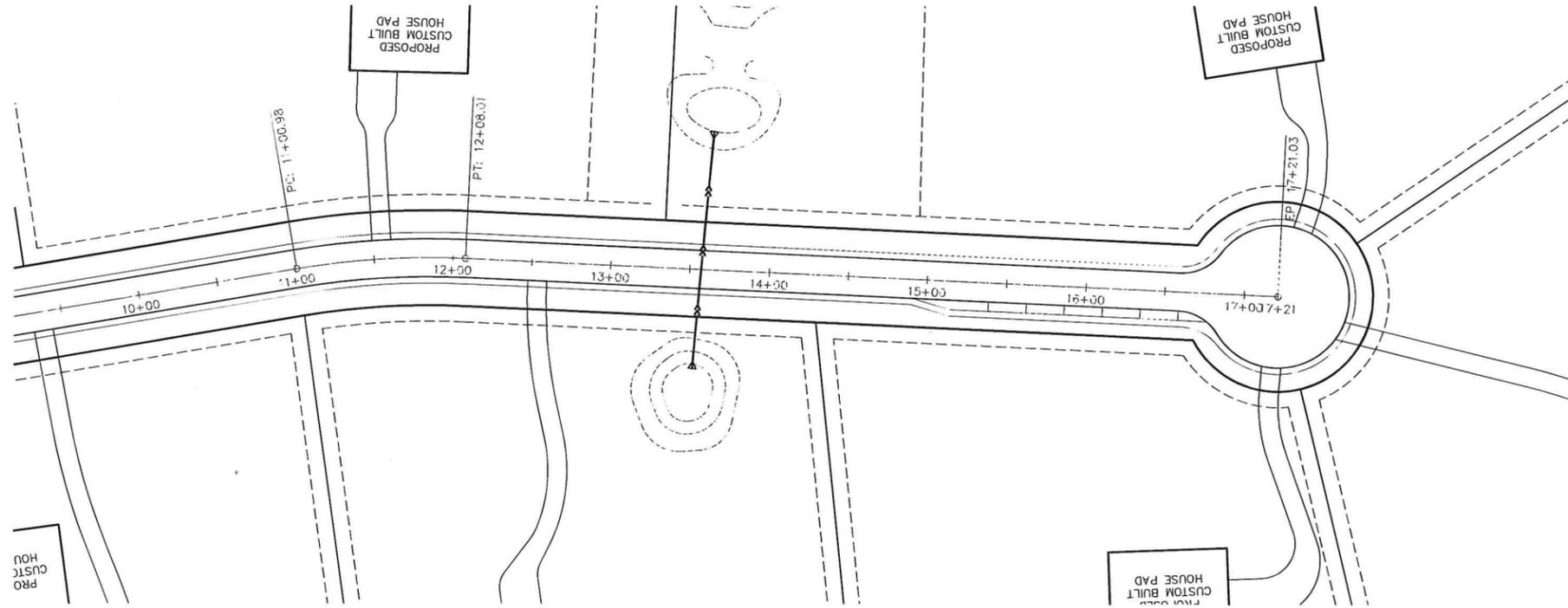
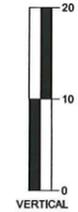
PREPARED FOR:
JOE BUSH



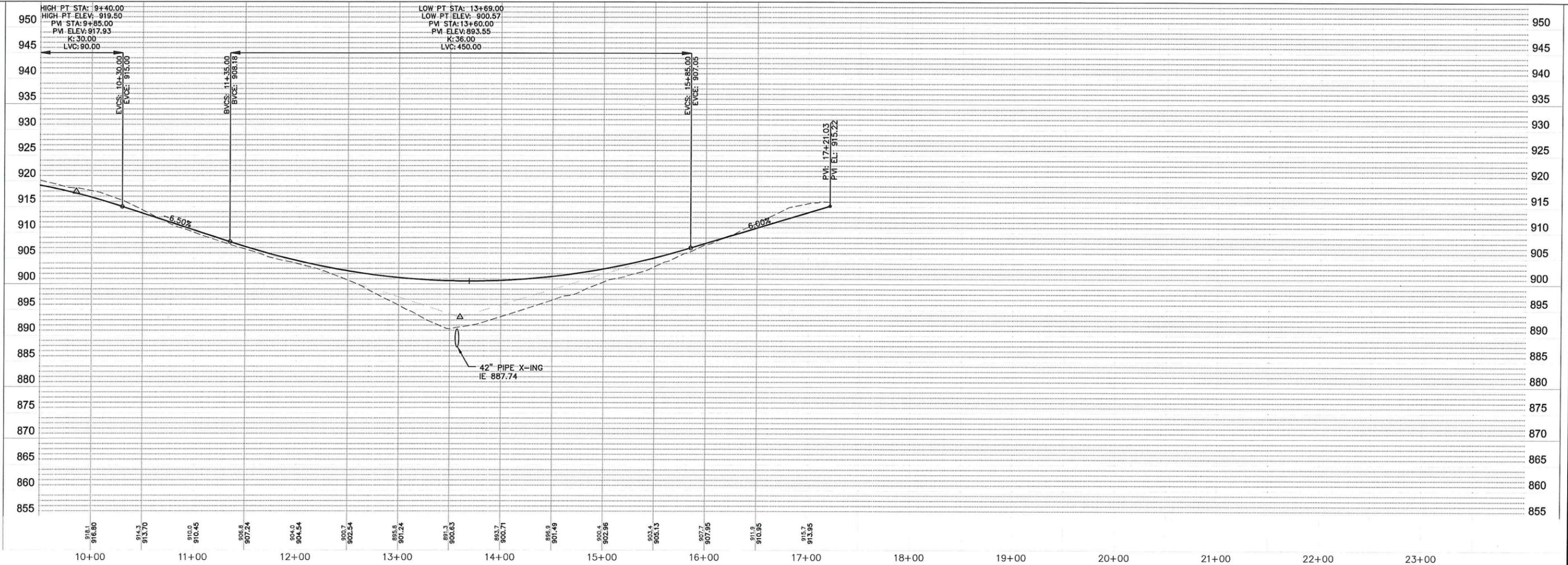
SITE PLANNING & ENGINEERING
PLOWE ENGINEERING, INC.
 6776 LAKE DRIVE
 SUITE 110
 LINO LAKES, MN 55014
 PHONE: (651) 361-8210
 FAX: (651) 361-8701

C3.4

NORTH



PRAIRIE WIND COURT



PLAN & PROFILE - PRAIRIE WIND COURT (10+00 TO 17+81)
AFTON CREEK PRESERVE

DRAWN BY: C.M.	DESIGN BY: C.W.P.
CHCKD BY: C.W.P.	PROJ. NO. 17-1707
ORIGINAL DATE: AUGUST 14, 2017	

DATE	REVISION DESCRIPTION
9/11/17	ADDED DIMENSIONS
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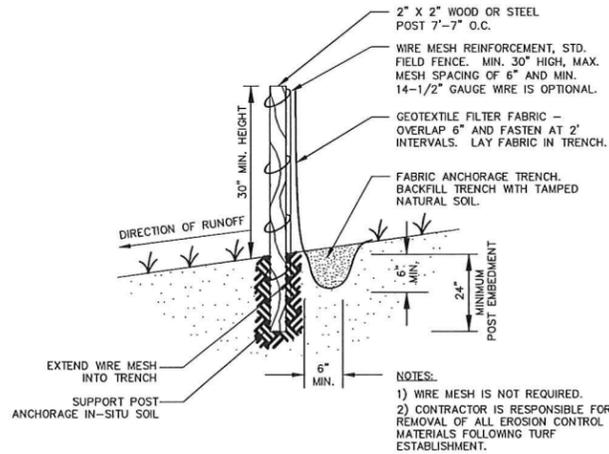
Charles W. Plowe
 CHARLES W. PLOWE
 LIC. NO. 18227
 DATE: 02.05.2018

AFTON CREEK PRESERVE
AFTON, MINNESOTA
 PLAN & PROFILE
 PRAIRIE WIND COURT (10+00 TO 17+81)

PREPARED FOR:
JOE BUSH

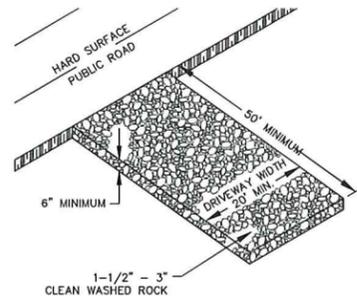
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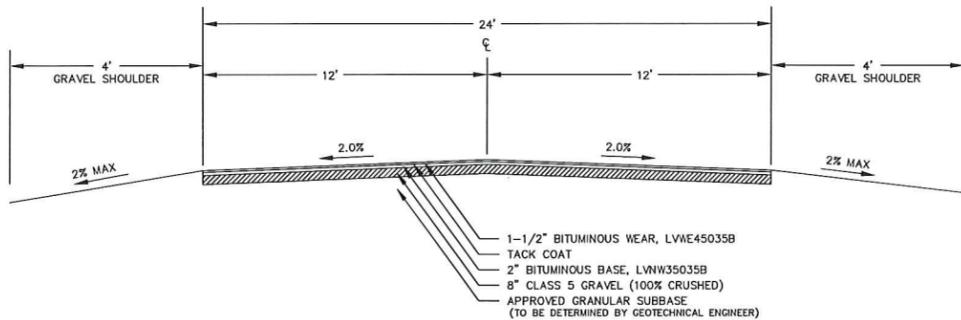
SILT FENCE

NOT TO SCALE



ROCK CONSTRUCTION ENTRANCE

NOT TO SCALE



STANDARD STREET SECTION

NOT TO SCALE

GRADING, DRAINAGE & EROSION CONTROL NOTES

PRIOR TO ANY GRADING OPERATIONS, THE CONTRACTOR SHALL PROVIDE WMCO INLET PROTECTION (OR OTHER APPROVED EQUAL) FOR ALL STORM SEWER INLETS THAT WILL RECEIVE RUN-OFF FROM CONSTRUCTION ACTIVITIES.

CONTRACTOR TO PROVIDE TOPSOIL STOCKPILES AT LOCATION DESIGNATED BY OWNER. PLACE STOCKPILES AS FAR FROM DRAINAGE WAYS AS POSSIBLE. PROVIDE SILT FENCE AT DOWNSTREAM SIDE OF STOCKPILE LOCATIONS. IF STOCKPILE IS TO BE IN-PLACE LONGER THAN 7 DAYS, PROVIDE SEED AND MULCH.

THE CONTRACTOR SHALL PROVIDE ALL SOD, SEED, MULCH AND FERTILIZER WHICH SHALL CONFORM WITH THE FOLLOWING MNDOT SPECIFICATIONS AS MODIFIED BELOW.

ITEM	MNDOT SPECIFICATION/NOTES
SOD	3878
SEED **	3876
* FOR TURF ESTABLISHMENT	
COMMERCIAL TURF	MNDOT MIX 25-131 (220 LBS/ACRE)
RESIDENTIAL TURF	MNDOT MIX 25-131 (120 LBS/ACRE)
TEMPORARY	
FALL COVER	MNDOT MIX 21-112 (100 LBS/ACRE)
SPRING/SUMMER	MNDOT MIX 21-111 (100 LBS/ACRE)
SOIL-BUILDING COVER	MNDOT MIX 21-113 (110 LBS/ACRE)
1-2 YEARS COVER	MNDOT MIX 22-111 (30.5 LBS/ACRE)
2-5 YEARS COVER	MNDOT MIX 22-112 (40 LBS/ACRE)
MULCH	3882 (TYPE 1 - DISC ANCHORED)
FERTILIZER	3881
WOOD FIBER BLANKET	3885 (CATEGORY 2)

* MOW A MINIMUM OF:
RESIDENTIAL TURF - ONCE PER 2 WEEKS
COMMERCIAL TURF - ONCE PER 4 WEEKS

** SEEDED AREAS SHALL BE EITHER MULCHED OR COVERED BY FIBROUS BLANKETS TO PROTECT SEEDS AND LIMIT EROSION.

ALL EROSION AND SEDIMENT CONTROL MEASURES SHOWN ON THE PLANS OR IMPLEMENTED IN THE FIELD SHALL BE IN ACCORDANCE WITH THE CITY AND NPDES PHASE II PERMIT REQUIREMENTS, AND THE MPCA'S "PROTECTING WATER QUALITY IN URBAN AREAS BEST MANAGEMENT PRACTICES FOR MINNESOTA."

THE CONTRACTOR SHALL PROVIDE DESIGNATED CONCRETE TRUCK WASHOUT AREA WITH APPROPRIATE SIGNAGE. WASHOUT AREA IS TO BE A MINIMUM OF 50' FROM STORM DRAINS, DITCHES, PONDS, OR OTHER STORMWATER FEATURES. ALL LIQUID AND SOLID WASTE GENERATED BY CONCRETE WASHOUT OPERATIONS MUST BE CONTAINED IN A LEAK-PROOF CONTAINMENT FACILITY OR IMPERMEABLE LINER (E.G. COMPACTED CLAY LINER, IMPERMEABLE GEO-MEMBRANE). AFTER WASTE CONCRETE IS SET, BREAK-UP AND DISPOSE OF PROPERLY.

THE CONTRACTOR SHALL MAINTAIN SILT FENCE, INCLUDING THE REMOVAL OF ACCUMULATED SEDIMENT, THROUGH COMPLETION OF BUILDING CONSTRUCTION. SILT FENCE TO BE REMOVED ONLY AFTER COMPLETION OF BUILDING CONSTRUCTION AND UPON ESTABLISHMENT OF VEGETATION.

THE CONTRACTOR SHALL PAY SPECIAL ATTENTION TO ALL ADJACENT PROPERTY LINES AND MAKE SURE THE EROSION CONTROL PRACTICES IN-PLACE IN THOSE AREAS PREVENT MIGRATION OF SEDIMENT ONTO ADJACENT PROPERTIES.

THE CONTRACTOR SHALL PROVIDE WOOD FIBER BLANKET FOR ALL AREAS OF CONCENTRATED FLOW AND FOR ALL SLOPES 3:1 OR GREATER.

IF ANY SLOPES APPEAR TO BE FAILING, THE CONTRACTOR SHALL PROVIDE ADDITIONAL SILT FENCE, BIOROLLS AND EROSION CONTROL BLANKET AS NEEDED.

THE CONTRACTOR SHALL FINAL GRADE SWALE AREAS UPON STABILIZATION OF UPSTREAM AREAS.

THE CONTRACTOR SHALL SOD ALL DISTURBED DRAINAGE AREAS, INCLUDING SWALES, OVERFLOWS, AROUND STORM SEWER FLARED-END SECTIONS, AND OFF-STREET CATCH BASINS.

UPON GRADING COMPLETION THE CONTRACTOR SHALL PROVIDE NATIVE TOPSOIL, SEED, AND MULCH ANCHORED WITH A STRAIGHT SET DISC WITHIN 48 HOURS OF FINAL GRADING.

EXCESS SOIL SHOULD BE TREATED LIKE OTHER EXPOSED SOIL AND STABILIZED WITHIN 72 HOURS. ANY SOIL STOCKPILES ARE TO HAVE SILT FENCE PLACED ON DOWNSTREAM SIDES AND SHALL NOT BE PLACED IN SURFACE WATERS.

ADJACENT STREETS SHALL BE KEPT CLEAN OF CONSTRUCTION MATERIALS, DIRT, AND OTHER UNDESIRABLE MATERIALS. WHEN MATERIALS OR DEBRIS HAVE WASHED/FLOWED ONTO ADJACENT STREETS, IT IS THE CONTRACTOR'S RESPONSIBILITY TO SWEEP/SCRAPE STREETS AS NECESSARY OR AS DIRECTED BY THE CITY.

DRAWN BY: C.M.
CHKD BY: C.W.P.
C.W.P.

DESIGN BY: C.W.P.
PROJ. NO. 17-1707
ORIGINAL DATE: AUGUST 14, 2017

REVISION DESCRIPTION	DATE

I hereby certify that this plan 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.
Charles W. Plowe
CHARLES W. PLOWE
LIC. NO. 8227
DATE: 02.05.2018

AFTON CREEK PRESERVE
AFTON, MINNESOTA
DETAILS & NOTES

PREPARED FOR:
JOE BUSH

SITE PLANNING & ENGINEERING
PLOWE ENGINEERING, INC.
6776 LAKE DRIVE
SUITE 110
LINO LAKES, MN 55014
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DETAILS & NOTES
AFTON CREEK PRESERVE

C4

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STORMWATER DRAINAGE REPORT
For
Rate Control, Water Quality, Temporary and Permanent
Slope Erosion Control

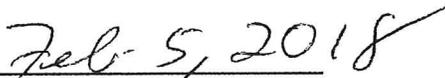
AFTON CREEK PRESERVE

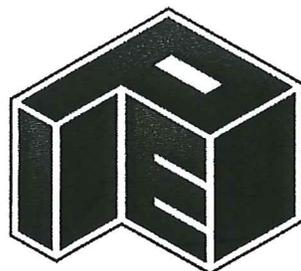
(Plowe #17-1707)

AFTON, MN

DATE: February 5, 2018

I HEREBY CERTIFY THAT THIS PLAN 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.

 
CHARLES W PLOWE, P.E. MN LIC. NO. 18227



PLOWE
ENGINEERING, INC.

6776 Lake Drive, Suite 110
Lino Lakes, Minnesota 55014
Office (651) 361-8210
Fax (651) 361-8701

EXHIBIT K

18-1707 AFTON CREEK PRESERVE

Site Drainage Narrative and Calculations

Date: February 5, 2018

The site is located at Trading Post Trail and 60th^h Street South, Afton, Minnesota. The total site area is 218.55 acres. Approximately 112.02 acres of the site is proposed open space with a conservation easement.

This proposed project includes the development of 18 single family lots. An existing house on one of the proposed lots will remain. All lots are 5.0 acres or larger in size.

Soil tests for septic areas indicate silt loam, loamy fine sand, clay loam and sandy loam with sandstone. Soil borings taken in the proposed roadway indicate sandy silt, brown clay, silty fine sand, brown sandy clay, and silty sand with limestone pieces.

Existing Drainage Conditions

The existing site consists of mostly cultivated crop land and some wooded areas. The site drainage flows south and easterly. A small area in the southwest corner of the site drains north. We have prepared a model for existing conditions with different times of concentration and a more specific representation of existing surface areas. The open space areas (proposed conservation easement area) are not included in the drainage calculation areas. Areas that drain south drains through open space to an existing trout stream.

Proposed Drainage Conditions

The proposed development will consist of one existing house and driveway, paved public streets and 17 additional homes with driveways. The estimated total proposed impervious surface = approximately **308,800 sq. ft. (approximately 3% of the total site and 6.6% of the site** excluding the open space conservation area) The existing wooded area in the northerly area of the site will primarily be left undisturbed. Most of the remaining area is existing crop land except for the existing home area and driveway. The non-impervious areas will consist of small sodded areas around the new homes and native grasses and flowering native grasses in the remaining previous crop land areas. The native grasses will have deep root systems and will provide highly favorable erosion control and promote infiltration on existing slope areas.

NOTE: NOAA Atlas 14 rainfall data is used for this drainage report:

2-year	2.81-in
10-year	4.17-in
100-year	7.33-in

Erosion Control

Erosion control for slopes and all other areas shall be managed as noted:

Temporary seeding and erosion control shall be required as noted in the STORM WATER POLLUTION PREVENTION PLAN.

Existing row crop cultivated areas that are not sodded with new home construction will be seeded to establish a native landscape to provide a long term ecologically sound landscape. The work shall be done by native landscape professionals to ensure seeding method used and site preparation is

performed properly. Two to three years of establishment period vegetation management will be done.

Volume Control

Based on hydro-cad calculations for existing and proposed conditions, the runoff volume will decrease with the change from substantial row crop areas to permanent planted native grasses.

Proposed storm water basins will provide water quality treatment and rate control. Culverts are included were required to maintain the existing drainage patterns.

Rate Control

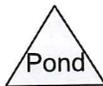
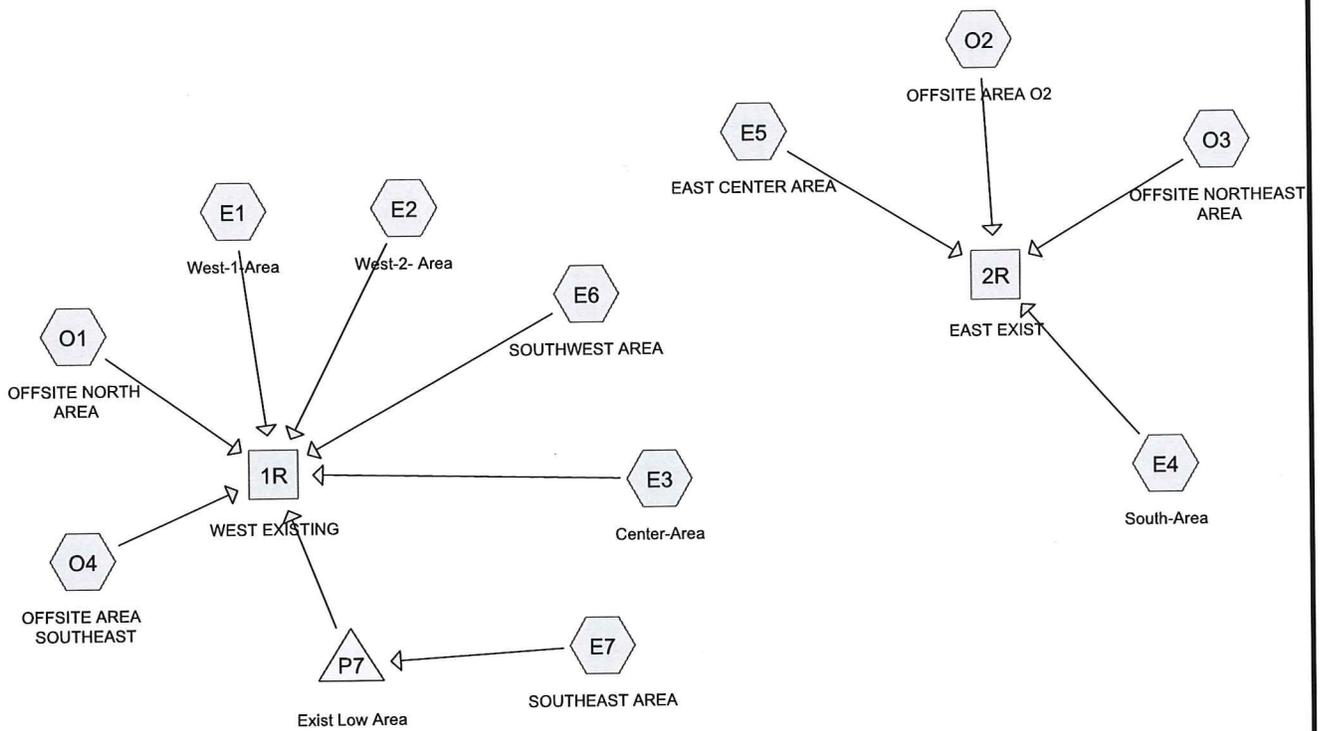
	2-YEAR (CFS)	10-YEAR (CFS)	100-YEAR (CFS)
EXISTING WEST	79.06	165.13	366.71
PROPOSED WEST	39.99	106.19	254.07
EXISTING EAST	43.83	88.37	190.54
PROPOSED EAST	25.27	62.01	171.98

Volume comparison

	2-YEAR (AC-FT)	10-YEAR (AC-FT)	100-YEAR (AC-FT)
EXISTING WEST	12.05	23.94	55.39
PROPOSED WEST	8.70	19.52	41.63
EXISTING EAST	7.19	14.26	32.99
PROPOSED EAST	4.58	10.92	28.74

Phosphorous load

We have not provided calculations for phosphorous load at this time. It is our opinion that the phosphorous export will be less than existing conditions based on the change in runoff surfaces from cultivated row crops to permanent native grass areas. And proposed ponds will provide additional treatment.



Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
6.408	74	>75% Grass cover, Good, HSG C (E5, E7)
0.274	98	IMPERV (O4)
0.011	98	ROOF (O3)
0.413	98	ROOF AND DRIVEWAY (E7)
74.749	85	Row crops, straight row, Good, HSG C (E1, E2, E3, E4, E5, E6, E7)
136.290	76	Woods/grass comb., Fair, HSG C (E1, E2, E3, E4, E6, O1, O2, O3, O4)
218.145	79	TOTAL AREA

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchmen Numbers
0.000	0.000	6.408	0.000	0.000	6.408	>75% Grass cover, Good	E5, E7
0.000	0.000	0.000	0.000	0.274	0.274	IMPERV	O4
0.000	0.000	0.000	0.000	0.011	0.011	ROOF	O3
0.000	0.000	0.000	0.000	0.413	0.413	ROOF AND DRIVEWAY	E7
0.000	0.000	74.749	0.000	0.000	74.749	Row crops, straight row, Good	E1, E2, E3, E4, E5, E6, E7
0.000	0.000	136.290	0.000	0.000	136.290	Woods/grass comb., Fair	E1, E2, E3, E4, E6, O1, O2, O3, O4
0.000	0.000	217.446	0.000	0.699	218.145	TOTAL AREA	

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentE1: West-1-Area	Runoff Area=365,007 sf 0.00% Impervious Runoff Depth>1.16"
	Flow Length=300' Slope=0.0600 '/' Tc=35.6 min CN=81 Runoff=7.09 cfs 0.809 af
SubcatchmentE2: West-2- Area	Runoff Area=1,201,062 sf 0.00% Impervious Runoff Depth>1.15"
	Flow Length=1,250' Tc=48.7 min CN=81 Runoff=19.60 cfs 2.652 af
SubcatchmentE3: Center-Area	Runoff Area=624,641 sf 0.00% Impervious Runoff Depth>1.36"
	Flow Length=850' Tc=20.0 min CN=84 Runoff=19.42 cfs 1.619 af
SubcatchmentE4: South-Area	Runoff Area=1,036,006 sf 0.00% Impervious Runoff Depth>1.35"
	Flow Length=1,000' Tc=25.2 min CN=84 Runoff=28.56 cfs 2.682 af
SubcatchmentE5: EAST CENTER AREA	Runoff Area=331,556 sf 0.00% Impervious Runoff Depth>1.35"
	Flow Length=550' Slope=0.0250 '/' Tc=28.4 min CN=84 Runoff=8.58 cfs 0.858 af
SubcatchmentE6: SOUTHWEST AREA	Runoff Area=1,220,375 sf 0.00% Impervious Runoff Depth>1.16"
	Flow Length=750' Tc=24.2 min CN=81 Runoff=29.02 cfs 2.713 af
SubcatchmentE7: SOUTHEAST AREA	Runoff Area=285,179 sf 6.31% Impervious Runoff Depth>0.88"
	Flow Length=750' Tc=20.6 min CN=76 Runoff=5.30 cfs 0.482 af
SubcatchmentO1: OFFSITE NORTH	Runoff Area=1,992,036 sf 0.00% Impervious Runoff Depth>0.87"
	Flow Length=500' Slope=0.0480 '/' Tc=58.5 min CN=76 Runoff=21.11 cfs 3.329 af
SubcatchmentO2: OFFSITE AREA O2	Runoff Area=166,588 sf 0.00% Impervious Runoff Depth>0.88"
	Flow Length=250' Slope=0.2000 '/' Tc=19.0 min CN=76 Runoff=3.22 cfs 0.282 af
SubcatchmentO3: OFFSITE	Runoff Area=2,025,025 sf 0.02% Impervious Runoff Depth>0.87"
	Flow Length=2,500' Tc=74.6 min CN=76 Runoff=18.29 cfs 3.367 af
SubcatchmentO4: OFFSITE AREA	Runoff Area=254,917 sf 4.68% Impervious Runoff Depth>0.93"
	Flow Length=575' Slope=0.0760 '/' Tc=54.4 min CN=77 Runoff=3.02 cfs 0.452 af
Reach 1R: WEST EXISTING	Inflow=79.06 cfs 12.048 af Outflow=79.06 cfs 12.048 af
Reach 2R: EAST EXIST	Inflow=43.83 cfs 7.189 af Outflow=43.83 cfs 7.189 af
Pond P7: Exist Low Area	Peak Elev=869.04' Storage=750 cf Inflow=5.30 cfs 0.482 af Discarded=0.01 cfs 0.004 af Primary=5.23 cfs 0.474 af Outflow=5.23 cfs 0.477 af

Total Runoff Area = 218.145 ac Runoff Volume = 19.245 af Average Runoff Depth = 1.06"
99.68% Pervious = 217.446 ac 0.32% Impervious = 0.699 ac

Summary for Subcatchment E1: West-1-Area

Runoff = 7.09 cfs @ 12.46 hrs, Volume= 0.809 af, Depth> 1.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 2-yr Rainfall=2.81"

Area (sf)	CN	Description
196,472	85	Row crops, straight row, Good, HSG C
168,535	76	Woods/grass comb., Fair, HSG C
365,007	81	Weighted Average
365,007		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
35.6	300	0.0600	0.14		Sheet Flow, WOODS Woods: Light underbrush n= 0.400 P2= 2.81"

Summary for Subcatchment E2: West-2- Area

Runoff = 19.60 cfs @ 12.66 hrs, Volume= 2.652 af, Depth> 1.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 2-yr Rainfall=2.81"

Area (sf)	CN	Description
614,767	85	Row crops, straight row, Good, HSG C
586,295	76	Woods/grass comb., Fair, HSG C
1,201,062	81	Weighted Average
1,201,062		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
39.7	350	0.0620	0.15		Sheet Flow, WOODS Woods: Light underbrush n= 0.400 P2= 2.81"
9.0	900	0.0340	1.66		Shallow Concentrated Flow, CULTIVATED Cultivated Straight Rows Kv= 9.0 fps
48.7	1,250	Total			

Summary for Subcatchment E3: Center-Area

Runoff = 19.42 cfs @ 12.24 hrs, Volume= 1.619 af, Depth> 1.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 2-yr Rainfall=2.81"

Area (sf)	CN	Description
570,426	85	Row crops, straight row, Good, HSG C
54,215	76	Woods/grass comb., Fair, HSG C
624,641	84	Weighted Average
624,641		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.6	300	0.1000	0.34		Sheet Flow, CULTIVATED Cultivated: Residue>20% n= 0.170 P2= 2.81"
5.4	550	0.0360	1.71		Shallow Concentrated Flow, CULTIVATED Cultivated Straight Rows Kv= 9.0 fps
20.0	850	Total			

Summary for Subcatchment E4: South-Area

Runoff = 28.56 cfs @ 12.31 hrs, Volume= 2.682 af, Depth> 1.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 2-yr Rainfall=2.81"

Area (sf)	CN	Description
880,518	85	Row crops, straight row, Good, HSG C
155,488	76	Woods/grass comb., Fair, HSG C
1,036,006	84	Weighted Average
1,036,006		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.0	350	0.0710	0.31		Sheet Flow, CULTIVATED Cultivated: Residue>20% n= 0.170 P2= 2.81"
6.2	650	0.0380	1.75		Shallow Concentrated Flow, CULTIVATED Cultivated Straight Rows Kv= 9.0 fps
25.2	1,000	Total			

Summary for Subcatchment E5: EAST CENTER AREA

Runoff = 8.58 cfs @ 12.35 hrs, Volume= 0.858 af, Depth> 1.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 2-yr Rainfall=2.81"

Area (sf)	CN	Description
312,575	85	Row crops, straight row, Good, HSG C
18,981	74	>75% Grass cover, Good, HSG C
331,556	84	Weighted Average
331,556		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.5	300	0.0250	0.20		Sheet Flow, CULTIVATED Cultivated: Residue>20% n= 0.170 P2= 2.81"
2.9	250	0.0250	1.42		Shallow Concentrated Flow, CULTIVATED Cultivated Straight Rows Kv= 9.0 fps
28.4	550	Total			

Summary for Subcatchment E6: SOUTHWEST AREA

Runoff = 29.02 cfs @ 12.29 hrs, Volume= 2.713 af, Depth> 1.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 2-yr Rainfall=2.81"

Area (sf)	CN	Description
674,269	85	Row crops, straight row, Good, HSG C
546,106	76	Woods/grass comb., Fair, HSG C
1,220,375	81	Weighted Average
1,220,375		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.3	350	0.0600	0.29		Sheet Flow, CULTIVATED Cultivated: Residue>20% n= 0.170 P2= 2.81"
3.9	400	0.0370	1.73		Shallow Concentrated Flow, SWALE FLOW Cultivated Straight Rows Kv= 9.0 fps
24.2	750	Total			

Summary for Subcatchment E7: SOUTHEAST AREA

Runoff = 5.30 cfs @ 12.27 hrs, Volume= 0.482 af, Depth> 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 2-yr Rainfall=2.81"

Area (sf)	CN	Description
* 18,000	98	ROOF AND DRIVEWAY
7,034	85	Row crops, straight row, Good, HSG C
260,145	74	>75% Grass cover, Good, HSG C
285,179	76	Weighted Average
267,179		93.69% Pervious Area
18,000		6.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	350	0.0850	0.33		Sheet Flow, CULTIVATED Cultivated: Residue>20% n= 0.170 P2= 2.81"
3.0	400	0.0600	2.20		Shallow Concentrated Flow, CULTIVATED Cultivated Straight Rows Kv= 9.0 fps
20.6	750	Total			

Summary for Subcatchment O1: OFFSITE NORTH AREA

Runoff = 21.11 cfs @ 12.81 hrs, Volume= 3.329 af, Depth> 0.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 2-yr Rainfall=2.81"

Area (sf)	CN	Description
1,992,036	76	Woods/grass comb., Fair, HSG C
1,992,036		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
58.5	500	0.0480	0.14		Sheet Flow, WOODS Woods: Light underbrush n= 0.400 P2= 2.81"

Summary for Subcatchment O2: OFFSITE AREA O2

Runoff = 3.22 cfs @ 12.24 hrs, Volume= 0.282 af, Depth> 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 2-yr Rainfall=2.81"

Area (sf)	CN	Description
166,588	76	Woods/grass comb., Fair, HSG C
166,588		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.0	250	0.2000	0.22		Sheet Flow, WOODS Woods: Light underbrush n= 0.400 P2= 2.81"

Summary for Subcatchment O3: OFFSITE NORTHEAST AREA

Runoff = 18.29 cfs @ 13.02 hrs, Volume= 3.367 af, Depth> 0.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 2-yr Rainfall=2.81"

Area (sf)	CN	Description
* 500	98	ROOF
2,024,525	76	Woods/grass comb., Fair, HSG C
2,025,025	76	Weighted Average
2,024,525		99.98% Pervious Area
500		0.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
41.6	400	0.0720	0.16		Sheet Flow, WOODED Woods: Light underbrush n= 0.400 P2= 2.81"
33.0	2,100	0.0450	1.06		Shallow Concentrated Flow, WOODED Woodland Kv= 5.0 fps
74.6	2,500	Total			

Summary for Subcatchment O4: OFFSITE AREA SOUTHEAST

Runoff = 3.02 cfs @ 12.76 hrs, Volume= 0.452 af, Depth> 0.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 2-yr Rainfall=2.81"

Area (sf)	CN	Description
* 11,933	98	IMPERV
242,984	76	Woods/grass comb., Fair, HSG C
254,917	77	Weighted Average
242,984		95.32% Pervious Area
11,933		4.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
54.4	575	0.0760	0.18		Sheet Flow, WOODS Woods: Light underbrush n= 0.400 P2= 2.81"

Summary for Reach 1R: WEST EXISTING

Inflow Area = 136.437 ac, 0.50% Impervious, Inflow Depth > 1.06" for 2-yr event
 Inflow = 79.06 cfs @ 12.40 hrs, Volume= 12.048 af
 Outflow = 79.06 cfs @ 12.40 hrs, Volume= 12.048 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach 2R: EAST EXIST

Inflow Area = 81.707 ac, 0.01% Impervious, Inflow Depth > 1.06" for 2-yr event
 Inflow = 43.83 cfs @ 12.34 hrs, Volume= 7.189 af
 Outflow = 43.83 cfs @ 12.34 hrs, Volume= 7.189 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond P7: Exist Low Area

Inflow Area = 6.547 ac, 6.31% Impervious, Inflow Depth > 0.88" for 2-yr event
 Inflow = 5.30 cfs @ 12.27 hrs, Volume= 0.482 af
 Outflow = 5.23 cfs @ 12.30 hrs, Volume= 0.477 af, Atten= 1%, Lag= 1.8 min
 Discarded = 0.01 cfs @ 12.30 hrs, Volume= 0.004 af
 Primary = 5.23 cfs @ 12.30 hrs, Volume= 0.474 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 869.04' @ 12.30 hrs Surf.Area= 735 sf Storage= 750 cf
 Flood Elev= 871.00' Surf.Area= 2,500 sf Storage= 3,526 cf

Plug-Flow detention time= 9.0 min calculated for 0.477 af (99% of inflow)
 Center-of-Mass det. time= 3.3 min (865.7 - 862.4)

Volume	Invert	Avail.Storage	Storage Description
#1	867.00'	3,526 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
867.00	73	0	0
868.00	325	199	199
869.00	714	520	719
870.00	1,200	957	1,676
871.00	2,500	1,850	3,526

Device	Routing	Invert	Outlet Devices
#1	Primary	867.90'	18.0" Round Culvert L= 68.0' Ke= 0.510 Inlet / Outlet Invert= 867.90' / 866.53' S= 0.0201 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Discarded	867.00'	0.400 in/hr Exfiltration over Surface area
#3	Primary	869.50'	30.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.01 cfs @ 12.30 hrs HW=869.04' (Free Discharge)
 ↳ **2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=5.22 cfs @ 12.30 hrs HW=869.04' TW=0.00' (Dynamic Tailwater)
 ↳ **1=Culvert** (Inlet Controls 5.22 cfs @ 3.62 fps)
 ↳ **3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentE1: West-1-Area	Runoff Area=365,007 sf	0.00% Impervious	Runoff Depth>2.25"
Flow Length=300'	Slope=0.0600 '/	Tc=35.6 min	CN=81 Runoff=14.31 cfs 1.569 af
SubcatchmentE2: West-2- Area	Runoff Area=1,201,062 sf	0.00% Impervious	Runoff Depth>2.24"
Flow Length=1,250'	Slope=0.0600 '/	Tc=48.7 min	CN=81 Runoff=39.53 cfs 5.149 af
SubcatchmentE3: Center-Area	Runoff Area=624,641 sf	0.00% Impervious	Runoff Depth>2.51"
Flow Length=850'	Slope=0.0600 '/	Tc=20.0 min	CN=84 Runoff=36.82 cfs 3.001 af
SubcatchmentE4: South-Area	Runoff Area=1,036,006 sf	0.00% Impervious	Runoff Depth>2.51"
Flow Length=1,000'	Slope=0.0600 '/	Tc=25.2 min	CN=84 Runoff=54.32 cfs 4.972 af
SubcatchmentE5: EAST CENTER AREA	Runoff Area=331,556 sf	0.00% Impervious	Runoff Depth>2.51"
Flow Length=550'	Slope=0.0250 '/	Tc=28.4 min	CN=84 Runoff=16.34 cfs 1.590 af
SubcatchmentE6: SOUTHWEST AREA	Runoff Area=1,220,375 sf	0.00% Impervious	Runoff Depth>2.25"
Flow Length=750'	Slope=0.0600 '/	Tc=24.2 min	CN=81 Runoff=58.66 cfs 5.261 af
SubcatchmentE7: SOUTHEAST AREA	Runoff Area=285,179 sf	6.31% Impervious	Runoff Depth>1.86"
Flow Length=750'	Slope=0.0600 '/	Tc=20.6 min	CN=76 Runoff=12.06 cfs 1.015 af
SubcatchmentO1: OFFSITE NORTH	Runoff Area=1,992,036 sf	0.00% Impervious	Runoff Depth>1.84"
Flow Length=500'	Slope=0.0480 '/	Tc=58.5 min	CN=76 Runoff=47.78 cfs 7.023 af
SubcatchmentO2: OFFSITE AREA O2	Runoff Area=166,588 sf	0.00% Impervious	Runoff Depth>1.86"
Flow Length=250'	Slope=0.2000 '/	Tc=19.0 min	CN=76 Runoff=7.31 cfs 0.593 af
SubcatchmentO3: OFFSITE	Runoff Area=2,025,025 sf	0.02% Impervious	Runoff Depth>1.83"
Flow Length=2,500'	Slope=0.0600 '/	Tc=74.6 min	CN=76 Runoff=41.50 cfs 7.109 af
SubcatchmentO4: OFFSITE AREA	Runoff Area=254,917 sf	4.68% Impervious	Runoff Depth>1.92"
Flow Length=575'	Slope=0.0760 '/	Tc=54.4 min	CN=77 Runoff=6.67 cfs 0.936 af
Reach 1R: WEST EXISTING		Inflow=165.13 cfs	23.945 af
		Outflow=165.13 cfs	23.945 af
Reach 2R: EAST EXIST		Inflow=88.37 cfs	14.264 af
		Outflow=88.37 cfs	14.264 af
Pond P7: Exist Low Area	Peak Elev=869.62'	Storage=1,259 cf	Inflow=12.06 cfs 1.015 af
	Discarded=0.01 cfs	0.004 af	Primary=12.03 cfs 1.005 af
			Outflow=12.04 cfs 1.010 af

