APPENDIX A

PLANS AND SPECIFICATIONS

Specifications and Quote Package Lost River Erosion Control Project Number 82 Red Lake Watershed District Thief River Falls, MN 56701 June 23, 2003

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

Brent & Johnsen

Brent H. Johnson MN License No. 20378

Date: 6- 23- 2003

Houston Engineering, Inc. 2505 North University Drive Box 5054 Fargo, ND 58105 H.E. Project No. 3655-040

REQUEST FOR QUOTES

NOTICE

The Red Lake Watershed District (District) is requesting quotes for an erosion control project in the Lost River within Sections 5 and 6 of Gully Township, T150N, R39W, Polk County, Minnesota. The work is outlined within the project plans and specifications. Major bid items are backhoe and dozer equipment rental, furnishing and installing Class IV Random Riprap, and seeding and erosion control items.

The Board of Managers of the Red Lake Watershed District will receive quotes at the Red Lake Watershed District Office, P.O. Box 803, 102 North Main, Thief River Falls, Minnesota, 56701, until <u>1:00 P.M. July 9, 2003</u>. Quotes must be submitted on forms furnished by the Red Lake Watershed District.

GOVERNING SPECIFICATIONS

The Minnesota Department of Transportation Standard Specifications for Construction, 2000 ed. shall govern.

Where the word "COMMISSIONER" is stated in the Standard Specifications it shall mean the Board of Managers of the Red Lake Watershed District.

Where the word "DEPARTMENT" is stated in the Standard Specifications it shall mean the Red Lake Watershed District.

Where the work "ENGINEER" is stated in the Standard Specifications it shall mean the ENGINEER of the Red Lake Watershed District or their designee.

PROJECT LIMITS

Work limits shall be as shown on the plans or as directed by the Engineer. All construction activities shall occur within the limits established.

INCIDENTAL WORK

Construction required to complete a specific item which is shown or described on the Plan, Specifications or Special Provisions and is necessary for the satisfactory completion of that specific item, and for which no item has been set aside on the proposal form, is to be considered incidental work and no direct compensation shall be made thereof.

PROGRESS SCHEDULE

Work shall start on this project within ten (10) days of notice to proceed. All items on this project shall be completed by September 15, 2003.

ADJUSTMENT OF QUANTITIES

Any item can be increased, decreased or deleted with no adjustment in the unit prices.

SEED MIXTURE 1

This item shall be compensation in full for furnishing Seed Mixture 1 at the contract price per pound. Furnishing oats or winter rye (as required for planting dates) at a rate of 1 bushel per acre shall be incidental to the Seed Mixture 1 item. Allowable planting dates for Mixture 1 shall be April 15 to September 20. The Seed Mixture furnished shall be a uniform blend of the designated seeds, proportioned by weight as specified in the following tabulation:

Mixture 1	Plant Species	Rate/acre	Relative %'s
	Smooth Brome grass	24 lbs.	50
	Timothy	9 lbs.	19
	Birds Foot Trefoil	15 lbs.	31
	TOTAL	48 lbs.	100 %
	*Oats	1 bu.	

*Winter rye shall be substituted for oats during plantings after August 14 of any year.

QUOTE

Project:Lost River Erosion Control Project #82Quotes Due:1:00 P.M. July 9, 2003

Quote Submitted to: Myron Jesme, Administrator Red Lake Watershed District 102 North Main, P.O. Box 803 Thief River Falls, MN 56701 PH. 218-681-5800 FAX. 218-681-5839

		Base	e Quote			
Item No.	Spec. No.	Description	Unit	Qty.	Unit Price	Total
1	2563.601	Traffic Control	l.s.	1		
2	2021.501	Mobilization	l.s.	1		
3	2123.509	Dozer	hour	4		
4	2123.610	2.5 C.Y. Backhoe	hour	10		
5	2511.501	Random Riprap, Class IV	cu.yd.	335		
6	2573.502	Silt Fence, Type Preassembled	lin. ft.	100		
7	2573.505	Floating Silt Curtain, Type Moving Water, 3'	lin. ft.	80		
8	2575.501	Seeding	acre	0.5		
9	2575.502	Seed, Mixture 1	lb.	24		
10	2575.523	Erosion Control Blanket, Category 4	Sq. Yd.	163		
				Tot	tal Base Quote	
		Bendway	Weir Opti	on		
11	2123.509	Dozer	hour	2		
12	2123.610	2.5 C.Y. Backhoe	hour	5		
13	2511.501	Random Riprap, Class IV	cu.yd.	162		
14	2573.502	Silt Fence, Type Preassembled	lin. ft.	50		
15	2575.523	Erosion Control Blanket, Category 4	Sq. Yd.	107		
		Subt	total Quote	e Bendwa	y Weir Option	
		Total Quote = Base Quote	Plus Bendy	way Weir	Option Quote	

