

FLOOD CONTROL NO. FC-33

Name of Applicant: City of Blunt

Address: PO Box 127, Blunt SD 57522-0127 Phone: 605 962-6262

Amount of Water Claimed: NA Total Acres: NA

Source of Water Supply: Dry Medicine Creek

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

Type of Waste Disposal System:

Location:

PRIORITY Date Received: 10-7-04 Application/License Fee: \$200

Corrected Application Received: Period of Annual Use: January 1 – December 31

Remarks:

Project Area: E ½ Sec 17-T112N-R76W

Land to be Irrigated: NA

Depth of Well: NA

Well Driller: : NA

Remarks:

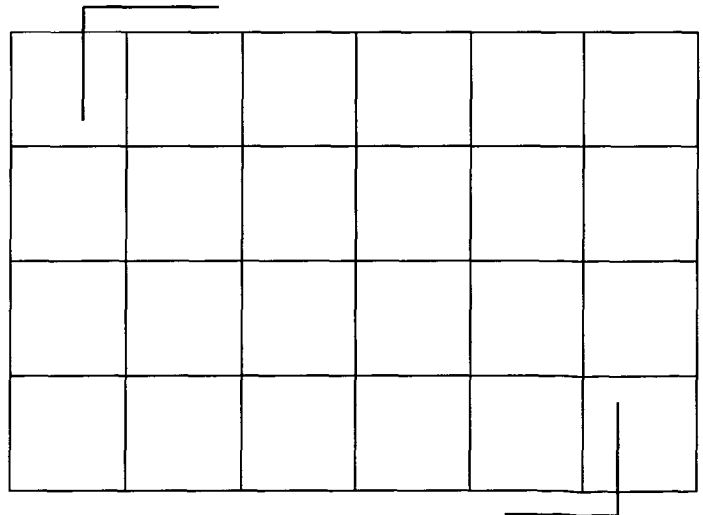
Type of Map:

Prepared by: Jason T Hanson, PE

Reviewed and the Number Assigned on: 10-7-04

By: Karen Schlaak

Notice of Hearing - date to intervene: _____



RECEIVED

OCT - 7 2004

WATER RIGHTS
PROGRAM

Mail to: Water Rights Program Joe Foss Building 523 E. Capitol Pierre, SD 57501-3181 (605) 773-3352	(office use only)	
	No. <u>FC-33</u>	Hydrologic Unit <u>10140103</u>
	Basin <u>Missouri River</u>	
	Newspaper <u>Capital Journal</u>	

Application For Flood Control Permit Within The State Of South Dakota

1. Name of Applicant City of BluntAddress PO Box 127

(Street, RR or Box)

BluntSD57522-0127Phone No. (605) 962-6262

(City)

(State)

(Zip Code)

2. Name of watercourse Dry Medicine Creek3. Location of project (e.g. SW $\frac{1}{4}$ NE $\frac{1}{4}$ section 2-T89N-R58W)East 1/2 Section 17-T112N-R76W4. County or counties where project is located Hughes

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 reports or other information that will help explain the project. (Attach sheet if more space is needed.)

The project is a diversion of high flows (greater than a 25 year flood event) below the town of Blunt on Medicine Creek. A high-flow channel will be constructed south of US 14 taking the flow to the west side of the DME Railroad tracks south 3600' into an old oxbow. Phase 2 of the project will be to construct an additional structure under the DME RR to return the flows to Medicine Creek at a location nearly a mile below the current junction. The existing condition causes water from the west branch to back into town when both the east and west branches of Medicine Creek flood. The diversion channel will provide relief during these high-flow events.

A hydraulics study of the proposed channel was done by Brosz Engineering, Inc. of Pierre, SD.

Attachment: Attach Map (see instructions)

STATE OF SOUTH DAKOTA) SS
County of Hughes)

I, City of Blunt the applicant, certify that I have read this application, have examined the attached map and that the matters are true and that I intend, and am able to complete the necessary construction.

Signed Dennis L. Jones
Subscribed and sworn to before me this 4th day of October 2004

Dawn M. Jones

Notary Public

my term expires: 10/28/05

**SOUTH DAKOTA
FLOOD CONTROL PERMIT NO. FC-33**

Date of first receipt of application October 7, 2004.

The Water Management Board approved Flood Control Permit No. FC-33 on March 2, 2005 for the City of Blunt, c/o Dennis Larson, Mayor, PO Box 127, Blunt SD 57522-0127 subject to the following limitations, conditions and qualifications:

1. Flood Control Permit No. FC-33 authorizes construction of a channel to facilitate the movement of water during flows greater than the 25 year flood event. The purpose is to prevent inundation of portions of the city. Under existing conditions water from the west branch tributary (Dry Medicine Knoll) backs water into town when both this tributary and Medicine Knoll Creek flood. This project consists of a high-flow channel to divert flow greater than the 25-year flood event from this west branch tributary in a channel along the west side of DME railroad tracks south of Blunt. Water will be returned to Medicine Knoll Creek approximately one mile south of the current confluence of the west branch tributary with the main branch of Medicine Knoll Creek. Project works will consist of: 1) an earthen dike north of Highway 14 on the east side of the west branch tributary, 2) concrete box culverts through the railroad grade on the north and south limits of the project and 3) a new high flow channel along west side of railroad and road berms.

The legal description of the project is the SW $\frac{1}{4}$ SE $\frac{1}{4}$ Section 8, E $\frac{1}{2}$ Section 17, N $\frac{1}{2}$ NE $\frac{1}{4}$ Section 20; all in T112N, R76W.

2. This project will prevent flood flow inundation of portions of the City of Blunt resulting in increased public safety. It will also reduce costly flood damage.
3. The date from which applicant may claim right is October 7, 2004.
4. All construction is to be completed on or before March 2, 2010.

QUALIFICATIONS

1. The City of Blunt is responsible for operation and maintenance of the flood control works.
2. Flood Control Permit No. FC-33 is subject to securing easements and/or land acquisitions on any areas, other than city property, where construction activities will take place or additional lands are flooded.
3. Prior to construction of dike north of US Highway 14, final designs for that phase shall be submitted to the Chief Engineer of the Water Rights Program for review and approval.
4. The Water Management Board retains jurisdiction of Flood Control Permit No. FC-33 in the event that additional information shows this project causes an increase in the severity of flood damages in areas other than the project area.

WATER MANAGEMENT BOARD

By: Garland Erbele

Garland Erbele, Chief Engineer
Water Rights Program
Department of Environment and Natural Resources

APR 01 2005

date



RECEIPT

WATER RIGHTS PROGRAM

South Dakota Department of Environment and Natural Resources

Date October 7, 20 04

RECEIVED OF City of Blunt, Box 127, Blunt SD 57522-0127

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

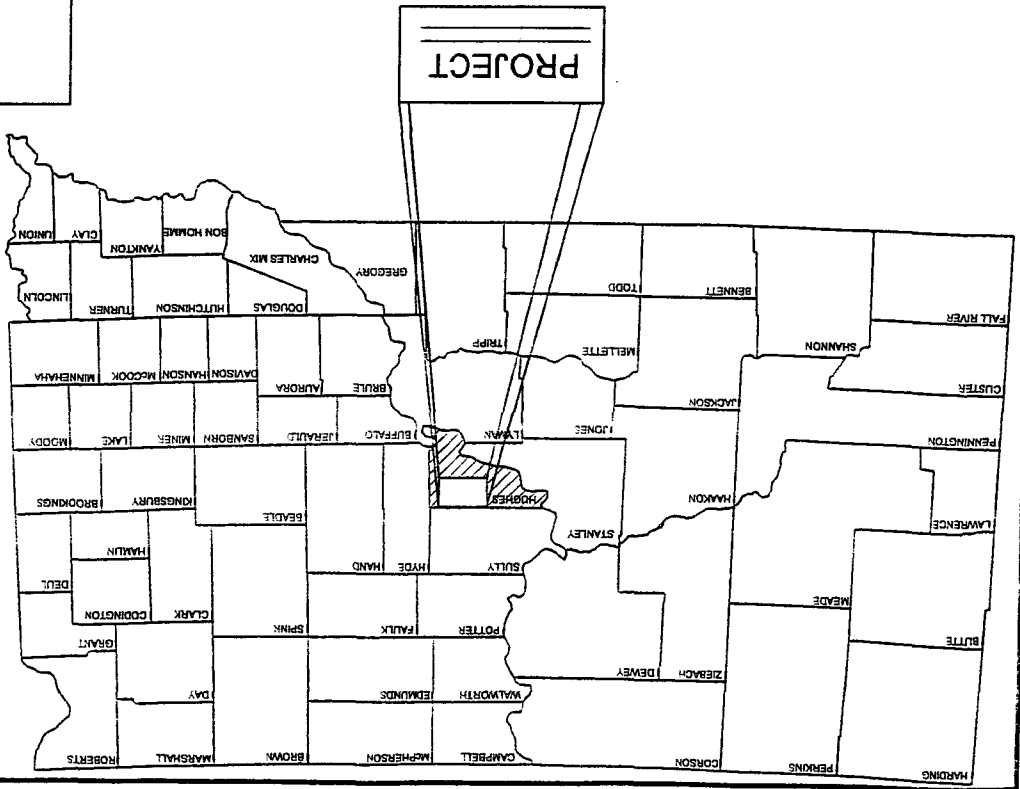
Fee for Application for Permit No. <u>Flood Control - FC 33</u> to Appropriate Water, to construct and to put water to beneficial use	150	00
Fee for Application for Permit No. _____ to Appropriate Water for Future use		
Fee to retain Future Use Permit No. _____ after period of seven years.		
Fee for Inspecting Constructed Works, confirming beneficial use and issuing Water License No. <u>FC-33</u>	50	00
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. _____		
Fee for Renewal of Well Pump Installer's License No. _____ for C.Y. _____		
(Any Other Work Provided by Law)	TOTAL	200.00

No.

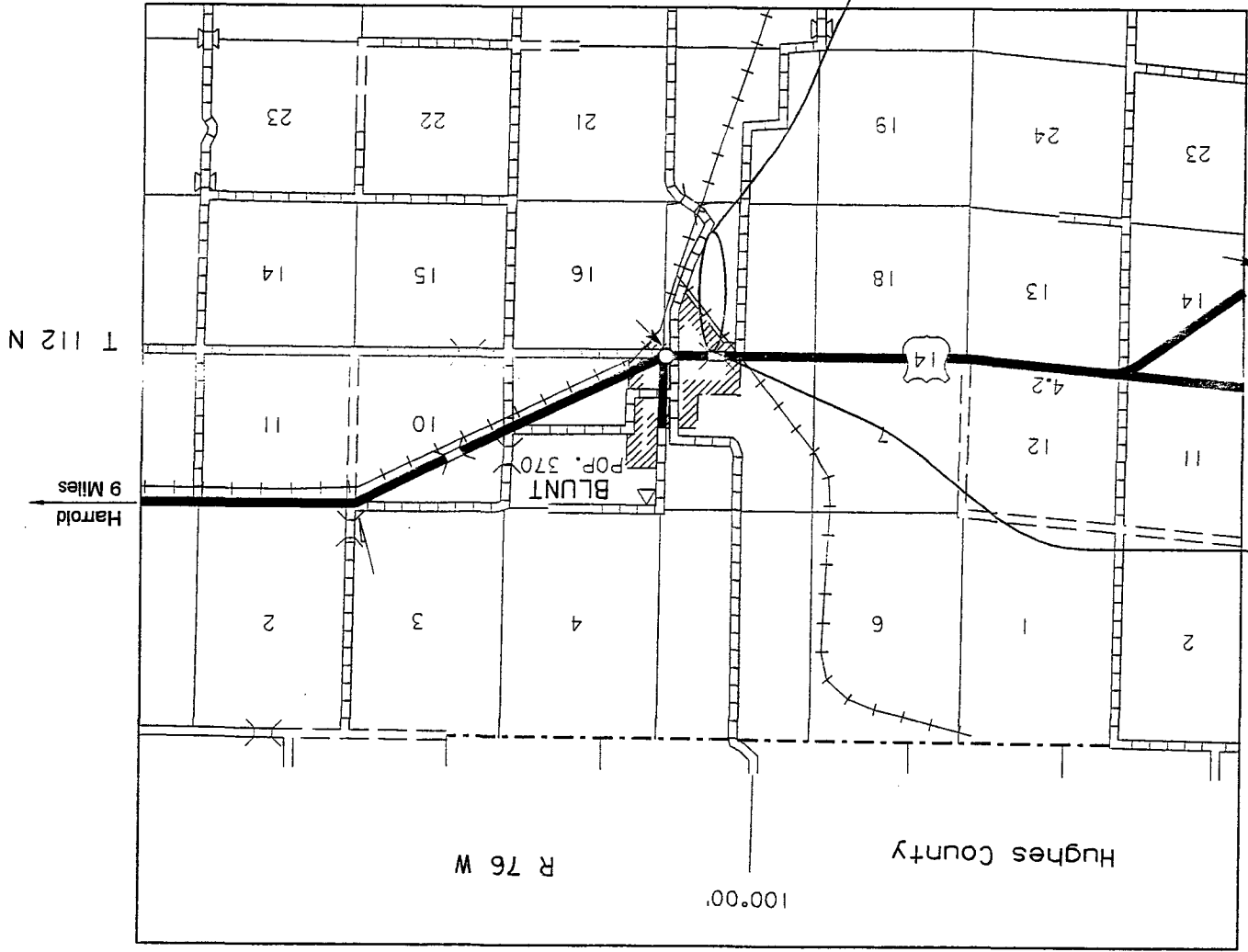
1135

By

Darlene E. Eide
Chief Engineer

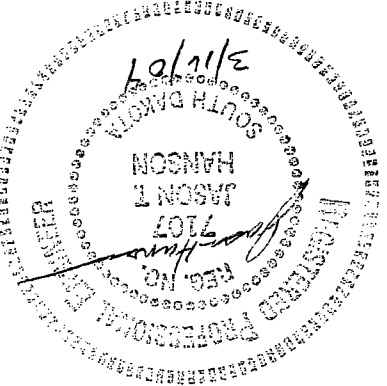


PLANS FOR PROPOSED
DRAINAGE IMPROVEMENT
PROJECT #0103-106
CITY OF BLUNT
STRUCTURE AND CHANNEL GRADING



END PROJECT
At Sta. 41+20.95 = A Point Approx. 99.4' South and 1883' West of the NE Corner of Section 17, T112N, R76W.

BEGIN PROJECT
At Sta. 0+00 = A Point Approx. 1216' West and 3657' South of the NE Corner of Section 17, T112N, R76W.



LEGEND

STATE LINE
COUNTY LINE
SECTION LINE
QUARTER LINE
SIXTEENTH LINE
R.O.W. LINE

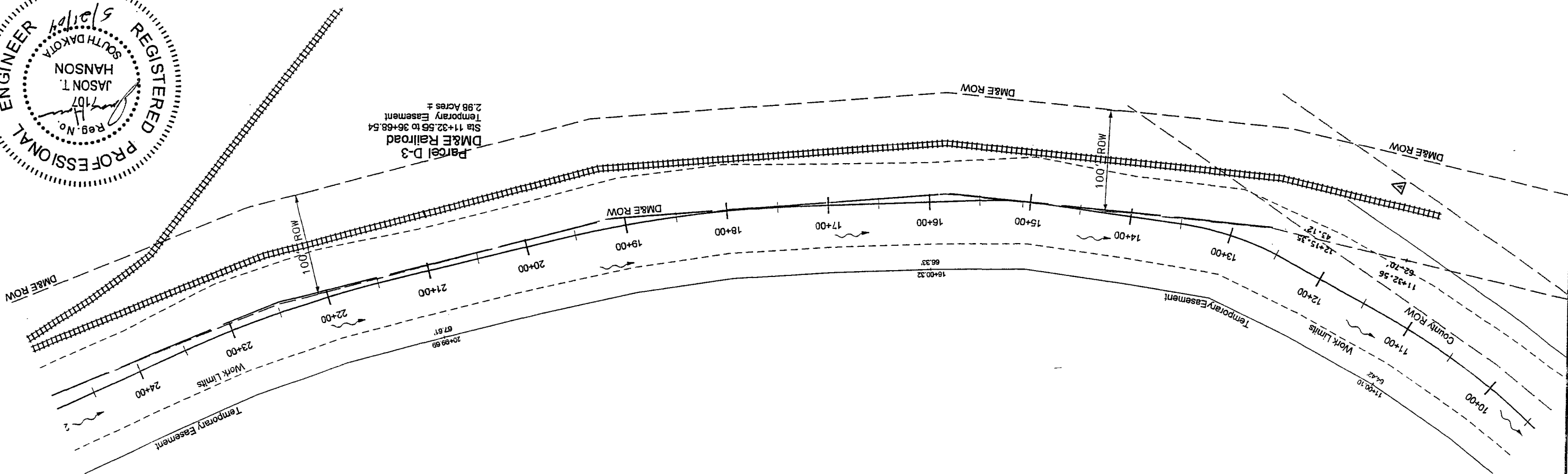
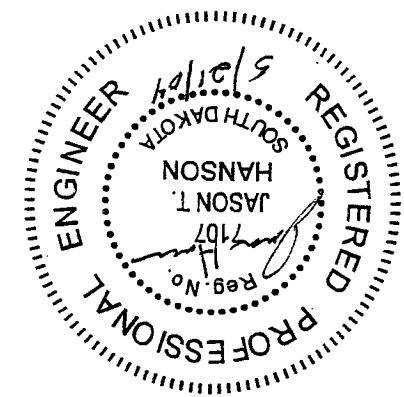
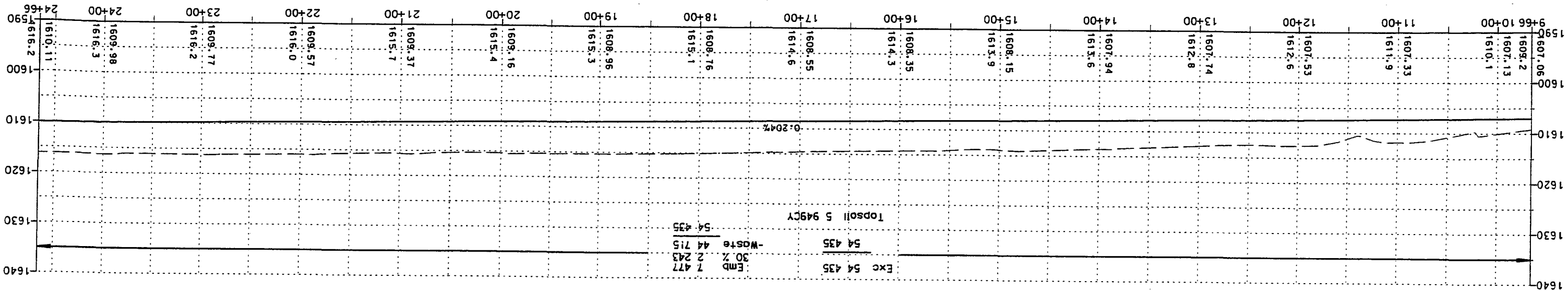
SCALES
PLAN: 1 INCH = 100 FT.
PROFILE { HORIZONTAL: 1 INCH = 100 FT.
VERTICAL: 1 INCH = 10 FT.
CROSS { HORIZONTAL: 1 INCH = 20 FT.
SECTION { VERTICAL: 1 INCH = 10 FT.
Disturbed Area 18.81 Acres
Medicine Creek Drainage

SHEET NO. 1	SHEET NO. 2-5	SHEET NO. 6-7	SHEET NO. 8-11	SHEET NO. 12-14	SHEET NO. 15-18	SHEET NO. 19-20	SHEET NO. 21	SHEET NO. 22-36
TITLE AND LAYOUT MAP	ESTIMATE OF QUANTITIES	AND GENERAL NOTES	TYPICAL SECTIONS	TRAFFIC CONTROL	PLAN & PROFILE	DOUBLE 12' X 6' RCBC DETAILS	STANDARD PLATES	WASTE AREA LOCATION
CROSS SECTIONS								

INDEX OF SHEETS

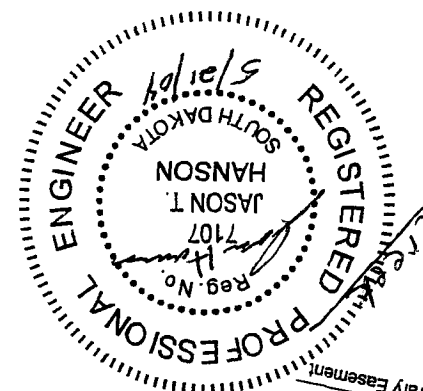
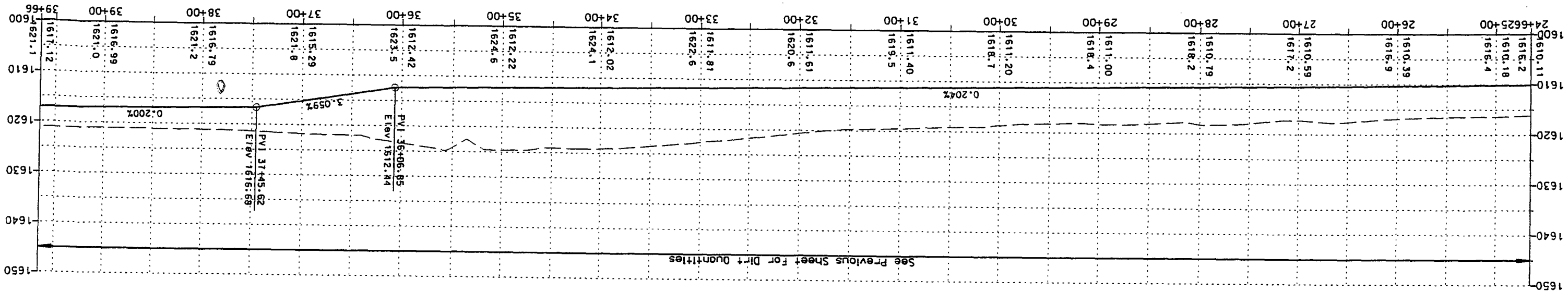
STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	1	TOTAL SHEETS	36
CITY OF BLUNT					

STRUCTURE PLANS
SURVEY BY: BROSE ENGINEERING, INC.
PIERRE, SOUTH DAKOTA
PLANS BY: BROSE ENGINEERING, INC.
PIERRE, SOUTH DAKOTA

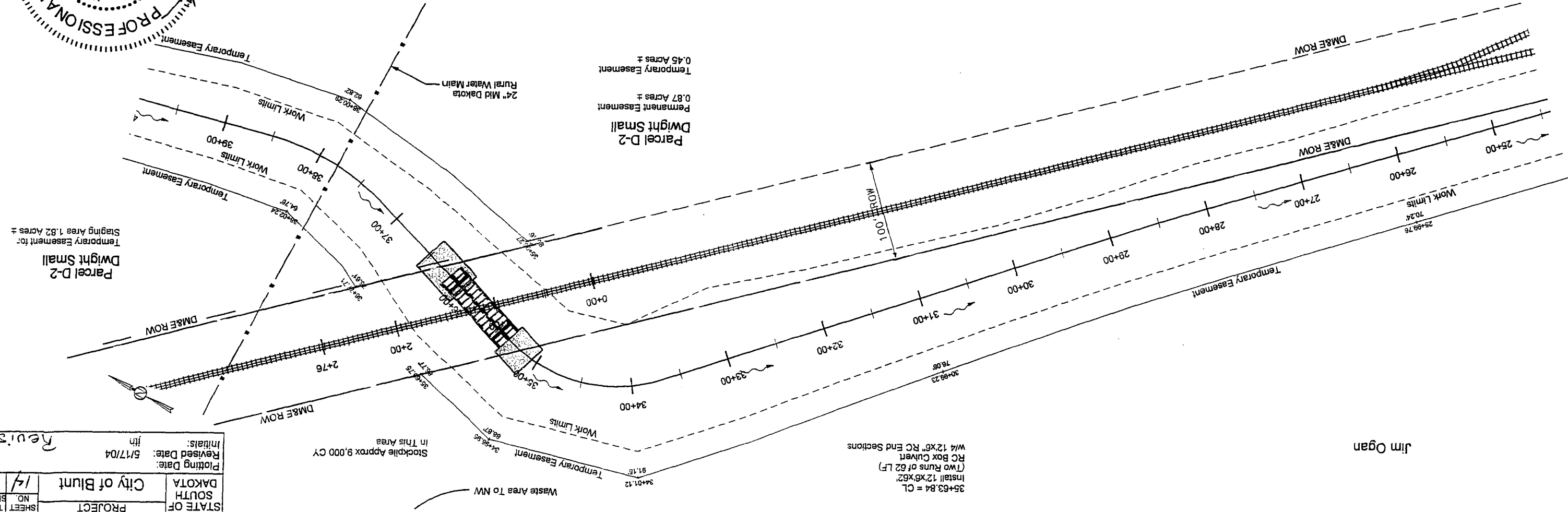


Jim Ogan

STATE OF SOUTH DAKOTA		PROJECT	
City of Blunt		NO. SHEETS	
13		13	
Revised		Initials: jth	
Plotting Date: 5/17/04		Revised Date: 5/17/04	



