REQUEST FOR PROPOSALS (RFP)

Channel Geomorphology and In-Channel Vegetation Monitoring and Data Analysis

PLATTE RIVER RECOVERY IMPLEMENTATION PROGRAM
Office of the Executive Director
4111 4th Avenue, Suite 6
Kearney, Nebraska 68845

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Contents

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SUBJECT:	Channel Geomorphology and In-Channel Vegetation Monitoring and Data Analysis
REQUEST DATE:	January 12, 2012
PRE-PROPOSAL MEETING:	January 24, 2012
CLOSING DATE:	February 2, 2012
POINT OF CONTACT:	Steve Smith Headwaters Corporation (720) 524-6115 *smiths@headwaterscorp.com*

I. OVERVIEW

The Platte River Recovery Implementation Program ("Program" or "PRRIP") was initiated on January 1, 2007 between Nebraska, Wyoming, Colorado, and the Department of the Interior to address threatened and endangered species issues in the central and lower Platte River basin. The species considered in the Program, referred to as "target species", are the whooping crane, piping plover, interior least tern, and pallid sturgeon.

A Governance Committee (GC) reviews, directs, and provides oversight for Program activities. The GC is comprised of one representative from each of the three states, three water user representatives, two representatives from environmental groups, and two members representing federal agencies. The GC has named Dr. Jerry Kenny to serve as the Program Executive Director (ED). Dr. Kenny established Headwaters Corporation as the staffing mechanism for the Program. Program staff is located in Nebraska and Colorado and are responsible for assisting in carrying out Program-related activities.

In 2007, the Program began its 13-year First Increment. The Program's management objectives are to 1) improve survival of whooping cranes during migration, 2) improve least tern and piping plover production, and 3) avoid adverse impacts on pallid sturgeon in the Lower Platte River. One of the Program's management strategies to achieve these objectives is the Flow-Sediment-Mechanical (FSM) management strategy, which includes flow management, sediment management, and land management (e.g., mechanically consolidating flow paths to increase stream power and braided nature of the Platte River). The second management strategy is the Mechanical Creation and Maintenance (MCM) strategy, which includes a combination of off-channel sandpit management, mechanical creation and maintenance of bare sand riverine islands, and creation and maintenance of inundated wetlands and upland areas.

Adaptive management will be used to reduce uncertainty associated with the potential performance of management actions. This will be achieved by explicitly acknowledging uncertainty in the form of alternative hypotheses of management action performance, and collecting and analyzing data to reduce uncertainty associated with Program hypotheses and related management actions. The Program's Adaptive Management Plan ("AMP") will be implemented to learn more about the physical processes of the central Platte River and the response of the four target species to management actions.

Several critical scientific and technical uncertainties about Program target species, physical processes, and the response of the target species to management actions will be the focus of the application of rigorous adaptive management in the First Increment through implementation of the Program's AMP. These uncertainties are captured in statements of broad hypotheses on pages 14-17 of the AMP and, as a means

of better linking science learning to Program decision-making, those uncertainties comprise a set of "Big Questions" that provide a template for linking specific hypotheses and performance measures to management objectives and overall Program goals.

Three "Big Questions" relate directly to river morphology and are influenced by in-channel vegetation:

- **Big Question #6 –** How do short-duration high flows (SDHF), restoring sediment balance, and mechanical channel alterations contribute to the maintenance of channel width and creation of a braided river channel?
- **Big Question #7 –** What is the relationship between SDHF, sediment balance, and tern and plover riverine nesting habitat meeting Program minimum criteria?
- **Big Question #8 –** What is the relationship between SDHF, sediment balance, and whooping crane habitat meeting Program minimum criteria?

Broad hypotheses directly related to river morphology and influenced by in-channel vegetation include:

S-1: A combination of flow management, sediment management, and land management (i.e., Clear/Level/Pulse) will/will not generate detectable changes in the channel morphology of the Platte River on Program lands, and/or habitats for whooping crane, least tern, piping plover, pallid sturgeon, and other species of concern.

S-2: A combination of non-managed flows, sediment management, and land management (i.e., Clear/Level/Mechanical Maintenance) will/will not generate detectable changes in the channel morphology of the Platte River, and/or habitats for whooping crane, least tern, piping plover, pallid sturgeon, and other species of concern.

S-4: Program management actions will/will not be of sufficient scale and magnitude to cause detectable system wide changes in channel morphology and/or habitats for the target species.

PP-1: Flows of varying magnitude, duration, frequency and rate of change affect the morphology and habitat quality of the river, including:

- Flows of 5,000 to 8,000 cfs magnitude in the habitat reach for a duration of three days at Overton on an annual or near-annual basis will build sand bars to an elevation suitable for least tern and piping plover habitat;
- Flows of 5,000 to 8,000 cfs magnitude in the habitat reach for a duration of three days at Overton on an annual or near-annual basis will increase the average width of the vegetation-free channel;
- Variations in flows of lesser magnitude will positively or negatively affect the sand bar habitat benefits for least terns and piping plovers.