THE ABOVE QUOTE IS HEREBY RESPECTFULLY SUBMITTED BY:

CONTRACT	OR		
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BUSINESS A	ADDRESS		
CITY	STATE	ZIP CODE	
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ALL EXCAVATION REQUIRED TO CONSTRUCT THE BENDWAY WEIRS AS DETAILED IN THE PLANS AND SPECIFICATIONS SHALL BE CONSIDERED INCIDENTAL AND NO DIRECT COMPENSATION SHALL BE MADE.

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APPENDIX B

JOINT NOTIFICATION PERMIT FORM

Minnesota Local/State/Federal Application Forms for Water/Wetland Projects

USE THIS APPLICATION FOR ANY PROJECT AFFECTING A LAKE, RIVER, STREAM OR WETLAND, INCLUDING:

Local Government Unit Approval Pursuant to Minnesota Wetlands Conservation Act (WCA) Minnesota Department of Natural Resources (DNR) Permit to Work in Public Waters Department of the Army Permit (33 CFR 325)

Note: The U. S. Army Corps of Engineers (COE) will forward application forms to the Minnesota Pollution Control Agency (MPCA) for processing if state water quality certification is required from the MPCA. You **do not** need to send this application to the MPCA.

This application packet includes **Part I:** The **BASIC APPLICATION** and the **COE APPLICATION** to be filled out by all applicants (see Instructions).

You will also be informed if your proposal requires **Part II**: The **REPLACEMENT PLAN SUPPLEMENT.** Part II is *only for* projects that require a replacement plan for wetland mitigation.

Do not proceed with your project until you have received all required approvals from your LGU, the DNR and the COE. If you wish to confirm the status of your application at any time, contact the agencies directly (see Instructions, page 2). Proceeding with work before all required authorizations are obtained may result in fines or other penalties, and may include a requirement to restore the project site to original condition.

If you have questions or need assistance with filling out these forms, contact your local SWCD office, your LGU, your Area DNR Waters office, or your COE field office (see Instructions, page 2).

If you believe that your project may be subject to watershed district, local zoning, or any other local regulations besides those of your LGU, contact those office(s) directly. If you are a Federal Farm Program participant and your project affects a wetland or water body on agricultural land, your eligibility for USDA benefits may be affected. Contact a Natural Resources Conservation Service office for further information.

A QUICK LOOK AT THE PROJECT APPLICATION PROCESS

Electronic files: Forms can be downloaded and filled out using Microsoft Word. Your input will be restricted to fill-in fields where users can enter text or check boxes. These areas appear gray on the screen, but not on the printed document.

Send copies of these completed application forms to your LGU, your Area DNR Waters office, and your COE regulatory office.

Any of the agencies may make initial contact with you to: a) inform you that it has no jurisdiction over your project; b) request additional information needed; or c) inform you of applicable fees.

When your application is considered complete and appropriate fees have been received (if requested) it will be distributed for appropriate review.

Following agencies' reviews, you will be informed if it has been approved, approved with changes or conditions, withdrawn, or denied. For information about state laws, rules and regulations that direct this process go to the web site www.revisor.leg.state.mn.us. For information on U.S. Army Corps of Engineers regulations go to the web site www.mvp.usace.army.mil.

Instructions for Part I

HELP 1: Every applicant must fill out Section 1. The applicant is the person, agency, company, corporation, or other organization that owns, leases, or holds other legal rights to the land where the project is located. Indicate names of multiple applicants on a separate sheet.

HELP 1A: Fill out Section 1A only if you have designated an authorized agent. An authorized agent may be an attorney, builder, consultant, contractor, engineer, or any other person or organization designated by the applicant to represent him/her in this process. An agent is not required.

HELP 5: Purpose, description and dimensions of project: State briefly (in a sentence or two) what you propose to do and why it is needed. Also, describe whether your project will involve any of the following:

- Construction of structures, filling, draining, dewatering, removing, excavating or repair.
- Construction of an access path, bridge, culvert, dam, ditch, dock, driveway, riprap, road, sand blanket, shore protection, or tile line.
- Construction of any structures on fill, piles or a float-supported platform. If so, describe.
- Dredging or discharging (placing fill material) into a wetland or other water body (including the temporary placement of material). If so, explain the specific purpose of the placement of the material (such as erosion control) and indicate how it will be done (such as with a backhoe or dragline). If dredged material is to be discharged on an upland site, identify the location of the site.