Medicine Creek



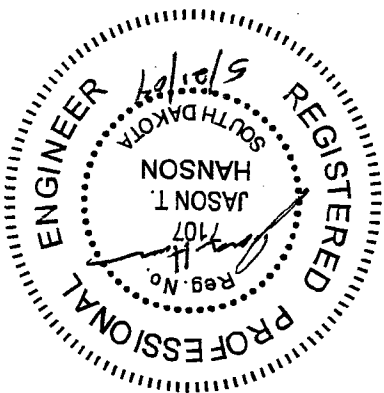
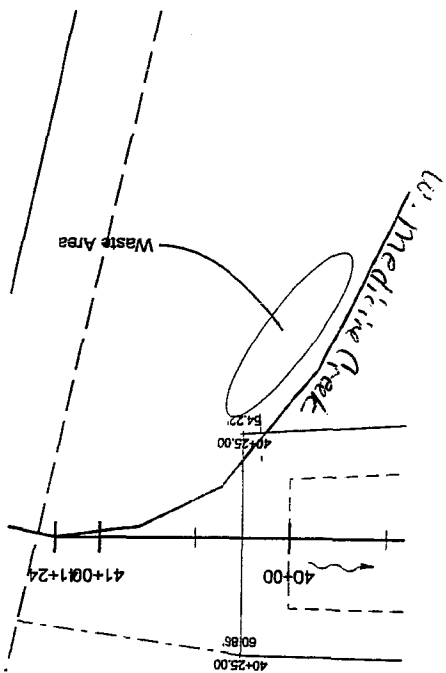
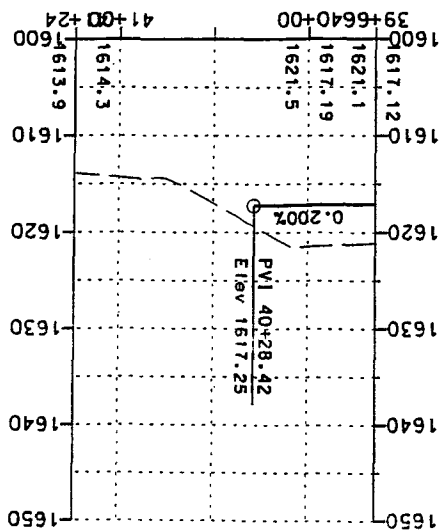
STATE OF SOUTH DAKOTA	PROJECT	SHEET NO. 14	TOTAL SHEETS
City of Blunt			
Revised			
Plotting Date: 5/17/04			
Revised Date: 5/17/04			
Initials: jth			

Jim Ogan

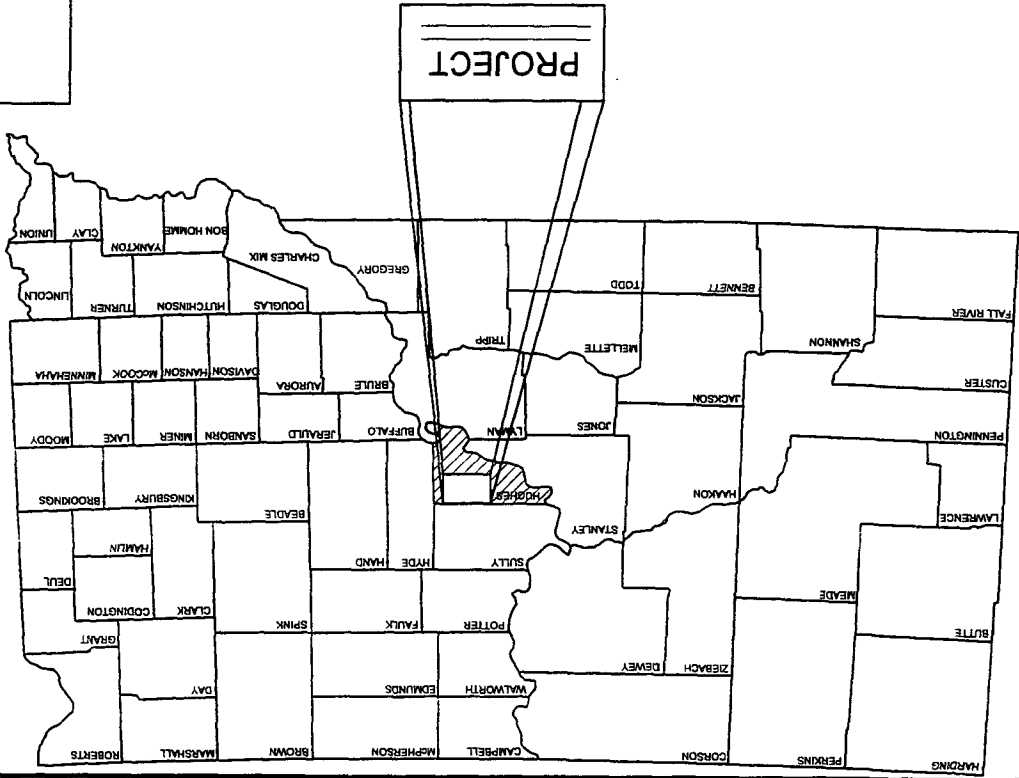
35+63.84 = CL
Install 12"x6"x62"
RC Box Culvert
w/ 12"x6" RC End Sections

Stockpile Approx 9,000 CY
In This Area

Waste Area To NW



STATE OF SOUTH DAKOTA		PROJECT		SHEET TOTAL	
City of Blunt		NO. SHEETS		15	
Plotting Date: 5/17/04		Revised Date: 5/17/04		Revised	
Initials: jth					



**PLANS FOR PROPOSED
DRAINAGE IMPROVEMENT
PROJECT #0103-106
CITY OF BLUNT
STRUCTURE AND CHANNEL GRADING**

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INDEX OF SHEETS

SCALES

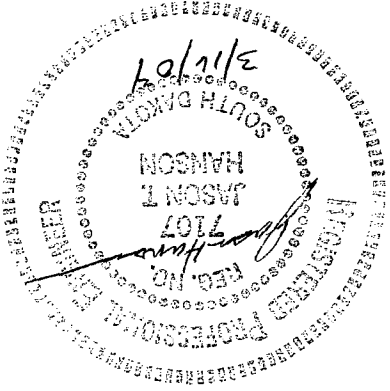
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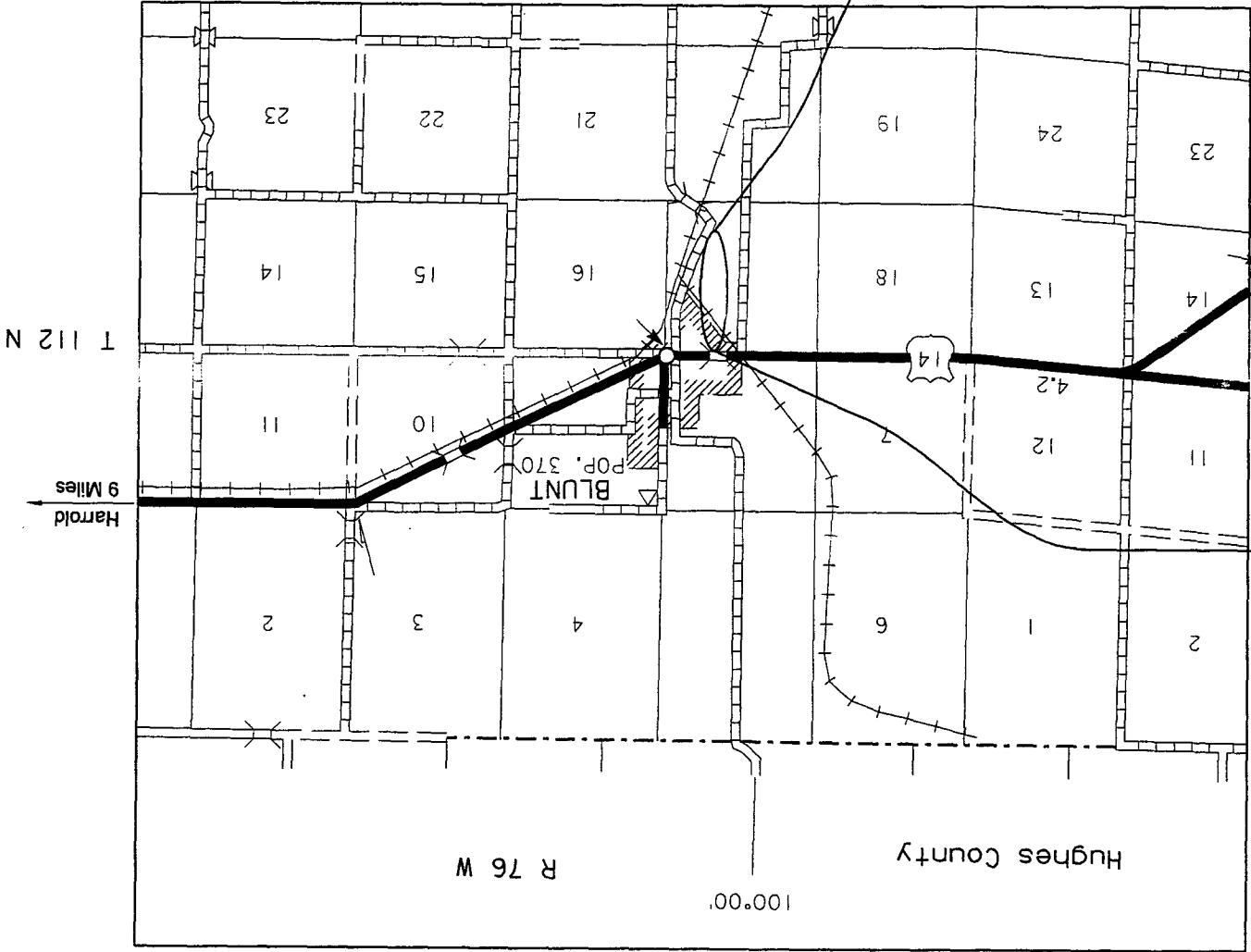


Disturbed Area 18.81 Acres
Medicine Creek Drainage



LEGEND

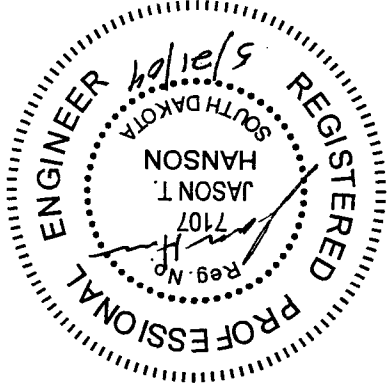
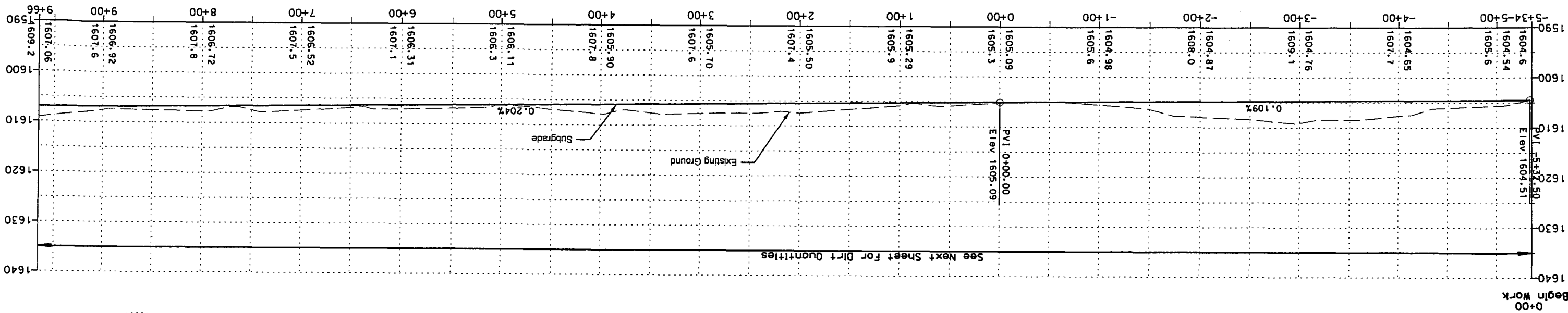
STATE LINE
COUNTY LINE
SECTION LINE
QUARTER LINE
SIXTEENTH LINE
R.O.W. LINE



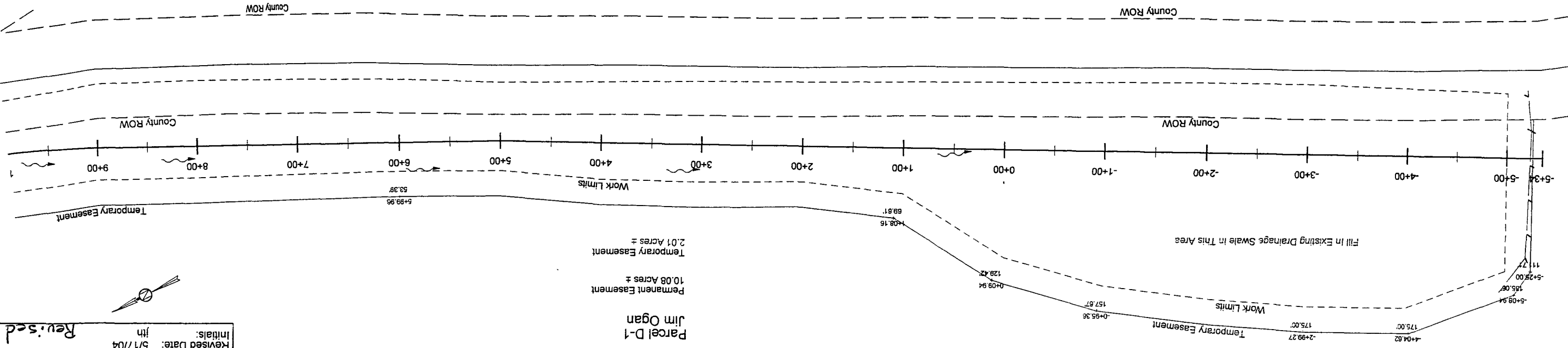
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West of the NE Corner of Section 17, T112N, R76W.

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PIERRE, SOUTH DAKOTA
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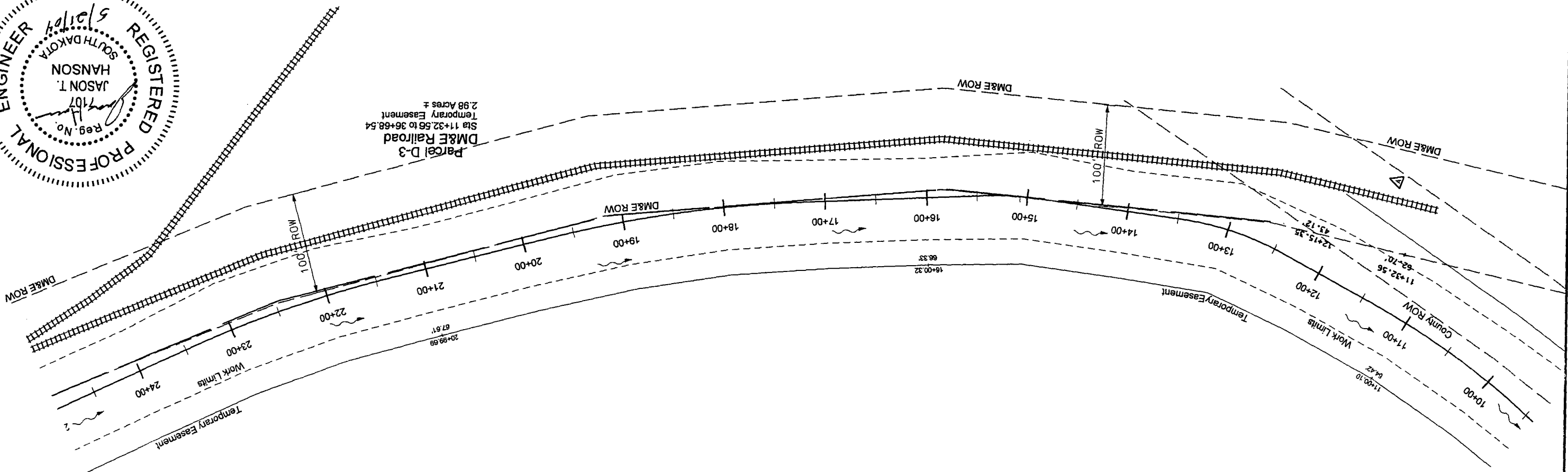
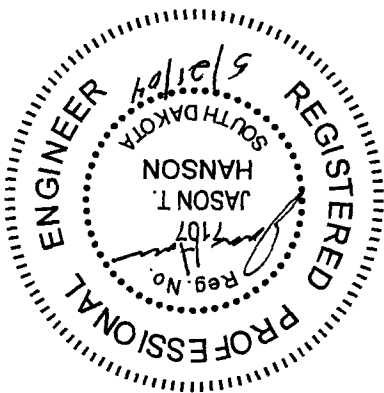
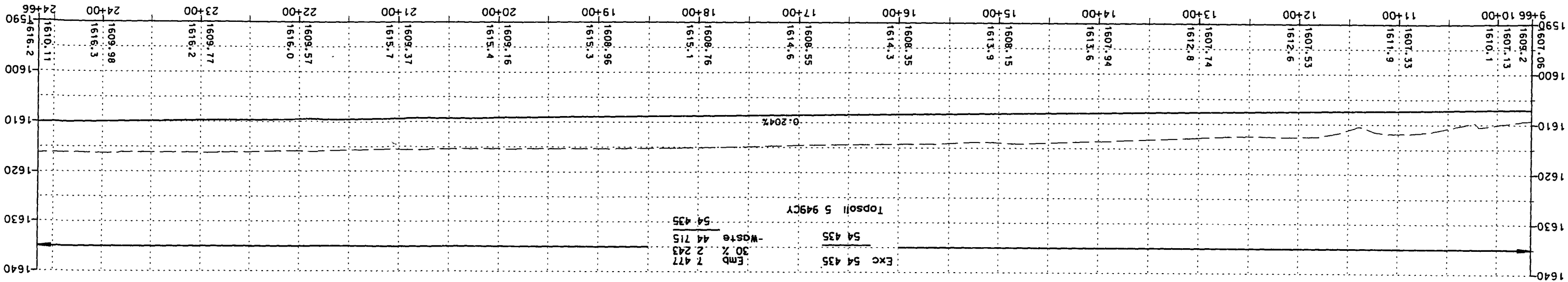


-5+34
Install 200 LF Silt Fence
Around Outlet of Drainage Channel



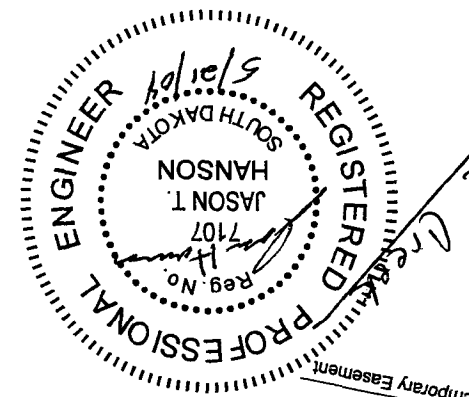
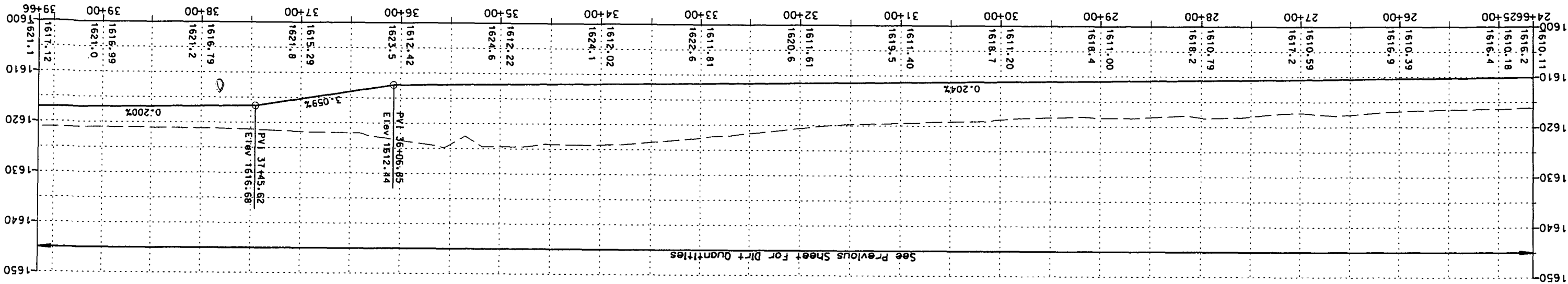
Sec 17 - T112N - R76W

STATE OF SOUTH DAKOTA		PROJECT	
City of Blunt		NO. SHEETS	
1/2		TOTAL	
Plotting Date: 5/17/04		Revised Date: 5/17/04	
Initials: jth		Revised Date: 5/17/04	
Revised Date: 5/17/04		Initials: jth	



Jim Ogan

STATE OF SOUTH DAKOTA		PROJECT	
City of Blunt		NO. SHEETS	
13		SHEET TOTAL	
Plotting Date: 5/17/04		Revised Date: 5/17/04	
Initials: jth		Revised	



W. Medicine Creek

Parcel D-2
Dwight Small
Permanent Easement
0.87 Acres ±
Temporary Easement
0.45 Acres ±

24" Mid Dakota
Rural Water Main

Parcel D-2
Dwight Small
Temporary Easement for
Staging Area 1.82 Acres ±

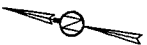
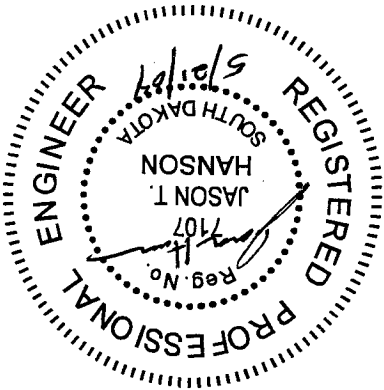
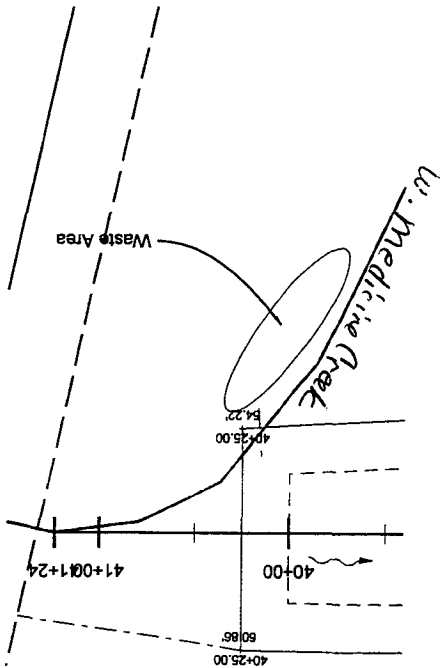
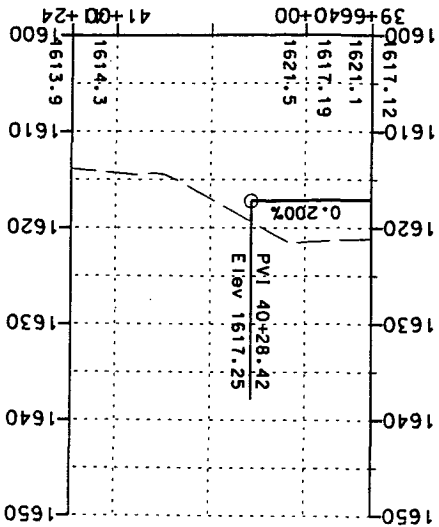
35+63.84 = CL
Install 12"x6"x62"
(Two Runs of 62 LF)
RC Box Culvert
w/ 4 12"x6" RC End Sections

Stockpile Approx 9,000 CY
In This Area

Waste Area To NW

Jim Ogan

STATE OF SOUTH DAKOTA	PROJECT	NO. SHEETS
City of Blunt	14	
Plotting Date: 5/17/04		
Revised Date: 5/17/04		
Initials: jth		
Revised		



STATE OF SOUTH DAKOTA		PROJECT	
City of Blunt		NO. SHEETS	
15		TOTAL	
Plotting Date: 5/17/04			
Revised Date: 5/17/04			
Initials: jth			
Revised			

02052

Part of
Dedicated

ZONE A
CORPORATE LIMITS

STATE OF	PROJECT	SHEET	TOTAL
SOUTH	Blunt Diversion	NO	SHEETS
DAKOTA		1	1

Plotting Date: 12/22/04
Revised Date: mm/dd/yy
Initials: sjs

Section Line

ABDC 15

P 305' 7"

ZONE X

New Structure

Addition to 100 Year Floodplain

17

Channel Centerline

17

ZONE X

Section Line

17

17

Section Line

Existing Trussel Bridge
Proposed Structure

RAILROAD

ZONE A

Medicine
Knoll
Creek

Note: Map is approximate
Scale: 1" = 600'

20



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3181
www.state.sd.us/denr

December 14, 1999

MEMO TO: Richard Smith
FROM: Jim Feeney
SUBJECT: Blunt Flooding

Last week, Rep. Cooper Garnos left a voice message for me regarding funding assistance to address flooding problems in Blunt. Garnos had attended a meeting in Blunt last Tuesday. Dave Templeton and I talked with Lloyd Johnson about assistance that your office may be able to provide on this. We returned Garnos' call and left a message that he should make an initial contact with you.

