SWC Date Received : 2/10/20

APPLICATION FOR SURFACE DRAIN

OFFICE OF THE STATE ENGINEER
REGULATORY DIVISION
SFN 2830 (10/2019)

Number	Number
(OSE USE ONLY)	(WRD USE ONLY)

OFFICE OF THE STATE ENGINEER USE ONLY
DATE RECEIVED

This application must be submitted to the North Dakota Office of the State Engineer by **mail to 900 E Boulevard Ave, Dept. 770, Bismarck, ND 58505-0850, by fax to (701) 328-3696, or by email to swcregpermits@nd.gov.** To be complete, this application must include the additional information listed in the instructions on page 3. For emergency drain permit applications, see instructions on page 4.

If you need any assistance, please contact the Regulatory Division at (701) 328-2752.

****** Additional Sheets May Be Attached If Necessary. ******

Water Resource District In Which Majority Of Project Watershed Is Located
Stutsman County Water Resource Board

Location Of Drain (drain center line) (use separate sheet(s) if necessary)

¼	Section	Township	Range	County
SE	31	142	62	Stutsman

Drain Outlet Location And Information

¼	Section	Township	Range	County
SE	31	142	62	Stutsman

Where Does The Drain Outlet Discharge?
☐ Road Ditch ☐ Stream, River, Coulee, etc. ☐ Assessment Drain
☐ Private Drain ☒ Pond, Slough, Or Lake ☐ Other (please explain) _____

Name Of Drain Or Water Body Where Drain Outlets (If applicable)
WETLANS UPSTREAM of ALKALI LAKE

Purpose Of Drainage (mark all that apply)
☐ Agricultural Drainage ☐ Flood Relief ☐ Emergency ☒ Other (please explain) Hypolimnetic Drawdown

Feature To Be Drained (mark all that apply)
☒ Pond, Slough, Lake, Or Any Series Thereof ☐ Sheetwater/Overland Flow
☒ Other (please explain) Low quality water from Lake Bottom

If Draining A Pond, Slough, Lake Or Any Series Thereof, How Far Down Will You Drain Them?
☐ Completely ☐ Partially

Design Data
☒ New Drain Construction ☐ Modification Of Existing Drain

Approximate Watershed Area Contributing To Drain, if known (acres)
22,124 ACRES

Is This An Assessment Drain? ☐ Yes ☒ No
If Yes, Please List Name Of Drain

Type Of Modification To Existing Drain (If applicable)
☐ Deepening ☐ Widening ☐ Extending ☐ Rerouting ☐ Other (please explain) _____

Who Designed The Drain?
☐ Self ☒ Engineering Firm/Agency _____ ☒ Other (please explain) G&F Dept.

(continued on page 2)

Additional Project Details, Design Information, and Comments

Design info Attached.

Drainage Method

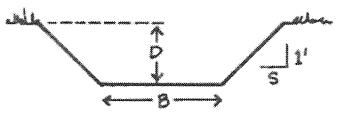
☒ Gravity (See Section A) ☐ Pumping (See Section B) ☐ Placement Of Fill (See Section C)

(A) Gravity (if checked above)

Gravity Type (please fill appropriate fields below)

☐ Ditch ☒ Pipe

Ditch



Length Of Drain (feet)	Maximum Cut (D) (feet)
Bottom Width (B) (feet)	Side Slopes (S:1 foot)

Pipe Diameter (feet)	Pipe Slope (feet per foot)
20-24"	—

(B) Pumping (if checked above)

Pumping Rate (gallons per minute)	Pumping Rate (cubic feet per second)
Pump Style ☐ Movable ☐ Fixed or Stationary	Pump Type ☐ Submersible ☐ Other

(C) Placement Of Fill (if checked above)

Fill Volume (cubic yards)

Other Information

Will The Drain Incorporate A Control Structure? ☒ Yes ☐ No

If Yes, Please Explain

Stop log structure in locked control box

Anticipated Construction Start Date	Anticipated Construction Completion Date
June 15, 2020	June 30, 2020

Applicant's Certification

I, the undersigned, am applying for a permit as required under North Dakota Century Code (N.D.C.C.) § 61-32-03. I understand that I must comply with N.D.C.C. § 61-32-03 and North Dakota Administrative Code art. 89-02, and that I must adhere to any conditions required by the Water Resource District and State Engineer as part of an approved permit for this application. Additionally, I acknowledge that my project is accurately described and depicted in this application as I intend to construct it. My signature below acknowledges that I have read and agree to these statements.

Affiliation To Proposed Drain

☐ Landowner ☐ Renter/Tenant ☐ Water Resource District/Agency ☒ Other City of Spiritwood Lake

Applicant Name (if not an individual, please list organization name)

City of Spiritwood Lake

Address	City	State	ZIP Code
PO Box 642	Jamestown	ND	58402-0642

Telephone Number	Cell Phone Number	Email Address
701-320-2244		cslauditor2004@gmail.com