Include an overhead view drawing showing the work to be undertaken and its relative location on the property. Show items such as property boundaries or lot dimensions; location and extent of shoreline, wetlands and water; location and dimensions and footprint of the proposed project, structure or activity (include length, width, elevation and other measurements as appropriate); points of reference such as existing homes, structures, docks or landscape features; indication of north; and location of spoil and disposal sites (if applicable). Hand drawn, computer generated or professionally prepared drawings are acceptable, as long as they contain all necessary information clearly, accurately, and in adequate detail. Please include specific dimensions whenever possible. You may also include photos, if you wish.

HELP 7: For information regarding adjacent landowners, contact the tax assessor where the project is to be developed.

HELP 8: If any part of the work has already been completed, describe the area already developed. Include a description of structures completed; any dredged or fill material already discharged (including type of material and volume in cubic yards); acres or square feet filled (if a wetland or other waterbody); and whether the work was done under an existing permit (if so identify the authorization, if possible).

HELP 9: Other permits, reviews or approval related to the project may include the following: conditional use permit; plat approval; zoning variance; National Pollutant Discharge Elimination System permit; state disposal system permit (includes dredged material disposal); watershed district/watershed management organization permit (stormwater, erosion, floodplain); environmental assessment worksheet/environmental impact statement; hazardous waste site; feedlot permit; groundwater appropriation permit; or county/township driveway/road permit. Are you aware of any archeological or cultural resource determinations or surveys completed concerning the project or replacement site by the State Historic Preservation Office (SHPO) or others? If yes, please explain on a separate sheet or attach a copy of any determinations or surveys.

Final Checklists (Part I)

\Box	Have you completed all of Part I (Page 1), plus the Federal application (Page 2)?
	Did you (and your agent, if applicable) sign Section 10 on page 1?
	Have you signed the Application for the Department of the Army Permit (Page 2) to seek Federal authorization of your project?
	Have you included the necessary attachments for Part I?
	Attachments <i>must</i> include:
	Site Locator Map (Section 3)
	Type of Project (Section 4) (if additional space was needed)
	Overhead View of Project (Section 5 and HELP 5)
	Project Purpose, Description and Dimensions (Section 5) (if additional space was needed)
	Attachments <i>may</i> also include:
	Applicant Contact Information (HELP 1) (if additional space was needed)
	Project Location (Section 3) (if additional space was needed)
	Project Alternatives (Section 6) (if additional space was needed)
	Photographs
	Adjoining Property Owners (Section 7) (if additional space was needed)
	Work Already Completed Section (Section 8) (if you answered YES)
	State Historic Preservation Office determination or survey

Submitting Your Application

Make three copies of the entire application and all attachments. Keep the original, and mail a complete copy of your application to each of the local, state, and Federal entities listed below. Be sure to include Part I and all attachments with each application.

LOCAL: Send to the appropriate Local Government Unit (LGU). If necessary, contact your county Soil and Water Conservation District (SWCD) office or visit the Board of Water and Soil Resources (BWSR) web site (www.bwsr.state.mn.us) to determine the appropriate LGU.

STATE: Send to your Area DNR Waters office, attention Area Hydrologist. If necessary, contact your county Soil and Water Conservation District (SWCD) office or visit the DNR web site (www.dnr.state.mn.us) to locate the Area Hydrologist for your location, or contact a Regional DNR office:

NW Region:	NE Region:	Central Region:	Southern Region:
2115 Birchmont Beach Road N.E.	1201 East Highway 2	1200 Warner Road	261 Highway 15 South
Bemidji, MN 56601	Grand Rapids, MN 55744	St. Paul, MN 55106	New Ulm, MN 56073
Phone: 218-755-3873	Phone: 218-327-4416	Phone: 651-772-7910	Phone: 507 359-6053

FEDERAL: Send to the appropriate U.S. Army Corps of Engineers regulatory field office:

Brainerd:	St. Paul:	La Crescent:	Two Harbors:
U.S. COE, Regulatory Branch	U.S. COE, Regulatory Branch	U.S. COE, Regulatory Branch	U.S. COE, Regulatory Branch
10867 E. Gull Lake Drive N.W.	Army Corps of Engineers Centre	1114 South Oak Street	1554 Highway 2, Suite 2
Brainerd, MN 56401-9051	190 5 th Street East	La Crescent, MN 55947-1338	Two Harbors, MN 55161
Phone: 218-829-8402	St. Paul. MN 55101-9051	Phone: 507-895-8059	Phone: 218-834-6630
Phone: 218-829-8402	St. Paul, MN 55101-9051 Phone: 651-290-5375	Phone: 507-895-8059	Phone: 218-834-6630