On Friday, Mr. Spaid hand-delivered that attached materials to my office. Since these also relate to Blunt I am forwarding a copy for your reference. I will also provide the Water Rights program with a copy.

Attachments

2nd letter worded
close to original
hand written form

As our ancestors tamed, settled and built their way in Medicine Creek Valley, with their railroads, city of Blunt, highways and county roads, not to forget the grain handling elevator system that is centrally located in some of the best grain growing areas of Hughes County, they may not have foreseen a couple of "Royal Flushes" that raged through the community and track system.

After pumping my own basement out one and half times, it was time to zoom to Pierre for a wet/dry shop vac. As I drove to the Mall, I was glancing at the road ditches before Del Acres and Moodie Implement and wondered why there was no water running through them. I wished at that moment that we could lift up one of the ditches (a nice wide one) place it south of the highway bridge at Blunt just to help the old creek during the "high tide" period that it went through. My idea was born.

I found a couple maps of the city, talked to some landowners about the idea, then drew a rough sketch to present to the Governor's office. They forwarded the map to SECOG located at Sioux Falls. I then approached the Blunt City Council, Railroad people, and Landowners for further discussion and here we go! A search for money for studies, phone and possibly build the project if approved by all.

The dirt taken from the channel area will be used and piled as a dike^{Berm} to contain water in the existing creek bed. This area lies on the north side of the highway 14 bridge, east side of the creek bank that will proceed north to the northwest corner of the ball field lots. If there is an excess of dirt removed from the channel, it will be used to "stair step" line the west side of the county roadway to prevent possible erosion when channel activates.

Two "check" type culverts may be needed in two locations. One will be placed to drain normal flow water back to creek from Ken's Service, (north hwy 14 road ditch), the other will be used to help drain the ditch (north side) just east of the model "T" style bridge located ^{east} as of Hyme Bourk's farm. (Jake Bonnichsen lives on that farm, now)

Two bridges will be needed as channel passes under the railroad track, then an exiting set of very large culverts or bridge about one mile south. (map shows exit area)

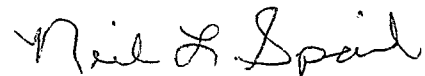
After exit area, on the very south end of the project, there will need to be three cut throughs (also shown on map). This will help traveling water pass with ease to the south and in direction of natural flow.

As I first talked to landowners about the project, I expressed reuse age of their properties once the project was built, to hay the bottom of the new channel, similar to the road ditch haying that is common along most highway right-of-ways today. With this assurance they seemed very willing to yield their land to the project. It would also solve an erosion factor.

It's said that "Man's his own worst enemy at times". This drafting shows the new channel linking back together a creek that once was an undisturbed artery of creek drainage. It is our generation's responsibility to maintain and care for all the valleys useful properties.

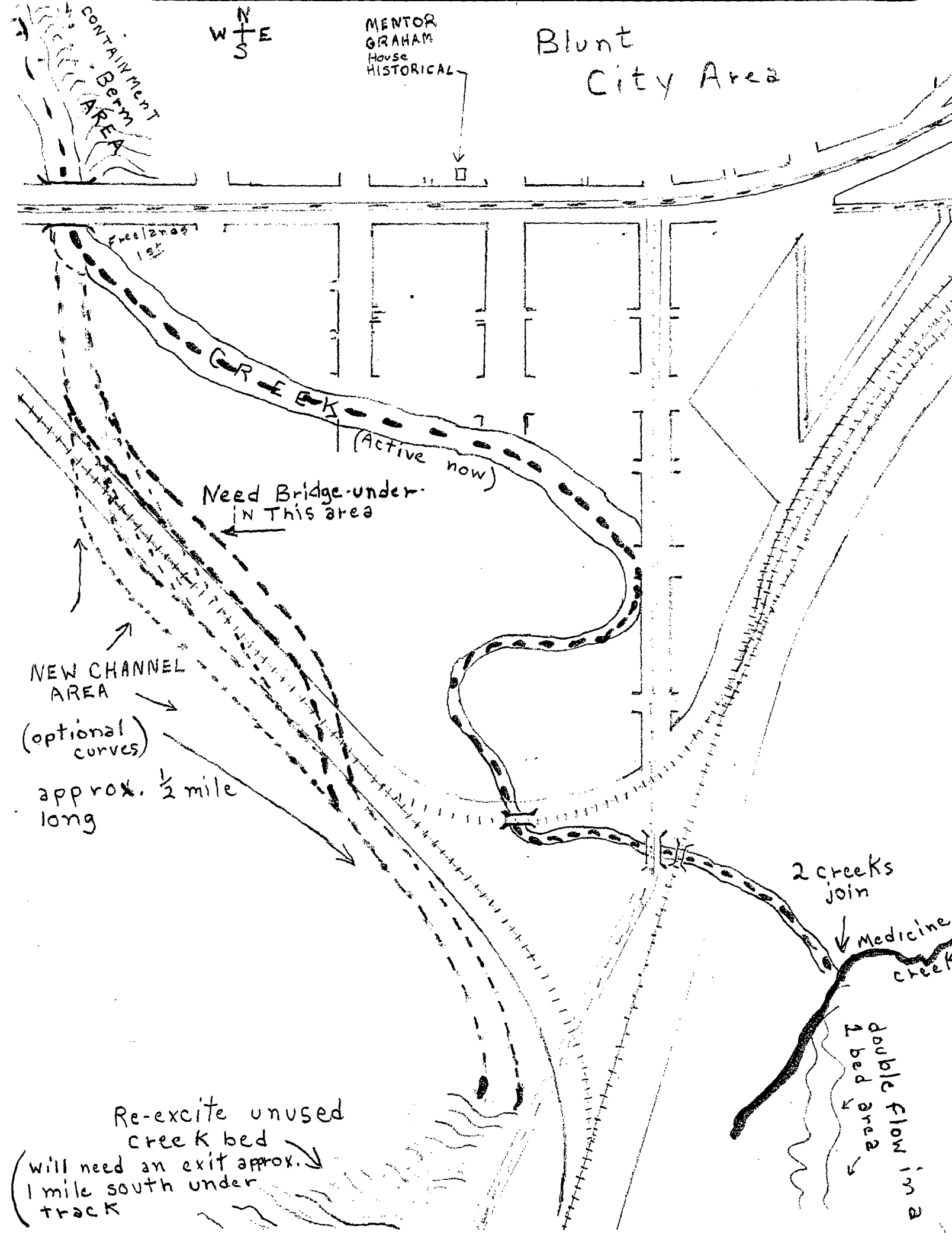
The new channel will see level full snow at times, but with careful watching of these situations, can be addressed and helped as the future wears on.

Yours truly,

A handwritten signature in cursive script that reads "Neil L. Spaid".

Neil Spaid

605-962-6404



N
W
S
E

MENTOR
GRAHAM
House
HISTORICAL

Blunt
City Area

CONTAINMENT
AREA

Free 2nd 1st

CREEK

(Active now)

Need Bridge under
in This area

NEW CHANNEL
AREA

(optional
curves)

approx. 1/2 mile
long

Re-excavate unused
creek bed

(will need an exit approx.
1 mile south under
track

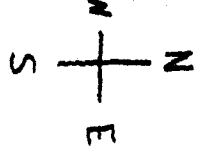
2 creeks
join

Medicine
creek

double flow in a
1 bed area

R.R.

Need Bridge under
track here and



New channel over-
flow
area

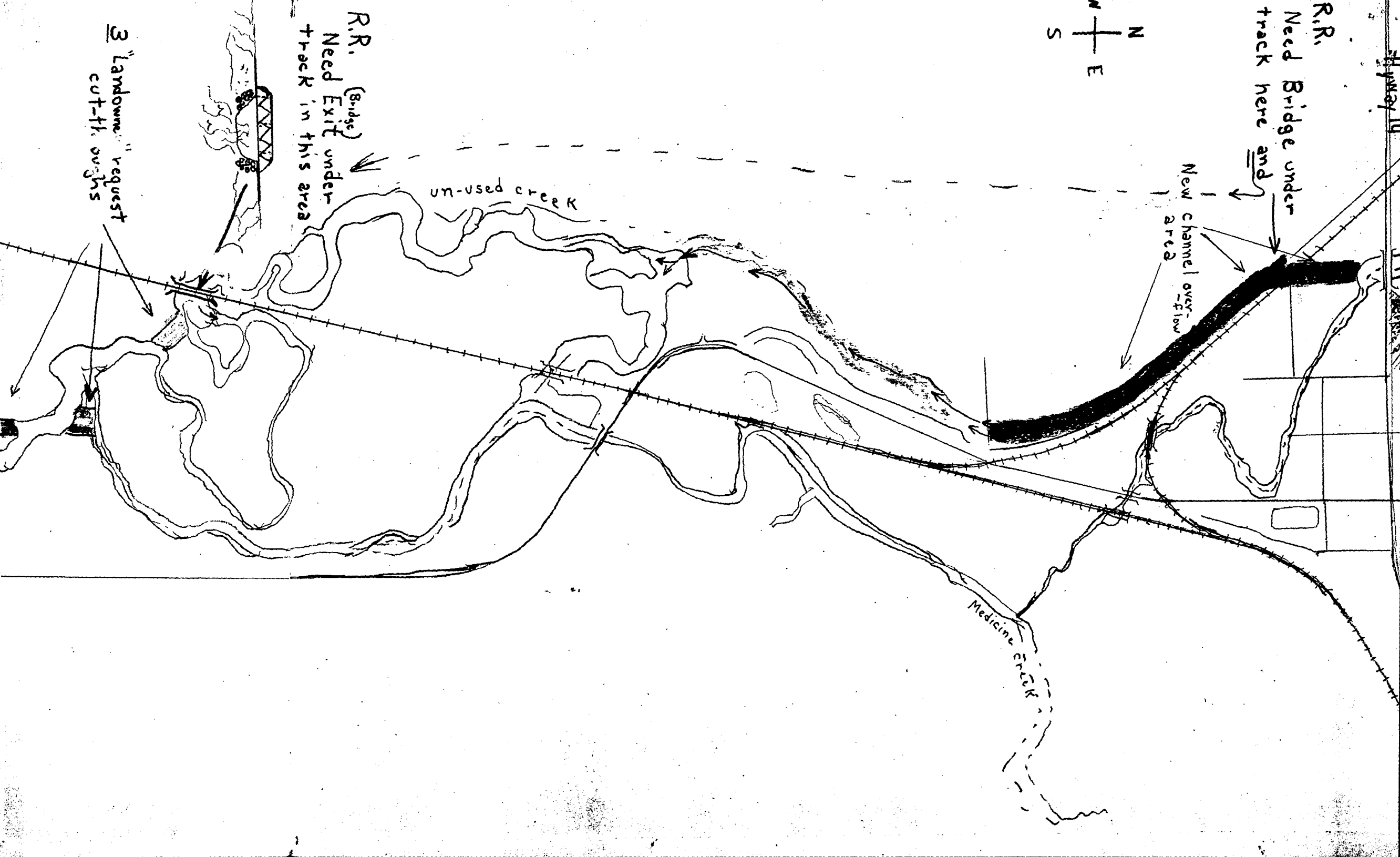
un-used creek

Medicine Creek

R.R.

(Bridge)
Need Exit under
track in this area

3 "Landowne" request
cut-th. oughs





DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3181
www.state.sd.us/denr

January 24, 2000

Neil Spaid
402 E. Alice St.
Blount, SD 57522

*Karen,
Possible app coming.
Alan*

Dear Mr. Spaid:

I am writing this letter in reference to our meeting at Blunt, SD on January 20, 2000 concerning your proposed flood control project. Based upon the field observations we made of the proposed modifications to the channel at Blunt and Medicine Creek south of Blunt, we have determined that a flood control permit will be required.

South Dakota Codified Law (SDCL) 46-2A-11 requires that a flood control permit can only be issued if it can be shown that the project will reduce the damage due to flooding or erosion in the area proposed to be benefited, will not increase the likelihood or severity of flood damages in other areas unless easements have been obtained, and the project cannot endanger human life or property. The applicant is responsible for demonstrating that the proposed project will meet these requirements.

A flood control application will require submittal of a plan of the project detailing the proposed diversion of the channel at Blunt, the culverts or bridge allowing the diversion to flow under the railroad bed south of Blunt, and the proposed oxbow cutoffs along Medicine Creek. It must be shown that this project will not increase the likelihood or severity of flood damages downstream of the project area on Medicine Creek. More than likely this will require the applicant to retain a registered professional engineer to perform an engineering analysis for the proposed project.

Enclosed is a copy of the flood control application form and instruction sheet. If you wish to make the application for a flood control permit, please complete the form and sign before a notary public. Return the application form to this office along with a signed map, the detailed project plan, and \$150 filing fee plus \$50 licensing fee (\$200 total).

If you have any questions, please contact myself or Mark Rath of the Water Rights Program at (605)773-4061 or (605)773-3352 respectively.

Sincerely,
Donald E. Stroup
Donald E. Stroup
Natural Resources Engineer

Enclosures

Floods in North-Central and Eastern South Dakota, Spring 1997

INTRODUCTION

Heavy precipitation between September 1996 and February 1997 caused record-breaking spring flooding in north-central and eastern South Dakota. Most of the winter precipitation came during severe snowstorms driven by strong winds that created blizzard conditions over much of the area. The potential for extensive flooding was widely recognized and emergency action plans were put into effect in many communities. A relatively slow warming period during March probably kept the severe flooding from reaching more catastrophic proportions.

The 1997 flooding equaled or exceeded the 500-year recurrence interval at two streamflow-gaging stations and the 100-year recurrence interval at five other gaging stations. This followed 1993 and 1995 flooding, when several streamflow-gaging stations had peaks exceeding the 100-year recurrence interval. Peak-flow data for the spring of 1997 at selected gaging stations located on South Dakota streams are shown in table 1. The listed recurrence intervals are estimates based on a limited period of record.

The U.S. Geological Survey (USGS), one of the principal Federal agencies responsible for the collection and interpretation of water-resources data, works with other Federal, State, and local

agencies to ensure that accurate and timely data are available for flood warning, damage assessment, and making decisions regarding the public's welfare.

WINTER OF 1996-97

Precipitation in South Dakota during the winter of 1996-97 was more than double the normal and was the highest on record, according to the State Climatologist (A.R. Bender, written commun., January 1998). During September 1996 through February 1997, Statewide precipitation averaged 10.8 inches, compared to a long-term average of 5.0 inches for September-February. Total snowfall for November 1996 through March 1997 ranged from near 20 inches at several locations in the southwestern part of the State to nearly 100 inches in areas of the east-central part of the State. The heavy snows were accompanied by persistent strong winds and cold temperatures creating blizzard conditions that closed roads, schools, and businesses many times throughout the winter. Livestock and agricultural losses were extensive. The winter storms killed more than 296,000 head of livestock (U.S. Department of Agriculture, Farm Service Agency, written commun., December 1997).

Due to severe winter storms, the Governor declared a State of Emergency on January 10, 1997. The President

approved a Disaster Declaration for all counties of South Dakota the same day. As of September 30, 1997, the State had received slightly more than \$314 million in Federal disaster-relief funds (Federal Emergency Management Agency, written commun., 1997).

In mid-March, estimated snow water content exceeded 4 inches in most of northeastern South Dakota. Areas in the northeastern and east-central parts of the State had snow water content greater than 5 inches (fig. 1).

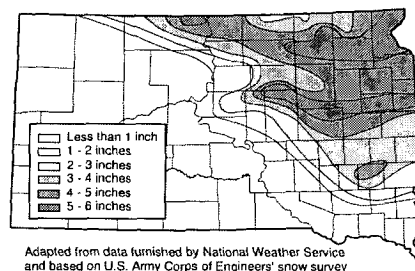
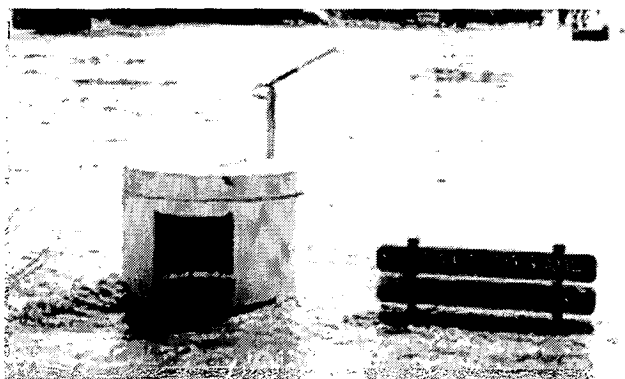


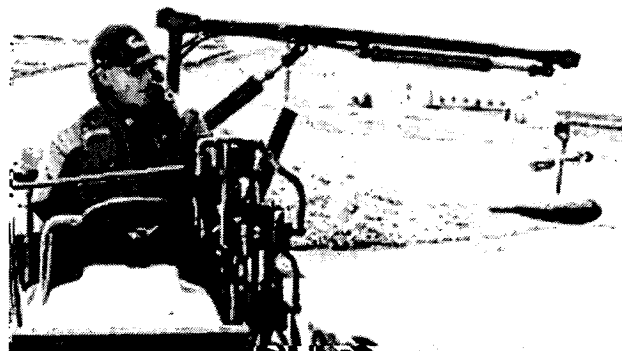
Figure 1. Water content of snow as of March 15-19, 1997.

FLOODS OF 1997

Ice jams on the White River and some nearby streams caused some flooding in late February in the central part of the State. Flooding began in mid-March in the north-central part of the State when runoff from melting snow



Flooding on the James River at the Huron streamflow-gaging station on April 8, 1997.



Discharge measurement on the James River near Scotland on April 3, 1997.

Table 1. Comparison of peak stage and streamflow data for February through May 1997, to previous maximums for period of record at selected gaging stations

[mi², square miles; ft, feet; ft³/s, cubic feet per second; --, no data, not computed, or not determined; <, less than; >, greater than; BW, backwater; (-), reverse flow; e, estimated]

Station number	Station name	Period of record (water years)	Contributing drainage area, (mi ²)	Flood of February-May 1997				Previous maximum		
				Peak stage (ft)	Peak flow (ft ³ /s)	Date	Recurrence interval range ¹ (years)	Peak stage (ft)	Peak flow (ft ³ /s)	Date
05051650	La Belle Creek near Veblen	1988-97	8.74	12.57 10.60	BW ² 100	4/1 4/4	--		BW 664	3/26/89 5/18/96
05289985	Big Coulee Creek near Peever	1988-97	12.1	9.43 7.72	BW 358	3/27 4/5	--	9.08 8.21	BW 456	3/11/95 6/21/91
05292704	North Fork Yellow Bank River near Odessa, MN	1992-97	208	18.02 15.94	BW 4,760	3/29 3/31	--		2,580	7/8/94
05299700	Cobb Creek near Gary	1993-97	70.3	13.99	² 2,100	3/31	--	12.09	860	6/17/92
06354860	Spring Creek near Herreid	1963-86, 1989-96	220	12.64	2,680	4/1	10-25		1,570 1,630	7/27/93 3/15/95
06354882	Oak Creek near Wakpala	1985-97	356	19.62	² 7,500	3/27	50-100	18.62 17.73	BW 3,780	3/14/95 3/4/86
06357800	Grand River at Little Eagle	1959-97	5,370	19.58 16.96	BW 20,900	3/24 3/27	25-50		BW 31,000	3/18/66 3/23/87
06360500	Moreau River near Whitehorse	1955-97	4,880	27.68 26.93	BW 29,700	3/21 3/23	25-50	26.20 26.00	BW 27,700	3/14/72 5/24/82
06442000	Medicine Knoll near Blunt	1950-97	317	13.15	e4,000	3/28	25-50		--	6/5/91
06442718	Campbell Creek near Lee's Corner	1988-97	54.1	14.40	² 800	3/21	--	15.01	3,260	7/24/93
06452000	White River near Oacoma	1929-97	9,940	23.84 --	BW ² 29,100	2/20 2/21	10-25		BW 51,900	3/4/94 3/30/52
06452320	Platte Creek near Platte	1989-97	741	12.67 9.13	BW 1,680	5/8 2/20	--	11.29	2,600	5/11/95
06471000	James River at Columbia		2,481		BW ² 4,130 (-2,430)	4/19 4/30 3/30)	25-50		BW 2,340 (-1,320)	5/13/95 5/3/79 3/16/95)
06471200	Maple River at North Dakota-South Dakota State line	1957-97	384	16.19	² 5,300	3/29	25-50	16.05	² 5,930	4/11/69
06471500	Elm River at Westport	1946-97	1,049	21.56	² 9,380	3/30	10-25		12,600	4/10/69
06472000	James River near Stratford	1950-72, 1977, 1995, 1997	4,860	19.48	8,400	4/6	50-100	19.86 --	-- 5,580	5/18/95 5/14/50
06473000	James River at Ashton		5,673	26.64 25.03	BW ² 9,150 (-8,400)	4/6 4/23 3/31)	>100		BW ² 5,680 (-2,100)	5/18/95 4/24/69 4/9/69)
06473700	Snake Creek near Ashton	1956-72, 1977-79, 1985-89, 1997	2,609	20.74	15,000	4/1	>100	³ 17.21	6,980	4/10/69
06474000	Turtle Creek near Tulare		1,124	19.32 18.80	BW 13,500	3/26 3/28	25-50		² 6,000	4/5/69
06474500	Turtle Creek at Redfield	1946-72	1,481	18.32	13,500	3/29	50-100	15.94	7,660	4/7/69
06475000	James River near Redfield	1950-97	9,793	31.10 29.92	BW 17,000	4/6 4/3	>100		9,800	5/15/95
06476000	James River at Huron	1929-32, 1944-97	11,721	21.28	23,400	4/6	>500	16.86	10,000	5/19/95
06476500	Sand Creek near Alpena		261	13.45	² 2,000	3/23	10-25		BW 2,240	3/28/50 3/28/60