Applicant Signature	Date
Shirly Krapp Auditor	2-6-2020

Landowner Name (print) (if not the applicant) Shirly Krapp

Landowner Signature (if not the applicant)	Date

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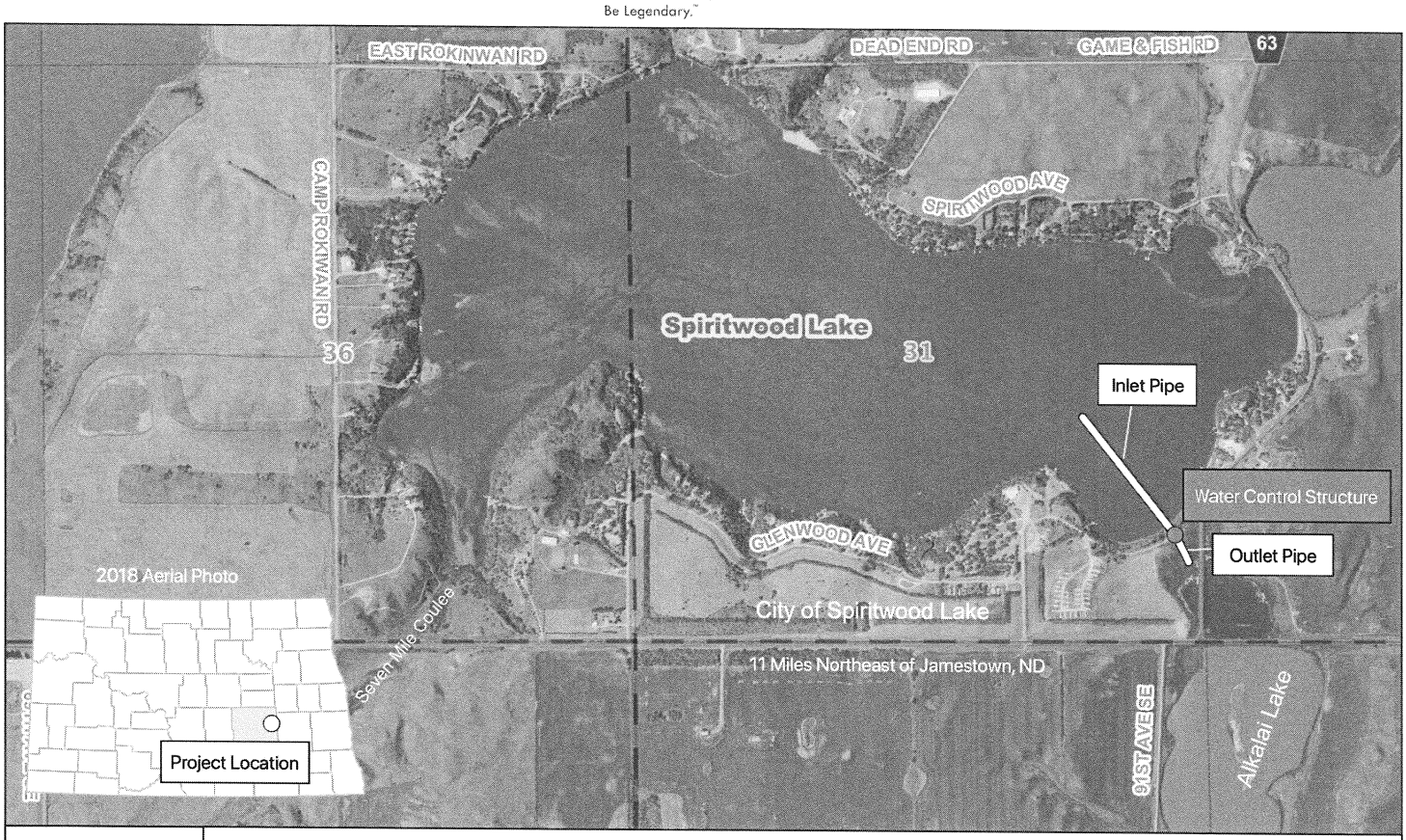

Drain Permit Application No. 5362
Stutsman County Water Resource District
Spiritwood Lake Hypolimnetic Drawdown

Date: 7/21/2020
Prepared by: CWN

SE 1/4 of Section 31, T141N, R63W, Stutsman County

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TECHNICAL MEMORANDUM

DATE: **August 21, 2020**

TO: AC Aaron Carranza, P.E., Director, Regulatory Division

FROM: ML Matt Lindsay, P.E., Manager, Engineering and Permitting Section

SUBJECT: **Application for Surface Drain No. 5362 – Spiritwood Lake drawdown**

On February 10, 2020, the Office of the State Engineer (OSE) received Application for Surface Drain No. 5362 (Application), from the City of Spiritwood Lake (Applicant), for the permitting of a surface drain located in the SE ¼ of Section 31, Township 142 North, Range 62 West, Montpelier Township, Stutsman County. The purpose of the Application is to provide a hypolimnetic drawdown for Spiritwood Lake to improve its water quality (Project). The Project will evacuate low-quality water from Spiritwood Lake, approximately 50 feet below its water surface elevation. All elevations used in this memo will be in the NAVD 88 datum.

The Project proposes a combination of pipe and a single, pre-fabricated, passive stop-log riser (see Application materials). The riser or water control structure will be located adjacent to and along the southwest side of Spiritwood Lake's current surficial outlet, which is located in the SE ¼ of Section 31. From the water control structure, the Project proposes approximately 2,000 feet of pipe entering Spiritwood Lake to approximately a lake depth of 50 feet. The water control structure outlet will traverse approximately 250 feet to the southeast from the water control structure. The water control structure will have removable stop logs, which will be operated at elevations of 1444.5 feet, 1442.0 feet, and 1440.0 feet. Details on the Project operation are outlined in a draft 2019 agreement included with the Application, which details a draft Plan of Operation.

According to the State Water Commission's Chris Korkowski, the current outlet elevation of Spiritwood Lake is approximately 1444.5 feet, which is located on the southeast side of Spiritwood Lake. From the outlet, Spiritwood Lake discharges enter Alkali Lake. Alkali Lake discharges enter Sevenmile Coulee, which is a tributary to the James River, whose confluence is several miles downstream of the City of Jamestown. Spiritwood and Alkali Lakes are within the Sevenmile Coulee watershed (HUC10).

PERMIT REQUIREMENTS

According to North Dakota Century Code (N.D.C.C.) § 61-32-03, a permit to drain is required "before draining a pond, slough, lake, or sheetwater, or any series thereof, which has a watershed area comprising of eighty acres or more." Based on the Application materials submitted, the OSE has determined that the proposed Application will drain a

watershed area of 80 acres or more. Therefore, a surface drain permit is required for the proposed Application. The OSE must determine if the proposed Application is of statewide or interdistrict significance. The criteria for determining whether the proposed drainage is of statewide or interdistrict significance were referenced and are addressed below.