Total Runoff Area = 218.145 ac Runoff Volume = 38.218 af Average Runoff Depth = 2.10"
99.68% Pervious = 217.446 ac 0.32% Impervious = 0.699 ac

Summary for Subcatchment E1: West-1-Area

Runoff = 14.31 cfs @ 12.46 hrs, Volume= 1.569 af, Depth> 2.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 10-yr Rainfall=4.17"

Area (sf)	CN	Description
196,472	85	Row crops, straight row, Good, HSG C
168,535	76	Woods/grass comb., Fair, HSG C
365,007	81	Weighted Average
365,007		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
35.6	300	0.0600	0.14		Sheet Flow, WOODS Woods: Light underbrush n= 0.400 P2= 2.81"

Summary for Subcatchment E2: West-2- Area

Runoff = 39.53 cfs @ 12.62 hrs, Volume= 5.149 af, Depth> 2.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 10-yr Rainfall=4.17"

Area (sf)	CN	Description
614,767	85	Row crops, straight row, Good, HSG C
586,295	76	Woods/grass comb., Fair, HSG C
1,201,062	81	Weighted Average
1,201,062		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
39.7	350	0.0620	0.15		Sheet Flow, WOODS Woods: Light underbrush n= 0.400 P2= 2.81"
9.0	900	0.0340	1.66		Shallow Concentrated Flow, CULTIVATED Cultivated Straight Rows Kv= 9.0 fps
48.7	1,250	Total			

Summary for Subcatchment E3: Center-Area

Runoff = 36.82 cfs @ 12.24 hrs, Volume= 3.001 af, Depth> 2.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 10-yr Rainfall=4.17"

Area (sf)	CN	Description
570,426	85	Row crops, straight row, Good, HSG C
54,215	76	Woods/grass comb., Fair, HSG C
624,641	84	Weighted Average
624,641		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.6	300	0.1000	0.34		Sheet Flow, CULTIVATED Cultivated: Residue>20% n= 0.170 P2= 2.81"
5.4	550	0.0360	1.71		Shallow Concentrated Flow, CULTIVATED Cultivated Straight Rows Kv= 9.0 fps
20.0	850	Total			

Summary for Subcatchment E4: South-Area

Runoff = 54.32 cfs @ 12.30 hrs, Volume= 4.972 af, Depth> 2.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 10-yr Rainfall=4.17"

Area (sf)	CN	Description
880,518	85	Row crops, straight row, Good, HSG C
155,488	76	Woods/grass comb., Fair, HSG C
1,036,006	84	Weighted Average
1,036,006		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.0	350	0.0710	0.31		Sheet Flow, CULTIVATED Cultivated: Residue>20% n= 0.170 P2= 2.81"
6.2	650	0.0380	1.75		Shallow Concentrated Flow, CULTIVATED Cultivated Straight Rows Kv= 9.0 fps
25.2	1,000	Total			

Summary for Subcatchment E5: EAST CENTER AREA

Runoff = 16.34 cfs @ 12.34 hrs, Volume= 1.590 af, Depth> 2.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 10-yr Rainfall=4.17"

Area (sf)	CN	Description
312,575	85	Row crops, straight row, Good, HSG C
18,981	74	>75% Grass cover, Good, HSG C
331,556	84	Weighted Average
331,556		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.5	300	0.0250	0.20		Sheet Flow, CULTIVATED Cultivated: Residue>20% n= 0.170 P2= 2.81"
2.9	250	0.0250	1.42		Shallow Concentrated Flow, CULTIVATED Cultivated Straight Rows Kv= 9.0 fps
28.4	550	Total			

Summary for Subcatchment E6: SOUTHWEST AREA

Runoff = 58.66 cfs @ 12.29 hrs, Volume= 5.261 af, Depth> 2.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 10-yr Rainfall=4.17"

Area (sf)	CN	Description
674,269	85	Row crops, straight row, Good, HSG C
546,106	76	Woods/grass comb., Fair, HSG C
1,220,375	81	Weighted Average
1,220,375		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.3	350	0.0600	0.29		Sheet Flow, CULTIVATED Cultivated: Residue>20% n= 0.170 P2= 2.81"
3.9	400	0.0370	1.73		Shallow Concentrated Flow, SWALE FLOW Cultivated Straight Rows Kv= 9.0 fps
24.2	750	Total			

Summary for Subcatchment E7: SOUTHEAST AREA

Runoff = 12.06 cfs @ 12.25 hrs, Volume= 1.015 af, Depth> 1.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 10-yr Rainfall=4.17"

Area (sf)	CN	Description
* 18,000	98	ROOF AND DRIVEWAY
7,034	85	Row crops, straight row, Good, HSG C
260,145	74	>75% Grass cover, Good, HSG C
285,179	76	Weighted Average
267,179		93.69% Pervious Area
18,000		6.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	350	0.0850	0.33		Sheet Flow, CULTIVATED Cultivated: Residue>20% n= 0.170 P2= 2.81"
3.0	400	0.0600	2.20		Shallow Concentrated Flow, CULTIVATED Cultivated Straight Rows Kv= 9.0 fps
20.6	750	Total			

Summary for Subcatchment O1: OFFSITE NORTH AREA

Runoff = 47.78 cfs @ 12.80 hrs, Volume= 7.023 af, Depth> 1.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 10-yr Rainfall=4.17"

Area (sf)	CN	Description
1,992,036	76	Woods/grass comb., Fair, HSG C
1,992,036		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
58.5	500	0.0480	0.14		Sheet Flow, WOODS Woods: Light underbrush n= 0.400 P2= 2.81"

Summary for Subcatchment O2: OFFSITE AREA O2

Runoff = 7.31 cfs @ 12.23 hrs, Volume= 0.593 af, Depth> 1.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 10-yr Rainfall=4.17"

Area (sf)	CN	Description
166,588	76	Woods/grass comb., Fair, HSG C
166,588		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.0	250	0.2000	0.22		Sheet Flow, WOODS Woods: Light underbrush n= 0.400 P2= 2.81"

Summary for Subcatchment O3: OFFSITE NORTHEAST AREA

Runoff = 41.50 cfs @ 13.01 hrs, Volume= 7.109 af, Depth> 1.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 10-yr Rainfall=4.17"

Area (sf)	CN	Description
* 500	98	ROOF
2,024,525	76	Woods/grass comb., Fair, HSG C
2,025,025	76	Weighted Average
2,024,525		99.98% Pervious Area
500		0.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
41.6	400	0.0720	0.16		Sheet Flow, WOODED Woods: Light underbrush n= 0.400 P2= 2.81"
33.0	2,100	0.0450	1.06		Shallow Concentrated Flow, WOODED Woodland Kv= 5.0 fps
74.6	2,500	Total			

Summary for Subcatchment O4: OFFSITE AREA SOUTHEAST

Runoff = 6.67 cfs @ 12.75 hrs, Volume= 0.936 af, Depth > 1.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 10-yr Rainfall=4.17"

Area (sf)	CN	Description
* 11,933	98	IMPERV
242,984	76	Woods/grass comb., Fair, HSG C
254,917	77	Weighted Average
242,984		95.32% Pervious Area
11,933		4.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
54.4	575	0.0760	0.18		Sheet Flow, WOODS Woods: Light underbrush n= 0.400 P2= 2.81"

Summary for Reach 1R: WEST EXISTING

Inflow Area = 136.437 ac, 0.50% Impervious, Inflow Depth > 2.11" for 10-yr event
 Inflow = 165.13 cfs @ 12.39 hrs, Volume= 23.945 af
 Outflow = 165.13 cfs @ 12.39 hrs, Volume= 23.945 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach 2R: EAST EXIST

Inflow Area = 81.707 ac, 0.01% Impervious, Inflow Depth > 2.09" for 10-yr event
 Inflow = 88.37 cfs @ 12.34 hrs, Volume= 14.264 af
 Outflow = 88.37 cfs @ 12.34 hrs, Volume= 14.264 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond P7: Exist Low Area

Inflow Area = 6.547 ac, 6.31% Impervious, Inflow Depth > 1.86" for 10-yr event
 Inflow = 12.06 cfs @ 12.25 hrs, Volume= 1.015 af
 Outflow = 12.04 cfs @ 12.26 hrs, Volume= 1.010 af, Atten= 0%, Lag= 0.4 min
 Discarded = 0.01 cfs @ 12.26 hrs, Volume= 0.004 af
 Primary = 12.03 cfs @ 12.26 hrs, Volume= 1.005 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 869.62' @ 12.26 hrs Surf.Area= 1,018 sf Storage= 1,259 cf
 Flood Elev= 871.00' Surf.Area= 2,500 sf Storage= 3,526 cf

Plug-Flow detention time= 5.6 min calculated for 1.009 af (99% of inflow)
 Center-of-Mass det. time= 2.5 min (842.9 - 840.4)

Volume	Invert	Avail.Storage	Storage Description
#1	867.00'	3,526 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
867.00	73	0	0
868.00	325	199	199
869.00	714	520	719
870.00	1,200	957	1,676
871.00	2,500	1,850	3,526

Device	Routing	Invert	Outlet Devices
#1	Primary	867.90'	18.0" Round Culvert L= 68.0' Ke= 0.510 Inlet / Outlet Invert= 867.90' / 866.53' S= 0.0201 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Discarded	867.00'	0.400 in/hr Exfiltration over Surface area
#3	Primary	869.50'	30.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.01 cfs @ 12.26 hrs HW=869.62' (Free Discharge)
 ↳2=Exfiltration (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=12.03 cfs @ 12.26 hrs HW=869.62' TW=0.00' (Dynamic Tailwater)
 ↳1=Culvert (Inlet Controls 8.34 cfs @ 4.72 fps)
 ↳3=Broad-Crested Rectangular Weir (Weir Controls 3.69 cfs @ 0.99 fps)

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentE1: West-1-Area Runoff Area=365,007 sf 0.00% Impervious Runoff Depth>5.08"
 Flow Length=300' Slope=0.0600 '/' Tc=35.6 min CN=81 Runoff=30.42 cfs 3.545 af

SubcatchmentE2: West-2-Area Runoff Area=1,201,062 sf 0.00% Impervious Runoff Depth>5.06"
 Flow Length=1,250' Tc=48.7 min CN=81 Runoff=85.04 cfs 11.634 af

SubcatchmentE3: Center-Area Runoff Area=624,641 sf 0.00% Impervious Runoff Depth>5.43"
 Flow Length=850' Tc=20.0 min CN=84 Runoff=73.16 cfs 6.493 af

SubcatchmentE4: South-Area Runoff Area=1,036,006 sf 0.00% Impervious Runoff Depth>5.43"
 Flow Length=1,000' Tc=25.2 min CN=84 Runoff=108.84 cfs 10.759 af

SubcatchmentE5: EAST CENTER AREA Runoff Area=331,556 sf 0.00% Impervious Runoff Depth>5.42"
 Flow Length=550' Slope=0.0250 '/' Tc=28.4 min CN=84 Runoff=32.82 cfs 3.441 af

SubcatchmentE6: SOUTHWEST AREA Runoff Area=1,220,375 sf 0.00% Impervious Runoff Depth>5.09"
 Flow Length=750' Tc=24.2 min CN=81 Runoff=123.68 cfs 11.880 af

SubcatchmentE7: SOUTHEAST AREA Runoff Area=285,179 sf 6.31% Impervious Runoff Depth>4.53"
 Flow Length=750' Tc=20.6 min CN=76 Runoff=27.93 cfs 2.473 af

SubcatchmentO1: OFFSITE NORTH Runoff Area=1,992,036 sf 0.00% Impervious Runoff Depth>4.49"
 Flow Length=500' Slope=0.0480 '/' Tc=58.5 min CN=76 Runoff=112.94 cfs 17.128 af

SubcatchmentO2: OFFSITE AREA O2 Runoff Area=166,588 sf 0.00% Impervious Runoff Depth>4.53"
 Flow Length=250' Slope=0.2000 '/' Tc=19.0 min CN=76 Runoff=16.92 cfs 1.445 af

SubcatchmentO3: OFFSITE Runoff Area=2,025,025 sf 0.02% Impervious Runoff Depth>4.48"
 Flow Length=2,500' Tc=74.6 min CN=76 Runoff=98.82 cfs 17.347 af

SubcatchmentO4: OFFSITE AREA Runoff Area=254,917 sf 4.68% Impervious Runoff Depth>4.61"
 Flow Length=575' Slope=0.0760 '/' Tc=54.4 min CN=77 Runoff=15.42 cfs 2.248 af

Reach 1R: WEST EXISTING Inflow=366.71 cfs 55.389 af
 Outflow=366.71 cfs 55.389 af

Reach 2R: EAST EXIST Inflow=190.54 cfs 32.992 af
 Outflow=190.54 cfs 32.992 af

Pond P7: Exist Low Area Peak Elev=869.86' Storage=1,510 cf Inflow=27.93 cfs 2.473 af
 Discarded=0.01 cfs 0.006 af Primary=27.91 cfs 2.461 af Outflow=27.92 cfs 2.467 af

Total Runoff Area = 218.145 ac Runoff Volume = 88.393 af Average Runoff Depth = 4.86"
99.68% Pervious = 217.446 ac 0.32% Impervious = 0.699 ac

Summary for Subcatchment E1: West-1-Area

Runoff = 30.42 cfs @ 12.46 hrs, Volume= 3.545 af, Depth> 5.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 100-yr Rainfall=7.33"

Area (sf)	CN	Description
196,472	85	Row crops, straight row, Good, HSG C
168,535	76	Woods/grass comb., Fair, HSG C
365,007	81	Weighted Average
365,007		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
35.6	300	0.0600	0.14		Sheet Flow, WOODS Woods: Light underbrush n= 0.400 P2= 2.81"

Summary for Subcatchment E2: West-2- Area

Runoff = 85.04 cfs @ 12.61 hrs, Volume= 11.634 af, Depth> 5.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 100-yr Rainfall=7.33"

Area (sf)	CN	Description
614,767	85	Row crops, straight row, Good, HSG C
586,295	76	Woods/grass comb., Fair, HSG C
1,201,062	81	Weighted Average
1,201,062		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
39.7	350	0.0620	0.15		Sheet Flow, WOODS Woods: Light underbrush n= 0.400 P2= 2.81"
9.0	900	0.0340	1.66		Shallow Concentrated Flow, CULTIVATED Cultivated Straight Rows Kv= 9.0 fps
48.7	1,250	Total			

Summary for Subcatchment E3: Center-Area

Runoff = 73.16 cfs @ 12.22 hrs, Volume= 6.493 af, Depth> 5.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 100-yr Rainfall=7.33"

Area (sf)	CN	Description
570,426	85	Row crops, straight row, Good, HSG C
54,215	76	Woods/grass comb., Fair, HSG C
624,641	84	Weighted Average
624,641		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.6	300	0.1000	0.34		Sheet Flow, CULTIVATED Cultivated: Residue>20% n= 0.170 P2= 2.81"
5.4	550	0.0360	1.71		Shallow Concentrated Flow, CULTIVATED Cultivated Straight Rows Kv= 9.0 fps
20.0	850	Total			

Summary for Subcatchment E4: South-Area

Runoff = 108.84 cfs @ 12.29 hrs, Volume= 10.759 af, Depth> 5.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 100-yr Rainfall=7.33"

Area (sf)	CN	Description
880,518	85	Row crops, straight row, Good, HSG C
155,488	76	Woods/grass comb., Fair, HSG C
1,036,006	84	Weighted Average
1,036,006		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.0	350	0.0710	0.31		Sheet Flow, CULTIVATED Cultivated: Residue>20% n= 0.170 P2= 2.81"
6.2	650	0.0380	1.75		Shallow Concentrated Flow, CULTIVATED Cultivated Straight Rows Kv= 9.0 fps
25.2	1,000	Total			

Summary for Subcatchment E5: EAST CENTER AREA

Runoff = 32.82 cfs @ 12.34 hrs, Volume= 3.441 af, Depth> 5.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 100-yr Rainfall=7.33"

Area (sf)	CN	Description
312,575	85	Row crops, straight row, Good, HSG C
18,981	74	>75% Grass cover, Good, HSG C
331,556	84	Weighted Average
331,556		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.5	300	0.0250	0.20		Sheet Flow, CULTIVATED Cultivated: Residue>20% n= 0.170 P2= 2.81"
2.9	250	0.0250	1.42		Shallow Concentrated Flow, CULTIVATED Cultivated Straight Rows Kv= 9.0 fps
28.4	550	Total			

Summary for Subcatchment E6: SOUTHWEST AREA

Runoff = 123.68 cfs @ 12.29 hrs, Volume= 11.880 af, Depth> 5.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 100-yr Rainfall=7.33"

Area (sf)	CN	Description
674,269	85	Row crops, straight row, Good, HSG C
546,106	76	Woods/grass comb., Fair, HSG C
1,220,375	81	Weighted Average
1,220,375		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.3	350	0.0600	0.29		Sheet Flow, CULTIVATED Cultivated: Residue>20% n= 0.170 P2= 2.81"
3.9	400	0.0370	1.73		Shallow Concentrated Flow, SWALE FLOW Cultivated Straight Rows Kv= 9.0 fps
24.2	750	Total			

Summary for Subcatchment E7: SOUTHEAST AREA

Runoff = 27.93 cfs @ 12.24 hrs, Volume= 2.473 af, Depth> 4.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 100-yr Rainfall=7.33"

Area (sf)	CN	Description
* 18,000	98	ROOF AND DRIVEWAY
7,034	85	Row crops, straight row, Good, HSG C
260,145	74	>75% Grass cover, Good, HSG C
285,179	76	Weighted Average
267,179		93.69% Pervious Area
18,000		6.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	350	0.0850	0.33		Sheet Flow, CULTIVATED Cultivated: Residue>20% n= 0.170 P2= 2.81"
3.0	400	0.0600	2.20		Shallow Concentrated Flow, CULTIVATED Cultivated Straight Rows Kv= 9.0 fps
20.6	750	Total			

Summary for Subcatchment O1: OFFSITE NORTH AREA

Runoff = 112.94 cfs @ 12.80 hrs, Volume= 17.128 af, Depth> 4.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 100-yr Rainfall=7.33"

Area (sf)	CN	Description
1,992,036	76	Woods/grass comb., Fair, HSG C
1,992,036		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
58.5	500	0.0480	0.14		Sheet Flow, WOODS Woods: Light underbrush n= 0.400 P2= 2.81"

Summary for Subcatchment O2: OFFSITE AREA O2

Runoff = 16.92 cfs @ 12.22 hrs, Volume= 1.445 af, Depth> 4.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 100-yr Rainfall=7.33"

Area (sf)	CN	Description
166,588	76	Woods/grass comb., Fair, HSG C
166,588		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.0	250	0.2000	0.22		Sheet Flow, WOODS Woods: Light underbrush n= 0.400 P2= 2.81"

Summary for Subcatchment O3: OFFSITE NORTHEAST AREA

Runoff = 98.82 cfs @ 13.01 hrs, Volume= 17.347 af, Depth> 4.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 100-yr Rainfall=7.33"

Area (sf)	CN	Description
* 500	98	ROOF
2,024,525	76	Woods/grass comb., Fair, HSG C
2,025,025	76	Weighted Average
2,024,525		99.98% Pervious Area
500		0.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
41.6	400	0.0720	0.16		Sheet Flow, WOODED Woods: Light underbrush n= 0.400 P2= 2.81"
33.0	2,100	0.0450	1.06		Shallow Concentrated Flow, WOODED Woodland Kv= 5.0 fps
74.6	2,500	Total			

Summary for Subcatchment O4: OFFSITE AREA SOUTHEAST

Runoff = 15.42 cfs @ 12.70 hrs, Volume= 2.248 af, Depth > 4.61"
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 100-yr Rainfall=7.33"

Area (sf)	CN	Description
* 11,933	98	IMPERV
242,984	76	Woods/grass comb., Fair, HSG C
254,917	77	Weighted Average
242,984		95.32% Pervious Area
11,933		4.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
54.4	575	0.0760	0.18		Sheet Flow, WOODS Woods: Light underbrush n= 0.400 P2= 2.81"

Summary for Reach 1R: WEST EXISTING

Inflow Area = 136.437 ac, 0.50% Impervious, Inflow Depth > 4.87" for 100-yr event
 Inflow = 366.71 cfs @ 12.39 hrs, Volume= 55.389 af
 Outflow = 366.71 cfs @ 12.39 hrs, Volume= 55.389 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach 2R: EAST EXIST

Inflow Area = 81.707 ac, 0.01% Impervious, Inflow Depth > 4.85" for 100-yr event
 Inflow = 190.54 cfs @ 12.34 hrs, Volume= 32.992 af
 Outflow = 190.54 cfs @ 12.34 hrs, Volume= 32.992 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond P7: Exist Low Area

Inflow Area = 6.547 ac, 6.31% Impervious, Inflow Depth > 4.53" for 100-yr event
 Inflow = 27.93 cfs @ 12.24 hrs, Volume= 2.473 af
 Outflow = 27.92 cfs @ 12.25 hrs, Volume= 2.467 af, Atten= 0%, Lag= 0.2 min
 Discarded = 0.01 cfs @ 12.25 hrs, Volume= 0.006 af
 Primary = 27.91 cfs @ 12.25 hrs, Volume= 2.461 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 869.86' @ 12.25 hrs Surf.Area= 1,131 sf Storage= 1,510 cf
 Flood Elev= 871.00' Surf.Area= 2,500 sf Storage= 3,526 cf

Plug-Flow detention time= 3.4 min calculated for 2.467 af (100% of inflow)
 Center-of-Mass det. time= 1.9 min (823.7 - 821.8)

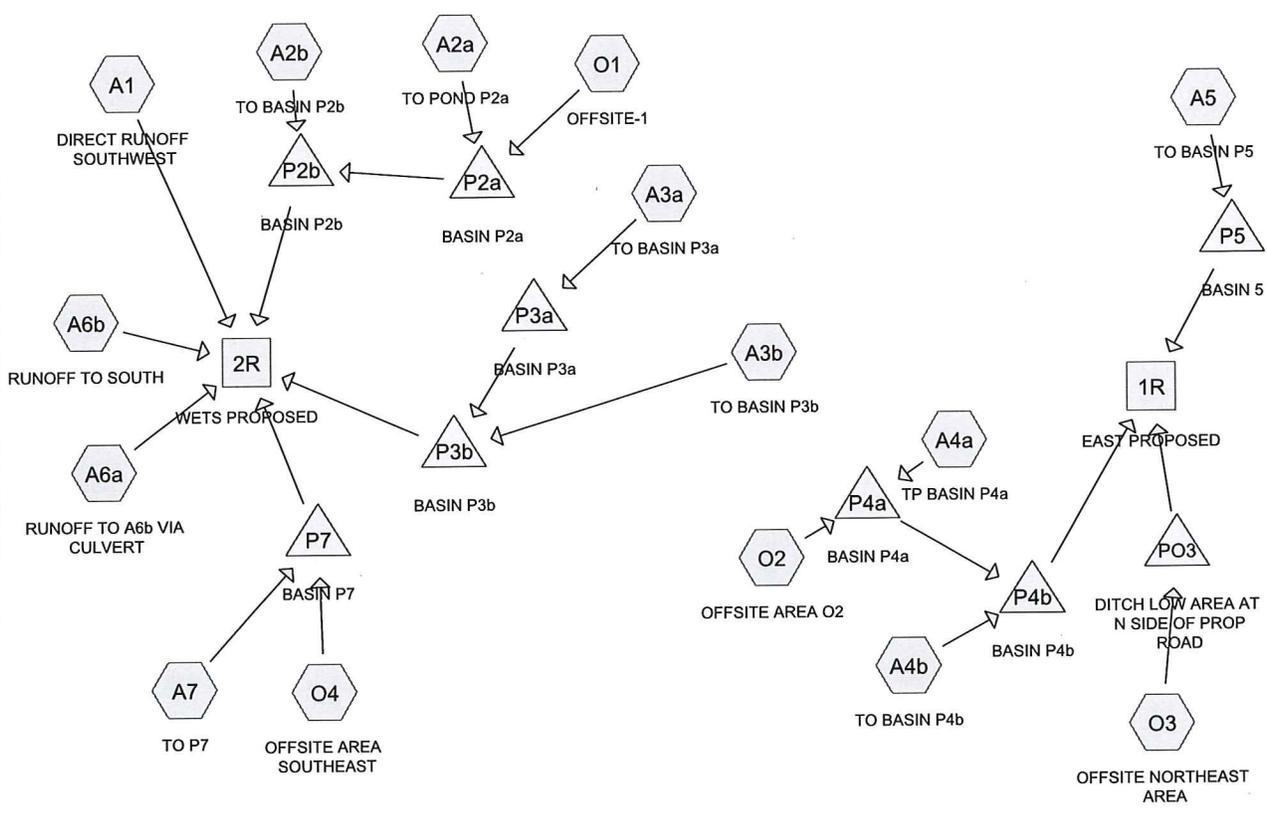
Volume	Invert	Avail.Storage	Storage Description
#1	867.00'	3,526 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
867.00	73	0	0
868.00	325	199	199
869.00	714	520	719
870.00	1,200	957	1,676
871.00	2,500	1,850	3,526

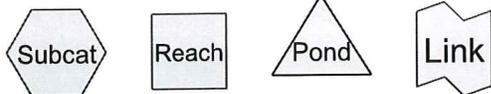
Device	Routing	Invert	Outlet Devices
#1	Primary	867.90'	18.0" Round Culvert L= 68.0' Ke= 0.510 Inlet / Outlet Invert= 867.90' / 866.53' S= 0.0201 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Discarded	867.00'	0.400 in/hr Exfiltration over Surface area
#3	Primary	869.50'	30.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.01 cfs @ 12.25 hrs HW=869.86' (Free Discharge)
 ↳ **2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=27.90 cfs @ 12.25 hrs HW=869.86' TW=0.00' (Dynamic Tailwater)
 ↳ **1=Culvert** (Inlet Controls 9.29 cfs @ 5.26 fps)
 ↳ **3=Broad-Crested Rectangular Weir** (Weir Controls 18.61 cfs @ 1.73 fps)



(new Text)



1707_AFTON CREEK PRESERVE_PROP-V4 FEB 5 2018

Prepared by PLOWE ENGINEERING, INC.

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
79.224	74	>75% Grass cover, Good, HSG C (A1, A2a, A2b, A3a, A3b, A4a, A4b, A5, A6a, A6b, A7)
0.297	98	IMPERV (O4)
2.778	98	IMPERVIOUS (A3b, A4a, A5, A6a, A6b)
0.576	98	Impervious area (A3a)
0.129	98	STEER (O3)
3.735	98	Unconnected pavement, HSG C (A1, A2a, A2b, A4b, A7)
131.406	76	Woods/grass comb., Fair, HSG C (A2a, A3a, A4a, A6b, O1, O2, O3, O4)
218.145	76	TOTAL AREA

1707_AFTON CREEK PRESERVE_PROP-V4 FEB 5 2018

Prepared by PLOWE ENGINEERING, INC.

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Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	79.224	0.000	0.000	79.224	>75% Grass cover, Good	A1, A2a, A2b, A3a, A3b, A4a, A4b, A5, A6a, A6b, A7
0.000	0.000	0.000	0.000	0.297	0.297	IMPERV	O4
0.000	0.000	0.000	0.000	2.778	2.778	IMPERVIOUS	A3b, A4a, A5, A6a, A6b
0.000	0.000	0.000	0.000	0.576	0.576	Impervious area	A3a
0.000	0.000	0.000	0.000	0.129	0.129	STEER	O3
0.000	0.000	3.735	0.000	0.000	3.735	Unconnected pavement	A1, A2a, A2b, A4b, A7
0.000	0.000	131.406	0.000	0.000	131.406	Woods/grass comb., Fair	A2a, A3a, A4a, A6b, O1, O2, O3, O4
0.000	0.000	214.365	0.000	3.780	218.145	TOTAL AREA	

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

- SubcatchmentA1: DIRECT RUNOFF** Runoff Area=735,325 sf 3.33% Impervious Runoff Depth>0.79"
 Flow Length=550' Tc=20.7 min UI Adjusted CN=74 Runoff=11.71 cfs 1.104 af
- SubcatchmentA2a: TO POND P2a** Runoff Area=897,320 sf 5.04% Impervious Runoff Depth>0.88"
 Flow Length=500' Tc=36.2 min CN=76 Runoff=12.52 cfs 1.510 af
- SubcatchmentA2b: TO BASIN P2b** Runoff Area=187,459 sf 13.07% Impervious Runoff Depth>0.88"
 Flow Length=450' Tc=20.7 min UI Adjusted CN=76 Runoff=3.48 cfs 0.317 af
- SubcatchmentA3a: TO BASIN P3a** Runoff Area=189,707 sf 13.23% Impervious Runoff Depth>0.94"
 Flow Length=300' Tc=15.7 min CN=77 Runoff=4.32 cfs 0.340 af
- SubcatchmentA3b: TO BASIN P3b** Runoff Area=172,171 sf 6.39% Impervious Runoff Depth>0.88"
 Flow Length=260' Slope=0.0460 '/' Tc=23.4 min CN=76 Runoff=3.01 cfs 0.291 af
- SubcatchmentA4a: TP BASIN P4a** Runoff Area=690,862 sf 5.51% Impervious Runoff Depth>0.88"
 Flow Length=600' Tc=24.9 min CN=76 Runoff=11.68 cfs 1.167 af
- SubcatchmentA4b: TO BASIN P4b** Runoff Area=300,663 sf 9.08% Impervious Runoff Depth>0.83"
 Flow Length=450' Tc=25.3 min UI Adjusted CN=75 Runoff=4.69 cfs 0.479 af
- SubcatchmentA5: TO BASIN P5** Runoff Area=346,926 sf 1.61% Impervious Runoff Depth>0.78"
 Flow Length=500' Tc=29.0 min CN=74 Runoff=4.67 cfs 0.520 af
- SubcatchmentA6a: RUNOFF TO A6b VIA** Runoff Area=157,765 sf 17.05% Impervious Runoff Depth>0.99"
 Flow Length=350' Tc=16.8 min CN=78 Runoff=3.72 cfs 0.299 af
- SubcatchmentA6b: RUNOFF TO SOUTH** Runoff Area=1,096,469 sf 3.59% Impervious Runoff Depth>0.88"
 Flow Length=700' Tc=24.7 min CN=76 Runoff=18.62 cfs 1.852 af
- SubcatchmentA7: TO P7** Runoff Area=289,159 sf 14.25% Impervious Runoff Depth>0.88"
 Flow Length=800' Tc=23.3 min UI Adjusted CN=76 Runoff=5.06 cfs 0.489 af
- SubcatchmentO1: OFFSITE-1** Runoff Area=1,992,036 sf 0.00% Impervious Runoff Depth>0.87"
 Flow Length=500' Slope=0.0480 '/' Tc=58.5 min CN=76 Runoff=21.11 cfs 3.329 af
- SubcatchmentO2: OFFSITE AREA O2** Runoff Area=166,588 sf 0.00% Impervious Runoff Depth>0.88"
 Flow Length=250' Slope=0.2000 '/' Tc=19.0 min CN=76 Runoff=3.22 cfs 0.282 af
- SubcatchmentO3: OFFSITE** Runoff Area=2,025,025 sf 0.28% Impervious Runoff Depth>0.87"
 Flow Length=2,500' Tc=74.6 min CN=76 Runoff=18.29 cfs 3.367 af
- SubcatchmentO4: OFFSITE AREA** Runoff Area=254,917 sf 5.08% Impervious Runoff Depth>0.93"
 Flow Length=575' Slope=0.0760 '/' Tc=54.4 min CN=77 Runoff=3.02 cfs 0.452 af
- Reach 1R: EAST PROPOSED** Inflow=25.27 cfs 4.578 af
 Outflow=25.27 cfs 4.578 af

Reach 2R: WETS PROPOSED Inflow=39.99 cfs 8.705 af
 Outflow=39.99 cfs 8.705 af

Pond P2a: BASIN P2a Peak Elev=891.15' Storage=1,853 cf Inflow=30.77 cfs 4.840 af
 42.0" Round Culvert n=0.012 L=150.0' S=0.0200 '/' Outflow=30.76 cfs 4.838 af

Pond P2b: BASIN P2b Peak Elev=882.13' Storage=54,806 cf Inflow=32.34 cfs 5.155 af
 Primary=26.55 cfs 4.393 af Secondary=0.00 cfs 0.000 af Outflow=26.55 cfs 4.393 af

Pond P3a: BASIN P3a Peak Elev=916.97' Storage=397 cf Inflow=4.32 cfs 0.340 af
 24.0" Round Culvert n=0.012 L=90.0' S=0.0056 '/' Outflow=4.28 cfs 0.339 af

Pond P3b: BASIN P3b Peak Elev=898.76' Storage=14,917 cf Inflow=6.99 cfs 0.630 af
 Primary=0.86 cfs 0.345 af Secondary=0.00 cfs 0.000 af Outflow=0.86 cfs 0.345 af

Pond P4a: BASIN P4a Peak Elev=906.70' Storage=3,181 cf Inflow=14.64 cfs 1.449 af
 36.0" Round Culvert n=0.012 L=135.0' S=0.0037 '/' Outflow=14.02 cfs 1.447 af

Pond P4b: BASIN P4b Peak Elev=900.32' Storage=36,403 cf Inflow=18.66 cfs 1.926 af
 Outflow=7.80 cfs 1.212 af

Pond P5: BASIN 5 Peak Elev=903.61' Storage=22,633 cf Inflow=4.67 cfs 0.520 af
 Outflow=0.00 cfs 0.000 af

Pond P7: BASIN P7 Peak Elev=868.88' Storage=13,759 cf Inflow=6.42 cfs 0.940 af
 Primary=4.10 cfs 0.712 af Secondary=0.00 cfs 0.000 af Outflow=4.10 cfs 0.712 af

Pond PO3: DITCH LOW AREA AT N SIDE OF Peak Elev=896.80' Storage=755 cf Inflow=18.29 cfs 3.367 af
 36.0" Round Culvert x 2.00 n=0.012 L=105.0' S=0.0048 '/' Outflow=18.27 cfs 3.367 af

Total Runoff Area = 218.145 ac Runoff Volume = 15.797 af Average Runoff Depth = 0.87"
96.56% Pervious = 210.630 ac 3.44% Impervious = 7.515 ac

Summary for Subcatchment A1: DIRECT RUNOFF SOUTHWEST

Runoff = 11.71 cfs @ 12.27 hrs, Volume= 1.104 af, Depth> 0.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 2-yr Rainfall=2.81"

Area (sf)	CN	Adj	Description
24,500	98		Unconnected pavement, HSG C
710,825	74		>75% Grass cover, Good, HSG C
735,325	75	74	Weighted Average, UI Adjusted
710,825			96.67% Pervious Area
24,500			3.33% Impervious Area
24,500			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.8	200	0.0470	0.18		Sheet Flow, grass Grass: Dense n= 0.240 P2= 2.81"
1.9	350	0.0430	3.11		Shallow Concentrated Flow, grass swale flow Grassed Waterway Kv= 15.0 fps
20.7	550	Total			

Summary for Subcatchment A2a: TO POND P2a

Runoff = 12.52 cfs @ 12.51 hrs, Volume= 1.510 af, Depth> 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 2-yr Rainfall=2.81"

Area (sf)	CN	Description
45,200	98	Unconnected pavement, HSG C
289,580	74	>75% Grass cover, Good, HSG C
562,540	76	Woods/grass comb., Fair, HSG C
897,320	76	Weighted Average
852,120		94.96% Pervious Area
45,200		5.04% Impervious Area
45,200		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.1	250	0.0500	0.13		Sheet Flow, SHEET FLOW Woods: Light underbrush n= 0.400 P2= 2.81"
3.1	250	0.0700	1.32		Shallow Concentrated Flow, SWALE FLOW Woodland Kv= 5.0 fps
36.2	500	Total			

Summary for Subcatchment A2b: TO BASIN P2b

Runoff = 3.48 cfs @ 12.26 hrs, Volume= 0.317 af, Depth> 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 2-yr Rainfall=2.81"

Area (sf)	CN	Adj	Description
24,500	98		Unconnected pavement, HSG C
162,959	74		>75% Grass cover, Good, HSG C
187,459	77	76	Weighted Average, UI Adjusted
162,959			86.93% Pervious Area
24,500			13.07% Impervious Area
24,500			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.9	250	0.0640	0.21		Sheet Flow, SHEET FLOW Grass: Dense n= 0.240 P2= 2.81"
0.8	200	0.0800	4.24		Shallow Concentrated Flow, GRASS SWALE Grassed Waterway Kv= 15.0 fps
20.7	450	Total			

Summary for Subcatchment A3a: TO BASIN P3a

Runoff = 4.32 cfs @ 12.19 hrs, Volume= 0.340 af, Depth> 0.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 2-yr Rainfall=2.81"

Area (sf)	CN	Description
* 25,100	98	Impervious area
140,607	74	>75% Grass cover, Good, HSG C
24,000	76	Woods/grass comb., Fair, HSG C
189,707	77	Weighted Average
164,607		86.77% Pervious Area
25,100		13.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.2	200	0.0800	0.22		Sheet Flow, SHEET FLOW Grass: Dense n= 0.240 P2= 2.81"
0.5	100	0.0600	3.67		Shallow Concentrated Flow, SWALE FLOW Grassed Waterway Kv= 15.0 fps
15.7	300	Total			

Summary for Subcatchment A3b: TO BASIN P3b

Runoff = 3.01 cfs @ 12.30 hrs, Volume= 0.291 af, Depth> 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 2-yr Rainfall=2.81"

Area (sf)	CN	Description
* 11,000	98	IMPERVIOUS
161,171	74	>75% Grass cover, Good, HSG C
172,171	76	Weighted Average
161,171		93.61% Pervious Area
11,000		6.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.4	260	0.0460	0.18		Sheet Flow, SHEET FLOW Grass: Dense n= 0.240 P2= 2.81"

Summary for Subcatchment A4a: TP BASIN P4a

Runoff = 11.68 cfs @ 12.33 hrs, Volume= 1.167 af, Depth> 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 2-yr Rainfall=2.81"

Area (sf)	CN	Description
* 38,100	98	IMPERVIOUS
555,262	74	>75% Grass cover, Good, HSG C
97,500	76	Woods/grass comb., Fair, HSG C
690,862	76	Weighted Average
652,762		94.49% Pervious Area
38,100		5.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.2	300	0.0630	0.22		Sheet Flow, SHEET FLOW Grass: Dense n= 0.240 P2= 2.81"
1.7	300	0.0400	3.00		Shallow Concentrated Flow, SWALE FLOW Grassed Waterway Kv= 15.0 fps
24.9	600	Total			