Table 1. Comparison of peak stage and streamflow data for February through May 1997, to previous maximums for period of record at selected gaging stations—Continued

Station number	Station name	Period of record (water years)	Contributing drainage area, (mi ²)	Flood of February-May 1997				Previous maximum		
				Peak stage (ft)	Peak flow (ft ³ /s)	Date	Recurrence interval range ¹ (years)	Peak stage (ft)	Peak flow (ft ³ /s)	Date
06477000	James River near Forestburg	1950-97	13,442	20.61	25,600	4/6	>100	17.26 17.08	BW 13,000	4/22/95 5/18/95
06477150	Rock Creek near Fulton		240	13.74	3,120	3/29	10-25		2,040	4/7/69
06478000	James River near Mitchell	1954-58, 1966-72, 1995, 1997	14,916	23.14	28,000	4/7	50-100	20.43	16,200	4/23/95
06478500	James River near Scotland	1929-97	16,505	19.87	28,000	4/9	50-100		29,400	6/23/84
06478513	James River near Yankton	1982-97	16,794	22.94	28,800	4/9	10-25	24.34	26,400	6/23/84
06478535	East Fork Vermillion River near Ramona	1987-89, 1996-97	508	8.50	1,600	4/30	--		BW 350	2/12/96 11/4/95
06478540	Little Vermillion River near Salem	1967-97	78.6	10.01	1,560	3/28	10-25	11.95	3,300	7/4/93
06478600	East Fork Vermillion River near Parker	1996-97	973	12.75 12.73	BW 4,210	3/22 3/29	--		1,380	6/3/96
06479000	Vermillion River near Wakonda	1946-97	1,676	16.93	6,150	3/30	10-25	17.62	17,000	6/23/84
06479010	Vermillion River near Vermillion	1984-97	1,808	22.10	6,070	4/2	5-10		21,400	6/23/84
06479215	Big Sioux River near Florence	1984-97	68	9.52 9.32	BW 2,000	4/2 4/4	10-25	9.18 9.08	1,280 1,810	7/25/93 3/29/86
06479430	Still Lake Outflow near Florence	1996-97	--	7.43 ⁴ 6.67	BW ⁴ 408	4/7 4/19	--			
06479438	Big Sioux River near Watertown	1973-97	228	12.09	7,820	4/5	25-50	11.13 11.08	BW 4,970	6/21/91 3/30/86
06479450	Lake Kampeska inlet/outlet near Watertown	1994-97	28.8	25.78 ⁴ 24.87	5,890 ⁴ 1,410	4/6 into lake 4/10 out of lake	--		--	--
06479500	Big Sioux River at Watertown	1946-72, 1997	350	12.49	5,800	4/6	>500	11.40 10.30	BW 2,220	4/8/69 4/9/52
06479515	Willow Creek near Watertown		110	10.93	3,650	4/5	10-25		BW 4,040	3/28/78 6/15/84
06479520	Big Sioux River below Watertown	1995-97	511	13.13 12.99	BW 6,300	4/2 4/11	--	11.78 11.74	BW ² 1,600	3/13/96 3/12/95
06479525	Big Sioux River near Castlewood	1977-97	570	13.19 12.87	BW ² 4,300	4/7 4/11	>100		2,250	3/30/86
06479980	Medary Creek near Brookings	1981-97	200	13.02	² 3,500	3/28	10-25	11.78	3,710	7/4/93
06480000	Big Sioux River near Brookings	1954-97	2,419	13.29 13.02	BW 11,100	4/8 4/2	10-25		33,900	4/9/69
06481000	Big Sioux River near Dell Rapids	1949-97	3,004	15.54	16,500	4/7	10-25	16.47	41,300	4/9/69
06482020	Big Sioux River at North Cliff Avenue at Sioux Falls	1972-97	3,729	23.11	17,700	4/7	25-50		21,600	6/22/84
06485500	Big Sioux River at Akron, IA	1929-97	6,937	22.63	31,300	4/9	5-10	23.05 22.99	66,700 80,800	5/10/93 4/9/69

¹Recurrence intervals given for stations with 10 or more years of record through 1996.

²Stage-flow relation affected by backwater.

³Site and datum then in use.

⁴Mean daily.

filled ice-covered river channels. The Grand and Moreau Rivers experienced lowland flooding from high flows and backwater from ice jams. The Moreau River near Whitehorse had a record flow of 29,700 ft³/s (cubic feet per second) and record stage of 27.68 ft (feet), as shown in table 1. Another record occurred on Oak Creek, which peaked at 19.62 ft, inundating most of the community of Wakpala.

When snowmelt began in late March in the eastern part of the State, ice thickness on rivers exceeded 3 ft. At the city of Westport in the James River Basin, heavy accumulations of ice created jams causing backwater on the Elm River that forced evacuation of several neighborhoods and caused the river to spill into the Moccasin Creek Basin, which then affected the city of Aberdeen. Snake Creek near Ashton had a recorded peak flow with a recurrence interval greater than 100 years. Tributary flows entering the main stem of the James River caused extreme backwater from Columbia to near Redfield. Record reverse flows were measured on the James River at Columbia (-2,430 ft³/s on March 30) and at Ashton (-8,400 ft³/s on March 31), when excessive tributary inflows flowed upstream in the river. Accumulating downstream inflows caused evacuation of James Valley Christian School when dikes failed on April 6 and the school was inundated with 5-7 ft of flood water. The James River at Huron rose to a record stage of 21.28 ft with a corresponding peak flow of 23,400 ft³/s on April 6, exceeding the 500-year recurrence interval. Peak-flow recurrence intervals downstream on the James River ranged from greater than 100 years at Forestburg to greater than 50 years at Scotland.

Additional severe flooding occurred in April as the heavy snowpack began to melt in the northeastern part of the State. The most adversely affected area was the upper Big Sioux River Basin near Watertown and the surrounding glacial-lakes area. The record levels reached by the Big Sioux River exceeded the 500-year recurrence interval at Watertown and forced the evacuation of many low-lying neighborhoods. Lake Kampeska residents suffered extensive damage to shoreline properties from record-high lake

levels, which were caused by inflows from the Big Sioux River.

Residual soil moisture and high base flows during 1993-96, coupled with the large winter 1996-97 snow accumulations, resulted in record total flows throughout eastern South Dakota for water year 1997. The total flow for water year 1997 was 17 times the long-term median streamflow at the James River near Scotland gaging station (fig. 2).

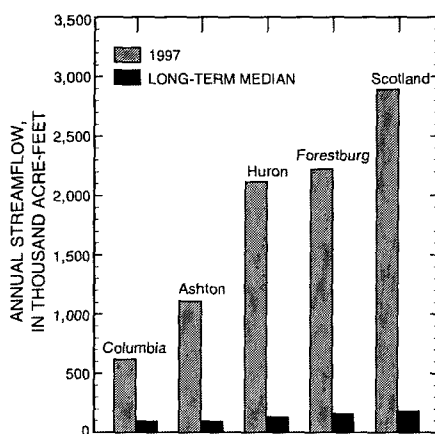


Figure 2. Comparison of 1997 streamflow to long-term median annual streamflow at selected James River gaging stations.

MONITORING OF STREAMFLOW

The USGS operates a network of 123 continuous-record streamflow-gaging stations and 23 high-flow partial-record gages in South Dakota. Miscellaneous annual streamflow measurements also are made at several additional sites throughout the State.

The data for about 50 of the continuous-record stations are relayed by satellite telemetry to computers in Rapid City, Huron, and Pierre. Data are transmitted every 4 hours, and within 15 minutes these data generally are available to decision makers in the agencies involved in flood management. In addition, data from selected stations within various river basins are displayed via the South Dakota District Homepage on the World Wide Web at: <http://www.sd.cr.usgs.gov>. The flood-tracking page that was maintained during the extreme 1997 flooding for the James River Basin is shown in figure 3.

This flood-tracking page, and similar ones for the Vermillion and Big Sioux Basins, made timely data readily accessible to the public, media, and cooperating agencies. The USGS and cooperating agencies also operate a network of telephone-accessible gages where critical stage data are available on a real-time basis.

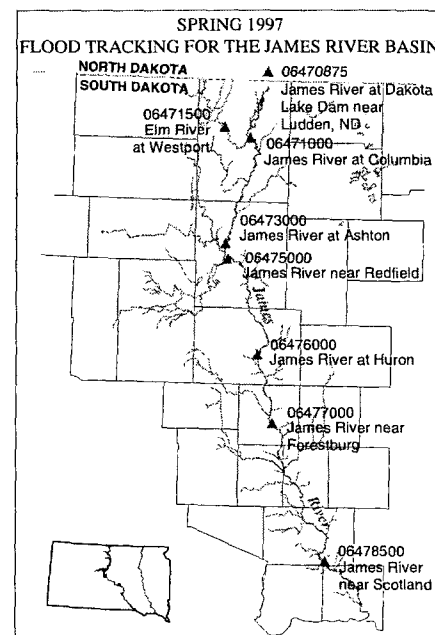


Figure 3. Flood-tracking page.

Rainfall and streamflow data in this report are provisional and subject to revision upon further review by personnel of the National Weather Service and the USGS.

—R.W. Teller and M.J.Burr

For More Information:

For water information:

District Chief
1608 Mt. View Road
Rapid City, SD 57702
(605) 355-4560
Fax: (605) 355-4523
Email: dc_sd@usgs.gov

Additional earth science information can be found by accessing the USGS Home Page on the World Wide Web at <http://www.usgs.gov>

For more information on all USGS reports and products (including maps, images, and computerized data), call **1-800-USA-MAPS**

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06476500	Sand Creek near Alpena		261	13.45	² 2,000	3/23	10-25		BW 2,240	3/28/50 3/28/60

Descriptive Statistics Report

Data File Name: C:\Work\PSI-Plot\MedicineKnollCr.PDW

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Number of missing points:	0
Number of negative values:	0
Number of positive values:	3861
Number of zero values:	8965
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Maximum value:	1800
Inter range value:	1800
Median:	0
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Sum of absolute value:	65820.13
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Geometric mean:	-NAN
Quadratic mean:	54.25683963
Harmonic mean:	0
Absolute mean:	5.13177374
Sum of squares:	37757238.4045
Variance:	2917.69702844
Standard deviation:	54.01571094
Absolute deviation:	9.07266601
Standard error:	0.47695179

95 percent confidence interval:
[4.19687719, 6.06667029]

99 percent confidence interval:
[3.90304461, 6.36050287]

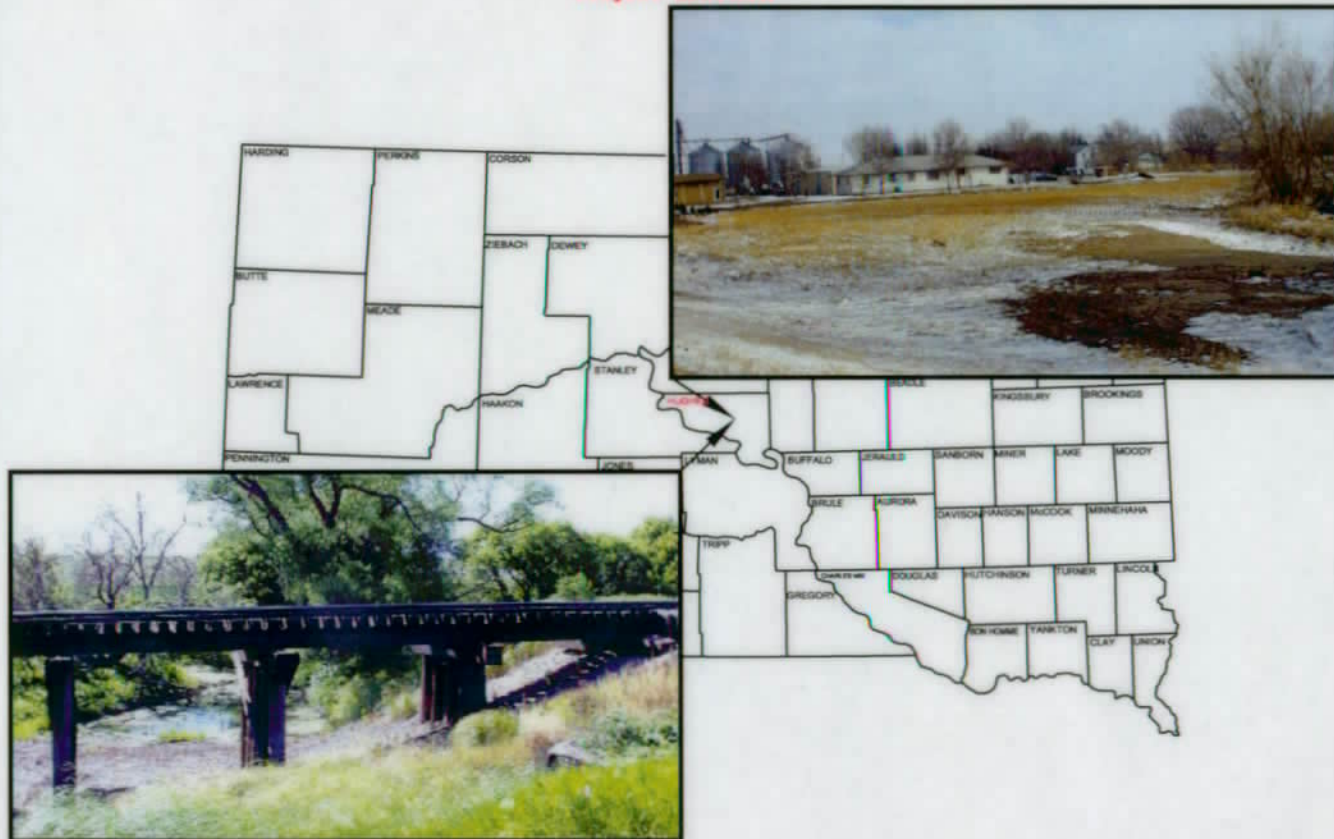
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25 percentile:	0
50 percentile:	0
75 percentile:	0.2
90 percentile:	2.4

----Created with PSI-Plot
----Fri Oct 29 10:30:17 2004

Hydraulic Analysis
For
Peak Runoff On:
MEDICINE CREEK DRAINAGE
BLUNT, SOUTH DAKOTA
2000

Project Location



Brosz

Engineering, Inc.

□ 315 S. Main * Box 357 * Bowman, ND 58623
Phone: (701) 523-3340 * Fax: (701) 523-5243

☒ 3030 Airport Rd., Suite A * Box 23 * Pierre, SD 57501
Phone: (605) 224-1123 * Fax: (605) 224-0659

Registered in North Dakota, South Dakota, and Montana

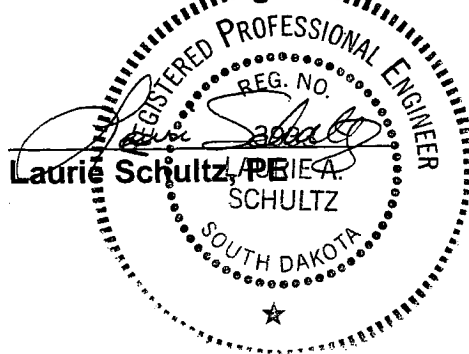
FLOOD PLAIN STUDY
FOR
MEDICINE CREEK DRAINAGE
HUGHES COUNTY, SOUTH DAKOTA

**PREPARED FOR THE CITY OF BLUNT
AND THE HUGHES COUNTY COMMISSION**

BY

**BROSZ ENGINEERING, INC.
PIERRE, SOUTH DAKOTA
DECEMBER 2000**

I hereby certify that these plans, specifications, or report was prepared by me or under my direct supervision and that I am a duly registered Professional Engineer under the laws of the state of South Dakota.



1/10/01
Date

3933
Registration No.

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II. POTENTIAL FLOOD IMPACT AREA	2
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IV. HYDROLOGIC EVALUATION	4
V. STUDY RECOMMENDATIONS	8
VI. STUDY CONCLUSIONS	8

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MAP FOUR	Hyde County Soils Map

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EXHIBIT TWO	Medicine Creek Drainage
EXHIBIT THREE	Recommended Overflow Channel and Structure

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DRAWING TWO	Typical Section of Natural Grass Channel
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I. Purpose of the Study

Introduction

The City of Blunt is located in northcentral Hughes County in central South Dakota (See Map 1). Three major drainages flow through the general vicinity of Blunt. Just southeast of the City is the confluence of the North and South Forks of Medicine Creeks. Just south of Blunt, Medicine Creek is joined by a Dry Medicine drainage that starts collecting water near Onida. Medicine Creek then flows into the Missouri River approximately 15 miles south of the City.

The City of Blunt has experienced devastating storm water related flooding four times in the last ten years (1991, 1994, 1997 & 1999). Summer thunderstorms that yield heavy rainfall amounts can cause flooding in the majority of Blunt. The most severely impacted is the area on both sides of US Highway 14.

Authorization

The City of Blunt with the cooperation of the Hughes County Commission hired Brosz Engineering, Inc. to do a hydraulic analysis of the broadly defined Medicine Creek Drainage area. A Professional Services agreement to do this study was approved in January 2000.

Purpose

The purpose of this report is to perform hydrologic and hydraulic analyses of the channel capacity and railroad and highway structures that are currently in place around the City. This study will present the peak flood flows for the 10, 25, and 100-year storm frequencies. This primary focus of this report is to evaluate the drainage basin to the north and west of Blunt using 10 and 25 year storm frequencies. The program used for the evaluations was the U.S. Army Corps of Engineers HEC-RAS computer program.

Flood control alternatives will include channel cleaning, channel widening, channel redirection, and reducing flow restriction by increasing the sizes of the bridges and culverts located in the path of the drainage. This study includes recommendations for improvements and estimated project costs for those improvements.

In addition to this analysis, Hughes County has conducted an evaluation of the hydraulics capacity of a major structure over Medicine Creek located to the south of the City. This structure (Hughes County structure number 33-288-030) and adjacent roadway have experienced damage from the same events referenced above. It should be noted that the hydraulic analysis shows that this structure would restrict the flow from a 25-year storm event. The County is currently working with the South Dakota Department of Transportation to upgrade this structure through the Federal Bridge Replacement program.

The Study Area

The Study Area includes portions of Hughes, Hyde, Hand, Sully and Faulk Counties in South Dakota. The drainage basin, which starts near Onida and passes just west of Blunt before joining Medicine Creek, includes approximately 106 square miles of land. The North Fork of the Medicine Creek encompasses 486 square miles. The drainage basin of the South Fork of Medicine Creek includes 187 square miles of drainage (See Exhibit 2). Combined, the total of the watershed of these three drainages has an approximate area of 498,560 acres.

II. Potential Flood Impacted Area

General

The City of Blunt is located in an area characterized by Betts-Java-Durrstein Association Soils. This land association is made up of rolling to steep, well-drained to excessively drained loamy soils that formed in glacial till on uplands, and nearly level, poorly drained soils that have a clay pan in alluvium on bottom land (See Soils Maps 2, 3 and 4).

Flooding occurs in the flat areas where the channel slopes decrease and the water slows down. The lower flow velocity causes the water to reach a greater depth, which in turn causes flooding. The flooding can occur from a very intense short-term thunderstorm or a longer duration steady rainstorm event. In 1999, a short-term thunderstorm with a reported 7 inches of rain storm event along the Dry Medicine Creek Drainage, caused severe flooding throughout the central and southern portions of the City.

Estimated Flood Zones

The estimated flood zones for a 25-year flood event in the City of Blunt and the surrounding area is shown on Exhibit One. The areas included are as follows:

Along Both Sides of US Highway 14:

From the area near where Highway 14 and the Dakota Minnesota & Eastern Railroad cross on the west edge of Blunt to approximately ¼ mile east of the City.

The Blunt City Limits

Roughly bordered on the west by the DM&E Railroad, on the north by Adams/Coler Streets, on the south where Dry Medicine and East Medicine Creeks join and on an undefined area that can include much of the land out to a quarter of a mile east of the City limits.

Homes and businesses in this area are likely to be directly impacted by floodwaters. The floodwaters will overwhelm the sanitary sewer system and cause both wastewater and surface water to back-up into house basements.

Also shown on Exhibit One is the area potentially impacted by a 100-year flood event. All the businesses and residences south of Washington/Lydia Streets would likely be flooded.

III. Data Collection

General

Brosz Engineering Inc. assembled and analyzed existing data utilizing aerial photography, general soils maps obtained from the Soil Conservation Service and topographical maps of the entire drainage basins of all three creeks. A field survey was conducted to more specifically define the topography of the area within the immediate vicinity of the City.

Hydrologic Data

The basin characteristics of the watershed were developed using USGS 7-1/2 minute quadrangle maps. Other sources of information included:

- Peak-Flow Frequency Estimates Through 1994 for Gauged Streams in South Dakota;
- General soils maps of the Soil Conservation Service;
- USGS Techniques for Estimating Peak-Flow Magnitude and Frequency Relations for South Dakota Stream;
- Hydrologic analysis using Applied Fluvial Geomorphology;
- FEMA Flood Insurance Study; and
- City maps and other pertinent data from within the study area.

Hydraulic Data

Data used in calculating hydraulic capacities was obtained from the South Dakota Department of Transportation and through field investigations completed by Brosz Engineering.

IV. Hydrologic Evaluation

General

This section on hydrology outlines the procedures used and the peak flow values for the basins investigated. Standard hydrologic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10, 25 or 100 year period (recurrence interval) have been selected as having special significance for flood plain management.

Although the recurrence interval represents the statistical probability between events, the rain storm event could occur in consecutive years or even within the same year. The risk of experiencing a rare flood increases when periods greater than one year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual occurrence) in any 50 year period is approximately 40 percent (4 in 10), and for any 90 year period, the risk increases to approximately 60 percent (6 in 10). The analysis reported herein reflect flooding

potentials base on conditions existing in the community at the time of completion of this study.

Basin Description

The Study area is located in the general vicinity of the City of Blunt in Hughes County, South Dakota (See Exhibit 1). The drainage basin consists of the watershed that affects the City of Blunt. The drainage basin for this area is shown on Exhibit Two.

The watershed has an approximate area of 498,560 acres, which primarily consists of three drainage ways, namely;

- North Medicine Creek which consists of approximately 486 square miles of drainage area;
- South Medicine Creek which consists of approximately 187 square miles of drainage area; and
- Dry Medicine Creek, which consists of approximately 106 square miles of drainage area.

The runoff is also affected by the weather and soil saturation conditions preceding the storm event. The majority of the watershed is rural pastures and farmland. The watershed has relatively steep to mild slopes throughout the basin with flat slopes that lead to the confluence of the three branches of the Medicine creeks just south of the City. The vertical relief is 352 feet from the basin highpoint at elevation 2002, which is located at the head of South Medicine Creek.

Short grasses are the dominant vegetation types. Quick-establishing, short rooted, drought-resistant species of buffalo and western wheat grass are plentiful. Vegetation is more plentiful along stream banks. Cottonwoods dominate the larger vegetation types.

Gauged Stream Sites

One long term gauging site was found at the base of what is shown as North Medicine Creek. The peak flow estimates in cubic feet per second (cfs) for selected recurrence intervals at the gauging station have been calculated by the United States Geological Survey (USGS) and presented on the top of the next page.