North Dakota Administrative Code (N.D.A.C.) § 89-02-01-09. Criteria for determining whether drainage is of statewide or interdistrict significance. In determining whether the proposed drainage is of statewide or interdistrict significance, the state engineer must consider:

1. **Drainage affecting property owned by the state or its political subdivisions.**
   The Project proposed under this Application does not appear to be constructed on or affect any property owned by the state.

2. **Drainage of sloughs, ponds, or lakes having recognized fish and wildlife values.** Per the OSE policy, three factors must be met for a drain to meet drainage of statewide significance under this criterion.

   a. <u>An identified slough, pond, or lake, as defined by OSE policy, must be drained.</u>
      Spiritwood Lake is a "lake" per definition in N.D.A.C. § 89-02-01-02.

   b. <u>The slough(s), pond(s), or lake(s) identified must be completely drained by either surficial or artificial means.</u>
      It appears the draft agreement provided with the Application proposed to drawdown Spiritwood Lake to a lowest elevation of 1440.0 feet . Therefore, Spiritwood Lake will not be completely drained but will only partially drained to a maximum drawdown of 1440.0 feet.

   c. <u>The cumulative watershed area of the identified slough(s), pond(s), or lake(s) to be completely drained must be 80 acres or more.</u>
      The cumulative watershed area of Spiritwood Lake is greater than 80 acres.

   The Project appears to partially drain a lake with a watershed area greater than 80 acres.

3. **Drainage having a substantial effect on another district.**
   The proposed drainage originates and discharges in Stutsman County. Spiritwood Lake is currently overflowing (according to the State Water Commission's PRESENS gage indicating a water surface elevation of 1445.1 as of August 17, 2020) into Alkali Lake. Therefore, it is not expected to have a substantial effect on another district downstream.

4. **Drainage converting previously noncontributing areas (based on the National Oceanic and Atmospheric Administration Atlas 14 twenty-five-year event - four percent chance) into permanently contributing areas.**
Per the OSE policy, three factors must be met for a drain to meet drainage of statewide significance under this criterion.
    a. A non-contributing area(s), as defined by the OSE policy, must be drained.
    Based on local accounts, Spiritwood Lake is currently contributing downstream and into Alkali Lake. However, this Project proposes to manage Spiritwood Lake approximately 4.5 feet below its current outlet elevation of 1444.5 feet. Therefore, it is assumed the Project will convert Spiritwood Lake to a contributing area when Spiritwood Lake is not naturally overflowing.

    b. The cumulative watershed area of the non-contributing area(s) to be drained must be 80 acres or more.
    The cumulative watershed area of Spiritwood Lake is greater than 80 acres.

    c. The proposed drainage must contribute to a watercourse, drain, or area outside of its natural HUC boundary.
    The proposed discharge under this Application contributes to Alkali Lake and Seven Mile Coulee, which is a tributary to the James River.

    Generally, the Project contributes to an unnamed tributary of the James River and does not convert a previously non-contributing area. However, the Project will cause Spiritwood Lake to contribute downstream under non-contributing hydrology or flow regimes, such as when Spiritwood Lake's water surface elevation lowers below 1444.5 feet.

5. **For good cause, the state engineer may classify or refuse to classify any proposed drainage as having statewide or interdistrict significance.**
Based on review of these criteria, the Application appears to be considered drainage of statewide or interdistrict significance. Additionally, the OSE's "Statewide or Interdistrict Significance Determinations" policy (interim policy) dated April 20, 2020 (enclosed) states, "the inclusion of those project types as SW/ID significance in the new policy insinuates that the State Engineer would likely have considered those applications drainage of SW/ID significance for good cause regardless if they were received before the effective date of REG-2020-3, which was March 13, 2020." Consequently, the OSE's interim policy states that this Application, for good cause, is considered drainage of statewide or interdistrict significance.

Based on review of these criteria, **the Application has been determined to be drainage of statewide or interdistrict significance.**

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TECHNICAL MEMORANDUM

DATE: **April 20, 2020**

TO: JP John Paczkowski, P.E., Interim State Engineer

FROM: AC Aaron Carranza, P.E., Director, Regulatory Division
ML Matt Lindsay, P.E., Manager, Engineering and Permitting Section

SUBJECT: **PENDING STATEWIDE OR INTERDISTRICT SIGNIFICANCE DETERMINATIONS**

The adoption of the Statewide or Interdistrict (SW/ID) Significance Determinations policy, REG-2020-3, created a transition period for review existing surface drain applications not processed yet under the new REG-2020-3 policy. Given this unique transition period, I have the following recommendations on how to handle these pending surface drain applications.

If an application would have been considered drainage of SW/ID significance under old guidance or rules but now only "may" be considered drainage of SW/ID significance under REG-2020-3, I recommend, the State Engineer, for good cause under North Dakota Administrative Code 89-02-01-09 and under this document, classify these applications as not drainage of SW/ID significance. Such a direction on these applications would still allow the State Engineer to provide recommendations or conditions on the draft "non-statewide" permits, if necessary. Also, the State Engineer will follow the spirit of the new REG-2020-3 by copying any applicable entity listed in section 3.1.3.8.1 of REG-2020-3 to the non-statewide determination referred to the water resource district of jurisdiction.

If an application would not have been considered drainage of SW/ID significance under old guidance or rules but now "may" be considered drainage of SW/ID significance under REG-2020-3, I recommend the State Engineer process these applications under old guidance or rules if they were received before the effective date of REG-2020-3, which was March 13, 2020.