Summary for Subcatchment A4b: TO BASIN P4b

Runoff = 4.69 cfs @ 12.34 hrs, Volume= 0.479 af, Depth> 0.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 2-yr Rainfall=2.81"

Area (sf)	CN	Adj	Description
27,300	98		Unconnected pavement, HSG C
273,363	74		>75% Grass cover, Good, HSG C
300,663	76	75	Weighted Average, UI Adjusted
273,363			90.92% Pervious Area
27,300			9.08% Impervious Area
27,300			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.0	250	0.0400	0.17		Sheet Flow, SHEET FLOW Grass: Dense n= 0.240 P2= 2.81"
1.3	200	0.0300	2.60		Shallow Concentrated Flow, SWALE FLOW Grassed Waterway Kv= 15.0 fps
25.3	450	Total			

Summary for Subcatchment A5: TO BASIN P5

Runoff = 4.67 cfs @ 12.41 hrs, Volume= 0.520 af, Depth> 0.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 2-yr Rainfall=2.81"

Area (sf)	CN	Description
* 5,600	98	IMPERVIOUS
341,326	74	>75% Grass cover, Good, HSG C
346,926	74	Weighted Average
341,326		98.39% Pervious Area
5,600		1.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.0	250	0.0300	0.15		Sheet Flow, SHEET FLOW Grass: Dense n= 0.240 P2= 2.81"
2.0	250	0.0200	2.12		Shallow Concentrated Flow, GRASS SWALE Grassed Waterway Kv= 15.0 fps
29.0	500	Total			

Summary for Subcatchment A6a: RUNOFF TO A6b VIA CULVERT

Runoff = 3.72 cfs @ 12.20 hrs, Volume= 0.299 af, Depth> 0.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 2-yr Rainfall=2.81"

Area (sf)	CN	Description
* 26,900	98	IMPERVIOUS
130,865	74	>75% Grass cover, Good, HSG C
157,765	78	Weighted Average
130,865		82.95% Pervious Area
26,900		17.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.1	200	0.0700	0.21		Sheet Flow, SHEET FLOW Grass: Dense n= 0.240 P2= 2.81"
0.7	150	0.0530	3.45		Shallow Concentrated Flow, GRASS SWALE Grassed Waterway Kv= 15.0 fps
16.8	350	Total			

Summary for Subcatchment A6b: RUNOFF TO SOUTH

Runoff = 18.62 cfs @ 12.33 hrs, Volume= 1.852 af, Depth> 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 2-yr Rainfall=2.81"

Area (sf)	CN	Description
* 39,400	98	IMPERVIOUS
620,000	76	Woods/grass comb., Fair, HSG C
437,069	74	>75% Grass cover, Good, HSG C
1,096,469	76	Weighted Average
1,057,069		96.41% Pervious Area
39,400		3.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.3	250	0.0480	0.19		Sheet Flow, SHEET FLOW Grass: Dense n= 0.240 P2= 2.81"
2.4	450	0.0420	3.07		Shallow Concentrated Flow, GRASS SWALE FLOW Grassed Waterway Kv= 15.0 fps
24.7	700	Total			

Summary for Subcatchment A7: TO P7

Runoff = 5.06 cfs @ 12.30 hrs, Volume= 0.489 af, Depth> 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 2-yr Rainfall=2.81"

1707_AFTON CREEK PRESERVE_PROP-V4 FEB 5MN-AFTON 24-hr S1 2-yr Rainfall=2.81"

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Area (sf)	CN	Adj	Description
41,200	98		Unconnected pavement, HSG C
247,959	74		>75% Grass cover, Good, HSG C
289,159	77	76	Weighted Average, UI Adjusted
247,959			85.75% Pervious Area
41,200			14.25% Impervious Area
41,200			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.0	250	0.0560	0.20		Sheet Flow, SHEET FLOW Grass: Dense n= 0.240 P2= 2.81"
2.3	550	0.0730	4.05		Shallow Concentrated Flow, SWALE FLOW Grassed Waterway Kv= 15.0 fps
23.3	800	Total			

Summary for Subcatchment O1: OFFSITE-1

Runoff = 21.11 cfs @ 12.81 hrs, Volume= 3.329 af, Depth> 0.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MN-AFTON 24-hr S1 2-yr Rainfall=2.81"

Area (sf)	CN	Description
1,992,036	76	Woods/grass comb., Fair, HSG C
1,992,036		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
58.5	500	0.0480	0.14		Sheet Flow, WOODS Woods: Light underbrush n= 0.400 P2= 2.81"

Summary for Subcatchment O2: OFFSITE AREA O2

Runoff = 3.22 cfs @ 12.24 hrs, Volume= 0.282 af, Depth> 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MN-AFTON 24-hr S1 2-yr Rainfall=2.81"

Area (sf)	CN	Description
166,588	76	Woods/grass comb., Fair, HSG C
166,588		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.0	250	0.2000	0.22		Sheet Flow, WOODS Woods: Light underbrush n= 0.400 P2= 2.81"

Summary for Subcatchment O3: OFFSITE NORTHEAST AREA

Runoff = 18.29 cfs @ 13.02 hrs, Volume= 3.367 af, Depth> 0.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 2-yr Rainfall=2.81"

	Area (sf)	CN	Description
*	5,600	98	STEER
	2,019,425	76	Woods/grass comb., Fair, HSG C
	2,025,025	76	Weighted Average
	2,019,425		99.72% Pervious Area
	5,600		0.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
41.6	400	0.0720	0.16		Sheet Flow, WOODED Woods: Light underbrush n= 0.400 P2= 2.81"
33.0	2,100	0.0450	1.06		Shallow Concentrated Flow, WOODED Woodland Kv= 5.0 fps
74.6	2,500	Total			

Summary for Subcatchment O4: OFFSITE AREA SOUTHEAST

Runoff = 3.02 cfs @ 12.76 hrs, Volume= 0.452 af, Depth> 0.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 2-yr Rainfall=2.81"

	Area (sf)	CN	Description
*	12,954	98	IMPERV
	241,963	76	Woods/grass comb., Fair, HSG C
	254,917	77	Weighted Average
	241,963		94.92% Pervious Area
	12,954		5.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
54.4	575	0.0760	0.18		Sheet Flow, WOODS Woods: Light underbrush n= 0.400 P2= 2.81"

Summary for Reach 1R: EAST PROPOSED

Inflow Area = 81.039 ac, 2.17% Impervious, Inflow Depth > 0.68" for 2-yr event
 Inflow = 25.27 cfs @ 12.96 hrs, Volume= 4.578 af
 Outflow = 25.27 cfs @ 12.96 hrs, Volume= 4.578 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach 2R: WETS PROPOSED

Inflow Area = 137.106 ac, 4.20% Impervious, Inflow Depth > 0.76" for 2-yr event
 Inflow = 39.99 cfs @ 12.89 hrs, Volume= 8.705 af
 Outflow = 39.99 cfs @ 12.89 hrs, Volume= 8.705 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond P2a: BASIN P2a

Inflow Area = 66.330 ac, 1.56% Impervious, Inflow Depth > 0.88" for 2-yr event
 Inflow = 30.77 cfs @ 12.73 hrs, Volume= 4.840 af
 Outflow = 30.76 cfs @ 12.74 hrs, Volume= 4.838 af, Atten= 0%, Lag= 0.4 min
 Primary = 30.76 cfs @ 12.74 hrs, Volume= 4.838 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 891.15' @ 12.74 hrs Surf.Area= 1,520 sf Storage= 1,853 cf

Plug-Flow detention time= 1.0 min calculated for 4.838 af (100% of inflow)
 Center-of-Mass det. time= 0.8 min (886.5 - 885.6)

Volume #1	Invert	Avail.Storage	Storage Description
	889.00'	80,923 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
889.00	5	0	0
890.00	908	457	457
892.00	1,971	2,879	3,336
894.00	3,887	5,858	9,194
896.00	6,696	10,583	19,777
898.00	13,780	20,476	40,253
900.00	26,890	40,670	80,923

Device	Routing	Invert	Outlet Devices
#1	Primary	889.00'	42.0" Round Culvert L= 150.0' Ke= 0.510 Inlet / Outlet Invert= 889.00' / 886.00' S= 0.0200 ' Cc= 0.900 n= 0.012, Flow Area= 9.62 sf

Primary OutFlow Max=30.76 cfs @ 12.74 hrs HW=891.15' TW=881.67' (Dynamic Tailwater)
 ↳ **1=Culvert** (Inlet Controls 30.76 cfs @ 4.96 fps)

Summary for Pond P2b: BASIN P2b

Inflow Area = 70.634 ac, 2.27% Impervious, Inflow Depth > 0.88" for 2-yr event
 Inflow = 32.34 cfs @ 12.69 hrs, Volume= 5.155 af
 Outflow = 26.55 cfs @ 13.02 hrs, Volume= 4.393 af, Atten= 18%, Lag= 19.8 min
 Primary = 26.55 cfs @ 13.02 hrs, Volume= 4.393 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

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Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 882.13' @ 13.02 hrs Surf.Area= 14,269 sf Storage= 54,806 cf

Plug-Flow detention time= 101.6 min calculated for 4.393 af (85% of inflow)
 Center-of-Mass det. time= 37.9 min (922.9 - 885.0)

Volume	Invert	Avail.Storage	Storage Description
#1	876.00'	105,267 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
876.00	4,400	0	0
878.00	7,059	11,459	11,459
880.00	10,226	17,285	28,744
882.00	13,962	24,188	52,932
884.00	18,582	32,544	85,476
885.00	21,000	19,791	105,267

Device	Routing	Invert	Outlet Devices
#1	Primary	880.00'	36.0" Round Culvert L= 55.0' Ke= 0.510 Inlet / Outlet Invert= 880.00' / 879.00' S= 0.0182 '/' Cc= 0.900 n= 0.012, Flow Area= 7.07 sf
#2	Secondary	884.00'	30.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=26.55 cfs @ 13.02 hrs HW=882.13' TW=0.00' (Dynamic Tailwater)
 ↑**1=Culvert** (Inlet Controls 26.55 cfs @ 4.94 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=876.00' (Free Discharge)
 ↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P3a: BASIN P3a

Inflow Area = 4.355 ac, 13.23% Impervious, Inflow Depth > 0.94" for 2-yr event
 Inflow = 4.32 cfs @ 12.19 hrs, Volume= 0.340 af
 Outflow = 4.28 cfs @ 12.21 hrs, Volume= 0.339 af, Atten= 1%, Lag= 1.1 min
 Primary = 4.28 cfs @ 12.21 hrs, Volume= 0.339 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 916.97' @ 12.21 hrs Surf.Area= 537 sf Storage= 397 cf

Plug-Flow detention time= 3.5 min calculated for 0.339 af (100% of inflow)
 Center-of-Mass det. time= 2.0 min (857.6 - 855.6)

Volume	Invert	Avail.Storage	Storage Description
#1	916.00'	5,300 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
916.00	280	0	0
918.00	810	1,090	1,090
920.00	3,400	4,210	5,300

Device	Routing	Invert	Outlet Devices
#1	Primary	916.00'	24.0" Round Culvert L= 90.0' Ke= 0.510 Inlet / Outlet Invert= 916.00' / 915.50' S= 0.0056 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=4.27 cfs @ 12.21 hrs HW=916.97' TW=897.05' (Dynamic Tailwater)
 ↳ **1=Culvert** (Barrel Controls 4.27 cfs @ 4.13 fps)

Summary for Pond P3b: BASIN P3b

Inflow Area = 8.308 ac, 9.98% Impervious, Inflow Depth > 0.91" for 2-yr event
 Inflow = 6.99 cfs @ 12.24 hrs, Volume= 0.630 af
 Outflow = 0.86 cfs @ 13.34 hrs, Volume= 0.345 af, Atten= 88%, Lag= 65.9 min
 Primary = 0.86 cfs @ 13.34 hrs, Volume= 0.345 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 898.76' @ 13.34 hrs Surf.Area= 8,218 sf Storage= 14,917 cf

Plug-Flow detention time= 257.6 min calculated for 0.345 af (55% of inflow)
 Center-of-Mass det. time= 139.5 min (1,000.3 - 860.8)

Volume	Invert	Avail.Storage	Storage Description
#1	896.00'	71,876 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
896.00	2,771	0	0
898.00	6,548	9,319	9,319
900.00	10,952	17,500	26,819
902.00	16,070	27,022	53,841
903.00	20,000	18,035	71,876

Device	Routing	Invert	Outlet Devices
#1	Primary	898.20'	15.0" Round Culvert L= 80.0' Ke= 0.510 Inlet / Outlet Invert= 898.20' / 898.00' S= 0.0025 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Secondary	902.00'	15.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=0.86 cfs @ 13.34 hrs HW=898.76' TW=0.00' (Dynamic Tailwater)

↑1=Culvert (Barrel Controls 0.86 cfs @ 2.38 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=896.00' (Free Discharge)

↑2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P4a: BASIN P4a

Inflow Area = 19.684 ac, 4.44% Impervious, Inflow Depth > 0.88" for 2-yr event
 Inflow = 14.64 cfs @ 12.31 hrs, Volume= 1.449 af
 Outflow = 14.02 cfs @ 12.38 hrs, Volume= 1.447 af, Atten= 4%, Lag= 4.1 min
 Primary = 14.02 cfs @ 12.38 hrs, Volume= 1.447 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 906.70' @ 12.38 hrs Surf.Area= 3,188 sf Storage= 3,181 cf

Plug-Flow detention time= 3.8 min calculated for 1.447 af (100% of inflow)
 Center-of-Mass det. time= 3.0 min (867.9 - 864.8)

Volume	Invert	Avail.Storage	Storage Description
#1	905.00'	28,039 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
905.00	5	0	0
906.00	2,429	1,217	1,217
908.00	4,600	7,029	8,246
910.00	7,295	11,895	20,141
911.00	8,500	7,898	28,039

Device	Routing	Invert	Outlet Devices
#1	Primary	905.00'	36.0" Round Culvert L= 135.0' Ke= 0.510 Inlet / Outlet Invert= 905.00' / 904.50' S= 0.0037 '/' Cc= 0.900 n= 0.012, Flow Area= 7.07 sf

Primary OutFlow Max=14.02 cfs @ 12.38 hrs HW=906.70' TW=899.25' (Dynamic Tailwater)

↑1=Culvert (Barrel Controls 14.02 cfs @ 4.90 fps)

Summary for Pond P4b: BASIN P4b

Inflow Area = 26.587 ac, 5.65% Impervious, Inflow Depth > 0.87" for 2-yr event
 Inflow = 18.66 cfs @ 12.37 hrs, Volume= 1.926 af
 Outflow = 7.80 cfs @ 12.88 hrs, Volume= 1.212 af, Atten= 58%, Lag= 30.8 min
 Primary = 7.80 cfs @ 12.88 hrs, Volume= 1.212 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 900.32' @ 12.88 hrs Surf.Area= 19,799 sf Storage= 36,403 cf
 Flood Elev= 901.00' Surf.Area= 20,690 sf Storage= 50,170 cf

Plug-Flow detention time= 197.0 min calculated for 1.212 af (63% of inflow)

Center-of-Mass det. time= 85.3 min (953.5 - 868.2)

Volume #1	Invert 898.00'	Avail.Storage 71,515 cf	Storage Description
Custom Stage Data (Prismatic) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
898.00	10,755	0	0
900.00	19,380	30,135	30,135
902.00	22,000	41,380	71,515

Device #1	Routing Primary	Invert 900.00'	Outlet Devices
15.0' long x 0.5' breadth Broad-Crested Rectangular Weir			
Head (feet) 0.20 0.40 0.60 0.80 1.00			
Coef. (English) 2.80 2.92 3.08 3.30 3.32			

Primary OutFlow Max=7.80 cfs @ 12.88 hrs HW=900.32' TW=0.00' (Dynamic Tailwater)
 ←1=Broad-Crested Rectangular Weir (Weir Controls 7.80 cfs @ 1.62 fps)

Summary for Pond P5: BASIN 5

Inflow Area = 7.964 ac, 1.61% Impervious, Inflow Depth > 0.78" for 2-yr event
 Inflow = 4.67 cfs @ 12.41 hrs, Volume= 0.520 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 903.61' @ 24.00 hrs Surf.Area= 15,775 sf Storage= 22,633 cf
 Flood Elev= 903.00' Surf.Area= 14,462 sf Storage= 13,388 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

Volume #1	Invert 902.00'	Avail.Storage 47,729 cf	Storage Description
Custom Stage Data (Prismatic) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
902.00	12,314	0	0
904.00	16,610	28,924	28,924
905.00	21,000	18,805	47,729

Device #1	Routing Primary	Invert 904.00'	Outlet Devices
20.0' long x 0.5' breadth Broad-Crested Rectangular Weir			
Head (feet) 0.20 0.40 0.60 0.80 1.00			
Coef. (English) 2.80 2.92 3.08 3.30 3.32			

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=902.00' TW=0.00' (Dynamic Tailwater)
 ←1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P7: BASIN P7

Inflow Area = 12.490 ac, 9.95% Impervious, Inflow Depth > 0.90" for 2-yr event
 Inflow = 6.42 cfs @ 12.37 hrs, Volume= 0.940 af
 Outflow = 4.10 cfs @ 12.95 hrs, Volume= 0.712 af, Atten= 36%, Lag= 35.3 min
 Primary = 4.10 cfs @ 12.95 hrs, Volume= 0.712 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 868.88' @ 12.95 hrs Surf.Area= 5,438 sf Storage= 13,759 cf

Plug-Flow detention time= 148.1 min calculated for 0.712 af (76% of inflow)
 Center-of-Mass det. time= 58.3 min (932.5 - 874.2)

Volume	Invert	Avail.Storage	Storage Description
#1	864.00'	31,920 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
864.00	824	0	0
866.00	2,212	3,036	3,036
868.00	4,247	6,459	9,495
870.00	6,952	11,199	20,694
871.00	7,500	7,226	27,920
871.50	8,500	4,000	31,920

Device	Routing	Invert	Outlet Devices
#1	Primary	867.90'	18.0" Round Culvert L= 55.0' Ke= 0.510 Inlet / Outlet Invert= 867.90' / 866.53' S= 0.0249 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Secondary	870.50'	20.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=4.10 cfs @ 12.95 hrs HW=868.88' TW=0.00' (Dynamic Tailwater)
 ↳1=Culvert (Inlet Controls 4.10 cfs @ 3.35 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=864.00' (Free Discharge)
 ↳2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond PO3: DITCH LOW AREA AT N SIDE OF PROP ROAD

Inflow Area = 46.488 ac, 0.28% Impervious, Inflow Depth > 0.87" for 2-yr event
 Inflow = 18.29 cfs @ 13.02 hrs, Volume= 3.367 af
 Outflow = 18.27 cfs @ 13.05 hrs, Volume= 3.367 af, Atten= 0%, Lag= 1.4 min
 Primary = 18.27 cfs @ 13.05 hrs, Volume= 3.367 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 896.80' @ 13.05 hrs Surf.Area= 1,204 sf Storage= 755 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 0.4 min (903.4 - 903.0)

Volume	Invert	Avail.Storage	Storage Description
#1	896.00'	35,826 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
896.00	695	0	0
898.00	1,973	2,668	2,668
900.00	8,790	10,763	13,431
901.00	11,000	9,895	23,326
902.00	14,000	12,500	35,826

Device	Routing	Invert	Outlet Devices
#1	Primary	895.50'	36.0" Round Culvert X 2.00 L= 105.0' Ke= 0.510 Inlet / Outlet Invert= 895.50' / 895.00' S= 0.0048 '/' Cc= 0.900 n= 0.012, Flow Area= 7.07 sf

Primary OutFlow Max=18.27 cfs @ 13.05 hrs HW=896.80' TW=0.00' (Dynamic Tailwater)
 ↑**1=Culvert** (Barrel Controls 18.27 cfs @ 4.61 fps)

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentA1: DIRECT RUNOFF	Runoff Area=735,325 sf	3.33% Impervious	Runoff Depth>1.71"
	Flow Length=550'	Tc=20.7 min	UI Adjusted CN=74
			Runoff=28.24 cfs
			2.410 af
SubcatchmentA2a: TO POND P2a	Runoff Area=897,320 sf	5.04% Impervious	Runoff Depth>1.85"
	Flow Length=500'	Tc=36.2 min	CN=76
			Runoff=28.26 cfs
			3.182 af
SubcatchmentA2b: TO BASIN P2b	Runoff Area=187,459 sf	13.07% Impervious	Runoff Depth>1.86"
	Flow Length=450'	Tc=20.7 min	UI Adjusted CN=76
			Runoff=7.90 cfs
			0.667 af
SubcatchmentA3a: TO BASIN P3a	Runoff Area=189,707 sf	13.23% Impervious	Runoff Depth>1.94"
	Flow Length=300'	Tc=15.7 min	CN=77
			Runoff=9.55 cfs
			0.704 af
SubcatchmentA3b: TO BASIN P3b	Runoff Area=172,171 sf	6.39% Impervious	Runoff Depth>1.86"
	Flow Length=260'	Slope=0.0460 '/'	Tc=23.4 min
			CN=76
			Runoff=6.83 cfs
			0.612 af
SubcatchmentA4a: TP BASIN P4a	Runoff Area=690,862 sf	5.51% Impervious	Runoff Depth>1.86"
	Flow Length=600'	Tc=24.9 min	CN=76
			Runoff=26.58 cfs
			2.456 af
SubcatchmentA4b: TO BASIN P4b	Runoff Area=300,663 sf	9.08% Impervious	Runoff Depth>1.78"
	Flow Length=450'	Tc=25.3 min	UI Adjusted CN=75
			Runoff=10.91 cfs
			1.026 af
SubcatchmentA5: TO BASIN P5	Runoff Area=346,926 sf	1.61% Impervious	Runoff Depth>1.71"
	Flow Length=500'	Tc=29.0 min	CN=74
			Runoff=11.17 cfs
			1.135 af
SubcatchmentA6a: RUNOFF TO A6b VIA	Runoff Area=157,765 sf	17.05% Impervious	Runoff Depth>2.02"
	Flow Length=350'	Tc=16.8 min	CN=78
			Runoff=8.03 cfs
			0.608 af
SubcatchmentA6b: RUNOFF TO SOUTH	Runoff Area=1,096,469 sf	3.59% Impervious	Runoff Depth>1.86"
	Flow Length=700'	Tc=24.7 min	CN=76
			Runoff=42.25 cfs
			3.899 af
SubcatchmentA7: TO P7	Runoff Area=289,159 sf	14.25% Impervious	Runoff Depth>1.86"
	Flow Length=800'	Tc=23.3 min	UI Adjusted CN=76
			Runoff=11.49 cfs
			1.029 af
SubcatchmentO1: OFFSITE-1	Runoff Area=1,992,036 sf	0.00% Impervious	Runoff Depth>1.84"
	Flow Length=500'	Slope=0.0480 '/'	Tc=58.5 min
			CN=76
			Runoff=47.78 cfs
			7.023 af
SubcatchmentO2: OFFSITE AREA O2	Runoff Area=166,588 sf	0.00% Impervious	Runoff Depth>1.86"
	Flow Length=250'	Slope=0.2000 '/'	Tc=19.0 min
			CN=76
			Runoff=7.31 cfs
			0.593 af
SubcatchmentO3: OFFSITE	Runoff Area=2,025,025 sf	0.28% Impervious	Runoff Depth>1.83"
	Flow Length=2,500'	Tc=74.6 min	CN=76
			Runoff=41.50 cfs
			7.109 af
SubcatchmentO4: OFFSITE AREA	Runoff Area=254,917 sf	5.08% Impervious	Runoff Depth>1.92"
	Flow Length=575'	Slope=0.0760 '/'	Tc=54.4 min
			CN=77
			Runoff=6.67 cfs
			0.936 af
Reach 1R: EAST PROPOSED			Inflow=62.01 cfs
			10.918 af
			Outflow=62.01 cfs
			10.918 af

Reach 2R: WETS PROPOSED

Inflow=106.19 cfs 19.522 af
 Outflow=106.19 cfs 19.522 af

Pond P2a: BASIN P2a

Peak Elev=893.02' Storage=5,847 cf Inflow=69.91 cfs 10.204 af
 42.0" Round Culvert n=0.012 L=150.0' S=0.0200 '/' Outflow=69.35 cfs 10.202 af

Pond P2b: BASIN P2b

Peak Elev=884.24' Storage=90,083 cf Inflow=72.60 cfs 10.869 af
 Primary=56.01 cfs 9.857 af Secondary=10.22 cfs 0.216 af Outflow=66.23 cfs 10.073 af

Pond P3a: BASIN P3a

Peak Elev=917.56' Storage=762 cf Inflow=9.55 cfs 0.704 af
 24.0" Round Culvert n=0.012 L=90.0' S=0.0056 '/' Outflow=9.46 cfs 0.702 af

Pond P3b: BASIN P3b

Peak Elev=899.93' Storage=26,053 cf Inflow=15.70 cfs 1.315 af
 Primary=4.61 cfs 1.017 af Secondary=0.00 cfs 0.000 af Outflow=4.61 cfs 1.017 af

Pond P4a: BASIN P4a

Peak Elev=907.80' Storage=7,364 cf Inflow=33.20 cfs 3.050 af
 36.0" Round Culvert n=0.012 L=135.0' S=0.0037 '/' Outflow=31.56 cfs 3.047 af

Pond P4b: BASIN P4b

Peak Elev=900.81' Storage=46,184 cf Inflow=42.32 cfs 4.073 af
 Outflow=35.83 cfs 3.349 af

Pond P5: BASIN 5

Peak Elev=904.09' Storage=30,485 cf Inflow=11.17 cfs 1.135 af
 Outflow=1.58 cfs 0.461 af

Pond P7: BASIN P7

Peak Elev=870.16' Storage=21,824 cf Inflow=14.74 cfs 1.965 af
 Primary=10.39 cfs 1.730 af Secondary=0.00 cfs 0.000 af Outflow=10.39 cfs 1.730 af

Pond PO3: DITCH LOW AREA AT N SIDE

Peak Elev=897.59' Storage=1,910 cf Inflow=41.50 cfs 7.109 af
 36.0" Round Culvert x 2.00 n=0.012 L=105.0' S=0.0048 '/' Outflow=41.44 cfs 7.109 af

Total Runoff Area = 218.145 ac Runoff Volume = 33.389 af Average Runoff Depth = 1.84"
96.56% Pervious = 210.630 ac 3.44% Impervious = 7.515 ac

Summary for Subcatchment A1: DIRECT RUNOFF SOUTHWEST

Runoff = 28.24 cfs @ 12.26 hrs, Volume= 2.410 af, Depth> 1.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 10-yr Rainfall=4.17"

Area (sf)	CN	Adj	Description
24,500	98		Unconnected pavement, HSG C
710,825	74		>75% Grass cover, Good, HSG C
735,325	75	74	Weighted Average, UI Adjusted
710,825			96.67% Pervious Area
24,500			3.33% Impervious Area
24,500			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.8	200	0.0470	0.18		Sheet Flow, grass Grass: Dense n= 0.240 P2= 2.81"
1.9	350	0.0430	3.11		Shallow Concentrated Flow, grass swale flow Grassed Waterway Kv= 15.0 fps
20.7	550	Total			

Summary for Subcatchment A2a: TO POND P2a

Runoff = 28.26 cfs @ 12.50 hrs, Volume= 3.182 af, Depth> 1.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 10-yr Rainfall=4.17"

Area (sf)	CN	Description
45,200	98	Unconnected pavement, HSG C
289,580	74	>75% Grass cover, Good, HSG C
562,540	76	Woods/grass comb., Fair, HSG C
897,320	76	Weighted Average
852,120		94.96% Pervious Area
45,200		5.04% Impervious Area
45,200		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.1	250	0.0500	0.13		Sheet Flow, SHEET FLOW Woods: Light underbrush n= 0.400 P2= 2.81"
3.1	250	0.0700	1.32		Shallow Concentrated Flow, SWALE FLOW Woodland Kv= 5.0 fps
36.2	500	Total			

Summary for Subcatchment A2b: TO BASIN P2b

Runoff = 7.90 cfs @ 12.26 hrs, Volume= 0.667 af, Depth> 1.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 10-yr Rainfall=4.17"

Area (sf)	CN	Adj	Description
24,500	98		Unconnected pavement, HSG C
162,959	74		>75% Grass cover, Good, HSG C
187,459	77	76	Weighted Average, UI Adjusted
162,959			86.93% Pervious Area
24,500			13.07% Impervious Area
24,500			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.9	250	0.0640	0.21		Sheet Flow, SHEET FLOW Grass: Dense n= 0.240 P2= 2.81"
0.8	200	0.0800	4.24		Shallow Concentrated Flow, GRASS SWALE Grassed Waterway Kv= 15.0 fps
20.7	450	Total			

Summary for Subcatchment A3a: TO BASIN P3a

Runoff = 9.55 cfs @ 12.18 hrs, Volume= 0.704 af, Depth> 1.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 10-yr Rainfall=4.17"

Area (sf)	CN	Description
* 25,100	98	Impervious area
140,607	74	>75% Grass cover, Good, HSG C
24,000	76	Woods/grass comb., Fair, HSG C
189,707	77	Weighted Average
164,607		86.77% Pervious Area
25,100		13.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.2	200	0.0800	0.22		Sheet Flow, SHEET FLOW Grass: Dense n= 0.240 P2= 2.81"
0.5	100	0.0600	3.67		Shallow Concentrated Flow, SWALE FLOW Grassed Waterway Kv= 15.0 fps
15.7	300	Total			

Summary for Subcatchment A3b: TO BASIN P3b

Runoff = 6.83 cfs @ 12.30 hrs, Volume= 0.612 af, Depth> 1.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 10-yr Rainfall=4.17"

Area (sf)	CN	Description
* 11,000	98	IMPERVIOUS
161,171	74	>75% Grass cover, Good, HSG C
172,171	76	Weighted Average
161,171		93.61% Pervious Area
11,000		6.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.4	260	0.0460	0.18		Sheet Flow, SHEET FLOW Grass: Dense n= 0.240 P2= 2.81"

Summary for Subcatchment A4a: TP BASIN P4a

Runoff = 26.58 cfs @ 12.31 hrs, Volume= 2.456 af, Depth> 1.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 10-yr Rainfall=4.17"

Area (sf)	CN	Description
* 38,100	98	IMPERVIOUS
555,262	74	>75% Grass cover, Good, HSG C
97,500	76	Woods/grass comb., Fair, HSG C
690,862	76	Weighted Average
652,762		94.49% Pervious Area
38,100		5.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.2	300	0.0630	0.22		Sheet Flow, SHEET FLOW Grass: Dense n= 0.240 P2= 2.81"
1.7	300	0.0400	3.00		Shallow Concentrated Flow, SWALE FLOW Grassed Waterway Kv= 15.0 fps
24.9	600	Total			

Summary for Subcatchment A4b: TO BASIN P4b

Runoff = 10.91 cfs @ 12.33 hrs, Volume= 1.026 af, Depth> 1.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 10-yr Rainfall=4.17"

Area (sf)	CN	Adj	Description
27,300	98		Unconnected pavement, HSG C
273,363	74		>75% Grass cover, Good, HSG C
300,663	76	75	Weighted Average, UI Adjusted
273,363			90.92% Pervious Area
27,300			9.08% Impervious Area
27,300			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.0	250	0.0400	0.17		Sheet Flow, SHEET FLOW Grass: Dense n= 0.240 P2= 2.81"
1.3	200	0.0300	2.60		Shallow Concentrated Flow, SWALE FLOW Grassed Waterway Kv= 15.0 fps
25.3	450	Total			

Summary for Subcatchment A5: TO BASIN P5

Runoff = 11.17 cfs @ 12.38 hrs, Volume= 1.135 af, Depth> 1.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 10-yr Rainfall=4.17"

Area (sf)	CN	Description
* 5,600	98	IMPERVIOUS
341,326	74	>75% Grass cover, Good, HSG C
346,926	74	Weighted Average
341,326		98.39% Pervious Area
5,600		1.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.0	250	0.0300	0.15		Sheet Flow, SHEET FLOW Grass: Dense n= 0.240 P2= 2.81"
2.0	250	0.0200	2.12		Shallow Concentrated Flow, GRASS SWALE Grassed Waterway Kv= 15.0 fps
29.0	500	Total			

Summary for Subcatchment A6a: RUNOFF TO A6b VIA CULVERT

Runoff = 8.03 cfs @ 12.19 hrs, Volume= 0.608 af, Depth> 2.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 10-yr Rainfall=4.17"

Area (sf)	CN	Description
* 26,900	98	IMPERVIOUS
130,865	74	>75% Grass cover, Good, HSG C
157,765	78	Weighted Average
130,865		82.95% Pervious Area
26,900		17.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.1	200	0.0700	0.21		Sheet Flow, SHEET FLOW Grass: Dense n= 0.240 P2= 2.81"
0.7	150	0.0530	3.45		Shallow Concentrated Flow, GRASS SWALE Grassed Waterway Kv= 15.0 fps
16.8	350	Total			

Summary for Subcatchment A6b: RUNOFF TO SOUTH

Runoff = 42.25 cfs @ 12.32 hrs, Volume= 3.899 af, Depth> 1.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 10-yr Rainfall=4.17"

Area (sf)	CN	Description
* 39,400	98	IMPERVIOUS
620,000	76	Woods/grass comb., Fair, HSG C
437,069	74	>75% Grass cover, Good, HSG C
1,096,469	76	Weighted Average
1,057,069		96.41% Pervious Area
39,400		3.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.3	250	0.0480	0.19		Sheet Flow, SHEET FLOW Grass: Dense n= 0.240 P2= 2.81"
2.4	450	0.0420	3.07		Shallow Concentrated Flow, GRASS SWALE FLOW Grassed Waterway Kv= 15.0 fps
24.7	700	Total			

Summary for Subcatchment A7: TO P7

Runoff = 11.49 cfs @ 12.30 hrs, Volume= 1.029 af, Depth> 1.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 10-yr Rainfall=4.17"

Area (sf)	CN	Adj	Description
41,200	98		Unconnected pavement, HSG C
247,959	74		>75% Grass cover, Good, HSG C
289,159	77	76	Weighted Average, UI Adjusted
247,959			85.75% Pervious Area
41,200			14.25% Impervious Area
41,200			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.0	250	0.0560	0.20		Sheet Flow, SHEET FLOW Grass: Dense n= 0.240 P2= 2.81"
2.3	550	0.0730	4.05		Shallow Concentrated Flow, SWALE FLOW Grassed Waterway Kv= 15.0 fps
23.3	800	Total			

Summary for Subcatchment O1: OFFSITE-1

Runoff = 47.78 cfs @ 12.80 hrs, Volume= 7.023 af, Depth> 1.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 10-yr Rainfall=4.17"

Area (sf)	CN	Description
1,992,036	76	Woods/grass comb., Fair, HSG C
1,992,036		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
58.5	500	0.0480	0.14		Sheet Flow, WOODS Woods: Light underbrush n= 0.400 P2= 2.81"

Summary for Subcatchment O2: OFFSITE AREA O2

Runoff = 7.31 cfs @ 12.23 hrs, Volume= 0.593 af, Depth> 1.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 10-yr Rainfall=4.17"

Area (sf)	CN	Description
166,588	76	Woods/grass comb., Fair, HSG C
166,588		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.0	250	0.2000	0.22		Sheet Flow, WOODS Woods: Light underbrush n= 0.400 P2= 2.81"

Summary for Subcatchment O3: OFFSITE NORTHEAST AREA

Runoff = 41.50 cfs @ 13.01 hrs, Volume= 7.109 af, Depth> 1.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 10-yr Rainfall=4.17"

Area (sf)	CN	Description
* 5,600	98	STEER
2,019,425	76	Woods/grass comb., Fair, HSG C
2,025,025	76	Weighted Average
2,019,425		99.72% Pervious Area
5,600		0.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
41.6	400	0.0720	0.16		Sheet Flow, WOODED Woods: Light underbrush n= 0.400 P2= 2.81"
33.0	2,100	0.0450	1.06		Shallow Concentrated Flow, WOODED Woodland Kv= 5.0 fps
74.6	2,500	Total			

Summary for Subcatchment O4: OFFSITE AREA SOUTHEAST

Runoff = 6.67 cfs @ 12.75 hrs, Volume= 0.936 af, Depth> 1.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 10-yr Rainfall=4.17"

Area (sf)	CN	Description
* 12,954	98	IMPERV
241,963	76	Woods/grass comb., Fair, HSG C
254,917	77	Weighted Average
241,963		94.92% Pervious Area
12,954		5.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
54.4	575	0.0760	0.18		Sheet Flow, WOODS Woods: Light underbrush n= 0.400 P2= 2.81"

Summary for Reach 1R: EAST PROPOSED

Inflow Area = 81.039 ac, 2.17% Impervious, Inflow Depth > 1.62" for 10-yr event
 Inflow = 62.01 cfs @ 12.71 hrs, Volume= 10.918 af
 Outflow = 62.01 cfs @ 12.71 hrs, Volume= 10.918 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach 2R: WETS PROPOSED

Inflow Area = 137.106 ac, 4.20% Impervious, Inflow Depth > 1.71" for 10-yr event
 Inflow = 106.19 cfs @ 12.53 hrs, Volume= 19.522 af
 Outflow = 106.19 cfs @ 12.53 hrs, Volume= 19.522 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond P2a: BASIN P2a

Inflow Area = 66.330 ac, 1.56% Impervious, Inflow Depth > 1.85" for 10-yr event
 Inflow = 69.91 cfs @ 12.67 hrs, Volume= 10.204 af
 Outflow = 69.35 cfs @ 12.72 hrs, Volume= 10.202 af, Atten= 1%, Lag= 2.8 min
 Primary = 69.35 cfs @ 12.72 hrs, Volume= 10.202 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 893.02' @ 12.72 hrs Surf.Area= 2,949 sf Storage= 5,847 cf

Plug-Flow detention time= 1.1 min calculated for 10.197 af (100% of inflow)
 Center-of-Mass det. time= 0.9 min (865.4 - 864.4)

Volume	Invert	Avail.Storage	Storage Description
#1	889.00'	80,923 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
889.00	5	0	0
890.00	908	457	457
892.00	1,971	2,879	3,336
894.00	3,887	5,858	9,194
896.00	6,696	10,583	19,777
898.00	13,780	20,476	40,253
900.00	26,890	40,670	80,923

Device	Routing	Invert	Outlet Devices
#1	Primary	889.00'	42.0" Round Culvert L= 150.0' Ke= 0.510 Inlet / Outlet Invert= 889.00' / 886.00' S= 0.0200 ' / Cc= 0.900 n= 0.012, Flow Area= 9.62 sf

Primary OutFlow Max=69.35 cfs @ 12.72 hrs HW=893.02' TW=883.89' (Dynamic Tailwater)
 ↑**1=Culvert** (Inlet Controls 69.35 cfs @ 7.21 fps)

Summary for Pond P2b: BASIN P2b

Inflow Area = 70.634 ac, 2.27% Impervious, Inflow Depth > 1.85" for 10-yr event
 Inflow = 72.60 cfs @ 12.69 hrs, Volume= 10.869 af
 Outflow = 66.23 cfs @ 12.91 hrs, Volume= 10.073 af, Atten= 9%, Lag= 13.1 min
 Primary = 56.01 cfs @ 12.91 hrs, Volume= 9.857 af
 Secondary = 10.22 cfs @ 12.91 hrs, Volume= 0.216 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 884.24' @ 12.91 hrs Surf.Area= 19,172 sf Storage= 90,083 cf

Plug-Flow detention time= 59.8 min calculated for 10.073 af (93% of inflow)
 Center-of-Mass det. time= 23.8 min (887.7 - 863.9)