WEBSITES: BWSR: www.bwsr.state.mn.us

U.S. COE: www.mvp.usace.army.mil

DNR: www.dnr.state.mn.us

MPCA: www.pca.state.mn.us

Minnesota Local/State/Federal Application Forms for Water/Wetland Projects Instructions, Page 2 NA-026620-03A

(V.2.01 for MS WORD) 02/14/03

Minnesota Local/State/Federal Application Form for Water/Wetland Projects

For Internal Use Only

Application No. Field Office Code

Date Initial Application Received

Date initial Application Deemed Complete

PART I: BASIC APPLICATION

"See HELP" directs you to important additional information and assistance in Instructions, Page 1.

1. LANDOWNER/APPLICANT CONTACT INFORMATION (See Help 1)

Name: Red Lake Watershed District, Myron Jesme, Administrator Phone: 218 681-5800 Complete mailing address: 102 North Main Avenue, PO Box 803, Thief River Falls, MN 56701

1A. AUTHORIZED AGENT (See Help 1A) (Only if applicable; an agent is not required)

Name:

Phone:

Complete mailing address:

2. NAME, TYPE AND SIZE OF PUBLIC WATERS or WETLANDS IMPACTED (Attach Additional Project Area sheets if needed) Name or I.D. # of Waters Impacted (if applicable; if known): Lost River

(Check all that apply): \Box Lake \boxtimes River \Box Wetland type \Box 1 \Box 1L \Box 2 \Box 3 \Box 4 \Box 5 \Box 6 \Box 7 \Box 8

Indicate size of entire lake or wetland (check one):	Less than 10 acres (indicate size:)	\square 10 to 40 acres \square Greater than 40 acres
--	--------------------------------------	--

3. PROJECT LOCATION (Information can be found on property tax statement, property title or title insurance):

Project street addre	ess:		Fire #:	City (if applicable):
1/4 Section:	Section: 5 & 6	Township #: 150-N	Range #: 39W	County: Polk
Lot #:	Block:	Subdivision:	Watershed (name or #) Red	Lake

Attach a simple site locator map. If needed, include on the map written directions to the site from a known location or landmark, and provide distances from known locations. Label the sheet SITE LOCATOR MAP.

See attached plans. Sheets 1 and 2 of 10 include location maps.

4. TYPE OF PROJECT: Describe the type of proposed work. Attach TYPE OF PROJECT sheet if needed.

This is an erosion control project. It includes the removal of sediment and the installation of rock weirs.

5. PROJECT PURPOSE, DESCRIPTION AND DIMENSIONS: Describe what you plan to do and why it is needed, how you plan to construct the project with dimensions (length, width, depth), area of impact, and when you propose to construct the project. This is the most important part of your application. See HELP 5 before completing this section; see What To Include on Plans (Instructions, page 1). Attach *PROJECT DESCRIPTION* sheet.

See attached project report.

Footprint of project: acres or (See Attached) square feet drained, filled or excavated.

6. PROJECT ALTERNATIVES: What alternatives to this proposed project have you considered that would avoid or minimize impacts to wetlands or waters? List at least TWO additional alternatives to your project in Section 5 that avoid wetlands (one of which may be "no build" or "do nothing"), and explain why you chose to pursue the option described in this application over these alternatives. Attach *PROJECT ALTERNATIVES* sheet if needed.

1. Large scale land use changes, and 2. Do Nothing, (see attached project report for descriptions)

7. ADJOINING PROPERTY OWNERS: For projects that impact more than 10,000 square feet of water or wetlands, list the complete mailing addresses of adjacent property owners on an attached separate sheet. (See HELP 7)

8. PORTION OF WORK COMPLETED: Is any portion of the work in wetland or water areas already completed? Yes No. If yes, describe the completed work on a separate sheet of paper labeled WORK ALREADY COMPLETED. (See HELP 8)

9. STATUS OF OTHER APPROVALS: List any other permits, reviews or approvals related to this proposed project that are either pending or have already been approved or denied on a separate attached sheet. See HELP 9.

10. I am applying for state and local authorization to conduct the work described in this application. I am familiar with the information contained in this application. To the best of my knowledge and belief, all information in Part I is true, complete, and accurate. I possess the authority to undertake the work described, or I am acting as the duly authorized agent of the applicant.