Location	Peak Flow (cfs)						
	Various Recurrence Intervals, years						
	2 yr.	5 yr.	10 yr.	25 yr.	50 yr.	100 yr.	500 yr.
Gauging Station	63	451	1230	3480	6730	12100	38700

Hydraulic Site Analysis

Dry Medicine Creek has flow restriction due to two conditions. The first problem exists as a natural condition due to the fork where it attaches to North Medicine Creek. As water from Dry Medicine Creek flows into the larger main channel, it creates a backwater and flow restriction in the area of the fork. As high flows from Dry Medicine Creek reach the fork, the water needs time to gather and continue down the creek. If there is water flowing in North Medicine Creek at this time, the time for the water from Dry Medicine Creek to enter North Medicine Creek and continue downstream is increased, therefore allowing less drainage during a storm event.

The second condition contributing to flooding conditions from Dry Medicine Creek is location and conditions of the creek. As the creek enters the flat area where Blunt is located, it has an opportunity to slow down and flow over the banks. This slope reduction along with the existence of trees along the banks reduces the creeks ability to allow water to flow through freely.

HEC-RAS (Hydraulic Engineering Center - River Analysis System) computer modeling was used to study the size of structures needed to pass a majority of the flow from Dry Medicine Creek through the railroad system in the area. It was also used to determine the width that a diversion channel would need to be, so that no excess of riprap would need to be used to reduce any local erosion problems within the diversion channel itself. The structures are capable of handling up to and including a fifty-year event, while keeping outlet velocities low enough to reduce the total amount of riprap necessary to control erosion and damage around the structure itself.

The current USGS method for estimating peak flows was used to determine design flow values to be used in HEC-RAS analysis. The values returned by the current method deviated slightly from those shown the hydraulic data sheet used in designing the bridge on HWY 14 located West of Blunt, and the values returned by

gauging data on North Medicine Creek. While the more current methods returned a higher flow for the 25-year design event, a lower value was returned for higher-year events. The variation can be attributed to the availability of more streamflow gauging station data from the USGS for derivations. In addition, due to the proximity of the gauging station to the study area, and taking into account that it covers only half of the entire study drainage area, USGS calculated values were applied. These values are shown below.

Location	Peak Flow (cfs)						
	Various Recurrence Intervals, years						
	2 yr.	5 yr.	10 yr.	25 yr.	50 yr.	100 yr.	500 yr.
North Medicine Creek	188	940	2042	4447	7096	10611	22687
South Medicine Creek	129	590	1233	2587	4042	5937	12284

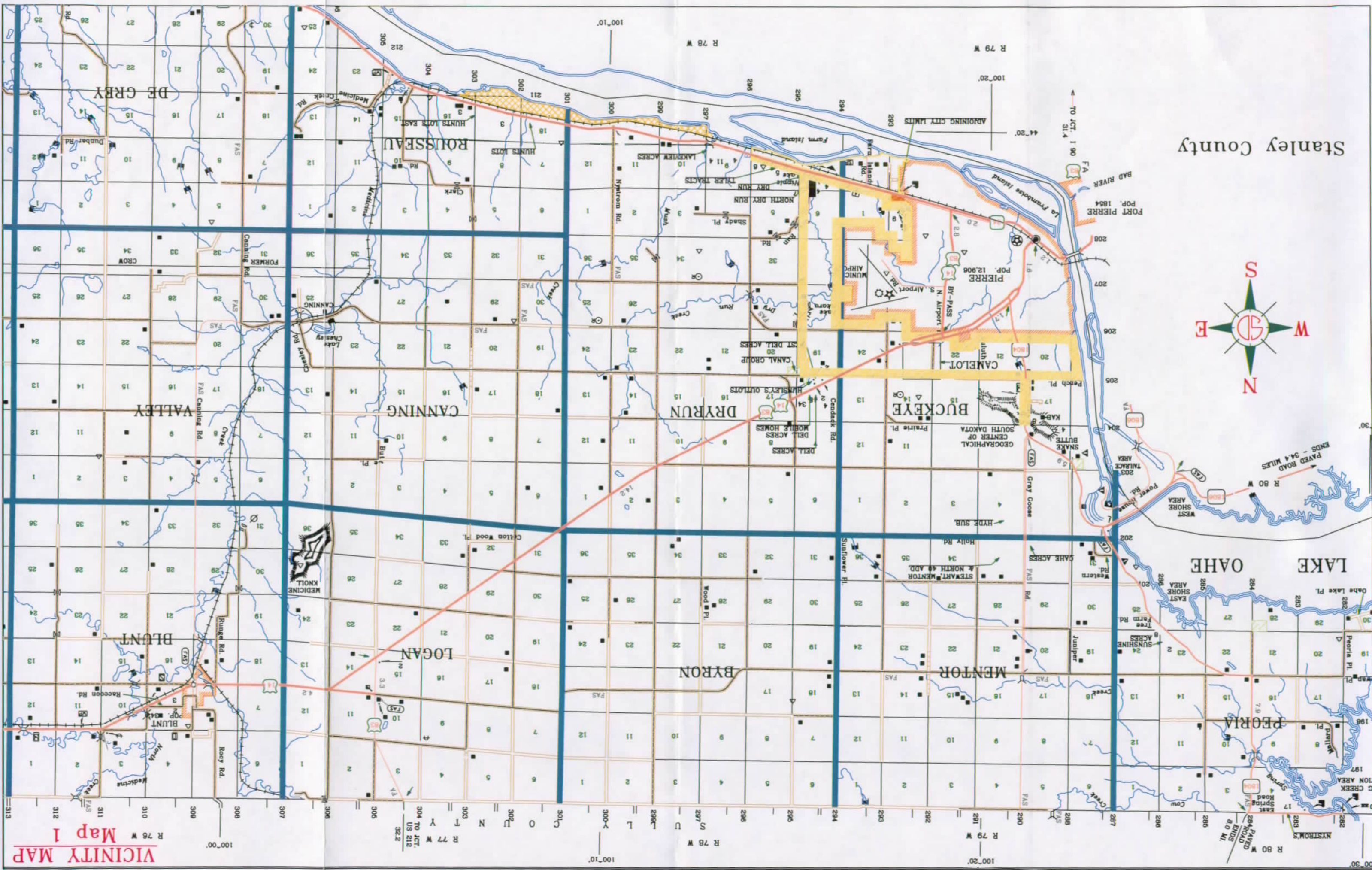
V. Study Recommendations

1. Construct an earthen dike north of Highway 14 on the east side of Dry Medicine Creek from Washington Street to Highway 14.
2. Re-channel and direct drainage that flows through Highway 14 at the west edge of the City directly south to the Railroad Grade.
3. Construct a new double 12' x 6' skewed concrete box through the Railroad Grade at the north limit of the project (See Exhibit 3 - Site A).
4. Re-channel drainage along southwest side of railroad/highway berms.
5. Reconnect new channel with existing Medicine Creek at a point approximately 5,050 feet south of the County Highway Bridge south of the City.
6. Construction of a new double 12' x 6' concrete box through the Railroad Grade at the south limit of the project (See Exhibit 3 – Site B).
7. Channel cleanout near the inlet and outlet of the diversion channel.

VI. Study Conclusions

The engineer's preliminary construction cost estimate of \$805,700.00 is shown on Table One of this report. This includes the estimated costs associated with diverting a 25-year stormwater flood event on Dry Medicine Creek around the City of Blunt. This study does not attempt to construct any improvements for an event above the 25-year frequency. The reason for this can be noted by looking at Exhibit I, which shows the large area inundated in a 100-year event.

The recommendations of this study are only part of the solution to the problem of moving storm water out of the Blunt area. A critical element relieving flooding in the area is to increase the hydraulic capacity of Hughes County structure No. 33-288-030 that is located 0.3 mile west and 1.0 mile south of Blunt. The hydraulics of this structure were independently evaluated and the structure currently restricts the flow of a 25-year storm event on the Medicine Creek drainage system.



Stanley County



VICINITY MAP
Map 1

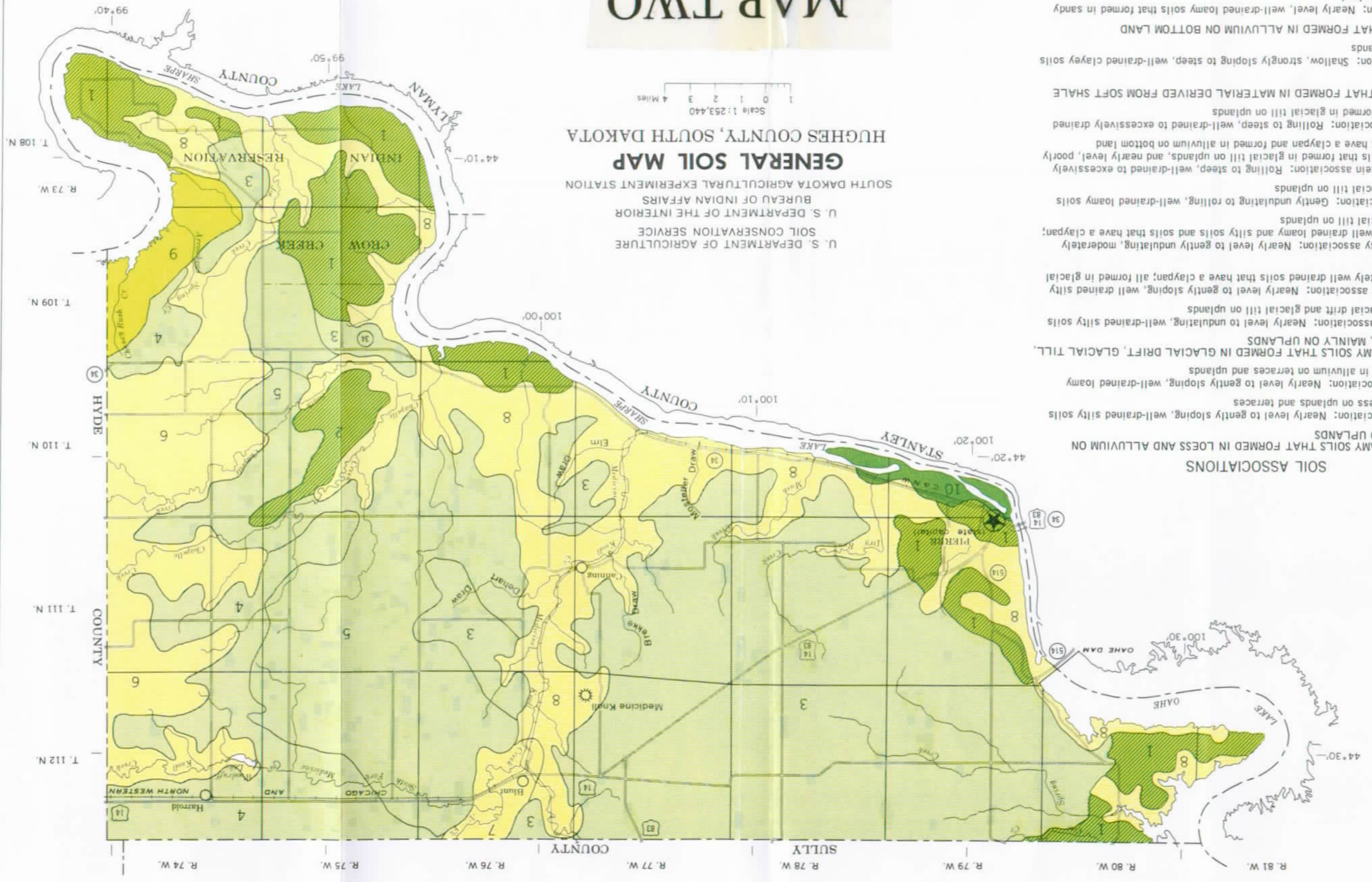
- SOIL ASSOCIATIONS**
- 1 Lowry-Agar association: Nearly level to gently sloping, well-drained silty soils that formed in loess on uplands and terraces
 - 2 Ree-Canning association: Nearly level to gently sloping, well-drained loamy soils that formed in alluvium on terraces and uplands
 - 3 Highmore-Eakin association: Nearly level to undulating, well-drained silty soils that formed in glacial drift and glacial till on uplands
 - 4 Highmore-Degrey association: Nearly level to gently sloping, well drained silty soils and moderately well drained soils that have a claypan; all formed in glacial drift on uplands
 - 5 Cavo-Raber-Demky association: Nearly level to gently undulating, moderately well drained and well drained loamy and silty soils and soils that have a claypan; all formed in glacial till on uplands
 - 6 Raber-Peno association: Gently undulating to rolling, well-drained loamy soils that formed in glacial till on uplands
 - 7 Betts-Java-Durstain association: Rolling to steep, well-drained to excessively drained loamy soils that formed in glacial till on uplands, and nearly level, poorly drained soils that have a claypan and formed in alluvium on bottom land
 - 8 Gettys-Betts association: Rolling to steep, well-drained to excessively drained loamy soils that formed in glacial till on uplands
 - 9 Clayey soils that formed in material derived from soft shale on uplands
 - 10 Sansarc association: Shallow, strongly sloping to steep, well-drained clayey soils over shale on uplands
 - LOAMY SOILS THAT FORMED IN ALLUVIUM ON BOTTOM LAND
 - Minor association: Nearly level, well-drained loamy soils that formed in sandy alluvium on bottom land

Compiled 1973

MAP TWO

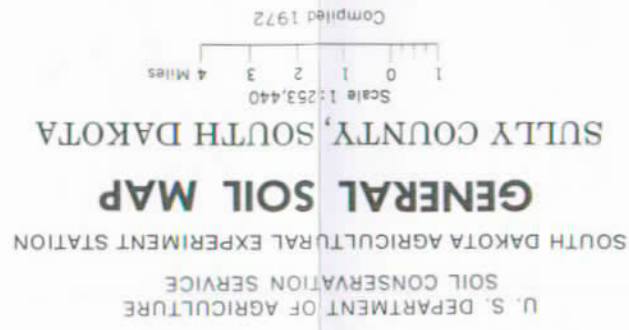
GENERAL SOIL MAP
 HUGHES COUNTY, SOUTH DAKOTA
 U. S. DEPARTMENT OF AGRICULTURE
 SOIL CONSERVATION SERVICE
 U. S. DEPARTMENT OF THE INTERIOR
 BUREAU OF INDIAN AFFAIRS
 SOUTH DAKOTA AGRICULTURAL EXPERIMENT STATION

Scale 1:253,440
 0 1 2 3 4 Miles



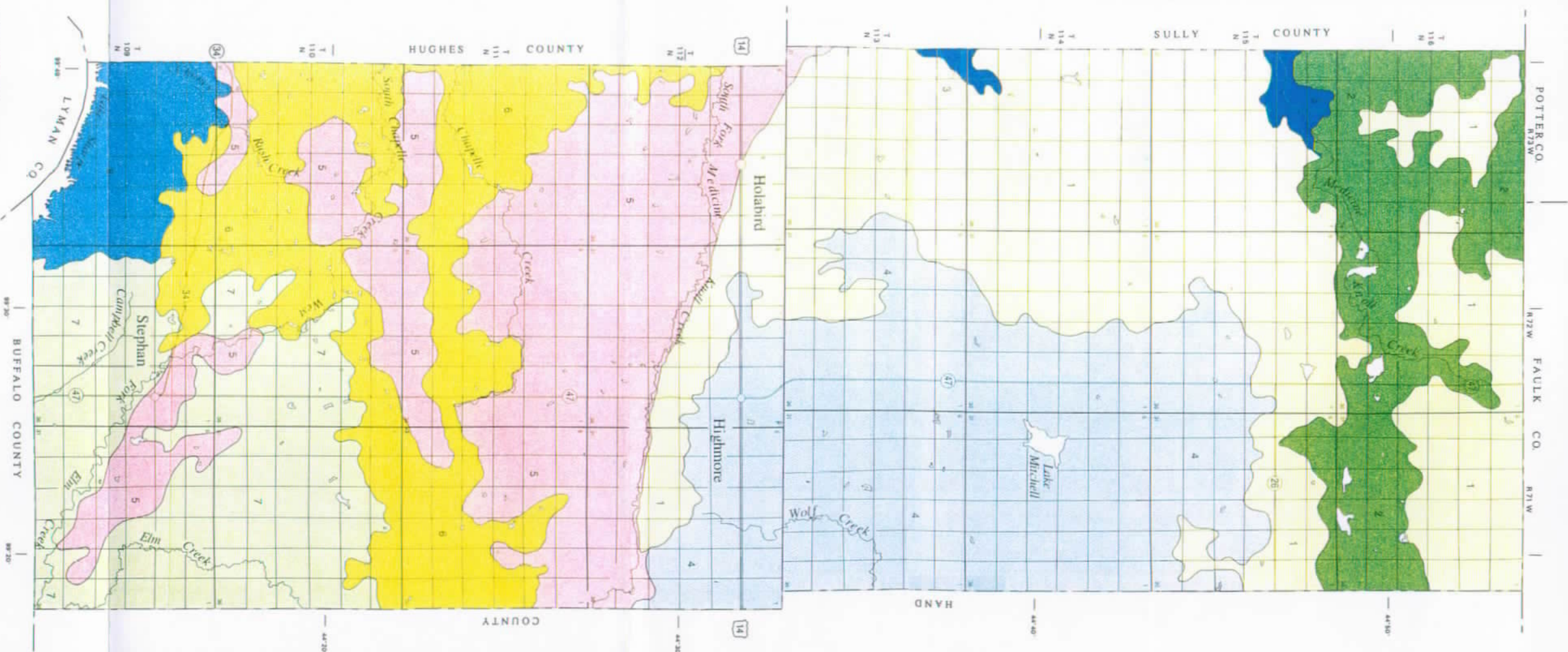
Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

1	Dupree association: Shallow, sloping to steep, well-drained, clayey soils over shale; on uplands
2	Agar-Onita association: Deep, nearly level to sloping, well-drained, silty soils formed in loess and deep, moderately well drained, silty soils formed in alluvium; on uplands
3	Betts-Durstein association: Deep, undulating to hilly, excessively drained, loamy soils formed in glacial till and deep, level, poorly drained claypan soils formed in alluvium; on uplands and bottom lands
4	Okla association: Deep, nearly level to hilly, well-drained, loamy soils formed in glacial till; on uplands
5	Highmore-Eakin association: Deep, nearly level to undulating, well-drained, silty soils formed in silty drift and loamy glacial till; on uplands
6	Glenham-Hoven association: Deep, nearly level to gently undulating, well-drained, loamy soils formed in glacial till and deep, level, claypan soils formed in alluvium in depressions; on uplands
7	Oahe-Talmo association: Nearly level to hilly, well-drained to excessively drained, loamy soils formed in alluvium over sand and gravel; on terraces and uplands
8	Highmore-Raber-Cavo association: Deep, nearly level to gently sloping, well drained and moderately well drained, silty and loamy soils formed in silty drift and glacial till; on uplands
9	Raber-Glenham association: Deep, nearly level to undulating, well-drained, loamy soils formed in glacial; on uplands



SECTIONALIZED	6	5	4	3	2	1
	7	8	9	10	11	12
	18	17	16	15	14	13
	19	20	21	22	23	24
	30	29	28	27	26	25
	31	32	33	34	35	36

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



SOIL LEGEND*

- 1 LEVEL TO MODERATELY STEEP, LOAMY AND SILTY SOILS ON TILL PLAINS AND MORAINES
Glenham-Prosper-Java association
- 2 Java-Glenham association
- 3 Java-Betts association
- 4 Java-Sickney-Hoven association
- 5 NEARLY LEVEL TO MODERATELY SLOPING, SILTY AND LOAMY SOILS ON TILL PLAINS AND MORAINES
Highmore-Degrey association
- 6 Eakin-Rubber association
- 7 NEARLY LEVEL TO STEEP, CLAYEY SOILS ON PLAINS AND DISSECTED PLAINS
Opal-Pronise association
- 8 Sarsac-Opal association

*The units on this legend are described in the text under the heading "General Soil Map Units."

Compiled 1997

MAP FOUR

SECTIONALIZED TOWNSHIP																																		
6	5	4	3	2	1																													
7	8	9	10	11	12																													
18	17	16	15	14	13																													
19	20	21	22	23	24																													
30	29	28	27	26	25																													
31	32	33	34	35	36																													

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
In cooperation with
UNITED STATES DEPARTMENT OF INTERIOR
BUREAU OF INDIAN AFFAIRS
AND
SOUTH DAKOTA AGRICULTURAL EXPERIMENT STATION
GENERAL SOIL MAP
HYDE COUNTY, SOUTH DAKOTA