Volume	Invert	Avail.Storage	Storage Description
#1	876.00'	105,267 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
876.00	4,400	0	0
878.00	7,059	11,459	11,459
880.00	10,226	17,285	28,744
882.00	13,962	24,188	52,932
884.00	18,582	32,544	85,476
885.00	21,000	19,791	105,267

Device	Routing	Invert	Outlet Devices
#1	Primary	880.00'	36.0" Round Culvert L= 55.0' Ke= 0.510 Inlet / Outlet Invert= 880.00' / 879.00' S= 0.0182 '/' Cc= 0.900 n= 0.012, Flow Area= 7.07 sf
#2	Secondary	884.00'	30.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=56.01 cfs @ 12.91 hrs HW=884.24' TW=0.00' (Dynamic Tailwater)
 ↳ **#1=Culvert** (Inlet Controls 56.01 cfs @ 7.92 fps)

Secondary OutFlow Max=10.22 cfs @ 12.91 hrs HW=884.24' (Free Discharge)
 ↳ **#2=Broad-Crested Rectangular Weir**(Weir Controls 10.22 cfs @ 1.40 fps)

Summary for Pond P3a: BASIN P3a

Inflow Area = 4.355 ac, 13.23% Impervious, Inflow Depth > 1.94" for 10-yr event
 Inflow = 9.55 cfs @ 12.18 hrs, Volume= 0.704 af
 Outflow = 9.46 cfs @ 12.20 hrs, Volume= 0.702 af, Atten= 1%, Lag= 1.2 min
 Primary = 9.46 cfs @ 12.20 hrs, Volume= 0.702 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 917.56' @ 12.20 hrs Surf.Area= 695 sf Storage= 762 cf

Plug-Flow detention time= 2.6 min calculated for 0.702 af (100% of inflow)
 Center-of-Mass det. time= 1.7 min (835.9 - 834.2)

Volume	Invert	Avail.Storage	Storage Description
#1	916.00'	5,300 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
916.00	280	0	0
918.00	810	1,090	1,090
920.00	3,400	4,210	5,300

Device	Routing	Invert	Outlet Devices
#1	Primary	916.00'	24.0" Round Culvert L= 90.0' Ke= 0.510 Inlet / Outlet Invert= 916.00' / 915.50' S= 0.0056 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=9.45 cfs @ 12.20 hrs HW=917.56' TW=898.30' (Dynamic Tailwater)
 ←1=Culvert (Barrel Controls 9.45 cfs @ 4.94 fps)

Summary for Pond P3b: BASIN P3b

Inflow Area = 8.308 ac, 9.98% Impervious, Inflow Depth > 1.90" for 10-yr event
 Inflow = 15.70 cfs @ 12.23 hrs, Volume= 1.315 af
 Outflow = 4.61 cfs @ 12.79 hrs, Volume= 1.017 af, Atten= 71%, Lag= 33.7 min
 Primary = 4.61 cfs @ 12.79 hrs, Volume= 1.017 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 899.93' @ 12.79 hrs Surf.Area= 10,797 sf Storage= 26,053 cf

Plug-Flow detention time= 153.7 min calculated for 1.017 af (77% of inflow)
 Center-of-Mass det. time= 71.3 min (910.3 - 839.0)

Volume	Invert	Avail.Storage	Storage Description
#1	896.00'	71,876 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
896.00	2,771	0	0
898.00	6,548	9,319	9,319
900.00	10,952	17,500	26,819
902.00	16,070	27,022	53,841
903.00	20,000	18,035	71,876

Device	Routing	Invert	Outlet Devices
#1	Primary	898.20'	15.0" Round Culvert L= 80.0' Ke= 0.510 Inlet / Outlet Invert= 898.20' / 898.00' S= 0.0025 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Secondary	902.00'	15.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=4.61 cfs @ 12.79 hrs HW=899.93' TW=0.00' (Dynamic Tailwater)
 ↖1=Culvert (Barrel Controls 4.61 cfs @ 3.76 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=896.00' (Free Discharge)
 ↖2=Broad-Crested Rectangular Weir(Controls 0.00 cfs)

Summary for Pond P4a: BASIN P4a

Inflow Area = 19.684 ac, 4.44% Impervious, Inflow Depth > 1.86" for 10-yr event
 Inflow = 33.20 cfs @ 12.29 hrs, Volume= 3.050 af
 Outflow = 31.56 cfs @ 12.37 hrs, Volume= 3.047 af, Atten= 5%, Lag= 4.4 min
 Primary = 31.56 cfs @ 12.37 hrs, Volume= 3.047 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 907.80' @ 12.37 hrs Surf.Area= 4,387 sf Storage= 7,364 cf

Plug-Flow detention time= 3.8 min calculated for 3.047 af (100% of inflow)
 Center-of-Mass det. time= 3.2 min (846.0 - 842.9)

Volume	Invert	Avail.Storage	Storage Description
#1	905.00'	28,039 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
905.00	5	0	0
906.00	2,429	1,217	1,217
908.00	4,600	7,029	8,246
910.00	7,295	11,895	20,141
911.00	8,500	7,898	28,039

Device	Routing	Invert	Outlet Devices
#1	Primary	905.00'	36.0" Round Culvert L= 135.0' Ke= 0.510 Inlet / Outlet Invert= 905.00' / 904.50' S= 0.0037 '/' Cc= 0.900 n= 0.012, Flow Area= 7.07 sf

Primary OutFlow Max=31.55 cfs @ 12.37 hrs HW=907.80' TW=900.59' (Dynamic Tailwater)
 ↖1=Culvert (Barrel Controls 31.55 cfs @ 5.96 fps)

Summary for Pond P4b: BASIN P4b

Inflow Area = 26.587 ac, 5.65% Impervious, Inflow Depth > 1.84" for 10-yr event
 Inflow = 42.32 cfs @ 12.35 hrs, Volume= 4.073 af
 Outflow = 35.83 cfs @ 12.51 hrs, Volume= 3.349 af, Atten= 15%, Lag= 9.6 min
 Primary = 35.83 cfs @ 12.51 hrs, Volume= 3.349 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 900.81' @ 12.51 hrs Surf.Area= 20,436 sf Storage= 46,184 cf
 Flood Elev= 901.00' Surf.Area= 20,690 sf Storage= 50,170 cf

Plug-Flow detention time= 106.4 min calculated for 3.349 af (82% of inflow)

Center-of-Mass det. time= 34.7 min (880.8 - 846.1)

Volume	Invert	Avail.Storage	Storage Description
#1	898.00'	71,515 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
898.00	10,755	0	0
900.00	19,380	30,135	30,135
902.00	22,000	41,380	71,515

Device	Routing	Invert	Outlet Devices
#1	Primary	900.00'	15.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=35.83 cfs @ 12.51 hrs HW=900.81' TW=0.00' (Dynamic Tailwater)
 ↑1=**Broad-Crested Rectangular Weir**(Weir Controls 35.83 cfs @ 2.96 fps)

Summary for Pond P5: BASIN 5

Inflow Area = 7.964 ac, 1.61% Impervious, Inflow Depth > 1.71" for 10-yr event
 Inflow = 11.17 cfs @ 12.38 hrs, Volume= 1.135 af
 Outflow = 1.58 cfs @ 13.45 hrs, Volume= 0.461 af, Atten= 86%, Lag= 64.0 min
 Primary = 1.58 cfs @ 13.45 hrs, Volume= 0.461 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 904.09' @ 13.45 hrs Surf.Area= 17,018 sf Storage= 30,485 cf
 Flood Elev= 903.00' Surf.Area= 14,462 sf Storage= 13,388 cf

Plug-Flow detention time= 274.0 min calculated for 0.461 af (41% of inflow)
 Center-of-Mass det. time= 160.8 min (1,012.3 - 851.6)

Volume	Invert	Avail.Storage	Storage Description
#1	902.00'	47,729 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
902.00	12,314	0	0
904.00	16,610	28,924	28,924
905.00	21,000	18,805	47,729

Device	Routing	Invert	Outlet Devices
#1	Primary	904.00'	20.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=1.58 cfs @ 13.45 hrs HW=904.09' TW=0.00' (Dynamic Tailwater)
 ↑1=**Broad-Crested Rectangular Weir**(Weir Controls 1.58 cfs @ 0.85 fps)

Summary for Pond P7: BASIN P7

Inflow Area = 12.490 ac, 9.95% Impervious, Inflow Depth > 1.89" for 10-yr event
 Inflow = 14.74 cfs @ 12.35 hrs, Volume= 1.965 af
 Outflow = 10.39 cfs @ 12.83 hrs, Volume= 1.730 af, Atten= 30%, Lag= 28.8 min
 Primary = 10.39 cfs @ 12.83 hrs, Volume= 1.730 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 870.16' @ 12.83 hrs Surf.Area= 7,041 sf Storage= 21,824 cf

Plug-Flow detention time= 86.4 min calculated for 1.729 af (88% of inflow)
 Center-of-Mass det. time= 32.5 min (885.4 - 852.9)

Volume	Invert	Avail.Storage	Storage Description
#1	864.00'	31,920 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
864.00	824	0	0
866.00	2,212	3,036	3,036
868.00	4,247	6,459	9,495
870.00	6,952	11,199	20,694
871.00	7,500	7,226	27,920
871.50	8,500	4,000	31,920

Device	Routing	Invert	Outlet Devices
#1	Primary	867.90'	18.0" Round Culvert L= 55.0' Ke= 0.510 Inlet / Outlet Invert= 867.90' / 866.53' S= 0.0249 1/1 Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Secondary	870.50'	20.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=10.39 cfs @ 12.83 hrs HW=870.16' TW=0.00' (Dynamic Tailwater)
 ↑1=Culvert (Inlet Controls 10.39 cfs @ 5.88 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=864.00' (Free Discharge)
 ↑2=Broad-Crested Rectangular Weir(Controls 0.00 cfs)

Summary for Pond PO3: DITCH LOW AREA AT N SIDE OF PROP ROAD

Inflow Area = 46.488 ac, 0.28% Impervious, Inflow Depth > 1.83" for 10-yr event
 Inflow = 41.50 cfs @ 13.01 hrs, Volume= 7.109 af
 Outflow = 41.44 cfs @ 13.03 hrs, Volume= 7.109 af, Atten= 0%, Lag= 0.8 min
 Primary = 41.44 cfs @ 13.03 hrs, Volume= 7.109 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 897.59' @ 13.03 hrs Surf.Area= 1,710 sf Storage= 1,910 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 0.5 min (882.9 - 882.4)

Volume	Invert	Avail.Storage	Storage Description
#1	896.00'	35,826 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
896.00	695	0	0
898.00	1,973	2,668	2,668
900.00	8,790	10,763	13,431
901.00	11,000	9,895	23,326
902.00	14,000	12,500	35,826

Device	Routing	Invert	Outlet Devices
#1	Primary	895.50'	36.0" Round Culvert X 2.00 L= 105.0' Ke= 0.510 Inlet / Outlet Invert= 895.50' / 895.00' S= 0.0048 '/' Cc= 0.900 n= 0.012, Flow Area= 7.07 sf

Primary OutFlow Max=41.43 cfs @ 13.03 hrs HW=897.59' TW=0.00' (Dynamic Tailwater)
 ↑**1=Culvert** (Barrel Controls 41.43 cfs @ 5.55 fps)

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

- SubcatchmentA1: DIRECT RUNOFF** Runoff Area=735,325 sf 3.33% Impervious Runoff Depth>4.31"
 Flow Length=550' Tc=20.7 min UI Adjusted CN=74 Runoff=68.24 cfs 6.065 af
- SubcatchmentA2a: TO POND P2a** Runoff Area=897,320 sf 5.04% Impervious Runoff Depth>4.52"
 Flow Length=500' Tc=36.2 min CN=76 Runoff=66.29 cfs 7.754 af
- SubcatchmentA2b: TO BASIN P2b** Runoff Area=187,459 sf 13.07% Impervious Runoff Depth>4.53"
 Flow Length=450' Tc=20.7 min UI Adjusted CN=76 Runoff=18.29 cfs 1.625 af
- SubcatchmentA3a: TO BASIN P3a** Runoff Area=189,707 sf 13.23% Impervious Runoff Depth>4.65"
 Flow Length=300' Tc=15.7 min CN=77 Runoff=21.55 cfs 1.687 af
- SubcatchmentA3b: TO BASIN P3b** Runoff Area=172,171 sf 6.39% Impervious Runoff Depth>4.53"
 Flow Length=260' Slope=0.0460 '/' Tc=23.4 min CN=76 Runoff=15.83 cfs 1.492 af
- SubcatchmentA4a: TP BASIN P4a** Runoff Area=690,862 sf 5.51% Impervious Runoff Depth>4.53"
 Flow Length=600' Tc=24.9 min CN=76 Runoff=61.83 cfs 5.985 af
- SubcatchmentA4b: TO BASIN P4b** Runoff Area=300,663 sf 9.08% Impervious Runoff Depth>4.42"
 Flow Length=450' Tc=25.3 min UI Adjusted CN=75 Runoff=25.95 cfs 2.541 af
- SubcatchmentA5: TO BASIN P5** Runoff Area=346,926 sf 1.61% Impervious Runoff Depth>4.30"
 Flow Length=500' Tc=29.0 min CN=74 Runoff=27.28 cfs 2.856 af
- SubcatchmentA6a: RUNOFF TO A6b VIA** Runoff Area=157,765 sf 17.05% Impervious Runoff Depth>4.76"
 Flow Length=350' Tc=16.8 min CN=78 Runoff=17.76 cfs 1.436 af
- SubcatchmentA6b: RUNOFF TO SOUTH** Runoff Area=1,096,469 sf 3.59% Impervious Runoff Depth>4.53"
 Flow Length=700' Tc=24.7 min CN=76 Runoff=98.15 cfs 9.499 af
- SubcatchmentA7: TO P7** Runoff Area=289,159 sf 14.25% Impervious Runoff Depth>4.53"
 Flow Length=800' Tc=23.3 min UI Adjusted CN=76 Runoff=26.64 cfs 2.506 af
- SubcatchmentO1: OFFSITE-1** Runoff Area=1,992,036 sf 0.00% Impervious Runoff Depth>4.49"
 Flow Length=500' Slope=0.0480 '/' Tc=58.5 min CN=76 Runoff=112.94 cfs 17.128 af
- SubcatchmentO2: OFFSITE AREA O2** Runoff Area=166,588 sf 0.00% Impervious Runoff Depth>4.53"
 Flow Length=250' Slope=0.2000 '/' Tc=19.0 min CN=76 Runoff=16.92 cfs 1.445 af
- SubcatchmentO3: OFFSITE** Runoff Area=2,025,025 sf 0.28% Impervious Runoff Depth>4.48"
 Flow Length=2,500' Tc=74.6 min CN=76 Runoff=98.82 cfs 17.347 af
- SubcatchmentO4: OFFSITE AREA** Runoff Area=254,917 sf 5.08% Impervious Runoff Depth>4.61"
 Flow Length=575' Slope=0.0760 '/' Tc=54.4 min CN=77 Runoff=15.42 cfs 2.248 af
- Reach 1R: EAST PROPOSED** Inflow=171.98 cfs 28.742 af
 Outflow=171.98 cfs 28.742 af

Reach 2R: WETS PROPOSED

Inflow=254.07 cfs 41.628 af
Outflow=254.07 cfs 41.628 af

Pond P2a: BASIN P2a

Peak Elev=899.77' Storage=74,920 cf Inflow=165.77 cfs 24.883 af
42.0" Round Culvert n=0.012 L=150.0' S=0.0200 '/' Outflow=138.21 cfs 24.877 af

Pond P2b: BASIN P2b

Peak Elev=884.86' Storage=102,448 cf Inflow=141.86 cfs 26.502 af
Primary=62.02 cfs 18.545 af Secondary=79.76 cfs 7.092 af Outflow=141.78 cfs 25.637 af

Pond P3a: BASIN P3a

Peak Elev=919.01' Storage=2,567 cf Inflow=21.55 cfs 1.687 af
24.0" Round Culvert n=0.012 L=90.0' S=0.0056 '/' Outflow=19.73 cfs 1.685 af

Pond P3b: BASIN P3b

Peak Elev=902.29' Storage=58,603 cf Inflow=35.36 cfs 3.177 af
Primary=9.75 cfs 2.680 af Secondary=6.55 cfs 0.176 af Outflow=16.30 cfs 2.855 af

Pond P4a: BASIN P4a

Peak Elev=910.68' Storage=25,379 cf Inflow=77.35 cfs 7.430 af
36.0" Round Culvert n=0.012 L=135.0' S=0.0037 '/' Outflow=66.06 cfs 7.424 af

Pond P4b: BASIN P4b

Peak Elev=901.46' Storage=59,840 cf Inflow=90.39 cfs 9.965 af
Outflow=87.91 cfs 9.219 af

Pond P5: BASIN 5

Peak Elev=904.53' Storage=38,352 cf Inflow=27.28 cfs 2.856 af
Outflow=23.37 cfs 2.176 af

Pond P7: BASIN P7

Peak Elev=871.01' Storage=27,967 cf Inflow=34.99 cfs 4.754 af
Primary=12.97 cfs 3.403 af Secondary=21.65 cfs 1.102 af Outflow=34.63 cfs 4.505 af

Pond PO3: DITCH LOW AREA AT N SIDE

Peak Elev=899.57' Storage=9,976 cf Inflow=98.82 cfs 17.347 af
36.0" Round Culvert x 2.00 n=0.012 L=105.0' S=0.0048 '/' Outflow=96.78 cfs 17.347 af

Total Runoff Area = 218.145 ac Runoff Volume = 81.616 af Average Runoff Depth = 4.49"
96.56% Pervious = 210.630 ac 3.44% Impervious = 7.515 ac

Summary for Subcatchment A1: DIRECT RUNOFF SOUTHWEST

Runoff = 68.24 cfs @ 12.24 hrs, Volume= 6.065 af, Depth> 4.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 100-yr Rainfall=7.33"

Area (sf)	CN	Adj	Description
24,500	98		Unconnected pavement, HSG C
710,825	74		>75% Grass cover, Good, HSG C
735,325	75	74	Weighted Average, UI Adjusted
710,825			96.67% Pervious Area
24,500			3.33% Impervious Area
24,500			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.8	200	0.0470	0.18		Sheet Flow, grass Grass: Dense n= 0.240 P2= 2.81"
1.9	350	0.0430	3.11		Shallow Concentrated Flow, grass swale flow Grassed Waterway Kv= 15.0 fps
20.7	550	Total			

Summary for Subcatchment A2a: TO POND P2a

Runoff = 66.29 cfs @ 12.46 hrs, Volume= 7.754 af, Depth> 4.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 100-yr Rainfall=7.33"

Area (sf)	CN	Description
45,200	98	Unconnected pavement, HSG C
289,580	74	>75% Grass cover, Good, HSG C
562,540	76	Woods/grass comb., Fair, HSG C
897,320	76	Weighted Average
852,120		94.96% Pervious Area
45,200		5.04% Impervious Area
45,200		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.1	250	0.0500	0.13		Sheet Flow, SHEET FLOW Woods: Light underbrush n= 0.400 P2= 2.81"
3.1	250	0.0700	1.32		Shallow Concentrated Flow, SWALE FLOW Woodland Kv= 5.0 fps
36.2	500	Total			

Summary for Subcatchment A2b: TO BASIN P2b

Runoff = 18.29 cfs @ 12.24 hrs, Volume= 1.625 af, Depth> 4.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 100-yr Rainfall=7.33"

Area (sf)	CN	Adj	Description
24,500	98		Unconnected pavement, HSG C
162,959	74		>75% Grass cover, Good, HSG C
187,459	77	76	Weighted Average, UI Adjusted
162,959			86.93% Pervious Area
24,500			13.07% Impervious Area
24,500			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.9	250	0.0640	0.21		Sheet Flow, SHEET FLOW Grass: Dense n= 0.240 P2= 2.81"
0.8	200	0.0800	4.24		Shallow Concentrated Flow, GRASS SWALE Grassed Waterway Kv= 15.0 fps
20.7	450	Total			

Summary for Subcatchment A3a: TO BASIN P3a

Runoff = 21.55 cfs @ 12.17 hrs, Volume= 1.687 af, Depth> 4.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 100-yr Rainfall=7.33"

Area (sf)	CN	Description
* 25,100	98	Impervious area
140,607	74	>75% Grass cover, Good, HSG C
24,000	76	Woods/grass comb., Fair, HSG C
189,707	77	Weighted Average
164,607		86.77% Pervious Area
25,100		13.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.2	200	0.0800	0.22		Sheet Flow, SHEET FLOW Grass: Dense n= 0.240 P2= 2.81"
0.5	100	0.0600	3.67		Shallow Concentrated Flow, SWALE FLOW Grassed Waterway Kv= 15.0 fps
15.7	300	Total			

Summary for Subcatchment A3b: TO BASIN P3b

Runoff = 15.83 cfs @ 12.28 hrs, Volume= 1.492 af, Depth> 4.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 100-yr Rainfall=7.33"

Area (sf)	CN	Description
* 11,000	98	IMPERVIOUS
161,171	74	>75% Grass cover, Good, HSG C
172,171	76	Weighted Average
161,171		93.61% Pervious Area
11,000		6.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.4	260	0.0460	0.18		Sheet Flow, SHEET FLOW Grass: Dense n= 0.240 P2= 2.81"

Summary for Subcatchment A4a: TP BASIN P4a

Runoff = 61.83 cfs @ 12.31 hrs, Volume= 5.985 af, Depth> 4.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 100-yr Rainfall=7.33"

Area (sf)	CN	Description
* 38,100	98	IMPERVIOUS
555,262	74	>75% Grass cover, Good, HSG C
97,500	76	Woods/grass comb., Fair, HSG C
690,862	76	Weighted Average
652,762		94.49% Pervious Area
38,100		5.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.2	300	0.0630	0.22		Sheet Flow, SHEET FLOW Grass: Dense n= 0.240 P2= 2.81"
1.7	300	0.0400	3.00		Shallow Concentrated Flow, SWALE FLOW Grassed Waterway Kv= 15.0 fps
24.9	600	Total			

Summary for Subcatchment A4b: TO BASIN P4b

Runoff = 25.95 cfs @ 12.31 hrs, Volume= 2.541 af, Depth> 4.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 100-yr Rainfall=7.33"

Area (sf)	CN	Adj	Description
27,300	98		Unconnected pavement, HSG C
273,363	74		>75% Grass cover, Good, HSG C
300,663	76	75	Weighted Average, UI Adjusted
273,363			90.92% Pervious Area
27,300			9.08% Impervious Area
27,300			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.0	250	0.0400	0.17		Sheet Flow, SHEET FLOW Grass: Dense n= 0.240 P2= 2.81"
1.3	200	0.0300	2.60		Shallow Concentrated Flow, SWALE FLOW Grassed Waterway Kv= 15.0 fps
25.3	450	Total			

Summary for Subcatchment A5: TO BASIN P5

Runoff = 27.28 cfs @ 12.35 hrs, Volume= 2.856 af, Depth> 4.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 100-yr Rainfall=7.33"

Area (sf)	CN	Description
* 5,600	98	IMPERVIOUS
341,326	74	>75% Grass cover, Good, HSG C
346,926	74	Weighted Average
341,326		98.39% Pervious Area
5,600		1.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.0	250	0.0300	0.15		Sheet Flow, SHEET FLOW Grass: Dense n= 0.240 P2= 2.81"
2.0	250	0.0200	2.12		Shallow Concentrated Flow, GRASS SWALE Grassed Waterway Kv= 15.0 fps
29.0	500	Total			

Summary for Subcatchment A6a: RUNOFF TO A6b VIA CULVERT

Runoff = 17.76 cfs @ 12.19 hrs, Volume= 1.436 af, Depth> 4.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 100-yr Rainfall=7.33"

Area (sf)	CN	Description
* 26,900	98	IMPERVIOUS
130,865	74	>75% Grass cover, Good, HSG C
157,765	78	Weighted Average
130,865		82.95% Pervious Area
26,900		17.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.1	200	0.0700	0.21		Sheet Flow, SHEET FLOW Grass: Dense n= 0.240 P2= 2.81"
0.7	150	0.0530	3.45		Shallow Concentrated Flow, GRASS SWALE Grassed Waterway Kv= 15.0 fps
16.8	350	Total			

Summary for Subcatchment A6b: RUNOFF TO SOUTH

Runoff = 98.15 cfs @ 12.30 hrs, Volume= 9.499 af, Depth> 4.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 100-yr Rainfall=7.33"

Area (sf)	CN	Description
* 39,400	98	IMPERVIOUS
620,000	76	Woods/grass comb., Fair, HSG C
437,069	74	>75% Grass cover, Good, HSG C
1,096,469	76	Weighted Average
1,057,069		96.41% Pervious Area
39,400		3.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.3	250	0.0480	0.19		Sheet Flow, SHEET FLOW Grass: Dense n= 0.240 P2= 2.81"
2.4	450	0.0420	3.07		Shallow Concentrated Flow, GRASS SWALE FLOW Grassed Waterway Kv= 15.0 fps
24.7	700	Total			

Summary for Subcatchment A7: TO P7

Runoff = 26.64 cfs @ 12.28 hrs, Volume= 2.506 af, Depth> 4.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 100-yr Rainfall=7.33"

Area (sf)	CN	Adj	Description
41,200	98		Unconnected pavement, HSG C
247,959	74		>75% Grass cover, Good, HSG C
289,159	77	76	Weighted Average, UI Adjusted
247,959			85.75% Pervious Area
41,200			14.25% Impervious Area
41,200			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.0	250	0.0560	0.20		Sheet Flow, SHEET FLOW Grass: Dense n= 0.240 P2= 2.81"
2.3	550	0.0730	4.05		Shallow Concentrated Flow, SWALE FLOW Grassed Waterway Kv= 15.0 fps
23.3	800	Total			

Summary for Subcatchment O1: OFFSITE-1

Runoff = 112.94 cfs @ 12.80 hrs, Volume= 17.128 af, Depth> 4.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 100-yr Rainfall=7.33"

Area (sf)	CN	Description
1,992,036	76	Woods/grass comb., Fair, HSG C
1,992,036		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
58.5	500	0.0480	0.14		Sheet Flow, WOODS Woods: Light underbrush n= 0.400 P2= 2.81"

Summary for Subcatchment O2: OFFSITE AREA O2

Runoff = 16.92 cfs @ 12.22 hrs, Volume= 1.445 af, Depth> 4.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 100-yr Rainfall=7.33"

Area (sf)	CN	Description
166,588	76	Woods/grass comb., Fair, HSG C
166,588		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.0	250	0.2000	0.22		Sheet Flow, WOODS Woods: Light underbrush n= 0.400 P2= 2.81"

Summary for Subcatchment O3: OFFSITE NORTHEAST AREA

Runoff = 98.82 cfs @ 13.01 hrs, Volume= 17.347 af, Depth> 4.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 100-yr Rainfall=7.33"

Area (sf)	CN	Description
* 5,600	98	STEER
2,019,425	76	Woods/grass comb., Fair, HSG C
2,025,025	76	Weighted Average
2,019,425		99.72% Pervious Area
5,600		0.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
41.6	400	0.0720	0.16		Sheet Flow, WOODED Woods: Light underbrush n= 0.400 P2= 2.81"
33.0	2,100	0.0450	1.06		Shallow Concentrated Flow, WOODED Woodland Kv= 5.0 fps
74.6	2,500	Total			

Summary for Subcatchment O4: OFFSITE AREA SOUTHEAST

Runoff = 15.42 cfs @ 12.70 hrs, Volume= 2.248 af, Depth> 4.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 MN-AFTON 24-hr S1 100-yr Rainfall=7.33"

Area (sf)	CN	Description
* 12,954	98	IMPERV
241,963	76	Woods/grass comb., Fair, HSG C
254,917	77	Weighted Average
241,963		94.92% Pervious Area
12,954		5.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
54.4	575	0.0760	0.18		Sheet Flow, WOODS Woods: Light underbrush n= 0.400 P2= 2.81"

Summary for Reach 1R: EAST PROPOSED

Inflow Area = 81.039 ac, 2.17% Impervious, Inflow Depth > 4.26" for 100-yr event
 Inflow = 171.98 cfs @ 12.63 hrs, Volume= 28.742 af
 Outflow = 171.98 cfs @ 12.63 hrs, Volume= 28.742 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach 2R: WETS PROPOSED

Inflow Area = 137.106 ac, 4.20% Impervious, Inflow Depth > 3.64" for 100-yr event
 Inflow = 254.07 cfs @ 12.29 hrs, Volume= 41.628 af
 Outflow = 254.07 cfs @ 12.29 hrs, Volume= 41.628 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond P2a: BASIN P2a

Inflow Area = 66.330 ac, 1.56% Impervious, Inflow Depth > 4.50" for 100-yr event
 Inflow = 165.77 cfs @ 12.67 hrs, Volume= 24.883 af
 Outflow = 138.21 cfs @ 12.95 hrs, Volume= 24.877 af, Atten= 17%, Lag= 16.5 min
 Primary = 138.21 cfs @ 12.95 hrs, Volume= 24.877 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 899.77' @ 12.95 hrs Surf.Area= 25,385 sf Storage= 74,920 cf

Plug-Flow detention time= 3.8 min calculated for 24.866 af (100% of inflow)
 Center-of-Mass det. time= 3.6 min (849.9 - 846.2)

Volume	Invert	Avail.Storage	Storage Description
#1	889.00'	80,923 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
889.00	5	0	0
890.00	908	457	457
892.00	1,971	2,879	3,336
894.00	3,887	5,858	9,194
896.00	6,696	10,583	19,777
898.00	13,780	20,476	40,253
900.00	26,890	40,670	80,923

Device	Routing	Invert	Outlet Devices
#1	Primary	889.00'	42.0" Round Culvert L= 150.0' Ke= 0.510 Inlet / Outlet Invert= 889.00' / 886.00' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 9.62 sf

Primary OutFlow Max=138.21 cfs @ 12.95 hrs HW=899.77' TW=884.86' (Dynamic Tailwater)
 ↳ **1=Culvert** (Inlet Controls 138.21 cfs @ 14.37 fps)

Summary for Pond P2b: BASIN P2b

Inflow Area = 70.634 ac, 2.27% Impervious, Inflow Depth > 4.50" for 100-yr event
 Inflow = 141.86 cfs @ 12.86 hrs, Volume= 26.502 af
 Outflow = 141.78 cfs @ 12.90 hrs, Volume= 25.637 af, Atten= 0%, Lag= 2.5 min
 Primary = 62.02 cfs @ 12.90 hrs, Volume= 18.545 af
 Secondary = 79.76 cfs @ 12.90 hrs, Volume= 7.092 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 884.86' @ 12.90 hrs Surf.Area= 20,673 sf Storage= 102,448 cf

Plug-Flow detention time= 34.4 min calculated for 25.637 af (97% of inflow)
 Center-of-Mass det. time= 16.6 min (864.7 - 848.2)

Volume	Invert	Avail.Storage	Storage Description
#1	876.00'	105,267 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
876.00	4,400	0	0
878.00	7,059	11,459	11,459
880.00	10,226	17,285	28,744
882.00	13,962	24,188	52,932
884.00	18,582	32,544	85,476
885.00	21,000	19,791	105,267

Device	Routing	Invert	Outlet Devices
#1	Primary	880.00'	36.0" Round Culvert L= 55.0' Ke= 0.510 Inlet / Outlet Invert= 880.00' / 879.00' S= 0.0182 '/' Cc= 0.900 n= 0.012, Flow Area= 7.07 sf
#2	Secondary	884.00'	30.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=62.02 cfs @ 12.90 hrs HW=884.86' TW=0.00' (Dynamic Tailwater)
 ↳ **1=Culvert** (Inlet Controls 62.02 cfs @ 8.77 fps)

Secondary OutFlow Max=79.76 cfs @ 12.90 hrs HW=884.86' (Free Discharge)
 ↳ **2=Broad-Crested Rectangular Weir** (Weir Controls 79.76 cfs @ 3.07 fps)

Summary for Pond P3a: BASIN P3a

Inflow Area = 4.355 ac, 13.23% Impervious, Inflow Depth > 4.65" for 100-yr event
 Inflow = 21.55 cfs @ 12.17 hrs, Volume= 1.687 af
 Outflow = 19.73 cfs @ 12.23 hrs, Volume= 1.685 af, Atten= 8%, Lag= 4.1 min
 Primary = 19.73 cfs @ 12.23 hrs, Volume= 1.685 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 919.01' @ 12.23 hrs Surf.Area= 2,117 sf Storage= 2,567 cf

Plug-Flow detention time= 2.2 min calculated for 1.685 af (100% of inflow)
 Center-of-Mass det. time= 1.6 min (817.4 - 815.8)

Volume	Invert	Avail.Storage	Storage Description
#1	916.00'	5,300 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
916.00	280	0	0
918.00	810	1,090	1,090
920.00	3,400	4,210	5,300

Device	Routing	Invert	Outlet Devices
#1	Primary	916.00'	24.0" Round Culvert L= 90.0' Ke= 0.510 Inlet / Outlet Invert= 916.00' / 915.50' S= 0.0056 '/ Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=19.72 cfs @ 12.23 hrs HW=919.01' TW=900.82' (Dynamic Tailwater)
 ↖ **1=Culvert** (Barrel Controls 19.72 cfs @ 6.28 fps)

Summary for Pond P3b: BASIN P3b

Inflow Area = 8.308 ac, 9.98% Impervious, Inflow Depth > 4.59" for 100-yr event
 Inflow = 35.36 cfs @ 12.25 hrs, Volume= 3.177 af
 Outflow = 16.30 cfs @ 12.64 hrs, Volume= 2.855 af, Atten= 54%, Lag= 23.1 min
 Primary = 9.75 cfs @ 12.64 hrs, Volume= 2.680 af
 Secondary = 6.55 cfs @ 12.64 hrs, Volume= 0.176 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 902.29' @ 12.64 hrs Surf.Area= 17,195 sf Storage= 58,603 cf

Plug-Flow detention time= 112.7 min calculated for 2.854 af (90% of inflow)
 Center-of-Mass det. time= 64.1 min (884.6 - 820.5)

Volume	Invert	Avail.Storage	Storage Description
#1	896.00'	71,876 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
896.00	2,771	0	0
898.00	6,548	9,319	9,319
900.00	10,952	17,500	26,819
902.00	16,070	27,022	53,841
903.00	20,000	18,035	71,876

Device	Routing	Invert	Outlet Devices
#1	Primary	898.20'	15.0" Round Culvert L= 80.0' Ke= 0.510 Inlet / Outlet Invert= 898.20' / 898.00' S= 0.0025 '/ Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Secondary	902.00'	15.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=9.75 cfs @ 12.64 hrs HW=902.29' TW=0.00' (Dynamic Tailwater)
 ↑1=Culvert (Barrel Controls 9.75 cfs @ 7.94 fps)

Secondary OutFlow Max=6.55 cfs @ 12.64 hrs HW=902.29' (Free Discharge)
 ↑2=Broad-Crested Rectangular Weir (Weir Controls 6.55 cfs @ 1.53 fps)

Summary for Pond P4a: BASIN P4a

Inflow Area = 19.684 ac, 4.44% Impervious, Inflow Depth > 4.53" for 100-yr event
 Inflow = 77.35 cfs @ 12.28 hrs, Volume= 7.430 af
 Outflow = 66.06 cfs @ 12.42 hrs, Volume= 7.424 af, Atten= 15%, Lag= 8.5 min
 Primary = 66.06 cfs @ 12.42 hrs, Volume= 7.424 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 910.68' @ 12.42 hrs Surf.Area= 8,114 sf Storage= 25,379 cf

Plug-Flow detention time= 4.6 min calculated for 7.424 af (100% of inflow)
 Center-of-Mass det. time= 4.1 min (828.3 - 824.3)

Volume	Invert	Avail.Storage	Storage Description
#1	905.00'	28,039 cf	Custom Stage Data (Prismatic) listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
905.00	5	0	0
906.00	2,429	1,217	1,217
908.00	4,600	7,029	8,246
910.00	7,295	11,895	20,141
911.00	8,500	7,898	28,039

Device	Routing	Invert	Outlet Devices
#1	Primary	905.00'	36.0" Round Culvert L= 135.0' Ke= 0.510 Inlet / Outlet Invert= 905.00' / 904.50' S= 0.0037 '/' Cc= 0.900 n= 0.012, Flow Area= 7.07 sf

Primary OutFlow Max=66.05 cfs @ 12.42 hrs HW=910.68' TW=901.46' (Dynamic Tailwater)
 ↑1=Culvert (Barrel Controls 66.05 cfs @ 9.34 fps)

Summary for Pond P4b: BASIN P4b

Inflow Area = 26.587 ac, 5.65% Impervious, Inflow Depth > 4.50" for 100-yr event
 Inflow = 90.39 cfs @ 12.37 hrs, Volume= 9.965 af
 Outflow = 87.91 cfs @ 12.45 hrs, Volume= 9.219 af, Atten= 3%, Lag= 4.5 min
 Primary = 87.91 cfs @ 12.45 hrs, Volume= 9.219 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 901.46' @ 12.45 hrs Surf.Area= 21,293 sf Storage= 59,840 cf
 Flood Elev= 901.00' Surf.Area= 20,690 sf Storage= 50,170 cf

Plug-Flow detention time= 58.4 min calculated for 9.219 af (93% of inflow)

Center-of-Mass det. time= 20.4 min (848.5 - 828.1)

Volume #1	Invert 898.00'	Avail.Storage 71,515 cf	Storage Description
Custom Stage Data (Prismatic) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
898.00	10,755	0	0
900.00	19,380	30,135	30,135
902.00	22,000	41,380	71,515

Device #1	Routing Primary	Invert 900.00'	Outlet Devices
15.0' long x 0.5' breadth Broad-Crested Rectangular Weir			
Head (feet) 0.20 0.40 0.60 0.80 1.00			
Coef. (English) 2.80 2.92 3.08 3.30 3.32			

Primary OutFlow Max=87.91 cfs @ 12.45 hrs HW=901.46' TW=0.00' (Dynamic Tailwater)
 ↑1=**Broad-Crested Rectangular Weir**(Weir Controls 87.91 cfs @ 4.01 fps)

Summary for Pond P5: BASIN 5

Inflow Area = 7.964 ac, 1.61% Impervious, Inflow Depth > 4.30" for 100-yr event
 Inflow = 27.28 cfs @ 12.35 hrs, Volume= 2.856 af
 Outflow = 23.37 cfs @ 12.52 hrs, Volume= 2.176 af, Atten= 14%, Lag= 10.0 min
 Primary = 23.37 cfs @ 12.52 hrs, Volume= 2.176 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 904.53' @ 12.52 hrs Surf.Area= 18,939 sf Storage= 38,352 cf
 Flood Elev= 903.00' Surf.Area= 14,462 sf Storage= 13,388 cf

Plug-Flow detention time= 127.7 min calculated for 2.176 af (76% of inflow)
 Center-of-Mass det. time= 45.9 min (878.3 - 832.4)

Volume #1	Invert 902.00'	Avail.Storage 47,729 cf	Storage Description
Custom Stage Data (Prismatic) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
902.00	12,314	0	0
904.00	16,610	28,924	28,924
905.00	21,000	18,805	47,729

Device #1	Routing Primary	Invert 904.00'	Outlet Devices
20.0' long x 0.5' breadth Broad-Crested Rectangular Weir			
Head (feet) 0.20 0.40 0.60 0.80 1.00			
Coef. (English) 2.80 2.92 3.08 3.30 3.32			

Primary OutFlow Max=23.37 cfs @ 12.52 hrs HW=904.53' TW=0.00' (Dynamic Tailwater)
 ↑1=**Broad-Crested Rectangular Weir**(Weir Controls 23.37 cfs @ 2.20 fps)

