

WATER PERMIT NO. FC-19

Name of Applicant: Lake Pelican Water District

Address: c/o Alan W. Schultz, Chairman, 4404 20th Ave SW, Watertown

Phone: 605 886-2213

Amount of Water Claimed: NA Total Acres: NA

Source of Water Supply: NA

Water to be used for: flood control project County: Codington

Type of Waste Disposal System:

Location: southwest edge of Watertown

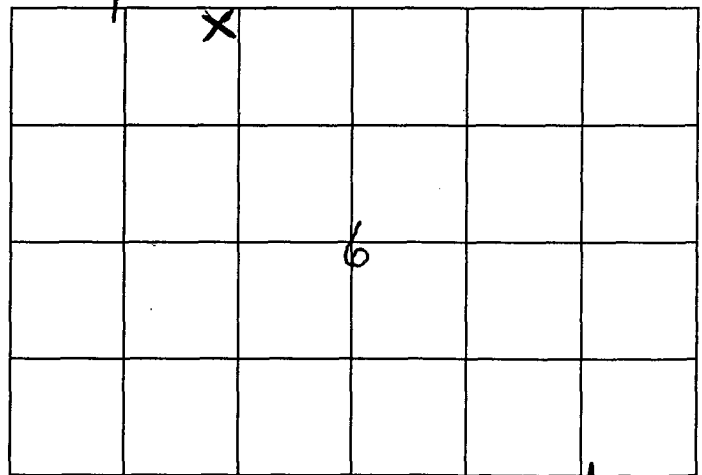
PRIORITY Date Received: 7-15-96 Fee: \$150.00

Corrected Application Received: Period of Annual Use:

Remarks: Project will reduce sediment entering Lake Pelican from Big Sioux River

Diversion Point: NW 1/4 Section 6-T116N-R52W

Land to be Irrigated:



Depth of Well: NA

Well Driller: NA

Remarks:

Type of Map: topo

Prepared by:

Reviewed and the Number Assigned on: 7-18-96

By: **Karen Schlaak**

Notice of Hearing - date to intervene: _____

FORM 2: Application for flood control permit
(type or print)



Mail to:
Water Rights Division
Joe Foss Building
523 E Capitol
Pierre SD 57501-3181
605 773-3352

No. FC-19 Hydrologic Unit 10170202
Basin Big Sioux River
Newspaper Public Opinion, Watertown, SD
(office use only)

APPLICATION FOR A FLOOD CONTROL PERMIT WITHIN THE STATE OF SOUTH DAKOTA

1. Name of Applicant Lake Pelican Water District c/o Alan W. Schultz, Chairman
Address 4404 20th Ave. SW
(Street, RR or Box)
Watertown SD 57201 Phone No. 605-886-2213
(City) (State) (Zip Code)
2. Name of watercourse Pelican Lake Diversion Canal, a right bank diversion canal on the Big
Sioux River.
3. Location of project (legal description) Sec. 6 / T116N / R52W
4. County or counties where project is located Codington, South Dakota
5. Give a brief description of the proposed project including the type of project (Dam, Dikes, Channel Modifications, etc.) and purpose for the project. When available include any preliminary engineering report or other reports or information that will help explain the project. (Attach sheet if more space is needed.)

This project is a sediment diversion weir. The purpose of this project is to reduce the sediment load entering Lake Pelican from the Upper Big Sioux River which will improve the quality of water in the lake.

Attachment: Attach map (see instruction)

STATE OF SOUTH DAKOTA)
County of Codington) SS

I, The Lake Pelican Water District the applicant, certify that I have read this application, have examined the attached map and that the matters stated are true and that I intend, and am able to complete the necessary construction.

Signed Alan W. Schultz

Subscribed and sworn to before me this 12 day of July 19 96

Betty J. Mahon

Notary Public

My Commission Expires Aug. 30, 200

**SOUTH DAKOTA
FLOOD CONTROL PERMIT NO. FC-19**

Date of first receipt of application July 15, 1996.

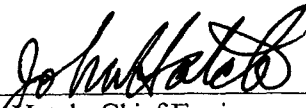
The Water Management Board approved Flood Control Permit No. FC-19 on October 3, 1996 for Lake Pelican Water District, c/o Alan Schultz, Chairman, 4404 20th Ave SW, Watertown SD 57201 authorizing the construction of the water use system and the placing of water to beneficial use subject to the following limitations, conditions and qualifications:

1. Flood Control Permit No. FC-19 authorizes construction of a diversion weir located in the inlet/outlet channel to Lake Pelican in the NW 1/4 NW 1/4 Section 6-T116N-R52W. The weir will control sediment loading to Pelican Lake from the Big Sioux River. The weir will have an overflow elevation of 1712.25 feet above mean sea level (fnsl) and contain a fish passage weir with a flow elevation of 1707.75 fnsl. Flow into the lake will be limited when the Big Sioux River is flowing at less than 1,600 cubic feet of water per second (cfs). When Big Sioux River flows are greater than 1,600 cfs, the rate at which water flows into Lake Pelican and downstream in the Big Sioux River will not change.
2. Approval of the permit does not increase the likelihood or severity of downstream flood damages, does not impair existing rights or endanger human life or property. The permit authorizes construction of a diversion weir to control the sediment load to Pelican Lake from the Big Sioux River.
3. The date from which applicant may claim right is July 16, 1996.
4. All construction is to be completed on or before October 3, 2001.

QUALIFICATIONS

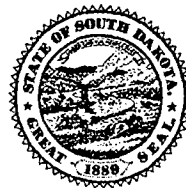
1. That the construction, future maintenance and repair of the Lake Pelican weir structure is the responsibility of the Lake Pelican Water District.
2. The prior water rights of all persons who, by compliance with the laws of the State of South Dakota, have acquired a right to use the water may not be unlawfully impaired by this flood control permit.
3. That the Water Management Board is retaining jurisdiction of Flood Control Permit No. FC-19 in the event that additional information shows the weir causes adverse upstream or downstream impacts.

WATER MANAGEMENT BOARD

By: 
John Hatch, Chief Engineer
Water Rights Program
Department of Environment and Natural Resources

DEC 26 1996

date



RECEIPT

415014

Division of Water Rights

South Dakota Department of Environment and Natural Resources

Pierre, _____ July 15, 19 96

RECEIVED OF Lake Pelican Water Project District, 4404 20th Ave. SW, Watertown, SD 57201

the following amount in fees for services rendered as provided for by law:

Fee for Application for Permit No. <u>FC-19</u> to Appropriate Water, to construct and to put water to beneficial use _____	150	00
Fee for Application for Permit No. _____ to Appropriate Water, for Future Use _____		
Fee to retain Future Use Permit No. _____ after period of seven years.		
Fee for Inspecting Constructed Works, confirming beneficial use and issuing Water License No. _____		
Fee for Filing Transfer Form _____		
Fee for Filing Extension Request _____		
Fee for _____		

(Any Other Work Provided by Law)	Total	150 00

By John Hatch
Chief Engineer

PARTIES OF RECORD

FLOOD CONTROL PERMIT APPLICATION NO. FC-19, Lake Pelican Water District

APPLICANT

Alan Schulz
Lake Pelican Water District
4404 - 20th Ave. SW
Watertown, SD 57201

PETITIONERS

Tim Olson
Dept. of Game, Fish and Parks
Foss Building
523 East Capitol
Pierre, SD 57501-3182

Don Crouse, President
Kampeska Chapter
Izaak Walton League of America
444 South Lake Drive
Watertown, SD 57201

Contract
Plans
For

LAKE PELICAN WATER DISTRICT
Lake Pelican Water Quality
Diversion Weir Project

Codington County
Watertown, South Dakota

JUNE 1996

HDR

HDR Engineering, Inc.

1. EXISTING TOPOGRAPHY AND SURVEY INFORMATION SHOWN ON PLANS ARE BASED ON SURVEY PERFORMED BY SCOTT ENGINEERING IN JANUARY 1996.

2. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE ALL UTILITIES AND PROTECT THEM FROM DAMAGE. THE LOCATION OF ALL AERIAL AND UNDERGROUND UTILITIES SHOWN ARE APPROXIMATE AND SOME ITEMS MAY NOT BE INDICATED IN THE PLANS. UNDERGROUND UTILITIES, WHETHER INDICATED OR NOT, WILL BE LOCATED AND FLAGGED BY THE UTILITIES AT THE REQUEST OF THE CONTRACTOR. THE CONTRACTOR SHALL NOT BEGIN EXCAVATION IN THE AREA OF UNDERGROUND UTILITIES UNTIL ALL SUCH UTILITIES HAVE BEEN LOCATED AND IDENTIFIED AND THEN ONLY WITH CARE TO AVOID ANY POSSIBILITY OF DAMAGE TO THE UTILITY FACILITY. THE CONTRACTOR SHALL BEAR THE TOTAL EXPENSE OF REPAIR OR REPLACEMENT OF SAID UTILITIES DAMAGED BY OPERATION IN CONNECTION WITH PROSECUTION OF THE WORK. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION EFFORTS WITH ALL OTHER LOCAL UTILITY COMPANIES PERTINENT TO PROSECUTION OF THE WORK.
3. CONTRACTOR SHALL APPLY FOR AND OBTAIN ALL PERMITS NECESSARY TO PERFORM WORK.
4. CONTRACTOR STAGING AND STORAGE AREAS SHALL BE RESTORED TO THEIR ORIGINAL CONDITION OR BETTER THAN EXISTING UPON COMPLETION OF USE.
5. ALL PAVED HAUL ROUTES SHALL BE MAINTAINED FREE OF MUD AND DEBRIS RESULTING FROM CONSTRUCTION OPERATIONS. ANY PAVEMENT DAMAGE RESULTING FROM HAULING OPERATIONS SHALL BE REPAIRED BY THE CONTRACTOR AT NO EXPENSE TO THE OWNER.
6. CONTRACTOR TO MAINTAIN SURVEY STATIONS AND CONTROL LOCATIONS.
7. CONTRACTOR SHALL PROVIDE A WORK SEQUENCE SCHEDULE TO THE ENGINEER WITHIN 10 DAYS AFTER NOTICE TO PROCEED. UPON ENGINEER'S APPROVAL OF THE SCHEDULE AND PLANS, WORK MAY COMMENCE.
8. THE GRADE SHALL BE MAINTAINED SO THAT THE SURFACE IS WELL DRAINED AT ALL TIMES. WHEN NECESSARY, TEMPORARY DRAINS AND DRAINAGE DITCHES SHALL BE INSTALLED TO INTERCEPT OR DIVERT SURFACE WATER WHICH MAY AFFECT THE WORK.

INDEX OF DRAWINGS

—OE— OVERHEAD ELEC. LINE

POWER POLE

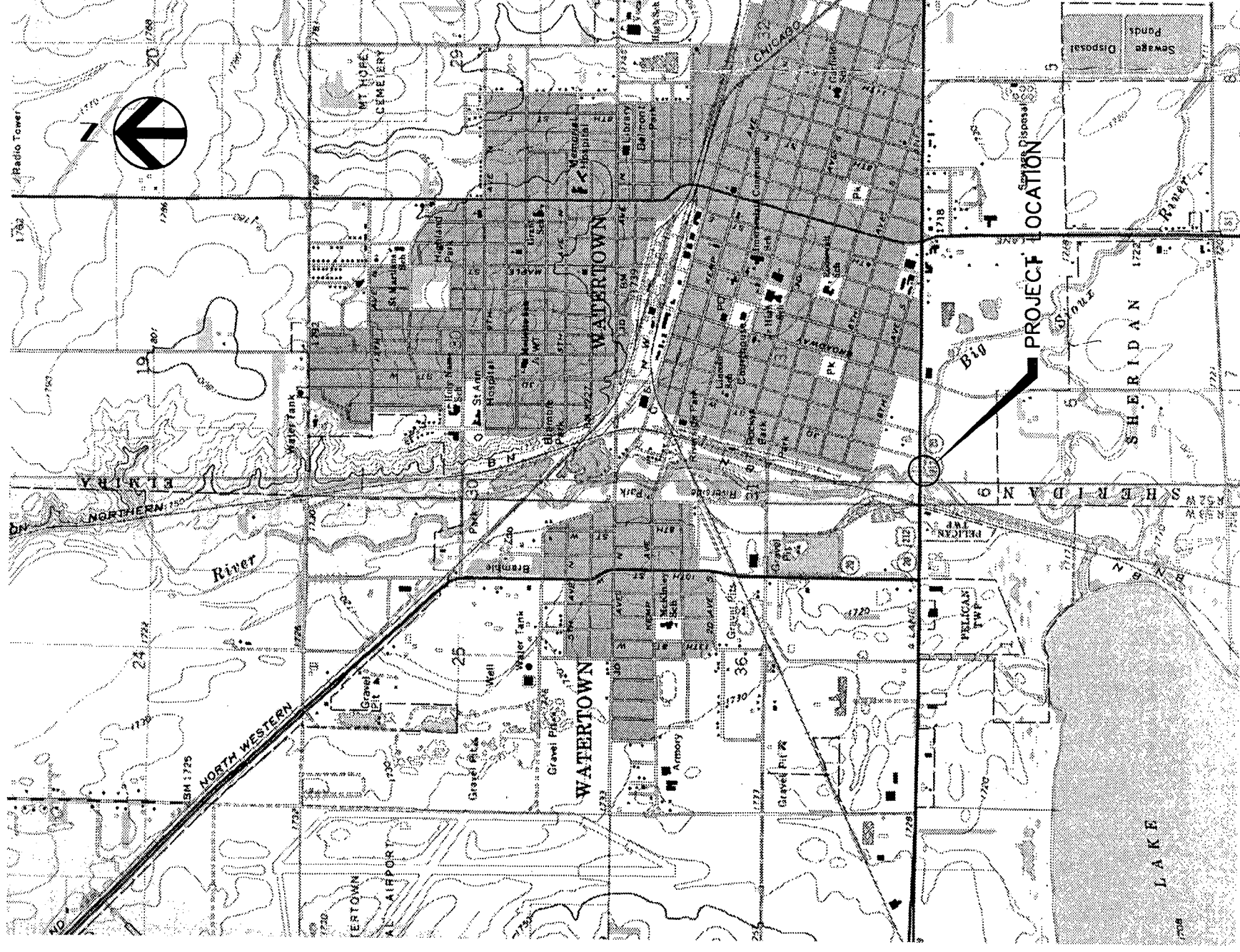
☐ PARK MONUMENT

C-5 TYPE II AND TYPE III WEIR SECTION

C-5 TYPE II AND TYPE III WEIR SECTION

FOR

HDR Engineering, Inc.



LOCATION MAP

[illegible]

WATER QUALITY DIVERSION WEIR
BIG SIOUX RIVER
WATERTOWN, SOUTH DAKOTA

WATER QUALITY DIVERSION WEIR
BIG SIOUX RIVER
WATERTOWN, SOUTH DAKOTA

Date	JUNE 1996
Scale	NO SCALE

Date	JUNE 1996
Scale	NO SCALE

COORDINATE TABLE

PT NO.	NORTHING	EASTING	TOP OF WEIR ELEV. (NGVD)
1	10,083.92	9,822.17	1713.00 *
2	10,068.92	9,822.09	1712.25
3	9,993.92	9,821.70	1712.25
4	9,892.45	9,732.65	1712.25
5	9,856.18	9,773.99	1712.25
6	9,819.90	9,815.33	1712.25
7	9,803.08	9,834.49	1715.00 *

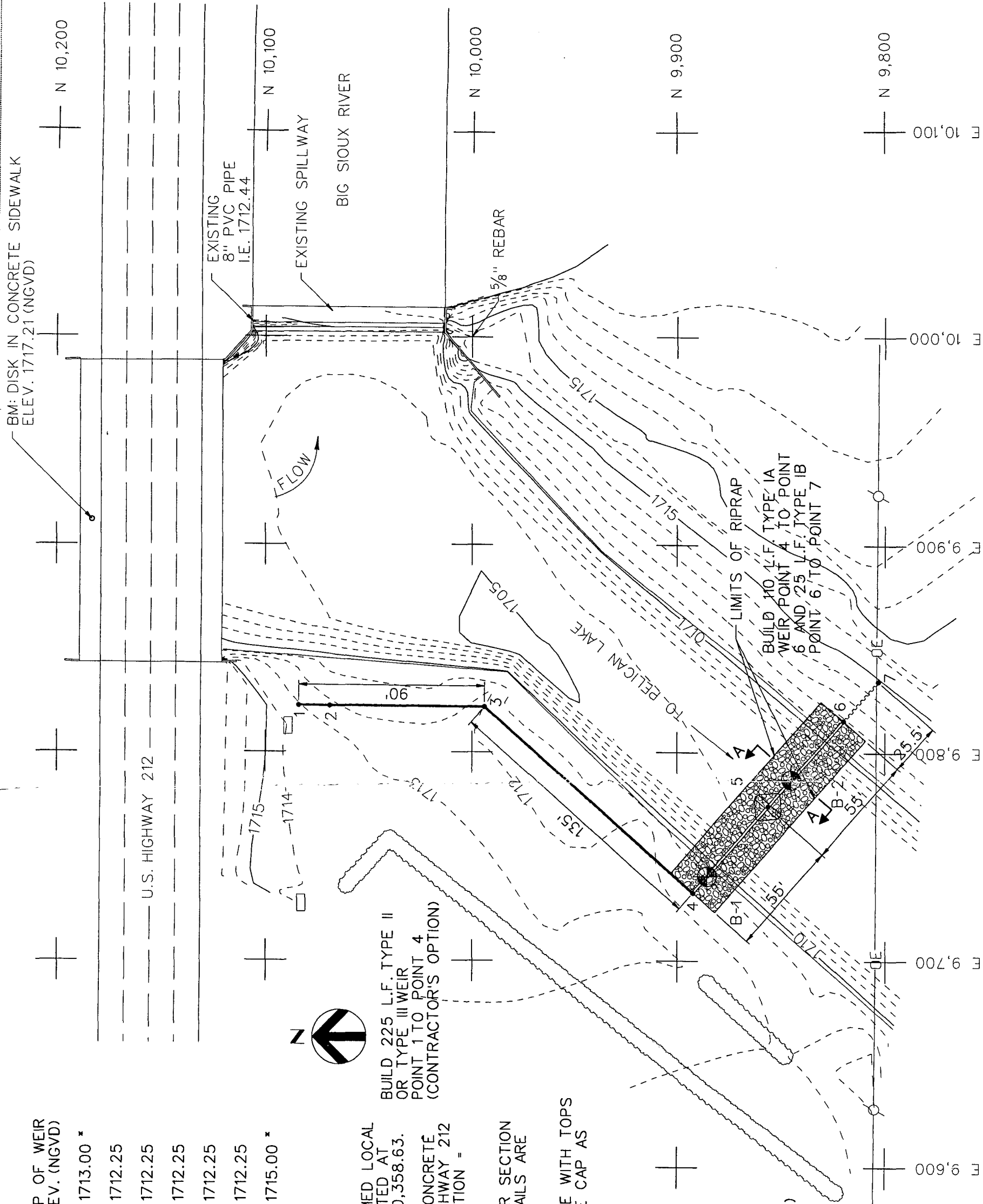
* ADJUST TO MATCH EXISTING GRADE

NOTES

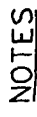
- COORDINATES ARE BASED ON AN ASSUMED LOCAL PLANE SYSTEM. A 5/8" REBAR IS LOCATED AT N 10,000, E 10,000 AND N 10,000, E 10,358.63.
- BENCHMARK IS A STANDARD DISK IN CONCRETE SIDEWALK ON THE NORTH SIDE OF HIGHWAY 212 BRIDGE OVER BIG SIOUX RIVER. ELEVATION = 1717.21 (NGVD), N 10,182.92, E 9,911.89.
- SEE DRAWING NO. C-4 FOR TYPE I WEIR SECTION AND DETAILS. TYPE II AND TYPE III DETAILS ARE SHOWN ON DRAWING NO. C-5.
- TYPE IB WEIR IS 20' PZ-27 SHEET PILE WITH TOPS CUT FLUSH TO GRADE. USE CONCRETE CAP AS SHOWN IN TYPE II WEIR.

LEGEND

- CONTROL POINT
- SHEET PILE
- B-1 APPROX. LOCATION OF NEW BORING BY CONTRACTOR (SEE SPEC. SECTION 02361)



Project No.	02280-001-135	Sheet No.	C-2
Date	JUNE 1996	Scale	1" = 50'
Project Name	LAKE PELICAN WATER DISTRICT	Project Location	WATERTOWN, SOUTH DAKOTA
Project Description	WATER QUALITY DIVERSION WEIR	Project Owner	BIG SIOUX RIVER
Project Engineer		Project Designer	
Project Checker		Project Approver	
Project Date		Project Status	
Project Location		Project Notes	
Project Details		Project Comments	
Project History		Project Changes	
Project Status		Project Actions	
Project Summary		Project Conclusions	
Project Recommendations		Project Next Steps	
Project Contact Information		Project Other Information	



- ### LEGEND

SPOT ELEVATION

DRAINAGE SWALE

LIMITS OF GRADING

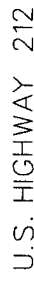
EXISTING CONTOUR

PROPOSED CONTOUR

PROPOSED WEIR

LIMITS OF GRADING

CLEAR AND GRUB TOPSOIL, FINE GRADE AND SEED 1.2 AC.



EXISTING
8" PVC PIPE
I.E. 1712.44

-EXISTING SPILLWAY

BIG SIOUX RIVER

5/8" REBAR

HDR Engineering, Inc.

FOR

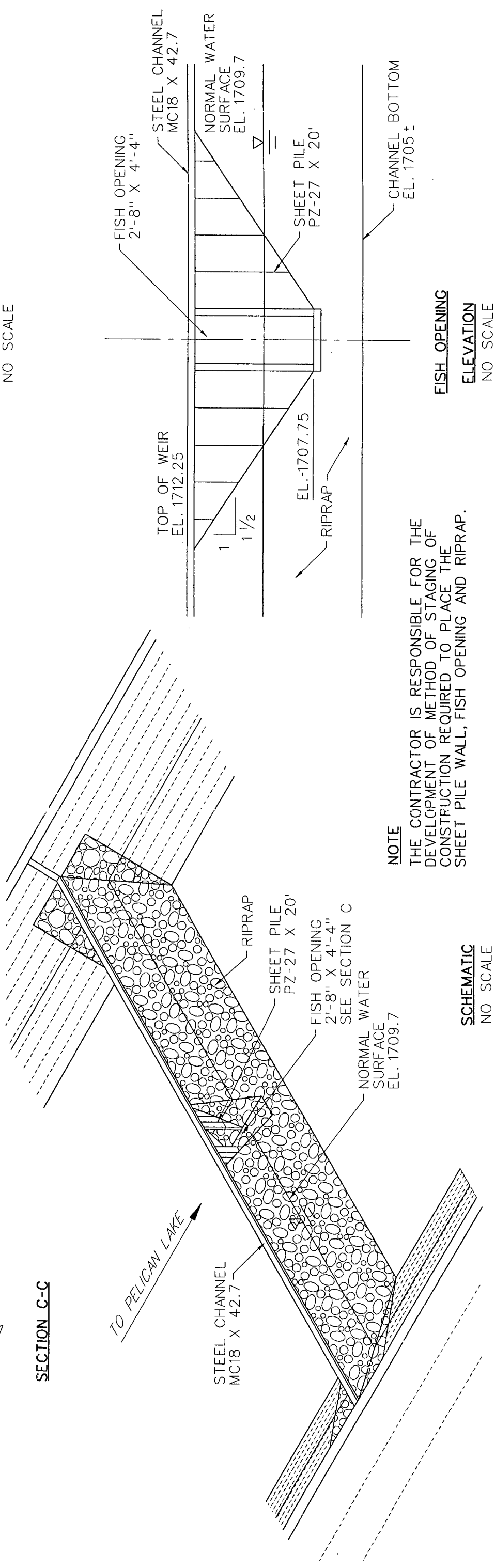
[illegible]

LAKE PELICAN WATER DISTRICT
WATER QUALITY DIVERSION WEIR
BIG SIOUX RIVER
WATERTOWN, SOUTH DAKOTA

GRADING PLAN

Date: JUNE 1996
Scale: 1" = 50'

3



NOTE

ELEVATION
NO SCALE

SCHEMATIC
NO SCALE

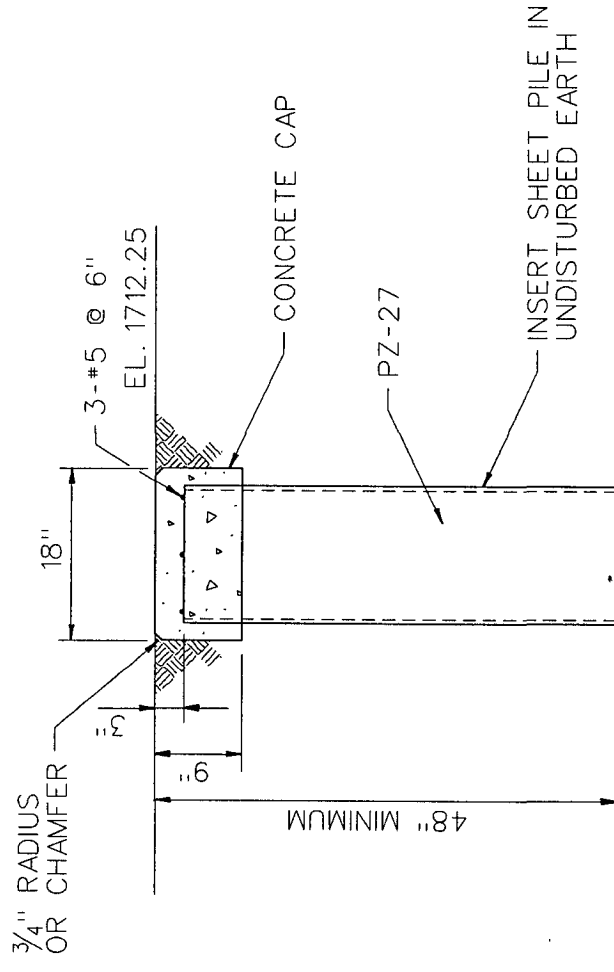
HR

HDR Engineering, Inc.

Project Name	LAKE PELICAN WATER DISTRICT	
Client	WATER QUALITY DIVERSION WEIR	
Location	BIG SIOUX RIVER	
City	WATERTOWN, SOUTH DAKOTA	
State	SOUTH DAKOTA	
County	BROWN	
Project No.	08260-001-135	
Drawn By	C-4	
Scale	AS SHOWN	
Date	JUNE 1996	

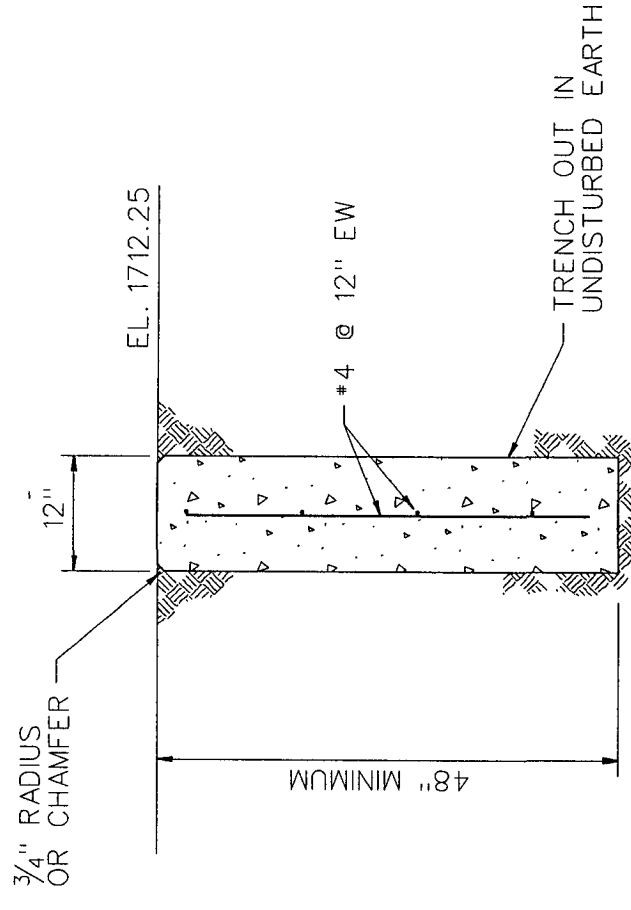
TYPE 1A
WEIR SECTION AND SCHEMATIC

LAKE PELICAN WATER DISTRICT
WATER QUALITY DIVERSION WEIR
BIG SIOUX RIVER
WATERTOWN, SOUTH DAKOTA



TYPE II WEIR

SHEET PILE WITH CONCRETE CAP
NO SCALE



TYPE III WEIR

CONCRETE GRADE BEAM
NO SCALE

TYPE II OR TYPE III WEIR SHALL BE
SELECTED AT CONTRACTOR'S OPTION.

[illegible]

TABLE OF CONTENTS

DIVISION 0 - BIDDING REQUIREMENTS, CONTRACT FORMS,
AND CONDITIONS OF THE CONTRACT

00020 INVITATION TO BID
00100 INSTRUCTIONS TO BIDDERS
00301 BID FORM
00500 AGREEMENT
00700 GENERAL CONDITIONS
00800 GUIDE TO THE PREPARATION OF SUPPLEMENTARY CONDITIONS
00805 SUPPLEMENTARY CONDITIONS

DIVISION 1 - GENERAL REQUIREMENTS

01060 SPECIAL CONDITIONS
01340 SHOP DRAWINGS, PRODUCT DATA & SAMPLES
01560 ENVIRONMENTAL PROTECTION AND SPECIAL CONTROLS
01600 PRODUCT DELIVERY, STORAGE, AND HANDLING
01640 PRODUCT SUBSTITUTIONS

DIVISION 2 - SITE WORK

02260 TOPSOILING AND GRADING
02271 RIPRAP
02361 DRIVEN STEEL SHEET PILING
02930 SEEDING

DIVISION 3 - CONCRETE

03002 CONCRETE

DIVISION 5 - METALS

05120 STRUCTURAL STEEL

01	96F27	SECTION 02260	01
02			02
03		TOPSOILING AND GRADING	03
04			04
05			05
06	PART 1 - GENERAL		06
07			07
08	1.01 SUMMARY		08
09			09
10	A. Section Includes:		10
11	1. Topsoiling and grading.		11
12			12
13	B. Related Sections include but are not necessarily limited to:		13
14	1. Division 0 - Bidding Requirements, Contract Forms, and		14
15	Conditions of the Contract.		15
16	2. Division 1 - General Requirements.		16
17	3. Section 02930 - Seeding.		17
18			18
19	C. Location of Work: All areas within limits of grading and all		19
20	areas outside limits of grading which are disturbed in the		20
21	course of the work.		21
22			22
23	1.02 SITE CONDITIONS		23
24			24
25	A. Verify amount of topsoil stockpiled and determine amount of		25
26	additional topsoil, if necessary to complete work.		26
27			27
28	1.03 MEASUREMENT AND PAYMENT		28
29			29
30	A. All measurement and payment will be based on completed work		30
31	performed in accordance with the Contract Drawings and		31
32	Specifications. No special pay items are established for		32
33	these items. This work shall be considered incidental to the		33
34	project and included in the lump sum price.		34
35			35
36			36
37	PART 2 - PRODUCTS		37
38			38
39	2.01 MATERIALS		39
40			40
41	A. Topsoil:		41
42	1. Original fertile, friable surface soil typical of the		42
43	area, capable of supporting native plant growth		43
44	reasonably free of subsoil, clay, weed, roots and stones		44
45	larger than 1 IN.		45
46	2. If topsoil stockpiled is less than amount required for		46
47	work, furnish additional topsoil at no cost to Owner.		47
48			48
49	2.02 TOLERANCES		49
50			50
51	A. Finish Grading Tolerance: 0.1 FT plus/minus from required		51
52	elevations.		52

01		01
02		02
03	PART 3 - EXECUTION	03
04		04
05	3.01 SITE CLEARING - GENERAL	05
06		06
07	A. Remove trees, shrubs and other vegetation improvements or	07
08	obstructions that interfere with the new construction.	08
09	1. Removal includes stumps of trees and their roots.	09
10	2. Carefully cut and protect roots and branches of trees	10
11	indicated to be left standing, where they obstruct the	11
12	new construction.	12
13	3. Remove objectionable obstructions that interfere with the	13
14	new construction.	14
15		15
16	3.02 TOPSOIL REMOVAL	16
17		17
18	A. Prior to stripping topsoil, follow procedures for soil	18
19	erosion and sediment control.	19
20		20
21	B. Strip topsoil to depths encountered, in manner to prevent	21
22	intermingling with underlying subsoil or objectionable	22
23	material.	23
24	1. Remove heavy growths of grass before stripping.	24
25	2. Where trees are indicated to be left standing, stop	25
26	topsoil stripping sufficient distance from such trees to	26
27	prevent damage to main root system.	27
28		28
29	C. Stockpile topsoil where directed.	29
30	1. Construct storage piles to freely drain surface water.	30
31	2. Seed or cover storage piles to prevent erosion.	31
32		32
33	D. Do not strip topsoil where no change in grade occurs.	33
34		34
35	E. Borrow topsoil to be reasonably free of subsoil, objects over	35
36	1 IN DIA, weeds, and roots.	36
37		37
38	3.03 GRADE PREPARATION	38
39		39
40	A. Correct, adjust and/or repair rough graded areas.	40
41	1. Cut off mounds and ridges.	41
42	2. Fill gullies and depressions.	42
43	3. Perform other necessary repairs.	43
44	4. Bring all sub-grades to specified contours, even and	44
45	properly compacted.	45
46		46
47	B. Loosen surface to depth of 2 IN, minimum.	47
48		48
49	C. Remove all stones and debris over 1 IN in any dimension.	49
50		50
51	3.04 PLACING TOPSOIL	51
52		52

01	A. Do not place when subgrade is wet or frozen enough to cause	01
02	clodding.	02
03		03
04	B. Spread to compacted depth of 4 IN for all disturbed earth	04
05	areas.	05
06		06
07	C. Provide finished surface free of stones, sticks, or other	07
08	material 1 IN or more in any dimension.	08
09		09
10	D. Provide finished surface smooth and true to required grades.	10
11		11
12	E. Restore stockpile area to condition of rest of finished work.	12
13		13
14	3.05 ACCEPTANCE	14
15		15
16	A. Upon completion of topsoiling, obtain Engineer's acceptance	16
17	of grade and surface.	17
18		18
19	B. Make test holes where directed to verify proper placement and	19
20	thickness of topsoil.	20
21		21
22	END OF SECTION	22

01	96F27	SECTION 02271	01
02			02
03		RIPRAP	03
04			04
05			05
06	PART 1 - GENERAL		06
07			07
08	1.01 SUMMARY		08
09			09
10	A. Section Includes:		10
11	1. Riprap for diversion weir slopes as shown on the		11
12	Drawings.		12
13			13
14	B. Related Sections include but are not necessarily limited to:		14
15	1. Division 0 - Bidding Requirements, Contract Forms, and		15
16	Conditions of the Contract.		16
17	2. Division 1 - General Requirements.		17
18			18
19	C. South Dakota Department of Transportation, "Standard		19
20	Specifications for Roads and Bridges", 1990 Edition.		20
21			21
22	1.02 SUBMITTALS		22
23			23
24	A. Shop Drawings:		24
25	1. See Section 01340.		25
26	2. Provide name and address of riprap source material		26
27	including geological formation name.		27
28	3. Provide service records of riprap material.		28
29	4. Gradation test report.		29
30			30
31	1.03 MEASUREMENT AND PAYMENT		31
32			32
33	A. All measurement and payment will be based on completed work		33
34	performed in accordance with the Contract Drawings and		34
35	Specifications. No special pay items are established for		35
36	these items. This work shall be considered incidental to the		36
37	project and included in the lump sum price.		37
38			38
39			39
40	PART 2 - PRODUCTS		40
41			41
42	2.01 MATERIALS		42
43			43
44	A. Rock Riprap:		44
45	1. Rock riprap shall consist of Class III riprap material in		45
46	accordance with South Dakota Department of		46
47	Transportation, "Standard Specifications for Roads and		47
48	Bridges", Edition 1990.		48
49			49
50	2.02 SOURCE QUALITY CONTROL		50
51			51
52	A. Source Tests:		52

01	1. Supply certified tests and service records to determine	01
02	acceptability and application of riprap materials.	02
03		03
04		04
05	PART 3 - EXECUTION	05
06		06
07	3.01 PLACING	07
08		08
09	A. Place riprap material on prepared foundation within limits	09
10	indicated.	10
11		11
12	B. Place on prepared base to produce a well-graded mass of stone	12
13	with minimum percentage of voids.	13
14		14
15	C. Place to required thickness and grades.	15
16		16
17	D. Place to full thickness in a single operation to avoid	17
18	displacing the underlying material.	18
19		19
20	E. Distribute entire mass to conform to gradation specified.	20
21	1. Do not place stone by dumping into chutes or by similar	21
22	method likely to cause segregation.	22
23		23
24	F. Keep finished riprap revetment free from objectionable	24
25	pockets of small stones or clusters of larger stone.	25
26	1. Hand place as necessary to obtain a well-graded	26
27	distribution.	27
28		28
29	G. Ensure a final tolerance of within 3 IN from indicated slope	29
30	and grade lines.	30
31		31
32	H. Place stone revetment in conjunction with embankment	32
33	construction to prevent mixture of embankment and stone	33
34	revetment materials.	34
35		35
36	I. Maintain riprap revetment until accepted.	36
37		37
38	J. Replace any displaced material to lines and grades shown.	38
39		39
40	END OF SECTION	40

01	96F27	SECTION 02361	01
02			02
03		DRIVEN STEEL SHEET PILING	03
04			04
05			05
06	PART 1 - GENERAL		06
07			07
08	1.01 SUMMARY		08
09			09
10	A. This work shall consist of furnishing and driving steel sheet		10
11	piles of the kind, shape and dimensions specified. The sheet		11
12	piles shall be driven in accordance with the requirements of		12
13	these specifications in the locations, manner, and to the		13
14	elevation and penetration shown in the plans or as directed		14
15	by the Engineer.		15
16			16
17	B. The sheet pile shall be driven in place on land and across an		17
18	existing body of water which will require the construction of		18
19	platforms, earthfills, or other temporary devices in which to		19
20	set up and install the sheets. The Contractor shall be		20
21	responsible for complying with all local, state and federal		21
22	regulations for this construction, and to restore the site,		22
23	both on land and below water, to its original condition and		23
24	to the satisfaction of the Engineer.		24
25			25
26	C. Related Sections include but are not necessarily limited to:		26
27	1. Division 0 - Bidding Requirements, Contract Forms, and		27
28	Conditions of the Contract.		28
29	2. Division 1 - General Requirements.		29
30	3. Section 05120 - Structural Steel.		30
31			31
32	D. Test Borings.		32
33	1. Prior to ordering or furnishing any sheet piles, the		33
34	Contractor shall hire a qualified geotechnical or		34
35	materials testing firm, subject to the approval of the		35
36	Engineer, to complete two test borings at the approximate		36
37	locations shown on the Plans.		37
38	2. The borings shall consist of drilling and drive sampling		38
39	in accordance with ASTM D1586. The depths of the borings		39
40	shall be 20 feet below the mudline. Casing shall be used		40
41	during drilling and sampling as needed to maintain a		41
42	stable borehole. Soil samples shall be retrieved at		42
43	5-foot intervals and shall be placed in thin-walled tubes		43
44	or 4 oz. glass jars with the boring number, depth of		44
45	sample, and the visual classification of samples in		45
46	accordance with ASTM D2488 noted. No laboratory testing		46
47	of soil samples is anticipated.		47
48	3. If refusal on rock is encountered above a depth of 20 FT,		48
49	the boring shall be terminated. Refusal is defined as a		49
50	Standard Penetration test blowcount of 50+ blows per FT.		50
51	4. Boring logs shall be prepared by a geotechnical engineer		51
52	or geologist in accordance with standard geotechnical		52

01	practice and submitted to the Engineer within 2 days	01
02	after the completion of each boring.	02
03	5. The purpose of the borings is to investigate the	03
04	subsurface conditions along the alignment of the sheet	04
05	pile wall and to provide the basis for the selection of	05
06	final sheet pile lengths. The Contractor will be	06
07	notified by the Engineer of the final lengths of the	07
08	sheet pile within 2 days after the submittal of the	08
09	boring logs.	09
10		10
11	1.02 QUALITY ASSURANCE	11
12		12
13	A. Referenced Standards:	13
14	1. American Institute of Steel Construction (AISC):	14
15	a. Manual of Steel Construction.	15
16	2. American Society for Testing and Materials (ASTM):	16
17	a. A36, Standard Specification for Structural Steel.	17
18	b. A328, Standard Specification for Steel Sheet Piling.	18
19		19
20	B. Qualifications:	20
21	1. Sheeting installer must have, as a minimum, three	21
22	successful past installations of sheet piling in similar	22
23	over-water site conditions.	23
24		24
25	1.03 SUBMITTALS	25
26		26
27	A. Shop Drawings:	27
28	1. See Section 01340.	28
29	2. Product technical data including:	29
30	a. Acknowledgement that sheet piles submitted meet	30
31	requirements of standards referenced.	31
32	3. Proposed method(s) for supporting equipment and the	32
33	driving of sheets over water.	33
34		34
35	1.04 MEASUREMENT AND PAYMENT	35
36		36
37	A. All measurement and payment will be based on completed work	37
38	performed in accordance with the Contract Drawings and	38
39	Specifications. No special pay items are established for	39
40	these items. This work shall be considered incidental to the	40
41	project and included in the lump sump price.	41
42		42
43		43
44	PART 2 - PRODUCTS	44
45		45
46	2.01 ACCEPTABLE MANUFACTURERS	46
47		47
48	A. Subject to compliance with the Contract Documents, the	48
49	following manufacturers are acceptable:	49
50	1. Sheet piling:	50
51	a. Bethlehem Steel Corporation.	51
52	b. Or approved equal.	52

01		01
02	2.02 MATERIALS	02
03		03
04	A. Sheet Steel Piling:	04
05	1. ASTM A328.	05
06	2. Piling sections shall be continuously interlocking.	06
07	3. Piling shall be reasonably free-sliding to grade when	07
08	threaded and driven.	08
09	4. Used piling may be used, subject to the Engineer's	09
10	approval. Piling shall be straight, undamaged and	10
11	complete sections with no cuts, repairs or holes.	11
12	Pilings with section loss from rust will not be allowed.	12
13		13
14		14
15	PART 3 - EXECUTION	15
16		16
17	3.01 STORING AND HANDLING	17
18		18
19	A. Under no circumstances shall the sheet piles be handled	19
20	roughly when handling and storing. The sheet piles must	20
21	never be used for other purposes or as an aid to other	21
22	construction, except by the written permission of the	22
23	Engineer.	23
24		24
25	B. Steel piles shall be stored in such a manner as to prevent	25
26	deterioration by rust. No material shall be piled so as to	26
27	rest upon the ground or in water, but must be placed on	27
28	suitable skids or platforms. Steel piles shall be kept free	28
29	from accumulations of dirt, oil or other foreign matter.	29
30		30
31	3.02 PREPARATION FOR DRIVING	31
32		32
33	A. No driving of steel sheet piles will be permitted without the	33
34	use of a closely fitting cap or driving head as recommended	34
35	by the manufacturer. This cap or driving head shall be of	35
36	such design as to distribute the blow of the hammer	36
37	throughout the cross section of the pile and thus avoid	37
38	damage to the pile.	38
39		39
40	B. Do not begin sheet pile installation until the earthwork in	40
41	the area has been completed.	41
42		42
43	C. Furnish lines and levels as required to install sheet piles	43
44	at their indicated locations.	44
45		45
46	D. Furnish full length sheet piles. No splices will be	46
47	permitted.	47
48		48
49	3.03 METHOD OF DRIVING	49
50		50
51	A. Steel sheet piling shall be driven with a steam hammer, air	51
52	hammer, diesel hammer or gravity hammer. The energy of the	52

01	hammer (ram weight and fall) shall be selected so as to	01
02	achieve the required penetration without damaging the piles.	02
03		03
04	B. Water or air jets may not be used to assist in driving.	04
05		05
06	3.04 DRIVING OF SHEET PILES	06
07		07
08	A. Piles shall be driven to the minimum tip elevation and	08
09	penetration below cut-off required in the plans.	09
10		10
11	B. Piles shall be driven plumb and accurately in the required	11
12	position. No variation greater than 1/4 IN per FT from	12
13	vertical line indicated shall be allowed. The tops of sheet	13
14	piles shall, in no case, be out of position by more than 2	14
15	IN, nor shall adjacent sheets be out of line with each other	15
16	by more than 1/2 IN.	16
17		17
18	C. Damaged or misplaced piles shall be withdrawn and properly	18
19	replaced, or with the permission of the Engineer, a second	19
20	pile may be driven in place thereof.	20
21		21
22	D. Should the driving of any pile cause previously driven piles	22
23	to rise or fall, the vertically displaced piles shall be	23
24	reinstalled to their original elevations. If the adjacent	24
25	ground is disturbed from the removal of displaced sheets, the	25
26	Contractor shall restore the soil adjacent to the sheets by	26
27	compaction or other approved means.	27
28		28
29	E. Should any obstruction including but not limited to boulders,	29
30	rocks, rubble, existing foundations or timbers be encountered	30
31	which prevent driving of sheet pile to its required final	31
32	depth, threaten sheet pile damage or cause sheet pile to	32
33	drift from required location horizontally, cease driving and	33
34	notify the Engineer immediately. Take corrective action as	34
35	directed by Engineer.	35
36		36
37		37
38	END OF SECTION	38
39		39

01	96F26	SECTION 02930	01
02			02
03		SEEDING	03
04			04
05			05
06	PART 1 - GENERAL		06
07			07
08	1.01 SUMMARY		08
09			09
10	A. Section Includes:		10
11	1. Seeding.		11
12			12
13	B. Related Sections include but are not necessarily limited to:		13
14	1. Division 0 - Bidding Requirements, Contract Forms, and		14
15	Conditions of the Contract.		15
16	2. Division 1 - General Requirements.		16
17	3. Section 02260 - Topsoiling and Grading.		17
18			18
19	1.02 SUBMITTALS		19
20			20
21	A. Shop Drawings:		21
22	1. See Section 01340.		22
23			23
24	1.03 DELIVERY, STORAGE, AND HANDLING		24
25			25
26	A. Furnish seed in sealed standard containers labeled with		26
27	producer's name and seed analysis. Remove from the site seed		27
28	which has become wet, moldy, or otherwise damaged in transit.		28
29			29
30	B. Furnish fertilizer uniform in composition, free flowing and		30
31	suitable for application with approved equipment, delivered		31
32	to site in bags or other containers, each fully labeled and		32
33	bearing the name, and warranty of the producer.		33
34			34
35	1.04 MEASUREMENT AND PAYMENT		35
36			36
37	A. All measurement and payment will be based on completed work		37
38	performed in accordance with the Contract Drawings and		38
39	Specifications. No special pay items are established for		39
40	these items. This work shall be considered incidental to the		40
41	project and included in the lump sum price.		41
42			42
43			43
44	PART 2 - PRODUCTS		44
45			45
46	2.01 MATERIALS		46
47			47
48	A. Seed Quality: Fresh, clean, new-crop seed labeled in		48
49	accordance with U.S. Department of Agriculture Rules and		49
50	Regulations under Federal Seed Act in effect on date of		50
51	bidding. Provide seed of species, proportions, and minimum		51
52	percentages of purity, germination and maximum percentage of		52

weed seed as specified. Approval of all seed for use shall be based on the accumulative total of PLS specified for each phase of work.