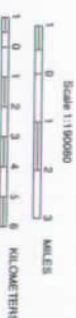
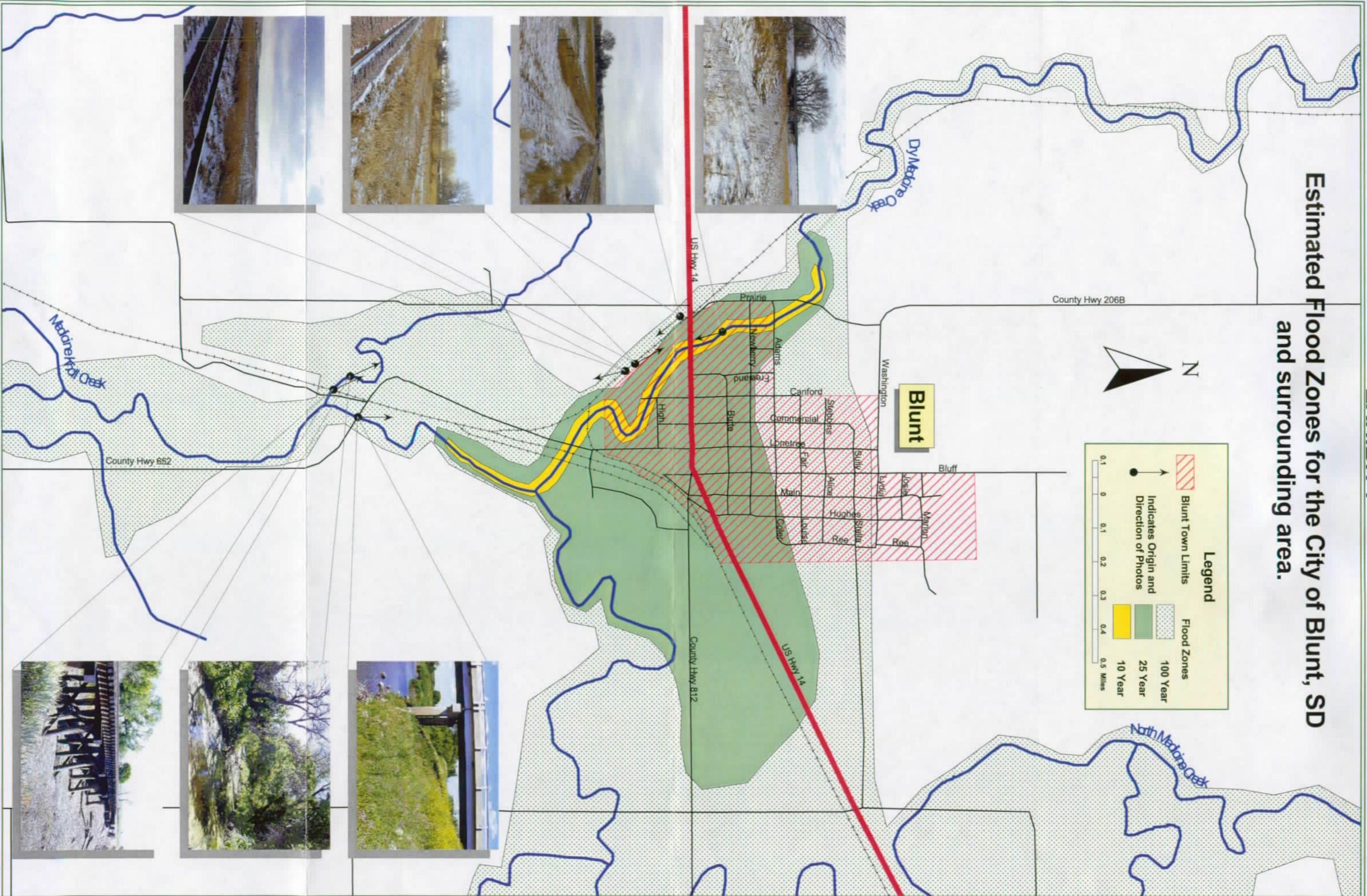
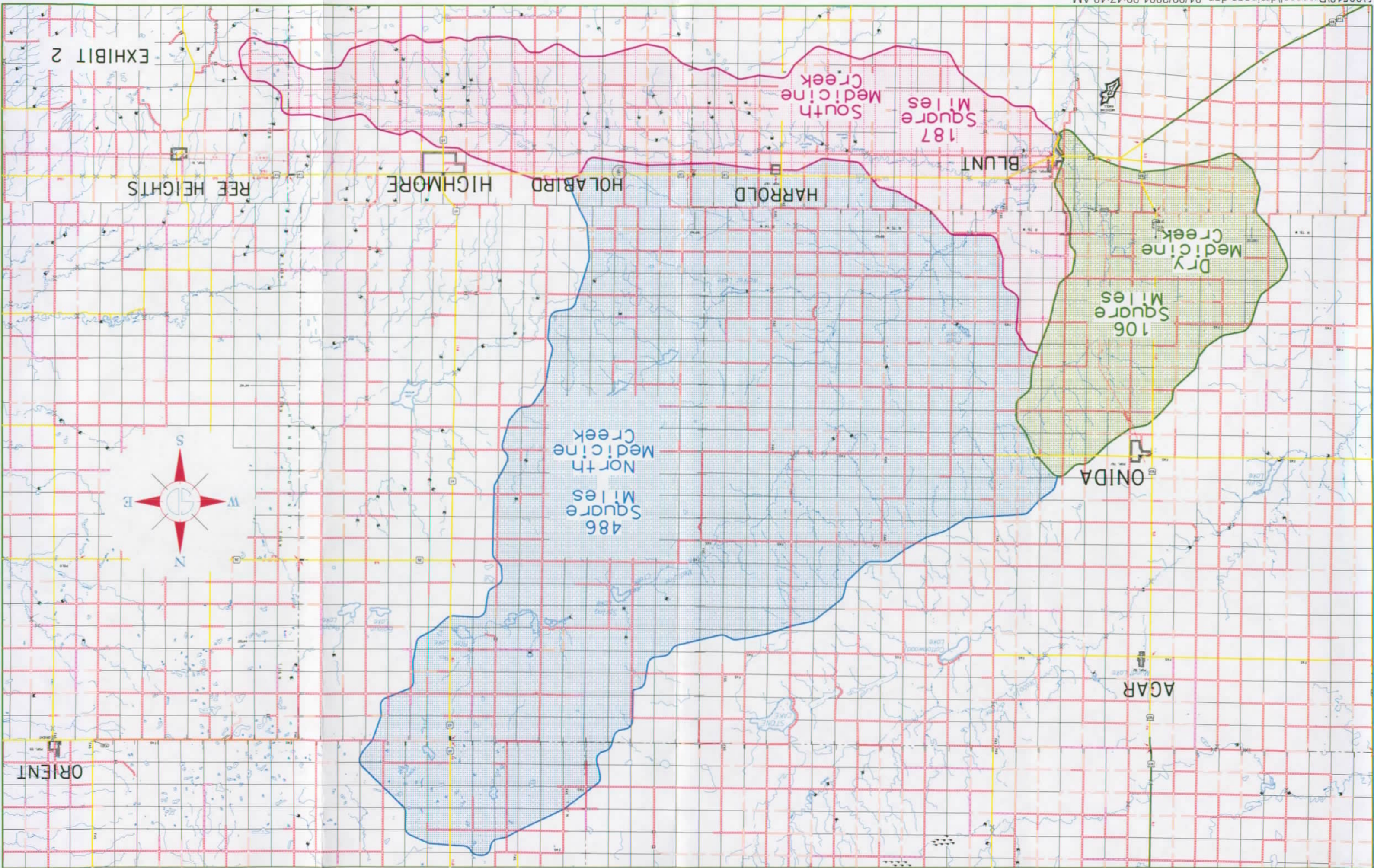


EXHIBIT I

Estimated Flood Zones for the City of Blunt, SD
and surrounding area.

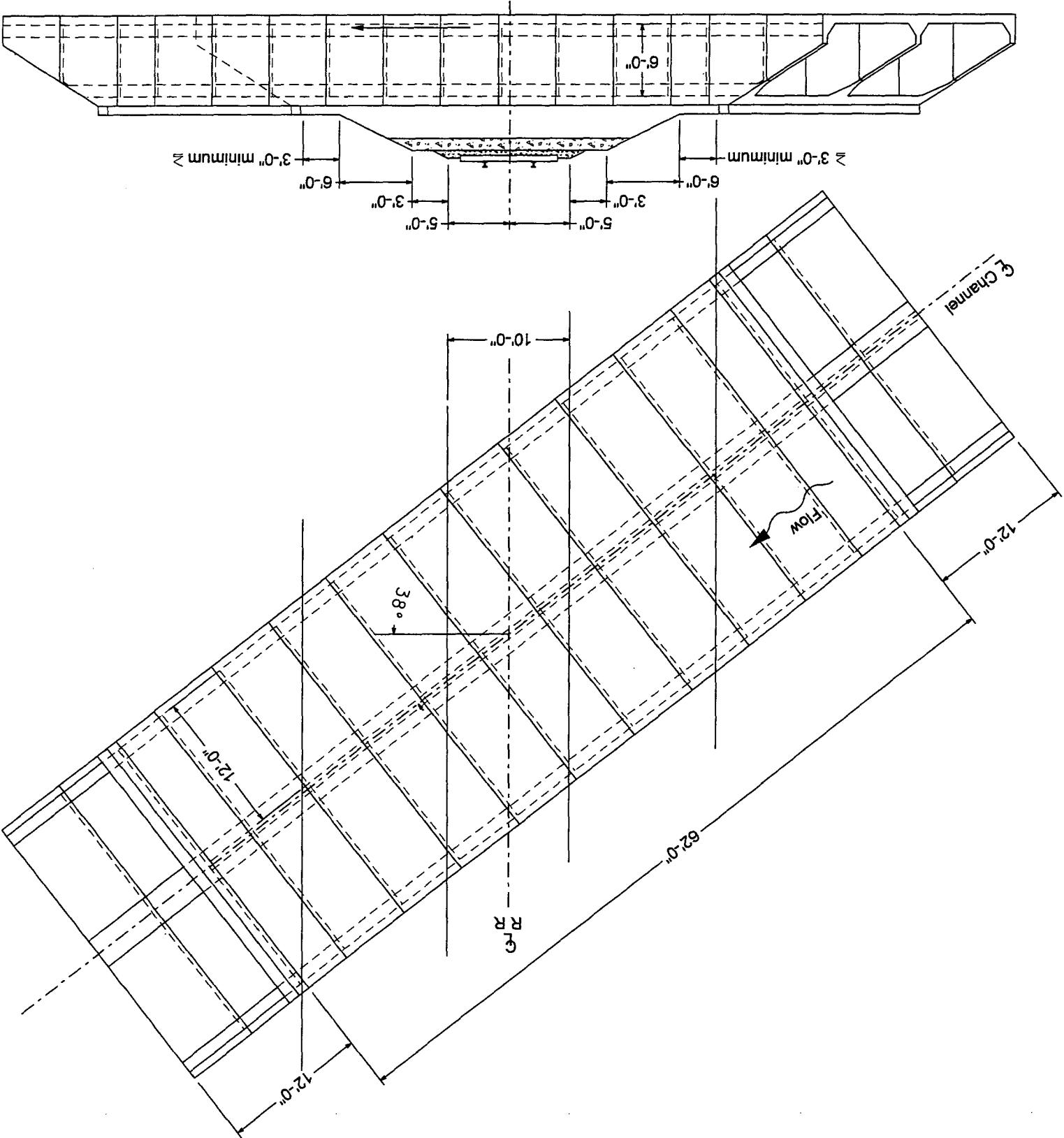






Cu. Yd.	6.2	Structure Excavation, Box Culvert
Cu. Yd.	200	Undercutting Box Culvert
Ton	~240	Riprap Class B
L.F.	62	Precast 2 - 12 X 6 Box Culvert Section - Furnish
L.F.	62	Precast 2 - 12 X 6 Box Culvert Section - Install
Each	2	Precast 2 - 12 X 6 Box Culvert End Section - Furnish
Each	2	Precast 2 - 12 X 6 Box Culvert End Section - Install
SqYd	~129	Drainage Fabric, Type B

- For payment, quantity is based on plan shown dimensions and will not be measured unless the Engineer orders a change.
- For estimating purposes only, a factor of 1.4 tons/cu.yd. was used to convert Cu. Yds. to Tons.
- Quantity is based on 9" Top and Bottom Slab and 8" walls
- * Dimensions may vary with installation and/or fabricator
- △ Based on assumed dimension shown
- ≥ Minimum dimension to satisfy clear zone



Qd	1426 cfs
Ad	144 sq. ft.
Vd	25 f.p.s.
Qf	N/A
Q100	3752 c.f.s.
Vmax	9.9 f.p.s.

HYDRAULIC DATA

Qd = Design discharge for the proposed culvert based on 25 year frequency, EI. 1618.6

Qf = Designated peak discharge for the basin approaching proposed project based on 25 year frequency.

Q100 = Computed discharge for the basin approaching proposed project based on 100 year frequency, EI. 1628.0

Vmax = Maximum computed outlet velocity for the proposed culvert, based on 25 year frequency.

DRAWING ONE

STATE OF SOUTH DAKOTA	City of Blunt	PROJECT NO.	SHEET TOTAL
Plotting Date: mm/dd/yy	Revised Date: mm/dd/yy	Initials: ss	

GENERAL DRAWING & QUANTITIES

FOR
TWIN - 12' X 6' BOX CULVERTS (PRECAST)
38° SKEW RHH

HUGHES COUNTY
S.D. DEPT. OF TRANSPORTATION

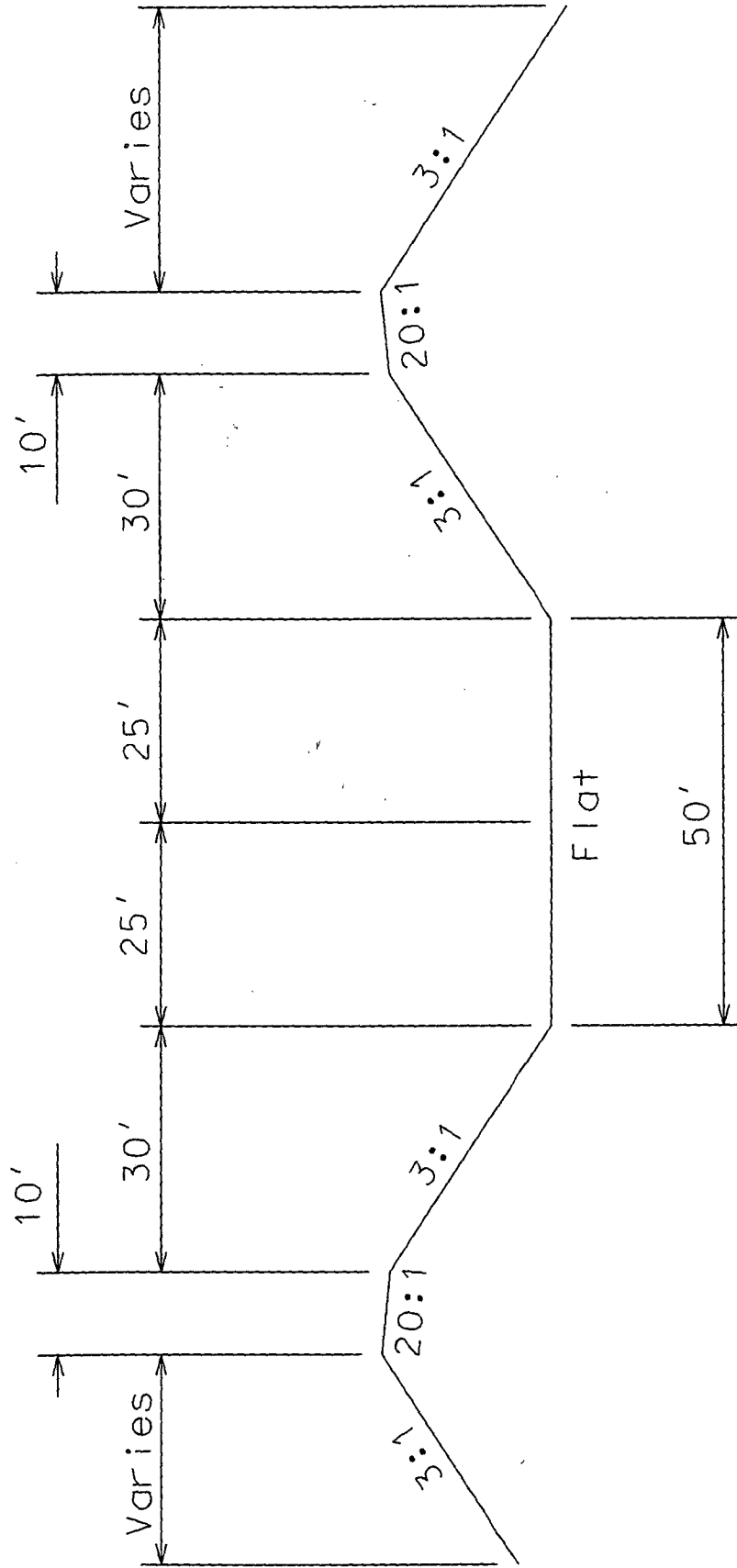
-X028-

JULY 2000

DESIGNED BY LS
DRAWN BY SS
CHECKED BY
APPROVED

8 of 11

Typical Section
Natural Grass Channel



Drawing 2

TABLE ONE
ENGINEERS CONSTRUCTION COST ESTIMATE
OVERFLOW CHANNEL AND BOX CULVERT STRUCTURES
NEAR BLUNT, SD

NO.	ITEM	UNIT	UNIT PRICE	AMOUNT	EXTENDED PRICE
1.	Excavation	CY	\$3.00	132,500	\$397,500.00*
2.	Type II Fencing	L.F.	1.00	6,000	6,000.00
3.	24" CMP F&I	L.F.	30.00	200	6,000.00
4.	Erosion Control/ Seeding	Acres	600.00	28	16,800.00
5.	New Railroad Structures - Double 12'x 6' Box Culvert				
	• Site A	Each	112,500.00	1	112,500.00
	• Site B	Each	71,400.00	1	71,400.00
6.	Easement/Land Acquisition	Each	500.00	28	14,000.00
7.	Flap Gates	Each	200.00	5	1,000.00
8.	Miscellaneous	L.S.	25,000.00	1	25,000.00
9.	Miscellaneous Railroad Repair	L.S.	15,000.00	1	<u>15,000.00</u>
	Cost of Structure and Materials				\$665,200.00
10.	Contingency (5% of Construction)				37,500.00
11.	Administration				15,000.00
12.	Design Engineering				44,000.00
13.	Construction Engineering				<u>44,000.00</u>
	Total Cost of Construction				\$805,700.00

*Material to be used to construct the earthen dike from Washington St. to US Hwy 14

BROSZ ENGINEERING, INC.

P.O. BOX 23

PIERRE, SD 57501

PHONE: (605) 224-1123**FAX: (605)224-0659****LETTER OF TRANSMITTAL**

Date: 10/27/2004 Job No.

Attention:

To: Don Stroup
Natural Resource Project Engineer
Water Rights
523 East Capital
Pierre, SD 57501

RE: Blunt Drainage Improvement Project

WE ARE SENDING YOU _____ Attached _____ Under separate cover via _____ the following items

_____ Shop Drawings _____ Prints _____ Plans _____ Samples _____ Specifications
_____ Copy of Letter _____ Change Order _____ Other _____

Copies	Date	No.	Description
1			HEC RAS Flowline elevations
6			Flood map of Blunt area
2			Easements obtained for Drainage Improvement

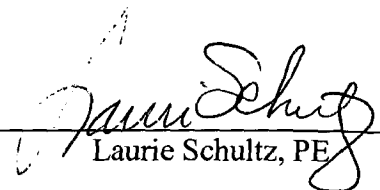
THESE ARE TRANSMITTED as checked below:

_____ For approval _____ Approved as submitted _____ Resubmit _____ copies for approval
_____ for your use _____ Approved as noted _____ Submit _____ copies for distribution
_____ As Requested _____ Returned for corrections _____ Return _____ corrected prints
_____ For review and comment _____ Other _____
_____ FOR BIDS DUE _____ 19 _____ PRINTS RETURNED AFTER LOAN TO US

Remarks: If you need any additional information, please let us know.