Summary for Pond P7: BASIN P7

Inflow Area = 12.490 ac, 9.95% Impervious, Inflow Depth > 4.57" for 100-yr event
 Inflow = 34.99 cfs @ 12.33 hrs, Volume= 4.754 af
 Outflow = 34.63 cfs @ 12.37 hrs, Volume= 4.505 af, Atten= 1%, Lag= 2.6 min
 Primary = 12.97 cfs @ 12.37 hrs, Volume= 3.403 af
 Secondary = 21.65 cfs @ 12.37 hrs, Volume= 1.102 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 871.01' @ 12.37 hrs Surf.Area= 7,513 sf Storage= 27,967 cf

Plug-Flow detention time= 50.1 min calculated for 4.503 af (95% of inflow)
 Center-of-Mass det. time= 22.4 min (857.0 - 834.6)

Volume	Invert	Avail.Storage	Storage Description
#1	864.00'	31,920 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
864.00	824	0	0
866.00	2,212	3,036	3,036
868.00	4,247	6,459	9,495
870.00	6,952	11,199	20,694
871.00	7,500	7,226	27,920
871.50	8,500	4,000	31,920

Device	Routing	Invert	Outlet Devices
#1	Primary	867.90'	18.0" Round Culvert L= 55.0' Ke= 0.510 Inlet / Outlet Invert= 867.90' / 866.53' S= 0.0249 ' / Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Secondary	870.50'	20.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=12.97 cfs @ 12.37 hrs HW=871.01' TW=0.00' (Dynamic Tailwater)
 ↑1=Culvert (Inlet Controls 12.97 cfs @ 7.34 fps)

Secondary OutFlow Max=21.65 cfs @ 12.37 hrs HW=871.01' (Free Discharge)
 ↑2=Broad-Crested Rectangular Weir (Weir Controls 21.65 cfs @ 2.14 fps)

Summary for Pond PO3: DITCH LOW AREA AT N SIDE OF PROP ROAD

Inflow Area = 46.488 ac, 0.28% Impervious, Inflow Depth > 4.48" for 100-yr event
 Inflow = 98.82 cfs @ 13.01 hrs, Volume= 17.347 af
 Outflow = 96.78 cfs @ 13.08 hrs, Volume= 17.347 af, Atten= 2%, Lag= 4.5 min
 Primary = 96.78 cfs @ 13.08 hrs, Volume= 17.347 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 899.57' @ 13.08 hrs Surf.Area= 7,329 sf Storage= 9,976 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 0.9 min (865.4 - 864.5)

Volume	Invert	Avail.Storage	Storage Description
#1	896.00'	35,826 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

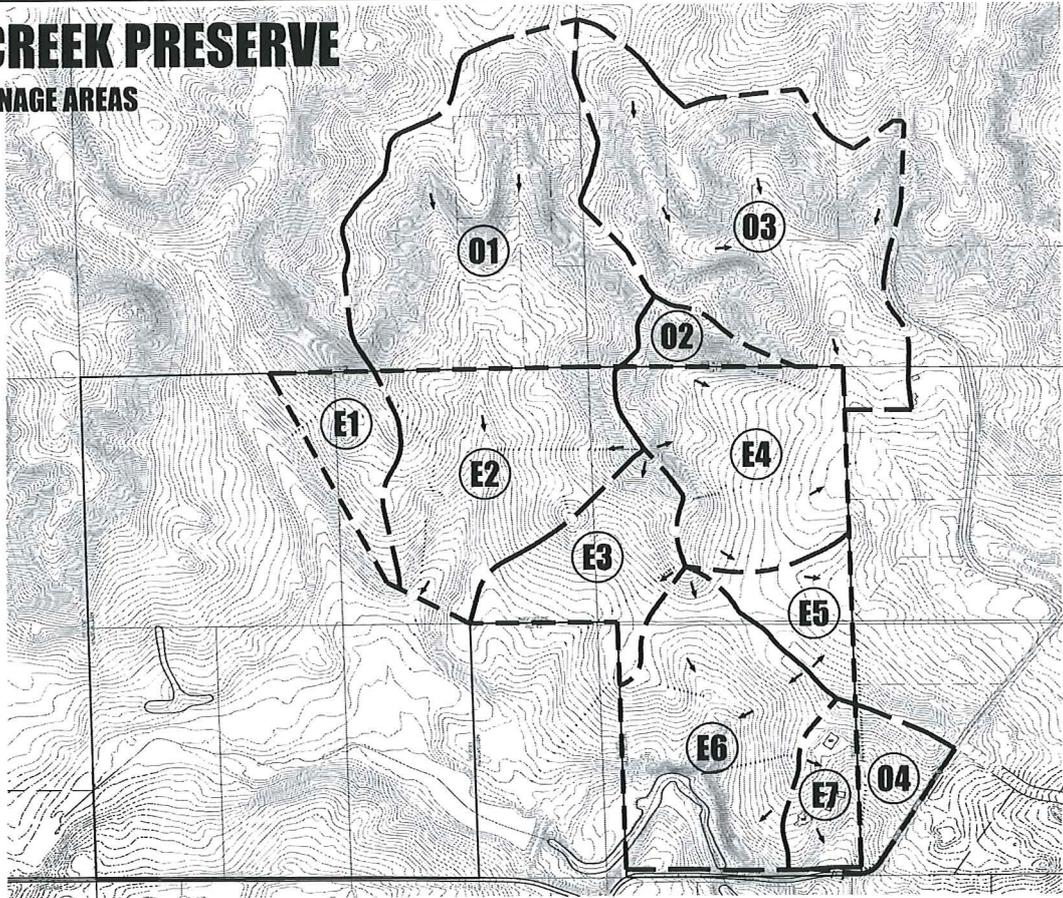
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
896.00	695	0	0
898.00	1,973	2,668	2,668
900.00	8,790	10,763	13,431
901.00	11,000	9,895	23,326
902.00	14,000	12,500	35,826

Device	Routing	Invert	Outlet Devices
#1	Primary	895.50'	36.0" Round Culvert X 2.00 L= 105.0' Ke= 0.510 Inlet / Outlet Invert= 895.50' / 895.00' S= 0.0048 '/' Cc= 0.900 n= 0.012, Flow Area= 7.07 sf

Primary OutFlow Max=96.77 cfs @ 13.08 hrs HW=899.57' TW=0.00' (Dynamic Tailwater)
 ↑**1=Culvert** (Barrel Controls 96.77 cfs @ 6.85 fps)

AFTON CREEK PRESERVE

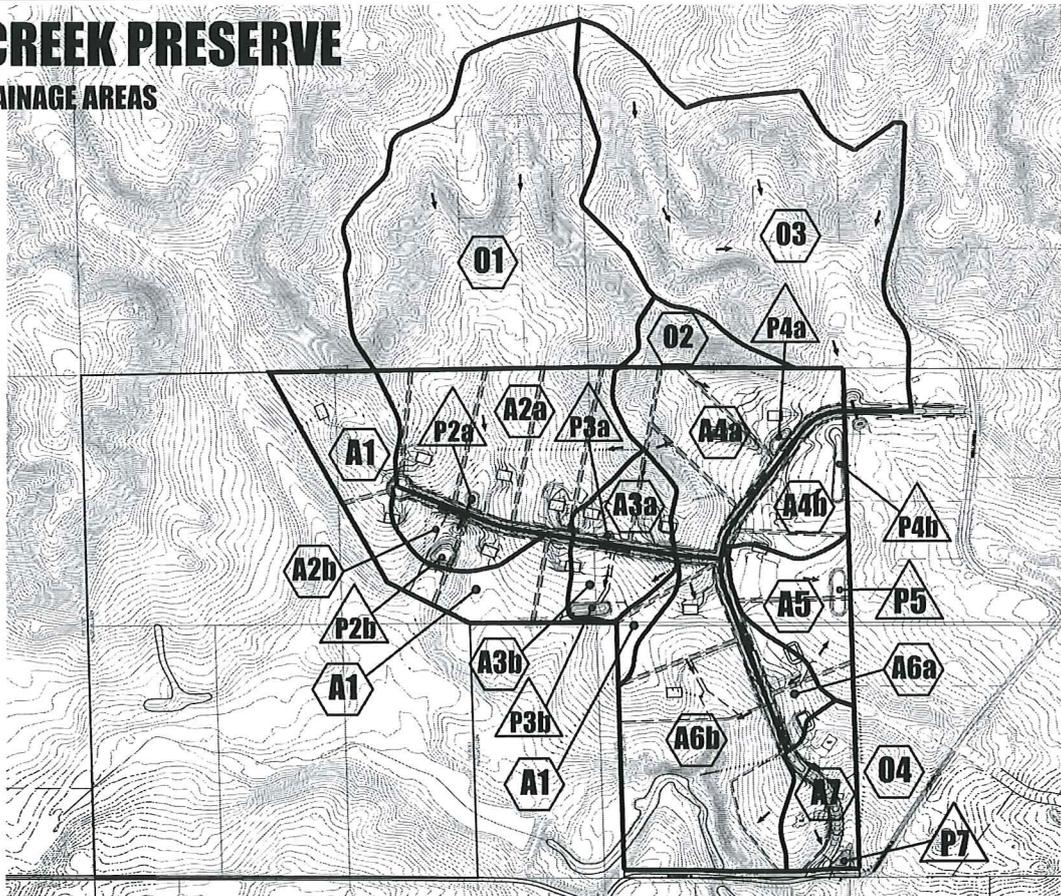
EXISTING DRAINAGE AREAS



2/5/2018

AFTON CREEK PRESERVE

PROPOSED DRAINAGE AREAS



2/5/2018

AFTON CREEK PRESERVE
HOMEOWNERS ASSOCIATION DRAFT AND
RESTRICTIVE COVENANTS
AUGUST 10 2017

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DECLARATION OF COVENANTS,
CONDITIONS AND RESTRICTIONS

AFTON CREEK PRESERVE

THIS DECLARATION, made this 8th day of may 2017 by (Developer) Custom Homes by JP Bush and (Declarant) Will Carlson as holders of the encumbrance recited in the consent and joinders attached hereto.

WITNESSETH:

WHEREAS, Declarant is the owner of the real property described in Article II of the Declaration; and

WHEREAS, Declarant desires to provide for the preservation of the values and amenities in the community and for the maintenance of the private open spaces and to this end desires to subject the real property described in Article II, Section 1 to the

easements, restrictions, covenants, conditions, charges and liens set forth in this Declaration, each and all of which is and are for the benefit of the property and each owner thereof; and

WHEREAS, Declarant has deemed it desirable for the efficient preservation of the values and amenities in the community to create an agency to which should be delegated and assigned the power of maintaining the open spaces, administering and enforcing the covenants and restrictions contained in this Declaration and collection and disbursing the assessments and charges created by this Declaration.

WHEREAS, Declarant will incorporate, under the laws of the State of Minnesota, as a non-profit corporation, Afton Creek Preserve Homeowners Association for exercising these functions;

NOW, THEREFORE, Declarant declares that the real property described in Article II Section 1 hereof is, and shall be, held, transferred, sold, conveyed and occupied subject to the following covenants, conditions, restrictions, easements, charges and liens (sometimes referred to as “covenants and restrictions”), which covenants and restrictions shall run with the real property and be binding on all parties having any right, title or interest in the hereinafter described properties or any part thereof, their heirs, successors and assigns, and shall inure to the benefit of each owner thereof.

ARTICLE 1 DEFINITIONS

The following words, when used in this Declaration (unless the context shall prohibit) shall have the following meanings:

(a) CONDITIONAL USE PERMIT SEC. 12-78

A. Purpose. The purpose of a conditional use permit is to provide the City of Afton with a reasonable degree of discretion in determining the suitability of certain designated uses upon the general welfare, public health and safety. In making this determination, whether or not the conditional use is to be allowed, the City may consider the nature of the adjoining land or buildings, the effect upon traffic into and from the

premises or on any adjoining roads, and all other factors the City shall deem a prerequisite of consideration in determining the effect of the general welfare, public health and safety. Conditional Use permits may be granted in accordance with this subdivision for any use or purpose listed as a conditional use for the zoning districts per Section 12-134 of the Zoning Ordinance.

- (b) **PLCD:** A PLCD is a tract of land that is developed as a unit under single or unified ownership or controls. A Preservation and Land Conservation Development may be allowed in the AG zoning district to preserve prime agricultural land, woodland, wildlife habitat, vistas, groundwater recharge areas, areas with sensitive soils or geological limitations and areas identified in the Comprehensive Plan.
- (c) **Minnesota Land Trust:** The Minnesota Land Trust is a member-supported, nonprofit conservation organization protecting natural and scenic land in Minnesota. *Established in 1993* working with landowners and local communities to protect shoreline on lakes, rivers, streams and wetlands.
- (d) **PLCD Land Dedication:** The land owner will grant a Conservation Easement which shall run with the land in perpetuity to the City of Afton, Homeowners Association, and the Minnesota Land Trust which restricts the lots and parcels, as well as the development rights on the undeveloped parcel, within the PLCD to the number of dwelling units approved for the PLCD and the land cover and use approved by the City of Afton as a part of the PLCD **ARTICLE XII. LAND USE SECTION OF THE CITY CODE**. In Addition: All land shown on the final development plan as an undeveloped parcel must be conveyed to a homeowners association for the maintenance of the planned development. The undeveloped parcel must be conveyed to the homeowners association to be approved by the City Council which restrict the undeveloped parcel to the uses specified on the final development plan and which provide for the maintenance of the undeveloped parcel in a manner which assures it continuing use for its intended purpose.

- (e) **Scenic Easements:** A part of the land being developed that has sensitive slopes, soils, and unique features is allowed to have a protection layer called a Scenic easement. For the purposes of this PLCD application and plan the Scenic Easements are indicated on the site plan and cover mostly the North Boundary of lots 9-15 and a part of lot 2 and 3 in the location of the restoration project by South Washington Watershed and Prairie restoration in 2015.
- (f) **Association:** Afton Creek Preserve Homeowners Association, a Minnesota non-Profit Corporation.

- (g) **Declarant:** Albert Wilmer Carlson, its successors and assigns, if such successor or assign shall acquire more than one Lot from the Declarant for the purpose of development. Notwithstanding the foregoing, no individual or entity acquiring a Lot from the Declarant shall become the Declarant solely by such acquisition, but only because of specific assignment of Declarant rights, which assignment shall be effective unless incorporated in the instrument of conveyance.
- (h) **Mortgagee:** any entity or person named as mortgagee in any mortgage deed Granting a lien (“Mortgage”) on any Lot.
- (i) **Afton Creek Preserve or the Property:** the property subject to this Declaration, and any additions subject to this Declaration or any Supplementary Declaration, pursuant to Article II.
- (j) **Living Unit:** a residential housing unit consisting of a group of rooms and Hallways and attached garage, which are designed and intended for use as Quarters for one family and located on a lot.
- (k) **Lot:** any Lot contained on a recorded plat of Afton Creek Preserve.
- (l) **Member:** each Owner entitled to membership in the Association pursuant to the provisions of Article III.
- (m) **Owner:** the record Owner or contract vendee of the fee simple title to any Lot, but excluding contract vendors, mortgagees or any others having such interest merely as security for the performance of an obligation.
- (n) **Developer:** a person or entity designated by the Declarant to supervise and manage the initial development and approval of Afton creek Preserve.
- (o) **Common Property:** Property owned by the Association.
Natural Planting Areas: Planting areas of natural and ornamental grasses, Wildflowers and groves of trees and shrubs that must cover 50% or more Of each lot and the areas shown on the site plan known as the Minnesota Land Trust Conservation, excluding the buildings and hard surface areas such as patios In addition, driveways. Areas that adjoin designated wetlands

or natural drainage Swales shall be a low maintenance filter strip of grasses or vegetation In addition, ground covers mulches.

- (p) **Limited Common Areas:** Those areas of the public right-of-way and Individual lots that have landscaping or pathway easements that are Designed to benefit the owner and the Association.

ARTICLE II PROPERTY SUBJECT TO THIS DECLARATION

Section 1. **The plat Afton Creek Preserve.**

The real estate subject to this Declaration is Located in Washington County, Minnesota and is described on the attached Exhibit A,

ARTICLE III MEMBERSHIP AND VOTING RIGHTS IN THE ASSOCIATION

Section 1. **Membership.** Each Owner of a Lot is a Member of the Association. Membership shall be appurtenant to and may not be Separated from ownership.

Section 2. **Voting Rights.** The Association shall have two (2) classes of Voting membership:

Class A. Class A Members shall be all Owners of one or more Lots, except Declarant. When more than one person or entity shares ownership of a Lot, the vote shall be exercised as they determine among themselves.

Class B. The Class B Member shall be the Declarant. The Class B Member shall be entitled to three (3) votes for each Lot owned by it.

The Class B membership shall cease and be converted to Class A membership when the Declarant conveys fee title to the last of the Lots in Afton Creek Preserve which the Declarant currently owns.

Section 3. **Suspension of Voting Rights.** The right of any Member to vote shall be Suspended during any period in which such Member shall be delinquent in the Payment of any assessment levied by the Association. Such rights may also be Suspended, after notice and hearing, for a period not to exceed sixty (60) days For any infraction of any rules or regulations published by the Association.

ARTICLE IV DUTIES OF ASSOCIATION

Section 1. **General Requirments for PLCD**

All land shown on the final development plan as an undeveloped parcel must be conveyed to a homeowners association for the maintenance of the planned development. The undeveloped parcel must be conveyed to the Homeowners association subject to covenants to be approved by the City Council which restrict the undeveloped parcel to the uses specified on the final development plan and which provide for the maintenance of the undeveloped parcel in a manner which assures it continuing use for its intended purpose.

Section 2. **Landscaping and seeding of conservation and development.**

The Declarant shall initially install immediately as weather and road construction permits Landscaping and Prairie grass seeding and the Association shall maintain such landscaping
On public areas and open space (conservation areas) consisting of street islands, entrance monuments, and parts Of boulevards, and lots until such time as either lots are sold or Association takes control.

Section 3. **Collection of Garbage.** Should City of Afton not provide garbage Collection services to the Owners, the Association shall be empowered to Contract with private vendors for the collection of garbage in Afton creek Preserve.

Section 4. **Enforcement of Covenants and Restrictions; Architectural Control.**

The Association shall be responsible for the enforcement of the covenants and Restrictions contained in this Declaration, and of the architectural controls.

Section 5. **Common Property.** The Association, subject to the rights of the Owners set forth in this Declaration, shall be responsible for the exclusive Management and control of the Common Property, if any, and all improvements Thereon (including furnishings and equipment related thereto) and shall keep the Same in good, clean, attractive and sanitary condition order and repair.

**ARTICLE V
ASSESSMENTS**

Section 1. **Creation of Assessments.** The Declarant, for each Lot owned by it hereby covenants, and each Owner of any Lot, by acceptance of a deed for a Lot, whether or not it shall be so expressed in the deed or any conveyance, is deemed to agree to pay to the Association: (a) annual assessments, and (b) any Individual Lot Maintenance Assessments levied against the Owner's Lot pursuant to the provisions of this Declaration.

Section 2. **Purpose of Annual Assessments.** The annual assessments shall be levied for paying the costs associated with the duties of the Association as set forth in Article IV hereof, together with the incidental costs of operating the Association.

Section 3. **Levy of Annual Assessments.** The annual assessment must be fixed at a uniform rate for each Lot. The annual assessment shall be due and payable each May 1, beginning on May 1, 2018. The annual assessment for each lot due May 1, 2018 shall not exceed \$xxx.xx plus the actual cost of garbage removal service. For the following years, the annual assessment shall be levied by the Association, based upon a proposed budget. The annual assessment may be increased, without a vote of the Membership, by not more than \$xx.xx per Lot, per year; provided that the costs of garbage removal service shall always be in addition to such increases. In order to increase the annual assessment more than the maximum amount established in this Section, a vote of 67% of the votes of each class of membership cast by the members present, in person or by proxy at a meeting of

the Association called for that purpose shall be necessary. The Board of Directors of the Association shall fix the amount of the annual assessment in an amount not in excess of the maximum. The annual assessment for each year shall be fixed, and written notice provided to each Owner at least thirty (30) days prior to May 1 of the year in which the assessment is due. Failure to provide such notice, however, shall not render the assessment invalid.

Section 4. **Individual Lot Maintenance Assessments.** In the event that any Owner violates any covenant or fails to perform any condition contained in this Declaration, the Association may perform the act, remove the defect or correct the violation upon thirty (30) days written notice to the Owner, and, as appropriate, pursuant to the procedures contained in Article VI. If the Association so acts on behalf of an Owner, the Association may levy an assessment (hereinafter, "Individual Lot Maintenance Assessment") against the Lot for the cost of the performance or correction

Section 5. **Special Assessments for Capital Improvements.** In addition to the Annual Assessments authorized above, the Association may levy, in any assessment year, a special assessment applicable to that year only for the purpose of defraying, in whole or in part, the cost of any construction, repair or replacement of any capital improvement upon the Common Property, including fixtures and personal property related thereto, provided that each such assessment shall have the assent of Members holding two-thirds (2/3) of the votes in each class of voting membership who are voting in person or by proxy at a meeting duly called for this purpose.

Section 6. **Effect of Nonpayment of Assessment; Remedies of Association.** The annual assessments and Individual Lot Maintenance Assessments shall be fixed as provided in this Declaration. If any such assessment is not paid when due, it shall become delinquent and shall, together with interest at a rate of eight percent 8% per annum, any cost of collection and any attorney's fees, become a continuing lien on the Lot and shall also be the personal obligation of the Owner of the Lot at the time the assessment is made. The lien may be enforced and foreclosed by action in the same

manner in which mortgages may be foreclosed in Minnesota. Each Owner, by acceptance of a deed for any Lot, shall be deemed to give full and complete power of sale to the Association and to consent to a foreclosure of the lien by advertisement. The Association may elect to bring an action at law against the Owner personally obligated to pay the assessment.

Section 7. **Subordination of Lien to First Mortgages.** The lien of assessments provided for herein shall be subordinate to the lien of any first Mortgage, and the sale or transfer of any Lot shall not affect the assessment lien. However, the sale or transfer of any Lot pursuant to the foreclosure of a First Mortgage, or pursuant to any other proceeding or arrangement in lieu of such foreclosure, shall extinguish the lien of such assessments as to installments which became due prior to the effective date of such sale, transfer or acquisition by the Mortgagee to the end that no assessment liability shall

accrue to an acquiring Mortgagee except with respect to installments of assessments becoming due after possession has passed to such acquiring Mortgagee, whether such possession has passed at the termination of any period of redemption or otherwise. In the event of the extinguishment of such assessment lien as aforesaid, the entire amount of such unpaid assessment shall be reallocated and assessed against, and payable by the Owners of all other Lots exclusive of such mortgaged Lot. No such sale, transfer or acquisition of possession shall relieve an Owner or a Lot from liability for any assessments thereafter becoming due or from the lien thereof, or shall relieve the person personally obligated to pay the assessments, which were levied prior to the transfer of such property from the personal obligation to pay the same.

Section 8. **Exempt Property.** The following property subject to this Declaration shall be exempted from the assessments, charges and liens created herein:

- (a) All properties to the extent of any easement or other interest therein dedicated to and accepted by the local public authority and devoted to public use;
- (b) All properties exempted from taxation by the laws of the State of Minnesota upon the terms and to the extent of such legal exemption; and
- (c) All Common Property.

Notwithstanding any provision herein, no land or improvements devoted to Dwelling use shall be exempt from said assessments, charges or liens.

EXHIBIT L

ARTICLE VI
ARCHITECTURAL CONTROL

Section 1. **Architectural Control Committee.** There shall be established an Architectural Control Committee (ACC) consisting of three persons. The members of the ACC shall be appointed by Declarant until Declarant no longer owns any lots or until December 31, xxxx, whichever is sooner. For purposes of this section, "Lots" shall include any property annexed by Declarant pursuant to annexed by Declarant pursuant to Article II. After the termination of Declarant's right to appoint the ACC members, members shall be appointed and serve at the pleasure of the Board of Directors of the Association.

Section 2. **Original Construction.** A site plan, landscaping plan and plans and specifications for the construction of a Living Unit on any Lot shall be submitted to the ACC for its written approval before any construction activity is begun.

Section 3. **Review of Modifications.** After the completion of the original Living Unit on a Lot, the construction or modification of any building or structure, including fences and mailboxes or the retaining walls or monuments constructed by the Declarant, shall require prior written approval by the ACC of the plans and specifications for the construction, in accordance with the standards set forth in Section 4 hereof.

Section 4. **Standard of Review.** The ACC may promulgate detailed standards and procedures governing its areas of responsibility and practice. In addition, the following shall apply: the plans and specifications shall be reviewed as to the quality of workmanship, design and harmony of external design with existing structures, topography, and finish grade elevation. No permission or approval shall be required to repaint in accordance with an originally approved color scheme, or to rebuild in accordance with originally approved plans and specifications. Nothing contained herein shall be construed to limit the right of an Owner to remodel the interior of the owners' residence or to paint the interior of the owners' residence any color desired.

Section 5. **Procedure.** If the ACC fails to approve or disapprove plans and specifications within thirty (30) days after the submission of the same to it, approval will be deemed to have been granted. In the event of disapproval by the ACC, the requesting Owner may give written notice that the Owner wishes to appeal the ACC decision and

request a hearing by the Association's Board of Directors. Such notice must be furnished to the ACC within ten (10) days of its decision. The hearing shall be at a special meeting of the Board of Directors to be held within thirty (30) days of the receipt of the Owner's notice of appeal.

Section 6. **Removal and Abatement**. The ACC or the Association shall have the right to order an Owner to remove or alter any structure on any Lot erected in violation of the terms of this Declaration, and to employ appropriate judicial proceedings to compel the alteration or demolition of any non-conforming construction or other violation. Any cost incurred by the ACC shall be levied as an Individual Lot Maintenance Assessment as provided in Article V.

Section 7. **Variances**. Reasonable variances to the covenants, conditions and restrictions may be granted by the ACC after review, in order to overcome practical difficulties or to prevent unnecessary hardship. A variance may only be granted if it is not detrimental to other property and shall not defeat the purpose of this Declaration.

ARTICLE VII RESERVED RIGHTS OF DECLARANT IN THE COMMON PROPERTY

Declarant shall have the following rights in the Common Property:

- (a) To be determined in land agreements with Minnesota land trust and The Minnesota DNR.

ARTICLE VII PROPERTY RIGHTS IN THE COMMON PROPERTIES

Section 1. **Easements**. Subject to the provisions of Section 2 hereof, there shall exist the following easements in favor of each Owner and appurtenant to such Owners' Lots or Outlots across and upon the Common Property:

- (a) Non-exclusive easements to construct, install, repair and replace sanitary and storm sewer, water, gas, electric, telephone, cable television and other utility lines serving such Lot or Outlot in the location the same shall be initially

constructed or installed by the Declarant, or such other location as may be approved by the Board of Directors of the Association;

- (b) A non-exclusive easement for the use and enjoyment of the Common Property developed for open-space or recreational purposes;
- (c) A non-exclusive easement over the Limited Common Properties;
- (d) A non-exclusive easement for pathway and/or landscaping purposes over part of Lots described in Exhibit B.

Section 2. **Extent of Members' Easements.** The rights and easements created Hereby and the title of the Association to the Common Property shall be subject to the following, and as further provided herein:

- (a) The right of the Association, in accordance with its Articles and Bylaws, to borrow money for the purpose of improving the Common Property, and in aid thereof to mortgage said Common Property; however, the rights of such mortgagee in the Common Property shall be subordinate to the rights of the Members hereunder;
- (b) The right of the Association to take such steps as are reasonable necessary to protect the Common Property against foreclosure;
- (c) The right of the Association, as provided in its Articles and Bylaws, to suspend the voting and enjoyment rights of any Member for any period during which any assessment remains unpaid, as provided in the Association's Bylaws;
- (d) The right of the Declarant to make use of such portions of the Common Property as may be necessary and incidental to the construction of any incidental improvements upon the property and such other rights as are contained in Article IV hereof;
- (e) The rights of the Association to dedicate or transfer all or any part of the Common Property to any public agency, authority or utility such purposes and subject to such conditions as may be agreed to by the Members, provided that no such dedication or transfer, determination as to the purposes or as to the conditions thereof shall be effective unless an instrument signed by Members entitled to cast two thirds (2/3) of the votes of each class of membership has

been recorded agreeing to such dedication, transfer, purpose or condition, and unless written notice of the proposed agreement and action thereunder is sent to every Member at least ninety (90) days in advance of any action taken. The consent requirements of Articles XII, Section 3, if applicable, must also be satisfied to effect a valid dedication

Nothing herein contained shall be construed as a dedication of any part of the Common Property to the public or to public use.

Section 3. **Title to Common Property.** Declarant shall convey legal title to the Common Property, if any, to the Association prior to December 31, xxxx.

Section 4. **Taxes and Special Assessments on Common Property.** Taxes and special assessments that would normally be levied against the Common Property shall be divided and levied in equal amounts against the Lots or Outlots or as the governmental taxing authorities shall determine, which levies shall be a lien against such individual Lots and Outlots.

Section 5. **Delegation of Rights.** Any Owner may delegate the Owners right and easement of enjoyment in and to the Common Property to the members of the Owners family, guests or to tenants who reside on the Lot.

ARTICLE IX INSURANCE

Section 1. **Liability Insurance; Fidelity Bonds.** The Board of Directors of the Association, or its duly authorized agent, shall obtain a broad form of public liability insurance covering all of the Common Property insuring the Association, with such limits of liability as the Association shall determine to be necessary. Such insurance policy shall contain a "severability of interest" clause, which shall preclude the insurer from denying the claim of an owner because of the negligence of the Association or other Owner. Any policy or bond contained hereunder shall provide that it may not be canceled or substantially modified (including cancellation for nonpayment of premium) without at least thirty (30) days' prior written notice to First Mortgagees.

Section 2. **Casualty Insurance on Insurable Common Property.** The Association shall keep all insurable improvements and fixtures on the Common Property insured against loss or damage by fire for the full insurance replacement cost thereof, and may obtain insurance against such other hazards and casualties, as the Association may deem desirable. The Association may also insure any other property whether real or personal, owed by the Association, against loss or damage by fire and such other hazards as the Association may deem desirable, with the Association as the owner and beneficiary of such insurance. The insurance coverage with respect to the Common Property shall be written in the name of, and the proceeds thereof shall be payable to, the Association for

the repair or replacement of property for which the insurance was carried. Premiums for all insurance carried by the Association are common expense included in the annual assessments.

Section 3. **Replacement or Repairs of Common Property.** In the event of damage to or destruction of any part of the Common Property, the Association shall repair or replace the same from the insurance proceeds available. If such insurance proceeds are insufficient to cover the cost or repair or replacement of the property damaged or destroyed, the Association may make a reconstruction assessment against all Owners to cover the additional cost of repair or replacement not covered by the insurance proceeds, in addition to any other assessments made against such Owners. Mortgagees shall receive notice from the Association to n the event of any damage or destruction to the Common Property in excess of \$xxxx. Any reconstruction assessed hereunder shall be adopted in accordance with the procedures set forth in Article V of this Declaration with respect to annual assessments and special assessments, as therein provided, and the lien of any reconstruction assessment levied hereunder shall be subordinate to the lien of any Mortgage, in the same manner and to the same extent as the subordination of annual assessments and special assessments, as provided in Article V, of this Declaration.

Section 4. **Annual Review of Policies.** All insurance policies shall be reviewed at least annually by the Board of Directors in order to ascertain whether the coverage contained in the policies is sufficient to make any necessary repairs or replacements of the Common Property, which may have been damaged or destroyed.

PROHIBITED USES

Section 1. **Use.** No Lot shall be used except for residential purposes; no Living Unit shall be erected, altered, placed or permitted to remain on any Lot other than one single family dwelling, not to exceed two (2) stories in height, and an attached garage for at least two (2) cars and on-site parking spaces to accommodate at least two (2) cars. No garages shall be erected on any site except attached garages and no attached garage for more than three (3) cars shall be permitted without the express written approval of the Architectural Control Committee. Provided, however, that these provisions do not apply to the existing residences and garages on Lot 3 and lot 20. Detached Garages and out buildings may be considered in this declaration at a later date.

Section 2. **Subdivision.** No Lot shall be subdivided or split by any means whatsoever into any greater number of residential Lots, nor into any residential plots of smaller size without the express written consent of Afton City.

Section 3. **Standards.** All uses of the Lots shall, as a minimum, comply with the zoning and other applicable ordinances and regulations of Afton. The standards herein contained shall be considered as requirements in addition to said zoning and other applicable ordinances and regulations.

Section 4. **Minimum Square Footage and Set Back Provisions.** The Architectural Control Committee shall have the right to restrict setbacks.

Section 5. **Signage.** No sign shall be placed on any Lot or within the Property without the express written consent of the Architectural Control Committee, except that one “for sale” sign may be placed on a Lot by an Owner of the Developer without Committee approval.

Section 6. **No Pets and Animals.** No birds, animals or insects shall be kept on any Lot except dogs, cats and other common house pets if they are not kept, bred or maintained for any commercial purposes. Cats, must be kept on a leash or restrained Within a confined area when outside the home or garage. Dogs, must be kept under voice control, kept on a leash, or restrained within a confined area when outside the home or garage. The Architectural Control Committee shall have authority to determine compliance of these provisions.

Section 7. **Home Occupation.** No profession or home industry shall be conducted in any Living Unit or on any Lot without the specific written approval of the Declarant as herein before defined or by the Architectural Control Committee thereafter. The Declarant of the Committee, whichever has authority at the time in question, in its discretion, upon consideration of the circumstances in each case, and particularly the effect on surrounding property, may permit a Lot to be used in whole or in part for the conduct of a profession or home industry. No such profession or home industry shall be permitted, however, unless it is considered by the Declarant or by the Architectural Control Committee, whichever then has authority, to be compatible with the residential neighborhood. Home occupations are permitted within the home that does not create a nuisance or excessive vehicular traffic within the neighborhood.

Section 8. **Nuisances.** No clothesline or drying yards or pet control lines shall be permitted unless concealed by hedges or screening acceptable to the Committee. No weeds or other unsightly growths shall be permitted to grow or remain upon the premises. No refuse pile or unsightly objects shall be allowed to be placed or suffered to remain anywhere thereon. In the event that on Owner of any Lot shall fail or refuse to keep such premises free from weeds, or refuse piles or other unsightly objects, then the Declarant or the Association may enter upon such lands and remove the same at the expense of the Owner and such entry shall not be deemed as trespass and in the event of such a removal, a lien shall arise and be created in favor of the Association and against such Lot for the full amount chargeable to such Lot and such amount shall be due and payable within thirty days after the Owner is billed therefor. No Lot shall be used in whole or in part for the storage of rubbish of any character whatsoever, nor for the storage of any property of thing that will cause such Lot to appear in an unclean or untidy condition or that will be obnoxious to the eye; nor shall any substance, thing, or material be kept upon any Lot that will emit foul or obnoxious odors, or that will cause any noise that will or might disturb the peace, quiet, comfort, or serenity of the occupants of surrounding property. The outside storage of an unlicensed motor vehicle upon the premises shall also be considered a nuisance.

Section 10. **Leasing.** Any lease between an Owner and non-Owner occupant shall be in writing and shall provide that the terms of the lease shall be subject in all respects to the provisions of this Declaration, the Articles of Incorporation and By-Laws of the Association, and shall provide that any failure by the Non-Owner occupant to comply

with the terms of such documents shall be default under the lease. Other than the forgoing, there shall be no restrictions on the use of a Living Unit by a non-Owner occupant.

Section 11. **Fences, Walls and Hedges.** Boundary walls and fences are inconsistent with the intended plan of development for the Property. No wall or fence shall be constructed or hedge planted on any Lot until the height, type, design, and location have been approved in writing by the Committee. Under no circumstances shall a boundary wall, fence or hedge be permitted with a height of more than six (6) feet. The height or elevation of any wall, fence or hedge shall be measured from the existing elevations on the property at or along the applicable point or lines. Any question as to

such heights may be completely determined by the Committee. The height limitations as set forth in this paragraph shall not be applicable to tennis courts enclosures provided such enclosures have been approved by the Committee. A refusal by the Committee to allow or permit a fence, wall or hedge (including tennis court enclosures and swimming pool fences) on any particular Lot or in any particular location shall not be construed to be an abuse of discretion.

Section 12. **Storage Tanks.** No permanent storage tanks of any kind shall be erected, placed or permitted on any Lot unless buried or effectively screened from view outside the Lot.

Section 13. **Temporary Structures.** No structure of temporary character, trailer, basement, tent, shack, garage, barn or other building shall be used on any Lot at any time as a residence, either temporarily or permanently.

Section 14. **Auxiliary Structures.** No detached dog kennels, runs or enclosures shall be permitted unless design and location of it shall be approved by the Architectural Control Committee. No detached storage buildings shall be permitted except those approved by the Architectural Control Committee as conforming in design and appearance to the dwelling, and which are located in the proximity of the dwelling or garage.

Section 15. **Driveways.** Driveways must be constructed of concrete, bituminous or other hard surface material. Material and installation shall be subject to approval of the Architectural Control Committee. Driveways must be installed within one year of the date of a Certificate of Occupancy issued for any dwelling constructed upon a Lot.

Section 16. **Exterior Lighting.** All exterior lighting fixtures and standards shall be shown on submitted plans and shall comply with the overall lighting plan of the Declarant. All forms of exterior lighting shall be subject to approval of the Committee.

Section 17. **Exterior Ornaments.** Exterior ornaments including but not limited to precast concrete, plastic or wood figurines, wishing wells and windmills shall be prohibited unless approved by the Committee prior to installation or construction.

Section 18. **Antennas.** Except with the prior written approval and authorization of the Committee, no satellite dishes over 24" in diameter, no exterior television or radio antenna of any sort shall be placed, allowed or maintained upon any portion of a Lot or the improvements or structures located thereon.

Section 19. **Completion of Construction of Improvements.** All construction work shall, upon approval of plans by the Committee, be carried on with dispatch; all improvements shall be constructed in conformity with the then existing building codes of Afton Minnesota; and all building plans shall be prepared by or under supervision of a registered architect, a builder or qualified design professional. If any structure is begun after approval of the plans provided in Article VI and is not completed within one year after the commencement of said construction, and in the judgment of the Developer of the Architectural Control Committee, it is offensive or unsightly in appearance, the Developer or the Committee, may take such steps as may be necessary to make the Property harmonious with other properties, such steps including completion of the exterior of the structure, screening or covering the structure or any combination thereof, or similar operations. The amount of any expenditure made in so doing shall be the personal, joint and several obligations of the Owner or Owners, shall be a lien on the Lot, and may be foreclosed in the same manner as proved in Article V. The lien herein shall not be valid as against a subsequent bona fide purchaser of the Lot in question unless a statement setting forth the claim had been filed for record in the office of the County Recorder and/or Registrar of Titles of Washington County, whichever is appropriate, or unless a suit and appropriate Lis Pendens to foreclose the lien shall have been filed. **EXHIBIT L**

record in the office of the County Recorder and/or Registrar of Titles of Washington County prior to the recordation of the Deed conveying the Lot in question to said purchaser.

ARTICLE XI OWNER'S DUTIES

Section 1. **Minimum landscape plan.** Each owner is required to submit a landscape plan for approval. Owners shall be charged with the maintenance or enhancement of natural plantings. In addition, all lots must be sodded, seeded, mulched, or retained as natural areas within 90 days after substantial completion of the living unit, except those living units completed from November to March of each year shall have

until the following June to complete the minimum landscape plan. Should an Owner fail to respect these duties, the Association reserves the right to seed, sod or plant an area and levy an Individual Lot Maintenance Assessment against such Lot for the costs incurred by the Association.

Section 2. **Mailboxes.** Each Owner shall maintain a mailbox of the design and type initially installed by the Declarant or as on file with the Association. The mailboxes shall be on public right-of-way, and may be located in groups of two (2) or more. The Association reserves the right to levy an Individual Lot Maintenance Assessment against a Lot, pursuant to the provisions of Section 4, Article V hereof, should an Owner fail to maintain the mailbox.