B. Lawn-Type Seed Mixture:

BOTANICAL AND COMMON NAME =====	PERCENT BY WEIGHT (PLS) =====	MINIMUM PERCENT GERMINATION =====	MINIMUM PERCENT PURITY =====
Kentucky Bluegrass (Poa pratensis)	60	85	95
Fescue, Tall, KY 31 (Festuca arundinacea 'KY 31')	40	85	98

C. Mulch:

- For seeded areas: Clean, seed-free, threshed straw of oats, wheat, barley, rye, beans, peanuts, or other locally available mulch material which does not contain an excessive quantity of matured seeds of noxious weeds or other species that will grow or be detrimental to seeding, or provide a menace to surrounding land. Do not use material which is fresh or excessively brittle, or which is decomposed and will smother or retard growth of grass.

- D. Fertilizer: Commercial fertilizer meeting applicable requirements of State and Federal law. Cyanic compound or hydrated lime not permitted in mixed fertilizers.
- For lawn-type seeding: 5-10-5 analysis.

PART 3 - EXECUTION

3.01 SOIL PREPARATION

A. General:

- Limit preparation to areas which will be planted soon after.
- Provide facilities to protect and safeguard all persons on or about premises.
- Protect existing trees designated to remain.
- Verify location and existence of all underground utilities. Take necessary precaution to protect existing utilities from damage due to construction activity. Repair all damages to utility items at sole expense.
- Provide facilities such as protective fences and/or watchmen to protect work from vandalism. Contractor to be responsible for vandalism until acceptance of work in whole or in part.

01		01
02	B. Preparation for Lawn-Type:	02
03	1. Loosen surface to minimum depth of 4 IN. Remove stones	03
04	over 1 IN in any dimension and sticks, roots, rubbish,	04
05	and other extraneous matter.	05
06	2. Prior to applying fertilizer, loosen areas to be seeded	06
07	with a double disc or other suitable device if the soil	07
08	has become hard or compacted. Correct any surface	08
09	irregularities in order to prevent pocket or low areas	09
10	which will allow water to stand.	10
11	3. Distribute fertilizer uniformly over areas to be seeded:	11
12	a. For lawn-type seeding: 30 LBS per 1000 SF.	12
13	4. Incorporate fertilizer into soil to a depth of at least 2	13
14	IN by disking, harrowing, or other approved methods.	14
15	Remove stones or other substances from surface which will	15
16	interfere with turf development or subsequent mowing	16
17	operations.	17
18	5. Grade lawn areas to a smooth, even surface with a loose,	18
19	uniformly fine texture. Roll and rake, remove ridges and	19
20	fill depressions, as required to meet finish grades.	20
21	Limit fine grading to areas which can be planted soon	21
22	after preparation.	22
23	6. Restore lawn areas to specified condition if eroded or	23
24	otherwise disturbed after fine grading and before	24
25	planting.	25
26		26
27	3.02 INSTALLATION	27
28		28
29	A. Lawn-Type Seeding:	29
30	1. Do not use seed which is wet, moldy, or otherwise	30
31	damaged.	31
32	2. Perform seeding work from April 20 to May 15 for spring	32
33	planting, and August 1 to September 15 for fall planting,	33
34	unless otherwise approved by Engineer.	34
35	3. Seed with grass drill or other approved equipment.	35
36	4. Distribute seed evenly over entire area at rate of	36
37	application not less than 4 LBS (PLS) of seed per 1000	37
38	SF, 50 percent sown in one direction, remainder at right	38
39	angles to first sowing.	39
40	5. Stop work when work extends beyond most favorable	40
41	planting season for species designated, or when	41
42	satisfactory results cannot be obtained because of	42
43	drought, high winds excessive moisture, or other factors.	43
44	Resume work only when favorable conditions develop.	44
45	6. Lightly rake seed into soil followed by light rolling or	45
46	cultipacking.	46
47	7. Immediately protect seeded areas against erosion by	47
48	mulching. Spread mulch in continuous blanket using 1-1/2	48
49	tons per acre to a depth of 4 or 5 straws.	49
50	8. Protect seeded slopes against erosion with erosion	50
51	netting or other methods approved by Engineer. Protect	51
52	seeded areas against traffic or other use by erecting	52

01	barricades and placing warning signs.	01
02	9. Immediately following spreading mulch, anchor mulch using	02
03	a rolling coultter or a wheatland land packer having	03
04	wheels with V-shaped edges to force mulch into soil	04
05	surface.	05
06		06
07	3.03 MAINTENANCE AND REPLACEMENT	07
08		08
09	A. General:	09
10	1. Begin maintenance of planted areas immediately after each	10
11	portion is planted and continue until final acceptance or	11
12	for a specific time period as stated below, whichever is	12
13	the longer.	13
14	2. Protection of new materials:	14
15	a. Provide barricades, coverings or other types of	15
16	protection necessary to prevent damage to existing	16
17	improvements indicated to remain. Repair and pay for	17
18	all damaged items.	18
19	3. Replace unacceptable materials with materials and methods	19
20	identical to the original specifications unless otherwise	20
21	approved by the Engineer.	21
22		22
23	B. Seeded Lawns:	23
24	1. Maintain seeded lawns: 90 days, minimum, after	24
25	installation and review of entire project area to be	25
26	planted.	26
27	2. Maintenance period begins at completion of planting or	27
28	installation of entire area to be seeded.	28
29	3. Engineer will review seeded lawn area after installation	29
30	for initial acceptance.	30
31	4. Maintain lawns by watering, fertilizing, weeding, mowing,	31
32	trimming, and other operations such as rolling,	32
33	regrading, and replanting as required to establish a	33
34	smooth, uniform lawn, free of weeds and eroded or bare	34
35	areas.	35
36	5. Remulch with new mulch in areas where mulch has been	36
37	disturbed by wind or maintenance operations sufficiently	37
38	to nullify its purpose. Anchor as required to prevent	38
39	displacement.	39
40	6. Unacceptable plantings are those areas that do not meet	40
41	the quality of the specified material, produce the	41
42	specified results, or were not installed to the specified	42
43	methods.	43
44	7. Replant bare areas using same materials specified.	44
45	8. Engineer will review final acceptability of installed	45
46	areas at end of maintenance period.	46
47	9. Maintain repaired areas until remainder of maintenance	47
48	period or approved by Engineer, whichever is the longer	48
49	period.	49
50		50
51	END OF SECTION	51

01	96F26	SECTION 03002	01
02			02
03		CONCRETE	03
04			04
05			05
06	PART 1 - GENERAL		06
07			07
08	1.01 SUMMARY		08
09			09
10	A. Section Includes:		10
11	1. Cast-in-place concrete.		11
12	2. Concrete mixes, proportioning, and quality control.		12
13			13
14	B. Related Sections include but are not necessarily limited to:		14
15	1. Division 0 - Bidding Requirements, Contract Forms, and		15
16	Conditions of the Contract.		16
17	2. Division 1 - General Requirements.		17
18			18
19	1.02 QUALITY ASSURANCE		19
20			20
21	A. Referenced Standards:		21
22	1. American Concrete Institute (ACI):		22
23	a. SP-19, Cement and Concrete Terminology.		23
24	b. 211.1, Standard Practice for Selecting Proportions		24
25	for Normal and Heavyweight Concrete.		25
26	c. 212.1R, Admixtures for Concrete.		26
27	d. 212.2R, Guide for Use of Admixtures in Concrete.		27
28	e. 214, Recommended Practice for Evaluation of		28
29	Compression Test Results of Field Concrete.		29
30	f. 304, Recommended Practice for Measuring, Mixing,		30
31	Transporting, and Placing Concrete.		31
32	g. 304.2R, Placing Concrete by Pumping Methods.		32
33	h. 305R, Hot Weather Concreting.		33
34	i. 306R, Cold Weather Concreting.		34
35	j. 318, Building Code Requirements for Reinforced		35
36	Concrete.		36
37	k. 347, Recommended Practice for Concrete Formwork.		37
38	2. American Society for Testing and Materials (ASTM):		38
39	a. A82, Standard Specifications for Cold Drawn Steel		39
40	Wire for Concrete Reinforcement.		40
41	b. A615, Standard Specification for Deformed and Plain		41
42	Billet Steel Bars for Concrete Reinforcement		42
43	Including Supplementary Requirements S1.		43
44	c. C31, Standard Method of Making and Curing Concrete		44
45	Test Specimens in the Field.		45
46	d. C33, Standard Specification for Concrete Aggregates.		46
47	e. C39, Standard Method of Test for Compressive Strength		47
48	of Cylindrical Concrete Specimens.		48
49	f. C94, Standard Specification for Ready Mixed Concrete.		49
50	g. C138, Standard Method of Test for Unit Weight, Yield,		50
51	and Air Content (Gravimetric) of Concrete.		51
52	h. C143, Standard Method of Test for Slump of Portland		52

01	Cement Concrete.	01
02	i. C150, Standard Specification for Portland Cement.	02
03	j. C171, Standard Specification for Sheet Materials for	03
04	Curing Concrete.	04
05	k. C172, Standard Method of Sampling Fresh Concrete.	05
06	l. C173, Standard Method of Test for Air Content of	06
07	Freshly Mixed Concrete by the Volumetric Method.	07
08	m. C192, Standard Method of Making and Curing Concrete	08
09	Test Specimens in the Laboratory.	09
10	n. C231, Standard Method of Test for Air Content of	10
11	Freshly Mixed Concrete by the Pressure Method.	11
12	o. C260, Standard Specification for Air Entraining	12
13	Admixtures for Concrete.	13
14	p. C289, Test Method for Potential Reactivity of	14
15	Aggregates (Chemical Method).	15
16	q. C309, Standard Specification for Liquid Membrane	16
17	Forming Compounds for Curing Concrete.	17
18	r. C494, Standard Specification for Chemical Admixtures	18
19	for Concrete.	19
20	s. C595, Specification for Blended Hydraulic Cements.	20
21	t. C618, Standard Specification for Fly Ash and Raw or	21
22	Calcined Natural Pozzolan for Use as a Mineral	22
23	Admixture in Portland Cement Concrete.	23
24	u. D1056, Specification for Flexible Cellular Materials	24
25	Sponge or Expanded Rubber.	25
26	v. D1751, Standard Specification for Preformed Expansion	26
27	Joint Fillers for Concrete Paving and Structural	27
28	Construction.	28
29	w. E329, Standard Recommended Practice for Inspection	29
30	and Testing Agencies for Concrete, Steel, and	30
31	Bituminous Materials as Used in Construction.	31
32	3. Federal Specification (FS):	32
33	a. TT-S-227b, Sealer Compound; Rubber Base, Two	33
34	Component.	34
35	b. LLL-B-810B, Building Board, (Hardboard) Hard Pressed,	35
36	Vegetable Fiber.	36
37	4. Corps of Engineers: Specification CRD-C572 Polyvinyl	37
38	Waterstops.	38
39		39
40	B. Quality Control:	40
41	1. Concrete testing agency.	41
42	a. Contractor to employ and pay for services of a	42
43	testing laboratory to:	43
44	1) Perform materials evaluation.	44
45	2) Design concrete mixes.	45
46	b. Concrete testing agency to meet requirements of ASTM	46
47	E329.	47
48	2. Do not begin concrete production until proposed concrete	48
49	mix design has been approved by Engineer.	49
50	a. Approval of concrete mix design by Engineer does not	50
51	relieve Contractor of his responsibility to provide	51
52	concrete that meets the requirements of this	52

01	Specification.	01
02	3. Adjust concrete mix designs when material	02
03	characteristics, job conditions, weather, strength test	03
04	results or other circumstances warrant.	04
05	a. Do not use revised concrete mixes until submitted to	05
06	and approved by Engineer.	06
07		07
08	C. Qualifications: Ready mixed concrete batch plant certified	08
09	by National Ready Mixed Concrete Association (NRMCA).	09
10		10
11	1.03 DEFINITIONS	11
12		12
13	A. Per ACI SP-19 except as modified herein:	13
14	1. Concrete Testing Agency: Testing agency employed to	14
15	perform materials evaluation, design of concrete mixes or	15
16	testing of concrete placed during construction.	16
17	2. Exposed concrete: Exposed to view after construction is	17
18	complete.	18
19	3. Indicated: Indicated by Contract Documents.	19
20	4. Nonexposed concrete: Not exposed to view after	20
21	construction is complete.	21
22	5. Required: Required by Contract Documents.	22
23	6. Specified strength: Specified compressive strength at 28	23
24	days.	24
25	7. Submitted: Submitted to Engineer.	25
26		26
27	1.04 SUBMITTALS	27
28		28
29	A. Shop Drawings:	29
30	1. See Section 01340.	30
31	2. Concrete mix designs proposed for use. Concrete mix	31
32	design submittal to include the following information:	32
33	a. Sieve analysis and source of fine and coarse	33
34	aggregates.	34
35	b. Test for aggregate organic impurities.	35
36	c. Test for deleterious aggregate per ASTM C289.	36
37	d. Proportioning of all materials.	37
38	e. Type of cement with mill certificate for cement.	38
39	f. Slump.	39
40	g. Air content.	40
41	h. Brand, type, ASTM designation, and quantity of each	41
42	admixture proposed for use.	42
43	i. 28-day cylinder compressive test results of trial	43
44	mixes per ACI 318 and as indicated herein.	44
45	j. Standard deviation value for concrete production	45
46	facility.	46
47	3. Manufacturer and type of joint filler, joint sealant and	47
48	curing agent.	48
49	4. Reinforcing steel: Show grade, sizes, number,	49
50	configuration, spacing, location and all fabrication and	50
51	placement details.	51
52	a. In sufficient detail to permit installation of	52

01	reinforcing without having to make reference to	01
02	Contract Drawings.	02
03	b. Obtain approval of shop drawings by Engineer before	03
04	fabrication.	04
05	c. Mill certificates.	05
06	5. Strength test results of in place concrete including	06
07	slump, air content and concrete temperature.	07
08		08
09	1.05 DELIVERY, STORAGE, AND HANDLING	09
10		10
11	A. Storage of Material:	11
12	1. Cement:	12
13	a. Store in moistureproof, weathertight enclosures.	13
14	b. Do not use if caked or lumpy.	14
15	2. Aggregate:	15
16	a. Store to prevent segregation and contamination with	16
17	other sizes or foreign materials.	17
18	b. Obtain samples for testing from aggregates at point	18
19	of batching.	19
20	c. Do not use frozen or partially frozen aggregates.	20
21	d. Do not use bottom 6 IN of stockpiles in contact with	21
22	ground.	22
23	e. Allow sand to drain until moisture content is uniform	23
24	prior to use.	24
25	3. Admixtures:	25
26	a. Protect from contamination, evaporation, freezing, or	26
27	damage.	27
28	b. Maintain within temperature range recommended by	28
29	manufacturer.	29
30	c. Completely mix solutions and suspensions prior to	30
31	use.	31
32	4. Reinforcing steel:	32
33	a. Support and store all rebars above ground.	33
34		34
35	B. Delivery:	35
36	1. Concrete:	36
37	a. Prepare a delivery ticket for each load for	37
38	ready-mixed concrete.	38
39	b. Truck operator shall hand ticket to Engineer at the	39
40	time of delivery.	40
41	c. Ticket to show:	41
42	1) Mix identification mark.	42
43	2) Quantity delivered.	43
44	3) Amount of each material in batch.	44
45	4) Outdoor temp in the shade.	45
46	5) Time at which cement was added.	46
47	6) Numerical sequence of the delivery.	47
48	7) Amount of water added.	48
49	2. Reinforcing steel: Ship to jobsite with attached plastic	49
50	or metal tags with permanent mark numbers.	50
51	a. Mark numbers to match shop drawing mark number.	51
52		52

01	1.06 MEASUREMENT AND PAYMENT	01
02		02
03	A. All measurement and payment will be based on completed work	03
04	performed in accordance with the Contract Drawings and	04
05	Specifications. No special pay items are established for	05
06	these items. This work shall be considered incidental to the	06
07	project and included in the lump sum price.	07
08		08
09		09
10	PART 2 - PRODUCTS	10
11		11
12	2.01 ACCEPTABLE MANUFACTURERS	12
13		13
14	A. Subject to compliance with the Contract Documents, the	14
15	following manufacturers are acceptable:	15
16	1. Form coating:	16
17	a. Richmond "Rich Cote."	17
18	b. Industrial Lubricants "Nox-Crete Form Coating."	18
19	c. Protex "Pro-Cote."	19
20	d. Or equal.	20
21	2. Prefabricated forms:	21
22	a. Simplex "Industrial Steel Frame Forms."	22
23	b. Symons "Steel Ply."	23
24	c. Universal "Uniform."	24
25	d. Or equal.	25
26		26
27	2.02 MATERIALS	27
28		28
29	A. Portland Cement: Conform to ASTM C150 Type I.	29
30		30
31	B. Admixtures:	31
32	1. Air entraining admixtures: ASTM C260.	32
33	2. Water reducing, retarding, and accelerating admixtures:	33
34	a. ASTM C494 Type A through E.	34
35	b. Conform to provisions of ACI 212.1R and ACI 212.2R.	35
36	c. Do not use retarding or accelerating admixtures	36
37	unless specifically approved in writing by Engineer	37
38	and at no cost to Owner.	38
39	d. Follow manufacturer's instructions.	39
40	e. Use chloride free admixtures only.	40
41	3. Maximum total water soluble chloride ion content	41
42	contributed from all ingredients of concrete including	42
43	water, aggregates, cementitious materials and admixtures	43
44	by weight percent of cement:	44
45	a. 0.10 all concrete.	45
46	4. Do not use calcium chloride.	46
47	5. Pozzolanic admixtures: ASTM C618.	47
48	6. Provide admixtures of same type, manufacturer and	48
49	quantity as used in establishing required concrete	49
50	proportions in the mix design.	50
51		51
52	C. Water: Potable, clean, free of oils, acids and organic	52

01	matter.	01
02		02
03	D. Aggregates:	03
04	1. Normal weight concrete: ASTM C33, except as modified	04
05	below.	05
06	2. Fine aggregate: Clean natural sand.	06
07	a. No manufactured or artificial sand.	07
08	3. Coarse aggregate: Crushed rock, natural gravel, or other	08
09	inert granular material.	09
10	a. Maximum amount of clay or shale particles: 1	10
11	percent.	11
12	4. Gradation of coarse aggregate:	12
13	a. All concrete: Size #57 or #67.	13
14		14
15	E. Reinforcing Steel:	15
16	1. Reinforcing bars: ASTM A615, Grade 60.	16
17		17
18	F. Forms:	18
19	1. Prefabricated or job built.	19
20	2. Plywood: PS1, waterproof, resin bonded, exterior-type	20
21	Douglas Fir.	21
22	a. Face adjacent to concrete Grade B or better.	22
23	3. Fiberboard: Fed Spec LLL-B-810, Type IX, tempered,	23
24	waterproof, screen back, concrete form hardboard.	24
25	4. Lumber: Straight; uniform width and thickness; and free	25
26	from knots, offsets, holes, dents, and other surface	26
27	defects.	27
28	5. Chamfer strips: Clear white pine, surface against	28
29	concrete planed.	29
30	6. Form ties: Removable end, permanently embedded body type	30
31	with cones on outer ends not requiring auxiliary	31
32	spreaders.	32
33	a. Cone diameter: 3/4 IN minimum to 1 IN maximum.	33
34	b. Embedded portion 1 IN minimum back from concrete	34
35	face.	35
36	c. If not provided with threaded ends, constructed for	36
37	breaking off ends without damage to concrete.	37
38	7. Form release: Nonstaining and shall not prevent bonding	38
39	of future finishes to concrete surface.	39
40		40
41	G. Chairs, Runners, Bolsters, Spacers, and Hangers:	41
42	1. Stainless steel, epoxy coated, or plastic coated metal.	42
43	a. Plastic coated: Rebar support tips in contact with	43
44	the forms only.	44
45		45
46	H. Membrane Curing Compound: ASTM C309, Type I-D.	46
47	1. Resin based, dissipates upon exposure to UV light.	47
48	2. Curing compound shall not prevent bonding of any future	48
49	coverings, coatings or finishes.	49
50		50
51	I. Expansion Joint Filler:	51
52	1. Asphalt impregnated fiber type.	52

- 01 2.03 CONCRETE MIXES 01
- 02 02 02
- 03 03 03
- 04 A. General: 04
- 05 1. All concrete to be ready mixed concrete conforming to 05
- 06 ASTM C94. 06
- 07 2. Provide concrete of specified quality capable of being 07
- 08 placed without segregation and, when cured, of developing 08
- 09 all properties required. 09
- 10 3. All concrete to be normal weight concrete. 10
- 11 11 11
- 12 B. Strength: 12
- 13 1. Provide specified strength and type of concrete for each 13
- 14 use in structure(s) as follows: 14
- 15 15 15
- | TYPE | WEIGHT | SPECIFIED STRENGTH* |
|--------------|---------------|---------------------|
| ==== | ===== | ===== |
| All Concrete | Normal weight | 3500 psi |
- 20 *Minimum 28-day compressive strength. 20
- 21 21 21
- 22 22 22
- 23 C. Air Entrainment: Provide air entrainment in all concrete 23
- 24 resulting in a total air content percent by volume as 24
- 25 follows: 25
- 26 26 26
- | MAX AGGREGATE SIZE | TOTAL AIR CONTENT PERCENT |
|--------------------|---------------------------|
| ===== | ===== |
| 1 IN or 3/4 IN | 5 to 7 |
| 1/2 IN | 6 to 8 |
- 31 31 31
- 32 1. Air content to be measured in accordance with ASTM C231, 32
- 33 ASTM C173, or ASTM C138. 33
- 34 34 34
- 35 D. Slump: 4 IN maximum, 1 IN minimum. 35
- 36 1. Measured at point of discharge of the concrete into the 36
- 37 concrete construction member. 37
- 38 2. Concrete of lower than maximum slump may be used provided 38
- 39 it can be properly placed and consolidated. 39
- 40 3. Pumped concrete: 40
- 41 a. Provide additional water at batch plant to allow for 41
- 42 slump loss due to pumping. 42
- 43 b. Provide only enough additional water so that slump of 43
- 44 concrete at discharge end of pump hose does not 44
- 45 exceed maximum slump specified above. 45
- 46 4. Determine slump per ASTM C143. 46
- 47 47 47
- 48 E. Selection of Proportions: 48
- 49 1. General - Proportion ingredients to: 49
- 50 a. Produce proper workability, durability, strength, and 50
- 51 other required properties. 51
- 52 b. Prevent segregation and collection of excessive free 52

01	water on surface.	01
02	2. Minimum cement contents and maximum water cement ratios	02
03	for concrete to be as follows:	03
04		04
05	MINIMUM CEMENT, LB/CY	05
06	=====	06
07	SPECIFIED MAXIMUM AGGREGATE SIZE, IN	07
08	STRENGTH 1/2 3/4 1	08
09	=====	09
10	3500 --- 564 564 0.45	10
11		11
12	3. Sand cement grout:	12
13	a. Three parts sand.	13
14	b. One part portland cement.	14
15	c. Entrained air: Six percent plus or minus one	15
16	percent.	16
17	d. Sufficient water for required workability.	17
18	e. Minimum 28-day compressive strength: 3,000 psi.	18
19	4. Submit mix design data as required by this specification	19
20	section.	20
21	5. Normal weight concrete: Proportion mixture to provide	21
22	desired characteristics using one of methods described	22
23	below:	23
24	a. Method 1 (Trial Mix): Per ACI 318, Chapter 5, except	24
25	as modified herein.	25
26	1) Air content within range specified above.	26
27	2) Record and report temperature of trial mixes.	27
28	3) Proportion trial mixes per ACI 211.1.	28
29	b. Method 2 (Field Experience): Per ACI 318, Chapter 5,	29
30	except as modified herein:	30
31	1) Field test records must be acceptable to Engineer	31
32	to use this method.	32
33	2) Test records shall represent materials,	33
34	proportions and conditions similar to those	34
35	specified.	35
36	6. Required average strength to exceed the specified 28-day	36
37	compressive strength by the amount determined or	37
38	calculated in accordance with the requirements of	38
39	paragraph 5.3 of ACI 318 using the standard deviation of	39
40	the proposed concrete production facility as described in	40
41	paragraph 5.3.1 of ACI 318.	41
42		42
43		43
44	PART 3 - EXECUTION	44
45		45
46	3.01 FORMING AND PLACING CONCRETE	46
47		47
48	A. General:	48
49	1. Contractor is responsible for design and erection of	49
50	formwork.	50
51	2. Construct formwork so that concrete members and	51
52	structures are of correct size, shape, alignment,	52

01	elevation and position.	01
02	a. Allowable tolerances: As recommended in ACI 347.	02
03		03
04	B. Openings: Provide openings in formwork to accommodate work	04
05	of other trades.	05
06	1. Accurately place and securely support items built into	06
07	forms.	07
08		08
09	C. Chamfer Strips: Place 3/4 IN chamfer strips in forms to	09
10	produce 3/4 IN wide beveled edges on permanently exposed	10
11	corners of members.	11
12		12
13	D. Reinforcement:	13
14	1. Position, support and secure reinforcement against	14
15	displacement.	15
16	2. Locate and support with chairs, runners, bolsters,	16
17	spacers and hangers, as required.	17
18	3. Set wire ties so ends do not touch forms and are directed	18
19	into concrete, not toward exposed concrete surfaces.	19
20	4. Lap splice lengths: ACI 318 Class B top bar tension	20
21	splices unless indicated otherwise on the Drawings.	21
22	5. Extend reinforcement to within 2 IN of concrete perimeter	22
23	edges.	23
24	a. If perimeter edge is earth formed, extend	24
25	reinforcement to within 3 IN of the edge.	25
26	6. Unless otherwise indicated, provide minimum concrete	26
27	cover as follows:	27
28	a. Concrete deposited against earth: 3 IN.	28
29	b. Formed surfaces exposed to weather or in contact with	29
30	earth: 2 IN for reinforcing bars #6 or larger; 1-1/2	30
31	IN for reinforcing bars less than #6.	31
32	7. Do not weld reinforcing bars.	32
33		33
34	E. Construction, Expansion, and Contraction Joints:	34
35	1. Provide at locations indicated.	35
36	2. Locate wall vertical construction joints at 30 FT maximum	36
37	centers and wall horizontal construction joints at 10 FT	37
38	maximum centers.	38
39	3. Install construction joints perpendicular to the planes	39
40	of their surfaces.	40
41	4. At least 48 HRS shall elapse between placing of adjoining	41
42	concrete construction.	42
43	5. Thoroughly clean and remove all laitance and loose and	43
44	foreign particles from construction joints.	44
45		45
46	F. Embedments:	46
47	1. Set and build in anchorage devices and other embedded	47
48	items required for other work that is attached to, or	48
49	supported by concrete.	49
50	2. Use setting diagrams, templates and instructions for	50
51	locating and setting.	51
52		52

- 01 G. Preparation: 01
- 02 1. Clean and adjust forms prior to concrete placement. 02
- 03 2. Tighten forms to prevent mortar leakage. 03
- 04 3. Coat form surfaces with form release agents prior to 04
- 05 placing reinforcing bars in forms. 05
- 06 06
- 07 H. Placing Concrete: 07
- 08 1. Place concrete in compliance with ACI 304 and 304.2R. 08
- 09 2. Place in a continuous operation within planned joints or 09
- 10 sections. 10
- 11 3. Begin placement when work of other trades affecting 11
- 12 concrete is completed. 12
- 13 4. Place concrete by methods which prevent aggregate 13
- 14 segregation. 14
- 15 5. Do not allow concrete to free fall more than 4 FT. 15
- 16 6. Where free fall of concrete will exceed 4 FT, place 16
- 17 concrete by means of tremie pipe or chute. 17
- 18 18
- 19 I. Consolidation: 19
- 20 1. Consolidate all concrete using mechanical vibrators 20
- 21 supplemented with hand rodding and tamping, so that 21
- 22 concrete is worked around reinforcement and embedded 22
- 23 items into all parts of forms. 23
- 24 24
- 25 J. Protection: 25
- 26 1. Protect concrete from physical damage or reduced strength 26
- 27 due to weather extremes. 27
- 28 2. In cold weather comply with ACI 306R except as modified 28
- 29 herein. 29
- 30 a. Do not place concrete on frozen ground or in contact 30
- 31 with forms or reinforcing bars coated with frost, ice 31
- 32 or snow. 32
- 33 b. Minimum concrete temperature at the time of mixing: 33
- 34 34
- | | | |
|----------------------------|----------------------|----|
| 35 OUTDOOR TEMPERATURE | CONCRETE TEMPERATURE | 35 |
| 36 AT PLACEMENT (IN SHADE) | AT MIXING | 36 |
| 37 ===== | ===== | 37 |
| 38 Below 30 DegF | 70 DegF | 38 |
| 39 Between 30-45 DegF | 60 DegF | 39 |
| 40 Above 45 DegF | 50 DegF | 40 |
| 41 | | 41 |
- 42 c. Do not place heated concrete that is warmer than 80 42
- 43 DegF. 43
- 44 d. If freezing temperatures are expected during curing, 44
- 45 maintain the concrete temperature at or above 50 DegF 45
- 46 for 7 days or 70 DegF for 3 days. 46
- 47 e. Do not allow concrete to cool suddenly. 47
- 48 3. In hot weather comply with ACI 305R except as modified 48
- 49 herein. 49
- 50 a. At air temperature of 90 DegF and above, keep 50
- 51 concrete as cool as possible during placement and 51
- 52 curing. 52

01	b.	Do not allow concrete temperature to exceed 90 DegF	01
02		at placement.	02
03	c.	Prevent plastic shrinkage cracking due to rapid	03
04		evaporation of moisture.	04
05	d.	Do not place concrete when the actual or anticipated	05
06		evaporation rate equals or exceeds 0.2 LBS/SF/HR as	06
07		determined from ACI 305R, Figure 2.1.5.	07
08			08
09	K.	Curing:	09
10	1.	Begin curing concrete as soon as free water has	10
11		disappeared from exposed surfaces.	11
12	2.	Cure concrete by use of moisture retaining cover, burlap	12
13		kept continuously wet or by membrane curing compound.	13
14	3.	Provide protection as required to prevent damage to	14
15		concrete and to prevent moisture loss from concrete	15
16		during curing period.	16
17	4.	Provide curing for minimum of 7 days.	17
18	5.	Form materials left in place may be considered as curing	18
19		materials for surfaces in contact with the form materials	19
20		except in periods of hot weather.	20
21	6.	In hot weather follow curing procedures outlined in ACI	21
22		305R.	22
23	7.	In cold weather follow curing procedures outlined in ACI	23
24		306R.	24
25	8.	If forms are removed before 7 days have elapsed, finish	25
26		curing of formed surfaces by one of above methods for the	26
27		remainder of the curing period.	27
28	9.	Curing vertical surfaces with a curing compound: Cover	28
29		vertical surfaces with a minimum of two coats of the	29
30		curing compound.	30
31	a.	Allow the preceding coat to completely dry prior to	31
32		applying the next coat.	32
33	b.	Apply the first coat of curing compound immediately	33
34		after form removal.	34
35	c.	Vertical surface at the time of receiving the first	35
36		coat shall be damp with no free water on the surface.	36
37	d.	A vertical surface is defined as any surface steeper	37
38		than 1 vertical to 4 horizontal.	38
39			39
40	3.02	CONCRETE FINISHES	40
41			41
42	A.	Tolerances:	42
43	1.	Class B: 1/4 IN in 10 FT.	43
44			44
45	B.	Surfaces Exposed and Not Exposed to View:	45
46	1.	Provide a smooth finish for exposed concrete surfaces.	46
47	2.	Remove fins and projections, and patch voids, air	47
48		pockets, and honeycomb areas with cement grout.	48
49	3.	Fill tie holes with cement grout.	49
50			50
51	C.	Troweled Finish:	51
52	1.	Hand trowel surface.	52

- | | | | | |
|----|------|--|--|----|
| 01 | | | | 01 |
| 02 | 2. | Produce a smooth surface which is relatively free of | | 02 |
| 03 | | defects with first hand troweling. | | |
| 04 | 3. | Perform additional trowelings by hand after surface has | | 03 |
| 05 | | hardened sufficiently. | | 04 |
| 06 | 4. | Thoroughly consolidate surface by hand troweling. | | 05 |
| 07 | 5. | Leave finished surface essentially free of trowel marks, | | 06 |
| 08 | | uniform in texture and appearance and plane to a Class B | | 07 |
| 09 | | tolerance. | | 08 |
| 10 | | | | 09 |
| 11 | D. | Broom Finish: Immediately after concrete has received a | | 10 |
| 12 | | finish as specified, give it a transverse scored texture by | | 11 |
| 13 | | drawing a broom across surface. | | 12 |
| 14 | 3.03 | FIELD QUALITY CONTROL | | 13 |
| 15 | | | | 14 |
| 16 | A. | Owner will employ and pay for services of a concrete testing | | 15 |
| 17 | | laboratory to perform testing of concrete placed during | | 16 |
| 18 | | construction. | | 17 |
| 19 | 1. | Contractor to cooperate with Owner in obtaining and | | 18 |
| 20 | | testing samples. | | 19 |
| 21 | | | | 20 |
| 22 | B. | Tests During Construction: | | 21 |
| 23 | 1. | Strength test - procedure: | | 22 |
| 24 | | a. Three cylinders, 6 IN DIA x 12 IN high, will be taken | | 23 |
| 25 | | from each sample per ASTM C172 and C31. | | 24 |
| 26 | | b. Cylinders will be tested per ASTM C39: | | 25 |
| 27 | | 1) One at 7 days. | | 26 |
| 28 | | 2) Two at 28 days. | | 27 |
| 29 | 2. | Strength test - frequency: | | 28 |
| 30 | | a. Not less than one test each day concrete placed. | | 29 |
| 31 | | b. Not less than one test for each 50 CY or major | | 30 |
| 32 | | fraction thereof placed in one day. | | 31 |
| 33 | 3. | Slump test: Per ASTM C143. | | 32 |
| 34 | | a. Determined for each strength test sample. | | 33 |
| 35 | | b. Additional slump tests may be taken. | | 34 |
| 36 | 4. | Air content: Per ASTM C231, C173, and C138. | | 35 |
| 37 | | a. Determined for each strength test sample. | | 36 |
| 38 | 5. | Temperature: Determined for each strength test sample. | | 37 |
| 39 | | | | 38 |
| 40 | C. | Evaluation of Tests: | | 39 |
| 41 | 1. | Strength test results: Average of 28-day strength of two | | 40 |
| 42 | | cylinders from each sample. | | 41 |
| 43 | | a. If one cylinder manifests evidence of improper | | 42 |
| 44 | | sampling, molding, handling, curing or testings, | | 43 |
| 45 | | strength of remaining cylinder will be test result. | | 44 |
| 46 | | b. If both cylinders show any of above defects, test | | 45 |
| 47 | | will be discarded. | | 46 |
| 48 | | | | 47 |
| 49 | D. | Acceptance of Concrete: | | 48 |
| 50 | 1. | Strength level of each type of concrete shall be | | 49 |
| 51 | | considered satisfactory if both of the following | | 50 |
| 52 | | requirements are met: | | 51 |
| | | | | 52 |

01	a.	Average of all sets of three consecutive strength	01
02		tests equals or exceeds the required specified 28-day	02
03		compressive strength.	03
04	b.	No individual strength test falls below the required	04
05		specified 28-day compressive strength by more than	05
06		500 psi.	06
07			07
08	3.04	SCHEDULES	08
09			09
10	A.	Form Types:	10
11	1.	Surfaces exposed to view:	11
12	a.	Prefabricated plywood panel forms, job-built plywood	12
13		forms, or forms lined with plywood or fiberboard.	13
14	b.	Laid out in a regular and uniform pattern with long	14
15		dimensions vertical and joints aligned.	15
16	c.	Produce finished surfaces free from offsets, ridges,	16
17		waves, and concave or convex areas.	17
18	d.	Construct forms sufficiently tight to prevent leakage	18
19		of mortar.	19
20	2.	Surfaces not exposed to view:	20
21	a.	Wood or steel forms sufficiently tight to prevent	21
22		leakage of mortar.	22
23	3.	Other types of forms may be used:	23
24	a.	For surfaces not restricted to plywood or lined	24
25		forms.	25
26	b.	As backing for form lining.	26
27			27
28	B.	Concrete:	28
29	1.	Normal weight concrete: All locations.	29
30			30
31			31
32		END OF SECTION	32

01	96F26	SECTION 05120	01
02			02
03		STRUCTURAL STEEL	03
04			04
05			05
06	PART 1 - GENERAL		06
07			07
08	1.01 SUMMARY		08
09			09
10	A. Section Includes:		10
11	1. Structural steel.		11
12			12
13	B. Related Sections include but are not necessarily limited to:		13
14	1. Division 0 - Bidding Requirements, Contract Forms, and		14
15	Conditions of the Contract.		15
16	2. Division 1 - General Requirements.		16
17	3. Section 02361 - Driven Steel Sheet Piling.		17
18			18
19	1.02 QUALITY ASSURANCE		19
20			20
21	A. Referenced Standards:		21
22	1. American Institute of Steel Construction (AISC):		22
23	a. Specifications for Structural Steel Buildings		23
24	(referred to herein as AISC Specification).		24
25	b. Code of Standard Practice for Steel Buildings and		25
26	Bridges (referred to herein as AISC Code of Standard		26
27	Practice). Section 4, Paragraph 4.2.1 is		27
28	specifically excluded from these Specifications.		28
29	c. Quality Certification Program.		29
30	d. Manual of Steel Construction.		30
31	2. American Society for Testing Materials (ASTM):		31
32	a. A36, Structural Steel.		32
33	3. American Welding Society (AWS):		33
34	a. A5.1, Specification for Mild Steel Covered Arc		34
35	Welding Electrodes.		35
36	b. A5.5, Specification for Low-Alloy Steel Covered Arc		36
37	Welding Electrodes.		37
38	c. A5.17, Specification for Bare Mild Steel Electrodes		38
39	and Fluxes for Submerged-Arc Welding.		39
40	d. A5.18, Specification for Mild Steel Electrodes for		40
41	Gas Metal-Arc Welding.		41
42	e. A5.20, Specification for Mild Steel Electrodes for		42
43	Flux-Cored Arc Welding.		43
44	f. A5.23, Specification for Bare Low-Alloy Steel		44
45	Electrodes and Fluxes for Submerged Arc Welding.		45
46	g. D1.1, Structural Welding Code (referred herein as AWS		46
47	Code.		47
48			48
49	B. Qualifications:		49
50	1. Steel fabricator: Minimum of 3 years experience in		50
51	fabrication of structural steel and shall be certified		51
52	under AISC Quality Certification Program Category-I.		52