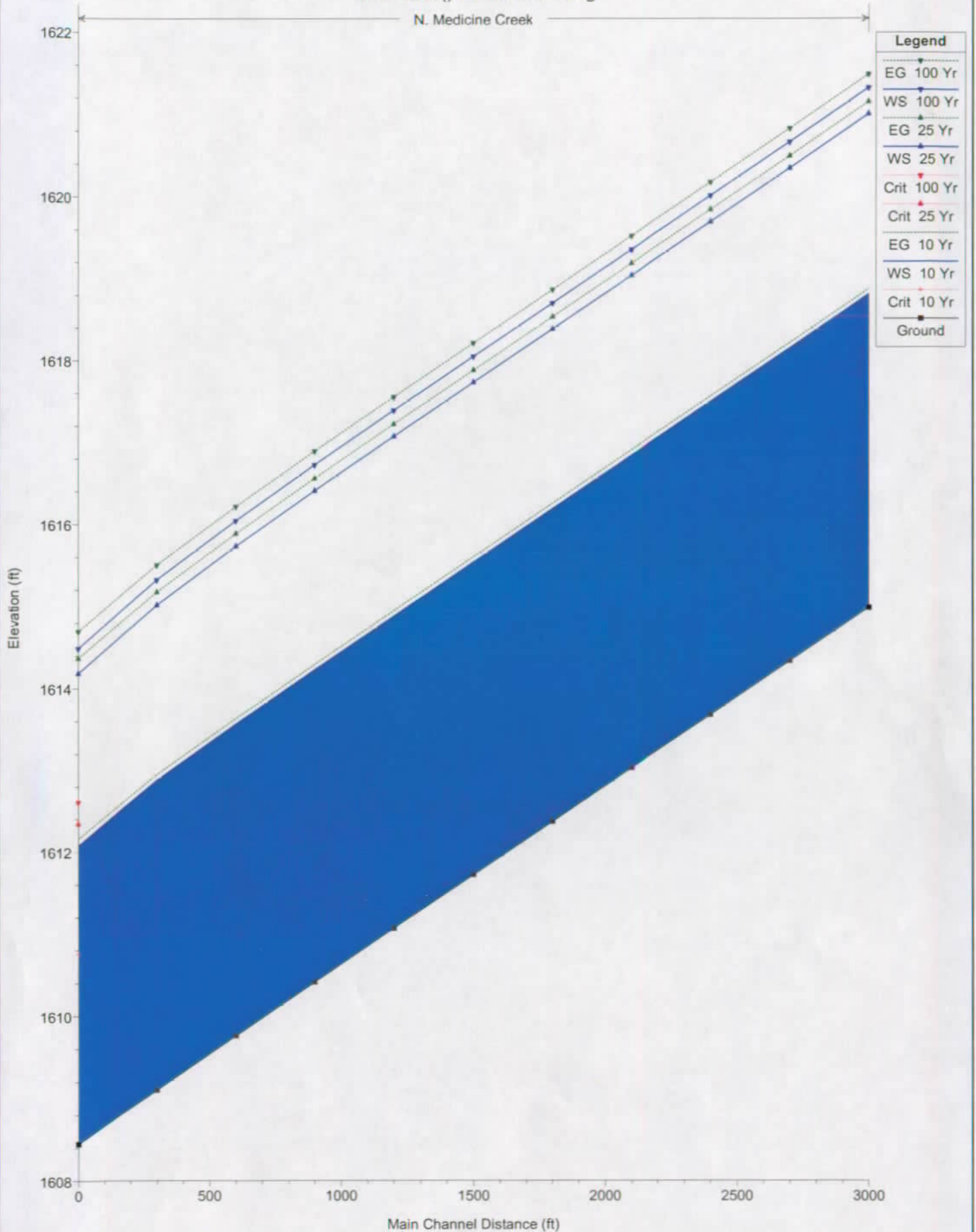
COPY TO: File

SIGNED: _____


Laurie Schultz, PE

BRF 6496() 10-27-04 existing

N. Medicine Creek



BRF 6496() Combined NEW 10-27-04

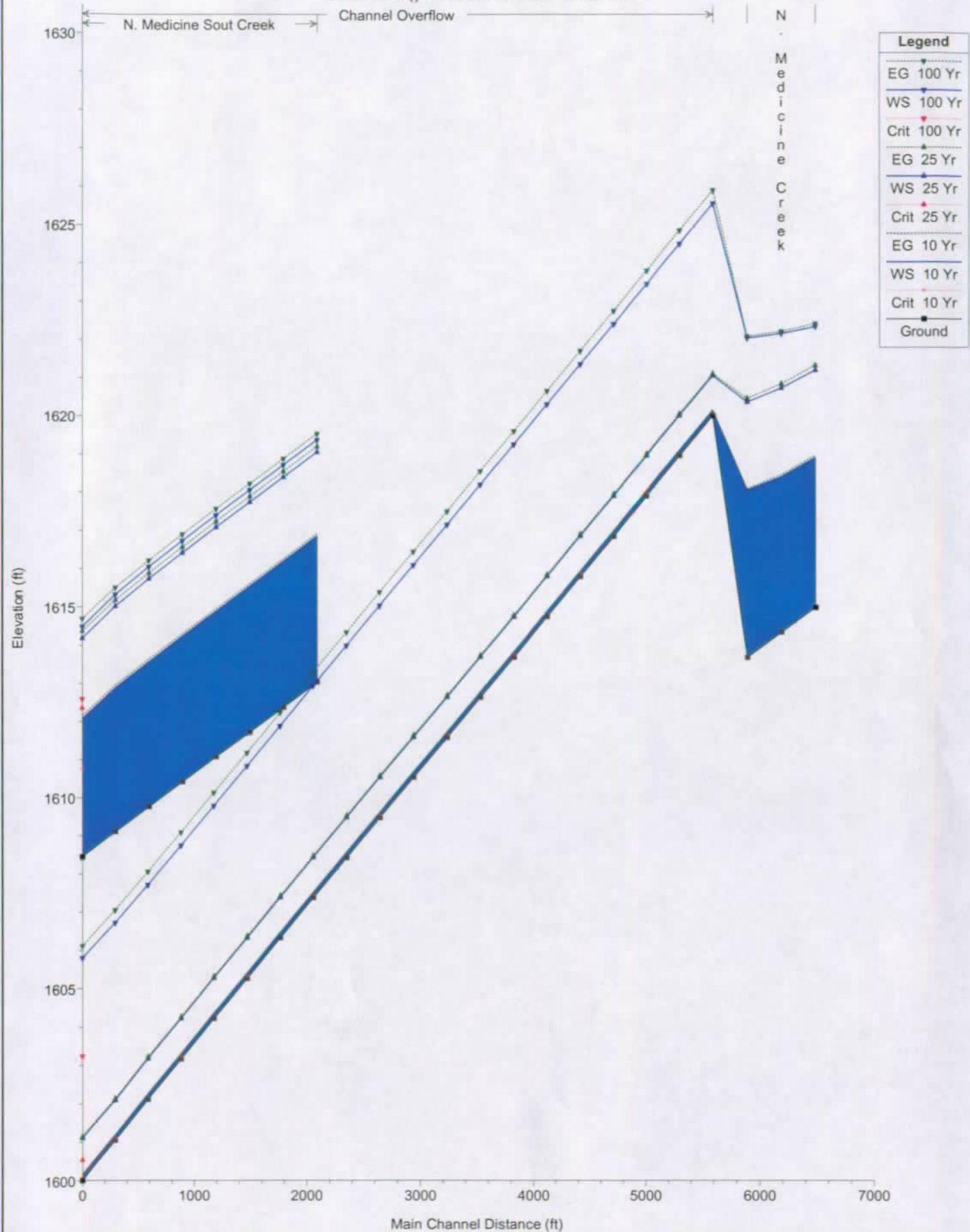
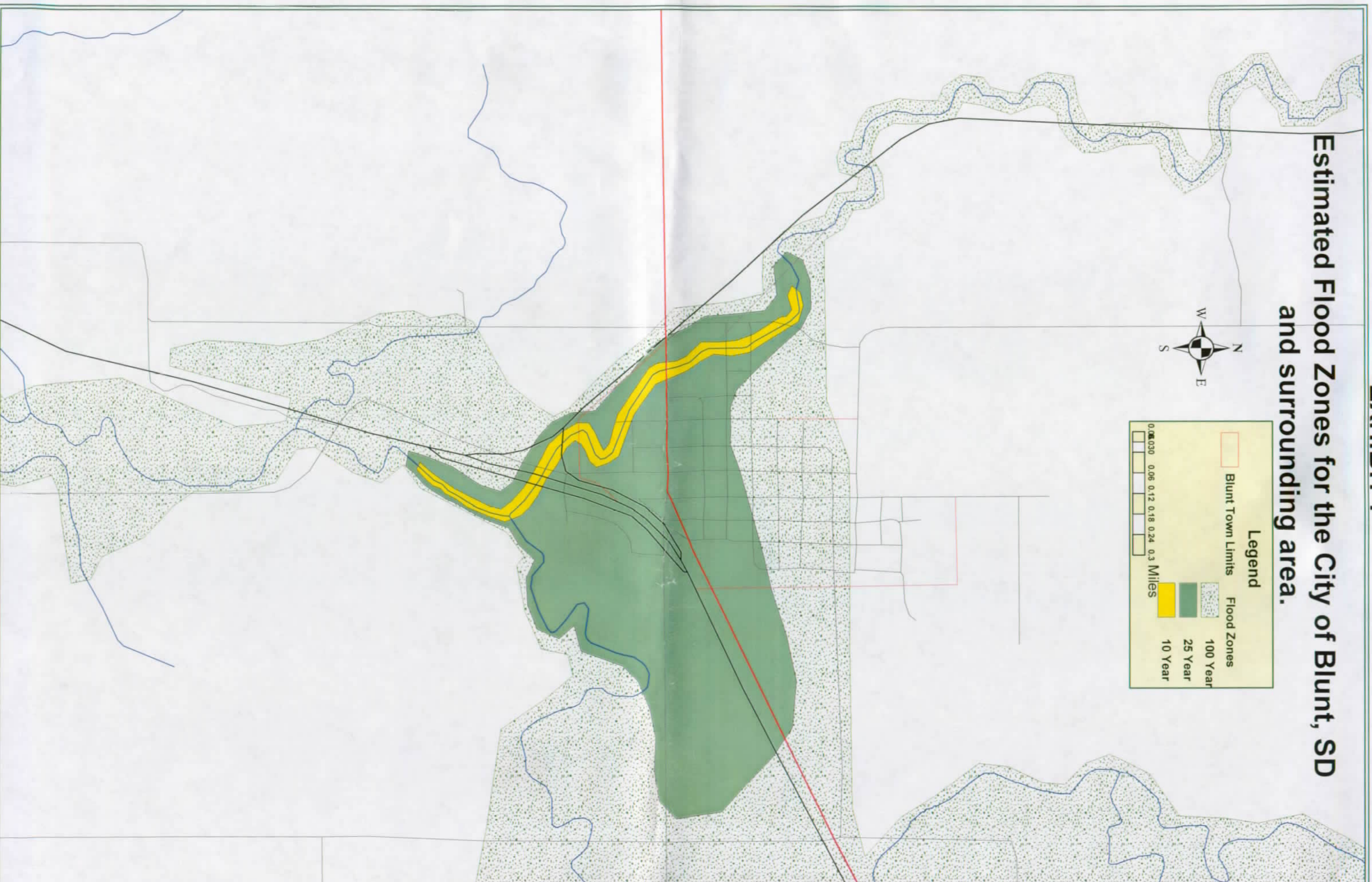


EXHIBIT I

Estimated Flood Zones for the City of Blunt, SD and surrounding area.



This agreement made and entered into this 7th day of October, 2004 by and between City of Blunt acting by and through the Blunt City Council, hereinafter referred to as CITY and Jim Ogan.

The CITY agrees to reimburse Jim Ogan for crop loss and fence repair caused by caused by flooding due to the flood diversion channel. The CITY agrees to clean flood debris from the field that was caused by flooding by the diversion channel.

This agreement will be in effect until the second Phase of the flood diversion project is completed.

In Witness Whereof, the parties hereto have caused this Agreement to be executed.

By: Dennis Larson
Dennis Larson, Mayor

By: Jim Ogan
Jim Ogan, Owner

Dawn M. Jassler
Notary Public

My Commission Expires: 10/28/2005



Prepared by:
Brosz Engineering, Inc.
Jason Hanson, PE
3030 Airport Rd., Ste. A
Pierre, SD 57501
(605) 224-1123

AGREEMENT FOR VOLUNTARY RIGHT OF WAY DONATION

PROJECT NO: CDEG 0103-106 CITY: Blunt PARCEL NO: D-1
This agreement made and entered into this day of , 20
by and between City of Blunt acting by and through the Blunt
City Council, hereinafter referred to as CITY, and Jim Ogan
whose postal address is 903 N Hughes, Blunt, SD 57522,
hereinafter referred to as DONOR.

WHEREAS, CITY needs the following easements for construction, operation
and maintenance of a flood diversion channel:

Perpetual Easement: For access to the diversion channel for the city
to perform maintenance, 10.03 Acres, See attached plan sheets. Sec 17 T112N
R76W

Temporary Easement: For access to the project for the contractor to
construct the diversion channel, 3.01 Acres See attached plan sheets. Sec 17
T112N R76W

NOW THEREFORE, DONOR understands his/her right to have an appraisal
prepared and his/her right to receive just compensation for the above
described perpetual and/or temporary easement in accordance with the Uniform
Relocation Assistance and Real Property Acquisition Act of 1970, as amended.
DONOR does hereby voluntarily grant and donate to CITY, for and in
consideration of \$1.00 and other good and valuable consideration, the adequacy
of which is hereby acknowledged by DONOR, the above described easements as
shown on the plans for construction of the above cited PROJECT. DONOR has the
right to mow the permanent easement. It will be the CITY's responsibility to
re-seed, riprap, clean flood debris, and maintain the channel for flood
purposes.

Stipulations of conditional donation:

If buried debris is discovered during construction, it will be removed
and not re-buried at the site. The hunting rights will remain with the
Property OWNER. Prior to accessing the Easement area for repairs,
maintenance, etc., the CITY will notify the Property OWNER.

DONOR agrees that the erection of fences, structures or obstacles within
the perpetual easement will not be permitted.

DONOR grants permission to CITY or CITY'S agent to enter upon above
described easement upon approval of this AGREEMENT.

The perpetual easement shall be in effect until the flood diversion
channel is abandoned by proper action of the Blunt City
Council and the temporary easement shall be in effect until construction of
the project is completed.

Prepared by:
Brosz Engineering, Inc.
Jason Hanson, PE
3030 Airport Rd., Ste. A
Pierre, SD 57501
(605) 224-1123

AGREEMENT FOR VOLUNTARY RIGHT OF WAY DONATION

PROJECT NO: CDEG 0103-106 CITY: Blunt PARCEL NO: D-1
This agreement made and entered into this day of 20
by and between City of Blunt acting by and through the Blunt
City Council, hereinafter referred to as CITY, and Jim Ogan
whose postal address is 903 N Hughes, Blunt, SD 57522
hereinafter referred to as DONOR.

WHEREAS, CITY needs the following easements for construction, operation and maintenance of a flood diversion channel:

Perpetual Easement: For access to the diversion channel for the city to perform maintenance, 10.08 Acres, See attached plan sheets, Sec 17 T112N R76W

Temporary Easement: For access to the project for the contractor to construct the diversion channel, 2.01 Acres, See attached plan sheets, Sec 17 T112N R76W

NOW THEREFORE, DONOR understands his/her right to have an appraisal prepared and his/her right to receive just compensation for the above described perpetual and/or temporary easement in accordance with the Uniform Relocation Assistance and Real Property Acquisition Act of 1970, as amended. DONOR does hereby voluntarily grant and donate to CITY, for and in consideration of \$1.00 and other good and valuable consideration, the adequacy of which is hereby acknowledged by DONOR, the above described easements as shown on the plans for construction of the above cited PROJECT. DONOR has the right to mow the permanent easement. It will be the CITY's responsibility to re-seed, riprap, clean flood debris, and maintain the channel for flood purposes.

Stipulations of conditional donation:

If buried debris is discovered during construction, it will be removed and not re-buried at the site. The hunting rights will remain with the Property OWNER. Prior to accessing the Easement area for repairs, maintenance, etc., the CITY will notify the Property OWNER.

DONOR agrees that the erection of fences, structures or obstacles within the perpetual easement will not be permitted.

DONOR grants permission to CITY or CITY'S agent to enter upon above described easement upon approval of this AGREEMENT.

The perpetual easement shall be in effect until the flood diversion channel is abandoned by proper action of the Blunt City Council and the temporary easement shall be in effect until construction of the project is completed.

IN WITNESS WHEREOF, the parties hereto have caused this AGREEMENT to be executed.

Attest: Wawn Hoxer
City Finance Office

By: Jim Ogan
Donor

By: [Signature]
Chairman of City Council

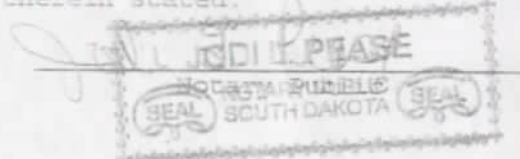
By: Norma Ogan
Donor

STATE OF South Dakota
CITY OF Verde

On this 24th day of March in the year of 2004
before me, Joel Reed a Notary Public within
and for said City and State, personally appeared

- Jim Ogan known to me to be the person(s)
described in and who executed the foregoing instrument and acknowledged to
me that
he executed the same for the purpose therein stated.

My Commission Expires: January 18, 2008



DM&E

DAKOTA, MINNESOTA & EASTERN RAILROAD

P.O. Box 1260-57101
140 N. Phillips-57104
Sioux Falls, SD
(605) 782-1200 Phone
(605) 782-1299 Fax

September 11, 2003

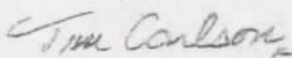
John Irvine
City of Blunt
PO Box 127
Blunt, SD 57522

Dear Mr. Irvine:

Enclosed please find two copies of License Agreement #091103, with attached print covering 2 - 12' x 6' box culverts located near MP 114.47, Blunt, SD. Please sign both copies and return for final execution. We will provide a copy for your records.

Please contact me at (605) 782-1556 if you have any questions.

Sincerely,



Tim Carlson
Manager Real Estate & Public Works
DM&E Railroad

Enclosures

LICENSE AGREEMENT #091103

DAKOTA, MINNESOTA & EASTERN RAILROAD CORPORATION, hereinafter referred to as "Company", hereby licenses CITY OF BLUNT, hereinafter referred to as "Licensee", subject to the terms and conditions hereinafter set forth, to construct, install, maintain and use 2 - 12'x6' box culverts, hereinafter referred to as "Facility", upon and across the right-of-way and property and under or over the tracks of the Company on the Onida Subdivision near MP 114.47, Blunt, SD pursuant to request of the Licensee and in accordance with the plan and in the location shown in yellow on map dated September 11, 2003, attached hereto, made a part hereof, for the sole purpose of drainage of storm water.

The Company may, at its option and without liability to the Licensee, revoke this license at any time by giving written notice thereof to the Licensee if the Licensee shall violate or breach any of the following terms and conditions:

1. The Licensee will procure all necessary public authority for the construction, installation, maintenance and use of said Facility and use said Facility in conformity with all requirements of public authority.
2. The Licensee will pay all taxes and assessments that may be levied or assessed against said Facility.
- 3(a). Said Facility shall be constructed, installed and maintained by and at the expense of the Licensee, in a manner satisfactory to the Company.
- 3(b). The Company shall have the right at any time to judge the necessity of repairs to said Facility. The Licensee will, within ten (10) days after written notice, make all necessary repairs at its expense.
- 3(c). If, at any time the Company judges it necessary to change the location, elevation or method of construction or installation of said Facility, the Licensee will do so at its sole expense.
4. Right of entry will be granted by the Company's representative upon request from the Licensee or its contractor after the Company has received a copy of the Railroad Protective Liability Insurance Certificate from the Licensee or its contractor and has notified the Licensee or its contractor of approval for said insurance. Said insurance limits shall be \$6,000,000.00 aggregate limit and \$2,000,000.00 each occurrence.
5. The Licensee agrees to pay the Company \$15.00 per protective train order, per day, issued by Company, for each train passing through or affected by said construction area when work performed by Licensee or its contractor is within scope stated herewith:
 - A. Men, equipment, material, structures or any other obstructions are placed within 25 feet laterally of the centerline of track;
 - B. Men, equipment, material, structures or any other obstructions working or placed at any distance vertically from top of rail of said track, within 50 feet laterally of the centerline of said track;
 - C. Protective train orders shall be issued until completion of construction to the satisfaction of Company's Engineering Department.
 - D. Work outside of 25 feet from track centerline will be covered by protective train order.
6. The Licensee or its contractor agrees to pay the Company the actual costs of flagging services

work performed by the Company in manner stated herewith:

- A. Flagging services performed per day - \$300.00 or actual expenses, incurred by Licensee;
 - B. Flagging services required when men, equipment, material, structures or any other obstructions are placed within 25 feet laterally of the centerline of track;
 - C. Flagging services required when men, equipment, material, structures or any other obstructions are working or placed at any distance vertically from top of rail of said track within 50 feet laterally of the centerline of said track; and
 - D. Flagging services are required on days of active construction by Industry or others at said location.
7. The Licensee or its contractor agrees to notify the Engineering Department of the Company (605-782-1551) 48 hours prior to commencing any work on Company right-of-way.
8. In case of an emergency call 1-800-658-3551. A copy of this agreement must be in the contractor's possession while performing work on job site and the contractor must be prepared to produce it upon proper demand. No work will be permitted if a copy is not available upon demand.
9. The Licensee assumes and agrees to protect, indemnify and hold harmless the Company, its officers, agents, employees, invitees and other licensees, from and against any and all claims, demands, suits, liability and expense by reason of loss or damage to any property whatsoever or injury to or death of any person whomsoever, from any cause whatsoever, arising or growing direct or indirectly out of said Facility.
10. This License is personal to the Licensee and is not assignable or transferable without the written consent of the Company.
11. For the privileges herein permitted, the Licensee shall pay to the Company a fee of Zero Dollars and no/100 (\$0.00).

IN WITNESS WHEREOF, this instrument is executed at Sioux Falls, South Dakota this _____ day of _____, 2003.

ATTEST:

DAKOTA, MINNESOTA & EASTERN
RAILROAD CORPORATION

By: _____
Chief Engineer

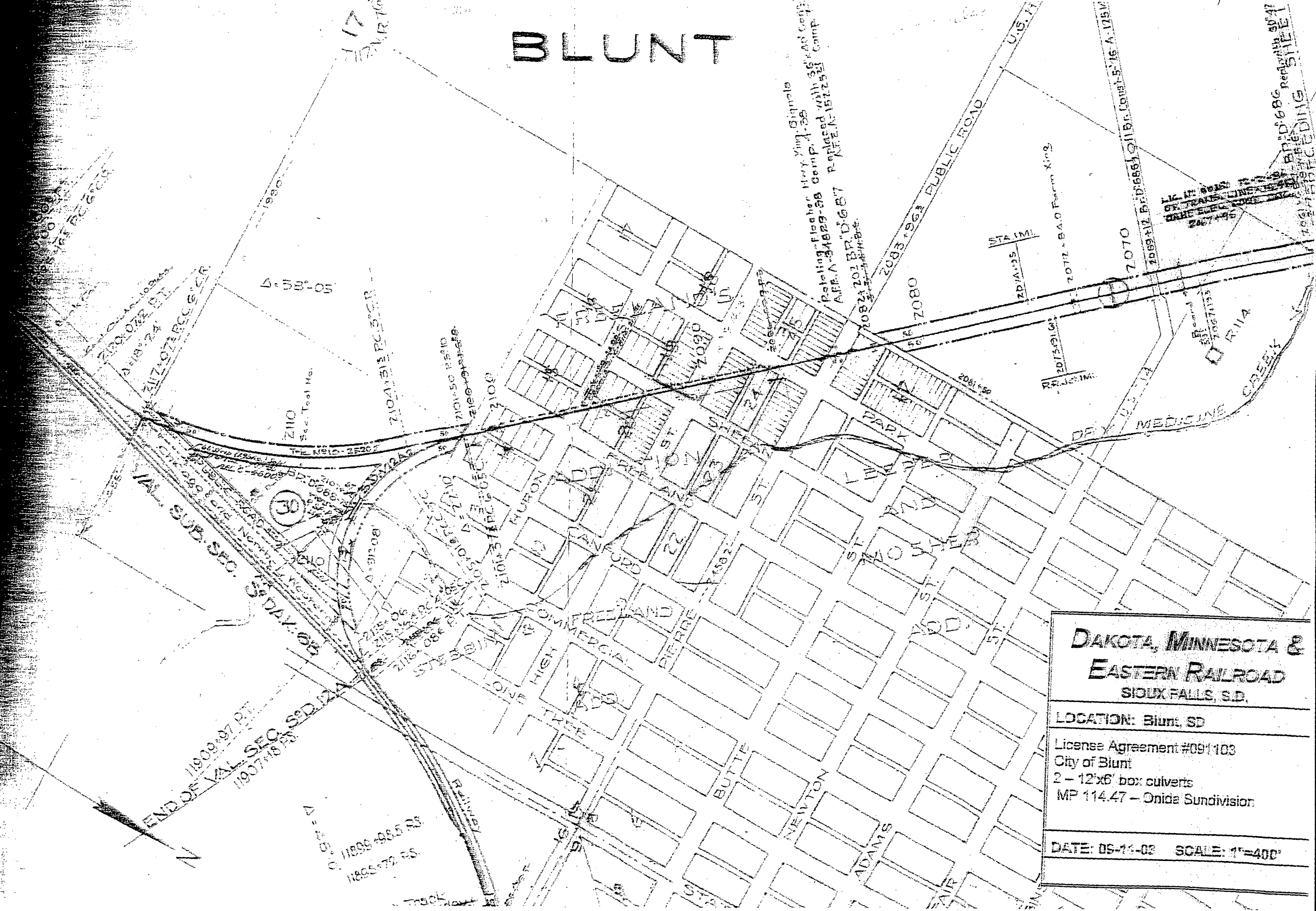
The undersigned, the Licensee mentioned in the foregoing License, ACCEPTS the same subject to the terms and conditions therein stated.

ATTEST:

CITY OF BLUNT

By: _____
Title: _____

BLUNT



DAKOTA, MINNESOTA & EASTERN RAILROAD SIOUX FALLS, S.D.

LOCATION: Blunt, SD

License Agreement #091103
City of Blunt
2 - 12'x6' box culverts
MP 114.47 - Onida Subdivision

DATE: 09-16-03 SCALE: 1"=400'

Prepared by:
Brosz Engineering, Inc.
Jason Hanson, PE
3030 Airport Rd., Ste. A
Pierre, SD 57501
(605) 224-1123

AGREEMENT FOR VOLUNTARY RIGHT OF WAY DONATION

PROJECT NO: CDBG 0103-106 CITY: Blunt PARCEL NO: D-2

This agreement made and entered into this _____ day of _____, 20____ by and between City of Blunt acting by and through the _____ Blunt City Council, hereinafter referred to as CITY, and Dwight Small, whose postal address is 105 S Canford Ave, Blunt, SD 57522, hereinafter referred to as DONOR.

WHEREAS, CITY needs the following easements for construction, operation and maintenance of a flood diversion channel:

Perpetual Easement: For access to the diversion channel for the city to perform maintenance, 0.87 Acres, See attached plan sheets. Sec 17 T112N R76W

Temporary Easement: For access to the project for the contractor to construct the diversion channel, 2.27 Acres, See attached plan sheets. Sec 17 T112N R76W

NOW THEREFORE, DONOR understands his/her right to have an appraisal prepared and his/her right to receive just compensation for the above described perpetual and/or temporary easement in accordance with the Uniform Relocation Assistance and Real Property Acquisition Act of 1970, as amended. DONOR does hereby voluntarily grant and donate to CITY, for and in consideration of \$1.00 and other good and valuable consideration, the adequacy of which is hereby acknowledged by DONOR, the above described easements as shown on the plans for construction of the above cited PROJECT. DONOR has the right to mow the permanent easement. It will be the CITY's responsibility to re-seed, riprap, clean flood debris, and maintain the flood diversion channel for flood purposes.

Stipulations of conditional donation:

If buried debris is discovered during construction, it will be removed and not re-buried at the site. The hunting rights will remain with the Property OWNER. Prior to accessing the Easement area for repairs, maintenance, etc., the CITY will notify the Property OWNER.

DONOR agrees that the erection of fences, structures or obstacles within the perpetual easement will not be permitted.

DONOR grants permission to CITY or CITY'S agent to enter upon above described easement upon approval of this AGREEMENT.

The perpetual easement shall be in effect until the flood diversion channel is abandoned by proper action of the Blunt City Council and the temporary easement shall be in effect until construction of the project is completed.

IN WITNESS WHEREOF, the parties hereto have caused this AGREEMENT to be executed.

Attest: Alan Barker
City Finance Office

By: Dwight Small
Donor

By: [Signature]
Chairman of City Council

By: _____
Donor

STATE OF South Dakota
CITY OF Deer

On this 25th day of March in the year of 2004, before me, Jodi Pease, a Notary Public within and for said City and State, personally appeared Dwight Small

known to me to be the person(s) described in and who executed the foregoing instrument and acknowledged to me that he executed the same for the purpose therein stated.

My Commission Expires: January 18, 2008



RECEIVED

JAN 21 2005

WATER RIGHTS
PROGRAM

FLOOD EASEMENT

This agreement made and entered into this 14th day of January, 2005 by and between the City of Blunt, South Dakota, acting by and through the Blunt City Council, hereinafter referred to as CITY and Jim and Norma Ogan, whose postal address is 903 N Hughes, Blunt, SD 57522, hereinafter referred to as DONOR.

WHEREAS, CITY needs the following easement for maintenance and operation of a flood diversion channel south of Blunt and west of the DM&E Railroad and the County Road in Sec 17 T112N R76W:

Perpetual Easement: The easement is for access to the diversion channel for the CITY to perform maintenance, and for flooding diversion purposes. The diversion channel will be flooded by the 25 year and higher flood event. The Channel Area is approximately 19.9 acres.

The DONOR has the right to mow and hay the diversion channel easement. It will be the CITY's responsibility to re-seed, riprap, clean flood debris and maintain the channel for flood purposes. Prior to accessing the easement area for repairs and maintenance, the CITY will notify DONOR. DONOR agrees that the erection of fences, structures or obstacles within the perpetual easement will not be permitted.

The CITY will pay DONOR for any damage to crops in the area due to flooding prior to the completion of Phase 2 of the drainage improvement project. Phase 2 is the installation of a drainage structure under the DM&E Railroad tracks south of the drainage channel.

The area effected includes (All in Sec 17 T112N R76W):

W $\frac{1}{2}$ NW $\frac{1}{4}$ NE $\frac{1}{4}$

SE $\frac{1}{4}$ NW $\frac{1}{4}$ NE $\frac{1}{4}$

NE $\frac{1}{4}$ SW $\frac{1}{4}$ NE $\frac{1}{4}$

W $\frac{1}{2}$ SE $\frac{1}{4}$ NE $\frac{1}{4}$

W $\frac{1}{2}$ NE $\frac{1}{4}$ SE $\frac{1}{4}$

S $\frac{1}{2}$ NW $\frac{1}{4}$ SE $\frac{1}{4}$

N $\frac{1}{2}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$

The perpetual easement shall be in effect until the flood diversion channel is abandoned by proper action of the Blunt City Council.