If an application would not have been considered drainage of SW/ID significance under old guidance or rules but will now be considered drainage of SW/ID significance under REG-2020-3, I recommend the State Engineer process these applications as SW/ID significant under a "for good cause" rationale. The inclusion of those project types as SW/ID significance in the new policy insinuates that the State Engineer would likely have considered those applications drainage of SW/ID significance for good cause regardless if they were received before the effective date of REG-2020-3, which was March 13, 2020.

Finally, any applications received after March 13, 2020, will be processed under REG-2020-3.

The adoption of this interim policy, provided old guidance or rules and REG-2020-3 are followed where applicable, will constitute State Engineer approval of a "for good cause" SW/ID significance determination under North Dakota Administrative Code section 89-02-01-09(5).

2020 DRAFT AGREEMENT

Spiritwood Lake Water Quality Improvement Project

I. Parties

This agreement is between the North Dakota Department of Environmental Quality hereinafter referred to as the DEQ, the North Dakota Water Commission hereinafter referred to as the Commission, the North Dakota Game and Fish Department hereinafter referred to as the Game and Fish Department, the Stutsman County Water Resource Board hereinafter referred to as the Board, the City of Spiritwood Lake hereinafter referred to as the City, and the Spiritwood Lake Association hereinafter referred to as the Association.

II. Project Location and Purpose

Spiritwood Lake is located 15 miles northeast of Jamestown, North Dakota in Stutsman County. The project is the second project designed to restore the lake by utilizing a comprehensive approach to lake management. The restoration of Spiritwood Lake is focusing on three areas:

1. Implementation of agricultural best management practices in the watershed.
2. Elimination of septic tank leachates entering the lake.
3. Removal of nutrient rich water from the hypolimnion.

The objective is to decrease primary productivity to a level which will manifest itself in an aerobic hypolimnion. The removal of nutrient rich water from the hypolimnion will be accomplished through the restoration and operation of a passive discharge system. This system would remove nutrient rich water and discharge it to a wetland on the southeast corner of Spiritwood Lake.

III. DEQ Responsibilities

The DEQ agrees to provide the following:

1. Overall project management and coordination.
2. Oversight of water quality monitoring of the discharge and lake, to document changes in the chemical composition and trophic state beginning 1 year after operation continuing for five years.
3. Assist in developing an effective ongoing program for the continued operation and maintenance of the hypolimnetic drawdown.

IV. Commission Responsibilities

The Commission agrees to provide the following:

1. Oversight and assistance with the permitting process.

V. Board Responsibilities

The Board agrees to provide the following:

1. Oversight and assistance during the project.

VI. City Responsibilities

The City agrees to provide the following:

1. Staff during the project period.
2. Enter into contracts to complete work.
3. Make payments to contractors upon completion of work.
4. Apply for and comply with necessary permits.
5. Develop and maintain a plan for operation and maintenance of the hypolimnetic drawdown.

VII. Game and Fish Department Responsibilities

The Game and Fish agrees to provide the following:

1. Assistance and oversight in development and operation of the hypolimnetic drawdown plan.

VIII. Association Responsibilities

The Association will be responsible to provide the following:

1. Funds to assist with operation and maintenance of the pumping facilities.

IX. Cost Participation

The estimated project cost allocations of eligible costs to the representative parties to this agreement shall be as follows:

ND Game and Fish Department	
ND Department of Environmental Quality	
ND Water Commission/Water Resource Board	
City of Spiritwood Lake	
Spiritwood Lake Association	
Total Estimated Project Costs	

Payments to contractors and material and energy costs shall be paid by the City out of a special account set up for this purpose. The DEQ, Commission, Game and Fish Department and Association will make payments for its allocated share of the project costs to the City at the request of the City on a cost reimbursable basis.

X. Changes to the Agreement

Changes to any contractual provision herein will not be effective or binding unless such changes are made in writing signed by the parties and attached hereto.

2020 DRAFT PLAN OF OPERATION

I. Parties

1) North Dakota Department of Environmental Quality (DEQ)
2) North Dakota Game & Fish Department (G&F)
3) North Dakota State Water Commission (SWC)
4) Stutsman County Water Resource Board (WRB)
5) City of Spiritwood Lake (CSL)

II. Intent and Purpose

The Spiritwood Lake passive hypolimnetic discharge system will be installed and operated to remove nutrient-rich water from the hypolimnion of Spiritwood Lake and discharge that water to Alkali Lake and eventually Seven Mile Coulee.

Goals:

1) Reduce the primary productivity of Spiritwood Lake.

III. Plan of Operation

The Spiritwood Lake passive discharge system shall be operated in the following manner:

1) The City in consultation with the G&F and DEQ will operate the discharge facilities on Spiritwood Lake.

2) The DEQ and G&F, based on water quality information and lake elevations, will determine when discharges from Spiritwood Lake will be allowed. Other parties to this Agreement will be kept informed of all discharge activities.

3) The relationship between the water levels in Spiritwood Lake, Alkali Lake and Seven Mile Coulee will be considered before and during all discharge activities.

4) These relationships are as follows:
   a) Spiritwood Lake above elevation 1,444.
      Discharge continually for water quality purposes.

   b) Spiritwood Lake elevation 1,444 to 1,442.
      Discharges will occur only when necessary for water quality purposes.

   c) Spiritwood Lake elevation 1,442 or below.
      No discharges will occur.

   d) Extreme flooding conditions on Seven Mile Coulee.
      No discharges will occur.

5) Discharges may occur outside of the above-mentioned conditions if unusual circumstances arise. Concurrence to operate the system under unusual

circumstances will be obtained from the DEQ, SWC and WRB.

6) The DEQ will provide an annual summary of discharge activities to all parties.

IV. Sampling

The passive discharge system will be monitored weekly during periods of discharge. Samples will be collected at the discharge box by the City and submitted for analysis. Analysis will be completed for the following variables: ammonia, nitrate+nitrite, cations/anions, total nitrogen, total phosphorus and dissolved oxygen.