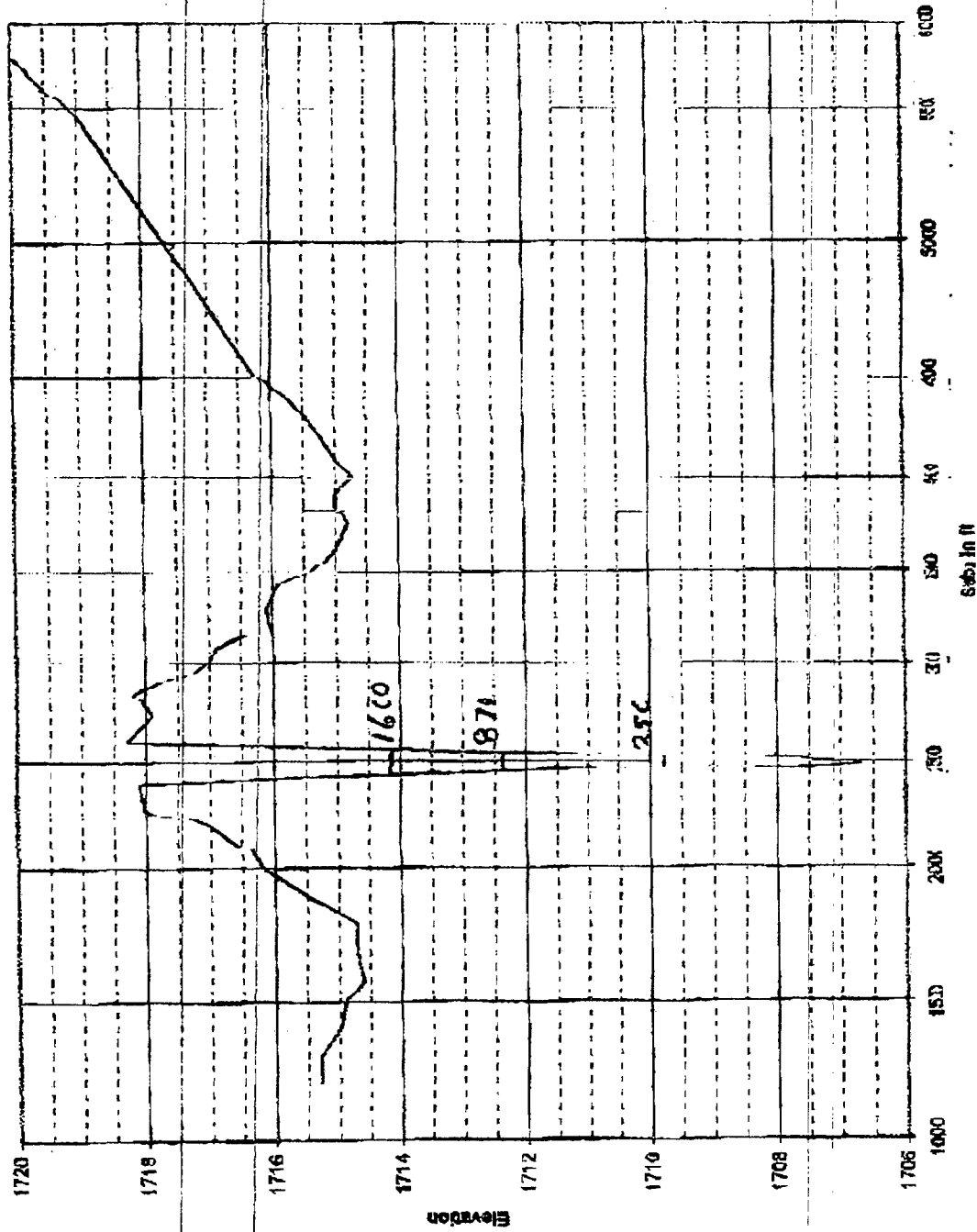
01	2. Steel erector: Minimum of 3 years of experience in	01
02	erection of structural steel.	02
03		03
04	1.03 SUBMITTALS	04
05		05
06	A. Shop Drawings:	06
07	1. See Section 01340.	07
08	2. Fabrication and/or layout drawings:	08
09	a. Steel erection plans and details including connection	09
10	details:	10
11	1) Show all cuts, copes, holes and welds.	11
12	2) Indicate all shop and field welds using AWS	12
13	symbols.	13
14	b. Prepare structural steel shop drawings under National	14
15	Institute of Steel Detailing Quality Procedures	15
16	Program certification.	16
17	c. Complete shop drawings for all of the work showing	17
18	clearly all pieces, details and connections.	18
19	d. All shop drawings checked and signed approved by the	19
20	checker before submittal.	20
21	e. Correct any incorrect or unacceptable material or	21
22	fabrication due to incorrect detailing, shop work, or	22
23	erection, without additional charge.	23
24	3. Product technical data including:	24
25	a. Acknowledgement that products submitted meet	25
26	requirements of standards referenced.	26
27	4. Certifications:	27
28	a. Copies of welding certificates for each person	28
29	assigned to perform field welding indicating	29
30	compliance with testing specified by AWS.	30
31	5. Test reports:	31
32	a. Certified copies of mill tests.	32
33		33
34	1.04 MEASUREMENT AND PAYMENT	34
35		35
36	A. All measurement and payment will be based on completed work	36
37	performed in accordance with the Contract Drawings and	37
38	Specifications. No special pay items are established for	38
39	these items. This work shall be considered incidental to the	39
40	project and included in the lump sum price.	40
41		41
42		42
43	PART 2 - PRODUCTS	43
44		44
45	2.01 MATERIALS	45
46		46
47	A. Steel, Structural Shapes and Plate: ASTM A36, unless noted	47
48	otherwise on Drawings.	48
49		49
50	B. Welding Electrodes:	50
51	1. Shielded metal-arc: AWS A5.1 or AWS A5.5, E70XX.	51
52	2. Submerged-arc: AWS A5.17 or A5.23, F7X-EXXX.	52

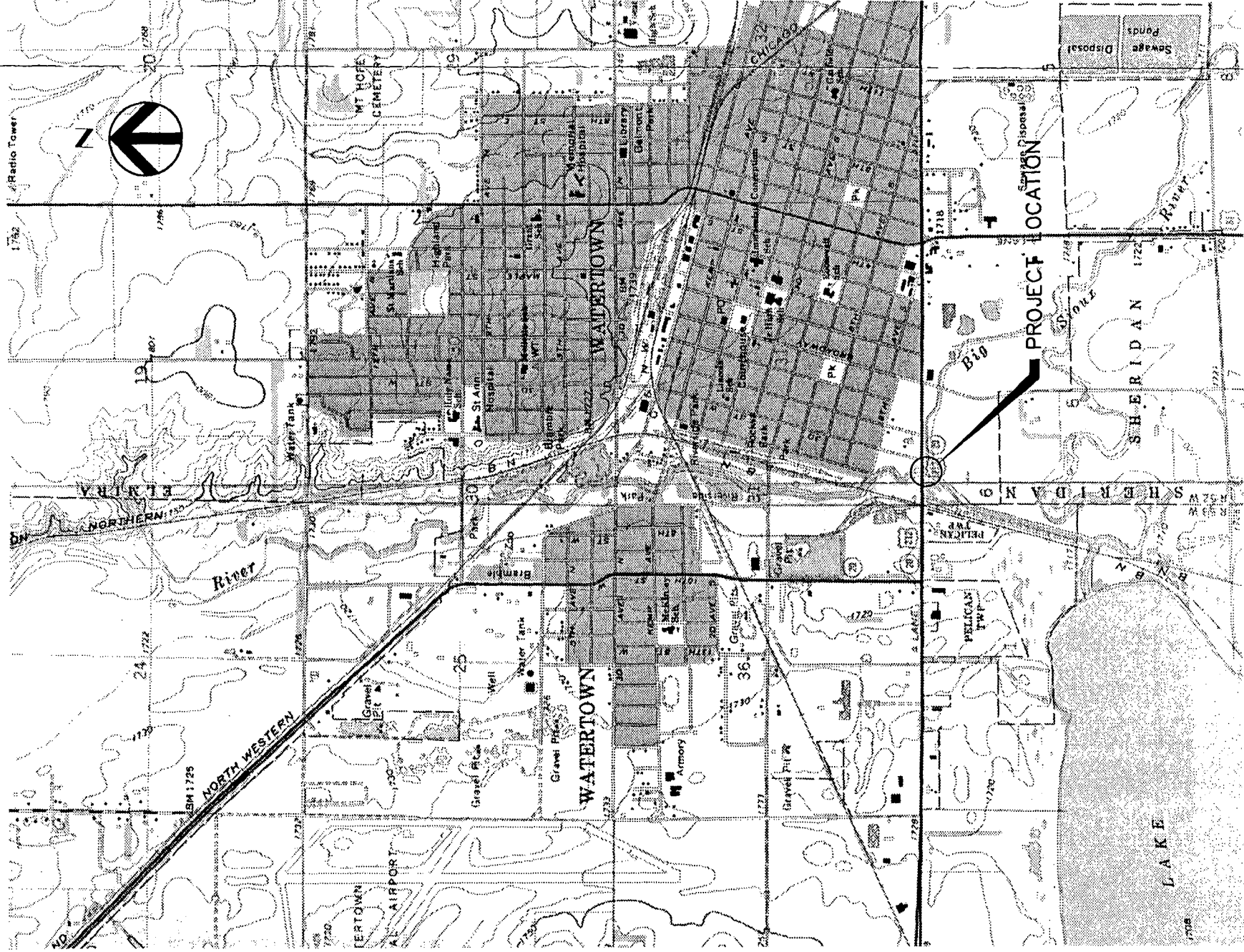
01	3. Gas metal-arc: AWS A5.18, E70S-X or E70U-1.	01
02	4. Flux cored-arc: AWS A5.20, E70T-X (except 2, 3, 10, GS).	02
03		03
04	2.02 FABRICATION	04
05		05
06	A. Comply with requirements of applicable building codes and	06
07	AISC Specification with modifications and additional	07
08	requirements specified herein.	08
09		09
10	B. Minimize the amount of field welding. Shop assemble	10
11	components into largest size possible commensurate with	11
12	transportation and handling limitations.	12
13		13
14	C. Make splices only where indicated or where approved.	14
15		15
16	D. Grind smooth all rough welds. Sharp steel edges shall be	16
17	ground to approximately 1/8 IN radius.	17
18		18
19	2.03 SHOP WELDING	19
20		20
21	A. Comply with AWS Code, and other requirements indicated	21
22	herein, for all welding, techniques of welding employed,	22
23	appearance and quality of welds, and methods used to correct	23
24	defective work.	24
25		25
26	B. Test and qualify welders, welding operators and tackers in	26
27	compliance with AWS Code for position and type of welding to	27
28	which they will be assigned.	28
29		29
30	C. Before Starting Welding:	30
31	1. Carefully plumb and align members in compliance with	31
32	specified requirements.	32
33	2. Preheat base metal to temperature stated in Table 4.3 of	33
34	AWS Code.	34
35	a. When no preheat temperature is given in Table 4.3 and	35
36	base metal is below 50 DegF, preheat base metal to at	36
37	least 70 DegF.	37
38	b. Maintain temperature during welding.	38
39	c. Preheat surface of all base metal within distance	39
40	from point of welding equal to thickness of thicker	40
41	part being welded or 3 IN, whichever is greater, to	41
42	specified preheat temperature.	42
43	d. Maintain this temperature during welding.	43
44	3. Comply with Section 3 of AWS Code for assembly and	44
45	surface preparation.	45
46		46
47	D. Manual Shielded Metal-Arc Welding: Comply with Article 4.6	47
48	of AWS Code.	48
49		49
50	E. Low Hydrogen Electrodes: Dry and store electrodes in	50
51	compliance with AWS Code.	51
52		52

01	F. Do not perform welding when ambient temperature is lower than	01
02	0 DegF or where surfaces are wet or exposed to rain, snow, or	02
03	high wind, or when welders are exposed to inclement	03
04	conditions.	04
05		05
06		06
07	PART 3 - EXECUTION	07
08		08
09	3.01 GENERAL	09
10		10
11	A. Plumb, align, and set structural steel members to specified	11
12	tolerances. Use temporary guys, braces, shoring,	12
13	connections, etc., necessary to maintain the structural	13
14	framing plumb and in proper alignment until permanent	14
15	connections are made, the succeeding work is in place, and	15
16	temporary work is no longer necessary. Remove and dispose of	16
17	all temporary work and facilities off-site.	17
18		18
19	B. Field Measurement: Take field measurements as necessary to	19
20	verify or supplement dimensions indicated on the Drawings.	20
21	Contractor responsible for the accurate fit of the work.	21
22		22
23	C. Check the elevations of all finished work before starting	23
24	erection. Use surveyor's level. Notify Engineer of any	24
25	errors or deviations found by such checking.	25
26		26
27	3.02 ERECTION	27
28		28
29	A. Conform to provisions of AISC "Code of Standard Practice for	29
30	Steel Buildings," Section 7 "Erection," except where shown or	30
31	specified otherwise in Contract Documents. Provisions in	31
32	Contract Document shall hold priority to provisions of "Code	32
33	of Standard Practice for Steel Buildings," where conflicts	33
34	exist.	34
35		35
36	B. Framing member location tolerances after erection shall not	36
37	exceed the frame tolerances listed in Article 3.03.	37
38		38
39	C. Erect plumb and level; introduce temporary bracing required	39
40	to support erection loads.	40
41		41
42	D. Welding: Conform to AWS D1.1 "Structural Welding Code" and	42
43	requirements of Article 2.03. When joining two sections of	43
44	steel of different ASTM designations, welding techniques	44
45	shall be in accordance with a qualified AWS D1.1 procedure.	45
46		46
47	E. Clean stored material of all foreign matter accumulated	47
48	during erection period.	48
49		49
50	F. Clean bearing and contact surfaces before assembly.	50
51		51
52	3.03 FIELD QUALITY CONTROL	52

01		01
02	A. Tolerances (unless otherwise noted on the Contract Drawings):	02
03	1. Frame placement, after assembly and before welding or	03
04	tightening:	04
05	a. Deviation from plumb, level and alignment: 1 in 500,	05
06	maximum.	06
07		07
08	END OF SECTION	08

Figure 1
Section II





1. EXISTING TOPOGRAPHY AND SURVEY INFORMATION SHOWN ON PLANS ARE BASED ON SURVEY PERFORMED BY SCOTT ENGINEERING IN JANUARY 1996.

2. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE ALL UTILITIES AND PROTECT THEM FROM DAMAGE. THE LOCATION OF ALL AERIAL AND UNDERGROUND UTILITIES SHOWN ARE APPROXIMATE AND SOME ITEMS MAY NOT BE INDICATED IN THE PLANS. UNDERGROUND UTILITIES, WHETHER INDICATED OR NOT, WILL BE LOCATED AND FLAGGED BY THE UTILITIES AT THE REQUEST OF THE CONTRACTOR. THE CONTRACTOR SHALL NOT BEGIN EXCAVATION IN THE AREA OF UNDERGROUND UTILITIES UNTIL ALL SUCH UTILITIES HAVE BEEN LOCATED AND IDENTIFIED AND THEN ONLY WITH CARE TO AVOID ANY POSSIBILITY OF DAMAGE TO THE UTILITY FACILITY. THE CONTRACTOR SHALL BEAR THE TOTAL EXPENSE OF REPAIR OR REPLACEMENT OF SAID UTILITIES DAMAGED BY OPERATION IN CONNECTION WITH PROSECUTION OF THE WORK. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION EFFORTS WITH ALL OTHER LOCAL UTILITY COMPANIES PERTINENT TO PROSECUTION OF THE WORK.

3. CONTRACTOR SHALL APPLY FOR AND OBTAIN ALL PERMITS NECESSARY TO PERFORM WORK.

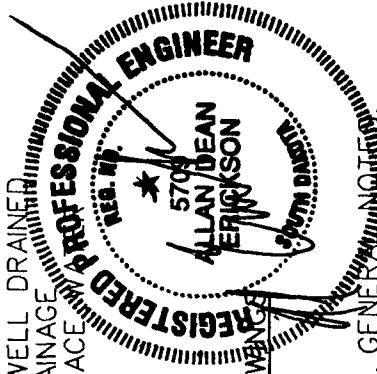
4. CONTRACTOR STAGING AND STORAGE AREAS SHALL BE RESTORED TO THEIR ORIGINAL CONDITION OR BETTER THAN EXISTING UPON COMPLETION OF USE.

5. ALL PAVED HAUL ROUTES SHALL BE MAINTAINED FREE OF MUD AND DEBRIS RESULTING FROM CONSTRUCTION OPERATIONS. ANY PAVEMENT DAMAGE RESULTING FROM HAULING OPERATIONS SHALL BE REPAIRED BY THE CONTRACTOR AT NO EXPENSE TO THE OWNER.

6 CONTRACTOR TO MAINTAIN SURVEY STATIONS AND CONTROL LOCATIONS.

7. CONTRACTOR SHALL PROVIDE A WORK SEQUENCE SCHEDULE TO THE ENGINEER WITHIN 10 DAYS AFTER NOTICE TO PROCEED. UPON ENGINEER'S APPROVAL OF THE SCHEDULE AND PLANS, WORK MAY COMMENCE.

8. THE GRADE SHALL BE MAINTAINED SO THAT THE SURFACE IS WELL DRAINED AT ALL TIMES. WHEN NECESSARY, TEMPORARY DRAINS AND DRAINAGE DITCHES SHALL BE INSTALLED TO INTERCEPT OR DIVERT SURFACE WATER WHICH MAY AFFECT THE WORK.



—OE—	OVERHEAD ELEC. LINE
	POWER POLE
	DECIDUOUS TREES
	PARK MONUMENT

FOR

HDR Engineering, Inc.

[illegible]

LAKE PELICAN WATER DISTRICT
WATER QUALITY DIVERSION WEIR
BIG SIOUX RIVER
WATERTOWN, SOUTH DAKOTA

LOCATION MAP, GENERAL NOTES,
INDEX OF DRAWINGS AND LEGEND

Date	JUNE 1986	Project No.	08260-001-135	Drawing No.	C-1	Task
Year	NO SCALE					

LAKE PELICAN DIVERSION WORKS PRELIMINARY DESIGN

1.0 HYDROLOGY/HYDRAULICS

1.1 Lake Pelican Inlet-Outlet Relationship

With the location of Lake Pelican being off-stream storage connected to the Big Sioux River by an inlet and outlet channel, the flow into the lake is defined as a function of the stage in the Big Sioux River. When the stage in the Big Sioux River is lower than the top of the Lake Pelican diversion weir there is flow into Lake Pelican from the Big Sioux River.

The discharge rating curve for the Big Sioux River at the Lake Pelican Diversion Weir is shown on Figure 1. This relationship was defined by analysis of historical flood events developed by the Corps of Engineers (COE) Omaha District. This information is provided in their report in "Flood Control for Watertown and Vicinity South Dakota" dated August 1994. Table 1 presents a modification of these relationships.

Table 1. Existing Discharge/Probability/Stage Relationships.

Event	Discharge (c.f.s.)			
	Big Sioux River Watertown Gage	Lake Kampeska Inlet/Outlet	Big Sioux River ¹ Lake Pelican Inlet/ Watertown Reach	Big Sioux River Downstream Lake Pelican Inlet
2 yr	990	460	530	250
3 yr	1,600	750	850	
10 yr	3,100	1,500	1,600	870
50 yr	6,700	3,300	3,400	2,000
100 yr	8,700	4,400	4,300	2,575
500 yr	16,000	9,200	6,800	4,100

* Data was not available in COE's report.

¹ Upstream of Lake Pelican Diversion.

2.1 Objectives

Lucas Beck

- ## 2.2 Assumptions

- The maximum allowable discharge downstream of the Lake Pelican diversion weir is 1,600 cfs. The COE report found that at 1,600 cfs, the 10-year event, the flows generally stay within the channel banks. Minor flooding would occur up to 1,600 cfs in low lying areas.
- The hydrologic/hydraulic data presented in the Omaha's District's U.S. Army Corps of Engineer's "Flood Control for Watertown and Vicinity, South Dakota, August 1994 was appropriate for analysis.
- The historical outlet of Lake Pelican will be maintained as the principal outlet and the Lake Pelican Canal Weir can be constructed so as not to be a factor in Lake Pelican flood control.

- Thowness
drawings have
detailed mapping
Not necessary
applies to
Kampeska
8707*
- Flood easements, levees or structures will be required to mitigate flood damages from increased frequencies due to the diversion structure.
 - The Pelican Lake diversion canal and Lake Pelican are maintained at normal depth and do are not permitted to cause backwater at the weir.

2.3 Hydraulic Analysis

The Corps of Engineers HEC-2 backwater model for the Big Sioux River through the city of Watertown was obtained and used as the basis for the analysis. The model extended downstream of the 20th Street bridge to the Old Watertown gage station or upstream of the Lake Kampeska inlet/outlet.

2.3.1 Weir Computation

Rating curves were developed for the Lake Pelican diversion weir and Lake Pelican canal weir. The proposed Lake Pelican canal weir would consist of a fish weir and an overflow weir. The discharge over the weirs were computed based on the weir equation.

$$Q = CLH^{1.5}$$

where:

- Q = discharge, in cfs
- C = weir coefficient, 2.9 or 3.0 for this analysis
- L = weir length, in feet
- H = head, in feet

2.4 Upstream and Downstream Impacts

In order to evaluate the impacts to downstream and upstream reaches, several HEC-2 analyses were made, assuming a constant discharge in the Big Sioux River. Table 2 shows the design water surface elevations and the constant discharge elevations for the study area. The difference between the 10-year water surface elevation and the water surface elevations for several constant flows was also computed. A positive difference indicates that the constant discharge elevation is greater than the 10-year. A negative difference indicates that the constant discharge does not have a negative effect on the water surface elevations.

It can be seen from Table 2 that there are more cross sections affected by the larger constant discharges than the smaller discharges. For example, in the reach of the Lake Pelican diversion weir an additional 2 feet of flooding would occur near the Highway 212 bridge if 1,600 cfs were diverted downstream.

3.0 FINDINGS

The Lake Pelican canal weir consists of a rectangular fish weir and an overflow weir. The weir lengths and heights were defined at the existing conditions of 1,600 cfs. Table 3 shows the results of the analysis. Under existing conditions 870 cfs is conveyed downstream of the diversion weir and 730 cfs enters Lake Pelican. This is approximately a 60/40 split between the downstream and canal flows under existing conditions.

The canal weirs were designed based on 730 cfs entering the lake. The bottom of the fish weir was set at elevation 1709.7, the same elevation as the top of the Lake Pelican diversion weir. The fish weir head was based on the difference between the water surface elevation at the weir at 1,600 cfs and the bottom of the fish weir. It was found that in order to pass 10% of 1,600 cfs (160 cfs), a 9.3 foot fish weir would be required. The elevation of the top of the fish weir was determined by trial and error. It was found that a 305 foot canal weir at an elevation of 1712.25 would pass the remaining 570 cfs in the canal. A weir 305 foot long appears to be reasonable.

Through an iterative process the flows in the Lake Pelican canal and upstream of Highway 212 and downstream of the diversion weir were found at elevation 1712.25 at the cross section

downstream of the Highway 212 bridge. Under this condition, no flow is flowing over the canal weir, but the fish weir is operating. The only flow through the canal weir would be through the fish passage, or 106 cfs. The flow upstream of Highway 212 would found to be 746 cfs, therefore the flow downstream of the diversion weir was 640 cfs.

The 50-, 100- and 500- year were analyzed under the proposed weir configurations. It was found that the canal weirs did not control the flow into the lake, and that a downstream control governed.

Figure 2 graphically shows the impacts of a project. The shaded area represents the flow that would be diverted downstream of the diversion weir in the Big Sioux River with the project. A maximum of 263 cfs ($369-106$) could be diverted.

LAKE PELICAN DIVERSION WEIR DISCHARGE RATING CURVE

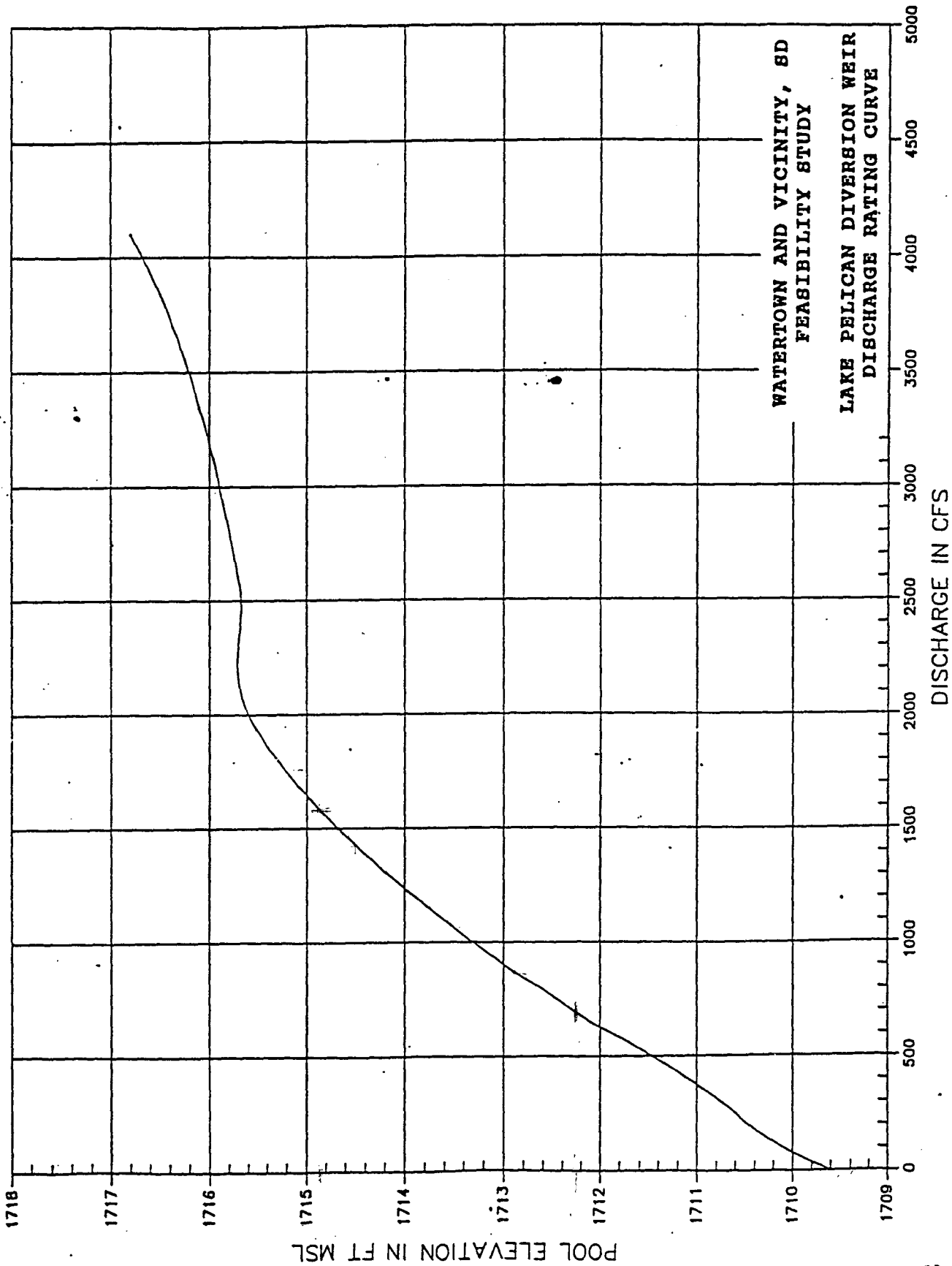


FIGURE 10

Landmark	Section Number	Discharge (cfs)	Existing at 1,600 cfs										Constant Discharge					WSEL Difference				
			10-yr	Existing	1,000 cfs	1,100 cfs	1,200 cfs	1,300 cfs	1,440 cfs	1,600 cfs	1,000 cfs - 10-yr	1,100 cfs - 10-yr	1,200 cfs - 10-yr	1,300 cfs - 10-yr	1,440 cfs - 10-yr	1,600 cfs - 10-yr	1,000 cfs - 10-yr	1,100 cfs - 10-yr	1,200 cfs - 10-yr	1,300 cfs - 10-yr	1,440 cfs - 10-yr	1,600 cfs - 10-yr
Approx. 3,500' d/s of 20th Ave	364.1	870	1705.57	1708.05	1705.82	1705.99	1706.16	1706.32	1706.53	1706.77	0.25	0.42	0.59	0.75	0.96	1.20	0.25	0.43	0.60	0.76	0.99	1.23
d/s face 20th Ave	365	870	1708.05	1708.05	1708.30	1708.48	1708.65	1708.81	1709.04	1709.28	0.25	0.43	0.60	0.76	0.99	1.23	0.25	0.43	0.60	0.76	0.99	1.23
u/s face 20th Ave	8.1	870	1708.66	1708.66	1708.94	1709.14	1709.34	1709.53	1709.79	1710.06	0.29	0.49	0.69	0.88	1.14	1.41	0.29	0.49	0.69	0.88	1.14	1.41
d/s face 20th Ave	8.2	870	1708.70	1708.70	1709.00	1709.21	1709.41	1709.60	1709.86	1710.14	0.30	0.51	0.71	0.90	1.16	1.44	0.30	0.51	0.71	0.90	1.16	1.44
u/s face 20th Ave	8.3	870	1708.71	1708.71	1709.01	1709.22	1709.42	1709.61	1709.87	1710.15	0.30	0.51	0.71	0.90	1.16	1.44	0.30	0.51	0.71	0.90	1.16	1.44
d/s face Hwy 81	10	870	1709.87	1710.18	1710.89	1711.10	1711.29	1711.47	1711.71	1711.97	0.31	0.52	0.72	0.91	1.16	1.42	0.31	0.52	0.72	0.91	1.16	1.42
u/s face Hwy 81	12.1	870	1710.57	1710.89	1711.00	1711.10	1711.29	1711.47	1711.72	1711.97	0.32	0.53	0.72	0.90	1.14	1.40	0.32	0.53	0.72	0.90	1.14	1.40
d/s face S. Broadway	12.2	870	1710.61	1710.92	1711.13	1711.33	1711.52	1711.76	1712.02	1712.28	0.31	0.52	0.72	0.91	1.15	1.41	0.31	0.52	0.72	0.91	1.15	1.41
u/s face S. Broadway	12.3	870	1710.62	1710.93	1711.15	1711.35	1711.53	1711.78	1712.04	1712.30	0.31	0.53	0.73	0.91	1.16	1.42	0.31	0.53	0.73	0.91	1.16	1.42
d/s face S. Broadway	14	870	1711.15	1711.46	1711.72	1711.94	1712.15	1712.43	1712.73	1713.03	0.34	0.57	0.79	1.00	1.28	1.58	0.34	0.57	0.79	1.00	1.28	1.58
u/s face S. Broadway	16.1	870	1712.41	1712.78	1713.03	1713.28	1713.51	1713.81	1714.13	1714.45	0.36	0.62	0.87	1.10	1.40	1.72	0.36	0.62	0.87	1.10	1.40	1.72
d/s face S. Broadway	16.2	870	1712.43	1712.79	1713.05	1713.29	1713.52	1713.85	1714.18	1714.51	0.37	0.62	0.86	1.09	1.39	1.72	0.37	0.62	0.86	1.09	1.39	1.72
u/s face S. Broadway	16.3	870	1712.44	1712.81	1713.07	1713.32	1713.55	1713.88	1714.21	1714.54	0.36	0.62	0.86	1.09	1.39	1.72	0.36	0.62	0.86	1.09	1.39	1.72
d/s face S. Broadway	18	870	1712.72	1713.10	1713.37	1713.62	1713.85	1714.17	1714.51	1714.84	0.37	0.63	0.88	1.11	1.41	1.74	0.37	0.63	0.88	1.11	1.41	1.74
u/s face S. Broadway	20	870	1713.02	1713.43	1713.71	1713.98	1714.24	1714.58	1714.95	1715.30	0.38	0.65	0.90	1.13	1.45	1.79	0.38	0.65	0.90	1.13	1.45	1.79
d/s face of Weir	20.1	870	1713.02	1713.43	1713.71	1713.98	1714.24	1714.58	1714.95	1715.30	0.41	0.70	0.97	1.23	1.57	1.94	0.41	0.70	0.97	1.23	1.57	1.94
u/s face of Weir	20.2	870	1712.98	1713.39	1713.68	1713.95	1714.21	1714.55	1714.92	1715.28	0.41	0.70	0.97	1.23	1.57	1.94	0.41	0.70	0.97	1.23	1.57	1.94
d/s face of Weir	20.3	870	1713.09	1713.50	1713.79	1714.06	1714.31	1714.66	1715.03	1715.39	0.41	0.70	0.97	1.23	1.57	1.94	0.41	0.70	0.97	1.23	1.57	1.94
u/s face of Weir	22	1,600	1713.09	1713.54	1713.83	1714.11	1714.37	1714.72	1715.10	1715.47	0.45	0.74	1.02	1.28	1.63	2.01	0.45	0.74	1.02	1.28	1.63	2.01
d/s face of Highway 212	22.1	1,600	1713.09	1713.54	1713.83	1714.11	1714.37	1714.72	1715.10	1715.47	0.45	0.74	1.02	1.28	1.63	2.01	0.45	0.74	1.02	1.28	1.63	2.01
u/s face of Highway 212	22.2	1,600	1713.13	1713.55	1713.84	1714.12	1714.38	1714.73	1715.11	1715.48	0.45	0.74	1.02	1.28	1.63	2.01	0.45	0.74	1.02	1.28	1.63	2.01
d/s face of Highway 212	22.3	1,600	1713.15	1713.56	1713.85	1714.13	1714.39	1714.74	1715.12	1715.49	0.42	0.71	0.99	1.25	1.60	1.98	0.42	0.71	0.99	1.25	1.60	1.98
u/s face of Highway 212	24	1,600	1713.34	1713.62	1713.91	1714.18	1714.45	1714.80	1715.18	1715.55	0.41	0.70	0.98	1.24	1.59	1.97	0.41	0.70	0.98	1.24	1.59	1.97
d/s face of Foot Bridge	24.1	1,600	1713.35	1713.62	1713.91	1714.18	1714.45	1714.80	1715.18	1715.55	0.28	0.57	0.84	1.11	1.46	1.84	0.28	0.57	0.84	1.11	1.46	1.84
u/s face of Foot Bridge	24.2	1,600	1713.38	1713.63	1713.92	1714.19	1714.45	1714.80	1715.18	1715.55	0.27	0.56	0.84	1.10	1.45	1.83	0.27	0.56	0.84	1.10	1.45	1.83
d/s face of Foot Bridge	26	1,600	1713.97	1713.84	1714.13	1714.39	1714.65	1714.91	1715.17	1715.43	-0.13	0.16	0.42	0.67	0.93	1.19	-0.13	0.16	0.42	0.67	0.93	1.19
u/s face of Foot Bridge	28	1,600	1714.31	1713.99	1714.28	1714.54	1714.80	1715.06	1715.32	1715.58	-0.32	-0.03	0.23	0.47	0.71	0.95	-0.32	-0.03	0.23	0.47	0.71	0.95
d/s face of BNRR	28.1	1,600	1714.35	1714.01	1714.30	1714.56	1714.81	1715.06	1715.31	1715.56	-0.34	-0.05	0.21	0.45	0.69	0.93	-0.34	-0.05	0.21	0.45	0.69	0.93
u/s face of BNRR	28.2	1,600	1714.37	1714.02	1714.31	1714.57	1714.82	1715.07	1715.32	1715.57	-0.34	-0.05	0.21	0.45	0.69	0.93	-0.34	-0.05	0.21	0.45	0.69	0.93
d/s face of BNRR	28.3	1,600	1714.38	1714.02	1714.31	1714.57	1714.82	1715.07	1715.32	1715.57	-0.35	-0.06	0.20	0.44	0.68	0.92	-0.35	-0.06	0.20	0.44	0.68	0.92
u/s face of BNRR	30	1,600	1714.54	1714.10	1714.39	1714.65	1714.90	1715.15	1715.40	1715.65	-0.36	-0.07	0.19	0.43	0.67	0.91	-0.36	-0.07	0.19	0.43	0.67	0.91
d/s face of 4th Ave S	32	1,600	1714.82	1714.24	1714.51	1714.77	1715.03	1715.29	1715.55	1715.81	-0.44	-0.15	0.11	0.36	0.61	0.86	-0.44	-0.15	0.11	0.36	0.61	0.86
u/s face of 4th Ave S	32.1	1,600	1714.82	1714.24	1714.51	1714.77	1715.03	1715.29	1715.55	1715.81	-0.58	-0.28	-0.01	0.24	0.49	0.74	-0.58	-0.28	-0.01	0.24	0.49	0.74
d/s face of 4th Ave S	32.2	1,600	1714.83	1714.24	1714.51	1714.77	1715.03	1715.29	1715.55	1715.81	-0.59	-0.29	-0.02	0.24	0.49	0.74	-0.59	-0.29	-0.02	0.24	0.49	0.74
u/s face of 4th Ave S	32.3	1,600	1714.85	1714.25	1714.52	1714.78	1715.04	1715.30	1715.56	1715.82	-0.60	-0.30	-0.03	0.23	0.48	0.73	-0.60	-0.30	-0.03	0.23	0.48	0.73
d/s face of 4th Ave S	34	1,600	1715.02	1714.34	1714.61	1714.87	1715.13	1715.39	1715.65	1715.91	-0.68	-0.37	-0.10	0.16	0.41	0.66	-0.68	-0.37	-0.10	0.16	0.41	0.66
u/s face of 4th Ave S	36	1,600	1715.39	1714.54	1714.81	1715.07	1715.33	1715.59	1715.85	1716.11	-0.85	-0.54	-0.25	0.02	0.27	0.52	-0.85	-0.54	-0.25	0.02	0.27	0.52
d/s face of CNW RR	36.1	1,600	1715.39	1714.54	1714.81	1715.07	1715.33	1715.59	1715.85	1716.11	-0.85	-0.54	-0.25	0.02	0.27	0.52	-0.85	-0.54	-0.25	0.02	0.27	0.52
u/s face of CNW RR	36.2	1,600	1715.39	1714.54	1714.81	1715.07	1715.33	1715.59	1715.85	1716.11	-0.85	-0.54	-0.25	0.02	0.27	0.52	-0.85	-0.54	-0.25	0.02	0.27	0.52
d/s face of CNW RR	36.3	1,600	1715.40	1714.55	1714.82	1715.08	1715.34	1715.60	1715.86	1716.12	-0.85	-0.54	-0.25	0.02	0.27	0.52	-0.85	-0.54	-0.25	0.02	0.27	0.52
u/s face of CNW RR	38	1,600	1715.50	1714.62	1714.89	1715.15	1715.41	1715.67	1715.93	1716.19	-0.88	-0.57	-0.28	0.01	0.26	0.51	-0.88	-0.57	-0.28	0.01	0.26	0.51
d/s face of Kemp Ave	38.1	1,600	1715.50	1714.61	1714.88	1715.14	1715.40	1715.66	1715.92	1716.18	-0.89	-0.58	-0.29	0.02	0.27	0.52	-0.89	-0.58	-0.29	0.02	0.27	0.52

Table 2. Big Sioux River Existing 10-Year and Constant Discharge Water Surface Elevations

Landmark	Existing at 1,600 cfs			Constant Discharge					WSEL Difference						
	Section Number	Discharge (cfs)	10-yr Existing	1,000 cfs	1,100 cfs	1,200 cfs	1,300 cfs	1,440 cfs	1,600 cfs	1,000 cfs - 10-yr	1,100 cfs - 10-yr	1,200 cfs - 10-yr	1,300 cfs - 10-yr	1,440 cfs - 10-yr	1,600 cfs - 10-yr
w/s face of Kemp Ave	38.2	1,600	1715.52	1714.63	1714.94	1715.23	1715.50	1715.86	1716.26	-0.89	-0.58	-0.29	-0.02	0.34	0.74
	38.3	1,600	1715.54	1714.64	1714.95	1715.24	1715.51	1715.88	1716.28	-0.90	-0.59	-0.30	-0.03	0.34	0.74
	40	1,600	1715.60	1714.68	1714.99	1715.28	1715.55	1715.92	1716.31	-0.92	-0.61	-0.32	-0.05	0.32	0.71
	42	1,600	1715.71	1714.76	1715.07	1715.36	1715.63	1716.00	1716.39	-0.95	-0.64	-0.35	-0.08	0.29	0.68
d/s face of 3rd Ave N	42.1	1,600	1715.70	1714.76	1715.07	1715.35	1715.62	1715.99	1716.38	-0.94	-0.63	-0.35	-0.08	0.29	0.68
w/s face of 3rd Ave N	42.2	1,600	1715.79	1714.81	1715.12	1715.41	1715.68	1716.05	1716.45	-0.98	-0.67	-0.38	-0.11	0.26	0.66
	42.3	1,600	1715.85	1714.84	1715.15	1715.44	1715.72	1716.09	1716.50	-1.01	-0.70	-0.41	-0.13	0.24	0.65
	44	1,600	1716.10	1715.04	1715.35	1715.65	1715.93	1716.28	1716.68	-1.06	-0.75	-0.45	-0.17	0.18	0.58
	46	1,600	1716.24	1715.18	1715.50	1715.79	1716.07	1716.38	1716.78	-1.06	-0.74	-0.45	-0.17	0.14	0.54
d/s face of RR	46.1	1,600	1716.25	1715.18	1715.50	1715.79	1716.07	1716.38	1716.78	-1.07	-0.75	-0.46	-0.18	0.13	0.53
w/s face of RR	46.2	1,600	1716.25	1715.18	1715.50	1715.79	1716.07	1716.39	1716.78	-1.06	-0.75	-0.46	-0.18	0.13	0.53
	46.3	1,600	1716.25	1715.19	1715.50	1715.79	1716.07	1716.39	1716.78	-1.10	-0.79	-0.49	-0.22	0.10	0.50
	48	1,600	1716.39	1715.29	1715.60	1715.90	1716.17	1716.49	1716.89	-1.10	-0.83	-0.55	-0.27	0.05	0.45
	50	1,600	1716.61	1715.47	1715.78	1716.06	1716.34	1716.66	1717.06	-1.14	-0.83	-0.54	-0.26	0.06	0.45
d/s face of 10th Ave N	50.1	1,600	1716.60	1715.47	1715.77	1716.06	1716.34	1716.66	1717.05	-1.13	-0.83	-0.54	-0.26	0.06	0.45
w/s face of 10th Ave N	50.2	1,600	1716.66	1715.50	1715.81	1716.09	1716.37	1716.70	1717.10	-1.16	-0.85	-0.57	-0.29	0.04	0.44
	50.3	1,600	1716.69	1715.52	1715.83	1716.11	1716.39	1716.72	1717.14	-1.17	-0.86	-0.58	-0.30	0.03	0.45
	52	1,600	1717.18	1715.95	1716.25	1716.52	1716.79	1717.13	1717.53	-1.23	-0.93	-0.66	-0.39	-0.05	0.35
	54	1,600	1717.30	1716.08	1716.36	1716.64	1716.90	1717.23	1717.63	-1.22	-0.94	-0.66	-0.40	-0.07	0.33
d/s face 14th Ave N	54.1	1,600	1717.30	1716.08	1716.36	1716.64	1716.90	1717.23	1717.63	-1.22	-0.94	-0.66	-0.40	-0.07	0.33
w/s face 14th Ave N	54.2	1,600	1717.30	1716.08	1716.36	1716.64	1716.90	1717.23	1717.63	-1.22	-0.94	-0.66	-0.40	-0.07	0.33
	54.3	1,600	1717.31	1716.08	1716.37	1716.64	1716.90	1717.23	1717.63	-1.23	-0.94	-0.67	-0.41	-0.08	0.32
	376.2	1,600	1721.51	1719.23	1719.45	1719.65	1719.84	1720.10	1720.39	-2.28	-2.06	-1.86	-1.67	-1.41	-1.12
	378.6	1,600	1724.17	1721.32	1721.53	1721.72	1721.90	1722.14	1722.40	-2.85	-2.64	-2.45	-2.27	-2.03	-1.77

Notes: Positive values for water surface elevation difference indicates that constant discharge elevation greater than 10-year elevation.
Negative values indicate no negative effects due to the constant discharge elevation.