Section 3. **Maintenance and Repair.** In order to preserve the uniform and high-standard appearance of the Property, each Owner undertakes responsibility for maintenance and repair of the exterior of his Living Unit, private yard area and private driveway on the Lot. Such responsibility for maintaining the Lot and improvements thereon shall include, but not be limited to the following: the maintenance and repair of exterior surfaces of all buildings on the Lot, including without limitation, the painting of the same as often as necessary, the replacement of trim and caulking, the maintenance or repair of roofs, gutters, downspouts and overhangs, the maintenance and repair of exterior windows and doors, necessary painting, staining and repair of patio structures; in maintain Private Yard Areas and private driveways an Owner shall be required to mow, trim, water or otherwise care for grass, trees or other plants located on a Lot and shall be

required to remove snow from the private driveways, parking areas and walkways to the Living Unit. Maintenance, painting and construction shall be in the original colors and materials, or according to approved color boards on file with the Association. Other colors and materials may be approved by the Architectural Control Committee.

ARTICLE XII GENERAL PROVISIONS

Section 1. **Association Easement.** The Association shall have an easement to enter upon any Lot in order to perform any obligations or duties of the Association hereunder, or to exercise any right or remedy of the Association hereunder.

Section 2. **Duration of Declaration of Covenants, Restrictions and Easements.** The covenants, restrictions, and easements of this Declaration shall run with and bind the land and shall inure to the benefit of and be enforceable by the Association or the Owner of any Lot subject to this Declaration, or their respective legal representatives, heirs, successors and assigns. The easements set forth herein shall be perpetual. The covenants and restrictions herein set forth shall have a term of twenty (20) years from the date this Declaration is recorded, after which time, said covenants and restrictions shall be automatically renewed for successive periods of ten (10) years. The covenants and restrictions of this Declaration may be amended during the first twenty (20) year period by an instrument signed by not less than seventy-five percent (75%) of the Owners and thereafter by an instrument signed by not less than sixty-seven percent (67%) of the Owners. Any amendment must be properly recorded.

Section 3. **Enforcement.** In the event, any Owner fails to comply with the provisions of this Declaration, or the Bylaws or Articles of Incorporation of the Association or with decisions of the Association which are made pursuant thereto, such failure will give rise to a cause of action on the part of the Association, or any aggrieved Owner for the recovery of damages or for injunctive relief, or both. Owners shall have a similar right of action against the Association. Enforcement of these covenants and restrictions may be by any proceeding at law in equity.

Section 4. **Severability.** Invalidation of any one of these covenants or restrictions by judgment or court order shall in no wise affect any other provision, which shall remain in full force and effect.

Section 5. **Rules and Regulations.** The Board of Directors of the Association may, from time to time, adopt such rules and regulations as the Board, in its sole discretion, deems appropriate or necessary, including, without limiting the generality of the foregoing, additional rules and regulations concerning the use of parking areas, maintenance of the Common Areas, reservation policies for the tennis courts and additional rules and regulations concerning the appearance of each Lot and utilization of ponding areas. Furthermore, the Association will adopt stocking, catch, and release

Policies for any fishing allowed by DNR on the Trout Brook. To help insure the continuing water quality of the Trout brook, the Association will adopt rules and regulations limiting the use of chemical fertilizers.

Section 6. **Rights of Declarant.** Until the last Lot is sold and conveyed to an Owner other than a Declarant, the following activities by Declarant or with the written consent of Declarant will not be deemed violations of restrictions contained in this Declaration:

- (a) The use of a Lot or Lots for model and sales office purposes;
- (b) The storage of a construction trailer, equipment, materials and earth during the construction of new Living Units;
- (c) The display of signs advertising the Property, or new Living Units and the maintenance of temporary fencing, walkways, landscaping and berming in the vicinity of model and sales units.

Section 1. **Mortgagee is Rights.** Notwithstanding any other provisions of this Declaration, the Articles of Incorporation or the By-Laws of the Association, the provisions of this Article XI shall control, and in the event of a conflict between the provision of this article and the provisions of such Declaration, Articles or By-Laws, the provisions of this article shall control.

Section 2. **Notice of Default.** Any Mortgagee holding a first Mortgage on a Lot, and who shall have previously filed a written request with the Association, shall be entitled to written notification of any default by the mortgagor or Owner of such Lot or his, or their, heirs, successors or assigns in the payment of any assessments or the performance of any other duties or obligations herein set forth which shall have remained in default for a period of thirty (30) days or more. The neglect or failure of the

Association to tender such notice to the Mortgagee shall toll the running of any time limits applicable to the procedure for the collection of such assessment of remedies available to the Association because of such default.

Section 3. **Consent Required.** Without the prior written approval of sixty-six and two-thirds percent (66-2/3%) of the holders of mortgage liens against all Lots, the Association shall not be entitled to:

- (a) By act or omission, seek to abandon, partition, subdivide, encumber, sell or transfer any Property which the Association shall have acquired for the benefit of the Owners;
- (b) Change the method of determining the obligations, assessments, dues or other charges which may be levied against a Lot;
- (c) By act or omission, change, waive or abandon the scheme of exterior and architectural controls, as hereinabove set forth.

Notwithstanding the reference to the authority of the Association to levy assessments for the enforcement of covenants and restrictions hereinabove or for maintenance, capital improvements, or any other remedies of the Association, Declarant declares that in addition to the real property which may coincident herewith or subsequent hereof be conveyed to the Association as common property, that additional properties not dedicated for such common area but rather dedicated in fee or as public easement to the municipality having jurisdiction over the premises comprising the entire subdivision of which the lots and the common area properties described hereon are a part, have nonetheless been or will be dedicated for the benefit of the individual lot owners and association. Individual lots may be contiguous to such dedicated lands, and such dedicated lands (or to be dedicated lands) may contain municipally mandated improvements. Declarant as owner is obligated pursuant to a certain “Developer’s

Agreement” with Afton to provide repairs for any damages to such improvements on such dedicated (or to be dedicated) properties during the period of construction and for a defined term thereafter. Declarant reserves the right to assess any individual lot owner for monies expended by Declarant to repair damage to such improvements by such lot owner, his agents, assigns, vendors, contractors and subcontractors. Such assessment shall constitute a lien in the same manner as such is described in Section 4 or Article V herein.

ARTICLE XV WATER MAINTENANCE AND MANAGEMENT

Section 1. **Access.** All owners within Afton Creek Preserve shall have access to open space and Trout Brook according to the easements described in Exhibit B of this Declaration.

Section 3. **Afton Creek Preserve Maintenance and Water Management.** In addition to Afton creek Preserve, property owners the City of Afton, The South Washington County Watershed District and the Minnesota DNR have restrictions regarding water maintenance and management. The Afton Creek Preserve Association may enter into agreement(s) for management responsibilities, which relate to the maintenance and water management for Afton Creek Preserve and especially the Trout Brook and its contribution to the Waterways down Stream.

EXHIBIT L



Technical Memorandum

To: Joseph Bush, JP Bush Homes
From: Max Moreland, P.E.
Bryant Ficek, P.E., P.T.O.E.
Date: February 5, 2018
Re: Afton Creek Preserve Housing Updated Traffic Assessment

Purpose

JP Bush Homes has proposed a single-family home development in Afton, Minnesota. This development is proposed to be located at 14220 60th Street South in Afton, Minnesota. The purpose of this memorandum is to determine the traffic associated with the development and evaluate the access points. An initial sight distance review was completed in the summer of 2017 by Spack Consulting; that review will be referenced in this memorandum.

Proposed Development

The proposed 218-acre development is a single-family home development with areas of open space. Two access points to the development are proposed. One access is proposed to be a full movement access located at 5550 Odell Avenue South. The other access is located at 14220 60th Street South and is proposed to allow entering vehicles from both directions with exiting vehicles limited to right turns only (no outbound left turns).

The proposed development layout can be seen in the attached concept site plan.

Study Area and Existing Conditions

60th Street is a local, two-lane undivided east-west road. Currently a gravel road in the area of the proposed access, 60th Street is proposed to be paved by the developer in conjunction with the residential construction. The existing pavement to the east of the site will be extended west through the intersection with Oakgreen Avenue. 60th Street extends west where it terminates at Manning Avenue. Just east of the proposed development access, 60th Street curves to the north and becomes Trading Post Trail. The statutory speed limit for this road is 30 mph.

Trading Post Trail is a local, two-lane undivided road with a 30-mph speed limit on its south end, a 35-mph speed limit north of 59th Street and a 45-mph speed limit north of 55th Street. Trading Post Trail extends approximately four miles north of 60th Street where it terminates at the intersection with Valley Creek Trail.

Odell Avenue is a local, two-lane undivided road. Odell Avenue extends less than a mile from Trading Post Trail providing a connection to 50th Street. The statutory speed limit is 30 mph.

50th Street is a local, two-lane undivided east-west road located north of the development. Just west of Odell Avenue, eastbound 50th Street has a 30-mph truck advisory speed limit sign. 50th Street extends west from Odell Avenue over two miles to Manning Avenue where it becomes Dale Road which extends

approximately four more miles west to where it terminates at Radio Drive. 50th Street extends east from Odell Avenue over two miles until it reaches the St. Croix River and curves north to become River Road.

Just west of the proposed access at 14220 60th Street South, 60th Street is intersection with Oakgreen Avenue, a local, two-lane undivided road with a 45-mph speed limit. This road extends South from 60th Street nearly two miles south to an intersection with 80th Street.

The previous Spack Consulting review in the summer of 2017 included collecting vehicle speeds on 60th Street west of the bend and transition to Trading Post Trail. The 85th percentile speed of westbound vehicles over the course of a week at that location was found to be 25.0 mph. The current characteristics of this curve demonstratively slowed vehicles from the statutory speed limit.

Trip Generation and Distribution

A trip generation analysis was performed for the development site based on the methods published in the *Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition* as well as local data collected by Spack Consulting.

The ITE manual compiles studies from across the country to provide a national average traffic for various land uses. Spack Consulting collects current average traffic volumes for various land uses in the Twin Cities regional area for use in our studies. Local data is considered more relevant than the ITE national data as it is generally newer and accounts for our area’s specific characteristics and driving habits. Per the procedure in the *Trip Generation Manual*, local trip generation data is preferred when possible and supplemented with national ITE data when local data is not available.

The resultant new trips generated by the proposed development are shown in Table 1.

Table 1 – New Trip Generation

Land Use Code – Source ¹	Description & Size	Daily		AM Peak Hour		PM Peak Hour	
		In	Out	In	Out	In	Out
210 - ITE	Single-Family Detached Housing (18 Units)	85	85	3	10	11	7
Local	Single Family Homes (18 Units)	83	83	3	9	10	7

¹ Local = Trip generation data collected by Spack Consulting in this regional area.

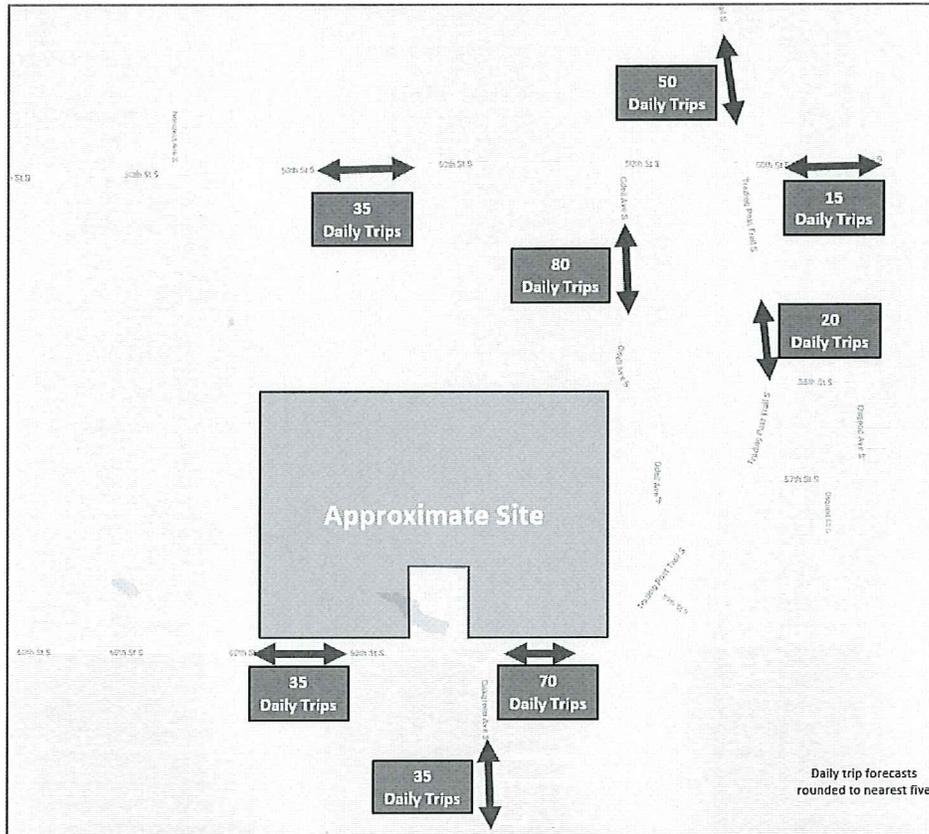
As shown, the local data closely matches the national data, suggesting this proposed residential development will generate approximately 170 daily vehicle trips on the surrounding roadway system. To put this level of traffic in context, ITE guidelines suggest a traffic study is necessary when the peak hour volumes exceed 100 vehicles per hour. At a peak of 18 vehicles per hour, the proposed development is well under a national threshold, suggesting this level of traffic is not a significant impact to the surrounding roadway system.

A trip distribution pattern was developed for the generated traffic going to and from the proposed development. This general trip generation pattern is based on site access, access to the regional transportation system, and observations of existing traffic operations. The generated trips were assigned

to the network surrounding the site with this trip distribution. Rounding to the nearest five vehicles, the forecast daily trips on the surrounding network are listed below and shown in Figure 1.

- i. 35 daily trips to/from the west on 60th Street.
- ii. 35 daily trips to/from the west on 50th Street.
- iii. 15 daily trips to/from the east on 50th Street.
- iv. 50 daily trips to/from the north on Trading Post Trail.
- v. 35 daily trips to/from the south on Oakgreen Avenue.

Figure 1 – Forecast Trip Distribution



As shown, the highest daily volume on any one road is expected to be about 80 vehicles. With the p.m. peak hour typically being about ten percent of the daily volume, this translates into about eight vehicles in the busiest peak hour, or about one car every 7.5 minutes.

Intersection Assessment

The volume of traffic expected from the proposed development will not impact intersection operations due to the relatively low volumes that are well within the capacity of the surrounding roads and intersections. Rather than examining capacity, the sight distance was reviewed to ensure operations can be safely accommodated.

Sight distances were evaluated at four locations; the access points on 60th Street and Odell Avenue per the attached site plan as well as the Odell Avenue intersections at 50th Street and Trading Post Trail. These locations will have the greatest concentration of vehicles to/from the proposed development.

According to the American Association of State Highway and Transportation Officials' (AASHTO) *A Policy on Geometric Design of Highways and Streets* (commonly referred to as the Green Book), "**The designer (of a roadway) should provide sight distance of sufficient length that drivers can control the operation of their vehicles to avoid striking an unexpected object in the traveled way.**" Translated, this text means that a motorist should be able to see cars, deer, kids, etc. in intersections or roadways in enough time to stop before hitting them.

This sight distance explanation can be further broken down depending on the specific movement the vehicle is making as well as the location of the vehicle in the roadway. Below are the key AASHTO sight distance definitions and summary definition.

Passing Sight Distance

- "The passing driver should be able to see a sufficient distance ahead, clear of traffic, so the passing driver can decide whether to initiate and to complete the passing maneuver without cutting off the passed vehicle before meeting an opposing vehicle that appears during the maneuver." (AASHTO)
- Enough sight distance should be provided to assure drivers have sufficient sight distance to perform a safe passing maneuver without cutting off any vehicles.

Stopping Sight Distance

- "The available sight distance on a roadway should be sufficiently long to enable a vehicle traveling at or near the design speed to stop before reaching a stationary object in its path." (AASHTO)
- Sight distance along a roadway should provide enough distance for a driver to come to a complete stop after seeing a condition requiring the stop.

Decision Sight Distance

- "Decision sight distance is the distance needed for a driver to detect an unexpected or otherwise difficult-to-perceive information source or condition in a roadway environment that may be visually cluttered, recognize the condition or its potential threat, select an appropriate speed and path, and initiate and complete complex maneuvers" (AASHTO)
- Similar to Stopping Sight Distance, but generally referring to operations in more difficult driving areas, such as interchanges and other locations with heavy traffic or areas with heavy signage. It assures drivers that enough sight distance is provided to notice a condition requiring a stop in a more complex environment, select a path to proceed or stop, and then complete the chosen maneuver safely.

Intersection Sight Distance

- "The driver of a vehicle approaching an intersection should have an unobstructed view of the entire intersection, including any traffic-control devices, and sufficient lengths along the intersecting highway to permit the driver to anticipate and avoid potential collisions." (AASHTO)
- Sight distance provided at intersections and driveways to allow drivers to perceive the presence of potentially conflicting vehicles and when the appropriate gap in traffic is provided to safely perform their movement.

Of these four types of sight distance, stopping sight distance and intersection sight distance are appropriate for this proposed development. Passing sight distance is not applicable as the proposed development does not require nor encourage passing. Decision sight distance is not applicable as it is more appropriate for urban areas where there is apt to be “visual noise”, areas of concentrated demand where sources of information compete (roadway elements, traffic, traffic control devices, and advertising signs). Therefore, only stopping sight distance and intersection sight distance are evaluated.

Stopping Sight Distances

Vehicles approaching these four intersections on the mainlines are not required to stop. However, drivers require sufficient time to stop if needed if there is an object in the intersection. In the AASHTO manual, consideration of road speed, braking reaction time, grade of the road and deceleration factors are considered in the stopping sight distance. Standard braking reaction times and deceleration rates were used while the grade of the road was measured in the field.

Utilizing these factors and equations provided by AASHTO, the minimum stopping sight distance for each mainline approach to the four intersections was calculated. Field measurements on-site then obtained the currently provided stopping sight distance for each approach. Table 2 shows a comparison of the measured to the minimum needed stopping sight distances. The minimum stopping sight distance needs for 50th Street were calculated using a 55-mph road speed to show the upper bounds of need. Speeds of 30-mph were used to calculate the stopping sight distance on 60th Street and Odell Avenue. Speeds of 35-mph were used to calculate the stopping sight distance on Trading Post Trail.

Table 2 – Stopping Sight Distances

Location	Approach	Minimum SSD Needed (feet)	Measured SSD (feet)
60 th St at Site Access	Westbound (east of Site Access)	220	331
60 th St at Site Access	Eastbound (west of Site Access)	182	245
Odell Ave at Site Access	Northbound (south of Site Access)	185	370*
Odell Ave at Site Access	Southbound (north of Site Access)	207	360
Trading Post Rd at Odell Ave	Northbound (south of Odell Ave)	293	880
Trading Post Rd at Odell Ave	Southbound (north of Odell Ave)	270	775
50 th St at Odell Ave	Westbound (east of Odell Ave)	495	770
50 th St at Odell Ave	Eastbound (west of Odell Ave)	606	740

*Additional Stopping Sight Distance extends beyond 620 feet from access, but due to short vertical curve it is obstructed between 620 feet and 370 feet from intersection.

As shown in Table 2, all approaches to these four study intersections exceed the minimum stopping sight distance needs for vehicles on the mainline. Drivers approaching the intersections on the mainline have adequate time and distance to stop if they see an object in the roadway at the intersection.

Intersection Sight Distances

Intersection sight distance requirements are provided in terms of both a physical distance and a time gap in the mainline traffic related to the speed of approaching vehicles. For approaching vehicles at any speed, a vehicle stopped at an intersection requires a minimum time gap of 7.5 seconds in either direction to complete a left turn movement. In other words, an average driver needs to see an approaching vehicle at least 7.5 seconds away to know if they have sufficient time to complete a left turn. To complete a right turn movement, the time gap is reduced to 6.5 seconds and applicable only to vehicles approaching from the left of the stopped driver. For intersections with stop control on the minor road, no adjustment of the recommended sight distance values for the major-road grade is generally needed because both the major and minor road vehicle will be on the same grade when departing from the intersection. MnDOT adopted these measurements and distances as official policy in 2013.

To translate this time factor into a distance, the AASHTO formula is:

$$ISD = 1.47 * \text{Major Street Vehicle Speed (mph)} * \text{time gap}$$

Field measurements of intersection sight distance were obtained at the same four study intersections and included measuring both the physical sight distances as well as the time for passing vehicles. Several passing vehicle measurements were made for each approach and averaged. Table 3 shows the minimum intersection sight distances in terms of time and distance along with the field measured values. Left turn measurements are facing down the approach to the right of the stopped vehicle and right turn measurements are facing down the approach to the left of the stopped vehicle. The minimum needs for 50th Street were calculated using a 55-mph speed limit to show the upper bounds of needs. Speeds of 30-mph were used in calculations at 60th Street and Odell Avenue. Speeds of 35-mph were used to calculate the intersection sight distance at Trading Post Trail. Locations that do not meet the minimums are in red.

Table 3 – Intersection Sight Distances

Location	Movement	Minimum ISD Needed* (feet)	Measured ISD (feet)	Minimum ISD Needed (seconds)	Measured ISD (seconds)
SB Site Access at 60 th St	Right Turn	290	320	6.5	9.9
EB Site Access at Odell Ave	Left Turn	335	350	7.5	8.9
EB Site Access at Odell Ave	Right Turn	290	325	6.5	7.3
Odell Ave at Trading Post Rd	Left Turn	390	140	7.5	3.2
Odell Ave at Trading Post Rd	Right Turn	335	315	6.5	7.8
NB Odell Ave at 50 th St	Left Turn	610	725	7.5	15.1
NB Odell Ave at 50 th St	Right Turn	530	405	6.5	8.1

*Design Intersection Sight Distance rounded up from the calculated Intersection Sight Distance

As shown in Table 3, three locations do not meet the minimum requirements.

The eastbound Site Access at Odell Avenue approach is shown to have adequate sight distance needs. During a field visit, it was noted that a small amount of vegetation from this developments property could be cleared to extend the sight distance for right turns by roughly 50 more feet. That would give approximately one extra second of intersection sight distance, exceeding the minimum need.

The eastbound Odell Avenue at Trading Post Trail approach is short of the needed ISD to make a left turn onto Trading Post Trail. This is due to some vegetation as well as a transformer box blocking the view to

the south on Trading Post Trail from the stop on Odell Avenue. It should be noted that this is an existing intersection, which should be addressed regardless of this proposed development. However, as part of this proposed development, the transformer box is planned to be moved. This relocation combined with clearing some vegetation away from the road within the public road right-of-way would improve the intersection sight distance to the minimum needed.

The eastbound Odell Avenue at Trading Post Trail approach is short of the minimum in terms of physical distance for right turns but does have enough in terms of time values. The difference is due to the physical distance calculation based on a 35-mph speed. Since the measured time is sufficient, vehicles are traveling at lower speeds than 35-mph. The intersection sight distance is therefore adequate at this location.

The northbound Odell Avenue at 50th Street approach is also short of the minimum in terms of physical distance for right turns. As with the previous description, the approach does have sufficient intersection sight distance based on measured time, suggesting vehicles are not travelling at 55 mph. The intersection sight distance is therefore adequate at this location.

Conclusions

The proposed single-family home development is forecast to generate approximately 170 new daily trips, 13 new a.m. peak hour trips and 18 new p.m. peak hour trips. This volume is below a national threshold for requiring a traffic study, suggesting little to no operational impacts on the surrounding roads.

The highest volume on any one road around the proposed site is about 80 vehicles per day with approximately eight during the busiest p.m. peak hour. This peak hour volume translates into one car every 7.5 minutes.

Of the key types of sight distances defined by the American Association of State Highway and Transportation Officials' (AASHTO) *A Policy on Geometric Design of Highways and Streets*, stopping sight distance and intersection sight distance are the appropriate measures. Decision sight distance is more appropriate for urban areas where various sources of information compete for a driver's attention (roadway elements, traffic, traffic control devices, and advertising signs).

Adequate stopping sight distance exists on each main line approach at the intersections of 60th Street/Site Access, Odell Avenue/Site Access, Odell Avenue/Trading Post Trail and 50th Street/Odell Avenue.

Intersection sight distance based on time measurements is adequate for all movements from the side street stop except for the left turn movement of eastbound Odell Avenue at Trading Post Trail. This existing deficiency is due to a transformer box located at the intersection and some surrounding vegetation in the right-of-way. The transformer box is proposed to be moved with this development which, combined with clearing of vegetation, will improve the intersection sight distance to the minimum needed.

For all intersections, clearing tall and overgrown vegetation in the public right-of-way will increase intersection sight distances and is recommended to improve overall safety in the area.

Attachment

- Site Plan



Memorandum

To: Ron Moore, City Administrator

From: Nick Guilliams, City Engineer
Sean Delmore, Transportation Project Manager
Maia Harold, Project Engineer

Date: February 27, 2018

Re: Afton Creek Preserve Preliminary Plat
Stormwater and Traffic Technical Review
WSB Project No. 010641-000

This memo is being provided to review the stormwater and traffic related plans for the proposed Afton Creek Preserve Project submitted on February 5, 2018 as preliminary plat application.

At the preliminary plat stage, our task as engineers is to review the documents that the applicant submitted for technical feasibility. We have reviewed all plans and have provided comments to the developer to ensure the plans meet all requirements.

This review is not a final approval; the developer is only required to show that the project is technically feasible. Final construction plans will be provided at the final plat stage if the project is approved by the City Council to move forward. The developer will be required to address all preliminary plat comments before approval. The City's consultant planner and engineer will review all final plat documents and provide additional comments at that stage.

Approval of the preliminary plat does not give the developer permission to start grading or begin any construction activities. The Afton City Council must approve the final plat, all comments from planning and engineering must be addressed, and all permit approvals must be received before construction can start.

Traffic and Access Review

JP Bush is proposing an 18-lot residential development along Trading Post Trail and 60th Street. The preliminary plat has been revised and now incorporates a street connection to Odell Avenue via a loop road. There are now 2 access points proposed for the development, 1 on 60th Street and another on Odell Avenue.

Upon review of the preliminary plat documents and supporting traffic study, WSB determined that the project is technically feasible from a traffic engineering standpoint based on the current posted speed limit, projected traffic volumes, and additional speed data. This conclusion was based on preliminary plat documents meeting Minnesota Department of Transportation (MnDOT) guidelines which follows the American Association of State and Highway and Transportation Officials (AASHTO).

Our evaluation is based on the following criteria, as well as information provided by the applicant as part of the preliminary plat submittal:

60th Street Access

- The developer's traffic study and the City's evaluation for Trading Post Trail is based on the posted speed limit of 30 mph for southbound traffic approaching 60th Street. A 30 mph sign is located just south of Odell Ave for southbound traffic. It is assumed that the City of Afton determined the speed for the roadway in accordance with the appropriate speed study requirements. The City has conveyed that it is their practice to follow MnDOT speed study requirements when placing speed limit signage. The City Engineer is requesting information from MnDOT to confirm that a speed study was performed at this time.
- Upon the City's request, WSB performed a separate study at this intersection to determine if additional curve warning signage was appropriate for the Trading Post/60th intersection. Based on this study, it was determined that this curve could be posted as a 20-mph curve based on FHWA guidelines. However, the warning signage is not required based on traffic volumes. A memo detailing the results of this study and recommendations is attached.
- A review of the technical memoranda provided by the applicant's engineer dated February 22, 2018 and July 26, 2017 provided data showing speeds less than 30 mph after the curve on 60th Street. This memo was prepared by a registered traffic engineer in the State of Minnesota. Based on this information and the posted speed, 30 MPH is acceptable and will be discussed with the City and MnDOT to confirm this posting is correct.
- Field work for the July 26, 2017 study was performed from 6/29/17 to 7/5/17. This work was performed over a holiday and during a street reconstruction project, although no construction activities took place from 6/26/17 to 7/7/17. While these conditions may have affected traffic volumes, this data is not necessary to make a determination on sight distance from the 2 access points and is not required to be provided for a development only generating an additional 170 vehicle trips per day.
- From a traffic engineering standpoint, 170 additional trips per day is a minor increase in traffic volume that will not alter existing roadway characteristics.
- Based on a 35 MPH design speed, the intersection sight distance is not acceptable at the proposed access driveway. The driveway will be signed for a right turn only movement and the required sight distance is 335 feet to the east. Per the technical memorandum provided by developer's engineer dated February 22, 2018 the measured sight distance is 320 feet. This would need to be increased if the City did not have a formal study indicating a 30 MPH speed limit or a formal MnDOT speed study could be done in the future to justify the speed limit of 30 MPH.
- There is no recorded accident history at this location that would indicate any deficiencies in traffic operations.

Odell Ave Access

- Minnesota State Statue 169.14 Subdivision 2 lists the speeds for different types of roads and situations. For rural residential roads, the speed limit is 35 mph if adopted by the local road authority. Odell Avenue appears to meet the requirements and is currently operating as a rural residential road. The only element lacking is a resolution adopting it as a rural residential road from the local road authority. In the absence of the local road authority adopting the road as a rural residential road, the statutory speed of 55 mph becomes the default the speed.

In addition, 2017 Minnesota Statue 16914 Subdivision 1 states "No person shall drive a vehicle on a highway at a speed greater than is reasonable and prudent under the conditions. Every driver is responsible for becoming and remaining aware of the actual and potential hazards then existing on the highway and must use due care in operating a vehicle. In every event speed shall

be so restricted as may be necessary to avoid colliding with any person, vehicle or other conveyance on or entering the highway in compliance with legal requirements and the duty of all persons to use due care.”

Due to the sharp horizontal curves that exist on Odell Avenue it's our opinion that it does not meet the criteria for a 55-mph road and should be considered per adoption as a rural residential road for posting as a 35-mph road.

- Based on a 35 MPH design speed for Odell Avenue, the intersection sight distance is acceptable at the proposed access driveway. Per the technical memorandum provided by the developer's engineer dated February 22, 2018 the measured sight distance is 710 feet to the north for left turn movements and 360 feet to the south for right turn movements. The required sight distance is 390 feet to the north and 335 feet to the south. Therefore, based on the preliminary drawings provided, the applicant has met the requirement assuming 35-mph or less.
- From a traffic engineering standpoint, 170 additional trips per day is a minor increase in traffic volume that will not alter existing roadway characteristics.
- There is no recorded accident history at this location that would indicate any deficiencies in traffic operations.

Based on the information provided, analyses completed by the applicant and City Engineer, and the reasons stated above, we believe the project is technically feasible and meets traffic engineering standards under the following conditions:

- The 30 MPH posting on Trading Post Trail is verified or;
- The developer can meet the sight distance requirements of 35 MPH and the City chose to move forward with the posting or;
- A MnDOT speed study is completed and the 30 MPH speed limit is correct.

There is no evidence or data that has been submitted that shows there are any safety issues associated with the access road or the approaches from Trading Post and 60th Street or Odell Avenue. Our review did not include existing intersections (Trading Post Trail at Odell Avenue or 50th at Odell Avenue).

Stormwater Review

Applicants must follow stormwater requirements for all jurisdictions. The City Engineer provided technical memos on September 14th, September 20th, and September 26th related to meeting jurisdictional requirements prior to the preliminary plat submittal. In the case of Afton Creek Preserve, rules of South Washington Watershed District (SWWD), the City of Afton, and the Minnesota Pollution Control Agency (MPCA) Permit No. MN R100001 (General Permit) must be followed for permanent stormwater design.

From a preliminary plat standpoint, the developer must demonstrate that they have adequately sited proposed stormwater management facilities and incorporated the required easements. Once the preliminary plat is approved, the developer will begin submitting their models and reports through a series of reviews until jurisdictional compliance is achieved.

Upon review of the preliminary plat documents, the City Engineer has determined that the project is technically feasible from a water resources engineering standpoint, in terms of meeting stormwater management requirements for all jurisdictions.

Permanent stormwater design must fulfill several requirements for each of these entities including rate control, volume, and water quality. The City's consultants have and will continue to comment on the developer's design submittals until all jurisdictional requirements have been met. These requirements include but are not limited to the following:

- No land shall be developed or altered and no use shall be permitted that results in surface or stormwater run-off causing or with the potential to cause unreasonable flooding, erosion or deposit of materials on adjacent properties or water bodies. Such run-off shall be properly channeled into a stormwater management facility that is consistent with the stormwater management and erosion and sediment control requirements of Article 13. Any increase in run-off rate or volume as a result of the developed portion of a property shall achieve at least the minimum requirements of Article 13 (Afton Code Sec. 12-217).
- On-site treatment during construction and post-construction must be provided to ensure no increase from existing conditions in offsite peak discharge for the 1-year, 2-year, 10-year, and 100-year, 24-hour storm events (Afton Code Sec. 13-162).
- Existing natural drainageways, wetlands, and vegetated soil surfaces used to convey, store, filter, and retain stormwater runoff before discharge to public waters shall not be eliminated by construction or land disturbance (Afton Code Sec. 12-409).
- The post-development 2-year, 10-year, and 100-year peak rate of runoff at the pre-development level for the critical duration precipitation event must be maintained, both on-site and at key regional locations identified by the District (SWWD Policy 7.1.1).
- Per the MPCA, a Stormwater Pollution Prevention Plan (SWPPP) is required. The SWPPP has many requirements, one of them being that if any stormwater flow will be channelized at the site, the Permittee(s) must design Best Management Practices (BMPs) to control both peak flow rates and total stormwater volume to minimize erosion at outlets and to minimize downstream channel and streambank erosion (General Permit Part III.A.5.i.iii).

Volume:

- For new, nonlinear developments on sites without restrictions, stormwater runoff volumes will be controlled and the post-construction runoff volume shall be retained on site for 1.1 inches of runoff from all impervious surfaces on the site (Afton Code Sec. 13-160.A).
- All projects must maintain the annual average existing conditions infiltration capacity of the site. This standard is applied to entire site, expressed as total annual runoff volume resulting from typical climatic conditions. Best Management Practices (BMPs) should be designed following guidance provided in the SWWD Standards Manual or MN Stormwater Manual (SWWD Policy 7.3.2).

Water Quality:

- All projects must provide treatment necessary to meet applicable annual total phosphorus loading rates per the table located in the SWWD Rules or maintain existing loading rates, whichever is less (SWWD Policy 7.3.3).
- All projects must provide treatment necessary to provide a net reduction of off-site Total Suspended Solids (TSS) discharge rates from existing conditions on an average annual basis (SWWD Policy 7.3.3.C).

Overland Sheet Flow onto Adjacent Property to the East:

Sheet flow in the area of the Carlson farm access road is already occurring in the existing condition, and there are prescriptive rights to allow water to drain where it always has per Section 12-409. The preliminary plat is indicating many ponds throughout the site that are intercepting both existing and proposed sheet flow and discharging it at a slower rate compared to existing.

Per the requirements previously stated, the development must maintain or reduce the existing flow rate from all discharge points, including the two on the eastern property line for specified storm events. The City and developer are aware of the sensitivity of the properties that have existing drainage problems and will ensure that the rates will either be maintained or reduced per jurisdictional requirements. As the modeling currently shows, flow rates specifically off the eastern properties will be greatly reduced in typical storm events because there are no existing stormwater controls.

As Afton Code Section 12-217 states, any increase in run-off rate or volume as a result of the developed portion of a property shall achieve at least the minimum requirements of Article 13. The ordinance does not state that the developer must contain all stormwater on their property.

The City Engineer's role was to determine if the project is technically feasible in terms of meeting stormwater management requirements from all jurisdictions, and based on the information provided, the Engineer believes this project will improve the drainage. The City Engineer will be reviewing future submittals carefully to ensure discharge rates and volumes are reduced for the various rainfall events. In addition, we will verify that the flow continues to be sheet flow and not concentrated when it leaves the stormwater basins.

Please let us know if you have any questions.

Sincerely,

WSB & Associates, Inc.



Memorandum

To: Ron Moore, City Administrator
From: Nick Guilliams, City Engineer
Date: February 26, 2018
Re: Afton Creek Preserve Preliminary Plat
Plan Resubmittal Review Comments
WSB Project No. 010641-000

We have reviewed the resubmittal documents provided by Plowe Engineering, Inc. on 2/5/2018 for the Afton Creek Preserve Preliminary Plat Submittal.

This is a preliminary review of items that must be addressed for the subdivision. These items are subject to additional comments and will follow in subsequent submittals. Based on preliminary review of Afton Creek Preserve Preliminary Plat Submittal, the development appears to be technically feasible subject to the following conditions:

Procedural Comments:

1. Prior to the start of any construction, permits may need to be obtained from the following agencies:
 - a. MPCA Construction General Permit
 - b. South Washington Watershed District
 - c. City of Afton Stormwater Management Permit
2. Provide a maintenance agreement to ensure that the permanent stormwater basins will be inspected and maintained long term. The agreement at a minimum shall include the following:
 - a. Who will conduct maintenance
 - b. Inspection frequency
 - c. Maintenance necessary to ensure effective performance
 - d. Maintenance intervals
 - e. Removal of settled materials
 - f. Maintenance of vegetation

Drainage, Grading, & Erosion Control Comments:

1. Structural calculations for retaining walls greater than 4.0 feet in height need to be submitted for review prior to construction of the walls. The submittal will need to include:
 - a. Certification of a qualified MN licensed professional
 - b. Soil boring logs and geotechnical recommendation for support
 - c. Identify the type of material for the wall and design details
 - d. Provide details of the wall construction

Stormwater Management Comments:

Culverts:

1. Provide culvert sizing calculations.

Permanent Stormwater Modeling and Reporting:

2. Applicant will need to follow all South Washington Watershed District (SWWD), City of Afton, and MPCA rules for permanent stormwater design and calculations including rate control, volume, and water quality. See Section 13-54 of Afton City Code for conflicts between provisions. Provide a report that addresses the following:
 - a. Identify receiving water body per SWWD Rule 7.3.3.
 - b. Demonstrate phosphorus and total suspended solids (TSS) loading compliance per SWWD Rule 7.3.3 Stormwater Quality.
 - c. Demonstrate with calculations and in the report that the requirements of the NPDES Construction Stormwater General Permit for permanent stormwater management systems (infiltration basins and wet ponds) are being met (Part III.D). The modeling, new impervious, and other calculations from the lots along 60th Street South need to be included. The report currently contains a volume comparison table which does not demonstrate compliance with regulatory requirements.
 - d. Provide hydrologic calculations for the 1, 2, 10, and 100-year 24-hour design storm events to demonstrate rate control as required by the regulatory agencies.
 - e. Some proposed areas are running off the site untreated. When comparing existing to proposed in the model, less volume is being running off-site in the proposed condition even though impervious is being added. State reasoning in the report or modify the model.
3. Provide the HydroCAD model file.
4. Additional borings in the locations of the basins are needed per the Minnesota Stormwater Manual and the NPDES Construction Stormwater General Permit. When the borings are obtained, the exfiltration value in HydroCAD may need to be modified.
5. Identify what pretreatment method is being used for each permanent stormwater basin where applicable.

Plans:

6. Label basin bottom, NWL, HWL, and top of berm on plans.
7. Attach infiltration basin and wet pond details, sections, insets, and other pertinent data.
8. Top berm of ponds should be a minimum of 2 feet above the HWL.

Wetlands:

9. The wetlands shown on the preliminary plat exhibits do not reflect the most updated National Wetland Inventory (NWI) data provided by the Department of Natural Resources. Walking trails shown in Open Space B are proposed in areas that are shown as wetland by the NWI. A wetland delineation should be completed and submitted to the WCA LGU and USACE for review and approval. Any wetland impacts (permanent and temporary) must also be permitted through the WCA LGU and USACE. The septic systems located in Lots 5 and 6 may also be adjacent to wetland areas. It should be verified that these systems will not impact the adjacent wetlands.