DONOR does hereby voluntarily grant and donate to CITY for and in consideration of \$1.00 and other good and valuable consideration, the easements as stated above.

By: Dennis Larson
Dennis Larson, Mayor

By: Jim Ogan
Owner

By: _____
Owner

Don M. Jassler
Notary Public

My Commission Expires: 10/28/2005

**Medicine Knoll Creek Drainage
FLOOD CONTROL PROJECT FC-33
City of Blunt, SD
PO Box 127
Blunt, SD 57522-0127
(605)962-6262**

Since 1983, a flood control permit has been required pursuant to South Dakota Codified Law (SDCL) 46-2A-11 and 46-5-47 for facilities constructed on a watercourse, other than a dry draw, to control flooding. According to these statutes, a flood control permit may only be issued if the project will reduce the damage from flooding or erosion in the area proposed to be benefited, the project will not increase the likelihood or the severity for flood damages in areas other than the project area or the area proposed to be benefited, the project will not endanger human life or property and the project will not impair existing rights, except to the extent that such rights are extinguished or compensated through agreement or exercise of the power of eminent domain.

Flood Control Project Application FC-33, City of Blunt, SD, proposes to divert 25-year or greater flood flows of Medicine Knoll Creek and contributing drainages to prevent inundation of portions of the city. The main construction for the proposed project will be in the E½ of Section 17 T112N R76W, Hughes County, SD.

Area Topography and Historical Flooding

The City of Blunt is located in north central Hughes County, SD near the convergence of three drainages. To the east-northeast of the city the South Fork of Medicine Knoll Creek converges with the main branch of the stream for a combined drainage area of approximately 673 square miles. Immediately south of the city, a dry wash draining an area of approximately 106 square miles converges with Medicine Knoll Creek. (Attachment 1)

The general soil types in the area consists of well to excessively drained loam on rolling to steep land and poorly drained soils with a clay pan in the alluvium on flatter bottom land. Flooding occurs in the relatively flat bottom land where water tends to pool and deepen as flow velocities lessen. Coincidental high water flows in the dry wash and Medicine Knoll Creek worsen the pooling and deepening of water in the bottom land.

In 1991, 1994, 1997, and 1999 the City of Blunt underwent severe storm water related flooding. Rainfall from heavy, intense, short term events, and long duration events have caused flooding within major portions of the city. A short, intense thunderstorm in 1999 with reported 7-inches of rainfall within the dry wash drainage caused severe flooding throughout the central and southern portions of the city.

Project Scope

The hydrologic and hydraulic analyses of channel capacities and in-place structures were completed in 2000 by Brosz Engineering, Inc. Pierre, SD. In conjunction with these analyses the peak flow capacities for 10, 25, and 100-year flood events were calculated using the U.S. Army Corp of Engineers (USACE) HEC-RAS computer software. The USACE HEC-RAS computer software system calculates one-dimensional water surface cross-sectional profiles for steady, unsteady, and gradually varied flows for a full network of natural and constructed channels. The HEC-RAS computer software program is recognized and accepted in the public and private sectors for hydrologic analysis. The primary purposes of the analyses and study were to evaluate the drainages and runoff paths to the north and west of Blunt.

The pre-flood control project HEC-RAS estimated 100 and 25-year events flood zones in the Blunt, SD area are shown in Attachment 2.

Hydrologic & Geotechnical Analyses

From 1950 to 1990 the U.S Geological Survey (USGS) maintained a stream flow gage on the main branch of Medicine Knoll Creek approximately 9 stream miles above Blunt, SD. The main branch of Medicine Knoll Creek drains approximately 486 square miles above the confluence with the South Branch of the stream. (Attachment 1) From 1950 to 1990 there was no stream flow recorded about 70-percent of the time at this location and the maximum flow recorded by the gage was 1800-cubic feet per second (cfs). Constructing a duration curve from the gage data for the 40-year period and plotting probability as a function of flow shows a hundred year event, 1-percent probability of occurrence, to be about 85-cfs at the gage location. (Graph 1) The probability analysis of this USGS gage data does not include the years 1991, 1994, 1997, and 1999 when the City of Blunt experienced flooding events, nor takes into consideration coinciding high intensity events within the dry wash and South Branch drainages. Brosz Engineering, Inc. elected to use the USGS method for estimating peak flows to determine design values used in the HEC-RAS analysis. The USGS estimated peak flows for the dry wash and Medicine Knoll Creek are presented in Table 1.

**Graph 1. Medicine Knoll Creek
1950-1990**

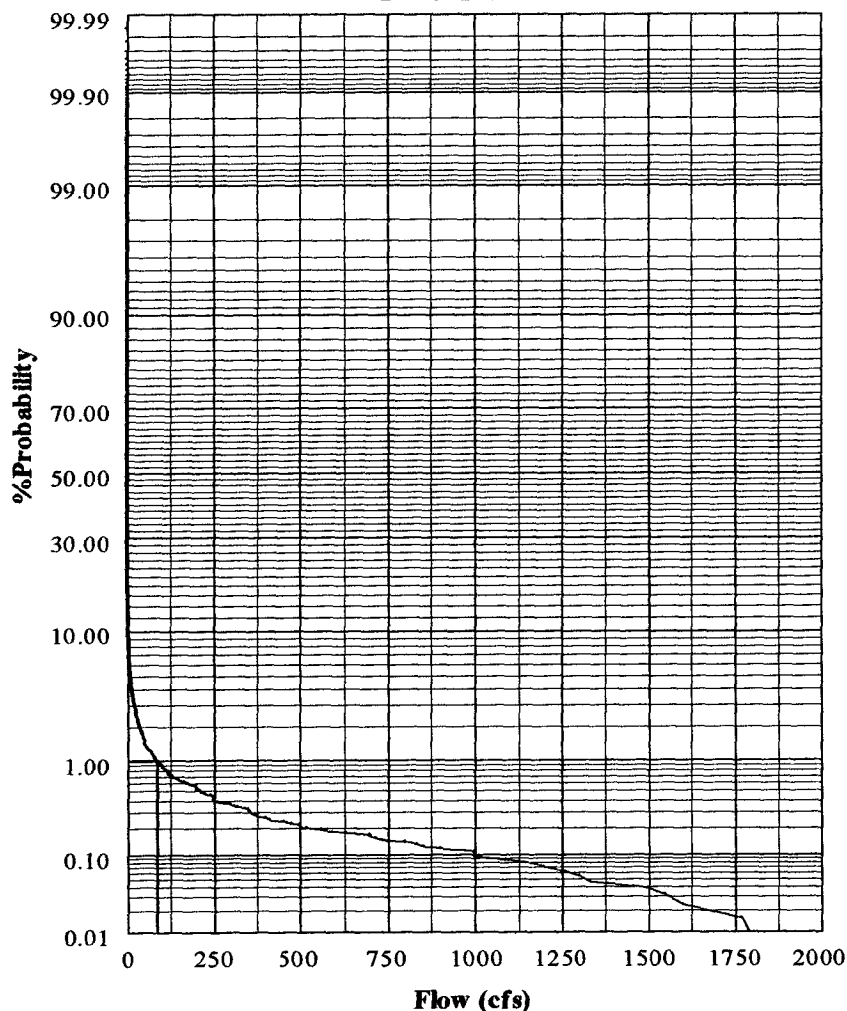


Table 1. USGS Estimated Peak Flows (cfs)

Source	Recurrence Interval (Years)						
	2	5	10	25	50	100	500
Dry Wash	102	446	912	1872	2888	4198	8515
Medicine Knoll Cr. (North)	188	940	2042	4447	7096	10611	22687
South Branch Medicine Knoll Cr.	129	590	1233	2587	4042	5937	12284

The analyses and study completed by Brosz Engineering, Inc. included recommended improvements to include channel cleaning and widening, redirection of 25-year or greater event flood flows , and removing high flood flow restrictors by increasing the capacities of culverts or modifications to bridges in the runoff path.

In addition, Hughes County completed an evaluation of the hydraulic capacity of a bridge over Medicine Knoll Creek south of Blunt. This bridge and roadway experienced damage from the previously cited flood events. The hydraulic analysis determined that this structure would restrict a 25-year or greater flood event. This bridge has been replaced by Hughes County.

Flood Control Project

A system has been constructed that will take those flows in the dry wash greater than a 25-year flood event and redirect them away from the original dry wash waterway into a diversion channel away from the central and southern portions of the City of Blunt (Attachment 3). This system will cause flooding of private lands that would not have previously occurred at this level of flooding. The City of Blunt has obtained the required easements from land owners affected by this phase of the project.

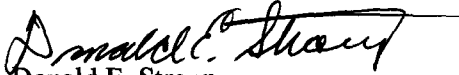
A dike is planned during the next phase of the project along the eastern edge of the dry wash north of Highway 14 (Attachment 3). HEC-RAS analysis to predict the water surface profiles will be completed so that easements for projected flooding of any private lands can be obtained before construction of this dike begins.

The completed and projected phases of this Flood Control Project should not change the flooding of lands that has previously occurred as flows approach the level of a 100-year flood event.

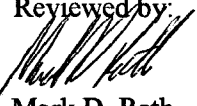
Conclusions

1. Consideration of this Flood Control Permit has been evaluated on criteria pertaining to this proposed project's future impacts on the conditions outlined in SDCL 46-2A-11 and not how previous flood flows have impacted the area.
2. The City of Blunt, SD and their contractors used software programs, analyses procedures, and quality assurance procedures recognized and accepted in the public and private sectors to produce geotechnical and hydrologic data for the design of this project.
3. So far, design data show the project will reduce the damage from flooding or erosion in the area proposed to be benefited, the project will not increase the likelihood or the severity for flood damages in areas other than the project area or the area proposed to be benefited, the project will not endanger human life or property, nor impair existing rights except to the extent that such rights are compensated through agreement.

4. When finalized, the designs for the next phase(s) of the project, any design engineering change notices (ECN), water surface elevation or other calculations and software calibration data pertaining to future construction should be reviewed by the Chief Engineer or his representative before work is implemented.


Donald E. Stroup
Natural Resources Project Engineer
DENR Water Rights Program

Reviewed by:


Mark D. Rath
Natural Resources Engineering Specialist
DENR Water Rights Program

References:

Techniques for Estimating Peak-Flow Magnitude and Frequency Relations for South Dakota, Steven K. Sando, US Dept. of Interior Geological Survey Water Resources Investigations Report 98-4055

South Dakota Department of Environment and Natural Resources, Water Rights Program Records

USGS National NWISWeb Water Information System, Historical Stream Flow for South Dakota

Applied Hydrogeology (Third Edition), C.W. Fetter, Macmillan College Publishing Co., 1994

PSI-Plot 7.5, Poly Software International[®]

Medicine Knoll Creek Drainage
Flood Control Project FC-33
City of Blunt, SD 57522-0127
(605)962-6262

USGS
Gaging Station

South Fork Medicine Knoll Creek

Dry Wash
Blunt

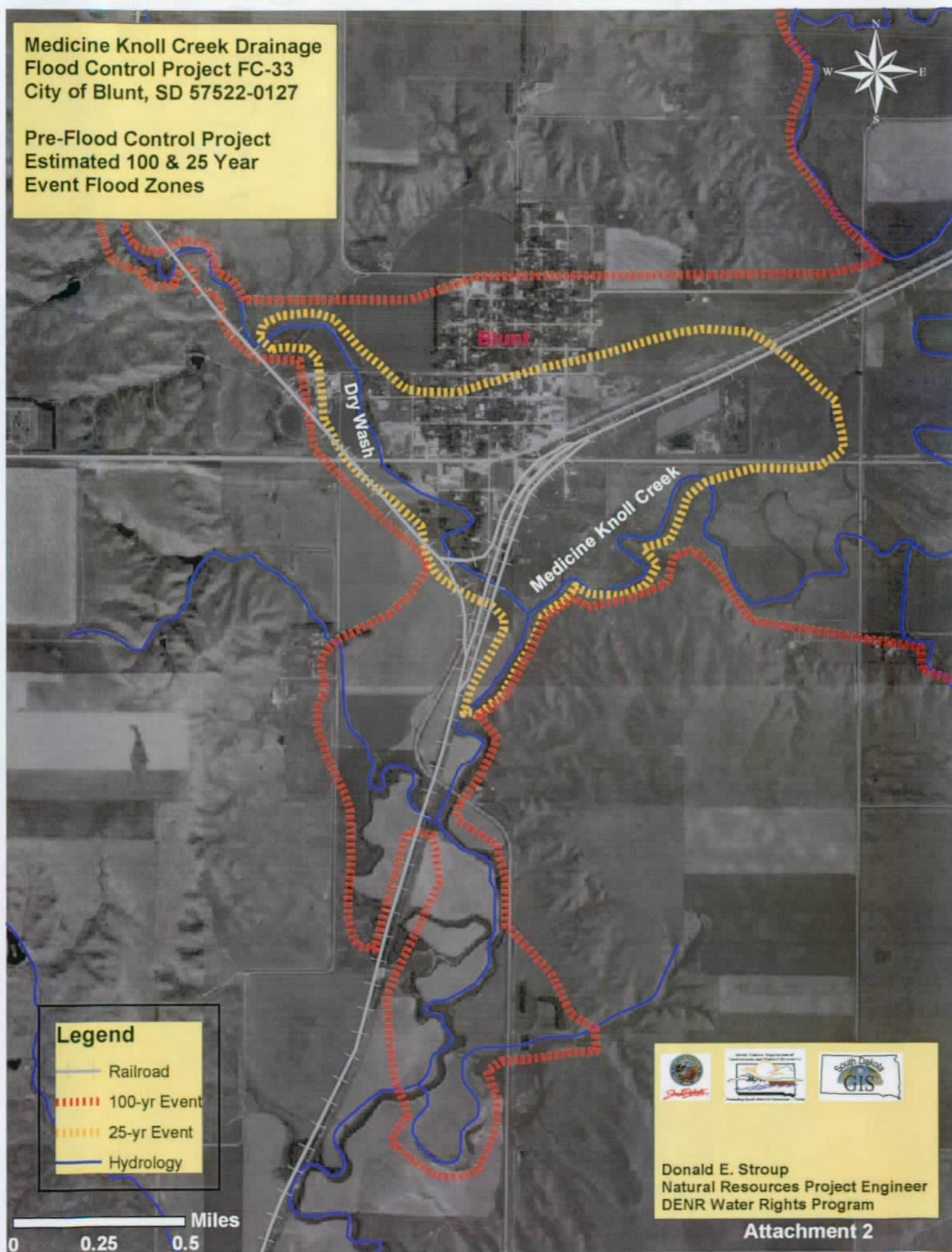
Medicine Knoll Creek



Donald E. Stroup
Natural Resources Project Engineer
DENR Water Rights Program

Medicine Knoll Creek Drainage
Flood Control Project FC-33
City of Blunt, SD 57522-0127

Pre-Flood Control Project
Estimated 100 & 25 Year
Event Flood Zones



Medicine Knoll Creek Drainage
Flood Control Project FC-33
City of Blunt, SD 57522-0127

Drainage Modificaitons



Blunt

Dike

Dry Wash

Dry Wash
Channel

Two 12x6 feet
Box Culverts

High Flow
Diversion Channel

Medicine Knoll Creek

Two 12x6 feet
Box Culverts

Legend

Railroad
Hydrology



Donald E. Stroup
Natural Resources Project Engineer
DNR Water Rights Program

Attachment 3

0 0.25 0.5 Miles



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
www.state.sd.us/denr

**RECOMMENDATION OF CHIEF ENGINEER FOR FLOOD CONTROL PERMIT
APPLICATION NO. FC-33, City of Blunt**

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 Permit Application No. FC-33, City of Blunt, c/o Mayor Dennis Larson, PO Box 127, Blunt SD 57522-0127.

The Chief Engineer is recommending APPROVAL of Application No. FC-33 with qualifications because 1) the project will not increase the likelihood or severity of flood damages, 2) will not endanger human life or property, 3) will not impair existing water rights, 4) necessary easements have or will be obtained prior to construction on each phase of the project, and 5) it is in the public interest to provide flood control to prevent inundation of portion of the city with the following qualifications:

1. The City of Blunt is responsible for operation and maintenance of the flood control works.
2. Flood Control Permit No. FC-33 is subject to securing easements and/or land acquisitions on any areas, other than city property, where construction activities will take place or additional lands are flooded.
3. Prior to construction of dike north of US Highway 14, final designs for that phase shall be submitted to the Chief Engineer of the Water Rights Program for review and approval.
4. The Water Management Board retains jurisdiction of Flood Control Permit No. FC-33 in the event that additional information shows this project causes an increase in the severity of flood damages in areas other than the project area.

Garland Erbele, Chief Engineer
January 25, 2005



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
www.state.sd.us/denr

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

January 26, 2005

Mayor Dennis Larson
PO Box 127
Blunt SD 57522-0127

Dear Mayor Larson:

Water Permit Application No. FC-33 for flood control use has been examined and found to comply with the South Dakota Water Laws and applicable rules. A notice has been sent to the Publisher of the Capital Journal printed at Pierre, SD (Ph # 605-224-7301). You will need to contact the newspaper and authorize publication of this notice. For your information, a copy of the notice, the recommendation of the Chief Engineer and a report on the application are enclosed. Please review the notice prior to publication and notify this office, if you have any corrections or questions.

Be sure to contact the above newspaper to authorize publication of your Notice and to arrange for payment. Early contact with the paper can eliminate delays. Upon receiving authorization, the publisher has been instructed to publish your notice once each week for two consecutive weeks. The newspaper has also been instructed to send us the Proof of Publication. We must receive Proof of Publication before action can be taken on the application.

Sincerely,


Eric Gronlund
Natural Resources Engineer
(605) 773-3352

cc: Laurie Schultz, Brosz Engineering, 3030 Airport Rd, Pierre SD 57501

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.



DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
www.state.sd.us/denr

January 26, 2005

Capital Journal
PO Box 878
Pierre SD 57501-0878

ATTENTION: Legal Public Notice

Enclosed is a Notice on Application No. FC-33 to Appropriate Water to be published twice. Please publish the first notice on February 2, 2005 with the second publication 7 days later. The text of the notice can be e-mailed to your paper by contacting Karen Schlaak at (605) 773-3352.

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 Mayor Dennis Larson, PO Box 127, Blunt, SD (Ph # 605-962-6262).

Please send the Water Rights Program the first publication immediately. The publication is checked for accuracy so any corrections can be made in the second publication. You may use the form below or fax a copy of the first publication. Any fax should be sent to the attention of Karen Schlaak at (605) 773-4068. Publication errors can invalidate the public notice.

After the second publication, **please send us an affidavit or use the enclosed Proof of Publication form.** The applicant pays the cost of publication, but the Water Rights Program records require an affidavit or Proof of Publication. Delays in receiving the affidavit can be costly to the applicant.

Sincerely,

Eric Gronlund
Natural Resources Engineer
605 773-3352

enclosures

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

No. FC-33

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

Date _____

We are in receipt of your letter of January 26, 2005 enclosing Notice to Appropriate Water by Application No. FC-33 which was first published in our issue of _____. **ENCLOSED IS A COPY OF THIS FIRST PUBLICATION.**

Name

Newspaper

PROOF OF PUBLICATION

STATE OF SOUTH DAKOTA)
) SS
 County of Hughes)

I, Marilyn Baker

certify that the attached printed Notice was taken

from the Capital Journal

printed and published in Pierre

County of Hughes and

state of South Dakota. The notice was published

in the newspaper on the following two dates:

February 2, '05

February 9, '05

Cost of Printing \$ 87.36

Marilyn Baker
 (Signature)

Bookkeeping
 (Title)

2-11-05
 (Date Signed)

SNAXLP

No. 6658

2ndly 2/2, 2/9

**NOTICE OF HEARING ON
 APPLICATION NO. FC-33 for a
 Flood Control Permit**

Notice is given that the City of Blunt, c/o Mayor Dennis Larson, P.O. Box 127, Blunt SD 57522-0127 has filed a flood control permit application to construct a channel to facilitate the movement of water during flows greater than the 25 year flood event. The purpose is to prevent inundation of portions of the city. Under existing conditions water from the west branch tributary (Dry Medicine Knoll) backs water into town when both this tributary and Medicine Knoll Creek flood. This project consists of a high-flow channel to divert flow greater than the 25-year flood event from this west branch tributary in a channel along the west side of DME railroad tracks south of Blunt. Water will be returned to Medicine Knoll Creek approximately one mile south of the current confluence of the west branch tributary with the main branch of Medicine Knoll Creek. Project works will consist of: 1) an earthen dike north of Highway 14 on the east side of the west branch tributary, 2) concrete box culverts through the railroad grade on the north and south limits of the project and 3) a new high flow channel along west side of railroad and road berms.

The legal description of the project is the SW 1/4 SE 1/4 Section 8, E 1/2 Section 17, N 1/2 NE 1/4 Section 20; all in T112N, R76W.

A copy of the application or the Water Rights Program's staff report which more completely describes the project may be obtained by contacting the Water Rights Program, Department of Environment and Natural Resources, 523 E. Capitol Avenue, Pierre SD 57501 (605 773-3352).

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application No. FC-33 with qualifications because 1) the project will not increase the likelihood or severity of flood damages, 2) will not endanger human life or property, 3) will not impair existing water rights, and 4) is in the public interest to provide flood control within the city of Blunt.

RECEIVED

FEB 14 2005

WATER RIGHTS
PROGRAM

Any person interested in opposing or supporting this 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 February 21, 2005. 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 this application at 10:00 AM, March 2, 2005, in the Matthew Training Center, Foss Building, 523 E. Capitol Ave., Pierre SD. The agenda time is an estimate. The Chief Engineer's recommendation is not final or binding upon the Board. The Board is authorized to 1) approve, 2) approve with qualifications, 3) defer, or 4) deny this application based on the facts presented at the public hearing. The March 2, 2005 hearing date will be automatically delayed for at least 30 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 by February 21, 2005.

Any hearing may be an adversarial 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 ~~Mr.~~ Gronlund by February 21, 2005 at the above Water Rights Program address to request copies of information pertaining to this application, to assure access to the hearing by the handicapped or to obtain an interpreter for the hearing impaired.

Since this application does not involve a monetary controversy in excess of \$2,500 or termination of a property right in accordance with SDCL 1-26-18.3, the Chief Engineer has determined this contested case may not be referred to Office of Hearing Examiners. If any party disagrees with this determination, the Chief Engineer shall be notified by February 21, 2005.

This 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-12, 46-2A-14, 46-2A-15, 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;

~~APR 15 2005 74:02:01~~
thru 74:02:01:15

Steven M. Pirner
Secretary
Department of Environment
and Natural Resources

Instruction to Newspaper - Publish first Notice on February 2, 2005 with the second publication 7 days later. The applicant is responsible for payment.

NOTICE OF HEARING ON APPLICATION NO. FC-33 for a Flood Control Permit

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Any hearing may be an adversarial 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 February 21, 2005, at the above Water Rights Program address to request copies of information pertaining to this application, to assure access to the hearing by the handicapped or to obtain an interpreter for the hearing impaired.

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Steven M. Pirner, Secretary, Department of Environment and Natural Resources.



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
www.state.sd.us/denr

APR 01 2005

Mayor Dennis Larson
City of Blunt
PO Box 127
Blunt SD 57522-0127

Dear Mayor Larson:

Enclosed is Flood Control Permit No. FC-33 as approved by the Water Management Board on March 2, 2005.

If you have any questions pertaining to the permit, please contact this office.

Sincerely,

Garland Erbele, Chief Engineer
Water Rights Program
605 773-3352

enclosure

c: Laurie Schultz, Brosz Engineering, Inc.