Table 3. Lake Pelican Channel Preliminary Weir Design

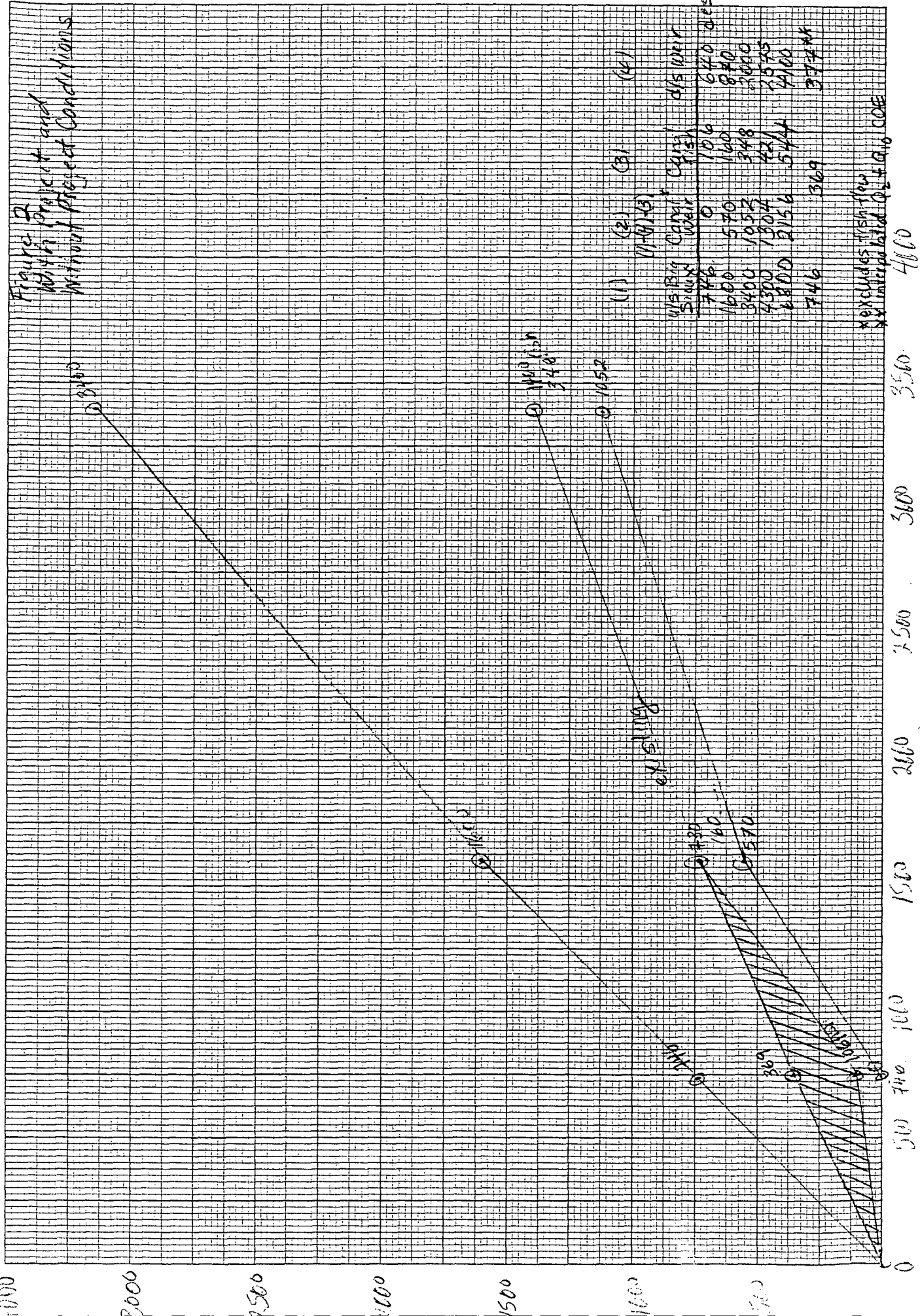
Comment	Stage Big Sioux 22.3*	Big Sioux Sec. 20.2**	Controlling WSEL	Qbigsioux u/s of 212 (cfs)	Qweir d/s of weir (cfs)	FISH WEIR				CANAL WEIR					
						Elevation Bottom	Elevation Top	C	Fish Weir Length (ft)	Fish Flow (cfs)	Weir C	Weir Length (ft)	Weir Q (cfs)	Qtotal Canal (cfs)	Comment
10 -Year	1713.15	1712.98	1712.98	1,600	870	1709.7	1711	2.9	9.3	160	3	68	570	730	
Size Selected	1713.15	1712.98	1712.98	1,600	870	1709.7	1712	2.9	9.3	160	3	196	570	730	
	1713.15	1712.98	1712.98	1,600	870	1709.7	1712.25	2.9	9.3	160	3	305	570	730	
	1713.15	1712.98	1712.98	1,600	870	1709.7	1712.5	2.9	9.3	160	3	571	570	730	
	1713.15	1712.98	1712.98	1,600	870	1709.7	1712.7	2.9	9.3	160	3	1,282	570	730	
***			1712.25	746	640	1709.7	1712.25	2.9	9.3	110	3	305	-	110	
50 -Year	1715.47	1715.21	1715.21	3,400	2,000	1709.7	1712.25	2.9	9.3	348	3	305	4,654	5,002	d/s control Qweir > Qcanal
100 -Year	1716.02	1715.95	1715.95	4,300	2,575	1709.7	1712.25	2.9	9.3	421	3	305	6,504	6,925	d/s control Qweir > Qcanal
500 -Year	1717.24	1717.12	1717.12	6,800	4,100	1709.7	1712.25	2.9	9.3	544	3	305	9,822	10,366	d/s control Qweir > Qcanal

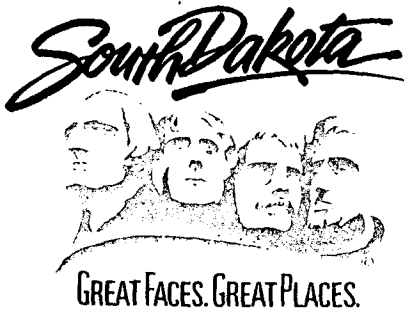
* Section upstream face of Highway 212 bridge, existing conditions. File: EXIST.DAT

** Section at diversion weir on Big Sioux River, existing conditions. File: EXIST.DAT

*** Ran HEC-2 to find the discharge that would yield an elevation of 1712.25 at Section 22.1 (downstream of Highway 212 bridge)

Figure 2
Within Project and
Without Project Conditions





**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE SOUTH DAKOTA 57501-3181

September 18, 1991

Jerry Siegel, Manager
East Dakota Water Development District
524 Seventeenth Avenue
Brookings, SD 57006

Re: Proposed Lake Pelican Improvements?

Dear Mr. Siegel:

I am writing in response to your request for comments on the proposed work to be completed at Lake Pelican in Codington county.

Your reaction to their proposal for a second outlet structure.

If the structure is to be built, an application for a flood control permit would have to be submitted to the Water Management Board for approval. The elevations for the outlet could not exceed 1709.70 feet msl nor could the ordinary high water mark elevation of 1710.20 feet msl be affected by the construction. These elevations were determined by the Water Management Board after public hearing in March 1983.

An explanation of the technical assistance you could provide to help make a detailed evaluation of the proposal.

As you know the Division of Water Rights is a regulatory agency and cannot complete studies for projects that we may have to review or regulate.

An outline of applications/studies/plans that would be required to secure permission from your office to implement the proposal and the likely timeliness for meeting these requirements.

To install an outlet at the same elevation as the current inlet outlet structure would require a flood control permit. This application would be similar to a water permit application and must be noticed for public hearing. The time frame for this application would vary depending on opposition to the application. If there is opposition and the Water Management Board's decision was appealed, the process could take two years.

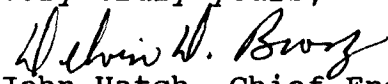
The outlet elevation and the ordinary high water mark for Lake Pelican were established by the Water Management Board in 1983. Once the ordinary high water mark is established and there is no appeal of the Board's decision, the elevation can not be changed unless significant natural changes have occurred. To change the outlet elevation would require a water permit application.

Any state cost-sharing that might be available to assist with project studies, engineering design or construction.

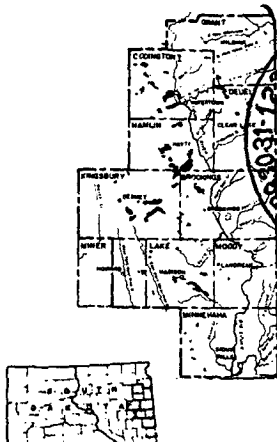
Tim Bjork should be able to answer this question.

I hope I have answered your questions concerning Lake Pelican. Please let me know if we may be of assistance.

Very truly yours,

for 
John Hatch, Chief Engineer
Division of Water Rights
(605) 773-3352

cc: Tim Olson, Department of Game, Fish and Parks
Tim Bjork, Water Resources Management Division, DENR



SOUTH DAKOTA WATER DEVELOPMENT DISTRICT

Office
524 Seventeenth Avenue
BROOKINGS, SOUTH DAKOTA 57006
TELEPHONE (605) 692-5185

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Doug Alvine, Regional Director - Dept. of GF&P
Ken Madison, DENR Regional Office - Watertown
Wally Redlin, EDWDD Director - Watertown

SUBJECT: Discussions on Proposed Lake Pelican Improvements

FROM: Jerry L. Siegel, Manager

DATE: September 10, 1991

1. On August 27, Lake Pelican members E. C. Krull and E. B. Oleson travelled to the Water Development District (WDD) office to visit with me about possible improvements to Lake Pelican.
2. Previous to this visit, Mr. Krull stopped and called the WDD office in June to ask us to compile a list of lake projects cost-shared by the WDD. We prepared and sent the list to him on July 15, 1991. On July 10, the Lake Pelican Water District adopted a resolution which was sent to Robert Roberts, Secretary, DENR. The resolution recommended three major improvements:
 - a. A control dam to maintain the lake water level,
 - b. Dredging with sediments used to establish a marina near Watertown, and
 - c. Islands established for wildlife habitat and control of wave action which is eroding shoreline.
3. Mr. Krull expressed his frustrations over the proposed EPA Phase I Diagnostic Feasibility Study for Lake Pelican because the lake has already been studied to death. Tim Bjork, in a letter to Mr. Krull dated 7/30/91, noted (a) EPA denied a FY90 Lake Pelican Phase I application due to insufficient federal funding and (b) DENR was resubmitting an application to EPA this fall with high DENR priority. I sympathized with his

feeling about more studies but noted a Phase I is nonetheless a required "hoop" for any EPA cost-shared implementation project.

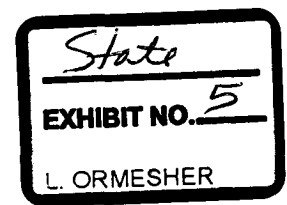
4. Mr. Krull expressed frustration over getting "jacked up" last spring to raise money for Lake Pelican sediment analysis. He secured the requested funding but was concerned there had been no apparent DENR follow through. Tim Bjork advised me this morning, however, the sediment analysis has been done and local entities are being billed for it.
5. Mr. Krull stated Lake Pelican officials are concerned they would get "swallowed up" in a joint Phase I study with Lake Kampeska so want to proceed alone if a Phase I is made. I told him Lake Campbell Association and Lake Hendricks Association officials were similarly apprehensive earlier about hiring a joint study coordinator. I noted, however, Phase I study evaluations and recommendations are not competitive so there was no reason to be apprehensive about a joint study with Lake Kampeska. I noted a joint study would be a good business practice because it would reduce local costs. Even with a joint study, Lake Campbell and Lake Hendricks each provided \$10,000 local match; the WDD also provided \$5,000 match for each study.
6. Mr. Krull indicated he feels their best approach is to select and push for constructions of a new control dam, a project which can be implemented without EPA funding. This would allow them to move forward and build a successful Lake Pelican improvement program without having to wait two years for a Phase I study.
7. I asked why they want to install a second control structure and noted the WDD provided \$5,000 in 1988 to help the Lake Pelican Association rebuilding the Big Sioux River (BSR) dam just south of Highway 212 which doubles as a lake outlet structure. He explained the structure would be similar in design but likely larger than the second Lake Poinsett outlet structure which was built in 1988-89. Their proposed dam would be on the diversion channel just southwest of the BSR dam/lake outlet structure. It would have two major functions:
 - a. In the spring, when there was sufficient BSR flow, the lake would be allowed to fill to some predetermined height (2"-12") above the level of the BSR structure and then the structure would be closed to retain this extra water.
 - b. If the lake was already at the predetermined height above the existing BSR structure when the BSR was in flood stage, the dam would be closed to prevent excessively high lake levels for occurring.
8. I asked about local funding. A check of our files later determined the second Lake Poinsett outlet structure cost \$112,000. Mr. Krull stated their Water Project District raises about \$1,700/year in tax revenues. Their levy has been used

thus far to repay a \$5,000 loan from the state revolving fund. That loan was used in 1988 to rebuild the BSR dam noted above. I noted lake residents would need to come up with a significant portion of project costs. Mr. Krull asked why that should be since the general public uses the lake extensively. I noted use by the general public is the usual justification basis for some city, county, WDD, state or federal cost-sharing. Lakeshore residents, however, are still considered primary beneficiaries. I commented about the large amount of local funds raised by the Punished Woman's Lake Association despite the lack of any major financial base in the area.

9. I noted the following reservations and pre-requisites for implementing the proposed second outlet structure:
 - a. The ordinary high water mark of 1710.2 ft. msl established by DENR's Division of Water Rights needs to be taken into consideration. Since the proposed second dam would raise the operating lake level, the Association/Water Project District would need to secure flood easements from all lakeshore landowners. I cautioned there was already concern by some lakeshore landowners and local/state officials over shoreline erosion that occurs during high lake levels.
 - b. A state flood control permit would likely need to be secured. This process, which involves the Division of Water Rights and Board of Water Management requires 6-12 months even when everyone is favorable and could take 16-24 months or longer if someone was opposed to the idea. I noted the Lake Association/Project District would likely need to finance a preliminary engineering study outlining design, potential impacts and costs before the state would act on a proposed permit for the structure.
10. I reviewed the Pelican Lake OHWM investigation report prepared in February, 1981 by DWNr. The report notes diversion of water from the BSR into the lake was accomplished by construction of a diversion dam across the river and connecting the river to the lake with a channel. The diversion dam is also the lake outlet structure and has an overflow elevation of 1,709.7 ft. msl. Originally, planks could be removed from one section of the dam to lower the lake level. Apparently, the structure rebuilt in 1988 does not have provision for lowering the elevation below 1709.7.
11. Mr. Krull asked me to take the lead in moving their proposal forward. I noted I was glad to assist but I am responsible for providing technical assistance to many other projects. Thus, a strong project ramrod from the lake is needed to implement a project of this type. I offered, however, to get the ball rolling by outlining their proposal, bringing it to the attention of pertinent local/state officials, and determining the steps/actions needed to implement it.

12. With this letter I am asking state officials to provide me with the following information. I will make copies of your responses for Lake Pelican officials.
 - a. Your reaction to their proposal for a second outlet structure.
 - b. An explanation of the technical assistance you could provide to help make a detailed evaluation of the proposal.
 - c. An outline of applications/studies/plans that would be required to secure permission from your office to implement the proposal and the likely timeliness for meeting these requirements.
 - d. Any state cost-sharing that might be available to assist with project studies, engineering design or construction.
13. I suggested Lake Pelican Association/Project District officials should take the following initial steps:
 - a. Hold a well publicized public meeting to secure input from landowners around the lake and local officials. WDD and DENR officials should be in attendance. If any shoreline landowners oppose the second structure and would not grant an easement for higher water levels, the proposal would be very difficult to implement.
 - b. They need to talk to Ardell Aason, a civil engineer who lives at the lake, to find out whether he is interested in conducting the preliminary engineering study. If so, they should determine what he would charge for an appropriate evaluation of the proposal plus the following engineering design, plans and specs.
 - c. Determine what their potential sources of cost-sharing are and whether there is any likelihood of raising the \$100,000-plus cost involved.

JLS/kah



MARK D. RATH

EDUCATION

B.S. Agricultural Engineering, South Dakota State University (1985). Emphasis on soil and water engineering.

M.S. Agricultural Engineering, South Dakota State University (1994). Thesis topic: Feasibility of Subsurface Irrigation/Drainage Systems in Eastern South Dakota.

CAREER EXPERIENCE

Natural Resources Engineer III - SD Dept of Environment and Natural Resources, Water Rights Program: Responsible for water rights activities in the Rapid Valley and the James River Valley drainage basin areas. Review and assess engineering reports and water permit applications. Monitor water use, investigate violation complaints and conduct water permit reviews for licensing.

Graduate Research Assistant - Water Resources Institute, SDSU: Performed feasibility study of subsurface irrigation/drainage system.

Agricultural Engineering Research Technologist - University of Nebraska Panhandle Research Center: Managed the day to day operation for a conservation tillage and irrigation management study.

Research Assistant - Water Resources Institute, SDSU: Compiled data from a 100,000 acre watershed to be used in the Agricultural Non-Point Source Pollution Model (AGNPS) as part of the Rural Clean Water Program.

REGISTRATIONS, PROFESSIONAL AND HONOR SOCIETIES

Engineer in Training, EIT #E5104

Soil and Water Conservation Society

Alpha Epsilon Honor Society

MISCELLANEOUS

Provided testimony before the South Dakota Water Management Board for the following water permit applications:

No. 5845-3, Pro Gold LLC, industrial use; Nos. 2142-2, 2199-2, 2201-2, 2217-2, 2218-2, & 2296-2, City of Rapid City, municipal use; No. 5530-3, Terry L Anderson, irrigation; No. 1498-1, Girl Scouts of America, recreation; No. 2134-2, US Forest Service, fish and wildlife propagation; No. 4354-3, City of Mitchell, qualification change; No. 2132-2, Brett and Joy Heath, irrigation.

CITY OF...

Watertown

South Dakota

"THE CITY ON THE GO!"

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Municipal Airport
882-6209

Building & Plumbing
Inspection Dept.
882-6281

Mt. Hope Cemetery
882-6208

City Attorney
882-6200

Engineering Dept.
882-6202

Finance Office
882-6283

Fire Dept.
886-4793

Library
882-6220
882-6221 - Fax

Park, Rec &
Forestry Dept.
882-6260

Police Dept.
882-6210

Public Works
Dept.
882-6204

Solid Waste
Dept.
882-6219

Street Dept.
882-6287

Watertown Comm.
Recreation Center
882-6250
882-6254 - Fax

Waste Water
Treatment Facility
882-6243
882-6242 - Fax

April 10, 1996

Mr. Greg Hentges
Lake Pelican Water Project District
45182 Air Haven Road
Watertown, SD 57201

Dear Greg:

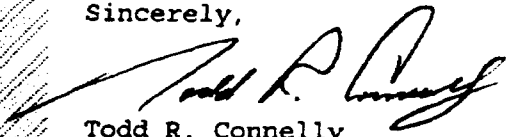
The maps depicting the extent of flooding due to 1600 cfs flows were reviewed by City staff. The elevations of known structures were found to be in excess of the predicted Big Sioux River stages.

This matter was brought before the City Council at their April 1, 1996, meeting. The City Council does not object to the project moving forward with a diversion rate of 1600 cfs.

The City of Watertown recognizes that the information to date reflects the preliminary evaluation of the project and subsequent flooding in the Watertown vicinity. The City of Watertown reserves the right to comment on future information as it becomes available.

If you have any questions or comments, please don't hesitate to contact me.

Sincerely,


Todd R. Connolly
Public Works Director

TRC/crt

cc: Brenda Barger
Vince Foley
Dr. Charles Sherman

Applicant

EXHIBIT NO. 1

L. ORMESHER



DEPARTMENT OF GAME, FISH AND PARKS

Regional Office

3305 West South Street

Rapid City, South Dakota 57702-8160

Copy

April 30, 1996

Mr. Alan W. Schultz
c/o Lake Pelican Board of Directors
4404 20th Avenue S.W.
Watertown, SD 57201

Re: Lake Pelican Canal Weir

Dear Mr. Schultz:

Thank you for your patience in waiting for a reply to the questions posed about fish passage requirements for the proposed Lake Pelican Canal Weir. The long delay in a Game, Fish and Parks response is the result of internal discussions regarding the balancing of fish passage requirements and the incremental changes to water quality improvement in Lake Pelican resulting from different frequencies of fish passage opportunity. The result of our internal discussions is to recommend that the Lake Pelican Canal Weir be constructed according to the design plans provided by HDR Engineering, Inc. in their February 28, 1996 letter. The following text outlines the steps taken to develop this recommendation.

Following receipt of the February 28, 1996 letter from HDR Engineering, Inc. additional flow duration/fish passage analysis was conducted by Mr. Jack Little, P.E. a retired USGS hydrologist. He used critical fish passage velocities for yellow perch (1.77 fps) as the maximum for design analysis. Velocities below this maximum were evaluated as being suitable for all fish species of concern (yellow perch, walleye, northern pike) to pass between Lake Pelican and the Big Sioux River during the period March-May when accommodations for spawning movements are necessary. No flow records were available for the site of the proposed weir, therefore records from the USGS gage (06479438) near Lake Kampeska and records from the Watertown Department of Utilities were used to project conditions that would occur at the site of the Lake Pelican weir. Information regarding the justification for using Kampeska records should be obtained from Mr. Little. GFP concurs with the use of the Kampeska records as suitable for the Lake Pelican weir analysis.

An analysis of the weir was conducted using the historical record developed from the referenced flow data for the years 1980-1995. The March-April time period was closely examined, as this corresponds to the time period when spawning movements occur between the lake and the river.

Using the weir specifications from the HDR letter of February 28, 1996 it was determined that in the sixteen years used as a record, fish passage would be precluded due to excessive velocities or extreme low river flows during a total of six years. The periods of fish passage preclusion came during 1982-83 and 1988-91. It appeared that the weir design contributed to the period of time when fish passage was precluded during 1988-91. This period of four successive years of fish passage preclusion due to the design of the weir was initially evaluated as unacceptable from a fisheries perspective. The weir design was then changed so that the bottom elevation of the weir notch was 2 feet lower than the HDR design specification. Another run of flow characteristic evaluations were made with this modified weir design. Lowering the bottom elevation of the weir notch by 2 feet reduced the number of years when fish passage would be precluded to one, during 1991, when it was likely that there was no flow in the river during the time when spawning movements would occur. An analysis of the 1982-83 period was not done using the modified weir design, but it appears that the modified design would reduce or eliminate both or a portion of both of those periods of fish passage preclusion that resulted from the originally specified weir design. In summary, if the Lake Pelican fish weir design was modified so that the bottom elevation of the notch would be at 1705.7 msl, fish passage velocity requirements will be met in most years, if the flow record developed by using the gage near Kampeska and the municipal records are reflective of actual conditions that would occur in the future.

Following development of the modifications to the original weir design to facilitate fish passage, further evaluation using the same synthetic flow record was done to evaluate the changes in water delivery to Lake Pelican using a modified weir. Nutrient and sediment loading were assumed to be directly related to the amount of water passing through the weir and into Lake Pelican. Water delivery to Lake Pelican is significantly affected by lowering the bottom elevation of the weir to elevation 1705.7 msl. For example, during conditions when 75 cfs of water would be flowing through the original weir notch design, a modified weir notch would allow passage of 130 cfs. This is an increase in flow volume of 173%. If sediment and nutrient loading are directly related to the volume of water passing into Lake Pelican during the initial flow of water down the Big Sioux River, the effectiveness in precluding nutrients and sediment is significantly compromised by a modified weir notch design. This significant compromise in the overall goal of the project is of great concern to GFP.

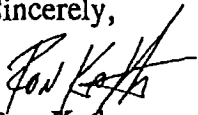
Water quality improvement in Lake Pelican is highly desirable from a fisheries and lake user perspective. GFP is not currently aware of the estimate of the amount of sediment and nutrient loading reductions that construction of the proposed weir will accomplish, however, the significant increase in water delivery to the lake indicates that by modifying the weir so that fish can pass every year when there is flow in the river, significant increases to sediment and nutrient loadings could occur. After considerable discussion, GFP is of the opinion that the water quality benefits to be gained by the original weir design overshadow the benefits to fisheries that would be gained by a lowering of the weir notch as suggested by the fish passage analysis.

No effort was made to evaluate the potential for debris jams to affect the weir or to determine the most likely mechanism to use to clear debris jams when or if they occur.

Thank you for the opportunity to provide information regarding design considerations of the

proposed weir. Please do not hesitate to call me at 605-394-2391 if you have questions.

Sincerely,

A handwritten signature in black ink, appearing to read "Ron Koth", written over the printed name.

Ron Koth
Senior Biologist

c Greg Hentges
Alvine
Hanten
Little
Meester
Lucchesi
Stewart-DENR

COPY

June 7, 1996

HDR

Mr. Steve Naylor
U.S. Army Corps of Engineers
Pierre Regulatory Office
Oahe Dam Administration Building
P.O. Box 1117
Pierre, SD 57501

RE: Pelican Lake Water Quality Diversion Weir
Section 404 Permit Application

Dear Mr. Naylor:

Attached is a completed Department of the Army permit application for a water quality diversion weir to be constructed by the Lake Pelican Water District. HDR Engineering is acting as the agent for the Lake Pelican Water District for the 404 permit. The project will help protect the water quality of Lake Pelican by reducing the inflow of nutrients and sediments during the spring runoff.

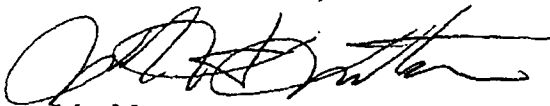
The weir will be constructed on the Pelican Lake Diversion Canal, a right bank diversion canal on the Big Sioux River located approximately 150 feet south of the U.S. Highway 212 bridge. The weir consists of sheet pile protected by rock riprap.

The project has been coordinated with the City of Watertown and South Dakota Department of Game, Fish and Parks. Copies of their comment letters are attached.

If you have any questions or need any additional information, please do not hesitate to contact either Rick Niedergeses at (402) 399-1082 or me at (402) 399-4903.

Sincerely,

HDR ENGINEERING, INC.



John Morton

Attachments:

ENG Form 4345

Figures 1-3

Letter from Watertown SD dated April 10, 1996

Letter from Dept. of Game, Fish and Parks dated April 30, 1996

cc: Rick Niedergeses
Allan W. Schultz
Chair of the Board
Lake Pelican Water District
4404 - 20th Ave. SW
Watertown, SD 57201

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT
(33 CFR 325)

OMB APPROVAL NO. 0710-003
Expires October 1996

Public reporting burden for this collection of information is estimated to average 5 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters Service Directorate of Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302; and to the Office of Management and Budget, Paperwork Reduction Project (0710-0003), Washington, DC 20503. Please DO NOT RETURN your form to either of these addresses. Completed applications must be submitted to the District Engineer having jurisdiction over the location of the proposed activity.

PRIVACY ACT STATEMENT

Authority: 33 USC 401, Section 10; 1413, Section 404. Principal Purpose: These laws require permits authorizing activities in, or affecting, navigable waters of the United States, the discharge of dredged or fill material into waters of the United States, and the transportation of dredged material for the purpose of dumping it into ocean waters. Routine Uses: Information provided on this form will be used in evaluating the application for a permit. Disclosure: Disclosure of requested information is voluntary. If information is not provided, however, the permit application cannot be processed nor can a permit be issued.

One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETED
--------------------	----------------------	------------------	-------------------------------

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME Lake Pelican Water District	8. AUTHORIZED AGENT'S NAME AND TITLE (an agent is not required) HDR Engineering, Inc.
6. APPLICANT'S ADDRESS 4404 - 20th Ave. SW Watertown, SD 57201	9. AGENT'S ADDRESS 8404 Indian Hills Drive Omaha, NE 68114-4049
7. APPLICANT'S PHONE NOS. W/AREA CODE a. Residence 605-886-2213 b. Business 605-886-2786	10. AGENT'S PHONE NOS. W/AREA CODE a. Residence b. Business 402-399-1000

11. STATEMENT OF AUTHORIZATION

I hereby authorize, _____ to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.


APPLICANT'S SIGNATURE

Chairman of Lake Pelican Water District

DATE

NAME, LOCATION AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions)

Pelican Lake Water Quality Diversion Wier

13. NAME OF WATERBODY, IF KNOWN (if applicable)

Pelican Lake supply canal

14. PROJECT STREET ADDRESS (if applicable)

Watertown, SD

15. LOCATION OF PROJECT

Codington County, South Dakota

COUNTY

STATE

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN, (see instructions)

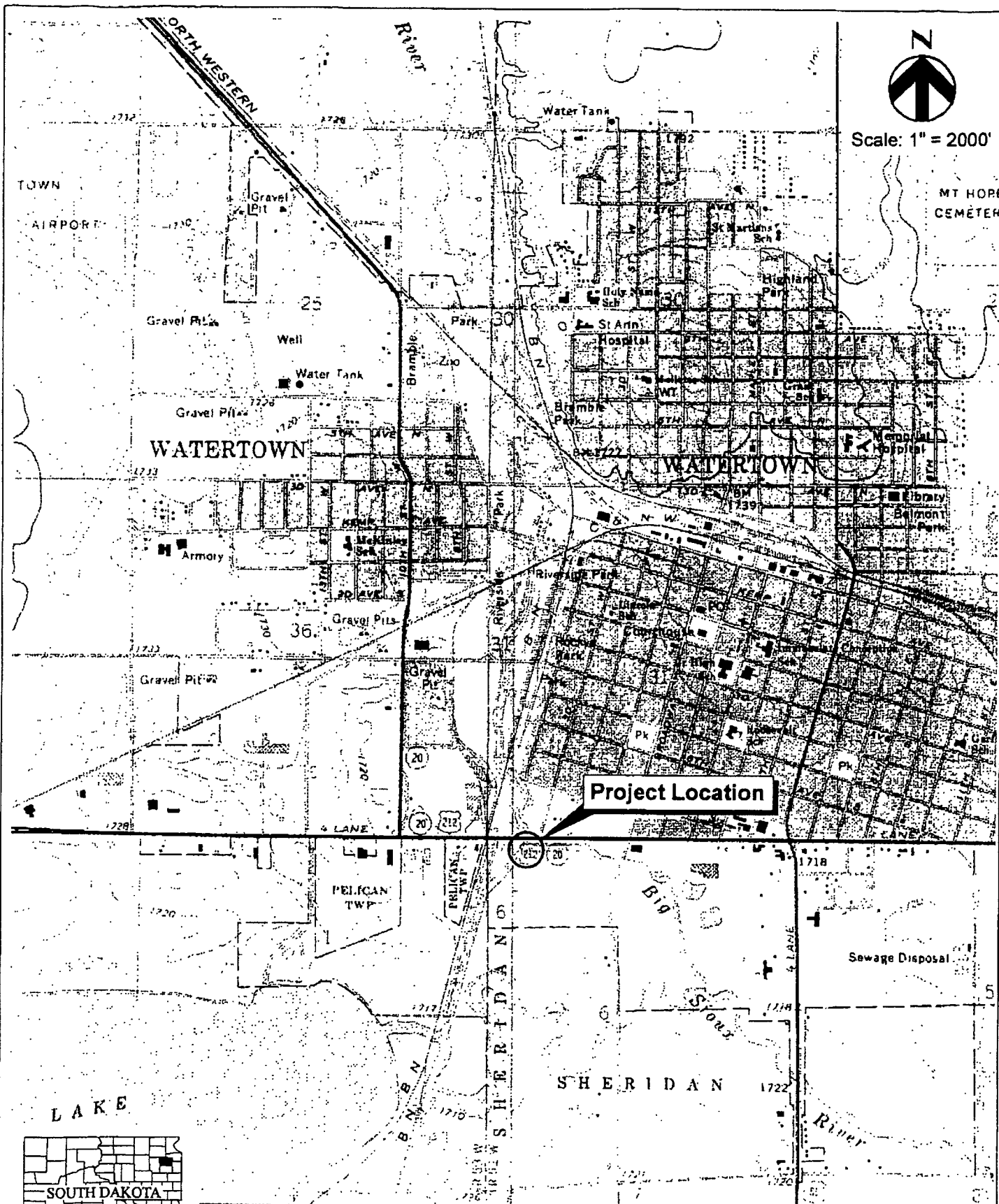
R52W, T116N, Section 6
97° 07' 30" 44° 53' 55"

7. DIRECTIONS TO THE SITE

Project location is approximately 500 feet south of the U.S. Highway 212 Bridge over the Big Sioux River in Watertown, SD.

Pelican Lake Application (Attachment)

18. The project is to construct a water quality diversion weir across the inlet of the Pelican Lake supply canal. The weir will be approximately 110 feet long and seven feet high constructed of sheet pile and riprap. A sheet pile cut off will be constructed in the right overbank upstream from the weir. The weir includes a fish passage opening.
19. The diversion weir will protect the water quality of Pelican Lake by limiting the influx of nutrients and sediments from the Big Sioux River during the early spring run off. The weir will limit flows into Pelican Lake when the Big Sioux River flow rate is less than 1,600 cfs. A fish passage notch in the weir will provide for fish movement. The work will be initiated on August 1, 1996 and will be completed by September 30, 1996.
- #20. The discharge of riprap is required to protect the sheet pile weir.
- #21. The weir will be constructed of sheet pile driven into the bed of the canal and protected by approximately 390 cubic yards of riprap. The riprap will either State Class II or State Class III stone riprap free from overburden, soil, organic material and debris.
- #22. Approximately 2,500 square feet of the Pelican Lake supply canal will be impacted by the footprint of the weir.



Source: United States Geological Survey, Watertown West, S. Dak., 1969
 Watertown East, S. Dak., 1969

Topographic Map

Pelican Lake Association
 Water Quality Diversion Weir
 Big Sioux River
 Watertown, South Dakota

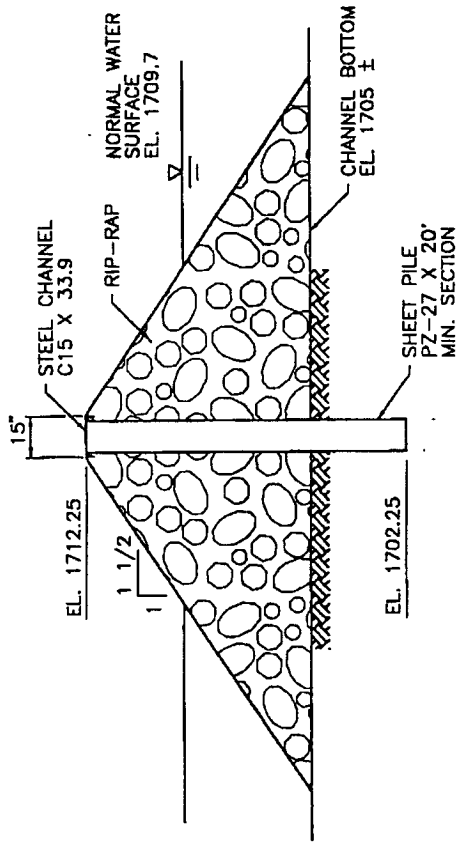


HDR Engineering, Inc.

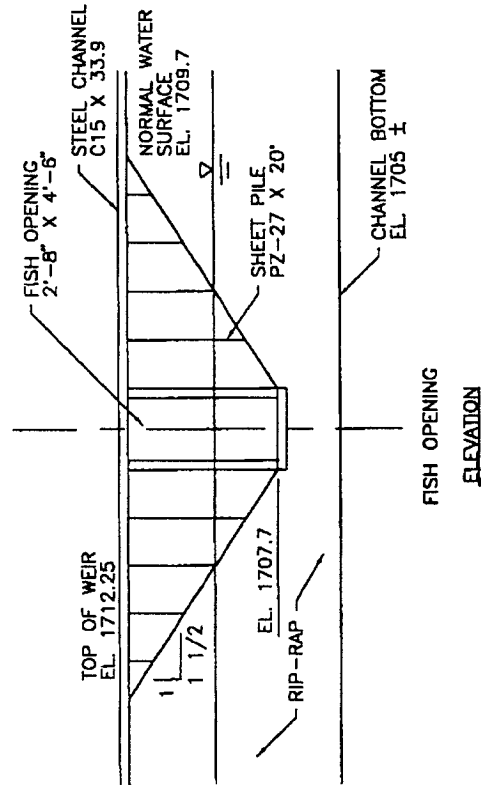
Date
 June 1996

Figure
 1

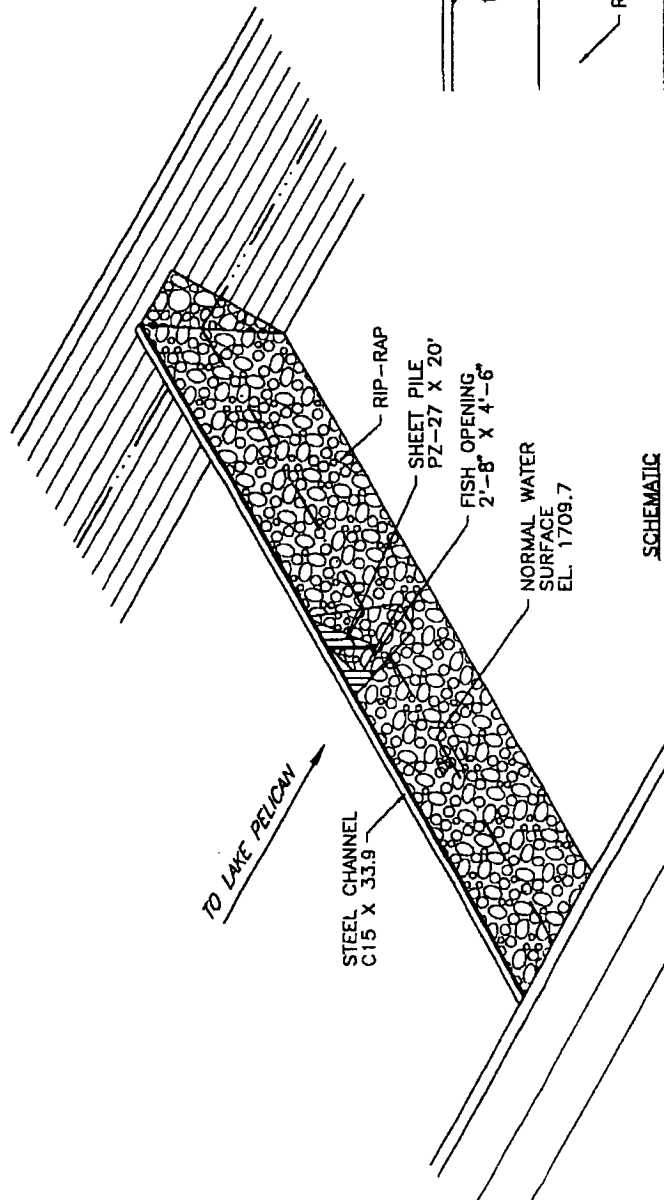
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 5-24-96



SECTION A-A
WIER SECTION



FISH OPENING
ELEVATION



SCHEMATIC

HDR

Details

Pelican Lake Association
Water Quality Diversion Wier
Big Sioux River
Watertown, South Dakota

HDR Engineering, Inc.

Date
June 1996

Figure
3



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3181

June 20, 1996

Alan W Schultz, Chairman
Lake Pelican Water District
4404 - 20th Avenue SW
Watertown SD 57201

Dear Mr. Schultz:

This letter is in response to receipt of a copy of your application for a 404 permit from the US Army Corps of Engineers. We received the application on June 20, 1996.

After reviewing the proposed project, it will be necessary for the district to apply for a flood control permit pursuant to South Dakota Codified Law 46-5-47. This statute requires obtaining a flood control permit to construct facilities for purposes of preventing or alleviating damages caused by flooding. In addition, SDCL 46-5-1.1 does not allow interference with the stage, level, or flow of public waters without lawful authority to do so. We are also advising the Corps of Engineers that a state flood control permit is needed via a copy of this letter.

I have enclosed application forms with an instruction sheet for a flood control permit. Please return the completed forms with the required map and \$150.00 application fee to the "Water Rights Program, 523 E Capitol, Pierre SD 57501." In addition, if any hydrologic study or analysis has been completed concerning potential affects to upstream or downstream properties, please include a copy of this information with the application.

Please contact Eric Gronlund at (605) 773-3352 if you have any questions concerning the application or processing procedure. We will be glad to help in any way possible.

Sincerely,

Ron Duvall
Natural Resources Engineer
Water Rights Program

enclosure

c: John Morton, HDR Engineering, Inc.
Steven E Naylor, Regulatory Program Manager - Corps of Engineers
Tim Olson, Dept. of Game, Fish & Parks

July 12, 1996



Ron Duvall
Natural Resources Engineer
Water Rights Division, DENR
Joe Foss Building
523 E. Capitol
Pierre, SD 57501-3181

RE: Flood Control Permit For Lake Pelican Water District

Dear Mr. Duvall:

Enclosed is the completed information and application fee requested in your June 20, 1996 letter. The preliminary design materials contain the hydrology information which was mentioned in your letter. Letters from the City of Watertown and the South Dakota Game Fish and Parks Department are also enclosed. We are sending the design information, maps, a copy of the 404 Permit information and two notarized copies of the completed application for a flood control permit within the state of South Dakota.

If you have any questions or need any additional information regarding the flood control permit, please call me at 605-886-2213.

Sincerely,

A handwritten signature in cursive script, appearing to read "Alan W. Schultz".

Alan W. Schultz, Chairman
Lake Pelican Water District
4404 20th Ave SW
Watertown, SD 57201



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3181

July 15, 1996

RE: 404 Notice of Permit Pending
Application #: 199630227

STEVE NAYLOR
U S ARMY CORPS OF ENGINEERS
PIERRE REGULATORY OFFICE
OAHE DAM ADMIN BUILDING
PO BOX 1117
PIERRE SD 57501

Dear Mr. Naylor:

The South Dakota Department of Environment and Natural Resources (DENR), Division of Environmental Services, has reviewed the above listed project. This project is located in NW 1/4 of Section 6, T116N, R52W, Codington County, South Dakota.

This Office has no objections to the project provided the applicant and/or contractor(s) comply with the following requirements:

1. All fill material shall be free of substances in quantities, concentrations, or combinations which are toxic to aquatic life.
2. Removal of vegetation shall be confined to those areas absolutely necessary to construction.
3. At a minimum, construction techniques for sediment and erosion control must be utilized, such as those presented in either "Best Management Practices" by DWR (1981), "Best Management Practices" by the Federal Department of Transportation, or the "Erosion Control Manual" by the Colorado Department of Transportation.

4. All material identified in the application as removed waste material, material stockpiles, dredged or excavated material shall be placed for either temporary or permanent disposal in an upland site that is not a wetland (unless approved by permit), and measures taken to ensure that the material cannot enter the watercourse through erosion or any other means.
5. All newly created and disturbed area above the ordinary high water mark which are not riprapped shall be seeded or otherwise revegetated to protect against erosion.
6. Measures shall be taken to minimize any increase in suspended solids and turbidity.
7. The Big Sioux River in this segment is classified by the South Dakota Surface Water Quality Standards and Uses Assigned to Streams for the following beneficial uses:
 - 1) Domestic water supply waters;
 - 5) Warmwater semipermanent fish life propagation waters;
 - 8) Limited contact recreation waters;
 - 9) Wildlife propagation and stock watering waters; and,
 - 10) Irrigation waters.

Because of these beneficial uses, special construction measures may have to be taken to ensure that the total suspended solids standard of 90 mg/L is not violated.

Thank you for the opportunity to provide comments on the proposed permit. A copy of the permit with any special conditions would be appreciated. If you have any questions, please contact this Office.

Sincerely,



John Miller
Environmental Project Scientist
Division of Environmental Services
Phone: (605) 773-3351

cc: Tim Olson, SD GFP
Nell McPhillips, US FWS



PUBLIC NOTICE

**US Army Corps
of Engineers**

Omaha District

Application No: 199630227

Applicant: Lake Pelican Water District

Waterway: Pelican Lake

Date: June 24, 1996

Expiration Date: July 15, 1996



Regulatory Office Oahe Dam Admin Building P.O. Box 1117 Pierre, South Dakota 57501

21 DAY NOTICE

JOINT NOTICE OF PERMIT PENDING

**US ARMY CORPS OF ENGINEERS
AND**

SOUTH DAKOTA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

The application of the Lake Pelican Water District, 4404 - 20th Avenue Southwest, Watertown, South Dakota 57201, for approval of plans and issuance of a permit under authority of the Secretary of the Army is being considered by the District Engineer, US Army Engineer District, Omaha, Nebraska.

The applicant requests authorization to construct a water control structure (diversion weir) across the Pelican Lake inlet/outlet channel. The project is located in the Northwest Quarter of Sections 6, Township 116 North, Range 52 West, Codington County, South Dakota.

The proposed project will consist of the construction of a combination steel sheet pile and riprap weir structure approximately one hundred ten (110) feet long and seven (7) feet high. The sheet piling will be driven into the bed of the channel and supported by approximately three hundred sixty (360) cubic yards of either State Class II or State Class III stone riprap. A fish passage notch in the weir will provide for fish movement. The weir is designed to limit flows into Pelican Lake when the Big Sioux River flow rate is less than 1,600 cubic feet per second. The plans include the construction of a sheet pile "cut off" in the right overbank upstream from the weir. The work is scheduled to begin August 1, 1996, with a completion date of September 30, 1996.

The purpose of the project is to protect the water quality of Pelican Lake by limiting the influx of nutrients and sediments from the Big Sioux River during the early Spring runoff.

The South Dakota Department of Environment and Natural Resources, Division of Environmental Regulation, 523 East Capitol Avenue, Pierre, South Dakota 57501-3181, will review the proposed project for state certification in accordance with the provisions of Section 401 of the Clean Water Act. The certification, if issued, will express the State's opinion that the operations undertaken by the applicant will not result in a violation of applicable water quality standards. The South Dakota Department of Environment and Natural Resources hereby incorporates this public notice as its own public notice and procedures by reference (ARSD 74:03:02).