Environmental:

1. The changes in the most recent submittal of the preliminary plat were compared to the plans reviewed as part of the Environmental Assessment Worksheet (EAW) process. Changes reviewed include:
 - Two lots previously proposed in the southwest corner of the development have been removed and designated as Open Space
 - One lot previously proposed along prairie Wind Drive has been removed and designated as Open Space
 - A loop road to Odell Avenue was added to the project plans
 - Adjustments to lot sizes north and west of the cul-de-sac

Based on a review of these changes, the environmental impact associated with the project has improved from the previous submittal. Therefore, an amendment of the EAW is not necessary.

Street Comments:

1. The minimum length of the vertical curve shall be 100 feet (12-1380 H.).
2. It is recommended as a condition of the development that the applicant pave 60th street from the end of pavement near the development entrance west to Neal Avenue. These improvements shall be shown on the final plat submittal and will be included as part the development agreement. All street improvements shall meet City standards.

Development Agreement:

1. Required with Final Plat.

Please let me know if you have any questions.

Sincerely,

WSB & Associates, Inc.



J.P. Bush
H O M E S

February 5th, 2018

City of Afton Preliminary Plat, Rezoning, CUP Application Narrative.

Property: 14220 60th St S Afton MN 55001
Will Carlson owned 218.6 Acres

Usage: Previously operated under Agriculture Zoning.
Request to Use Ordinance Article XII Sec. 12-2371
PRESERVATION AND LAND CONSERVATION DEVELOPMENT

Proposer: Will Carlson, Land Owner.
JP Bush Homes, Developer.

5550 ODELL AVE S. ROAD DEDICATION & GREEN SPACE PARK

The parcel at 5550 Odell Ave S. is a 5-acre property owned by Mr. Carlson. The full extent of the parcel is being dedicated for Park land while reserving a 60 foot right of way (access). The park area will be landscaped to create a Passive Green Space park that requires little or no maintenance. The boulevard of the road access will be landscaped, and trees installed. More details and landscape plans will be provided.

JP Bush Homes



J.P. Bush
H O M E S

February 5th, 2018

City of Afton Preliminary Plat, Rezoning, CUP Application Narrative.

Property: 14220 60th St S Afton MN 55001
Will Carlson owned 218.6 Acres

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Request to Use Ordinance Article XII Sec. 12-2371
PRESERVATION AND LAND CONSERVATION DEVELOPMENT

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JP Bush Homes, Developer.

FARM ROAD ACCESS LAND OWNED BY CARLSON

The Farm Road Access that stems off Trading Post Trail and angles NW into the proposed Development has several related elements needing clarification.

The Traffic study performed by Spack Consulting shows a single obstruction (Xcel Switching box) at the Odell and Trading Post intersection. The Xcel Switching box in the Boulevard on Trading post is in the center of the Farm road access. The traffic going left or right from Odell onto Trading Post Trail does not have the required safe sight distances. We have contacted the designers at Xcel and at this time we have preliminary information that the box can be relocated. We will move the box as allowed to create safe sight lines.

It is also important to note that in the event we do not get the approval for the Development we will use the access road for the equipment needed to farm the land.

JP Bush Homes



February 20, 2018

Mr. Ron Moorse
Administrator
3033 St Croix Trail S
Afton, MN 55001

Dear Mr. Moorse,

As the District Manager of the Washington Conservation District, it is our mission to enhance, protect, and preserve the natural resources of Washington County through conservation projects, technical guidance, and educational services to citizens and local government. The developer of the Afton Creek Preserve Development has asked us to provide some feedback on the benefits of the 135 acres of prairie restoration in his proposed design.

We support the implementation of sustainable landscapes such as tallgrass prairie for the multiple benefits they provide. Converting agricultural lands to grasslands like prairie can offer measurable benefits to water quality. Excess phosphorus, one of the leading causes of the eutrophication of lakes and streams, has a minimum of a six fold decrease in entering nearby waterbodies when converting land from row crops to grasslands. Converting 135 acres of row crops to prairie within the Trout Brook watershed will dramatically improve the water quality of Trout Brook and assist in reaching the Phosphorus reduction goals outlined in the Lower St Croix TMDL.

In addition to water quality, prairie restoration offers habitat for a wide variety of plants and animals. The St Croix Valley hosts a diversity of wildlife; many are listed by the Minnesota Department of Natural Resources as "Species of Greatest Conservation Need". One of the groups of birds especially in decline is grassland birds. These species depend on large tracts of remnant or restored grasslands such as the bobolink and the meadowlark. Prairie restorations at a scale like the Afton Creek Preserve will provide habitat for these species. Not only is the scale of this restoration important, but the location is valuable as well. The monarch butterfly uses the St Croix River flyway on its migration. Finding large populations of milkweed and other important nectar species along its migratory route is critical for this iconic species.

Please consider these important ecological benefits in your review of the prairie restoration at Afton Creek Preserve.

Sincerely,

A handwritten signature in black ink, appearing to read 'J. R. Moorse', is placed over a light gray rectangular background.

Supervisors: Louise Smallidge • Bob Rosenquist • Diane Blake • John Rheinberger • Jim Levitt

EXHIBIT S



SOUTH WASHINGTON
WATERSHED DISTRICT

September 11, 2017

VIA EMAIL

Mr. Ron Moorse
Administrator
3033 St. Croix Trail S
Afton, MN 55001

RE: Afton Creek Preserve EAW

Dear Mr. Moorse:

As per the City of Afton's request, SWWD has reviewed the proposed Afton Creek Preserve development for compliance with SWWD rules and for consistency with SWWD and City goals to protect and enhance Trout Brook. The proposed project meets SWWD rules and will protect and improve not only the water quality of Trout Brook, but the surrounding terrestrial habitat as well. Completion of the project as proposed will greatly benefit Trout Brook and compliment ongoing District efforts to enhance the stream and its riparian area.

We greatly appreciate the efforts of the developer and City to protect Trout Brook. Specifically, the extensive seeding plan will make immediate and lasting improvements. We look forward to working with the developer and the Minnesota Land Trust to restore the areas within the conservation easement area.

If you have questions or need additional information please contact me at 651-714-3714 or john.loomis@woodburymn.gov.

Sincerely,
South Washington Watershed District

John Loomis
Water Resources Program Manager

Cc: Joe Bush/J.P. Bush Homes

Ron Moorse

From: Loomis, John <john.loomis@woodburymn.gov>
Sent: Friday, October 13, 2017 8:34 AM
To: Ron Moorse
Subject: Afton Creek Preserve PLCD

Ron,

I am writing to commend and congratulate the City of Afton for the development and implementation of the Preservation and Land Conservation Development (PLCD) ordinance as related to the proposed Afton Creek Preserve Development. It is an innovative approach to allow development and protect valued resources. We hope that the successful implementation of the ordinance will serve as a model not only for other landowners in Afton, but throughout southern Washington County.

One of the greatest threats to Trout Brook is runoff and erosion of bluffs and streambanks. We worked with Bob Schuster in the past to limit those threats to Trout Brook by stabilizing active ravines and converting turf grass along the top of the bluff to native prairie. While those efforts were valuable and did help to protect Trout Brook, we are thrilled that the proposed conservation easement will permanently protect the bluff and stream corridor. Further, planting natives on the new residential lots which previously were used to grow row crop as proposed will directly attack the cause of runoff and erosion concerns. We look forward to working with the City of Afton and Minnesota Land Trust to continue to restore and protect Trout Brook.

The PLCD concept and this proposed project are great assets to the community and watershed. Thank you for the chance to be involved in the development process and for your commitment to protecting Trout Brook. Let me know if you need anything else.

John Loomis

Water Resources Program Manager
South Washington Watershed District
@SoWashWD
2302 Tower Drive
Woodbury, MN 55125
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Correspondence from Residents

February 14, 2018

To: Afton City Council and Planning Commission

RE: Carlson PLCD: Preliminary Comments on Proposed Final Plan submitted on February 5, 2018 (Odell Access, Horse Sanctuary, Park)

From: Citizens Concerned for Afton (see list)

First, we are very disappointed that Mr. Bush's final application addresses very few of the concerns the neighborhood group has expressed for the past 18 months. For example, despite the Odell access being taken off the table in December 2016, the developer is now back to proposing an Odell access point. This plan shows even more homes (now 4 instead of 3) abutting the Turner/Rhode horse farm than many of the previous plans.

This all goes back to the owner buying property that has substantial development challenges with a stream, steep topography, and very poor access. Yet he continues to put the burden back on the City and its residents to fix his problem with compromises on road safety, breaking up an existing neighborhood, hurting existing businesses, and maximizing density on land that is unsuitable for it. This, coupled with an inexperienced developer who has refused to work with the community, is why we are here after 18 months and countless hours spent by the residents, city staff and committee volunteers.

Odell Access. The City attorney has suggested that an access at 5550 Odell could be considered without the need for a variance if there was a pre-existing road on the parcel. Although the City attorney in his December 1 opinion claimed this way to access was technically possible, he went on to say that this approach would be "unusual, to say the least." Alternatively, if there is no pre-existing road, the developer would have to get a variance to join the parcel to the PLCD in order to use it as an access

To allow the developer to proceed without a joining variance, the City would have to approve tearing down a house on a rural residential lot in the middle of a mature subdivision in order to put a public road through it so that the developer could come in later to say there was a preexisting road. However, it defies logic to suggest there is or could be a pre-existing road under these present circumstances.

On its own, the City would never approve a public road through this lot because it would be a public road to no where with no purpose. The developer is seeking approval for the public road in conjunction with his approval for the PLCD development. In fact, but for this public road approval, he could not maximize his density with a loop road as shown on his plan, so the two are tightly intertwined—there is nothing pre-existing about it. The application for the public road is made in conjunction with his application for approval for his preliminary plat—his preliminary plat plan shows the issues are not independent (or preexisting) but one and the same.

Further, as a matter of policy if the City approved this approach, there would never be such a thing as a final plat in Afton again. The parcel at 5550 Odell is a rural residential lot with a home on it. It is located in the middle of an established neighborhood/subdivision that was reviewed extensively and platted over 20 years ago. The proposed road will break up the subdivision and add over 180 car trips per day on the local road (Odell) that was designed to serve only 14 lots under its original plats. Final plats are created to give some certainty to buyers and owners to invest in their properties without fear that roads, parks, etc. will appear next door devaluing their interests. What a terrible precedent and a way to discourage investment by breaking up cohesive neighborhoods of Afton residents with roads/parks just to advance the economic interests of a developer.

Lastly, we are shocked that this type of trickery with our ordinances is even being presented as a viable option for consideration. It shows how far off-track things are that a developer would be encouraged to present this option and even worse if it is considered by the City only to advance the interests of a developer at the expense of the community. This is a sad day for Afton.

An Odell access also does not comply with Afton's subdivision or PLCD ordinances:

12-1377.D. Proposed subdivision shall be coordinated with existing nearby municipalities or neighborhoods so that the community as a whole may develop harmoniously. (emphasis added). The project has not been coordinated with existing nearby neighborhoods so that the community as a whole may develop harmoniously. In fact, the developer now proposes to break up an existing subdivision by tearing down a house in the middle of it and forcing a road through this lot so he can access his development behind it. This access is not in harmony with nearby neighborhoods.

Sec. 12-2375. General standards for approval.

A. A Conditional Use Permit shall be required for all preservation and land conservation developments. The City may approve the preservation and land conservation development if it finds that the development satisfies all of the following standards:

3. The preservation and land conservation development can be planned and developed to harmonize with any existing or proposed development in the areas surrounding the project site. The development does not harmonize with existing development surrounding the project site. In fact, it breaks up an existing subdivision with a proposed road access at Odell. This road access is not a unified part of the PLCD boundary but burdens an existing neighborhood. A proposed park in the middle of an existing neighborhood also burdens an adjacent existing neighborhood. The surrounding neighborhoods object to the placement of a park that breaks up an existing neighborhood

Sec. 12-2379. General development plan.

B. In addition to the criteria and standards set forth in Sec. 12-78 of this article for the granting of Administrative Permits, the following additional findings shall be made before the approval of the outline development plan:

2. The uses proposed will not have an undue and adverse impact on the reasonable enjoyment of neighboring property and will not be detrimental to potential surrounding uses. The proposed road access at 5550 Odell will break up an existing cohesive neighborhood that was planned, reviewed and

approved more than 20 years ago as a subdivision. Odell was designed as a minor street to support only traffic from abutting properties. The proposed access onto Odell will change it to a collector street where it will collect traffic properties that do not abut it. Odell has sharp curves with steep grades and currently is popular as a walking, biking and running road. These activities will be negatively impacted by increased traffic that is incompatible with these uses given the reduced sightlines, curves and steep grades. The proposed park in the middle of this historical subdivision is not compatible with the nature of the neighborhood and will negatively impact the two properties that abut it plus it would add potentially more traffic to Odell in addition to the traffic from the development. These road safety considerations have not been adequately addressed.

5. The proposed total development is designed in such a manner as to form a desirable and unified environment within its own boundaries. The proposed access point from 5550 Odell is outside of the PLCD boundaries breaking up an established subdivision. It is not a development that is a “unified environment within its own boundaries.”

Turner/Rhode Horse Sanctuary. How can we allow a developer to come into our community and destroy the value of a long-standing business particularly one that is encouraged and prized in Afton’s Agricultural Zone? Our Comprehensive Plan is filled with policy/goals to promote continued agricultural uses in our Ag Zone and not residential uses.

The horse sanctuary that has operated on the Turner/Rhode property for many years is part of a very successful non-profit operation that is widely known throughout the country for its exemplary work (www.thisoldhorse.org). It is one of only 30 accredited horse sanctuaries in the US! The proposed development with its maximum density surrounds the sanctuary with 4 lots butting right up to its pastures on 2 sides. The neighborhood suggested that the lots be shifted north to allow a conservation easement buffer around the farm’s pastures—a very small concession for the business. But the developer even ignored that option saying he might have to take down some trees even though he is willing to do so for roads. In fact, a review of the tree line on his plan shows very few trees would be impacted. Further, while a previous development plan showed 3 lots abutting the farm’s pastures, the new plan shows 4 lots now abutting the farm’s pastures. Again, this is a retreat from addressing any of the community’s concerns. The developer proposes to mitigate impacts by planting some trees on the boundary line of the lots that abut the farm’s pastures, but trees on private property can always be easily removed and this provides no meaningful protection for the sanctuary. Instead, the developer needs to remove all the lots around this sanctuary.

We need to remind ourselves what our Comprehensive Plan states at page 21: **“The residents of the City of Afton value the agricultural economy and rural character that an agricultural environment provides. This Plan intends to preserve agricultural land for permanent agricultural use, and does not accept the belief held by some that agricultural use is merely a temporary use or that agricultural lands are merely a holding area for future residential or other development. Moreover, the community values agricultural land as open space in an increasingly urban environment, a sanctuary for a rural lifestyle that Afton residents have consistently desired to maintain.”**

Park. Joe Bush also proposes a public park at 5550 Odell adjacent to his access road presumably to meet his park dedication obligation. First, this is a public park in the middle of an established neighborhood and has no context as part of any park planning in the City. The residents in this neighborhood do not want their subdivision broken up with a public park placed adjacent to their properties and which could potentially add even more traffic to Odell in addition to the proposed 180 new car trips per day with the Odell access. Afton typically has chosen not to take scattered parcels of parkland throughout the city and this would be a deviation from current practice.

James Rickard
Nicole Mettler Rickard
Mary McConnell
William and Jan Dickes
Doug and Joy Forbes
Mike McBain
Franz Hall
T. Seifert
N. Rademacher
Ed Stanek
Sue Rich
Patrick Leahy
George Kinney
Kevin and Vicki Slaikeu
Randy Graham
Kathy Graham
Teresa Lewandowski
Christian Dawson
Nancy Turner
Tom Rhode
Jeff Berggren
Doug Parker
Paul Wolner
PLUS

Rezoning

We are opposed to the application for the Carlson PLCD to rezone a 5-acre parcel from rural residential (RR) to agricultural in conjunction with the proposed Carlson PLCD/Afton Creek Preserve.

Purpose of the Rezoning. Joe Bush has asked to rezone a 5-acre parcel (Lot 1, Block 2 based on Preliminary Plat Map dated September 22, 2017) from Rural Residential (RR) to Agricultural in conjunction with the proposed Carlson PLCD/Afton Creek Preserve. The existing parcel has an existing home on it (the old Schuster home) that has been used as a residential property for many years. The subject parcel is not used for agricultural purposes, nor is there any proposal for it to be used for agricultural purposes in the future.

The sole purpose of the rezoning this parcel is for the convenience of Mr. Bush so he can: (1) reconfigure the subject parcel with other lots on his proposed PLCD so that the parcel can be used to build a road access from/to the PLCD from 60th Street just west of Trading Post and (2) to add this rezoned parcel to his proposed PLCD development which would not otherwise be allowed because the RR zone does not allow a PLCD. Overall, the rezoning will allow Mr. Bush to maximize the number of homes in the PLCD and allow him to use his preferred road access location to the development even though there is a safer alternative farther down 60th Street.

Legal Standards for Reviewing Rezoning. Minnesota law and Afton ordinances govern the standards by which rezoning applications must be judged. First, the Municipal Planning Act at Minn. Stat. 462.357, subd. 1, allows municipalities to approve zonings and rezonings that promote the “public health, safety, morals and general welfare.” Second, Afton Ordinance 12.81.J states that “in granting or recommending any rezoning the Council shall find that the proposed development conforms substantially to the policies, goals and standards of the Comprehensive Plan.”

When interpreting state law, the courts have found “[W]hen an application is made for reclassification from one zone to another, there is a presumption that the original zoning was well planned and was intended to be more or less permanent. Before a zoning board rezones property there should be proof either that there was some mistake in the original zoning or that the character of the neighborhood had changed to such an extent that reclassification ought to be made. The burden of proof is upon the proponents of the change.” Hardesty v. Zoning Board, 211 Md. 172, 177, 126 A.2d 621, 623 (1956). The courts have also found in reviewing rezonings that “The general welfare of the public is paramount in importance to the pecuniary stake of the individual.” Beck v. City of St. Paul, 304 Minn. 438, 449, 231 N.W.2d 919, 925 (1975).

The League of Minnesota Cities also provides guidance on the review of a rezoning. The League’s Information Memo: Zoning Guide for Cities dated July 6, 2017 at page 34 states: “The law presumes an existing zoning ordinance constitutional, and an applicant only is entitled to a change if they can demonstrate that the existing zoning is unsupported by any rational basis related to the public health, safety and welfare.” https://www.lmc.org/media/document/1/zoning_guide.pdf?inline=true

1. Public health, safety, and welfare. There is no provision in the law or ordinance that allows approvals for rezoning requests like the one Mr. Bush makes here—one that is merely for convenience purposes and for the economic interests of the developer at the expense of the public. The character of the neighborhood surrounding the subject parcel hasn't changed requiring a rezoning. Nor does the rezoning of this parcel promote the public health, safety, morals and general welfare as required. In fact, the rezoning would allow the developer to pursue his preferred road access location that will add potentially 200 more car trips onto a section of Trading Post that has significant safety problems related to substandard road width (only 18 feet in spots), steep grade, blind curve, and reduced site lines.

While Bush's economic interests or "pecuniary stake" may be promoted with a rezoning, it comes at a substantial cost to the general welfare and safety of the public inconsistent with law that requires the public interest to be paramount as discussed above. Even if the rezoning were denied, Mr. Bush has feasible alternatives. He is not precluded from reconfiguring his lot design to meet the conditions of the ordinances or moving the entrance to the PLCD to the safer alternative farther down 60th Street. He has publicly stated on several occasions that an entrance farther down 60th Street would be about the same cost to him.

In addition to the public safety problems, the rezoning would also have a negative impact on the general public in the surrounding area by allowing the developer to increase development density by reconfiguring lots to increase the number of homes built. Of the 13 existing neighborhood parcels abutting the proposed PLDC, only 3 are 5 acres and most are much larger. For example, to the east the abutting parcel acreages are as follows: Dawson/Lewandowski 6.5, Graham 9.2, McConnell 5.45, Rickard 5, Dickes 5. To the south the abutting parcel acreage is: Rhode/Turner 23.5. To the west the abutting parcel is: Wallace 160 acres plus. To the north the abutting parcel acreages are: Swanson 78, Forbes 19.8, Berggren 68.4, Belz 14, and Brannan 5.96. Yet all but one of the lots in the Carlson PLCD will be 5 acres. By using the PLCD ordinance the developer is increasing the housing density in the area to a greater degree than if the development was restricted to one home per ten acres as allowed under the underlying agricultural zoning district. This is particularly true on this acreage because much of it is not developable at all because of steep slopes and limited access so there would never be one home per ten acres actually constructed.

As noted at the Planning Commission meeting on October 2, 2017, there is a high bar for any rezoning. Some may interpret a rezoning from RR to Agricultural as a lesser bar because it may be a less intense use. But here, there will be no change to a less intense use. It is residential now and will continue to be in the future. So, the rezoning is in name only merely to avoid the restrictions in the RR district.

2. Afton Comprehensive Plan. Finally, the rezoning does not conform substantially to the policies, goals and standards of the Afton Comprehensive Plan as required.

- Page 22, paragraph 3 of the Comprehensive Plan, states that PLCDs should have "minimum impact to the character of the community." As discussed above, the Carlson PLCD maximizes density and has a substantial impact on the overall density in the immediately surrounding community.
- On page 26, the top 3 Comprehensive Plan Landuse Goals, Policies and Strategies are listed as:
 1. Maintain the city's overall low density;
 2. Preserve the rural character of Afton;
 3. Encourage agricultural uses.The rezoning will facilitate results that are contrary to these principles.

o The Carlson PLCD will actually result in a net gain of density because the City is intending to allow the developer to take credit for already undevelopable land when determining how many acres must be set aside in a conservation easement under the PLCD. These undevelopable wetlands, streams, steep slopes are already “preserved” and only the developer gains by taking credit for these to reduce the amount of land he has to put in a conservation easement so he can maximize density on the remaining land.

o The development does not preserve the rural character or encourage agricultural uses. It converts over 100 acres of existing farmland to 5-acre housing parcels in a surrounding community made up of primarily very large multiacre parcels contributing to the rural character of southwest Afton. It will severely impact the existing horse sanctuary that has operated at the Turner/Rhode farm for many years. This is an existing agricultural use that should be encouraged in the Ag Zone instead of damaged by the proposed residential use abutting its farm.

- Page 27, paragraph 8 of the Comprehensive Plan states the Afton states:
“8. Discourage residential development on lands suitable for agricultural use and adhere to Planning practices that will allow farms to operate without external pressures.” The rezoning will facilitate the conversion of agricultural land to residential by allowing the developer to reconfigure land parcels to maximize 5-acre housing density in the proposed PLCD.

- Page 21 of the Comprehensive Plan states: “The residents of tl1e City of Afton value the agricultural economy and rural character that an agricultural environment provides. This Plan intends to preserve agricultural land for permanent agricultural use, and does not accept the belief held by some that agricultural use is merely a temporary use or that agricultural lands are merely a holding area for future residential or other development. (emphasis added). Moreover, the community values agricultural land as open space in an increasingly urban environment, a sanctuary for a rural lifestyle that Afton residents have consistently desired to maintain.” The rezoning will further facilitate the conversion of agricultural land to residential development and damage existing agricultural businesses in the area including the Turner/Rhode horse sanctuary.

February 2, 2018

To: Afton Planning Commission
cc Afton City Council and Ron Moore

RE: Carlson PLCD--Response to January 31, 2018 Letter from Joe Bush to Planning Commission (PC)

From: Citizens Concerned for Afton

We have read Mr. Bush's letter to the Planning Commission dated January 31, 2018 that includes his demand to have 6 minutes of "uninterrupted" time to provide comments on this application.

1. We are shocked at the arrogance in tone and the misrepresentations in his accompanying letter. Coming from a developer who is seeking the right to develop in Afton, his lack of professionalism does not bode well for the City should this development ultimately be approved.
2. Mr. Bush has attempted to monopolize many public meetings in the past. His advocacy many times turns into misrepresentations as it does in his January 31 letter. The public has not demanded nor is it ever allotted "uninterrupted" time to respond to his misrepresentations.
3. We don't understand how anyone could be surprised or have questions regarding the formalized recommendation from the Planning Commission adopted at its January 8 meeting. All of these same comments on Carlson PLCD have been talked about for many, many months by the Planning Commission. Mr. Bush has ignored most of them apparently thinking he doesn't have to listen to the Planning Commission. His disdain is also evidenced in the disrespectful tone in his letter to the Commission.
4. We have the following specific comments on the Bush letter corresponding to his numbered paragraphs. As you can see, his letter is filled with inaccuracies and misrepresentations. Mr. Bush has wasted countless hours of City Council, Planning Commission and City staff time with his incomplete, inaccurate and untimely submittals. For these reasons, among others, the public has lost confidence in him.

2) **Incorrect.** The preliminary plat application Plan submitted by Bush on August 14, 2017 clearly shows the Schuster lot joined as part of the PLCD. The Schuster lot has already been subdivided to its maximum permitted density. Subsequent Concept Plans 1A and 1B (dated November 19, 2017) submitted by Bush also show the Schuster lot part of the PLCD. The City Attorney in his December 1 opinion on page 5 states that the Schuster lot would require a variance if it was included in the PLCD.

4) **Incorrect.** For almost one year, the Planning Commission has asked developer to provide slope data that was understandable. He has resisted doing so. While his drawings have showed topography, the lines showing slopes in excess of 18 percent and those greater than 12 and less than 18 have been very difficult to detect with light color coding that was at times absent. The PC and public needs drawings that show clear slope information and the percentage of slopes in excess of 18 percent and percentage of slopes from 12 to less than 18 percent.

5) Given that stormwater flows from the Carlson PLCD location are a known existing problem on adjacent existing properties, the PC has been asking to see stormwater calculations for months to ensure that the problems are clearly addressed up front. This is for the benefit of the developer and the public so there are no surprises.

6) **Incorrect.** Data collected by Bush consultant Spack Consulting is referenced in Spack memo dated July 26, 2017. Data was collected from June 29-July 5 over the 4th of July holiday weekend. See the attached the summary date sheet from this report referencing the dates. Why does Bush continue to misrepresent this? Further, during this time the surface of Trading Post just adjacent to the Trading Post curve was ground up with reclaimed asphalt (similar to gravel) in anticipation of the mill overlay project. There were construction signs in the area to give notice of the altered surface reducing traffic volumes. WSB acknowledged in its Technical memo dated October 12, 2017, page 2 that the road approaching the Trading Post curve was not paved until July 7, after the study was conducted, and that data was collected over the holiday weekend.

7) **Incorrect.** The WSB Curve analysis report dated October 12, 2017 addresses only the radius of the curve with an accelerometer. It does not also address the substandard road width (at places only around 18 feet), steep embankments, no shoulder, or the private driveway at the tangent of the curve. See last paragraph of page 1 of Curve Study (excerpt attached). The WSB Technical report dated October 12, 2017, last paragraph on page 2 (excerpt attached) presumes all traffic will travel west towards St. Paul and addresses none of the traffic that will travel north and east towards, Afton, Hudson and Stillwater along the Trading Post curve.

8) **Incorrect.** The traffic study focuses on the Trading Post curve and sitelines right at the Schuster access point. It does not adequately address traffic approaching the access point from 60th Street and the reduced sitelines, reverse curves or the intersection quality at Oakgreen and 60th Street.

9) **Incorrect.** The developer submitted a formal preliminary plat application in August 2017 with a plan dated August 14. In November 2017, he submitted 2 new "Concept" plans dated November 19. It is impossible to tell which plan he is referring to. We understand that he has yet another plan coming. Given all the plans submitted, his application is NOT complete.

10) **Incorrect.** The City attorney has never said that "off-shaped" lots are encouraged. In fact, the City attorney in his letter dated December 1, 2017 page 5, paragraph 7 states that such lots require a variance (excerpt attached).

11) The developer has inappropriately tried to use the field access road as a negotiating point with the City and the neighbors in the past. If his development is approved, there will be no need for the access road for farming. The City and the citizens do not want abandoned roads taken over with invasive species. The developer should state his future intentions with the road as part of his application process for approval.

12) **Incorrect.** Neither the current application (August 2017) or the "Concept" maps provided in November dated November 19 have the southern boundary of the shoreline district delineated on the maps.

14) It is not clear from the drawings what the setbacks are from the Graham property and it appears that they will encumber the property in the future. The developer should prepare an expanded detailed drawing of the area in question showing property lines and setbacks conforming to City ordinance requirements.

Attachment

PicoCount 2500 V2.30 (slr# 08090608)

TrafficViewer Pro v1.6.5.136

Weekly Volumes

Unit ID: 08080608

Location: 60th St at Trading Post Rd (on straightaway)

Week of 06/29/2017

Start Time	06/29 Thursday		06/30 Friday		07/01 Saturday		07/02 Sunday		07/03 Monday		07/04 Tuesday		07/05 Wednesday		Daily Average	
	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB
00:00	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	1	0	1	2	1	0	0	0	0	0	0	0	0	0	0	1
05:00	0	2	0	1	0	1	0	0	0	0	0	0	0	0	0	1
06:00	1	1	1	2	1	1	0	1	1	0	1	0	1	1	1	1
07:00	1	2	4	2	2	2	0	1	1	0	3	0	1	3	2	1
08:00	1	2	4	3	1	1	2	1	1	0	1	3	2	2	2	1
09:00	3	0	5	3	6	1	2	2	0	0	1	0	4	2	3	1
10:00	2	3	3	2	3	3	2	2	2	1	3	3	4	5	3	3
11:00	5	5	2	6	4	3	11	4	6	8	9	7	7	6	6	6
12:00	2	6	3	3	2	2	5	4	5	1	4	3	5	6	4	4
13:00	8	2	3	5	4	5	3	5	3	1	10	1	4	4	5	3
14:00	6	5	5	7	4	3	5	4	2	3	3	2	5	4	4	4
15:00	7	10	6	4	2	2	6	6	2	7	4	8	1	3	4	6
16:00	4	7	5	7	2	1	2	3	1	4	3	3	2	2	3	4
17:00	6	1	10	2	3	1	6	1	3	4	3	1	2	4	5	2
18:00	9	8	3	3	1	1	1	1	7	3	5	2	4	3	4	3
19:00	7	4	0	5	2	3	3	3	3	2	2	2	3	1	3	3
20:00	3	3	3	2	2	2	1	3	1	1	1	4	5	3	2	3
21:00	0	2	1	2	1	0	1	3	2	1	5	1	0	2	1	2
22:00	3	1	1	2	0	0	1	1	0	0	0	4	0	0	1	1
23:00	1	0	2	2	1	2	1	0	0	1	2	3	1	1	1	1
Lane Total	70	64	62	65	42	34	52	47	40	37	59	48	52	51	54	50
Day Total		134		127		76		99		77		105		103		104
AM Peak	10:41	10:25	07:02	10:57	08:43	10:56	10:30	10:27	10:43	10:52	10:53	10:58	10:17	10:07	11:00	11:00
AM Count	6	6	5	6	6	5	12	6	7	8	9	7	8	7	6	6
PM Peak	17:47	15:36	15:18	13:25	13:11	12:15	14:41	14:14	17:51	14:57	12:51	14:56	12:15	12:00	13:00	15:00
PM Count	10	13	10	8	5	5	8	7	7	7	10	8	8	6	5	6

Excerpt from WSB Technical Review Memo dated October 12, 2017, page 2, last paragraph

What about those traveling north and east along Trading Post?

- As a condition of the development, the applicant will be required to pave the existing gravel section on 60th Street from the end of the pavement near Trading Post Trail west to Neal Avenue. This will limit the traffic volumes at Trading Post and 60th, as anyone traveling to the west toward St. Paul would head west on 60th and anyone coming from the west would travel east on 60th, avoiding Trading Post Trail altogether. Although there is no guarantee how motorists will travel, traffic studies have shown that motorists will nearly always take the shortest and quickest route to their destination.

Excerpt from WSB Curve Study dated October 12, 2017, page 1, last paragraph

Other site condition considerations include poor sight distance due to an embankment and vegetation, presence of a private driveway at the tangent of the curve, and reverse curves within 600 feet. As the driveway was private and the reverse curves were very short signage was not deemed necessary to address those considerations. Based on Table 2C-5 of the 2015 MNMUTCD, the recommended signage would be Turn (W1-1) Signs with 20 mph speed advisory plaques (W13-1P) placed at the beginning of the curve in each direction and replacement of the existing Chevrons (W1-8). See Figure 3 for recommended sign placement.

Excerpt from City Attorney Opinion dated December 1, 2017, page 5, paragraph 7

7. *Can the City approve a subdivision that has one or more irregularly-shaped lots? If so, does this approval require a variance?*

(Sec. 12-1387. Lot requirements.

- A. Side lot lines shall be substantially at right angles to straight street lines or radial to curved street lines or radial to lake or stream shores unless topographic conditions necessitate a different arrangement.*
- l. All remnants of lots below minimum size remaining after subdividing of a larger tract must be added to adjacent lots.)*

Opinion. The answer to both questions, referencing the provision of the code you have provided with the question, is "yes."

To: Mr. Moose, Members of the City Council, and Members of the Planning Commission

From: David Husebye

RE: New 2/5/2018 Afton Creek Preserve Proposal

Mr. Bush presented another plat dated 2/5/2018, and this largely resembles prior versions. This is accompanied by a new 2/5/2018 Spack Consulting memo. All plats have relied on the creation of a new intersection at 60th street on the Schuster property as an entrance road. I believe there are strong reasons why an intersection should not be at that location.

PAVING 60th STREET: POTENTIAL FINANCIAL RISK TO AFTON

As part of the plan, 60th street is to be paved. Mr. Bush states they will contribute to the paving of 60th street (Letter from Mr. Bush, dated 2/5/2018 with CUP Proposal. Item M: "60th Street Asphalt Instillation Budget"). It does not state he will be responsible for all of the costs associated the paving of this segment for his benefit. This puts Afton at risk for future financial obligations on this segment. I have previously expressed my concern about potential water issues and the actual subsurface condition of part of this road segment (on 60th Street heading west up the hill approaching Oakgreen Avenue in Denmark Township). I am not alone in this concern. While I do not have access to how the question was phrased by Mr. Bush, Mr. Morse's response also indicates this has been observed by others, and is known to the City of Afton (Exhibit Q, Page 237 of CC Packet #1 of 2 for 10/17/2017 CC meeting):

Joe Bush

From: Ron Moose <rmoose@ci.afton.mn.us>
Sent: Thursday, August 03, 2017 3:25 PM
To: Joe Bush
Subject: 60th Street paving

Joe,
I talked to our Public Works Supervisor about the segment of 60th Street that was removed from the 2017 paving project. The segment is from the end of the pavement on Trading Post Trail to the "Y" at Oakgreen in Denmark Township. The segment was removed from the project for two reasons. One was that we found that a portion of that segment was saturated with groundwater and we didn't have time to resolve that problem in time to be ready for the paving project. The second reason is that some or all of 60th street is located in Denmark Township. Particularly, the segment near the "Y" is located 100% in Denmark Township.
Ron

Please note the date of this was in August, so this likely does not refer solely to the spring runoff, which has also been my observation and stated concern. The potential future financial obligation for Afton could present in one of two ways. In the process of paving this road now, water issues may be found, and those issues would need to be dealt with at that time. The cost of this project could be much higher. Mr. Bush's contribution may be inadequate to cover for the increased expenses needed to adequately deal with this issue. Alternatively, if the road is simply paved, and there are water issues that cause premature road failure (especially with construction traffic), the cost of remediating this will be paid by Afton (and likely Denmark Township). In either case, the benefit is to the builder (Mr. Bush) while the cost goes to the City and residents of Afton. The potential future financial obligations of Afton should be considered when making a decision to pave this section of the road. I had other reservations about paving this section of road, but those relate to traffic volume, traffic speed, and possible future noise issues.

GRADE OF PROPOSED ROAD

The proposed intersection creates Prairie Wood Drive North going steeply up the hill on the Schuster property. The natural grade exceeds 8% on the Schuster property where much of the road is proposed (Page 182 of CC Packet #1 of 2 for 10/17/2017 CC Meeting). The elevation at the height of the hill is ~917 feet, and the proposed road surface is some 5+ feet lower. The road will be at 8% for some distance going up this hill. While this grade may be acceptable from a road standpoint, this may create water issues going forward by creating an impervious funnel to quickly channel water downhill.

RUNOFF WATER CONCERNS

Using the information from a map in the 10/17/2017 CC Packet #1 of 2 (page 182), rough calculations can be made for potential water runoff from Prairie Wood Drive. From 60th street, the paved surface of the road is 24 feet wide, and the estimated distance to peak is some 800+ feet (ignoring the extra wide paving near the intersection).

Road surface = 24 x 800 = 19,200 square feet

For a 1.1 inch rain event there will be 3,041,280 cubic inches of rain to fall on that surface alone. This equals 1,760 cubic feet of water. This would fill a 70 foot by 25 foot area to a depth of 1 foot. This also translates to 13,166 gallons of water. Given the steep grade and topography, the water falling on the paved surface would run to the proposed storm water basin. With the steep topography, there will be additional water from the shoulders of the road, general drainage of the land (blue arrows on maps), and any other increased impervious surfaces in the drainage area (such as homes and driveways). But this road and the Schuster property are not the only source of water for the storm water basin. Trading Post Trail meets 60th Street at the corner of the Schuster lot. This road is paved with concrete gutters and is some 800 feet going downhill from 59th Street. This guarantees that all rain water is collected and carried downhill. At 18 feet wide (ignore the gutters) and 800 feet, this will add over 660 cubic feet if half the water on the road is counted (the other half the water will drain directed towards the Trout Brook south of the road). The new road will much more than triple the volume of water reaching the storm water basin (2,440 cubic feet up from 660 cubic feet for the road surfaces alone).

The drainage pond at its deepest point is some 10 feet below the level of the nearby roads. There is to be a culvert running under the proposed road to bring water from the West / North side of the new road into the basin. There is a culvert currently under 60th Street that provides for water to leave the basin. The depth of water that can be retained in this basin is not known. Core soil samples were done along the proposed road bed. ITCO Allied Engineering Company provided soil boring analysis (10/17/2017 CC Packet #2 of 2, pages 181-219). Core # 2569 is near the intersection and west of the basin. Core # 2568 is just up the hill from the basin. Both went to depths of 11.5 feet, thus perhaps not even down to the level of the base of the basin. There appear to be no borings were done in the basin itself.

In the recent past a development was created southeast of 50th and Trading Post. As part of this, Osgood Court North was extended, and a storm water basin was created west of this with various drainage ditches, culverts and so forth. To my knowledge prior to this, there never was standing water in this area (the edge of a farm field). After the basin was created, there was persistent standing water (now year round) with water flowing over Osgood Court North at various times with rain events. This small basin needed to be significantly changed and enlarged to the west and to the north, and perhaps also deepened. The enlarged basin filled with water. With rain events, water still spilled over the road, so a new culvert was placed under Osgood Court North some distance from the development with drainage ditches and new culverts some distance away from the basin itself. To date this basin has never been dry, and during rain events there is flowing water along the road for quite some time. I assume the basin was never intended to be a lake. I assume that it was felt that water was to collect and drain into the ground, but this never happened. I also assume this was never anticipated at the time the basin was originally created.

The use of the storm water basin in the corner of the Schuster property may currently drain, but with increased impervious surfaces feeding vastly increased amounts of water, the volume may overwhelm the drainage potential. The culvert under 60th street will likely prevent it from overflowing, but any flow will go directly into Trout Brook. The WSB memo of 12/12/2017 (page 188 of CC packet #1 of 2 for 10/17/2017) on page 3 states the plans are "technically feasible from a water engineer standpoint.' The memo goes on to state:

Permanent stormwater design incorporates several requirements for each of these entities including rate control, volume, and water quality. The City's consultants have and will continue to comment on the developer's design submittals until all jurisdictional requirements have been met as stated in the Planning Commission meeting on October 2nd. These requirements include but are not limited to the following:

Rate Control:

- No land shall be developed or altered and no use shall be permitted that results in surface or stormwater run-off causing or with the potential to cause unreasonable flooding, erosion or deposit of materials on adjacent properties or water bodies. Such run-off shall be properly channeled into a stormwater management facility that is consistent with the stormwater management and erosion and sediment control requirements of Article 13. Any increase in run-off rate or volume as a result of the developed portion of a property shall achieve at least the minimum requirements of Article 13 (Afton Code Sec. 12-217).