Signature of applicat	nt (Landowner)
-----------------------	----------------

Date

Signature of agent (if applicable)

Date

This block must be signed by the person who desires to undertake the proposed activity and has the necessary property rights to do so. If only the Agent has signed, please attach a separate sheet signed by the landowner, giving necessary authorization to the Agent.

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT (33 CFR 325) OMB APPROVAL NO. 0710-003 Expires Dec 31, 2004

The public burden for this collection of information is estimated to average 10 hours per response, although the majority of applications should require 5 hours or less. This includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters Service Directorate of Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302; and to the Office of Management and Budget, Paperwork Reduction Project (0710-0003), Washington, DC 20503. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information at display a currently valid OMB control number. Please DO NOT RETURN your form to either of these addresses. Completed applications must be submitted to the District engineer having jurisdiction over the location of the proposed activity.

PRIVACY ACT STATEMENT: Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research and Sanctuaries Act, 33 USC 1413, Section 103. Principal purpose: Information provided on this form will be used in evaluating the application for a permit. Routine uses: This information may be shared with the Department of Justice and other Federal, state, and local government agencies. Submission of requested information is voluntary; however, if information is not provided, the permit application cannot be evaluated nor can a permit be issued.

ITEMS 1 THROUGH 4 TO BE FILLED IN BY THE CORPS				
1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETED	

YOU DO NOT NEED TO COMPLETE ITEMS 6-10 and 12-25 in the SHADED AREAS.

All applicants must complete **non-shaded** items 5 and 26. If an agent is used, **also** complete items 8 and 11. This optional Federal form is valid for use **only** when included as part of this entire state application packet.

5. APPLICANT'S NAME Red Lake Watershed District, Myron Jesme, Admin.	8. AUTHORIZED AGENT'S NAME AND TITLE (an agent is not required)				
6. APPLICANT'S ADDRESS	9. AGENT'S ADDRESS				
7. APPLICANT'S PHONE NO.	10. AGENT'S PHONE NO.				

11. STATEMENT OF AUTHORIZATION (if applicable; complete only if authorizing an agent)

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

APPLICANT''S SIGNATURE:	DATE:
12. PROJECT NAME OR TITLE (see instructions)	
13. NAME OF WATERBODY, IF KNOWN (if applicable)	14. PROJECT STREET ADDRESS (if applicable)
15. LOCATION OF PROJECT	
16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (see	instructions)
17. DIRECTIONS TO THE SITE	18. NATURE OF ACTIVITY
19. PROJECT PURPOSE	20. REASON(S) FOR DISCHARGE
21. TYPES OF MATERIAL BEING DISCHARGED AND TH	E AMOUNT OF EACH TYPE IN CUBIC YARDS
22. SURFACE AREA IN ACRES OF WETLANDS OR OTHE	ER WATERS FILLED
23. IS ANY PORTION OF THE WORK ALREADY COMPL	ETE? YES NO IF YES, DESCRIBE COMPLETED WORK.
24. ADDRESSES OF ADJOINING PROPERTY OWNERS,	
25. LIST OF OTHER CERTIFICATIONS OR APPROVALS	DENIALS RECEIVED FROM OTHER FEDERAL, STATE OR LOCAL AGENCIES FOR

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

Signature of applicant

Date

Signature of agent (if any)

Date

The application must be signed by the person who desires to undertake the proposed activity (applicant), or it may be signed by a duly authorized agent if the statement in Block 11 has been filled out and signed. **18 U.S.C. Section 1001** provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up with any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than \$10,000 or imprisoned not more than five years or both. ENG FORM 4345, Jul 97 EDITION OF FEB 94 IS OBSOLETE. (Proponent: CECW-OR)

Minnesota Local/State/Federal Application From for Water/Wetland Projects

5. PROJECT PURPOSE, DESCRIPTION AND DIMENSIONS:

Footprint of project: _____ acres or 9800 square feet of sediment removal (with disposal on existing upland spoil banks), and 4100 square feet of rock fill for vane construction.

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APPENDIX C

MONITORING PLAN PROCEDURES, BASELINE DATA, AND PHOTOGRAPHS

MONITORING PLAN PROCEDURES

Monitoring will be conducted on the Lost River Erosion Control Project to measure and document the condition of the river channel and the implemented erosion control features. Monitoring should be done on an annual basis for a period of about five years. The monitoring will be conducted in order to determine the effectiveness of the proposed erosion control measures. This will be determined by monitoring bank erosion, lateral and vertical movement of the stream, and vegetation in and immediately adjacent to the project locations. Monitoring will consist of the following:

- Photos taken from designated locations
- Surveyed cross sections and profiles to document the channel shape, thalweg elevations and changes.
- Vegetation type and density assessment

The following workbook sections should be completed following each site inspection so that changes in the observed data can be compared year to year as well as cumulatively over the monitoring period. A written summary report should be prepared. The report should identify the results of the monitoring and include the collected data for each monitoring location. The report should also include comments from the inspector on the effectiveness of the erosion control measures, and particularly include descriptions of any surprising issues—problems, solutions, or ancillary benefits that were not planned or expected.