Omaha District will comply with the National Historic Preservation Act of 1966 and 36 CFR 800. We have checked the National Register of Historic Places and "its current supplements," and no property listed in the Register or proposed for listing is located in the permit area. This is the extent of our knowledge about historic properties in the permit area at this time. However, we will evaluate input by the State Historic Preservation Officer and the public in response to this public notice, and we may conduct or require a reconnaissance survey of the permit area or check for unknown historic properties, if warranted.

In compliance with the Endangered Species Act, our review indicates that the proposed activity will not affect species designated as threatened or endangered pursuant to the Endangered Species Act or their critical habitat.

The decision whether to issue a permit will be based on an evaluation of the probable impacts including cumulative impacts of the proposed activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefit which reasonably may be expected to accrue from the proposals must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the activity will be considered including the cumulative effects thereof; among those are conservation, economics, aesthetics, general environmental concerns, wetlands, cultural values, fish and wildlife values, flood hazards, flood plain values, land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food production, and, in general the needs and welfare of the people. In addition, the evaluation of the impacts of the project on public interest will include application of the guidelines promulgated by the Administrator, Environmental Protection Agency, under authority of Section 404(b) of the Clean Water Act (40 CFR Part 230).

The Corps of Engineers is soliciting comments from the public; Federal, state, and local agencies and officials; Indian Tribes; and other interested parties in order to consider and evaluate the impacts of this proposed activity. Any comments received will be considered by the Corps of Engineers to determine whether to issue, modify, condition or deny a permit for this proposal. To make this decision, comments are used to assess impacts on endangered species, historic properties, water quality, general environmental effects, and the other public interest factors listed above. Comments are used in the preparation of an Environmental Assessment and/or an Environmental Impact Statement pursuant to the National Environmental Policy Act. Comments are also used to determine the need for a public hearing and to determine the overall public interest of the proposed activity.

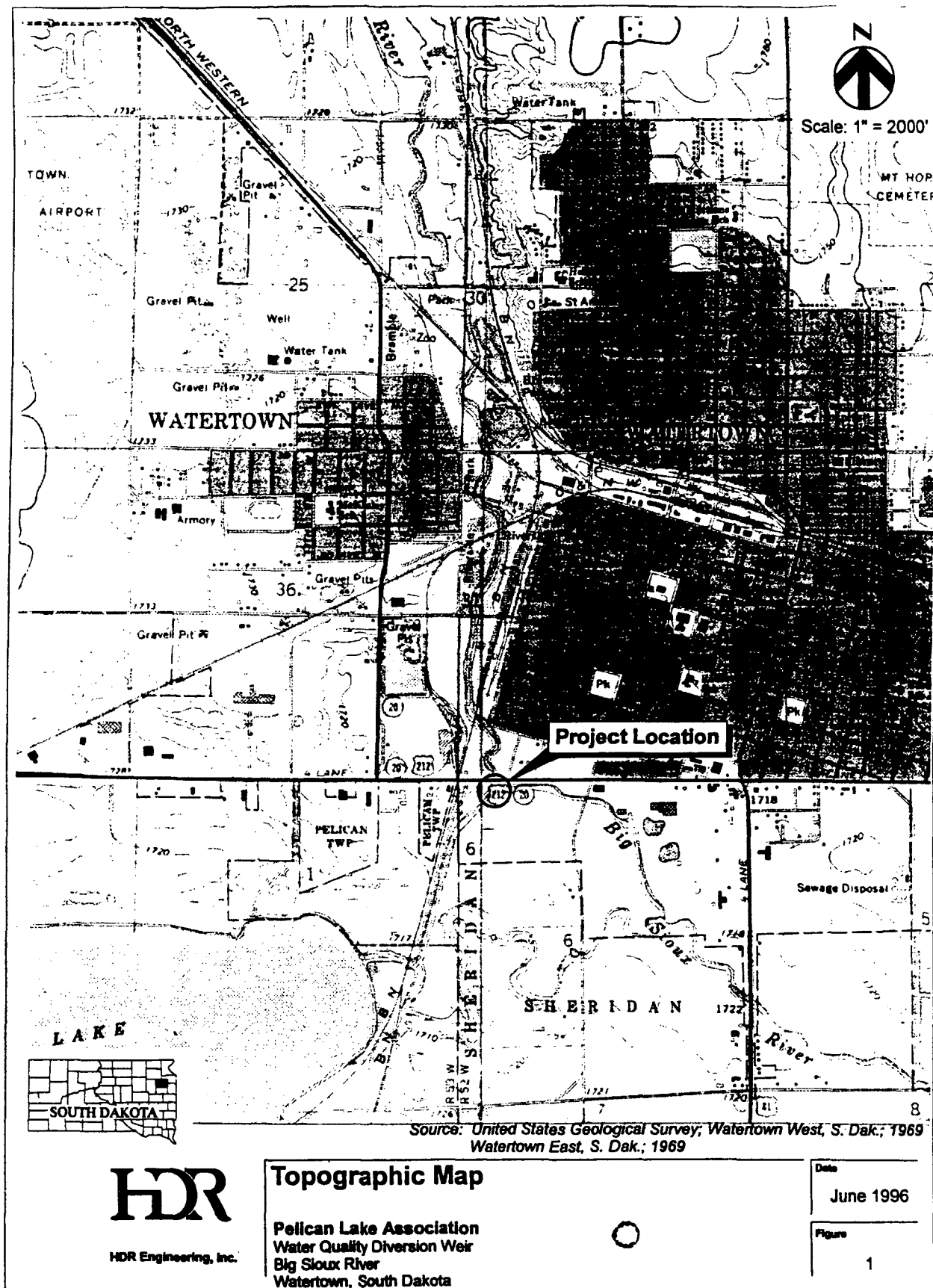
Any person may request, in writing, within the comment period specified in this notice, that a public hearing be held to consider this application. Requests for public hearings shall state, with particularity, the reason for holding a public hearing. The request must be submitted to the US Army Corps of Engineers, Pierre Regulatory Office, Oahe Dam Admin Building, PO Box 1117, Pierre, South Dakota 57501.

Any interested party (particularly officials of any town, city, county, state, Federal agency, or local association whose interests may be affected by the proposed work) is invited to submit to this office, written facts, arguments, or objections on or before July 15, 1996. Any agency or individual having an objection to the proposed work should specifically identify it as an objection with clear and specific reasons. Comments, both favorable and unfavorable, will be accepted, made a part of the record and will receive full consideration in subsequent actions on this permit application. All replies to the public notice should be addressed to the address listed in the previous paragraph. Thomas A. Lowin, telephone number (605) 224-8531, may be contacted for additional information.

Comments received after the close of the business day on the expiration date of this public notice will not be considered.

This project, if authorized, will be under the provisions of Section 404 of the Clean Water Act.

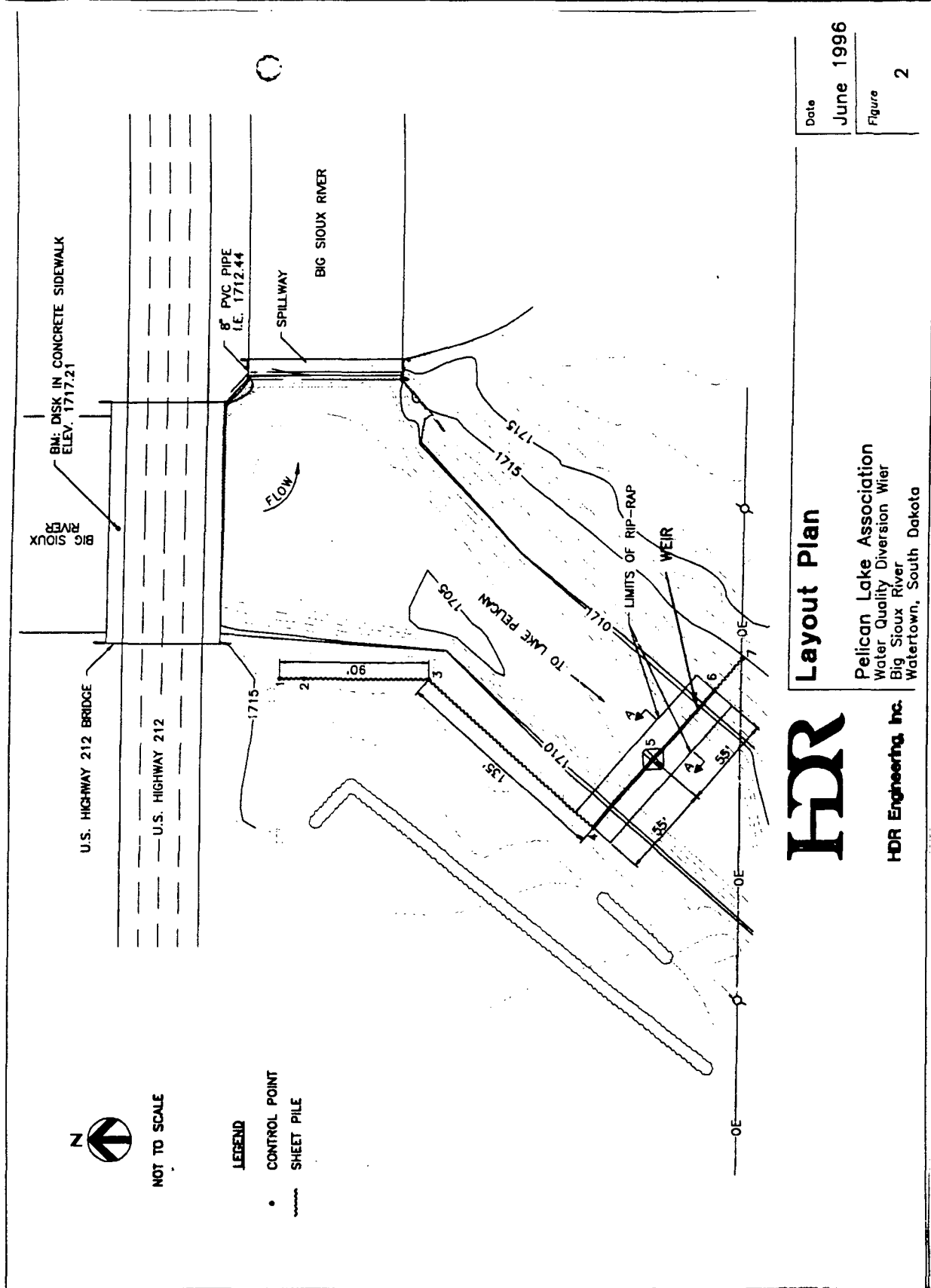
Drawings showing the location and extent of the work are attached to this notice.



PURPOSE: water quality
DATUM: MSL
APPLICATION BY:
 Lake Pelican Water District
ADJACENT PROPERTY OWNERS:
 1) Burlington Northern Railroad
 2) City of Watertown
 3) Herb Hanten

IN Pelican Lake Channel
AT Sec.6/T116N/R52W
COUNTY Codington, SD

DATE 6/21/96
SHEET 1 of 3



PURPOSE: water quality
DATUM: MSL
APPLICATION BY:
 Lake Pelican Water District
ADJACENT PROPERTY OWNERS:
 1) Burlington Northern Railroad
 2) City of Watertown
 3) Herb Hanten

IN Pelican Lake Channel
AT Sec.6/T116N/R52W
COUNTY Codington, SD

DATE 6/21/96
SHEET 2 of 3

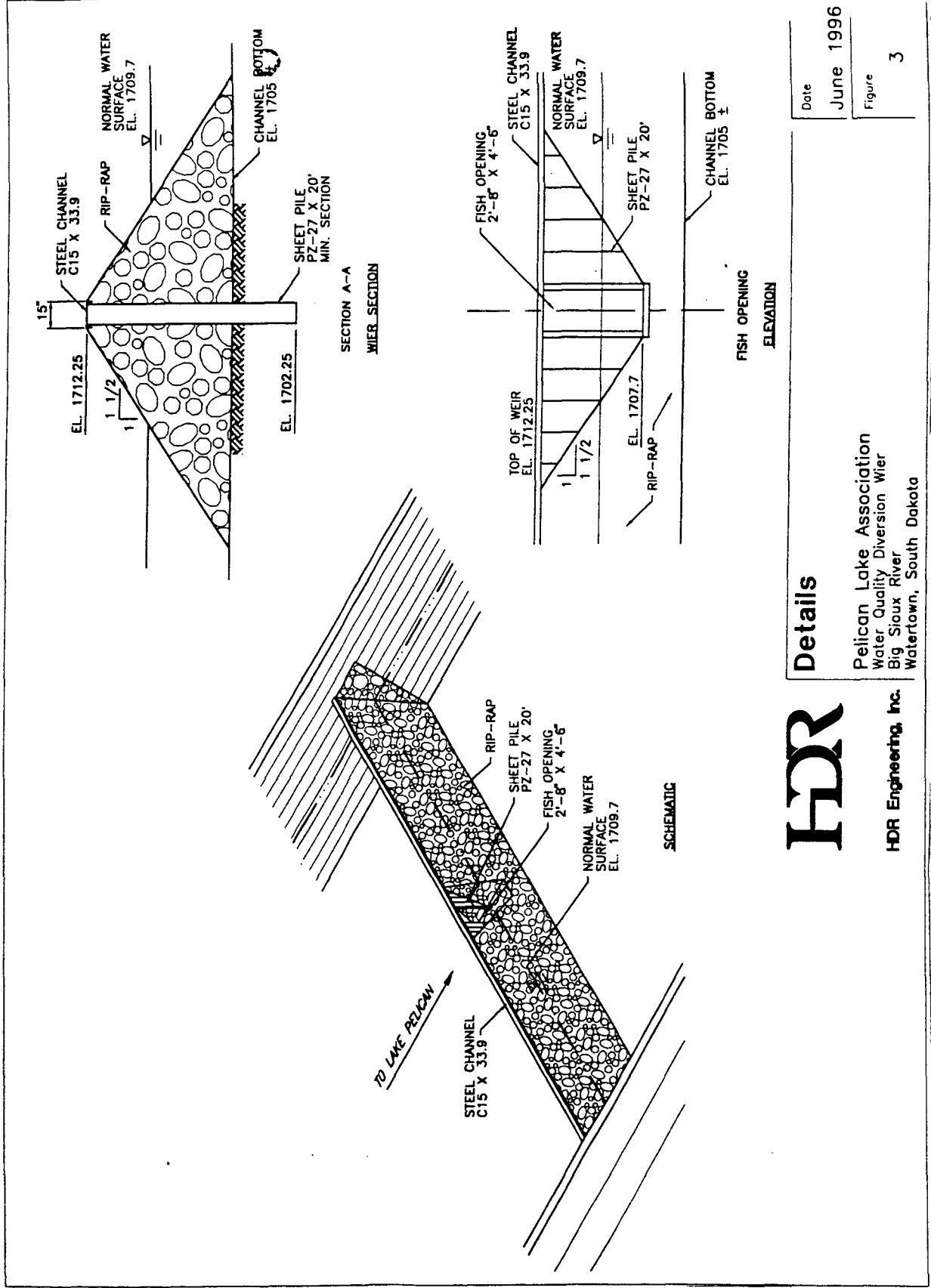
HDR

Layout Plan

Pelican Lake Association
 Water Quality Diversion Weir
 Big Sioux River
 Watertown, South Dakota

HDR Engineering, Inc.

Date
 June 1996
 Figure
 2



PURPOSE: water quality
DATUM: MSL
APPLICATION BY:
 Lake Pelican Water District
ADJACENT PROPERTY OWNERS:
 1) Burlington Northern Railroad
 2) City of Watertown
 3) Herb Hanten

IN Pelican Lake Channel
 AT Sec.6/T116N/R52W
 COUNTY Codington, SD

DATE 6/21/96
SHEET 3 of 3



DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
215 NORTH 17TH STREET
OMAHA, NEBRASKA 68102-4978



REPLY TO
ATTENTION OF

June 19, 1996



Pierre Regulatory Office
Oahe Dam Admin Bldg, PO Box 1117
Pierre, South Dakota 57501

Mr. John Hatch
South Dakota Department of
Environment and Natural Resources
Joe Foss Building
523 East Capitol Avenue
Pierre, South Dakota 57501

Dear Mr. Hatch:

Enclosed for your review and information is a copy of pending Department of the Army permit application number 199630227.

A public notice of the proposed project will be issued in the near future.

If you have any questions regarding this application, please contact this office at the above Regulatory Office address, or telephone Mr. Thomas A. Lowin, of my staff, at (605) 224-8531.

Sincerely,

for Steven E. Naylor
Regulatory Program Manager,
South Dakota

Enclosure

Public reporting burden for this collection of information is estimated to average 5 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters Service Directorate of Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302; and to the Office of Management and Budget, Paperwork Reduction Project (0710-0003), Washington, DC 20503. Please DO NOT RETURN your form to either of those addresses. Completed applications must be submitted to the District Engineer having jurisdiction over the location of the proposed activity.

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One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO. 1996 30 227	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETED
-----------------------------------	----------------------	------------------	-------------------------------

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME Lake Pelican Water District	8. AUTHORIZED AGENT'S NAME AND TITLE (an agent is not required) HDR Engineering, Inc.
6. APPLICANT'S ADDRESS 4404 - 20th Ave. SW Watertown, SD 57201	9. AGENT'S ADDRESS 8404 Indian Hills Drive Omaha, NE 68114-4049
7. APPLICANT'S PHONE NOS. W/AREA CODE a. Residence 605-886-2213 b. Business 605-886-2786	10. AGENT'S PHONE NOS. W/AREA CODE a. Residence b. Business 402-399-1000

STATEMENT OF AUTHORIZATION

I hereby authorize, _____ to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.


APPLICANT'S SIGNATURE

Chairman of Lake Pelican Water District

DATE

NAME, LOCATION AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions)

Pelican Lake Water Quality Diversion Wier

13. NAME OF WATERBODY, IF KNOWN (if applicable)

Pelican Lake supply canal

5. LOCATION OF PROJECT

Codington County, South Dakota

COUNTY

STATE

14. PROJECT STREET ADDRESS (if applicable)

Watertown, SD

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN, (see instructions)

R52W, T116N, Section 6
97° 07' 30" 44° 53' 55"

7. DIRECTIONS TO THE SITE

Project location is approximately 500 feet south of the U.S. Highway 212 Bridge over the Big Sioux River in Watertown, SD.

18. Nature of Activity (Description of project, include all features)

See Attachment

19. Project Purpose (Describe the reason or purpose of the project, see instructions)

See Attachment

USE BLOCKS 20-22 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. Reason(s) for Discharge

See Attachment

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards

See Attachment

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)

See Attachment

23. Is Any Portion of the Work Already Complete? Yes ☐ No ☒ IF YES, DESCRIBE THE COMPLETED WORK

24. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (If more than can be entered here, please attach a supplemental list).

Burlington Northern Railroad, Tony Neptune, Mitchell, SD 57301
City of Watertown, Mayor Brenda Barger, Watertown, SD 57201
Herb Hanten, RR 3 Box 141, Watertown, SD 57201

25. List of Other Certifications or Approvals/Denials Received from other Federal, State or Local Agencies for Work Described in This Application.

AGENCY	TYPE APPROVAL*	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED
--------	----------------	-----------------------	--------------	---------------	-------------

See attached letters from the City of Watertown and South Dakota Game, Fish, and Parks.

*Would include but is not restricted to zoning, building and flood plain permits

26. Application is hereby made for a permit or permits to authorize the work described in this application. I certify that the information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

SIGNATURE OF APPLICANT

DATE

SIGNATURE OF AGENT

DATE

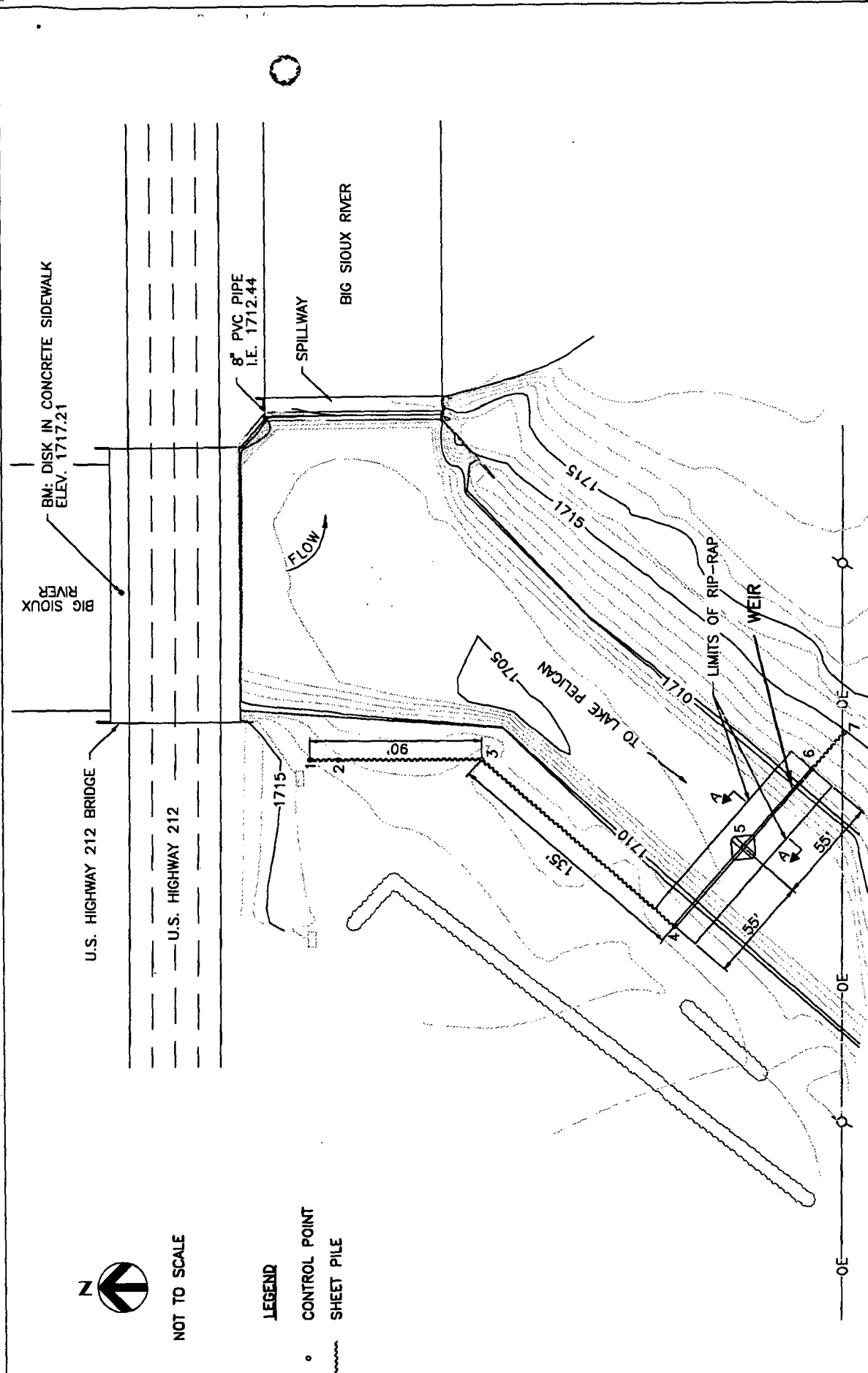
John Morton, HDR Engineering

The application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than \$10,000 or imprisoned not more than five years or both.

Pelican Lake Application (Attachment)

18. The project is to construct a water quality diversion weir across the inlet of the Pelican Lake supply canal. The weir will be approximately 110 feet long and seven feet high constructed of sheet pile and riprap. A sheet pile cut off will be constructed in the right overbank upstream from the weir. The weir includes a fish passage opening.
19. The diversion weir will protect the water quality of Pelican Lake by limiting the influx of nutrients and sediments from the Big Sioux River during the early spring run off. The weir will limit flows into Pelican Lake when the Big Sioux River flow rate is less than 1,600 cfs. A fish passage notch in the weir will provide for fish movement. The work will be initiated on August 1, 1996 and will be completed by September 30, 1996.
- #20. The discharge of riprap is required to protect the sheet pile weir.
- #21. The weir will be constructed of sheet pile driven into the bed of the canal and protected by approximately 390 cubic yards of riprap. The riprap will either State Class II or State Class III stone riprap free from overburden, soil, organic material and debris.
- #22. Approximately 2,500 square feet of the Pelican Lake supply canal will be impacted by the footprint of the weir.



Date June 1996

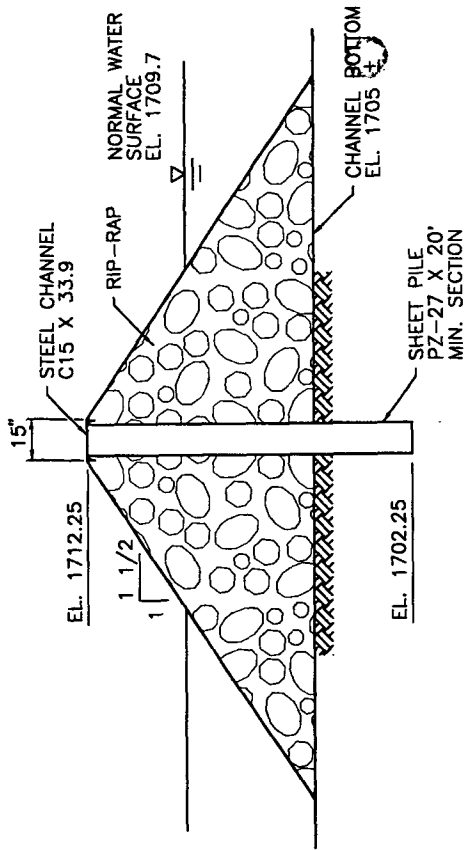
Figure 2

Layout Plan

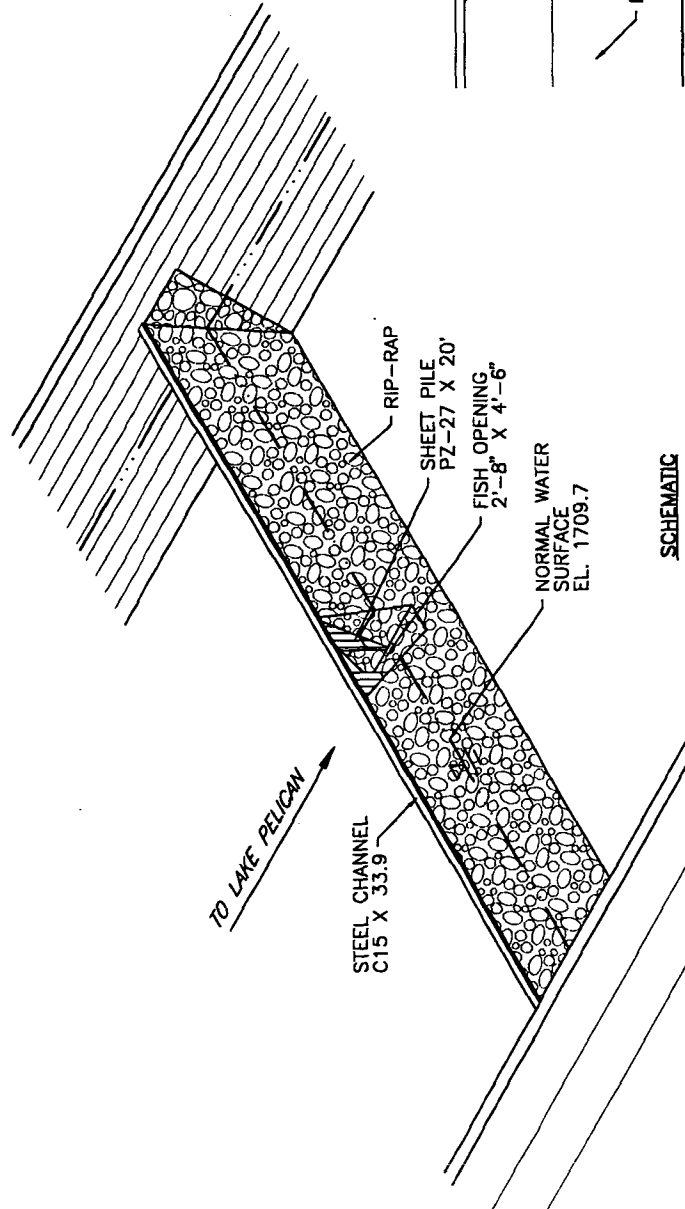
Pelican Lake Association
Water Quality Diversion Wier
Big Sioux River
Watertown, South Dakota

FOR

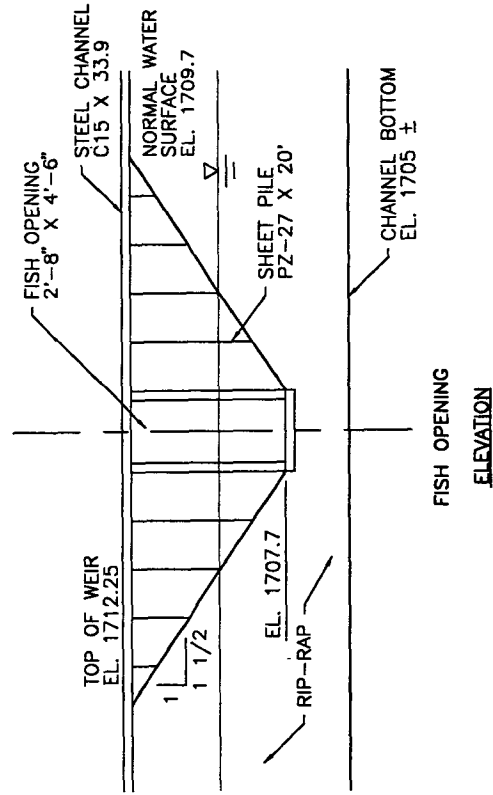
HDR Engineering, Inc.



SECTION A-A
WIER SECTION



SCHEMATIC



FISH OPENING
ELEVATION

HDR

HDR Engineering, Inc.

Details

Pelican Lake Association
Water Quality Diversion Wier
Big Sioux River
Watertown, South Dakota

Date	June 1996
Figure	3



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
215 NORTH 17TH STREET
OMAHA, NEBRASKA 68102-4978

June 19, 1996



Pierre Regulatory Office
Oahe Dam Admin Bldg, PO Box 1117
Pierre, South Dakota 57501

John Miller
SD Dept of Environment and Nat Res
Joe Foss Buidling
523 East Capitol
Pierre, South Dakota 57501

Dear Mr. Miller:

Enclosed is a copy of ENG Form 4345, Department of the Army application for permit review relative to activities in waters of the United States pursuant to Section 404 of the Clean Water Act.

This proposed activity may affect the quality of the receiving water. Prior to authorization of this activity by this office, certification of compliance with applicable effluent limitations and water quality standards under Section 401 of the Clean Water Act or waiver of such certification is required.

Certification for the project should be sent directly to the applicant and a copy furnished to this office. To prevent undue delay in the processing of the applicant's permit, it is requested that you respond within thirty (30) days of the receipt of this notice.

Application No.: 199630227

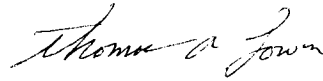
Applicant: Lake Pelican Water District

Location: Pelican Lake inlet/outlet channel

Activity: Weir - Sheetpile/Riprap

If you have any questions, or if this office can be of any assistance, please feel free to contact us at the above Regulatory Office address, or telephone Thomas A. Lowin of my staff, or myself, at (605) 224-8531.

Sincerely,



for Steven E. Naylor
Regulatory Program Manager,
South Dakota

Enclosure



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3181

Alan Schultz
Lake Pelican Water District
4404 - 20th Ave. SW
Watertown SD 57201

RE: 199630227
Weir - Sheetpile/Riprap
Pelican Lake inlet/outlet

Dear Mr. Schultz:

The Department of Environment and Natural Resources has reviewed the request for water quality certification. This project pertains to the construction of a combination steel sheet pile and riprap weir structure in the inlet/outlet channel of Pelican Lake. This project is located in the NW 1/4 of Section 6, Township 116 North, Range 52 West, Codington County, South Dakota. Section 401 of the Clean Water Act requires this review before a 404 permit is granted.

The department is granting water quality certification with the following conditions:

- (1) That all construction activities be performed from the shore, or
- (2) That work be performed when there is no flow in the channel, or
- (3) That the flow is diverted so construction activities will not occur in flowing water.

This certification does not authorize the above referenced activity. The activity may occur only by issuance of the U.S. Corps of Engineers Section 404 permit. If you have questions pertaining to this certification, please contact John Miller, at (605) 773-3351. Thank you for ensuring the continued protection of our natural resources.

Sincerely,

Nettie H. Myers
Secretary

cc: Steve Naylor, US COE, Pierre
Dick Gorton, US COE, Omaha
Bob Mairley, US EPA, Denver
John Hatch, DENR, Pierre

Fax Sheet

HDR

Date

July 31 1996

Number of Pages (includes cover page)

2

Message To

Name Lynn Beck

Teletype number called

605-773-4068

Firm

Dept of Environment and Natural Resources

City

Pierre

State

SD

If you do not receive all the pages, please call 402-399-1098 as soon as possible.

From

Name

Rick Niedergangas

Department

HDR NR

Telephone

402-399-1062

Job Number

Please use this Hydraulic survey to evaluate
the Lake Pelican Wier.

Rick Niedergangas

CC All Schultz Fax 605-886-0191

Lake Pelican Canal Flood Weir Design

FLOW CONDITIONS

Storm Frequency	Stage	Big Sioux Sec. 20.2**	Coexisting WSEL	Obligations vs of 212 (cfs)	Qweir (cfs)	Qcanal (cfs)	Elevation Bottom	Elevation Top	Wear C	Fish Weir Length (ft)	Wear Q (cfs)	Qtotal Canal (cfs)	Comment
10-Year	1713.15	1712.98	1712.98	1,600	870	730	1707.7	1712.25	3.1	2.67	3.1	2.67	See Note No. 2
50-Year	1715.47	1715.21	1715.21	3,400	2,000	1,400	1707.7	1712.25	3.1	2.67	3.1	2.67	
100-Year	1716.02	1715.95	1715.95	4,300	2,575	1,775	1707.7	1712.25	3.1	2.67	3.1	2.67	
500-Year	1717.24	1717.12	1717.12	6,800	4,100	2,700	1707.7	1712.25	3.1	2.67	3.1	2.67	

Assumptions and Notes:

1. Adjusted for submerged flow conditions. Source: Brinker and King Figure 5.5.

2. Lake Pelican natural surface elevation based on elevation of Big Sioux weir at 1709.7.

3. Ran HEC-2 to find the discharge that would yield an elevation of 1712.25 at Section 22.1 (downstream of Highway 212 bridge)

* Section upstream face of Highway 212 bridge, existing conditions. File: EXIST.DAT

** Section at diversion weir on Big Sioux River, existing conditions. File: EXIST.DAT

FISH WEIR

CANAL WEIR

Comment	WSEL	Elevation Bottom	Elevation Top	Weir Coef. C	Fish Weir Length (ft)	Fish Flow (cfs)	Weir C	Weir Length (ft)	Weir Q (cfs)	Qtotal Canal (cfs)
Size Selective	1709	1707.7	1712.25	3.1	2.67	11	3.1	331	-	11
	1710	1707.7	1712.25	3.1	2.67	26	3.1	331	-	26
	1711	1707.7	1712.25	3.1	2.67	45	3.1	331	-	45
	1712	1707.7	1712.25	3.1	2.67	66	3.1	331	-	66
	1712.25	1707.7	1712.25	3.1	2.67	72	3.1	331	-	72
	1712.5	1707.7	1712.25	3.1	2.67	78	3.1	331	128	207
	1712.8	1707.7	1712.25	3.1	2.67	86	3.1	331	418	504
	1713	1707.7	1712.25	3.1	2.67	91	3.1	331	666	757
	1713.5	1707.7	1712.25	3.1	2.67	104	3.1	331	1,431	1,537
	1714	1707.7	1712.25	3.1	2.67	118	3.1	331	2,374	2,492
	1715	1707.7	1712.25	3.1	2.67	147	3.1	331	4,677	4,824
	1716	1707.7	1712.25	3.1	2.67	178	3.1	331	7,447	7,625
	1717	1707.7	1712.25	3.1	2.67	211	3.1	331	10,616	10,828

how did this
you get this
SPRINT

Report on Flood Control Application No. FC-19
Lake Pelican Water District
August 16, 1996

Application No. FC-19, Lake Pelican Water District, proposes to construct a water quality diversion weir located in the inlet/outlet channel to Lake Pelican in the NE $\frac{1}{4}$ NW $\frac{1}{4}$ NW $\frac{1}{4}$ Section 6, T116N, R52W. The Weir is to control sediment loading to Pelican Lake from the Big Sioux River during early spring runoff. The weir will have an overflow elevation of 1712.25 feet above mean sea level (fmsl) and contain a fish passage weir with a flow elevation of 1707.75 fmsl.

Review of Proposed Project

The Lake Pelican proposed canal weir consists of a fish passage weir and an overflow weir. The canal weir will protect the water quality of Lake Pelican by limiting the amount of nutrients and sediments from the Big Sioux River during early spring runoff. Flow into the lake will be limited when the Big Sioux River is flowing at less than 1600 cubic feet of water per second (cfs). The weir will contain a fish passage to provide for fish movement.

The overflow weir elevation is to be 1712.25 fmsl with a length of 335 feet. The fish passage weir overflow elevation is 1707.75 fmsl and will pass 72 cfs. The weir lengths and heights were defined using existing conditions during a 10 year event of 1600 cfs. The rate at which water flows into Lake Pelican and downstream in the Big Sioux River will not change from existing rates when the Big Sioux River is discharging at or above 1600 cfs, just upstream of the proposed project,. Under existing conditions 870 cfs is conveyed downstream of the diversion weir and 730 cfs enters Lake Pelican. This is approximately a 60/40 split in flow between the Big Sioux River and the Lake Pelican canal.

The outlet elevation of Lake Pelican will remain 1709.7 fmsl. This elevation is the top of the existing diversion weir in the Big Sioux River. The proposed water quality diversion weir and fish passage weir location is in the inlet/outlet canal to Lake Pelican. See figure 2 and 3 for project location and layout.

Review of Upstream and Downstream Effects

Upstream effects due to the proposed weir appear to be limited to the flood plain along the Big Sioux River through Watertown. According to the U.S. Army Corps of Engineer's (COE) August 1994 feasibility report "Flood Control for Watertown and Vicinity," the 10-year frequency of 1600 cfs was found to stay within the Big Sioux River's banks except in some low lying areas. HDR Engineering looked at increased flood damages to structures. While the water's edge may come closer to a few structures than before, none of the structures were in danger of sustaining flood damage. At a flow of 1600 cfs or greater the proposed weir will mimic the flows prior to its construction. However the water profile elevation at the Highway 212 bridge will increase approximately two feet.

Flood easements through the city of Watertown may be needed due to the increased water elevations. It is the understanding that at the time of this report the area that would need flood easements belongs to the city of Watertown and they have agreed to the proposed new conditions. Included in this application is a letter from the City of Watertown to the Lake Pelican Water Project District stating that the City Council does not object to the project as proposed.

The additional water diverted downstream due to the proposed weir will increase the frequencies of certain flows in the Big Sioux River below Watertown. It is important to determine that these flows will not increase the frequency or severity of flooding to downstream land owners.

The above mentioned COE report also addresses channel capacities for the Big Sioux River upstream and downstream of Watertown. Cross sections were surveyed every five miles between Brookings and Highway 81 at the south edge of Watertown and every mile between Lake Kampeska and Mahoney Creek. The report states that "the 2-year event was mostly confined to the channel throughout the rural reaches both upstream and downstream of Watertown. The 10-year event stayed within the channel banks at some locations but generally discharges at or above the 10-year event resulted in overbank flows."

Flows of 1600 cfs or greater upstream of Highway 212 will split between Lake Pelican and the Big Sioux River as they did before the proposed project. At 1600 cfs, the 10-year frequency, approximately 870 cfs will go downstream of the existing diversion weir in the Big Sioux River and 730 cfs will enter Lake Pelican. The current flow downstream of the existing diversion weir during a 2-year event is 250 cfs. With the proposed weir in place this would increase to 480 cfs which falls somewhere between the 2-year event and the 10-year event. It is necessary to determine if flood easements are required due to the increased flows between the 2 and 10-year events. See table 1 for other flow increases due to other events.

Table 1 Without Project and With Project Flow Comparisons

LOCATION	WITHOUT PROJECT				WITH PROJECT			
event	2-yr.	3-4 yr.	7-yr.	10-yr.	2-yr.	3-4 yr.	7-yr.	10-yr.
Flow in cfs just upstream of the proposed project.	530	850	1200	1600	530	850	1200	1600
Flow in cfs to Lake Pelican.	280	450	540	730	72	160	410	730
Flow in cfs just downstream of the existing div. weir.	250	400	660	870	458	690	790	870

The proposed project, if constructed, will allow less Big Sioux River water into Lake Pelican. HDR Engineering ran the Corps of Engineer's (COE) HEC 2 Backwater model for the Big Sioux River to determine the discharge rate that would yield an elevation of 1712.25 fmsl, at the top of the proposed weir. It was found that a discharge of 746 cfs at the downstream face of the

Highway 212 bridge over the Big Sioux River resulted in an elevation of 1712.25 fmsl. According to flood frequency curves developed by the COE for the gage at Watertown (old gage between Lake Kampeska and the existing weir) there is a 35 percent chance of exceeding a flow of 746 cfs. Using a 40/60 split for flows at the existing diversion weir, the without project flow into Lake Pelican is 311 cfs. The with project flow into Lake Pelican would be 72 cfs, this represents a 239 cfs loss of flow to the lake. See figure 1 for a graphical representation of the loss of flow to Lake Pelican. Figure 1 of this report was prepared from Figure 3 in HDR Engineering's report titled Lake Pelican Diversion Works.

The exact loss of flow is dependent on the water level in Lake Pelican. During dry periods Lake Pelican will receive less runoff from its watershed and lower flows from the Big Sioux River. At flows of 746 cfs or less Lake Pelican will receive only those flows allowed through the fish weir.

Lake Pelican is also influenced by an extensive ground water connection. During times of low ground water levels and less than normal precipitation Lake Pelican becomes more dependent on flows from the Big Sioux River. Lake Pelican is a large lake with a surface area of 2800 acres and an average depth of five feet. It is important to realize that while protecting Lake Pelican from sediment loading and poor water quality the proposed weir may limit needed flow during dry periods.

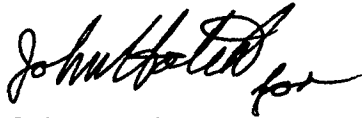
Conclusions

1. Application No. FC-19 proposes to construct a water quality diversion weir across the inlet canal to Lake Pelican. The project consists of an overflow weir at elevation 1712.25 fmsl and a fish passage weir with a flow elevation of 1707.75 fmsl. The proposed project will bypass nutrient loaded flows down the Big Sioux River instead of entering Lake Pelican.
2. The outlet elevation for Lake Pelican will remain at 1709.7 fmsl. This is the overflow elevation for the existing diversion weir in the Big Sioux River.
3. Flows at or greater than the 10 year event will pass into Lake Pelican and downstream in the Big Sioux River at the rate they did prior to the proposed project.
4. Lake Pelican will receive less water from the Big Sioux River during flows below 1600 cfs that occur just upstream of the proposed project.
5. The proposed weir will raise water profile elevations upstream and downstream of the weir location at certain discharge rates. The weir will also increase certain flows downstream of the existing diversion weir in the Big Sioux River.
6. Requirements to approve this application should include; 1) Determination of whether flood easements are required needs to be made, and 2) If flood easements are needed they must be obtained prior to the proposed project being constructed.



Lynn Beck
Natural Resources Engineer III

Approved by:



Gale N. Selken, P.E.
Natural Resources Engineer IV

References

US Army Corp of Engineers, 1994. Feasibility Report Technical Appendix, Volume 1 for Flood Control For Watertown and Vicinity. US Army Corps of Engineers, Omaha District, Missouri River Division.