Somewhere in this tight corner, silt fencing must be placed, and must be able to protect the basin from erosion or deposit of material. If there is to be any mitigation for water management, the question is where this can be done. The storm water basin is surrounded by elevated roads on 2 sides of the triangle, and much higher ground outside the Schuster property on the third side. Crossing the road is another property in Denmark Township and is quite close to, if not within the protected Brook Trout watershed (not marked on map). In fairness to all parties, this needs to be reviewed if there is to be an intersection and road on the Schuster property. It must be demonstrated prior to even preliminary plat approval that this is actually a workable plan (waiting to find this out after approval of the preliminary plat will only cause increased pressure to proceed when this might shut down this whole entry point).

WATER QUALITY CONCERNS

With the proposed intersection the City will be obligated to use much more salt and sand on 60th Street during the winter for safety reasons. The 8% grade of the new road will require significant amounts of salt and sand with snow or ice events. The downhill slope at the intersection itself will require significant salt and sand use in the winter. In addition, 60th Street itself will need more sand and salt at the new proposed intersection. All this salt will wind up being delivered to the storm water basin. With high water events (including spring runoff), eventually all of the salts (chloride in particular being a concern) will be delivered into Trout Brook. Increasing chloride in the water is associated with degradation in the potential for trout to reproduce (as mentioned at the PC Meeting 1/8/2018 by Mr. Langen).

Using the Schuster property to enter this development presents some potential challenges to the viability of Trout Brook as a trout stream. While one of the stated intents of this proposal is to preserve land and especially the headwater and recharging region, the negative downstream effects with the potential for increased water flow and increased use of road salts should also be considered.

SAFETY OF PROPOSED INTERSECTION

I have previously expressed my concern about the safety of the proposed new intersection based on the concern for a safe left hand turn onto 60th from the proposed development. A new proposal has been put forth, and a new Spack Consulting report from 2/5/2018 was included. The report includes a lot of new information and analysis, but a few questions remain. Before the new report is reviewed, some of the details of the older information should be reviewed for reference and fairness.

WSB sent a memo to Mr. Morse dated 10/12/2017 (10/17/2017 CC Packet #1 of 2, pages 186-188). They state WSB had provided a memo to Mr. Bush on 7/10/2017 that "preliminary sketch did not even meet 25 mph based on" MnDOT and AASHTO. WSB further notes: "The primary recommendation of the July 10, 2017 memo was to move the access far enough west to gain appropriate sight distance" (emphasis added) Those changes were made, and a new plat was prepared and submitted with a variety of reports. Spack Consulting provided a memo dated 7/26/2017 (CC Packet #2 of 2, pages 220-245). There are field measurements concluding "a vehicle could be seen approaching from the east provided a sight line distance of between 280 and 290 depending on the exact height of eye and height of object." This last comment is at odds with the normal procedure for measurement (AASHTO Green Book 2001, page 127). The distance measured is from a usual height of 3.5 feet (eye level in a vehicle) to 2.0 foot (an object) or 3.5 feet (another vehicle, eye level). Nevertheless, this measurement seems to state fairly the sight line distance is 280 to 290 feet and avoids the cut bank on the Trading Post curve. A speed study was done, and data was presented. The speed study showed the 85th percentile speed was 25 MPH, thus most vehicles were going less than the posted 30 MPH for that stretch of the road. Finally they present a graph of their measurements (page 245 in the packet #1 of 2):

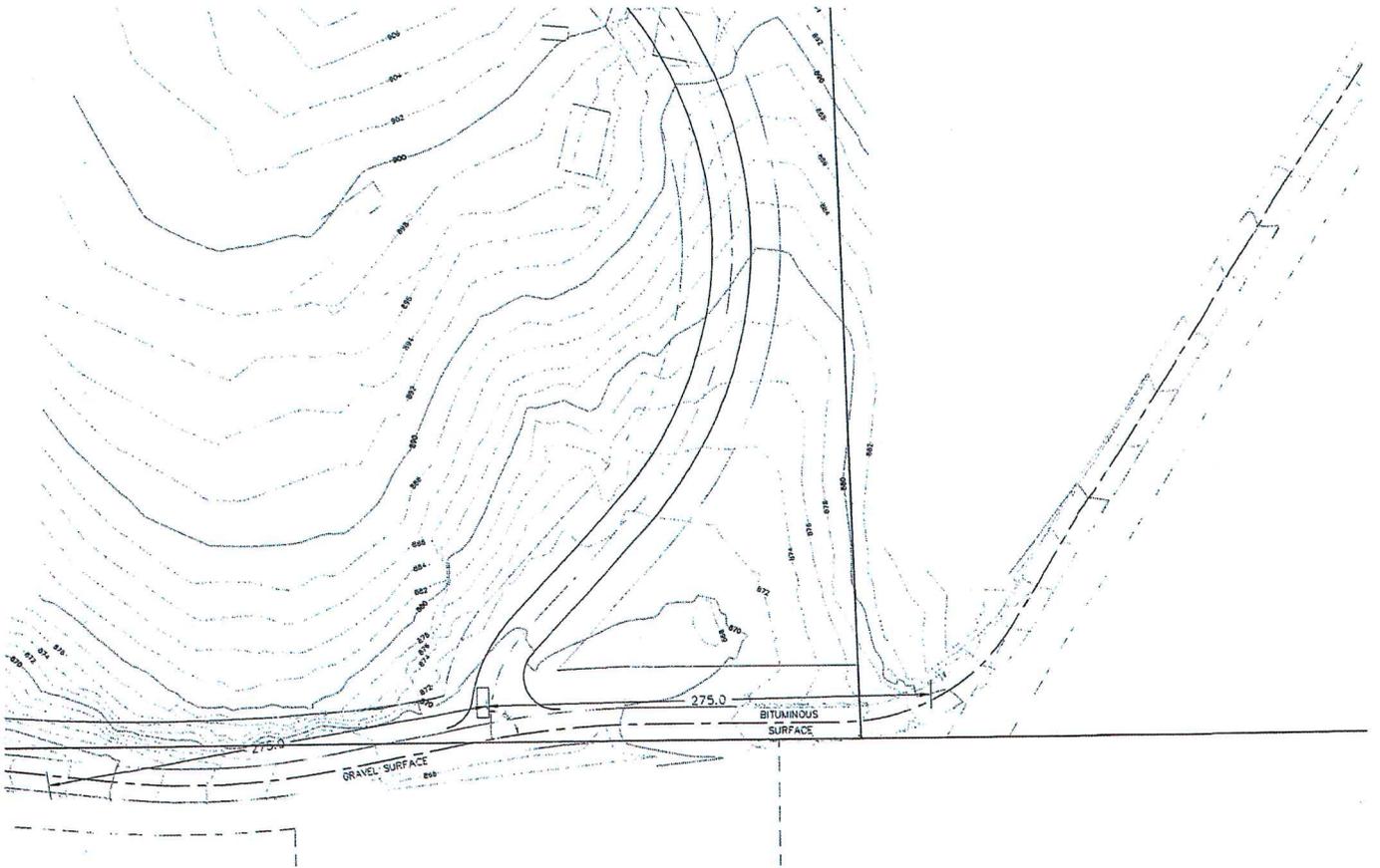


Figure 1

This measures 275 feet of apparent sight distance in both directions (a total of 550 feet). Additionally there is another graph of this exact corner included in the packet (the CC Packet #2 of 2, page 84):

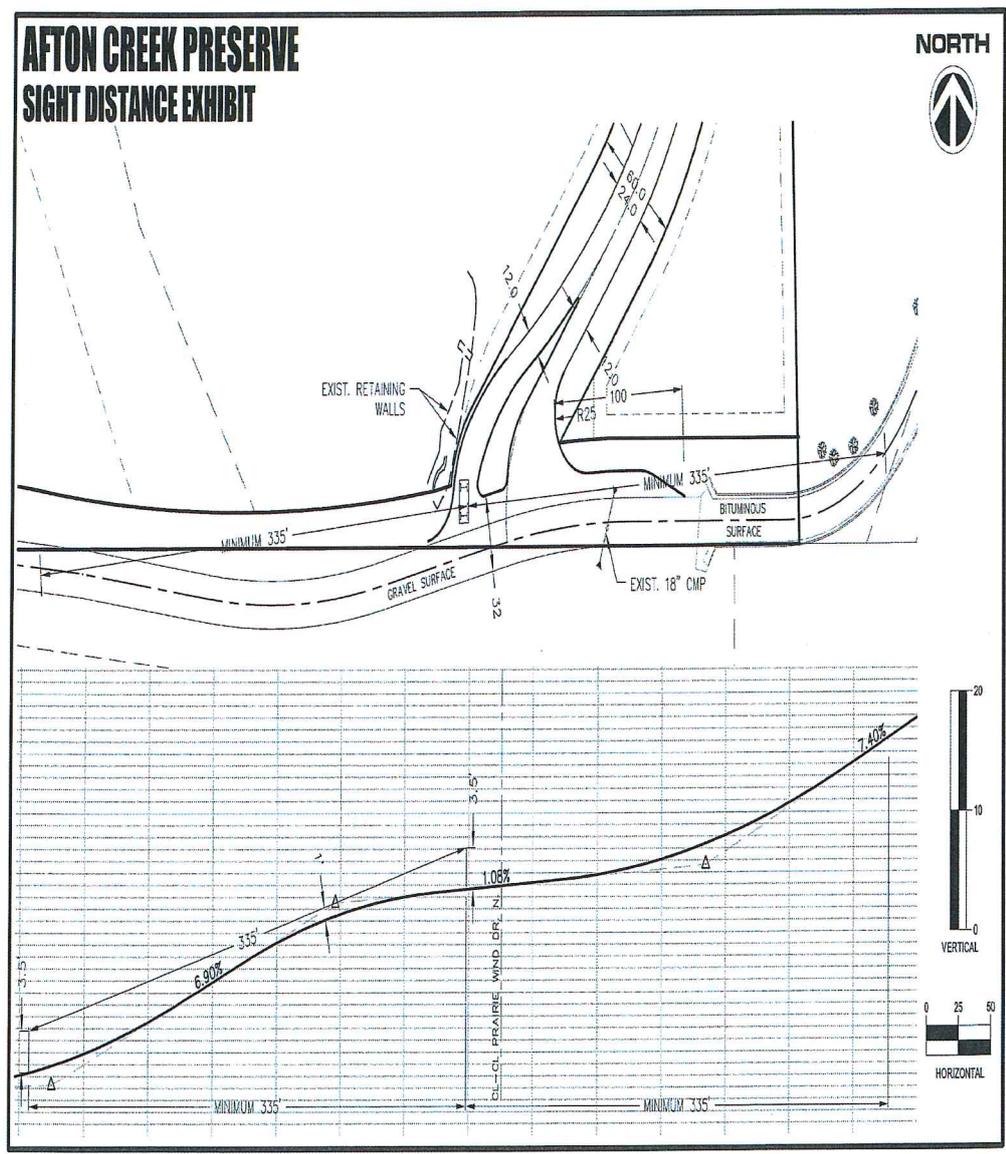
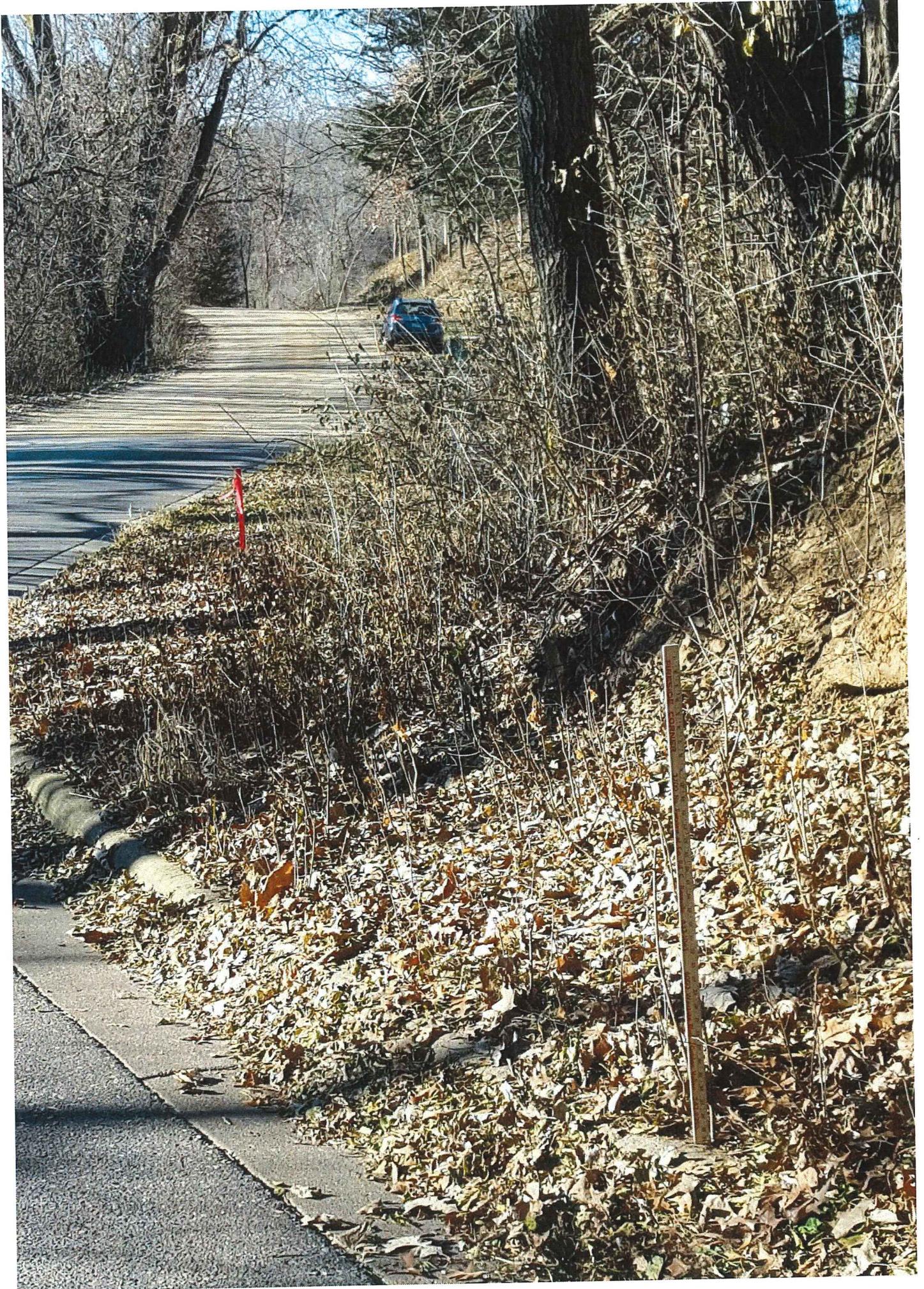


Figure 2

This shows quite a bit of information on grade and other features. First, the road is clearly not flat, and coming from the east the grade exceeds 7% at the 335 foot marked for sight distance. Second, this road is placed right next to the existing retaining walls, thus as far west as possible. Also please note that looking to the east one is actually looking over land (a cut bank) and in between the trees. This figure shows some 335 feet of sight distance in both directions. The measured 335 to the east begins just off of the existing retaining wall on the west side to around the curve on Trading post behind some trees.

In my earlier correspondence, I included several pictures, and do so again. Please note a standard yard stick was placed on top of the ground next to the curbing (i.e. above the height of the roadbed). The corner of the lot is marked with the red flagged stake. The car viewed is actually on the road, and not on the proposed approach (as depicted in both Figures 1 and 2, making the car in the picture more easily seen). Looking at the intersection when standing on Trading Post, one looks past trees (those noted in Figure 2) and underbrush. As this was late fall, there were no leaves, but at other times of the year, this would be blocked by vegetation. This is not some suburban lawn that can be glanced over. Also note when looking at the cut bank, that this is well over 3 feet tall, thus precluding adequate visualization of the proposed intersection from this point.





I concur with the measured sight line distance of 280-290 as measured by Spack Consulting based on the original measurements for the plat used in October 2017 (Figure 1). I raised my safety concerns based on the posted 30 MPH speed, the change in elevation not used in calculations, and the actual road surface of gravel and not pavement.

2018 Proposal

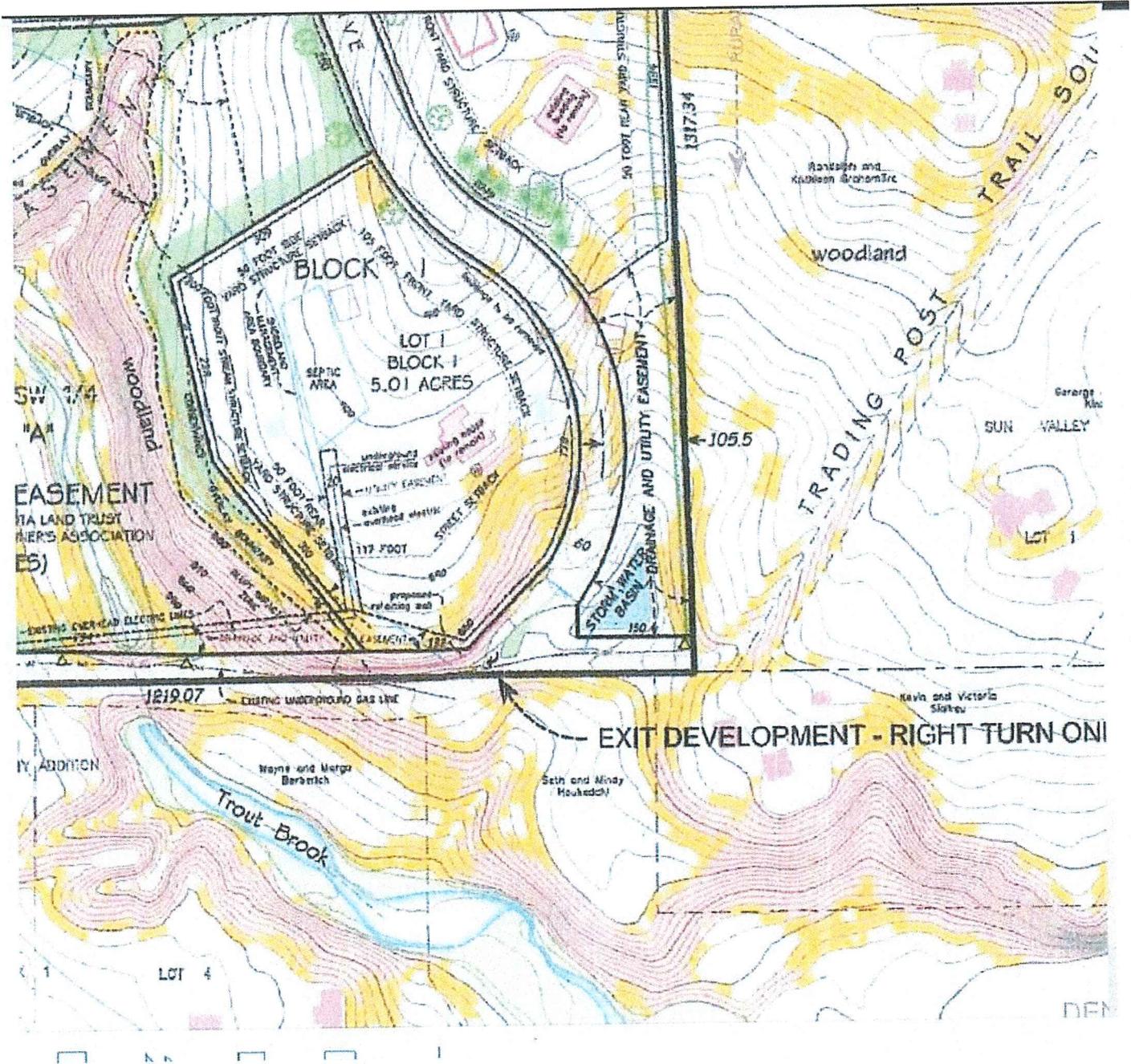
Mr. Bush has submitted another Preliminary Plat dated 2/5/2018. Enclosed below is an enlargement of the 2/5/2018 plat, but please note the following:

The new road is 10 feet closer to the lot corner, now 150 feet (was 160 feet on in 2017 renderings)

The new road is no longer right next to the retaining wall (a fixed position on all maps) to the west

There are elevation lines along trading Post trail (2 lines are 2 feet at a minimum) at the cut bank

Lot 1 Block 1 is bounded by an easement to the north, and different than all 2017 renderings



The concerns about the safety of a left hand turn have been fixed in the new proposal by banning the left hand turn. Included with that plat is a memo from Spack Consulting also dated 2/5/2018 including of a copy of the plat used. This report contains much detailed information and some definitions. Here I will only refer to the measurements concerning the proposed 60th street intersection.

Table 2 lists Measured SSD in feet for the new 60th Street intersection. Traveling west, the measured SSD is 331 feet, and traveling east is 245 feet. Table 3 lists the measured ISD at 320 feet. All of these distances are now measured with the intersection 10 feet closer to the lot corner. All of these measured distances are different than the measurements they have previously obtained and reported (280-290 feet per Figure 1 BEFORE the road was moved closer to the lot corner). With Figure 2 (with the road as far to the west as possible next to the retaining wall) there is a measured distance of 335 feet to a position around the start of the curve on Trading Post, and on the other side of trees.

Table 3 shows the calculated minimal ISD of 290 feet (6.5 seconds at 30 mph, $\Rightarrow 1.47 \cdot 30 \cdot 6.5 = \sim 290$). The new measured ISD is 320 feet in Table 3. The listed measured ISD time is 9.9 seconds. The conversion of MPH to feet per second is $1.47 \times \text{MPH}$. At 20 MPH a vehicle travels at ~ 29 feet per second and a vehicle travels 320 feet in ~ 11 seconds. The 2017 Spack speed study showed an 85th percentile speed of 25 MPH and at 25 MPH the 320 foot distance would be covered in 8.6 seconds. The posted speed is

30 MPH, and the 320 foot distance would be covered in ~7.3 seconds. Using the 2018 study with 320 feet and 9.9 seconds, the average speed is 22 MPH, thus lower than both the 85th percentile (25 MPH) and the posted speed limit (30 MPH). What is never stated is when this most recent study was done. Most likely this was done in the winter with ice and / or snow on the road. In the future, if this intersection is created, and 60th street is paved, the speeds will be higher, especially in non-winter times of the year. The ISD of 290 feet for a right hand turn is met if we use ice / snow data (slower measured speed of 9.9 seconds) and longer distances than previously obtained with the road located farther to the west. But using faster speeds and shorter distances this does not appear to be safe.

Data for a left hand turn from this intersection is never presented in the 2/5/2018 memo. Using 7.5 seconds for the left hand turn (vs 6.5 for the right hand turn); the ISD distances can be calculated at various speeds. Using 22 MPH (using the 9.9 seconds needed for the listed 320 feet above), 242 feet are needed. At 25 MPH (the 85th percentile for speed from last summer's Spack speed study), the distance is ~ 276 feet. For 30 MPH (posted speed limit), the distance is ~ 331 feet. Using Figure 1 and noting the new intersection has been shifted 10 feet closer to the corner, it appears the safe ISD distance can be achieved for only at the 22 MPH speed. However, most of the year, the road is not covered with snow or ice. The apparent solution to this dilemma is to ban the left hand turn. Thus this new T intersection will have a right turn only exit. Last year the CC worked hard on crafting a motorcycle / noise ordinance, and law enforcement said this was not enforceable. The safety of this intersection appears to rely on the ban of a left hand turn that will be nearly impossible to enforce. How does this create a safe intersection for Afton and its residents?

The new 2/5/2018 Spack Consulting memo contains many pieces of information on volumes of traffic and already existing intersections. A central part of this report centers on the proposed new intersection for the development with an entrance on 60th street. **The plat enclosed with the Spack memo of 2/5/2018 is from 2017, and not the 2/5/2018 new version submitted for review.** It would have been nice if the new Spack memo would have actually used the plat currently being presented, and not the old plat. How this may change the measurements presented is not known, but certainly makes one have questions that there might be discrepancies. It is possible the correct plat was used, but confusion is what has now been presented.

From a safety standpoint I have the following concerns with the proposed new intersection on 60th Street:

- 1) The 2017 Spack appears to show this was unsafe as my concerns were never refuted for a left hand turn and 30 MPH
- 2) The 2018 Spack study shows no data on a left hand turn at 60th Street
- 3) The current proposal requires the prohibition of a left hand turn to be safe, and this may be unenforceable
- 4) On the 2/5/2018 plat the new intersection is CLOSER to the lot corner, yielding less reaction time
- 5) The 2018 Spack study uses distances longer than found on 2 separate diagrams from the 2017 plats despite the road being moved 10 feet closer to the lot corner
- 6) The 2018 Spack study may have used an incorrect plat
- 7) The 2018 Spack study may have been done with snow or ice on the road, affecting speeds and times measured
- 8) The road surface (gravel vs. paved) is not addressed, and if paved, will support faster speeds

The creation of a new intersection on 60th Street with this current proposal presents potential financial risk for Afton, might present an environmental risk to the very Brook Trout that everyone is trying to protect, and may create an intersection that might well be unsafe. At this time one should strongly consider if there is an alternative solution to creating an intersection at this location on 60th Street.

I apologize for the length of this document. A decision such as this has long term consequences, perhaps even some unintended consequences, and many viewpoints should be considered. I thank you for your time and efforts as you review this.

TO: Ron Moorse – Afton City Administrator

FROM: Daniel Brannan – Sr Traffic Safety Specialist

February 15, 2018

SUBJECT: Traffic Study, Tech Memo- Spack to Joe Bush Feb 5, 2018

Page 1 asserts that the statutory speed limit for Odell Ave and 60th Street is 30 MPH. This is incorrect and is a misinterpretation of statute. Statute has a 30 MPH statutory speed limit for urban districts but there must be houses or businesses every 100 feet for at least a quarter mile. Neither of these roads qualify for that. A 25 MPH statutory speed is applicable to residential roads but they must be less than ½ mile in length. Neither of these roads qualify for that. A 35 MPH statutory speed is applicable to rural residential districts but houses must be contiguous to the road every 300 feet. Neither of these roads qualify for that. The remaining statutory speed limit that these roads do qualify for is in statute 169.14 subd 2 item (3) “55 miles per hour in locations other than those specified in this section; “. I contacted Max Moreland, coauthor of the memo and he had no explanation for the misinterpretation.

This is a serious error since the relative safety of the proposed intersections is based on Intersection Sight Distances and the Stopping Sight Distances on page 5 which are based on a 30 MPH speed limit, which is not the case. As an example, using the minimum 6.5 seconds for a right turn, at 30 MPH this is 286 feet but at 55 MPH it is 524 feet. Safety is compromised.

Data for the traffic studies is suspect. Page 2 of this memo references a previous speed study done by Spack Consulting showing the 85th %tile to be 25 MPH and that drivers are not traveling at the posted speed of 30 MPH on Trading Post near 60th St. This previous memo indicated that MnDOT uses the 85th %tile to set speed limits and this is true but MnDOT also has specifications on where to place the speed data collection tubes for the determination of a speed limit. Tubes must 1000 ft away from a curve, 1000 ft away from an intersection, 1000 ft away from a 3% (or greater) grade, tubes must be placed on a Tue, Wed, or Thurs only and any week with a holiday should be avoided and data should not be collected if there is snow on the ground. None of these specifications were used for tube placement. Data was collected near curves and over a holiday weekend. The developer is not an expert in data collection therefore Spack did have the liberty to use all data, but the city engineer should have been employed to qualify specifications to be used for safety analysis. To meet a 90% confidence level of predictable true data (a normalcy curve), 67% of the samples should be within a 10 MPH pace, this the highest percentage of vehicles traveling within 10 MPH of each other. 9 of the 14 samples did not meet this criteria. Some tube data samples had only 54% of drivers within the 10 MPH pace. As an example, this means an average of 25 MPH could be calculated but half the drivers are going either under 20 or over 30 but in reality very few are traveling at 25 MPH.

What the raw data really indicates is that there is a wide variation in speeds that drivers are choosing to safely navigate a road with wide variations in design features.

The current memo and the conclusions indicate that intersection sight distance based on time measurements that are adequate, except at Odell/Trading Post. A time measurement study is not included as an appendix to this memo. My discussion with Max Moreland indicated that these time measurements were made with snow on the ground and not enough samples were collected to statistically report a 90% confidence level of predictable accuracy at any of the intersections investigated.

The current traffic study does not have existing average daily traffic(ADT) recorded on the site plan. Without knowing this, probability estimates about impacts to volumes and peak hour volume are pure speculation. It must be understood that these are guesses about origin/destination patterns and depending on potential buyer patterns, all numbers could be right on or 100% different, therefore a minimally designed intersection could become the highest ADT in the area. Spack Consulting is an expert in traffic consulting but Amazon and EBAY are changing culture a lot faster than traffic engineers are and my experience is that the highest increase in the number of vehicles I see on 50th Street S. are UPS and FEDX trucks. I believe the 10 trips/day is underestimated by today's real traffic.

It is a matter of opinion, but I believe that the 10 second Decision Sight Distance is more appropriate for new construction in the city of Afton and we should not be using minimum values. Spack's selected quotes from AASHTO indicate this is suited for complex decision making in an urban environment. My definition of complex decision making is coming around the south end curve of Trading Post Trail and facing a 16 foot wide corn combine. It is watching 3 deer running parallel to you and trying to watch the road ahead and guess when the deer will jump in front of you and then not seeing the intersection. It is approaching 2 horse riders with a loose dog and you do not focus on the intersection. The additional few seconds will be life savers in those situations.

I am disappointed with the city's attitude about this project. I worked for 30 yrs as a traffic safety specialist and I attended many city council meetings. The city would make demands about design speed, safety, impacts, and minimizing taxpayer costs. Afton should be a responsible road authority and should be directing the city engineer to demand the minimum design speeds to be used, using maximum design values for citizen safety, and realizing that additional unattended park space will be a taxpayer burden. The developer should not be the governor in determining the design speed and safety impacts.

I wish to thank the members of both the City Council, and the Planning Commission (and those going to both sets of meetings) for all their work on the issue of the proposed Carlson PLCD. A healthy dialog is happening, and at some point decisions will need to be made, and clearly not all parties will be satisfied with the final result. Thus, I wish to take this time to thank all of you for your time and efforts.

I have special concerns about HEALTH, safety and wellbeing. The Carlson PLCD presents unique challenges trying to balance many different priorities. The health, safety and welfare are primary concerns of all citizens of Afton. Preservation of land, views and nature are also noble goals. However, any proposal for a PLCD must be deemed to be safe for the public, thus I wish to outline my concerns for an intersection as proposed, my direct field measurements and calculations, and my request.

Concerns:

To date every proposal has used the Schuster property as the primary entry point. This has in fact become the very foundation of the PLCD design. A traffic study has been conducted by SPACK consulting (report dated 7/26/2017, done 6/29-7/5). This study took place after Trading Post Trail had been ripped apart in the City's pavement management project. During much of June, the Trading Post was difficult to drive on, and only those going directly to their homes were likely driving on the road. Some days the road was closed as culverts were replaced, many times without signage to warn drivers the road was closed ahead. For June I assume other drivers may have also altered their driving routes, and avoided this area. The SPACK study was done shortly after the first layer of paving on Trading Post Trail was placed from 40th to Odell Avenue. The segment from Odell to 59th was paved 7/7/2017 and after the study period according to WSB's report 10/12/2017. South of 59th Avenue, Trading Post was untouched and paved towards the proposed intersection. During the study period, a section of Trading Post was reclaimed gravel, and quite soft. Thus, during the study period a fully paved Trading Post Trail did not exist leading into the study area. Claiming this represents normal traffic patterns from a volume standpoint is quite likely incorrect. Short of another study this cannot be determined. However, the study does provide relevant data on the speed of traffic that did drive on this segment of road. The average speed was 25 mph, and should be used in any calculations. Recall the posted limit is 30 mph.

SPACK consulting measured a sight distance of 280-290 feet based on direct observations for a vehicle approaching the intersection from the east. This becomes the benchmark of safety. SPACK Consulting presents the AASHTO formula and uses this to perform a single calculation. This is based on a dry, paved or hard gravel surface, relative flat surface (< 3% grade), measured from a height of 2.5 to 3.5 feet over a distance. They present the following for a vehicle going 25 mph:

$$\text{Inspection Sight Distance} = \text{ISD} = 1.47 \times \text{vehicle speed (MPH)} \times \text{time gap (seconds)} = 1.47 \times 25 \times 7.5 = 275 \text{ feet}$$

At the 10/17 City Council Meeting, material from WSB is included (pages ~186-188), and they conclude using the SPACK data that this intersection is safe for 30 MPH. They do not provide any calculations. At that meeting I asked about the slope of the road as one drives west on Trading Post Trail, and no response was given. Mr. Bush states the road is flat at the intersection.

Using the AASHTO formula, the Inspection Sight Distance (ISD) at 30 MPH is $1.47 \times 30 \times 7.5 = 330$ feet if all assumed conditions are met. On a down slope, a 3% grade will increase the ISD by some 1-2%. One should calculate if there is a grade of 3% or more on this segment of road. Even using a 3% grade for the first ½ of the stopping distance needed, the corrected distance could increase by 16-32 feet. It is not clear if any such calculations were made as none are provided (nor is it mentioned this was even reviewed). At the proposed intersection, the road surface is not

paved, but is gravel, and loose or graded gravel does not provide consistent friction. This is compared to snow in the ability to provide friction, and no calculations can be made to account for this. For a truck the AASHTO formula is $1.47 \times \text{MPH} \times 9.5$ seconds. Using a slower speed of 25 MPH, this calculates to 349 feet if all conditions are met. This is farther up the road, and much steeper. Correcting for the drop in elevation would only add more distance, and still require stopping on gravel at the end. The bank on the road before the bend in the road is more than 3 feet tall and densely covered with trees and vegetation. There is no ability to see thru this section of the road.

Near the bottom of the WSB report of 10/12/2017 it states: "Based on 30 mph design speed....The required site distance is 290 feet to the east and 335 feet to the west. We have determined based, based on the preliminary drawings provided, that the applicant has exceeded this requirement." This statement is unclear. Are the *required* site distances the actual *measured* site distances, or are these the *calculated* sight distances? Their calculation for 25 mph from the east was 275 feet. Where is the calculation for 30 feet? Do these calculations take into consideration the rise or fall in the road grade? It may well be clear to the WSB team what was meant, but to the public this is not clear, and should be clarified. The conclusion that this is a safe intersection is not based on a clear presentation of the data, nor have the usual assumptions been met when using the AASHTO calculation.

Also mentioned is a proposal to place a 20 mph speed advisory plaque to lower the speed. At the 12/19/2017 City Council meeting there was discussion of a barrier used to block traffic on a cartway adjacent to 14933 Afton Blvd. As an alternative to the barrier, a citizen suggested a sign be placed on the cartway to prohibit motorized traffic and thus prevent motorized traffic from causing damage to the cartway, and to take down the barrier. It was pointed out by a member of the City Council that this would never be followed, thus not appropriate. If true, then the citizens of Afton will not slow down to 20 mph with an "advisory plaque". It is legal to drive 30 mph here (that is the posted speed limit). Using a 20 mph sign as a way to somehow turn this into a safe intersection does not seem to be supported by hard data.

Field measurements and calculations:

Location of measurements is centered on the corner lot marker near where Trading Post turns into 60th Street

I used a 30 foot tape measure, used the lot corner marker as the reference point, all readings in feet

(Negative numbers indicate measurements east / north of the corner lot marker)

- 77 start of gravel surface
- 64 end of concrete curbing
- 05 west/south end of curve
- 00 lot corner (paved road)
- 30 start of trees and bank as visual block (see WSB 10/17/2017 report, page 6 for photo)

WSB gave an actual measured sight distance of 280-290 feet, so I will use 290 feet. If the intersection is set at 00 feet, then the end of 290 feet is where the trees are above, or -30. WSB also states the length of curve is 125 feet, so this can also be added. In the proposals presented the east edge of the intersection is measured at 160 feet from the lot corner, so this is also added. Adding in a new second column gives the following:

Measured	Calculated	
	00	Intersection (per definition of measured distance of 290 by WSB)
	100	east side of intersection (based on submitted drawing listing 160 feet from lot corner)
77	183	gravel surface changes to pavement heading from intersection to east/north
64	196	end of concrete curbing
05	255	west/south end of curve
00	260	corner of lot (marker)
-30	290	start of trees and bank visual block (see WSB 10/12/2017 report page 6 for picture)
	380	east/north end of curve (based on WSB statement of 125 foot curve)

Based on the above, if AASHTO calculations are used (and if all conditions are met) with a calculated ISD of greater than 290 feet, one must initiate a stop on the curve behind trees in the middle of the curve. If the calculated ISD is greater than 380 feet, one must initiate a stop before the curve in the woods (please see the WSB Consulting's photos to look at the location of the curve). Also note under all conditions, that the last 183 feet needed for this stop is on gravel (not a paved or hard gravel surface).

AASHTO calculation table

ISD = Inspection site distance = $1.47 \times \text{MPH} \times \text{time gap}$

Time gap for a car is 7.5 seconds, and 9.5 seconds for a truck

AASHTO is calculated for a dry, hard gravel or paved road that is flat (<3% grade)

? Safe = Is the calculated distance ≤ 290 feet, the measured direct observation by SPACK Consulting?

	MPH	ISD	? SAFE	Elevation change	Adjusted ISD
VEHICLE	25	276	YES	???	???
VEHICLE	30	331	NO	???	???
TRUCK	20	279	YES	???	???
TRUCK	25	349	NO	???	???
TRUCK	30	419	NO	???	???

Request

The creation of an unsafe road or intersection is not in the best interest of anyone in Afton. My calculations may be incorrect. The City Engineer can easily correct any mistakes. With the drawings he has, he could further add to the above table to make corrections (if any) based on changes in elevation. The Engineer should clarify what is meant in the above quoted text on what is required, measured or calculated. The report should clear up any / all areas of confusion on using 290 and 330 feet for the listed mph and clarify the directions and the exact meaning. Finally the Engineer should comment specifically are the AASHTO calculations valid with the road surface and conditions in question. Then, based on the facts, the Engineer could render an opinion on the safety of this proposed intersection.

One could propose a slower speed here, but that is never going to be enforced by the City. Creation of this unsafe intersection and the required slow speed to make it safe will obligate the City to make this happen (how to control the speed and at what cost), or the City could be negligent (creating an unsafe intersection, and having no plans to enforce the speed required to make it safe). Discussion of paving of parts or all of 60th street has also taken place. A paved 60th street will only increase the speed and volume of traffic. If paved, the other assumptions (low volumes, slow speed) will be incorrect, and the AASHTO calculations will be even higher. The cost to defend the City in any adverse event would likely not be small.

Consideration for the health, safety and welfare of the residents of Afton are critical concerns for the City Council. This proposed PLCD starts with an intersection that WSB Consulting has to agree is not safe based on the direct measurements and all calculations, not just selected ones. From this unstable foundation an entry road to a development is proposed and a development needing any number of variances is created. While a builder has the right to build, his foundations must be solid, will inspected, and must be found to be safe. If the foundation is flawed, one cannot allow the building to proceed, the process stopped, and corrections made. The safety question of this proposed intersection needs to be carefully reviewed based on all facts and calculations, and fully considered as all of the current proposals go thru this intersection.