Channel Cross Sections

The following channel station locations should be monitored to measure changes in the river channel: 6+00, 14+00, 18+00, 18+50, 19+00 and 20+50. Additional cross sections should be added to document areas of significant erosion or sediment deposition. The frequency of channel measurements can be reduced to less than once per year if changes from year to year are small.

Monuments should be set at each cross section to mark the location of each endpoint, and a TBM elevation should be established and recorded for one monument at each crosssection. Cross section measurements should be taken between the monuments (perpendicular to the channel), using a uniform cross section stationing so the sections can be compared year to year for changes. A table and graph for each measured cross section should be updated after each monitoring survey.

Cross Section Station (feet)	Lost River 1959		Corps Design		Lost River 2001		RLWD 2003 As- built		Monitoring Year 1,2 etc.	
	Offset	Elevation	Offset	Elevation	Offset	Elevation	Offset	Elevation	Offset	Elevation
6+00	16.0	1149.05	16.0	1149.05	16.0	1149.05				
	22.0	1147.65	22.0	1147.65	22.0	1147.65				
	29.2	1146.77	25.8	1147.19	25.0	1145.45				
	44.2	1147.14	51.9	1138.37	32.0	1142.95				
	45.2	1147.09	68.0	1138.32	41.0	1142.45				
	48.6	1143.67	98.4	1148.57	43.0	1141.35				
	54.8	1142.15	100.0	1148.85	43.5	1138.95				
	55.8	1142.0	115.0	1150.05	46.0	1137.75				
	61.4	1142.44			50.0	1137.25				
	65.3	1143.00			55.0	1137.55				
	70.7	1143.27			61.0	1138.75				
	73.1	1145.27			65.0	1137.55				
	75.0	1147.06			69.0	1137.75				
	88.5	1147.81			72.5	1137.95				
	94.0	1147.85			74.5	1138.65				
	100.0	1148.85			75.0	1142.35				
	115.0	1150.05			77.0	1143.25				
					86.0	1143.35				
					94.0	1147.85				
					100.0	1148.85				
					115.0	1150.05				

Table C-1 Station 6+00





Table C-2 Station 14+00

~	L . D! . 1050									
Cross	Lost River 1959		Corps Design		Lost Ri	ver 2001	RLWD	2003 As-	Monito	ring Year
Section							built		1,2 etc.	
Station										
(feet)										
	Offset	Elevation	Offset	Elevation	Offset	Elevation	Offset	Elevation	Offset	Elevation
14+00	6.0	1148.73	6.0	1148.73	6.0	1148.73				
	17.5	1148.03	17.5	1148.03	17.5	1148.03				
	28.9	1147.85	45.5	1138.53	20.0	1146.63				
	32.4	1147.61	61.5	1138.53	22.0	1144.73				
	38.8	1144.22	84.2	1146.31	22.5	1142.73				
	47.7	1142.23	87.0	1147.43	25.0	1142.63				
	54.2	1141.67	90.0	1147.83	26.0	1140.63				
	60.0	1142.38	93.0	1147.23	28.0	1140.43				
	64.48	1143.40	100.0	1148.33	29.0	1138.83				
	67.5	1144.26			33.0	1138.43				
	69.6	1145.98			39.0	1137.93				
	84.2	1146.31			41.0	1137.93				
	87.0	1147.43			56.0	1139.43				
	90.0	1147.83			57.0	1141.03				
	93.0	1147.23			62.0	1143.73				
	100.0	1148.33			70.0	1143.93				
					75.0	1144.43				
					83.0	1145.93				
					87.0	1147.43				
					90.0	1147.83				
					93.0	1147.23				
					100.0	1148.33				





Table C-3 Station 18+00

Cross Section Station (feet)	Lost River 2001		RLWD 2003 As- built		Monitoring Year 1,2 etc	
	Offset	Elevation	Offset	Elevation	Offset	Elevation
18+00	7.0	1149.33				
	9.0	1147.43				
	10.0	1147.43				
	11.5	1146.23				
	14.0	1145.83				
	19.0	1144.33				
	21.0	1142.43				
	23.0	1138.73				
	28.0	1138.23				
	31.0	1138.53				
	40.0	1139.13				
	52.0	1139.13				
	54.0	1139.53				
	66.0	1142.73				
	71.0	1142.73				
	85.0	1147.33				
	97.0	1150.93				
	100.0	1150.73				
	115.0	1150.63				