SD Department of Environment and Natural Resources, 1996. Water Rights program files.

HDR Engineering report, 1996. Lake Pelican Diversion Works, HDR Engineering, Omaha, Nebraska.

Figure 1: With Project and Without Project Flows

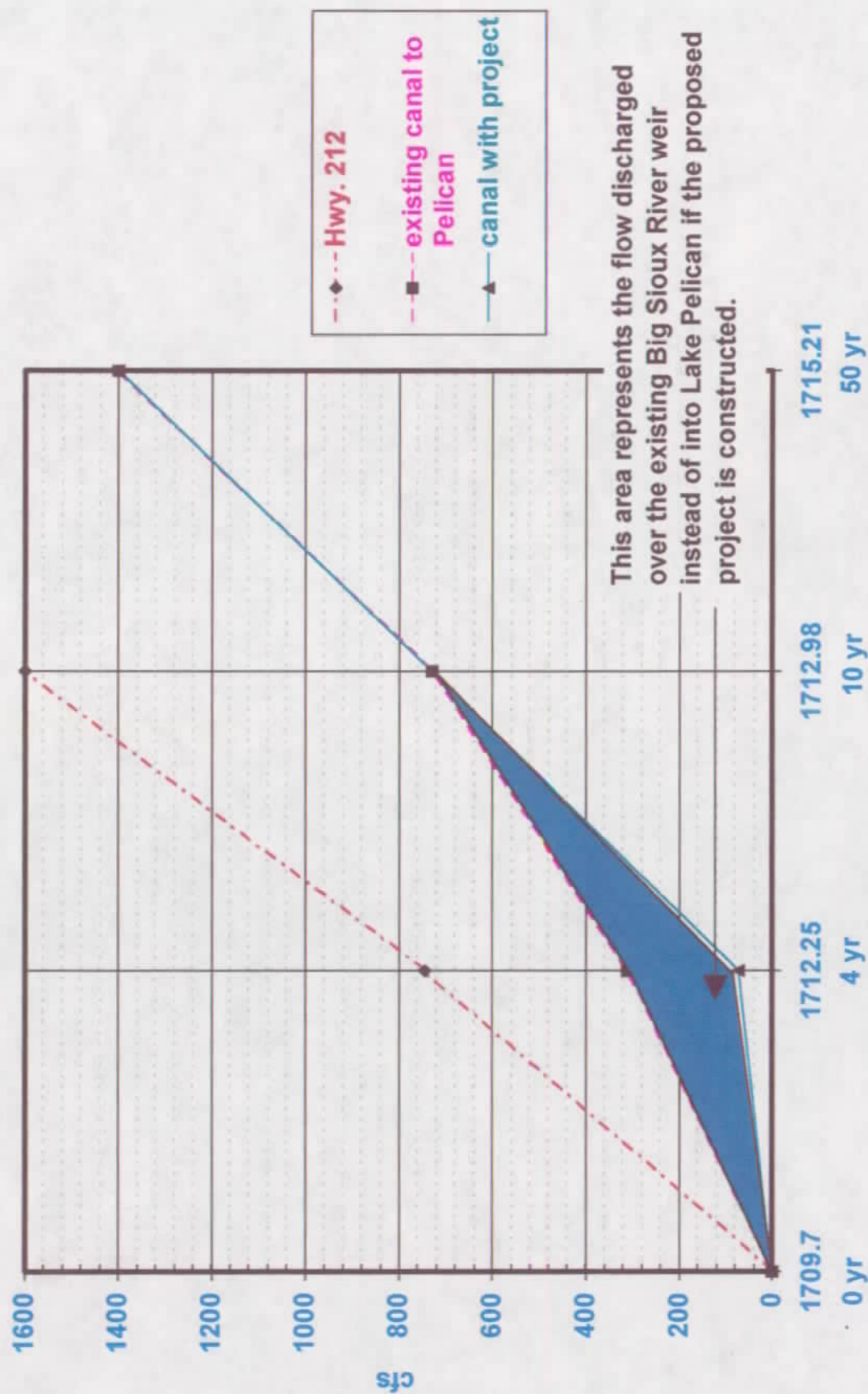


Figure 2: Location Map
Pelican Lake Water Quality Diversion Weir

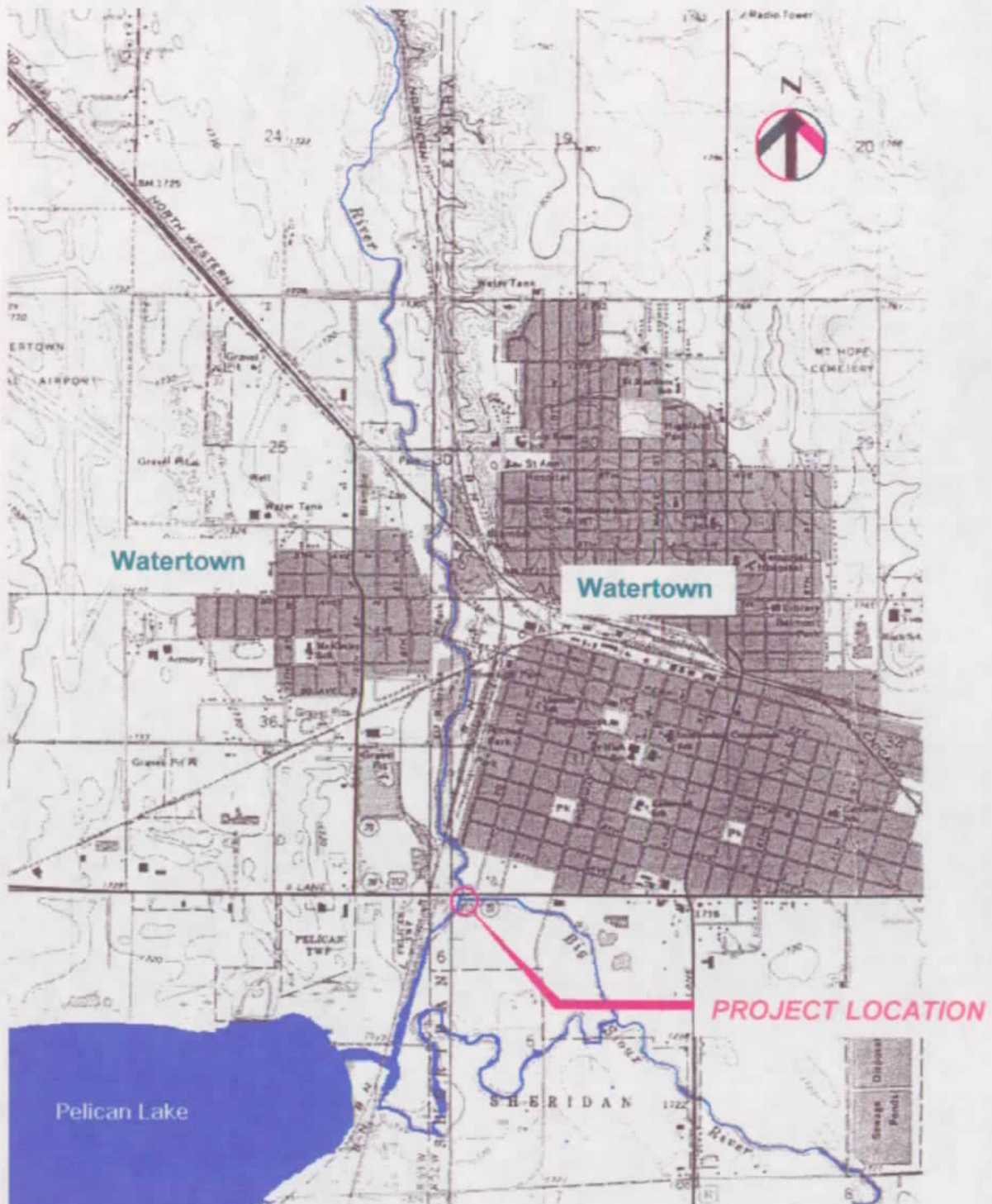
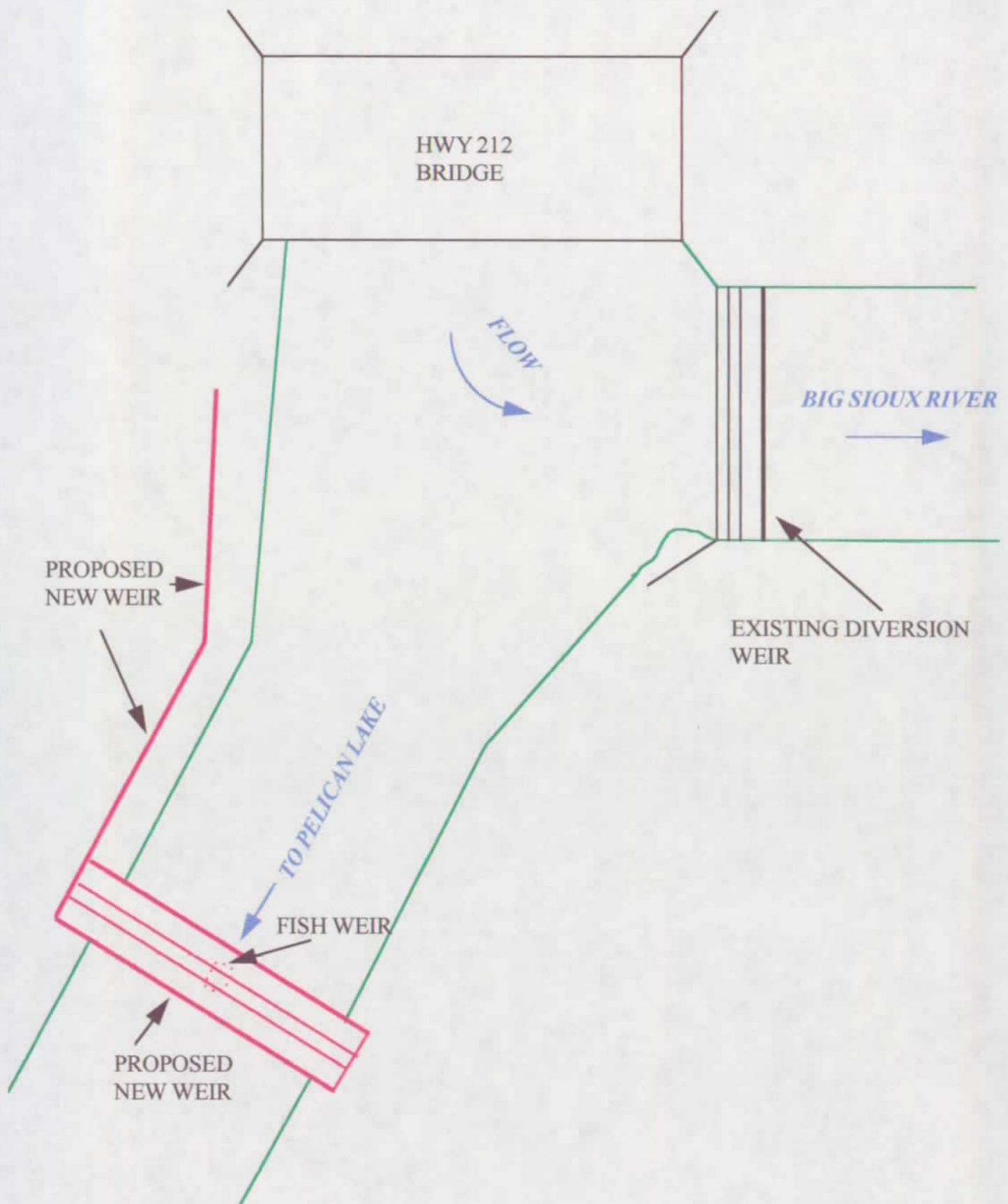


Figure 3 Layout Plan
Pelican Lake Water Quality Diversion Weir

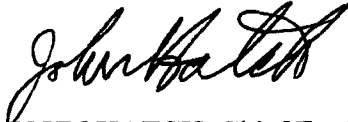


**RECOMMENDATION OF CHIEF ENGINEER FOR FLOOD
CONTROL APPLICATION NO. FC-19**

Pursuant to SDCL 46-2A-2, the following is the recommendation of the Chief Engineer, Water Rights Program, Department of Environment and Natural Resources concerning Flood Control Application No. FC-19, Lake Pelican Water District, c/o Alan Schultz, Chairman, 4404 20th Ave. SW, Watertown, SD 57201.

The Chief Engineer is recommending DEFERRAL of Application No. FC-19 until the applicant provides additional information on the potential downstream impacts of the project including obtaining flood easements if necessary.

See report on application for additional information.

A handwritten signature in black ink, appearing to read "John Hatch", written in a cursive style.

JOHN HATCH, Chief Engineer
August 27, 1996



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3181

NOTE: TO BE SURE OF PUBLICATION ON
THE CORRECT DATES, CONTACT
THE NEWSPAPER RIGHT AWAY.

August 28, 1996

Alan Schultz, Chairman
Lake Pelican Water District
4404 20th Ave. SW
Watertown, SD 57201

Dear Mr. Schultz:

Flood Control Application No. FC-19 to request authorization to construct a diversion weir located in the inlet/outlet channel to Lake Pelican has been examined by the Water Rights Program. A notice of hearing has been sent to the Publisher of the Public Opinion printed at Watertown, SD (Ph # 605 886-6901). Enclosed is a copy of the notice and the recommendation of the Chief Engineer. Please review the notice prior to publication and notify this office, if you have any corrections or questions.

The Chief Engineer is recommending DEFERRAL of the Application to allow time for the Lake Pelican Water District to provide additional information. By publishing the notice, an October 3, 1996, hearing is scheduled before the Water Management Board.

The Chief Engineer is requesting additional information on the potential downstream impacts of the project. If constructed, the project will divert additional flow downstream during flood occurrences between the 2 and 10 year event. Additional information is necessary on whether the Big Sioux River downstream of the project will remain within its banks when the weir structure is directing additional flow downstream. If the Big Sioux River does not remain in its bank and flooding occurs, flood easements must be obtained from affected landowners.

The Water Rights Program will need this information by September 20, 1996 in order to provide adequate time to analyze it prior to the Board meeting. The Chief Engineer may revise his recommendation prior to the Board meeting based on this information.

Be sure to contact the above newspaper to authorize publication of your Notice of Hearing and to arrange for payment. Early contact with the paper can eliminate delays. The publisher has been instructed to publish your notice once each week for two consecutive weeks with the last publication to occur twenty days before the board meeting.

Sincerely,

A handwritten signature in cursive script, appearing to read "Eric Gronlund".

Eric Gronlund
Natural Resources Engineer
605 773-3352

enclosures

NOTE: If you plan to contest any part of the Chief Engineer's recommendation, you must file a petition pursuant to the procedures outlined in the attached notice of hearing. The Water Management Board will then consider your concerns during a hearing on the application.

c: Rick Niedergeses, HDR Engineering



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3181

August 28, 1996

Public Opinion
P.O. Box 10
Watertown, SD 57201-0010

ATTENTION: Legal Department

Enclosed is a Notice of Hearing on Application No. FC-19 to be published twice. Please publish the first notice on September 5, 1996, with the second publication 7 days later.

The APPLICANT MUST VERIFY TO YOU THAT THE NOTICE IS TO BE PUBLISHED, before you make the first publication. Please BILL the APPLICANT for the cost of publication. The APPLICANT is Lake Pelican Water District, %Alan W. Schultz, Chairman, 4404 20th Ave. SW, Watertown, SD 57201 (Ph # (605) 886-2213).

A copy of BOTH publications must be SENT to the WATER RIGHTS PROGRAM. IMMEDIATELY return the FIRST publication with the FIRST Transmittal form on the bottom of this page. The first copy is needed to check the publication for errors so any corrections can be made in the second publication. Publication errors can invalidate the public notice and cause the applicant costly delays.

Please be sure the SECOND publication is returned IMMEDIATELY with the enclosed Proof of Publication form. DO NOT WAIT until the end of the month or the billing cycle. No action may be taken on the permit application until proof of publication has been received.

Sincerely,

Eric Gronlund
Natural Resources Engineer
605 773-3352

enclosures

-----CUT HERE-----

FIRST TRANSMITTAL NOTICE

TO: Eric Gronlund
Water Rights Program
Joe Foss Building
Pierre SD 57501-3181

No. FC-19

Date _____

We are in receipt of your letter of _____ enclosing Notice of Hearing to Appropriate Water by Application No. _____ which was first published in our issue of _____. ENCLOSED IS A COPY OF THIS FIRST PUBLICATION.

Name

Newspaper

Instruction to Newspaper - Publish first Notice on September 5, 1996 with the second publication 7 days later. The applicant is responsible for payment.

NOTICE OF HEARING on Flood Control Application No. FC-19

Notice is given that the Lake Pelican Water District, c/o Alan Schultz, Chairman, 4404 20th Ave. SW, Watertown, SD 57201 has filed an application for a flood control permit for a weir at the inlet to Lake Pelican in Codington County.

Flood Control Application No. FC-19 requests authorization to construct a diversion weir located in the inlet/outlet channel to Lake Pelican in the NW1/4 NW1/4 Section 6, T116N, R52W. The weir is to control sediment loading to Pelican Lake from the Big Sioux River. The weir will have an overflow elevation of 1712.25 feet above mean sea level (fmsl) and contain a fish passage weir with a flow elevation of 1707.75 fmsl. Flow into the lake will be limited when the Big Sioux River is flowing at less than 1600 cubic feet of water per second (cfs). At Big Sioux River flows greater than 1600 cfs, the rate at which water flows into Lake Pelican and downstream in the Big Sioux River will not change.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends DEFERRAL of Application No. FC-19 until the applicant provides additional information on the potential downstream impacts of the project including obtaining flood easements if necessary.

Any person interested in opposing or supporting the application must file a written petition with BOTH the applicant and Chief Engineer. The applicant must also file a petition if opposed to the Chief Engineer's recommendation. The Chief Engineer's address is "Water Rights Program, Foss Building, 523 E Capitol, Pierre SD 57501 (605 773-3352)" and the applicant's mailing address is given above. A petition filed by either an interested person or the applicant must be filed by September 23, 1996. The petition may be informal, but must include a statement describing the petitioner's interest in the application, the petitioner's reasons for opposing or supporting the application, and the signature and mailing address of the petitioner or the petitioner's legal counsel, if legal counsel is obtained.

The Water Management Board will consider the application at 9:30 am, October 3, 1996, in the Conference Room, Floyd Matthew Training Center, Joe Foss Building, 523 E. Capitol Ave., Pierre, SD 57501. The Chief Engineer's recommendation is not final or binding upon the Board. If the applicant provides information on potential for downstream impacts, the recommendation may be revised to reflect the new information. The Board is authorized to 1) approve, 2) approve with qualifications, 3) defer, or 4) deny the application based on the facts presented at the public hearing. The hearing date will be automatically delayed for at least 20 days upon written request to the Chief Engineer from the applicant or any interested person opposing the application. The request for an automatic delay must be filed by September 23, 1996.

Any hearing will be an adversary proceeding. Any person filing a petition and/or the applicant have the right to be represented by a lawyer and may present evidence or cross-examine witnesses according to SDCL 1-26. These and other due process rights will be forfeited if not exercised. Decisions of the Board may be appealed to the Circuit Court and State Supreme Court as provided by law. Contact Eric Gronlund by September 23, 1996, at the above Water Rights Program address to request copies of information pertaining to the application, to assure access to the hearing by the handicapped or to obtain an interpreter for the hearing impaired.

The application is made pursuant to SDCL 46-1-1 thru 46-1-9, 46-1-12 thru 46-1-16; 46-2-3.1, 46-2-9, 46-2-11, 46-2-13, 46-2-17; 46-2A-1 thru 46-2A-10, 46-2A-12, 46-2A-14, 46-2A-15, 46-2A-20, 46-2A-21; 46-5-1 thru 46-5-11, 46-5-13 thru 46-5-15, 46-5-24, 46-5-25, 46-5-30.2, 46-5-30.4, 46-5-31, 46-5-47, 46-5-48; and Board Rules ARSD 74:02:01:01 thru 74:02:01:15. Nettie Myers, Secretary, Department of Environment and Natural Resources.

PROOF OF PUBLICATION

STATE OF SOUTH DAKOTA)
County of Codington) SS

I, Monica K. Saathoff

certify that the attached printed Notice was

taken from the Watertown Public Opinion

printed and published in Watertown

County of Codington and State of

South Dakota. The notice was published in
the newspaper on the following two dates:

September 5th, 1996

September 12th, 1996

Cost of Printing: \$127.74

Monica K. Saathoff
(Signature)

Bookkeeper

(Title)

September 12th, 1996

(Date Signed)



PIERRE

NOTICE OF HEARING on Flood Control Application No. FC-19

Notice is given that the Lake Pelican Water District, c/o Alan Schultz, Chairman, 4404 20th Ave. S.W., Watertown, SD 57201 has filed an application for a flood control permit for a weir at the inlet to Lake Pelican in Codington County.

Flood Control Application No. FC-19 requests authorization to construct a diversion weir located in the inlet/outlet channel to Lake Pelican in the NW 1/4 NW 1/4 Section 6, T116N, R52W. The weir is to control sediment loading to Pelican Lake from the Big Sioux River. The weir will have an overflow elevation of 1712.25 feet above mean sea level (fmsl) and contain a fish passage weir with a flow elevation of 1707.75 fmsl. Flow into the lake will be limited when the Big Sioux River is flowing at less than 1600 cubic feet of water per second (cfs). At Big Sioux River flows greater than 1600 cfs, the rate at which water flows into Lake Pelican and downstream in the Big Sioux River will not change.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends DEFERRAL of Application No. FC-19 until the applicant provides additional information on the potential downstream impacts of the project including obtaining flood easements if necessary.

Any person interested in opposing or supporting the application must file a written petition with BOTH the applicant

and Chief Engineer. The applicant must also file a petition if opposed to the Chief Engineer's recommendation. The Chief Engineer's address is "Water Rights Program, Foss Building, 523 E. Capitol, Pierre, SD 57501 (605-773-3352)" and the applicant's mailing address is given above. A petition filed by either an interested person or the applicant must be filed by September 23, 1996. The petition may be informal, but must include a statement describing the petitioner's interest in the application, the petitioner's reasons for opposing or supporting the application, and the signature and mailing address of the petitioner or the petitioner's legal counsel, if legal counsel is obtained.

The Water Management Board will consider the application at 9:30 a.m., October 3, 1996, in the Conference Room, Floyd Matthew Training Center, Joe Foss Building, 523 E. Capitol Ave., Pierre, SD 57501. The Chief Engineer's recommendation is not final or binding upon the Board. If the applicant provides information on potential for downstream impacts, the recommendation may be revised to reflect the new information. The Board is authorized to 1) Approve, 2) Approve with qualifications, 3) Defer, or 4) deny the application based on the facts presented at the public hearing. The hearing date will be automatically delayed for at least 20 days upon written request to the Chief Engineer from the applicant or any interested person opposing the application. The request for an automatic delay must be filed by September 23, 1996.

Any hearing will be an adversary proceeding. Any person filing a petition and/or the applicant have the right to be represented by a lawyer and may present evidence or cross-examine witnesses according to SDCL 1-26. These and other due process rights will be forfeited if not exercised. Decisions of the Board may be appealed to the Circuit Court and State Supreme Court as provided by law. Contact Eric Gronlund by September 23, 1996, at the above Water Rights Program address to request copies of information pertaining to the application, to assure access to the hearing by the handicapped or to obtain an interpreter for the hearing impaired.

The application is made pursuant to SDCL 46-1-1 thru 46-1-9, 46-1-12 thru 46-1-16; 46-2-3.1, 46-2-9, 46-2-11, 46-2-13, 46-2-17; 46-2A-1 thru 46-2A-10, 46-2A-12, 46-2A-14, 46-2A-15, 46-2A-20, 46-2A-21; 46-5-1 thru 46-5-11, 46-5-13 thru 46-5-15, 46-5-24, 46-5-25, 46-5-30.2, 46-5-30.4, 46-5-31, 46-5-47, 46-5-48; and Board Rules ARSD 74:02:01:01 thru 74:02:01:15.

Nettie Myers, Secretary
Department of Environment and Natural Resources.

(September 5, 12, 1996)

Fax Sheet

HDR

Date August 22 1996
Number of Pages (includes cover page) 12

Message To

Name Lynn Beck Telecopy number called 605-773-4068
Firm South Dakota State
City Pierre State SD

If you do not receive all the pages, please call 402-399-1098 as soon as possible.

From

Name Rick Niedergeser Department _____
Telephone 402-399-1082 Job Number _____

As you requested I have Finalized the
Lake Pelican Diversion Works Design Report
If you have any more information needs
Please Call

Rick Niedergeser

LAKE PELICAN DIVERSION WORKS

1.0 HYDROLOGY/HYDRAULICS

1.1 Lake Pelican Inlet-Outlet Relationship

Lake Pelican is located off-stream of the Big Sioux River and is connected by a man made canal. Flow into the lake is controlled by a concrete weir across the Big Sioux River down stream of the Highway 212 bridge.

The discharge rating curve for the Big Sioux River at the Lake Pelican Diversion Weir is shown on Figure 1. This relationship was defined by analysis of historical flood events developed by the Corps of Engineers (COE) Omaha District. This information is provided in their report in "Flood Control for Watertown and Vicinity South Dakota" dated August 1994. Table 1 presents these relationships.

Table 1. Existing Discharge/Probability/Stage Relationships

Event	Discharge (cfs)			
	Big Sioux River Watertown Gage	Lake Kampeska Inlet/Outlet	Big Sioux River ¹ Lake Pelican Inlet/ Watertown Reach	Big Sioux River Downtown Lake Pelican Inlet
2 yr.	990	460	530	250
3-4 yr. ²	1,600	750	850	
10 yr.	3,100	1,500	1,600	870
50 yr.	6,700	3,300	3,400	2,000
100 yr.	8,700	4,400	4,300	2,575
500 yr.	16,000	9,200	6,800	4,100

¹ Upstream of Lake Pelican Diversion

² Data was not available in COE's report.

2.0 DESIGN CONCEPTS

2.1 Objectives

The objectives of the study include:

- Divert sediment laden spring flood waters downstream of the Pelican Diversion Weir without increasing water surface elevations upstream of Highway 212.
- Design structure to allow 10% of the Big Sioux River flow into the Pelican Lake canal for fish passage.
- The "with project" stage-discharge relationship should not exceed the "without project" relationship at discharges of 1,600 cfs and greater at Big Sioux River upstream and downstream of Highway 212.

2.2 Assumptions

The following assumptions of the feasibility study include:

- The allowable, no damage, discharge downstream of the existing Lake Pelican diversion weir is 1,600 cfs. The COE report found that at 1,600 cfs, the 10-year event, the flows generally stay within the channel banks. Below Willow Creek the bank full capacity is substantially increased.
- The hydrologic/hydraulic data presented in the Omaha's District U.S. Army Corps of Engineer's "Flood Control for Watertown and Vicinity, South Dakota," August 1994 was appropriate for analysis.
- The historical outlet of Lake Pelican can be restored as an emergency relief outlet. It is assumed that High water conditions on Lake Pelican will be relieved by opening the historic channel.
- Analysis of available mapping indicates no structures which will be subject to additional flood depths. Flood easements, levees or structures may be required to mitigate flood damages from increased frequencies due to the diversion structure if additional structures have been constructed prior to mapping.
- The Pelican Lake diversion canal and Lake Pelican are maintained at normal depth and do not cause backwater at the weir.

2.3 Hydraulic Analysis

The COE's HEC-2 backwater model for the Big Sioux River through the City of Watertown was obtained and used as the basis for the analysis. The model extended downstream of the 20th Street bridge to the Old Watertown gage station located upstream of the Lake Kampeska inlet/outlet.

2.3.1 Weir Computation

Rating curves were developed for the Lake Pelican Diversion Weir and Lake Pelican Canal Weir. The proposed Lake Pelican canal weir would consist of a fish weir and an overflow weir. The discharge over the weirs were computed based on the weir equation.

$$Q = CLH^{1.5}$$

where:

Q = discharge, in cfs

C = weir coefficient

L = weir length, in feet

H = head, in feet

2.4 Upstream and Downstream Impacts

In order to evaluate the impacts to downstream and upstream reaches, several HEC-2 analyses were made, assuming a constant discharge in the Big Sioux River. Table 2 shows the design water surface elevations and the constant discharge elevations for the study area. The difference between the 10-year water surface elevation and the water surface elevations for several constant flows was also computed. A negative difference indicates that the constant discharge does not have a negative effect on the water surface elevations.

It can be seen from Table 2 that there are more cross sections affected by the larger constant discharges than the smaller discharges. For example, in the reach of the Lake Pelican diversion weir, an additional 2 feet of flow depths would occur near the Highway 212 bridge if 1,600 cfs were diverted downstream.

3.0 FINDINGS

The Proposed Lake Pelican Canal Weir consists of a rectangular fish weir and an overflow weir. The weir lengths and heights were defined at the existing conditions of 1,600 cfs. Table 3 shows the results of the analysis. Under existing conditions, 870 cfs is conveyed downstream of the diversion weir and 730 cfs enters Lake Pelican. This is approximately a 60/40 split between the downstream and canal flows under existing conditions based on studies by the COE.

The canal weirs were designed based on 730 cfs entering the lake. The bottom of the fish weir was set at elevation 1707.7. The elevation of the fish weir was set to be at half the channel depth, 2 feet below the elevation of the top of the Lake Pelican diversion weir. The fish weir head was based on the difference between the water surface elevation at the weir and the bottom of the fish weir adjusted for the weir submergence assuming Lake Pelican is at normal depth at 1709.7. It was found that in order to pass 10% of the base flow, a 2.67 foot fish weir would be required. It was found that a 331 foot canal weir at an elevation of 1712.25 would pass the remaining 646 cfs in the canal.

Through an iterative process the flows in the Lake Pelican canal and upstream of Highway 212 and downstream of the diversion weir were found at elevation 1712.25 at the cross section downstream of the Highway 212 bridge. Under this condition, no flow is flowing over

the canal weir, but the wish weir is operating. The only flow through the canal weir would be through the fish passage, or 72 cfs. The flow upstream of Highway 212 would be 746 cfs, therefore the flow downstream of the diversion weir was 674 cfs.

The 50-, 100- and 500-year were analyzed under the proposed weir configurations. It was found that the canal weirs would not control the flow into the lake, because the downstream channel control governed.

Figure 2 graphically shows the impacts of a project. Figure 3 is an expansion of the low flow data shown in Figure 2. The shaded area represents the flow that would be diverted downstream of the diversion weir in the Big Sioux River with the project. A maximum of 297 cfs ($369 - 72$) could be diverted at elevation 1712.25. This value is reduced to 0 cfs at elevation 1712.98.

Table 1. Big Sioux River Existing 10-Year and Constant Discharge Water Surface Elevations

Landmark	Section Number	Discharge (cfs)	Existing at 1,600 cfs			Constant Discharge										WSL Difference				
			10-yr	Existing	1,000 cfs	1,100 cfs	1,200 cfs	1,300 cfs	1,400 cfs	1,600 cfs	1,000 cfs - 10-yr	1,100 cfs - 10-yr	1,200 cfs - 10-yr	1,300 cfs - 10-yr	1,400 cfs - 10-yr	1,600 cfs - 10-yr				
Approx. 3,500' d/s of 20th Ave	364.1	870	1705.57	1705.57	1705.82	1705.99	1706.16	1706.32	1706.53	1706.77	0.25	0.42	0.59	0.75	0.96	1.20				
	365	870	1708.05	1708.05	1708.30	1708.48	1708.65	1708.81	1709.04	1709.28	0.25	0.43	0.60	0.76	0.99	1.23				
	8	870	1708.65	1708.65	1708.94	1709.14	1709.34	1709.53	1709.79	1710.06	0.29	0.49	0.69	0.88	1.14	1.41				
	8.1	870	1708.66	1708.66	1708.95	1709.15	1709.35	1709.54	1709.80	1710.07	0.29	0.49	0.69	0.88	1.14	1.41				
u/s face 20th Ave	8.2	870	1708.70	1708.70	1709.00	1709.21	1709.41	1709.60	1709.86	1710.14	0.30	0.51	0.71	0.90	1.16	1.44				
	8.3	870	1708.71	1708.71	1709.01	1709.22	1709.42	1709.61	1709.87	1710.15	0.30	0.51	0.71	0.90	1.16	1.44				
	10	870	1709.87	1710.18	1710.89	1711.10	1711.29	1711.47	1711.71	1711.97	0.32	0.53	0.72	0.91	1.16	1.42				
	12	870	1710.57	1710.89	1711.10	1711.29	1711.47	1711.72	1711.97	1712.02	0.31	0.52	0.72	0.91	1.15	1.41				
d/s face Hwy 81	12.1	870	1710.61	1710.92	1711.13	1711.33	1711.52	1711.78	1712.04	1712.04	0.31	0.53	0.73	0.91	1.16	1.42				
	12.2	870	1710.62	1710.93	1711.15	1711.35	1711.53	1711.78	1712.04	1712.04	0.31	0.53	0.73	0.91	1.16	1.42				
	12.3	870	1711.15	1711.49	1711.72	1711.94	1712.15	1712.43	1712.73	1712.73	0.34	0.57	0.79	1.00	1.28	1.58				
	14	870	1712.41	1712.77	1713.03	1713.28	1713.51	1713.81	1714.13	1714.13	0.36	0.62	0.87	1.10	1.40	1.72				
d/s face S. Broadway	16.1	870	1712.41	1712.78	1713.03	1713.28	1713.50	1713.81	1714.13	1714.13	0.37	0.62	0.87	1.09	1.40	1.72				
	16.2	870	1712.43	1712.79	1713.05	1713.29	1713.52	1713.82	1714.15	1714.15	0.36	0.62	0.86	1.09	1.39	1.72				
	16.3	870	1712.44	1712.81	1713.07	1713.32	1713.55	1713.85	1714.18	1714.18	0.37	0.63	0.88	1.11	1.41	1.74				
	18	870	1712.72	1713.10	1713.37	1713.62	1713.85	1714.17	1714.51	1714.51	0.38	0.65	0.90	1.13	1.45	1.79				
u/s face of Weir	20	870	1713.02	1713.43	1713.71	1713.98	1714.24	1714.58	1714.95	1714.95	0.41	0.69	0.96	1.22	1.56	1.93				
	20.1	870	1713.02	1713.43	1713.72	1713.99	1714.25	1714.59	1714.96	1714.96	0.41	0.70	0.97	1.23	1.57	1.94				
	20.2	870	1712.98	1713.39	1713.68	1713.95	1714.21	1714.55	1714.92	1714.92	0.41	0.70	0.97	1.23	1.57	1.94				
	20.3	870	1713.09	1713.50	1713.79	1714.06	1714.31	1714.66	1715.03	1715.03	0.41	0.70	0.97	1.22	1.57	1.94				
d/s face of Highway 212	22	1,600	1713.09	1713.54	1713.83	1714.11	1714.37	1714.72	1715.10	1715.10	0.45	0.74	1.02	1.28	1.63	2.01				
	22.1	1,600	1713.09	1713.54	1713.83	1714.11	1714.37	1714.72	1715.10	1715.10	0.45	0.74	1.02	1.28	1.63	2.01				
	22.2	1,600	1713.13	1713.55	1713.84	1714.12	1714.38	1714.73	1715.11	1715.11	0.42	0.71	0.99	1.25	1.60	1.98				
	22.3	1,600	1713.15	1713.56	1713.85	1714.13	1714.39	1714.74	1715.12	1715.12	0.41	0.70	0.98	1.24	1.59	1.97				
d/s face of Foot Bridge	24	1,600	1713.34	1713.62	1713.91	1714.18	1714.45	1714.80	1715.18	1715.18	0.28	0.57	0.84	1.11	1.46	1.84				
	24.1	1,600	1713.35	1713.62	1713.91	1714.19	1714.45	1714.80	1715.18	1715.18	0.27	0.56	0.84	1.10	1.45	1.83				
	24.2	1,600	1713.38	1713.63	1713.92	1714.19	1714.45	1714.80	1715.18	1715.18	0.25	0.54	0.81	1.07	1.42	1.80				
	26	1,600	1713.97	1713.84	1714.13	1714.39	1714.64	1714.97	1715.34	1715.34	-0.13	0.16	0.42	0.67	1.00	1.37				
u/s face of BNRR	28	1,600	1714.31	1713.99	1714.28	1714.54	1714.78	1715.11	1715.46	1715.46	-0.32	-0.03	0.23	0.47	0.80	1.15				
	28.1	1,600	1714.35	1714.01	1714.30	1714.56	1714.80	1715.13	1715.47	1715.47	-0.34	-0.05	0.21	0.45	0.78	1.12				
	28.2	1,600	1714.37	1714.02	1714.31	1714.57	1714.81	1715.14	1715.49	1715.49	-0.35	-0.06	0.20	0.44	0.77	1.12				
	28.3	1,600	1714.38	1714.02	1714.31	1714.57	1714.82	1715.15	1715.50	1715.50	-0.36	-0.07	0.19	0.44	0.77	1.12				
u/s face of	30	1,600	1714.54	1714.10	1714.39	1714.65	1714.90	1715.23	1715.59	1715.59	-0.44	-0.15	0.11	0.36	0.69	1.05				
	32	1,600	1714.82	1714.24	1714.54	1714.81	1715.06	1715.41	1715.78	1715.78	-0.58	-0.28	-0.01	0.24	0.59	0.96				
	32.1	1,600	1714.82	1714.24	1714.53	1714.81	1715.06	1715.41	1715.78	1715.78	-0.58	-0.29	-0.01	0.24	0.59	0.96				
	32.2	1,600	1714.83	1714.24	1714.54	1714.81	1715.07	1715.42	1715.79	1715.79	-0.59	-0.29	-0.02	0.24	0.59	0.96				
u/s face of 4th Ave S	32.3	1,600	1714.85	1714.25	1714.55	1714.82	1715.08	1715.43	1715.80	1715.80	-0.60	-0.30	-0.03	0.23	0.58	0.95				
	34	1,600	1715.02	1714.34	1714.63	1714.92	1715.18	1715.53	1715.91	1715.91	-0.68	-0.37	-0.10	0.16	0.51	0.89				
	36	1,600	1715.39	1714.54	1714.83	1715.14	1715.41	1715.78	1716.17	1716.17	-0.85	-0.54	-0.25	0.02	0.39	0.78				
	36.1	1,600	1715.39	1714.54	1714.85	1715.14	1715.41	1715.78	1716.17	1716.17	-0.85	-0.54	-0.25	0.02	0.39	0.78				
u/s face of CNW RR	36.2	1,600	1715.39	1714.54	1714.85	1715.15	1715.42	1715.78	1716.17	1716.17	-0.85	-0.54	-0.25	0.02	0.39	0.78				
	36.3	1,600	1715.40	1714.55	1714.86	1715.15	1715.42	1715.78	1716.17	1716.17	-0.85	-0.54	-0.25	0.02	0.39	0.78				
	38	1,600	1715.50	1714.62	1714.93	1715.22	1715.49	1715.85	1716.24	1716.24	-0.88	-0.57	-0.28	0.02	0.35	0.74				
	38.1	1,600	1715.50	1714.61	1714.93	1715.21	1715.48	1715.85	1716.24	1716.24	-0.89	-0.57	-0.29	0.02	0.35	0.74				

Table 2. Big Sioux River Existing 10-Year and Constant Discharge Water Surface Elevations

Landmark	Section Number	Existing at 1,600 cfs		Constant Discharge										WSEL Difference			
		Discharge (cfs)	10-yr Existing	1,000 cfs	1,100 cfs	1,200 cfs	1,300 cfs	1,440 cfs	1,600 cfs	1,000 cfs - 10-yr	1,100 cfs - 10-yr	1,200 cfs - 10-yr	1,300 cfs - 10-yr	1,440 cfs - 10-yr	1,600 cfs - 10-yr		
Up's face of Kemp Ave	38.2	1,600	1715.52	1714.63	1714.94	1715.23	1715.50	1715.86	1716.26	-0.89	-0.58	-0.29	-0.02	0.34	0.74		
	38.3	1,600	1715.54	1714.64	1714.95	1715.24	1715.51	1715.88	1716.28	-0.90	-0.59	-0.30	-0.03	0.34	0.74		
	40	1,600	1715.60	1714.68	1714.99	1715.28	1715.55	1715.92	1716.31	-0.92	-0.61	-0.32	-0.05	0.32	0.71		
	42	1,600	1715.71	1714.76	1715.07	1715.36	1715.63	1716.00	1716.39	-0.93	-0.64	-0.35	-0.08	0.29	0.68		
Up's face of 3rd Ave N	42.1	1,600	1715.70	1714.76	1715.07	1715.35	1715.62	1715.99	1716.38	-0.94	-0.63	-0.35	-0.08	0.29	0.68		
	42.2	1,600	1715.79	1714.81	1715.12	1715.41	1715.68	1716.05	1716.45	-0.98	-0.67	-0.38	-0.11	0.26	0.66		
	42.3	1,600	1715.85	1714.84	1715.15	1715.44	1715.72	1716.09	1716.50	-1.01	-0.70	-0.41	-0.13	0.24	0.65		
	44	1,600	1716.10	1715.04	1715.35	1715.65	1715.93	1716.28	1716.68	-1.06	-0.75	-0.45	-0.17	0.18	0.58		
Up's face of RR	46	1,600	1716.24	1715.18	1715.50	1715.79	1716.07	1716.38	1716.78	-1.06	-0.74	-0.45	-0.17	0.14	0.54		
	46.1	1,600	1716.25	1715.18	1715.50	1715.79	1716.07	1716.38	1716.78	-1.07	-0.75	-0.46	-0.18	0.13	0.53		
	46.2	1,600	1716.25	1715.18	1715.50	1715.79	1716.07	1716.38	1716.78	-1.07	-0.75	-0.46	-0.18	0.13	0.53		
	46.3	1,600	1716.25	1715.19	1715.50	1715.79	1716.07	1716.38	1716.78	-1.06	-0.75	-0.46	-0.18	0.14	0.53		
Up's face of 10th Ave N	48	1,600	1716.39	1715.29	1715.60	1715.90	1716.17	1716.49	1716.89	-1.10	-0.79	-0.49	-0.22	0.10	0.50		
	50	1,600	1716.61	1715.47	1715.78	1716.06	1716.34	1716.66	1717.06	-1.14	-0.83	-0.53	-0.27	0.05	0.45		
	50.1	1,600	1716.60	1715.47	1715.77	1716.06	1716.34	1716.66	1717.05	-1.13	-0.83	-0.54	-0.26	0.06	0.45		
	50.2	1,600	1716.66	1715.50	1715.81	1716.09	1716.37	1716.70	1717.10	-1.16	-0.85	-0.57	-0.29	0.04	0.44		
Up's face of 14th Ave N	50.3	1,600	1716.69	1715.52	1715.83	1716.11	1716.39	1716.72	1717.14	-1.17	-0.86	-0.58	-0.30	0.03	0.43		
	52	1,600	1717.18	1715.95	1716.25	1716.52	1716.79	1717.13	1717.53	-1.23	-0.93	-0.66	-0.39	-0.05	0.35		
	54	1,600	1717.30	1716.08	1716.36	1716.64	1716.90	1717.23	1717.63	-1.22	-0.94	-0.66	-0.40	-0.07	0.33		
	54.1	1,600	1717.30	1716.08	1716.36	1716.64	1716.90	1717.23	1717.63	-1.22	-0.94	-0.66	-0.40	-0.07	0.33		
Up's face of 14th Ave N	54.2	1,600	1717.30	1716.08	1716.36	1716.64	1716.90	1717.23	1717.63	-1.22	-0.94	-0.66	-0.40	-0.07	0.33		
	54.3	1,600	1717.31	1716.08	1716.37	1716.64	1716.90	1717.23	1717.63	-1.23	-0.94	-0.67	-0.41	-0.08	0.32		
	376.2	1,600	1721.51	1719.23	1719.45	1719.65	1719.84	1720.10	1720.39	-2.28	-2.06	-1.86	-1.67	-1.41	-1.12		
	378.6	1,600	1724.17	1721.32	1721.53	1721.72	1721.90	1722.14	1722.40	-2.85	-2.64	-2.45	-2.27	-2.03	-1.77		

Notes: Positive values for water surface elevation difference indicates that constant discharge elevation greater than 10-year elevation.