Spiritwood Lake (343) Stutsman County

Average Depth: **31.0 ft.** | Acres: **488.8** | Shoreline Miles: **5.1** | Year Mapped: **2003**

Max Depth: **55.5 ft.** | Acrefeet: **15,167.0** | SDI: **1.6** | Manager: **Kratz**

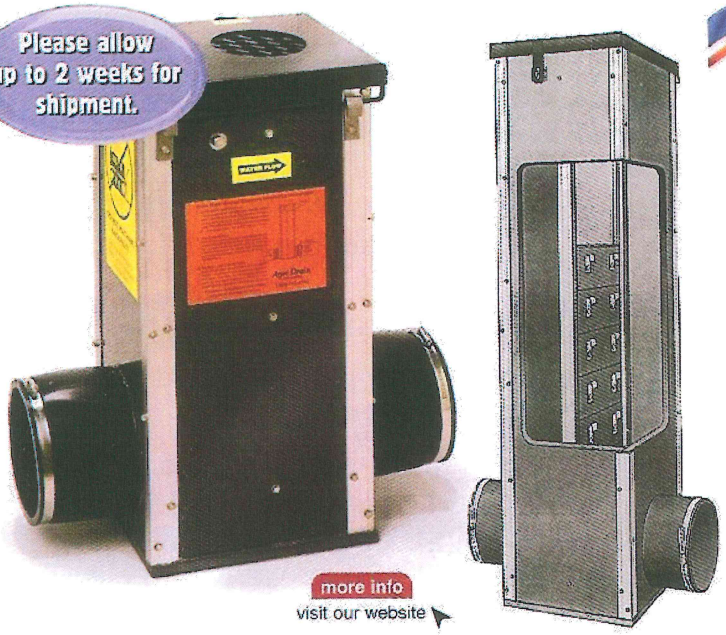
Depth Interval	Area Cubic Feet	Area Acres	Total Volume Cubic Feet	Total Volume AcreFeet
0	21,280,546	488.5	660,690,460	15,167.4
-1	21,015,806	482.5	639,545,814	14,682.0
-2	20,758,176	476.5	618,656,490	14,202.4
-3	20,435,798	469.1	598,056,129	13,729.5
-4	20,021,604	459.6	577,813,296	13,264.8
-5	19,553,189	448.9	558,030,381	12,810.6
-6	19,142,102	439.4	538,676,621	12,366.3
-7	18,651,691	428.2	519,784,550	11,932.6
-8	18,173,800	417.2	501,369,613	11,509.9
-9	17,727,329	407.0	483,422,440	11,097.9
-10	17,352,656	398.4	465,891,125	10,695.4
-11	17,009,988	390.5	448,709,939	10,301.0
-12	16,643,285	382.1	431,883,537	9,914.7
-13	16,275,391	373.6	415,425,448	9,536.9
-14	15,937,237	365.9	399,322,244	9,167.2
-15	15,624,551	358.7	383,546,126	8,805.0
-16	15,341,899	352.2	368,063,495	8,449.6
-17	15,065,881	345.9	352,859,430	8,100.5
-18	14,794,929	339.6	337,931,198	7,757.8
-19	14,561,181	334.3	323,255,176	7,420.9
-20	14,338,660	329.2	308,805,195	7,089.2
-21	14,118,808	324.1	294,579,568	6,762.6
-22	13,918,456	319.5	280,561,863	6,440.8
-23	13,727,721	315.1	266,739,335	6,123.5
-24	13,542,183	310.9	253,104,525	5,810.5
-25	13,352,755	306.5	239,656,414	5,501.8
-26	13,169,679	302.3	226,395,384	5,197.3
-27	12,990,761	298.2	213,315,955	4,897.1
-28	12,820,737	294.3	200,410,725	4,600.8
-29	12,648,951	290.4	187,675,912	4,308.4
-30	12,487,118	286.7	175,108,928	4,019.9
-31	12,328,446	283.0	162,701,148	3,735.1
-32	12,164,864	279.3	150,453,660	3,453.9
-33	11,986,538	275.2	138,376,590	3,176.7
-34	11,806,089	271.0	126,480,084	2,903.6
-35	11,614,355	266.6	114,769,637	2,634.7
-36	11,421,165	262.2	103,251,336	2,370.3
-37	11,210,457	257.4	91,933,729	2,110.5
-38	10,975,280	252.0	80,838,627	1,855.8
-39	10,700,413	245.6	69,993,352	1,606.8
-40	10,268,300	235.7	59,501,088	1,366.0
-41	9,763,552	224.1	49,494,768	1,136.2
-42	9,154,665	210.2	40,024,972	918.8
-43	7,798,702	179.0	31,413,444	721.2
-44	5,954,675	136.7	24,527,638	563.1
-45	4,746,588	109.0	19,199,907	440.8

Spiritwood Lake (343) Stutsman County

Average Depth: **31.0 ft.**
Max Depth: **55.5 ft.**
Acres: **488.8**
Acrefeet: **15,167.0**
Shoreline Miles: **5.1**
SDI: **1.6**
Year Mapped: **2003**
Manager: **Kratz**

-46	3,955,219	90.8	14,873,296	341.4
-47	3,187,409	73.2	11,281,066	259.0
-48	2,525,224	58.0	8,450,073	194.0
-49	2,084,184	47.8	6,150,466	141.2
-50	1,730,881	39.7	4,237,062	97.3
-51	1,373,449	31.5	2,696,059	61.9
-52	1,031,410	23.7	1,490,749	34.2
-53	616,248	14.1	670,349	15.4
-54	325,709	7.5	214,743	4.9
-55	81,588	1.9	18,399	0.4

Please allow up to 2 weeks for shipment.