Table C-4 Station 18+50

Cross	Lost River 2001		RLWD	RLWD 2003 As-		Monitoring Year		
Section			built		1,2 etc			
Station								
(feet)		r		-				
	Offset	Elevation	Offset	Elevation	Offset	Elevation		
18+50	8.5	1148.49						
	9.0	1143.19						
	12.5	1141.89						
	15.0	1140.59						
	18.0	1139.69						
	22.0	1138.89						
	26.0	1138.49						
	34.0	1138.99						
	43.5	1138.79						
	47.0	1139.39						
	51.0	1139.69						
	52.5	1140.59						
	59.0	1141.59						
	65.0	1142.69						
	70.0	1142.99						
	72.0	1142.39						
	76.0	1142.79						
	83.0	1145.49						
	95.5	1149.39						
	100.0	1150.29						
	115.0	1150.89						





Table C-5 Station 19+00

Cross Section Station (feet)	Lost River 1959		Corps Design		Lost River 2001		RLWD 2003 As- built		Monitoring Year 1,2 etc.	
	Offset	Elevation	Offset	Elevation	Offset	Elevation	Offset	Elevation	Offset	Elevation
19+00	-45.0	1150.83	-45	1150.83	-45.0	1150.83				
	-37.2	1150.24	-37.2	1150.24	-15.0	1148.53				
	0	1150.43	0	1150.43	0	1148.63				
	5.8	1150.46	5.8	1150.46	3.5	1148.63				
	25.6	1150.80	41.4	1138.60	13.5	1143.73				
	31.8	1148.02	56.4	1138.60	18.0	1142.43				
	35.2	1143.91	89.8	1149.73	23.0	1139.83				
	40.2	1142.35	100.0	1150.23	30.0	1137.73				
	49.4	1141.76	110.0	1149.83	34.0	1137.13				
	57.9	1142.56			36.0	1137.63				
	62.8	1144.21			40.0	1138.33				
	70.5	1149.11			47.0	1138.93				
	76.9	1151.04			64.0	1139.83				
	87.79	1149.78			70.0	1142.53				
	89.8	1149.73			76.0	1144.63				
	100.0	1150.23			83.0	1144.73				
	110.0	1149.83			86.0	1145.23				
					90.0	1146.73				
					100.0	1150.23				
					110.0	1149.83				





Table C-6 Station 20+50

Cross Section Station	Lost River 2001		RLWD 2003 As- built		Monitoring Year 1,2 etc.		
(feet)	0.00	T 1	0.00	51	0.00		
2 0 7 0	Offset	Elevation	Offset	Elevation	Offset	Elevation	
20+50	-28.0	1154.26					
	-15.0	1151.66					
	-6.0	1151.16					
	0	1151.16					
	9.0	1149.46					
	21.0	1148.36					
	29.0	1146.16					
	33.0	1146.06					
	36.0	1147.16					
	38.5	1146.96					
	43.0	1142.56					
	44.5	1140.56					
	48.0	1139.36					
	50.0	1138.96					
	55.0	1138.46					
	60.0	1138.26					
	65.0	1138.26					
	70.0	1138.46					
	75.0	1139.16					
	80.0	1139.96					
	82.0	1140.96					
	84.0	1144.26					

90.0	1145.66		
93.0	1146.46		
97.0	1148.26		
103.0	1149.36		
112.0	1149.86		

Figure C-6. Cross Sections at Station 20+50



Thalweg Profile

A profile measurement of the channel thalweg should be made during each inspection (i.e. the profile defining the lowest points along a reach of a river bed) from station 6+00 to station 21+00.

A table and graph for each measured thalweg profile should be updated after each monitoring survey.