Negative values indicate no negative effects due to the constant discharge elevation.

Table 3. Lake Pelican Channel Weir Design

FLOW CONDITIONS										FISH WEIR				CANAL WEIR			
Storm Frequency	Stage Big Sioux 22.3*	Big Sioux Sec. 20.2**	Controlling WSEL	QBigSioux u/s of 212 (cfs)	Qweir d/s of weir (cfs)	Qcanal (cfs)	Elevation Bottom	Elevation Top	C	Fish Weir Length (ft)	Submerge Factor	Fish Flow ¹ (cfs)	Weir C	Weir Length (ft)	Weir Q (cfs)	Qtotal Canal (cfs)	Comment
10-Year	1713.15	1712.98	1712.98	1,600	870	730	1707.7	1712.25	3.1	2.67	0.90	90	3.1	331	640	730	
		1712.98	1712.98				1707.7	1712.25	3.1	2.67	0.90	90					
			1712.25	746	674	72	1707.7	1712.25	3.1	2.67	0.90	72	3.1	331	-	72	See Note No. 2
50-Year	1715.47	1715.21	1715.21	3,400	2,000	1,400	1707.7	1712.25	3.1	2.67	0.94	160	3.1	331	5,222	5,383	d/s control Qweir > Qcanal
100-Year	1716.02	1715.95	1715.95	4,300	2,575	1,725	1707.7	1712.25	3.1	2.67	0.95	186	3.1	331	7,299	7,485	d/s control Qweir > Qcanal
500-Year	1717.24	1717.12	1717.12	6,800	4,100	2,700	1707.7	1712.25	3.1	2.67	0.96	230	3.1	331	11,021	11,251	d/s control Qweir > Qcanal

Assumptions and Notes:

* Adjusted for submerged flow conditions. Source: Brader and King Figure 5.5.

Lake Pelican normal surface elevation based on elevation of Big Sioux weir at 1709.7.

* Rao HEC-2 to find the discharge that would yield an elevation of 1712.25 at Section 22.1 (downstream of Highway 212 bridge)

* Section upstream face of Highway 212 bridge, existing conditions. File: EXIST.DAT

** Section at diversion weir on Big Sioux River, existing conditions. File: EXIST.DAT

Comment	FISH WEIR					CANAL WEIR				
	WSEL	Elevation Bottom	Elevation Top	Weir Cool. C	Fish Weir Length (ft)	Fish Flow (cfs)	Weir C	Weir Length (ft)	Weir Q (cfs)	Q total Canal (cfs)
Size Selected	1709	1707.7	1712.25	3.1	2.67	11	3.1	331	-	11
	1710	1707.7	1712.25	3.1	2.67	26	3.1	331	-	26
	1711	1707.7	1712.25	3.1	2.67	45	3.1	331	-	45
	1712	1707.7	1712.25	3.1	2.67	66	3.1	331	-	66
	1712.25	1707.7	1712.25	3.1	2.67	72	3.1	331	-	72
	1712.5	1707.7	1712.25	3.1	2.67	78	3.1	331	128	207
	1712.8	1707.7	1712.25	3.1	2.67	86	3.1	331	418	504
	1713	1707.7	1712.25	3.1	2.67	91	3.1	331	666	757
	1713.5	1707.7	1712.25	3.1	2.67	104	3.1	331	1,433	1,537
	1714	1707.7	1712.25	3.1	2.67	118	3.1	331	2,374	2,492
	1715	1707.7	1712.25	3.1	2.67	147	3.1	331	4,677	4,824
	1716	1707.7	1712.25	3.1	2.67	178	3.1	331	7,447	7,625
	1717	1707.7	1712.25	3.1	2.67	211	3.1	331	10,616	10,828

LAKE PELICAN DIVERSION WEIR
DISCHARGE RATING CURVE

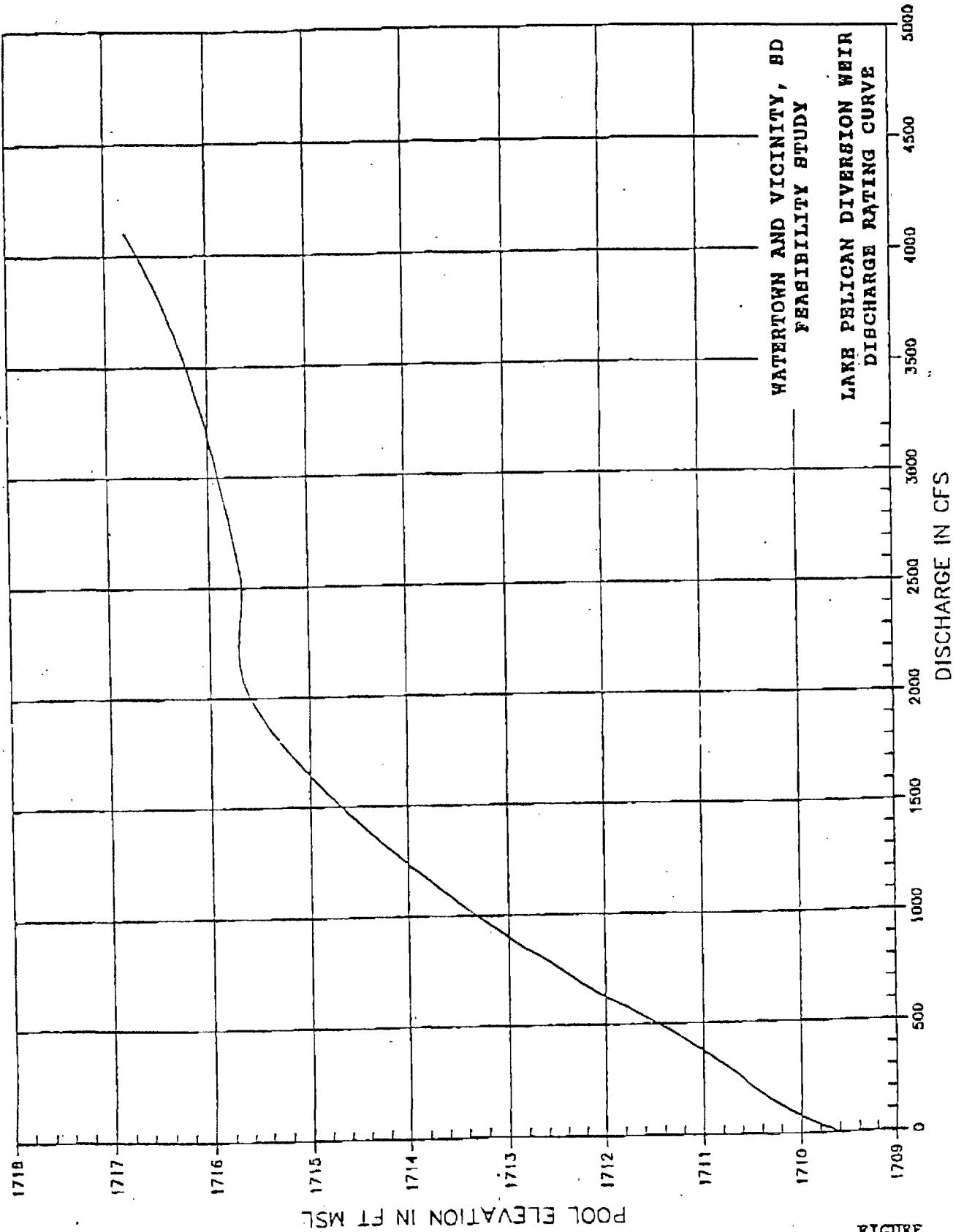
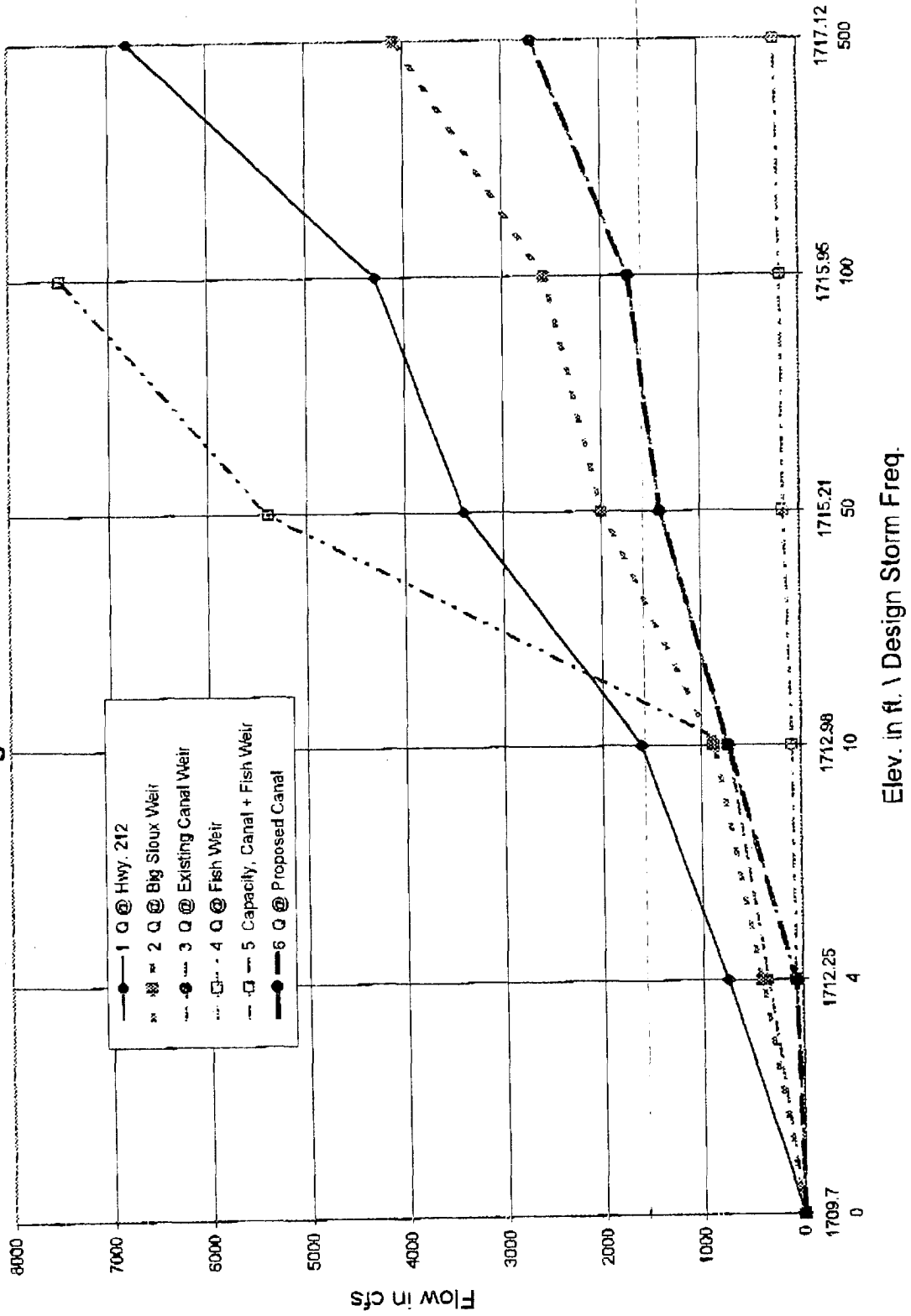
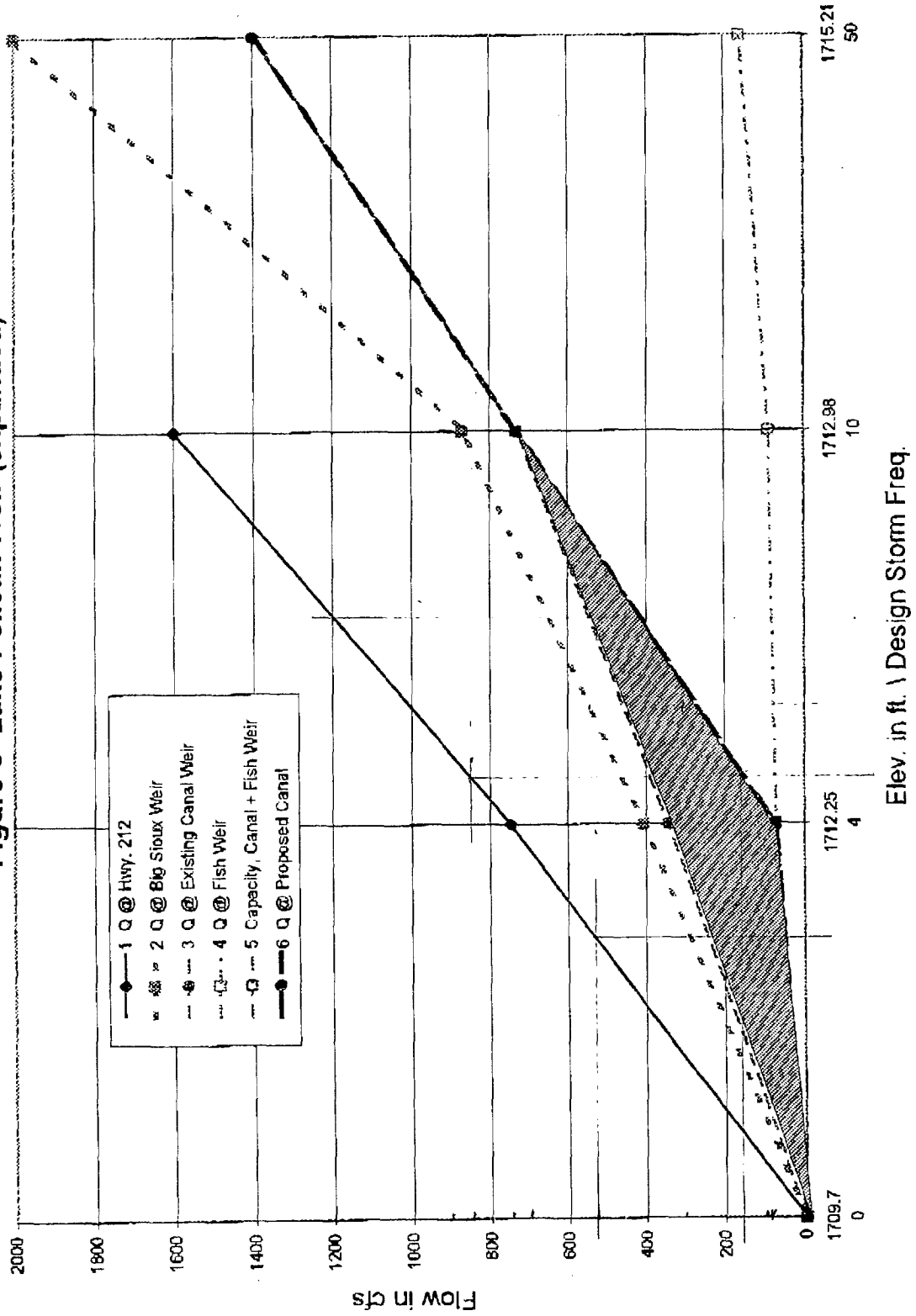


Figure 2 Lake Pelican Weir



8/22/96

Figure 3 Lake Pelican Weir (expanded)





**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3181

August 29, 1996

Todd R. Connelly, Public Works Director
City of Watertown
PO Box 910
Watertown SD 57201-0910

Dear Mr. Connelly:

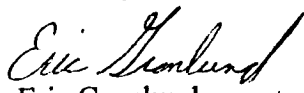
The Lake Pelican Water District filed a flood control application for a diversion weir along the inlet/outlet channel to Lake Pelican. I am providing you a copy of the notice of hearing, report and recommendation on the application. It is my understanding that the District has involved the city in the planning of this project.

Currently, the Chief Engineer is recommending deferral until the applicant provides additional information on potential downstream impacts. The recommendation may be revised to reflect any supplemental information.

The notice of hearing is scheduled to be published in the Public Opinion on September 5 and 12, 1996. If the city wishes to participate in the October 3, 1996, hearing to support or oppose the application, a petition to intervene must be filed by September 23, 1996. The procedure for filing a petition is contained in the enclosed notice of hearing.

If you have any questions on the application, please contact Lynn Beck at (605) 773-3352.

Sincerely,


Eric Gronlund
Water Rights Program
(605) 773-3352

enclosure



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3181

August 29, 1996

Greg Hentges
Lake Pelican Water Association
45182 Air Haven Road
Watertown, SD 57201

Dear Mr. Hentges:

The Lake Pelican Water District filed a flood control application for a diversion weir along the inlet/outlet channel to Lake Pelican. I know you have been involved in the development of this project. To keep you informed, I am providing you a copy of the notice of hearing, report and recommendation.

Currently, the Chief Engineer is recommending deferral until the applicant provides additional information on potential downstream impacts. The recommendation may be revised to reflect any supplemental information.

The notice of hearing is scheduled to be published in the Public Opinion on September 5 and 12, 1996. If you know of anyone who wishes to participate in the October 3, 1996, hearing to support the application, a petition to intervene must be filed by September 23, 1996. The procedure for filing a petition is contained in the enclosed notice of hearing.

If you have any questions on the application, please contact Lynn Beck at (605) 773-3352.

Sincerely,

Eric Gronlund
Water Rights Program
(605) 773-3352

enclosure



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3181

August 29, 1996

Jay Gilbertson, Manager
East Dakota Water Development District
307 Sixth Street
Brookings SD 57006

Dear Jay:

The Lake Pelican Water District filed a flood control application for a diversion weir along the inlet/outlet channel to Lake Pelican. I am providing you a copy of the notice of hearing, report and recommendation on the application. Currently, the Chief Engineer is recommending deferral until the applicant provides additional information on potential downstream impacts. The recommendation may be revised to reflect any supplemental information.

The notice of hearing is scheduled to be published in the Public Opinion on September 5 and 12, 1996. If the District wishes to participate in the October 3, 1996, hearing to support or oppose the application, a petition to intervene must be filed by September 23, 1996. The procedure for filing a petition is contained in the enclosed notice of hearing.

If you have any questions on the application, please contact Lynn Beck at (605) 773-3352.

Sincerely,

Eric Gronlund
Water Rights Program
(605) 773-3352

enclosure

LAKE KAMPESKA WATER PROJECT DISTRICT

123 19th St. SE • Watertown, SD • 57201



September 13, 1996

Alan Schultz
Rural Route 3, Box 92
Watertown, SD 57201

Dear Alan:

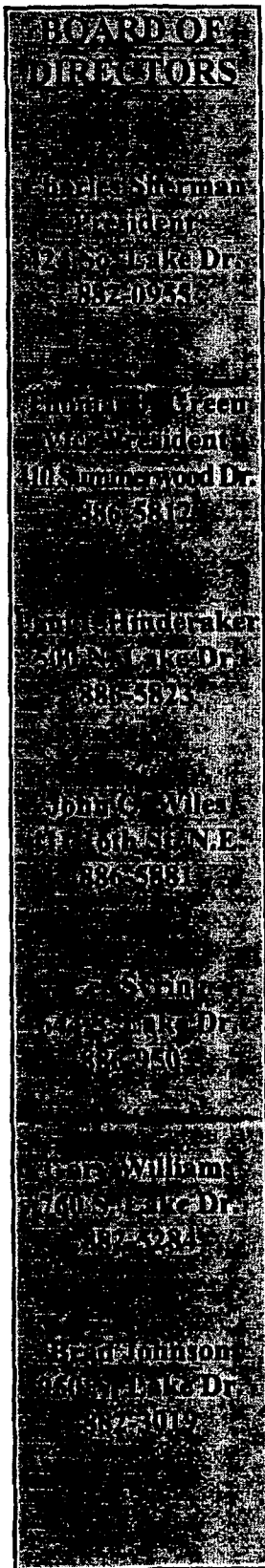
This letter is sent on behalf of the Lake Kampeska Water Project District for the purpose of endorsing the diversion project activity for Lake Pelican. The Board of Directors of the Lake Kampeska Water Project District strongly supports your efforts to build this diversion structure.

If there is any way that our Board can continue the cooperative working relationship that we have experienced over the last two years with the Pelican Board, we would be more than willing to help out in any way possible.

Respectfully,

Charles F. Sherman, President

CFS:crh



EAST DAKOTA WATER DEVELOPMENT DISTRICT

Office
524 Seventeenth Avenue
BROOKINGS, SOUTH DAKOTA 57006
TELEPHONE (605) 692-5185

BOARD OF DIRECTORS

EARL P. ACHESON, CHAIRMAN, Chester
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HOBERT A. STORER, Colman

JERRY L. SIEGEL
Manager-Treasurer



MEMO TO: Tim Bjork, DENR
John Hatch, DENR
Doug Alvine, GF&P
Wally Redlin, EDWDD

FROM: Jerry L. Siegel, Manager-Treasurer

SUBJECT: Follow-up on September 10 Lake Pelican Memo

1. I received a call from E. C. Krull responding to the September 10 memo I sent outlining their proposal for a second outlet control structure. He indicated they have had second thoughts about raising the operating level of Lake Pelican. They still want to pursue the structure for the second purpose which is to prevent Big Sioux River flood flow from entering Lake Pelican when it is already full.
2. He invited me to a Lake Pelican meeting scheduled for 7:00 p.m. on Wednesday, October 23. I am hoping you will also be invited because I would like you to participate. If you do not hear from him about the meeting, you might want to call him (phone 882-2339). I am scheduled to make a tour of Lake Pelican with Mr. Krull at 5:00 p.m. If any of you would like to participate on that, please let me know in advance.
3. Thank you.

JLS/kah

cc: E. C. Krull



DEPARTMENT OF GAME, FISH AND PARKS

Foss Building
523 East Capitol
Pierre, South Dakota 57501-3182



September 20, 1996

Mr. John Hatch, Chief Engineer
Water Rights Program
S.D. Department of Environment and Natural Resources
Foss Building, 523 East Capitol Ave.
Pierre, SD 57501

RE: Flood Control Permit Application No. FC-19, Lake Pelican Water District
Petition to Become Party of Record

Dear Mr. Hatch:

The South Dakota Department of Game, Fish and Parks (GF&P) has reviewed the notice of hearing, report and Chief Engineer's recommendations for the above referenced flood control permit application.

Pursuant to SDCL 1-26 we request that GF&P be made a party of record in the proceedings for this application. GF&P is an interested and potentially affected party by virtue of statutory authority to manage fish and wildlife resources of the state (SDCL Chapter 41). GF&P also holds a vested water right claim for Lake Pelican (Water License No. 880-3) for recreational and fish and wildlife propagation purposes. Filing for party status in this proceeding will ensure our ability to protect our interests in water and habitat management within the subject watershed.

We have cooperated with the applicant and their engineers to assure that the design of the structure will allow adequate fish passage from the lake into the Big Sioux River system.

Thank you for the opportunity to comment.

Sincerely,

Tim Olson
Water Permits Coordinator

cc: Lake Pelican Water District c/o Alan Schultz
Doug Alvine
Ron Koth

STATE OF SOUTH DAKOTA



OFFICE OF ATTORNEY GENERAL

500 EAST CAPITOL
Pierre, South Dakota 57501-5070
Phone (605) 773-3215
FAX# (605) 773-4106

MARK W. BARNETT
ATTORNEY GENERAL



LAWRENCE E. LONG
CHIEF DEPUTY ATTORNEY GENERAL

September 20, 1996

Alan W. Schultz
Lake Pelican Board of Directors
4404 20th Avenue, S.W.
Watertown, SD 57201

Re: **Lake Pelican Canal Weir**

Dear Mr. Schultz:

This letter confirms our telephone conversation.

During our conversation, we discussed the Department of Environment and Natural Resource's request for information on potential downstream affects of the proposed canal weir. You indicated that you would contact HDR and attempt to insure that this information would be provided to the DENR (Lynn Beck) as soon as possible. As of yesterday, I do not believe that Ms. Beck had received the information. At the present time, the Chief Engineer's recommendation in this matter is that the proposal be deferred until adequate information is available concerning downstream affects. Please take whatever steps you can to provide the information as soon as possible since it will impact the Chief Engineer's recommendation at the time of hearing.

Also, we briefly touched upon the issue of whether HDR engineers would be available to testify. Ms. Beck informed me yesterday that some discussion had been held about the possibility of having an HDR engineer testify by teleconference. Ordinarily, teleconference participation is not practical for testimony which involves explanation of plans and specifications and other technical evidence. It is my personal opinion that an HDR witness will need to be present in order to provide direct testimony and respond to cross-examination on these technical issues.

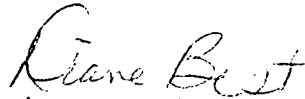
Finally, we discussed the South Dakota Bar Association's position that associations, corporations, cooperatives, and the like must be represented by attorneys in order to appear before administrative agencies in the State of South Dakota. The Bar Association considers that any representation of such entities

Alan Schultz
September 20, 1996
Page 2

before an administrative agency by someone other than a licensed attorney constitutes the unauthorized practice of law. This position does not apply to the circumstance where an individual would represent his or her own interest. I expect, however, that it would apply to a situation involving a water district. As a member of the Bar, I feel that I have a personal obligation to advise you of this circumstance.

Finally, I checked this morning to see whether anyone had filed a petition to intervene in this matter. As of today's date, the Water Rights staff has received no petitions. You may want to check on this next week after the filing deadline has expired.

Sincerely,



Diane Best
Assistant Attorney General
Counsel for the Water Rights Program, DENR

DB:mjj
cc: Lynn Beck, DENR

m-ltr115.db(mjj)(word)



Don Crouse, President
Kampeska Chapter
Izaak Walton League of America
444 South Lake Drive
Watertown, South Dakota 57201

John P. Hatch
Water Rights Division
Department of Environment and Natural Resources
Joe Foss Building
523 East Capitol
Pierre, South Dakota 57501-3181

September 20, 1996

Dear Mr. Hatch

The Kampeska Chapter of the IWLA is concerned with the water quality of our lakes. We look to prevent silt and nutrients in the Big Sioux River from entering these water bodies.

We fully support the construction of the Pelican Diversion Device to help prevent this pollution.

We feel that it will help keep silt out of the lake during the initial flows of major storm or spring run off events. It is our belief that it will not adversely affect marine life or down stream properties.

We appreciate any help you can give us in this matter.

Sincerely

Don Crouse, President
Kampeska IWLA



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3181

September 24, 1996

Alan W. Schultz
Lake Pelican Board of Directors
4404 20th Avenue, S.W.
Watertown, SD 57201

Dear Mr. Schultz:

Please find a copy of the petition in support of the flood control application for Lake Pelican. The petition was filed by the Kampeska Chapter of the Izaak Walton League of America.

Sincerely,

Eric Gronlund
Water Rights Program
(605) 773-3352

enclosure

WILES, RYLANCE & HOLGERSON

(A partnership of Professional Corporations)

ATTORNEYS AT LAW

3 East Kemp - Suite 200

P. O. Box 227

Watertown, South Dakota 57201-0227

(605) 886-5881

TELECOPIER

(605) 886-3934

John C. Wiles, P.C.
Raymond D. Rylance, P.C.
Albert H. Holgerson, P.C.*



Of Counsel:
Donald E. Osheim
Also Licensed In:
* Mass. & N.H.

DATE/TIME:

September 25, 1996

PLEASE DELIVER TO:

John Hatch, Chief Engineer
Water Rights Program
Department of Environment & Natural Resources
Foss Building, 523 East Capitol
Pierre, SD 57501

FAX NUMBER:

773-4068

FROM:

RAYMOND D. RYLANCE
WILES, RYLANCE & HOLGERSON

RE:

Lake Pelican Water District

TOTAL NUMBER OF PAGES: 17 (including this page)

Please (X) deliver to above addressee.

PLEASE CALL (605) 886-5881 IF THERE ARE ANY QUESTIONS OR PROBLEMS WITH RECEIVING THIS FAX.

The information contained in the accompanying transmission is or may be protected by the attorney/client and/or the attorney work product privilege and is confidential. It is intended only for the use of the individual or entity identified above. If the reader of this message is not the intended recipient, you are hereby notified that any dissemination or distribution of the accompanying communication is prohibited. No applicable privilege is waived by the party sending the accompanying documents. If you have received this communication in error, please notify us immediately by telephone collect and return the original message to us at the above address via the U. S. Postal Service. We will reimburse you for postage. Thank you.

MESSAGE: See the following.

WILES, RYLAND & HOLGERSON

(A partnership of Professional Corporations)

ATTORNEYS AT LAW

3 East Kemp - Suite 200

P. O. Box 227

Watertown, South Dakota 57201-0227

(605) 886-5881

TELECOPIER

(605) 886-3934

John C. Wiles, P.C.

Raymond D. Ryland, P.C.

Albert H. Holgerson, P.C.

Of Counsel:

Donald E. Osheim

Also Licensed In:

* Mass & N.H.

SENT VIA FAX TRANSMISSION
773-4068

September 25, 1996

John Hatch, Chief Engineer
Water Rights Program
Department of Environment & Natural Resources
Foss Building, 523 East Capitol
Pierre, SD 57501

RE: Lake Pelican Water District

Dear John:

Following this letter is the report from HDR Engineering. Please provide Lynn Beck with a copy of the same. Once you have reviewed the material, please call me to discuss this matter.

Thank you, and I await your reply.

Sincerely yours,

WILES, RYLAND & HOLGERSON

Raymond D. Ryland

RDR/nd

605-886-3934

Ray
Rylance

September 23, 1996

Mr. Greg Hentges
Lake Pelican Water Association
45182 Air Haven Road
Watertown, SD 57201

RE: South Dakota State Flood Control Application

Dear Mr. Hentges:

We have reviewed your letter from Mr. Eric Gronlund, South Dakota State Department of Environment and Natural Resources. We understand that the principal issue in consideration is the extent of increased flows in reaches downstream from the proposed weir structure.

Additional Data

We have reviewed our files and have met with the Corps of Engineers to determine if additional information exists with respect to hydrology and hydraulics in the downstream reaches from the project. We found that the Corps of Engineers has a model which evaluates the 560 cfs and 820 cfs flows for extensive distances downstream. This information is not available to HDR in detailed form. As per our discussions with the Corps of Engineers (COE) we understand that their study was based on surveyed cross sections taken between 1 and 5 miles apart for reaches downstream to Brookings. The COE may be able to evaluate these sections and determine the extent of increased flooding, if any, resulting from the proposed project. However, we feel the wide section spacing will not add significantly to the understanding of down stream reaches.

Hydrology

The hydrology used for this evaluation was prepared by the COE to evaluate major flood events in the Big Sioux River Basin. Lesser local rainfall events can also cause flooding in the ranges being discussed here (0 to 870 cfs). For rainfall centered on Lake Pelican the proposed weir will store flows and reduce the frequency of floods to down stream reaches. Due to cost considerations the value of flood reduction benefits of this project have not been considered in this evaluation.

Hydraulics:

We have reviewed data available to us in the reach just downstream of the proposed improvement. We have numerous sections between the mouth of the Pelican Lake canal and the confluence of Willow Creek, approximately 12,000 ft. downstream. The flow characteristics of this reach provide a good indication of the downstream channel hydraulic conditions. As distance downstream increases, the flow contribution from this project will be attenuated or lessened with distance. In addition increased drainage areas downstream will add additional flows from other sub-basins which will proportionately reduce the result of flow changes. Finally, it can generally be assumed channel capacities increase as one proceeds down stream.

DATA TO FRICK
UP?

We have prepared a number of exhibits which help visualize the increased water depths of the Big Sioux River channel. The State of South Dakota prepared a Frequency Analysis in which they showed the change in flow based on the proposed project for a variety of recurrence intervals. We have prepared a graph shown in Figure 1 which shows the flow change for all recurrence intervals between 0 and 10 years. It appears that the maximum increase in flow is at about the 3 year recurrence interval at 230 cfs. The increase reduces to 0 at 870 cfs flow, which is currently equal to approximately the 10 year recurrence interval. Figure 2 shows the same information plotted on the scale showing the 100 year recurrence interval to provide a perspective of other plausible flood events. Viewing Figure 1 from a frequency perspective the proposed project will result in an increased frequency of recurrence of approximately 2 years for a typical flow. For example, the channel currently experiences a 755 cfs flow once in 8 years after the Pelican Lake weir is installed the channel will flow at 755 cfs once in 6 years.

55% increase at 3 yr

An indication of the extent of increased channel deaths due to these flows can be determined by evaluating available downstream sections between Lake Pelican and the mouth of Willow Creek. A number of natural sections have been plotted and rating curves calculated at Section 364, located at the mouth of Willow Creek, Section 10, located approximately 1200 ft. downstream of U.S. Highway 81, Section 14, located approximately 1200 ft. upstream of U.S. Highway 81 and Section 16, located just downstream of 20th Avenue (see Figures 3 to 10). Rating curves were plotted showing the 250 cfs, 870 cfs, and 1600 cfs low flows as well as the 50, 100 and 500 year flows as determined by the Corps of Engineers. Evaluation of Section 364 and Section 16 indicates that flows up to 870 cfs that may be changed by the proposed project are essentially confined to the channel. For these two sections, the project would have minimal increase in channel topwidth and area flooded. The channel capacity is substantially greater than the maximum flows that would be affected with the project.

At Sections 10 and 14 the channel is not as well defined. These sections show that flows in the range between 250 to 870 cfs effect the width of the channel area at Section 10 (97 ft. to 360 ft. width, Figure 6) and at Section 14 (113 ft. to 183 ft. width, Figure 8). If the proposed weir is constructed only these areas will experience an increased frequency of flows. Increased depths of flow will range between 0 to 1.2 feet and the maximum increase 1.2 feet will occur for the 2.3 year frequency. Though the channel is less well defined, these flows can still be considered within the natural historic channel capacity. There are no known buildings or croplands in these channel areas.

Based on these sample sections the changes from the proposed weir have been well identified. The frequency of a given flow between 0 and 870 cfs will become more frequent, varying between 0 and 2 years more frequent. Figure 1 shows a 2 year shift in frequency is typical between the 3 year and 8 year events. Maximum increase in flow will be approximately 230 cfs at approximately the 2.3 year recurrence interval.

It should be noted that the recurrence intervals used here are for the current canal condition, with the existing Lake Pelican diversion on the Big Sioux River in operation. The historic 10 year flow was approximately 1600 cfs before the existing Lake Pelican diversion weir was constructed on the Big Sioux River.

The existing Big Sioux weir was constructed to maintain a minimum water surface elevation in Lake Pelican during drought periods. A secondary benefit of the existing weir was reduced flooding in the downstream reaches for all frequencies of events. A negative impact which resulted from the construction of the existing Big Sioux weir was to cause sedimentation and water quality problems in Lake Pelican. The proposed Lake Pelican weir project is intended to reduce sedimentation and water quality deterioration by excluding only the low flows from the Big Sioux River. With the proposed project flows higher than 870 cfs will continue to be diverted into Lake Pelican retaining the flow reduction benefits of the existing Big Sioux weir.

Findings

The above evaluation is based on available data on the reach from just downstream of the project to the mouth of Willow Creek. Data on down stream reaches below Willow Creek was not available. We believe the available data is sufficient to characterize the worst case condition based on the generalization that channel capacities increase and flooding effects attenuate as distance down stream increases.

In some reaches the proposed project will increase the frequency of low flows for flows less than 870 cfs.

In the reach evaluated (12,000 feet downstream of the project) the area that would experience increased flows is 0 to 250 feet wide and is contained within the natural historic channel. This is especially true if the natural condition previous to the construction of the Big Sioux weir is considered to define the channel.

We hope the above evaluation meets your requirements. If you have any questions please call.

Respectfully submitted:

HDR ENGINEERING, INC.