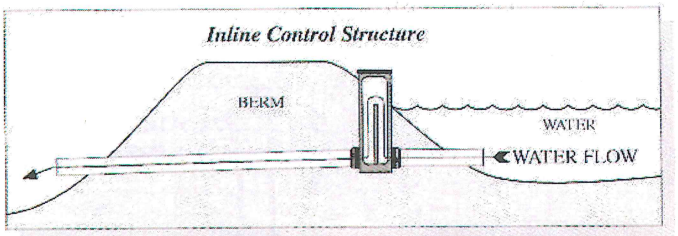
more info
visit our website

Agri Drain Inline Water Level Control Structure™

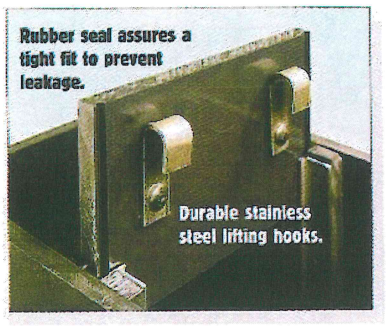
- Rugged ½" PVC structure.
- Heavy steel lockable top.
- Stainless steel screws and custom anodized aluminum corner extrusions are used for strength and durability.
- 5" & 7" Stoplogs for adjustability.
- Flexible couplers allow PVC, plastic pipe, or other materials to be easily attached.
  (Please specify type of pipe when ordering)
- 5-Year Warranty on all parts.

I have owned and operated a business for 20 years and I can tell you, that you guys are on the right track. Keep up the good work!

Bill Ohrt, Ohrts Construction
Ionia, IA

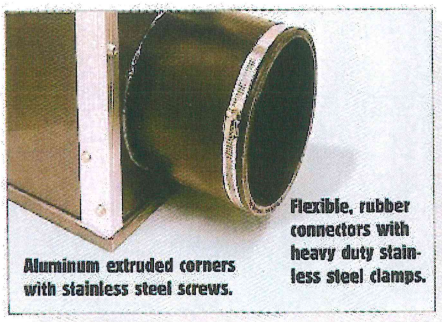


Handle (included) is used to install and remove stoplogs.



Rubber seal assures a tight fit to prevent leakage.

Durable stainless steel lifting hooks.



Aluminum extruded corners with stainless steel screws.

Flexible, rubber connectors with heavy duty stainless steel clamps.

*Larger CMP structures also available–see page 11.
Call for details on custom sizes and pricing.

Inline Water Control Structure Installation Instructions

1. *EXCAVATION AND GRADING*

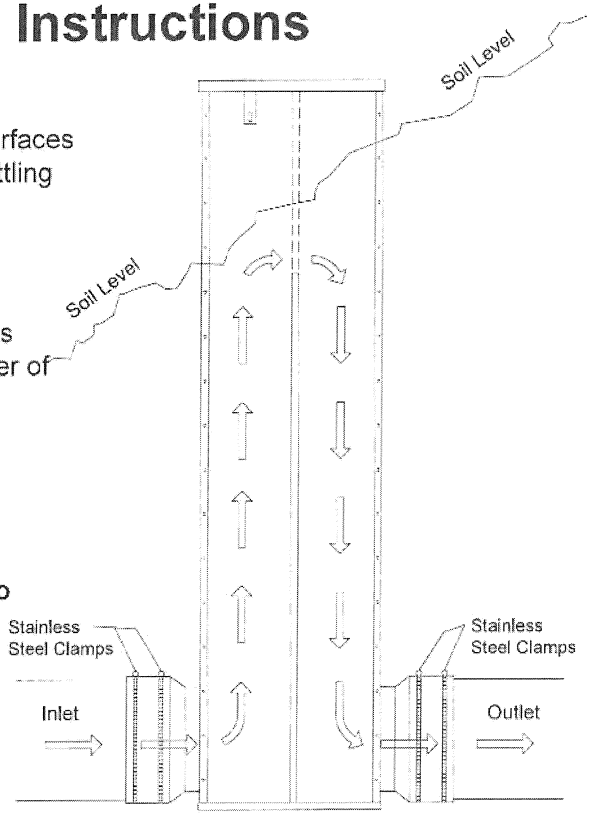
The structure base, the inlet pipe, and the outlet pipe must be set on firm, flat surfaces of compacted soil or fill sand to provide a solid, stable base. This will prevent settling and reduce stress or misalignment of pipe connections.

2. *PIPE CONNECTION*

Remove black tape from both inlet and outlet flex couplers exposing the stainless steel clamps. The flex couplers must be placed directly over the outside diameter of the pipes; then secured by tightening the stainless steel clamps as shown in the illustration.

3. *BACK FILL AND COMPACTION*

Level the structure vertically before placing backfill. Backfill around the control structure by hand in 6" lifts. Hand tamp only - **do not** mechanically compact. **Do not** use a backhoe or blade to place backfill directly against the water control structure.



Excessive compaction may cause structural damage or failure.

- Either the inlet or inline structure may be used for primary or secondary outlet with larger pipe or emergency spillway as primary.
- Inline structure removes sub-surface water.
- On the inline installation, the inlet end of the pipe should be held off the bottom of the impoundment to allow for siltation and be protected with an inlet guard. The outlet end should be protected with a rodent quard.
- In a controlled drainage or sub-surface irrigation application, the structure nearest the outlet should be installed with a minimum of 20' of non-perforated pipe on the down stream end. Anti seep collars are recommended.