Corps Design		Lost River 20	01	Monitoring Year 1,2 etc.		
Station	Elevation	Station	Elevation	Station	Elevation	
250	1138.17	250	1137.7			
300	1138.19	600	1137.3			
400	1138.22	1000	1136.9			
500	1138.25	1300	1138			
600	1138.29	1350	1138.3			
700	1138.32	1400	1137.9			
800	1138.35	1450	1137.7			
900	1138.38	1500	1137.9			
1000	1138.41	1550	1138.6			
1100	1138.44	1580	1138.4			
1200	1138.48	1630	1138.4			
1300	1138.51	1700	1138.6			
1400	1138.54	1800	1138.2			
1500	1138.57	1850	1138.5			
1600	1138.6	1900	1137.1			
1700	1138.64	1950	1137.2			
1800	1138.67	2000	1139.4			
1900	1138.7	2034	1140.5			
2000	1138.73	2050	1138.3			
2100	1138.76	2088	1137.8			
2200	1138.79	2150	1137.9			
2300	1138.83	2200	1137.8			
2400	1138.86	2312	1139.0			
2500	1138.89	2375	1138.6			
2600	1138.92	2550	1138.9			
2700	1138.95	2600	1138.2			
2800	1138.99	2700	1138.3			
2900	1139.02	2800	1138.6			
		2900	1138			
		3000	1138.5			

<u>Table C-7</u> Thalweg Profile



Figure C-7. Lost River Channel Profile (Thalweg Elevation)

Vegetation

Measure and record the dominant species and percentage cover during each inspection. Vegetation measurements should be taken from the same points each year so comparisons can be made. Use the monuments at each cross-section as reference points to mark channel transects for measurement. The frequency of vegetation measurements can be reduced to less than once per year if changes from year to year are small. Vegetation measurements should be taken at cross sections 6+00, 14+00, 18+50, and 20+50. Add additional vegetation measurements in areas that are significantly different from the measured transects. Identify the vegetation types in a 1-meter square area at up to 9 points along each channel transect. Select points such as spoil bank centerline (right and left), top of bank (right and left), bankfull or 1.5 year flood level (right and left), channel toe (right and left) and channel centerline. Figure C-8 shows a typical channel cross-section and the approximate vegetation measurement locations.





Record the vegetation type and percent cover at each transect point. The following table provides an example:

Table C-8

Cross Section:	Transect point:	Vegetation Type	Percent Cover
6+00	Top of left	Reed Canary	85%
	ascending bank	Willow	5%
		Other	1%
		Exposed Soil	9%

Photos

Photos of the channel should be taken during each inspection. Photos should be taken from the same points each year so year-to-year comparisons can be made. Use the monuments at each cross section as reference points as well as the C.S.A.H. Bridge centerline. Take photos from each reference point looking across the channel and up and downstream. Take photos from the bridge looking upstream and downstream. The frequency of channel photos can be reduced to less than once per year if changes from year to year are small. Photos should be taken at cross sections 6+00, 14+00, 18+00, 18+50, 19+00 and 20+50 and from the bridge. The following photos are from the 2001 site inspection and survey.

Lost River Erosion Control Project

- Location
 - Lost River within Sections 5 and 6 of Gully Township, Polk County.



Lost River May 13, 1991 Aerial Photo: Section 5 and 6 of Gully Township, CSAH 28 near center



Lost River Erosion Control Project

- Survey
 - RLWD staff surveyed the channel in November 2001
 - Alignment
 - Cross sections
 - Channel profile
 - Bridge opening
 - 3000 foot reach

Lost River at CSAH 28 (Trail Road) May 13, 1991



Looking downstream (west) from near Station 2+00, November 2001



Looking upstream (north) from near Station 2+00, November 2001



Looking downstream (south) from near Station 14+50, November 2001



Looking downstream from near station 14+50, November 2001



Looking at left (descending) bank near station 14+50, November 2001



Looking upstream from near station 15+00, November 2001



Looking northwest at right descending bank near Station 14+50 November 2001





Bank slump near station 14+50 on right (descending bank), November 2001

Looking upstream at right descending bank from near Station 14+50 November 2001



Looking upstream (east) at bridge opening and point bar, November 2001



Looking upstream from near station 18+50, November 2001



Looking NW from SW Abutment (near station 19+50)at erosion on right bank just west of bridge, Nov. 2001



Looking downstream from CSAH 28 bridge, November 2001



Looking upstream (east) at bridge opening and rock/beaver dam (November 2001)



Looking upstream (east) from Bridge near Station 20+00, November 2001



Looking southeast from NE Bridge Abutment, near station 20+50 November 2001



Looking upstream from near NE abutment, November 2001



Looking upstream from near Station 22+00 (200 feet upstream from bridge) November 2001



Looking upstream at large sediment bar on right bank near station 24+00 (400 feet upstream of bridge) November 2001



Looking downstream from near Station 24+00, November 2001



Looking upstream from near Station 25+00 (500 feet upstream of bridge), November 2001



Looking at right (west) bank from near Station 25+00 (500 feet upstream of bridge), November 2001



Looking upstream from near Station 26+50, November 2001



Looking upstream from near Station 27+00 (700 feet upstream of bridge) November 2001