Richard M. Niederges
Project Engineer

RMN:dw

Attachments

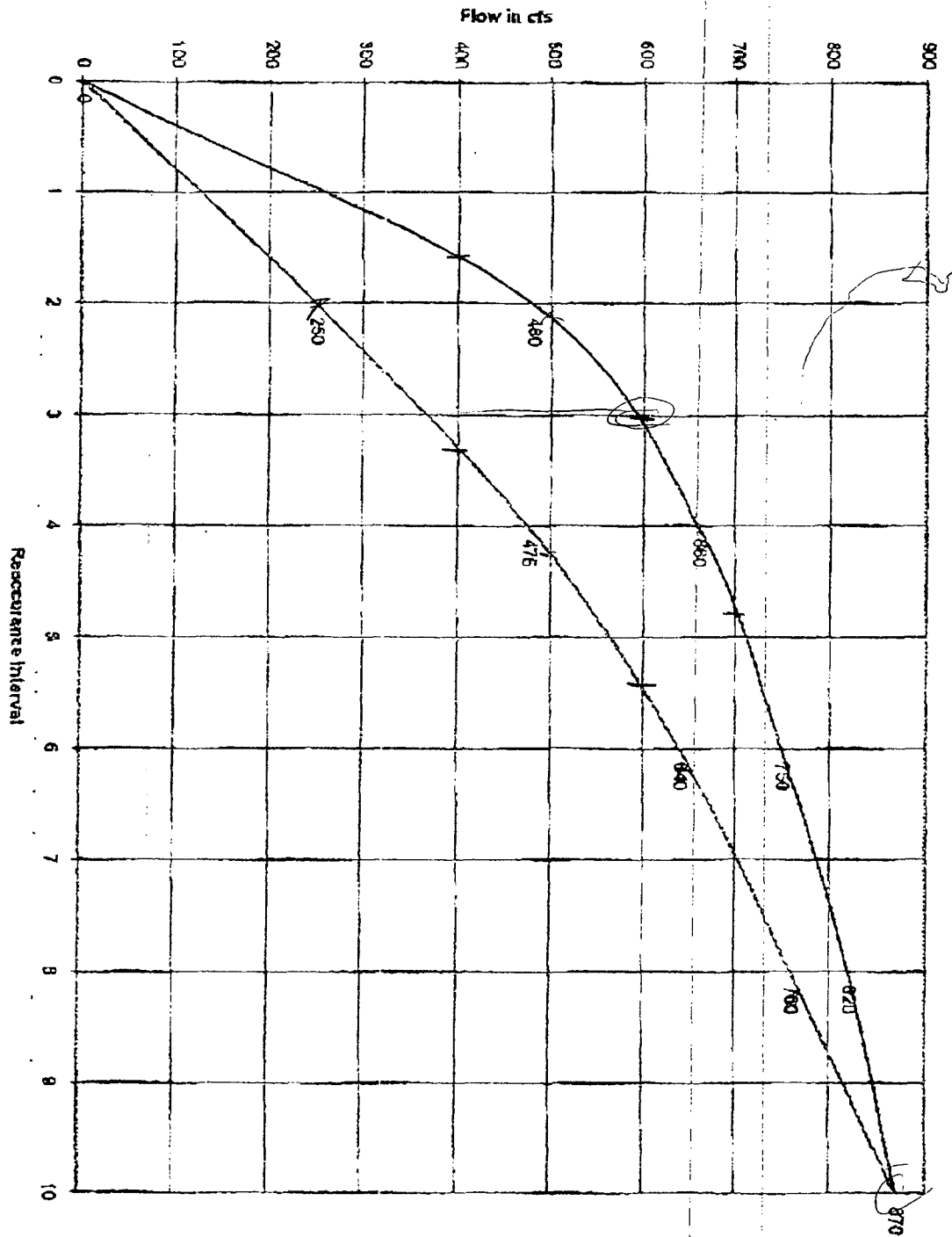


Figure 1
Frequency Change Study

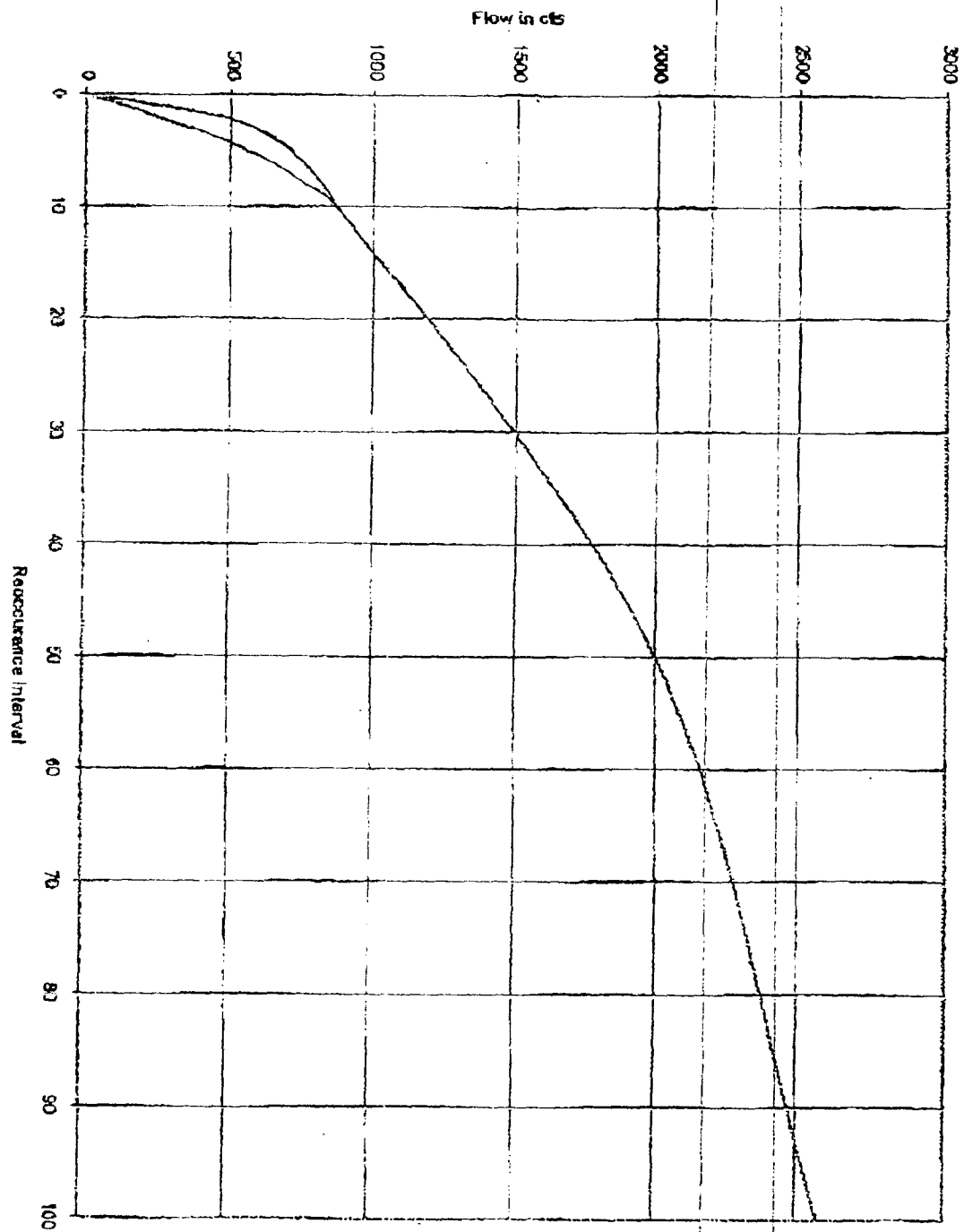


Figure 2
Frequency Change Study

Figure 3
Channel Rating Curve Section 384

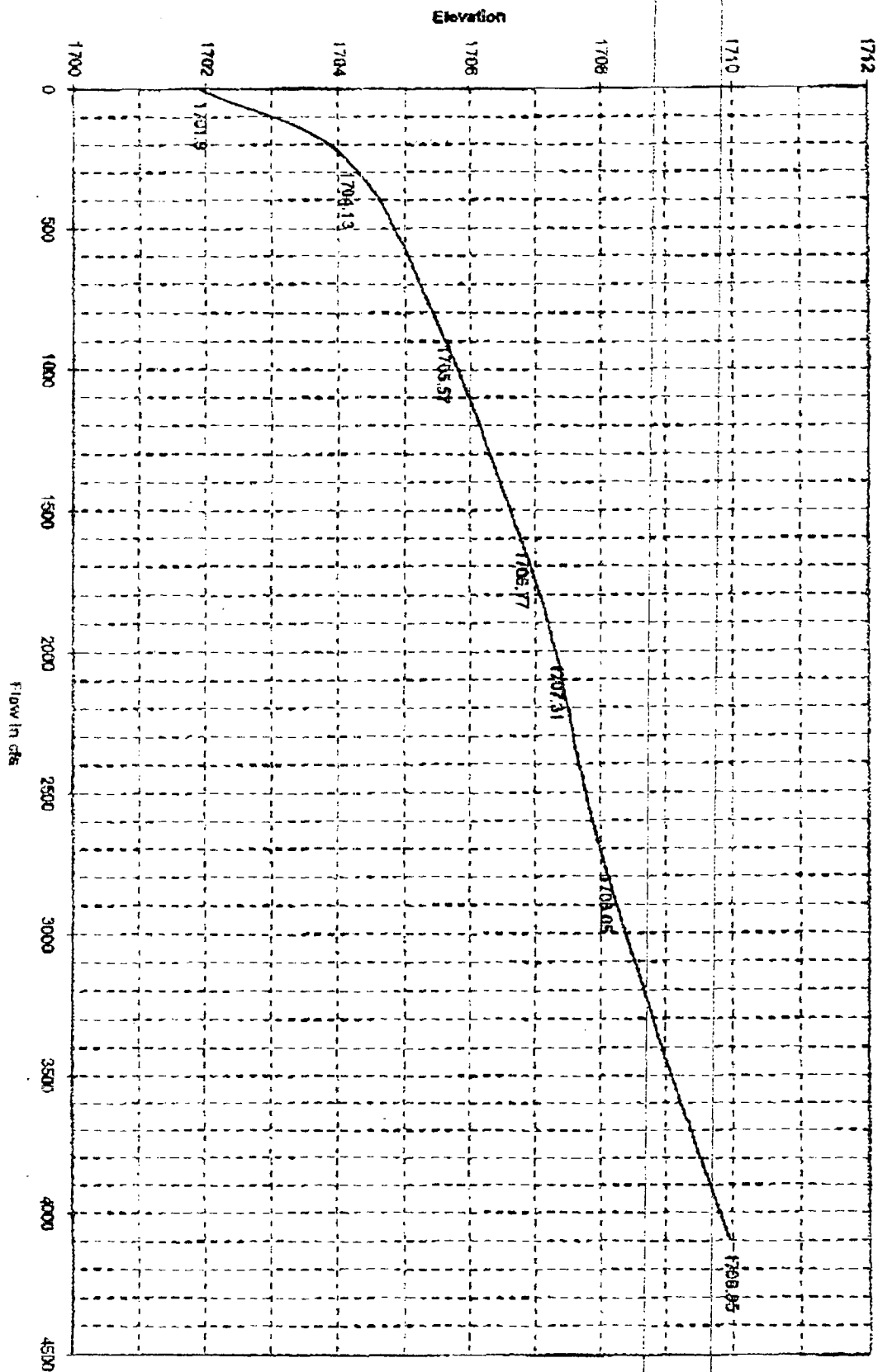


Figure 4
Section 384
Confluence, Willow Creek

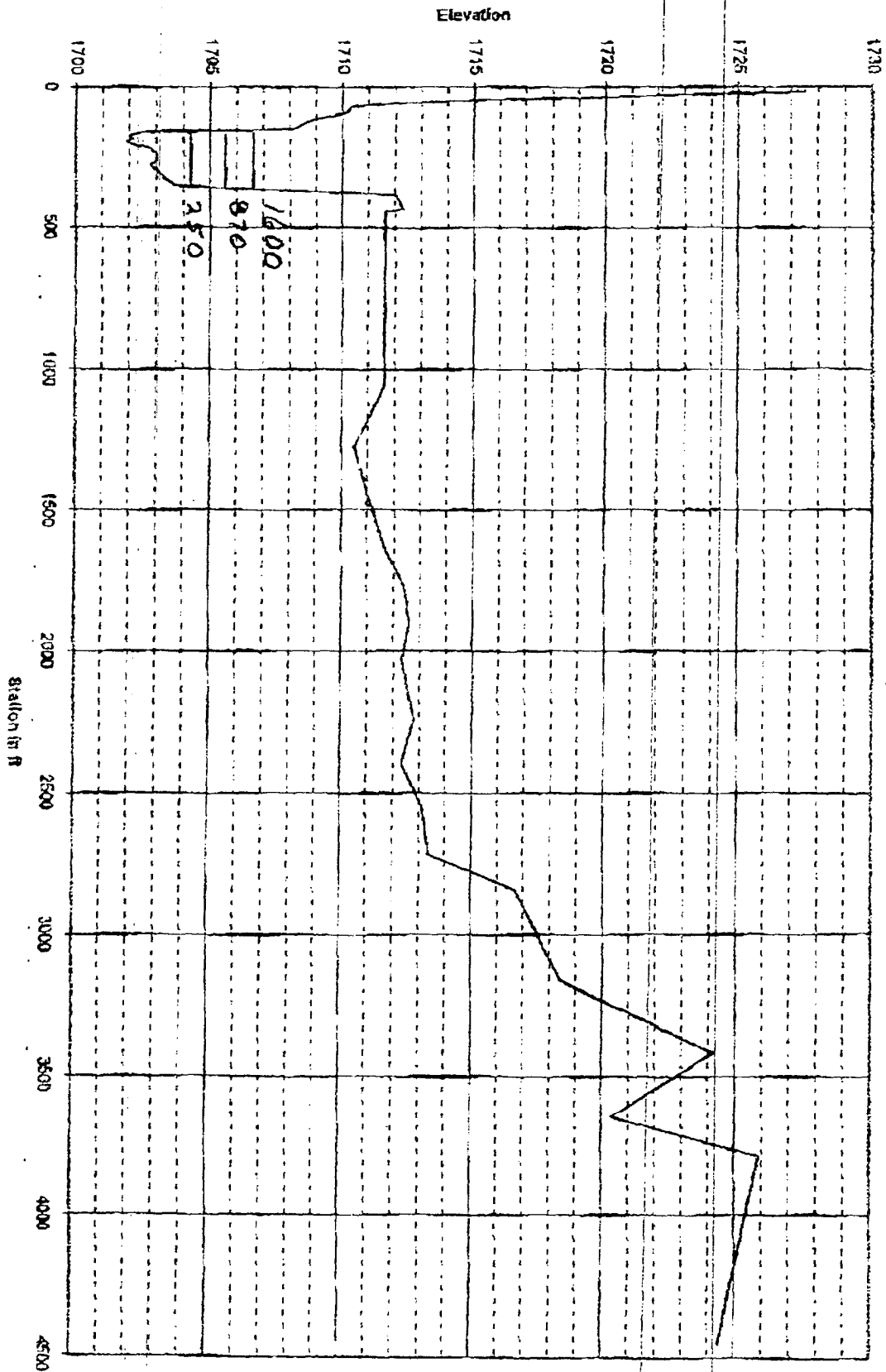


Figure 5
Channel Rating Curve Section 10

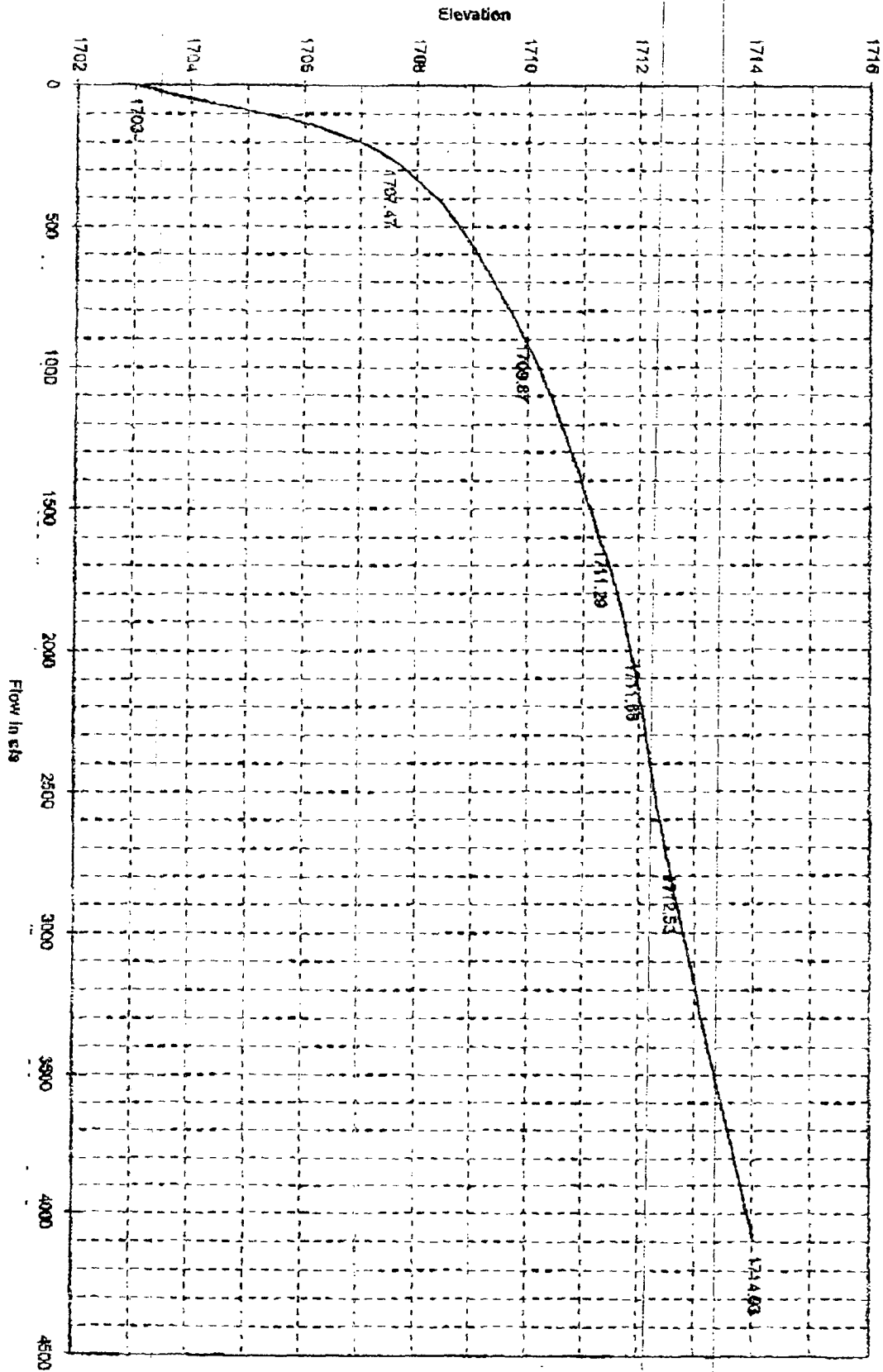


Figure 6
Section 10
1200' d.s. U.S. Hwy 81

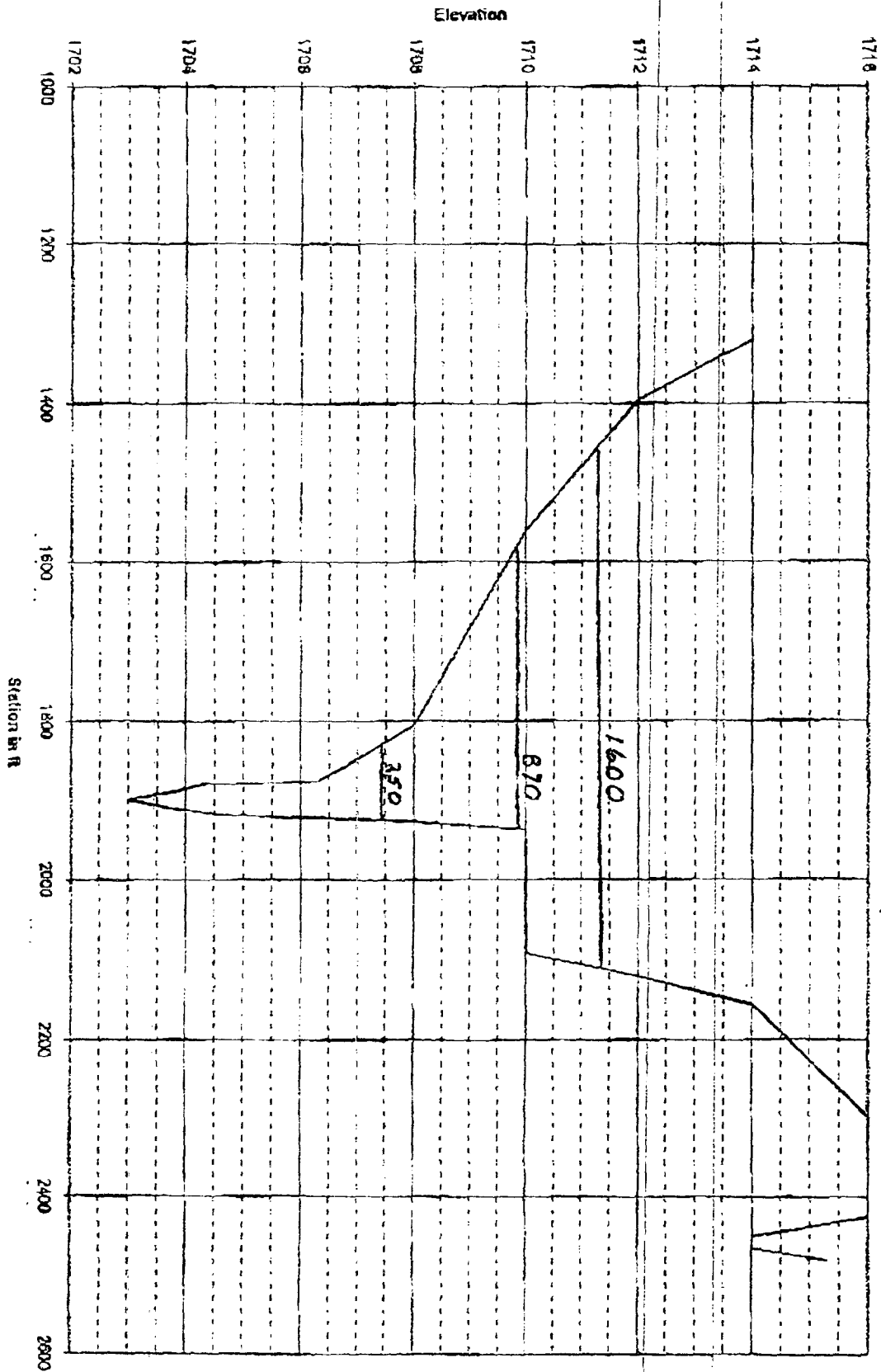


Figure 7
Channel Rating Curve Section 14

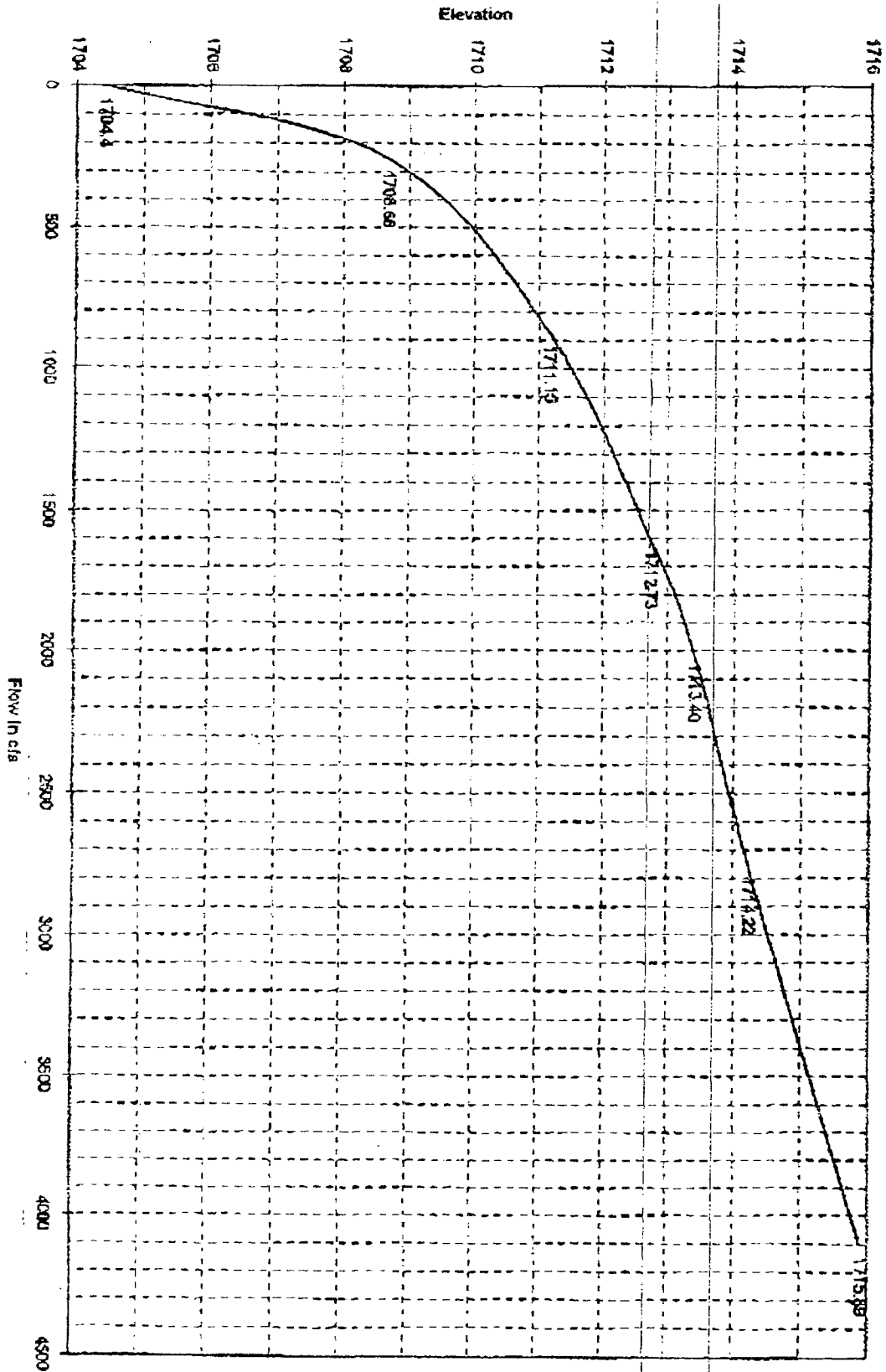
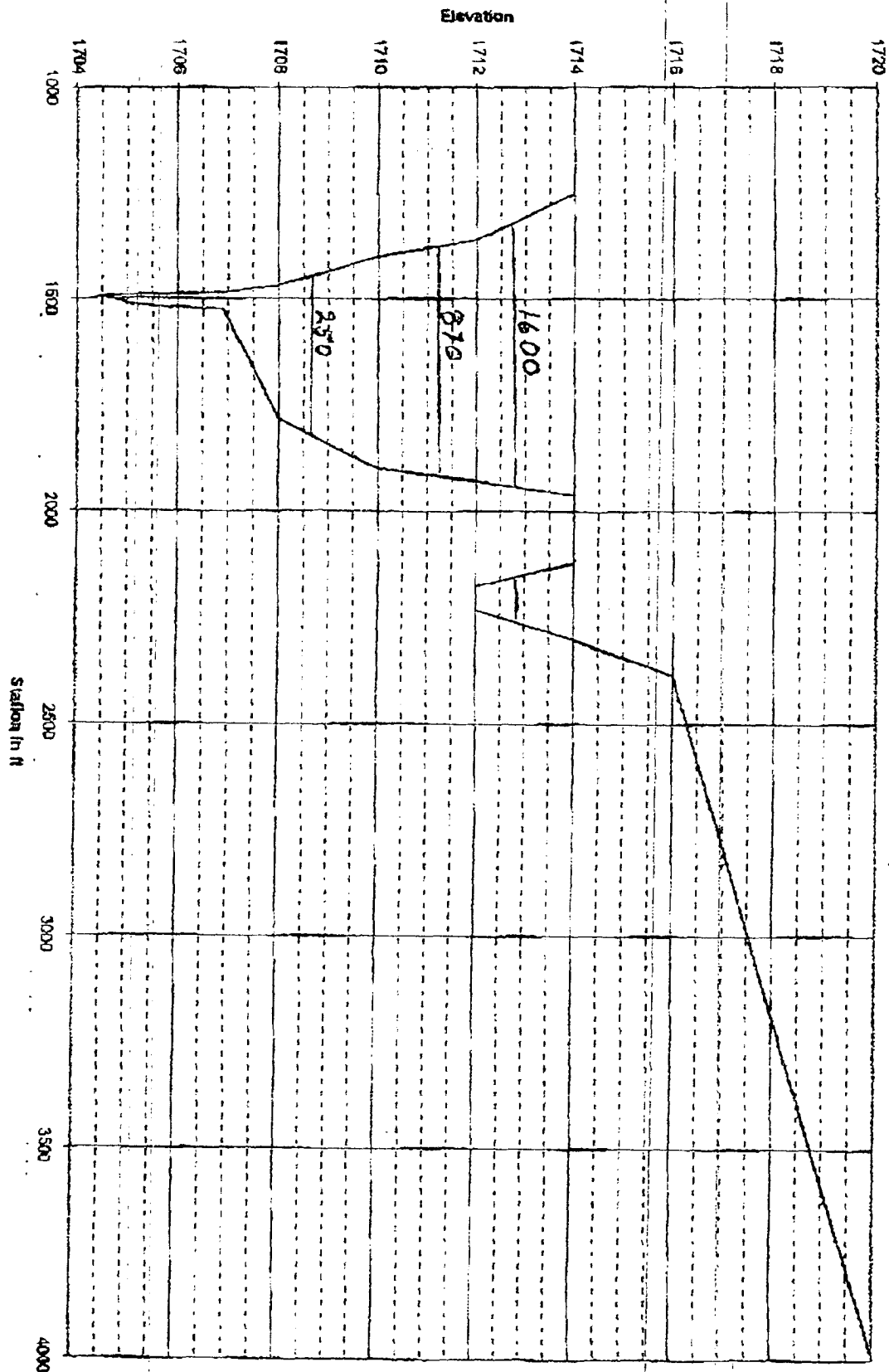


Figure 8
Section 14
1200' u.s. 11.S. Hwy 81



Frequency Change Study

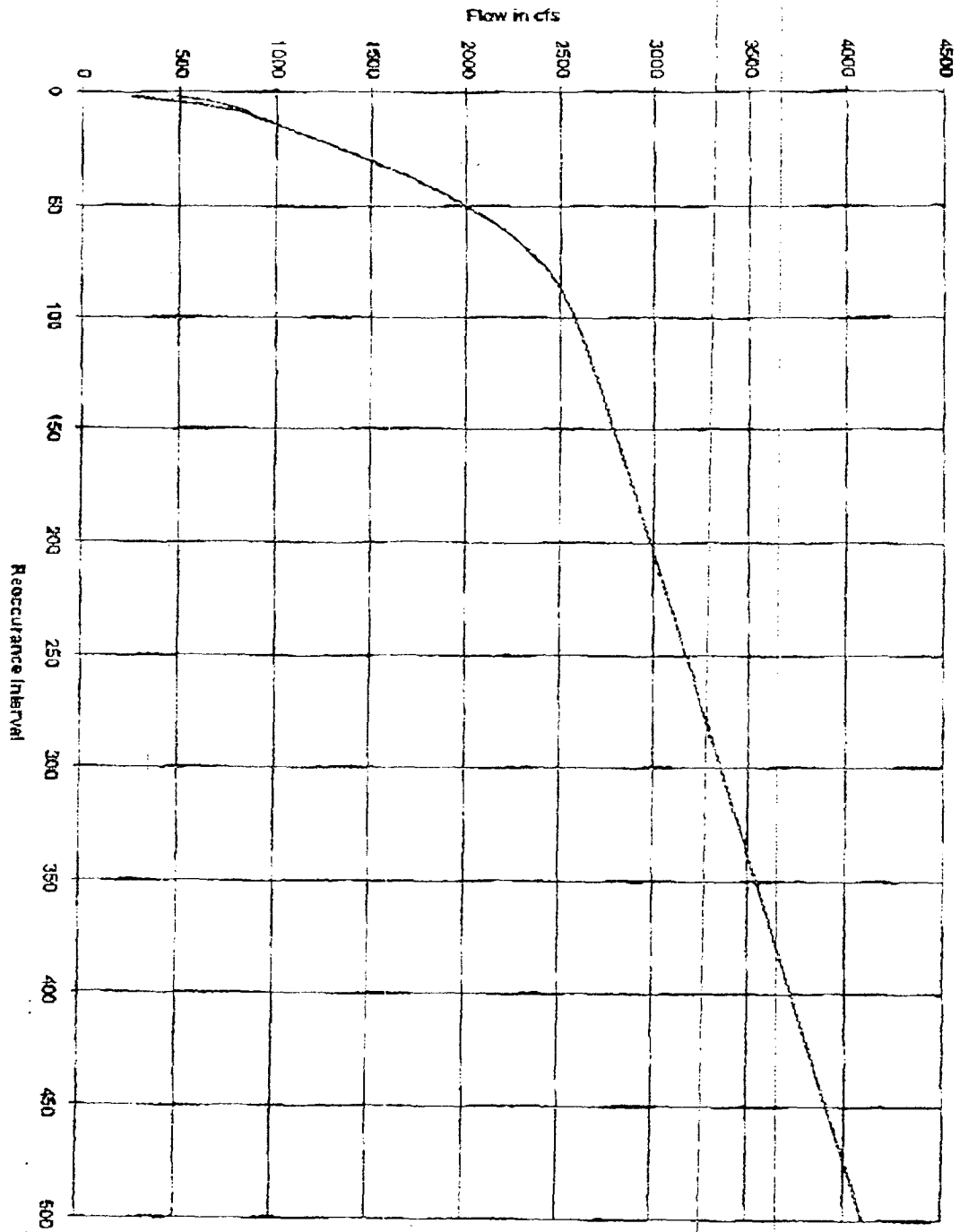
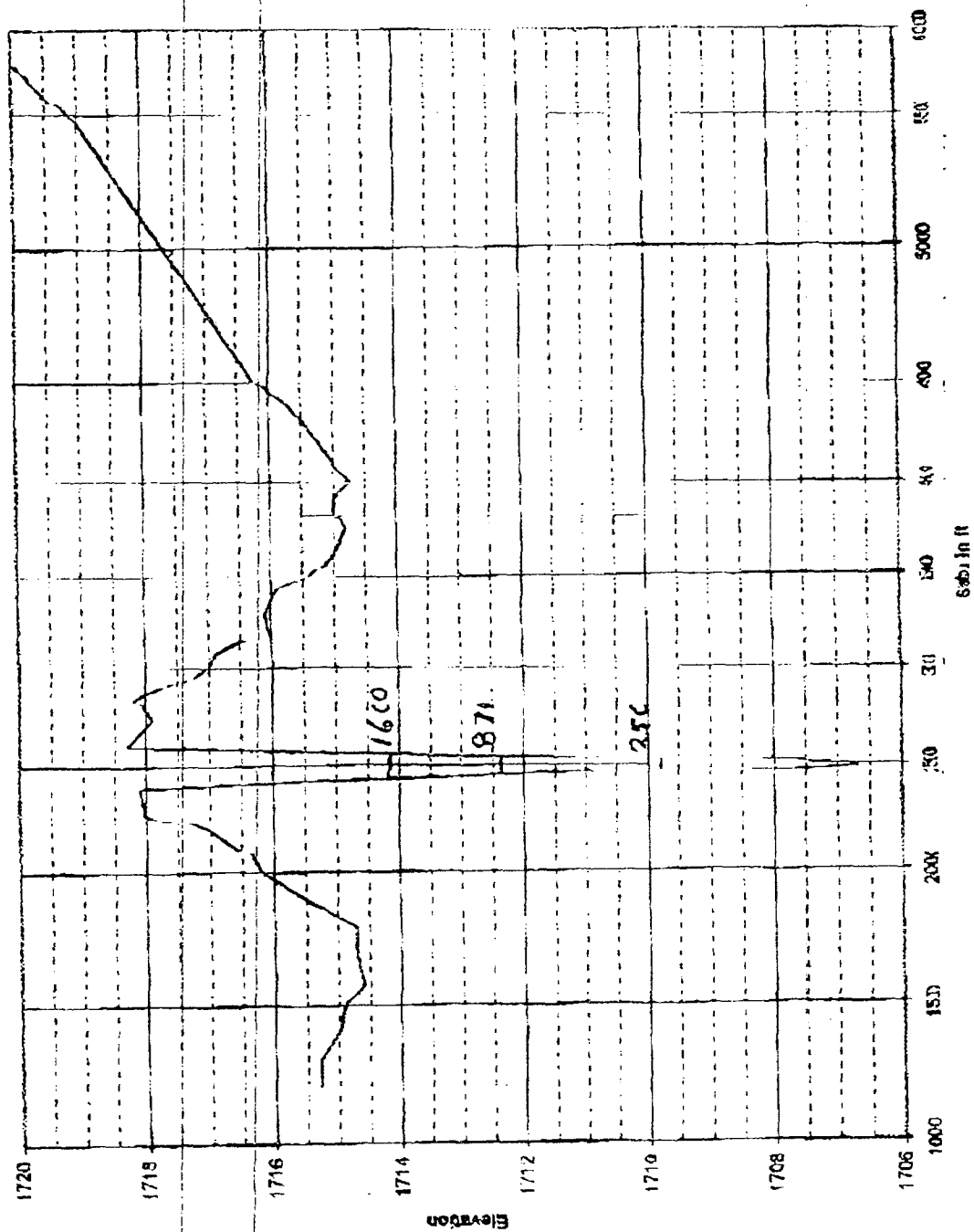


Figure 1
Section 11





September 26, 1996

Eric Gronlund
Water Rights Program DENR
Joe Foss Building
523 East Capitol
Pierre SD 57501-3181

Dear Mr. Gronlund:

Please find enclosed a petition in support of the Lake Pelican diversion weir sent from the Lake Kampeska Water Project District. Please make sure copies of this information are given to Lynn Beck and Diane Best prior to our hearing next week.

Thanks!!!

Sincerely,

Alan W. Schultz - Chairman
Lake Pelican Water Project District

enclosure

CITY OF... *Watertown*
South Dakota

"THE CITY ON THE GO!"

Mayor
882-6204

Municipal Airport
882-6209

Building & Plumbing
Inspection Dept.
882-6201

Mt. Hope Cemetery
882-6208

City Attorney
882-6200

Engineering Dept.
882-6202

Finance Office
882-6203

Fire Dept.
886-4733

Library
882-6220
882-6221 - Fax

Park, Rec &
Forestry Dept.
882-6260

Police Dept.
882-6210

Public Works
Dept.
882-6204

Solid Waste
Dept.
882-6219

Street Dept.
882-6207

Watertown Comm.
Recreation Center
882-6250
882-6254 - Fax

Waste Water
Treatment Facility
882-6243
882-6242 - Fax

November 4, 1996

Mr. Steve Naylor
US Army Corps of Engineers
Pierre Regulatory Office
Oahe Dam Administration Building
PO Box 1117
Pierre, SD 57501



RE: Application No. 199630227
Pelican Lake Diversion Weir Project

Dear Mr. Naylor:

The City of Watertown anticipates that the proposed Pelican Lake Diversion Weir Project will present only minimal adverse effects to the City and its residents.

City staff has based its recommendations to the Watertown Public Works Committee on the following:

- Maps depicting the extent of flooding due to a flow of 1600 cfs upstream of the Highway 212 bridge under proposed flow conditions.
- Lake Pelican Diversion Works Preliminary Design report dated January 30, 1996.
- Lake Pelican Diversion Works report dated August 22, 1996.
- US Army Corps of Engineers and South Dakota Department of Environment and Natural Resources Joint Notice of Permit Pending dated June 24, 1996.
- South Dakota Department of Environment and Natural Resources letter dated August 29, 1996 with attached documents pertaining to flood control application FC-19 including Recommendation of Chief Engineer dated August 27, 1996, Notice of Hearing, and Report on Flood Control Application.
- HDR Engineering, Inc. letter dated September 23, 1996.
- Telephone conversation with HDR Engineering, Inc. on October 1, 1996.
- Numerous conversations with the applicant.

As was stated in the City's April 10, 1996 letter to Mr. Greg Hentges, maps depicting the extent of flooding due to a flow of 1600 cfs were reviewed by City staff. These maps were submitted to the City by the Water Project District and its consultant. The City viewed these maps as representing the flow condition for 1600 cfs in the

Watertown reach of the Big Sioux River upstream of the Highway 212 bridge with the Pelican Lake Diversion Weir in place. The elevations of known structures were found to be in excess of the predicted Big Sioux River stages.

The City of Watertown has had concerns that, according to the draft and final reports for the Pelican Lake Diversion Works, "... in the reach of the Lake Pelican diversion weir, an additional 2 feet of flow depths would occur near the Highway 212 bridge if 1,600 cfs were diverted downstream". This statement and the tabulated results of HEC-2 analyses for constant Big Sioux River discharges found in Table 2 of the reports did not seem consistent with the maps depicting the flow regime for a discharge of 1600 cfs upstream of the Highway 212 bridge after the Pelican Lake Diversion Weir was constructed.

After a recent telephone conversation with HDR Engineering, it is the City's understanding that the HEC-2 analyses as represented in Table 2 assume no discharge from the Big Sioux River into Pelican Lake and Lake Kampeska. The HEC-2 analyses and the results contained in Table 2 were not intended to, and do not, model the proposed flow regime once the Pelican Lake Diversion Weir is constructed. ✓

HDR Engineering explained that the design process for the diversion weir is contained in Table 3. It is the City's understanding that the diversion weir elevation and crest length were selected based on current projected water surface elevations of the Big Sioux River for a flow of 1600 cfs measured at the Highway 212 bridge such that at flows of 1600 cfs and greater, the diversion rate would approximately mimic current conditions.

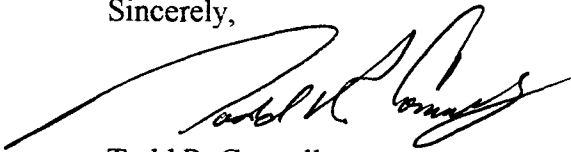
The proposed project will result in less water entering Pelican Lake. The project applicant is aware of this and is willing to live with this change. Likewise, in times of high water conditions in Pelican Lake, the lake's ability to discharge will be greatly inhibited by the project, especially for lake surface water elevations of 1712.25 or less. This has been brought to the applicant's attention as well. The applicant indicated that they accept this new operating condition. Flows of 1600 cfs or greater measured upstream of the project will mimic those prior to the construction of the proposed project. However, as indicated in the frequency analysis prepared by the State of South Dakota, the proposed project will result in an increased frequency of occurrence of approximately 2 years. For example, downstream of the existing weir, a flow experienced every 8 years will occur every 6 years once the project is implemented.

The changes in flow duration and upstream water surface elevations have not been fully considered or addressed. Once the proposed weir is installed, storage capacity in Pelican Lake will no longer be available for flow attenuation under certain circumstances. In addition to the change in the occurrence interval, there may be a detrimental effect on flow duration and water surface elevations upstream of the proposed project. For flows less than 755 cfs measured upstream of the Highway 212 bridge, it is likely that the Big Sioux River will adjust its water surface profile upward to accommodate increased head pressure requirements due to the increased flows diverted downstream as compared to the current operating regime. With the information provided as the basis of our determination, the City anticipates that the effects of increased duration and increased upstream water surface elevations will be minor in nature.

In addition to potential increased structural damage due to the proposed project, Watertown has recently reviewed the effects of the project in regard to the capability of the city's storm drainage system. Watertown's storm drainage system is based on the conveyance of the 5-year event. There is no data readily available to give us a clear representation of the effects of the project on our storm drainage system since most analyses are based on a 10-year event of 1600 cfs measured upstream of the Highway 212 bridge. We do know that in some instances, Big Sioux River flows from a 2-year event negatively impact some of the city's outfalls. For Big Sioux River flows corresponding to a 10-year event, much of Watertown's storm drainage system is significantly impacted due to submerged outfalls.

In closing, Watertown realizes that the proposed Pelican Lake Diversion Weir may provide increased flood control benefits during those events with a recurrence interval greater than 10 years. Though not well documented, the City also sees the potential benefit of the project in terms of improved water quality in Pelican Lake through the reduction of sediment and nutrient loadings to the lake. The City of Watertown is cautiously optimistic that the project will result in only minor adverse effects to the city and its residents.

Sincerely,



Todd R. Connelly
Public Works Director

cc: Mayor Brenda Barger
Vince Foley, city attorney
Greg Hentges, Upper Big Sioux River Advisory Board
Alan Schultz, Pelican Lake Water Project District
Dr. Charles Sherman, Kampeska Water Project District
Lynn Beck, DENR Water Rights
Rick Niedergeses, HDR Engineering



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3181

DEC 26 1996

Lake Pelican Water District
%Alan Schultz, Chairman
4404 20th Ave. SW
Watertown, SD 57201

Dear Mr. Schultz:

Enclosed is Flood Control Permit No. FC-19 as approved by the Water Management Board. If you have any questions pertaining to the permit, please contact this office.

Very truly yours,

JOHN HATCH, Chief Engineer
Water Rights Program
(605) 773-3352

Enclosure

REPORT ON INSPECTION OF FLOOD CONTROL PERMIT NO. FC19-

Big Sioux River - Water District Report Of Examination Of Works

TO: Chief Engineer, Water Rights Program, DENR, Foss Bldg., Pierre, SD 57501

On, February 29, 2016, I made a thorough examination of the flood control project constructed by Lake Pelican Water Project District of PO Box 172, Watertown SD 57201 holder of Flood Control Permit No. FC19-3, bearing the priority of July 16, 1996 authorizing the construction and operation of the flood control project, in Codington County.

Contact Person & Address: Ken Bunde, District President cell (605) 880-6725

Project Legal Description: From the NW corner of Sec 6 T116N-R52W: 275 feet south and 420 feet east. Latitude 44.88930 Longitude -97.12522

Description of flood control works: Consists of a sheet pile weir 7 feet high weir approximately 110 feet long with the crest set a elevation 1712.25 fmsl constructed across the inlet/outlet channel between Lake Pelican and the Big Sioux River. There is a 32 inch by 54 inch fish passage opening through the weir. There is also a cutoff wall located on the right bank on the upstream (Big Sioux River) side of the weir.



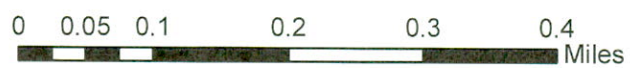
The system is in the following condition good.

Applicable permit qualifications have been complied with: yes

Exceptions to compliance are: none

Mark D. Rath
Mark D. Rath
Natural Resources Engineer
DENR, Water Rights Program

3-10-16
Date



Mark D Rath
Mark D Rath
Natural Resources Engineer
03-03-2016



DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182

denr.sd.gov

May 4, 2016

FC-19

Lake Pelican Water Project District
c/o Ken Bunde, President
PO Box 172
Watertown SD 57201

Dear Mr. Bunde:

On February 29, 2016 the investigation of the flood control project, including the extent of application of water to beneficial use, as developed under Flood Control Permit No. FC-19, was completed by Mark Rath, a staff engineer with our program. The final water right document, the water license, can now be issued.

State law requires that we charge a \$50.00 fee for the investigation and issuance of the water license. Upon receipt of the \$50.00 fee, we will complete processing the water license. The check or money order for the fee should be made payable to the "Water Rights Program".

A licensed water right will be similar to a property right that can not be lost as long as the water use continues and you abide by the permit requirements.

Our records indicate Water License No. FC-35 was issued March 23, 2016. The license fee for the district's other permit, FC-32 was submitted at the time the application was received.

If you have any questions regarding permit, investigation of the flood control project or payment of the fee, please contact Genny McMath with our program at (605) 773-3352.

Sincerely,

Karen Schlaak
Water Rights Program
(605) 773-3352

RECEIPT

WATER RIGHTS PROGRAM

South Dakota Department of Environment and Natural Resources

Date 6/17, 20 16

RECEIVED OF Lake Pelican Water Project Dist PO Box 172 Watertown SD 57201

The following amount in fees for services rendered as provided for by law:

Fee for Application for Permit No. _____ to Appropriate Water, to construct and to put water to beneficial use	50	00
Fee for Application for Permit No. _____ to Appropriate Water for Future use		
Fee to retain Future Use Permit No. _____ after period of seven years.		
Fee for Inspecting Constructed Works, confirming beneficial use and issuing Water License No. <u>FC-19</u>		
Fee for Filing Transfer Form _____		
Fee for _____		
Fee for Issuing New Well Driller's License No. _____ for C.Y. _____		
Fee for Renewal of Well Driller's License No. _____ for C.Y. _____		
Fee for Issuing Well Pump Installer's License No. _____ for C.Y. _____	50	00
Fee for Renewal of Well Pump Installer's License No. _____ for C.Y. _____		
(Any Other Work Provided by Law)	TOTAL	50 00

No. **07856**

By J. Lee Goodman
Chief Engineer

STATE OF SOUTH DAKOTA

WATER LICENSE NO. FC-19

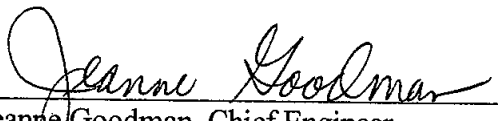
(1) Lake Pelican Water Project District, PO Box 172, Watertown SD 57201 made Application No. FC-19, July 15, 1996 for a flood control permit to authorize construction of a diversion weir to control sediment loading to Pelican Lake from the Big Sioux River. The project is located in Codington County, South Dakota. Permit No. FC-19, with a priority date of July 16, 1996 was approved October 3, 1996.

(2) It is certified that the permit holder has complied with the provision South Dakota State Law relating to completion of the flood control project. The flood control works located 275 feet south and 420 feet east of the NW corner Section 6-T116N-R52W (NW 1/4 NW 1/4) consists of a weir with an overflow elevation of 1712.25 feet mean sea level (fmsl) and contains a fish passage weir with a flow elevation of 1707.75 fmsl. Flow into the lake is limited when the Big Sioux River is flowing at less than 1,600 cubic feet of water per second (cfs). When the Big Sioux River flows are greater than 1,600 cfs, the rate at which water flows into Lake Pelican and downstream in the Big Sioux River will not change.

(3) Pursuant to South Dakota Water Law 46-5-30.1 Lake Pelican Water Project District, PO Box 172, Watertown SD 57201 the holder and/or owner of Permit No. FC-19 is issued a license for flood control purposes. No. FC-19 carries a priority date of July 16, 1996.

This license is subject to South Dakota Water Law, any limitations or conditions listed in Flood Control Permit No. FC-19 including the following qualifications:

- Construction, future maintenance and repair of the Lake Pelican weir structure is the responsibility of the Lake Pelican Water District.
- The prior water rights of all persons who, by compliance with the laws of the State of South Dakota, have acquired a right to use the water may not be unlawfully impaired by this flood control permit.
- The Water Management Board is retaining jurisdiction of Flood Control Permit No. FC-19 in the event that additional information shows the weir causes adverse upstream or downstream impacts.


Jeanne Goodman, Chief Engineer
Water Rights Program
Department of Environment and Natural Resources

JUL 22 2016

date





DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182

denr.sd.gov

FC-19
FC-32

JUL 22 2016

Lake Pelican Water Project District
c/o Ken Bunde, President
PO Box 172
Watertown SD 57201

Dear Mr. Bunde:

Enclosed are Water License Nos. FC-19 and FC-32. These are the final water right documents completing the District's process of obtaining a Water Right. Enclosed is a receipt for \$50.00 which you paid for the investigation and issuance of the water license for No. FC-19. Also, included with the licenses are maps prepared by the staff engineer who conducted the investigation.

As long as the District uses the water beneficially, as stated in the Water License, the State Water Laws provide that you have a continuing right to use the water. If you have any questions, please contact our office.

Sincerely,

Jeanne Goodman, Chief Engineer
Water Rights Program
(605) 773-3352

enclosures