1462 340th street
Adair, Iowa 50002
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E-mail: info@agridrain.com

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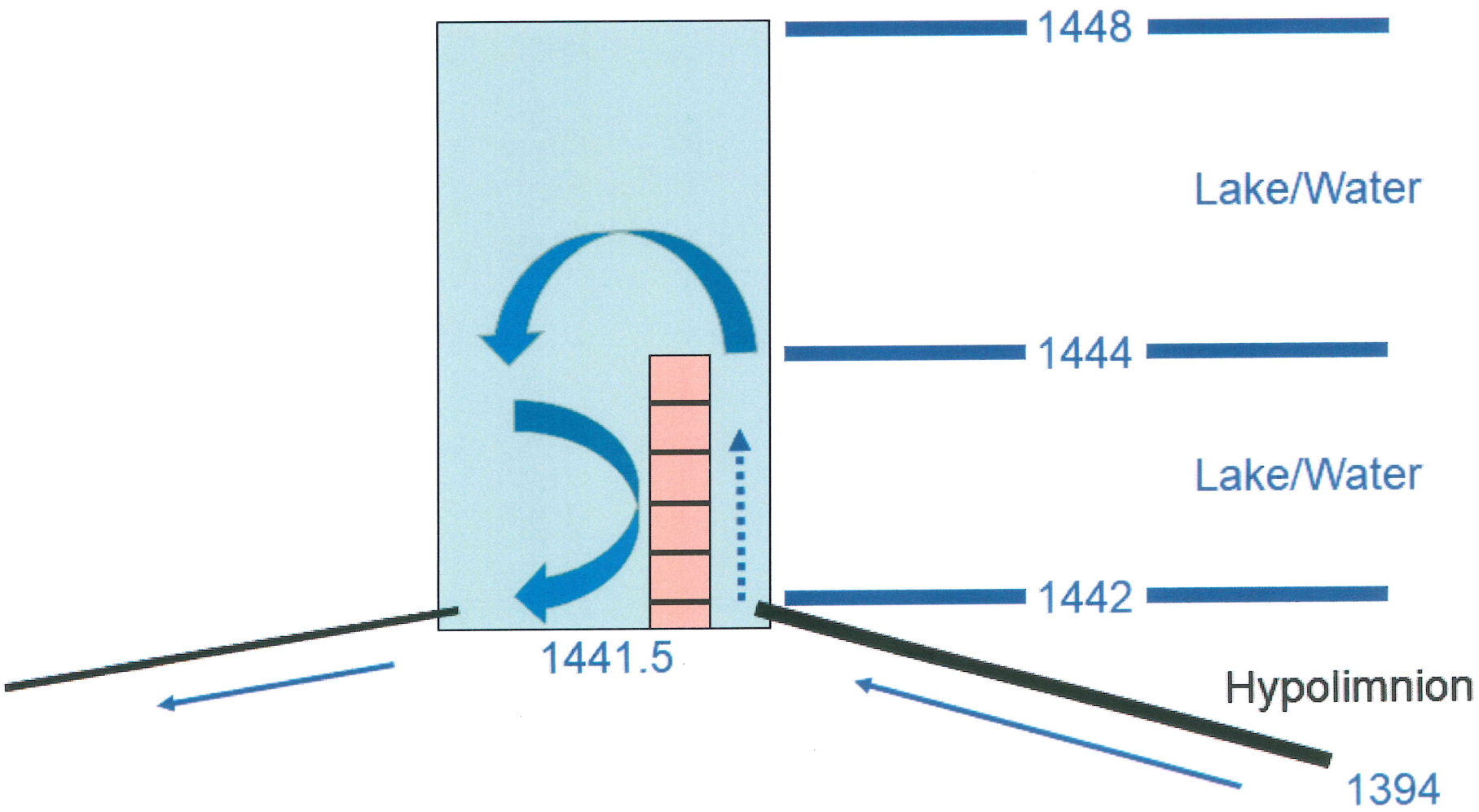
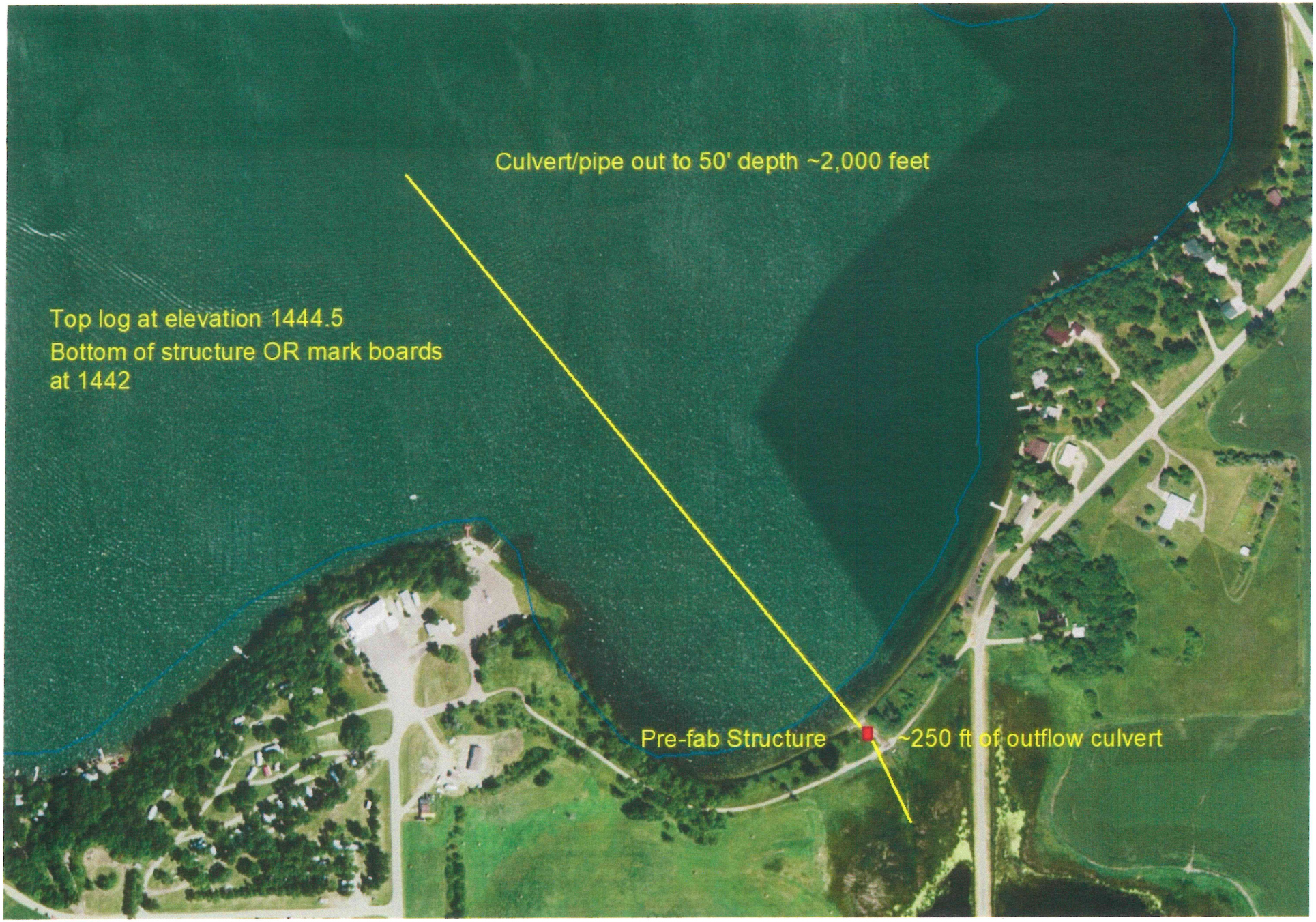
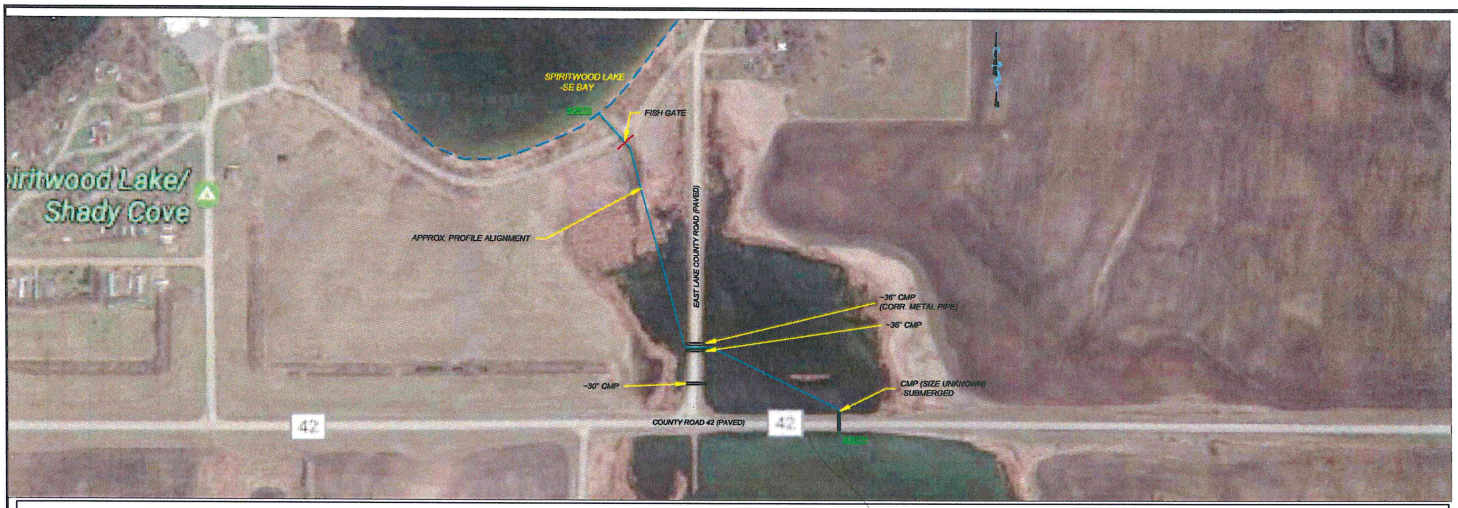
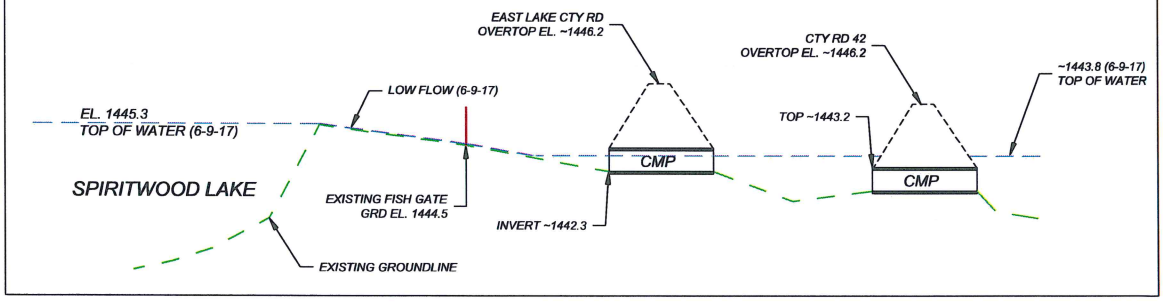
Passive Drawdown - Stop Log Type




Culvert/pipe out to 50' depth ~2,000 feet
Top log at elevation 1444.5
Bottom of structure OR mark boards
at 1442
Pre-fab Structure
~250 ft of outflow culvert



Southeast Profile
N.T.S.



Date
Approved By PRELIMINARY
Title NOT FOR CONSTRUCTION

Date Surveyed 6-9-17
Date Drawn 6-17
Designed by SKK
Drawn By SKK
Date Checked
Checked by
File: prelim2017.dwg

Spiritwood Lake
Stutsman County ND
Outlet Feasibility
Concept Plan & Profile

K,S ENGINEERING INC.
4209 94TH AVE SE
YPSILANTI, ND 58497
Phone 701-489-3322

Sheet No.
2 of 2