PP-2: Between Lexington and Chapman, eliminating the sediment imbalance of approximately 400,000 tons annually in eroding reaches will:

- Reduce net erosion of the river bed;
- Increase the sustainability of a braided river;
- Contribute to channel widening;

- Shift the river over time to a relatively stable condition, in contrast to present conditions where reaches vary longitudinally between degrading, aggrading, and stable conditions; and
- Reduce the potential for degradation in the north channel of Jeffrey Island resulting from headcuts.

PP-3: Designed mechanical alterations of the channel at select locations can accelerate changes towards braided channel conditions and desired river habitat using techniques including:

- Mechanically cutting the banks and islands to widen the channel to a width sustainable by program flows at that site, and distributing the material in the channel;
- At specific locations, narrowing the river corridor and increasing stream power by consolidating over 85 percent of river flow into one channel will accelerate the plan form change from anastomosed to braided, promoting wider channels and more sand bars.
- Clearing vegetation from banks and islands will help to increase the width-to-depth ratio of the river

More detailed hypotheses that address uncertainty in underlying physical process relationships are formalized in the AMP as flow, sediment, and mechanical priority hypotheses (AMP, Table 2). The Program recently refined the list of priority hypotheses. Tier I physical process priority hypotheses include:

Flow #1: ↑ the variation between river stage at peak (indexed by Q1.5 flow @ Overton) and average flows (1,200 cfs index flow), by ↑ the stage of the peak (1.5-yr) flow through Program flows, will ↑ the height of sand bars between Overton and Chapman by 30% to 50% from existing conditions.

Flow #3: ↑ Q1.5 with Program flows will ↑ local boundary shear stress and frequency of inundation @ existing green line (elevation at which riparian vegetation can establish). These changes will ↑ riparian plant mortality along margins of channel, raising elevation of green line. Raised green line = more exposed sand bar area and wider unvegetated main channel.

Flow #5: ↑ magnitude and duration of flow will ↑ riparian plant mortality along the margins of the river. There will be different relations (graphs) for different species.

Sediment #1: Average sediment augmentation near Overton of 185,000 tons/yr under existing flow regime and 225,000 tons/yr under GC proposed flow regime achieves a sediment balance to Kearney.

Mechanical #2: ↑ the Q1.5 in the main channel by consolidating 85% of the flow, and aided by Program flow and a sediment balance, flows will exceed stream power thresholds that will convert main channel from meander morphology in anastomosed reaches to braided morphology with an average braiding index > 3.

Several Program protocols are being implemented to monitor target species, habitat, and physical processes to better understand interrelationships and provide data for evaluating species response to management actions. This RFP is related to the Program's protocol for channel geomorphology and in-channel vegetation monitoring. Information from this protocol will be used to help evaluate the linkages between land and water management activities of the Program, and effects on the Central Platte's channel geomorphology (e.g., river planform, width-to-depth ratio, and sand bar creation and maintenance) and in-channel vegetation.

The GC submits this Request for Proposals (RFP) to solicit proposals from Consultants to implement the Program's protocol for monitoring channel geomorphology and in-channel vegetation in the central Platte River (Nebraska). The term Consultant shall be used throughout this document to describe both the RFP Respondent providing the proposal and the Consultant (the successful Respondent) who would be performing the work upon award of the project.

This RFP describes a multi-year program of work encompassing annual channel geomorphology and in-channel vegetation monitoring and data analysis from summer 2012 through summer 2015. Annual budgets for implementing the protocol will be developed in conjunction with the selected Consultant. A four-year program of monitoring and reporting will begin in 2012, with potential extension beyond 2015. Under the final contract, annual written Notice to Proceed from the Program ED Office will be required before work begins. All work will be contingent on availability of Program funding.

II. PROJECT DESCRIPTION & SCOPE OF WORK

The Consultant will rigorously implement the Program's Channel Geomorphology and In-Channel Vegetation Monitoring Protocol (see Attachment A) for the Program's approximate 95-mile associated habitat within the Central Platte River. As described in the Protocol (Attachment A), 25 system-wide anchor points will be sampled each year. Each anchor point will include several transects sampled systematically to determine representative in-channel geomorphology and vegetation characteristics. The Protocol provides extensive detail about the study area, timing, and survey/data collection methods. Consultants responding to this RFP should provide information detailing their ability to implement all aspects of the Protocol.

Monitoring Tasks

In particular, potential Consultants should be aware of the following details related to implementation of the Protocol:

1) The area of interest for geomorphology and vegetation monitoring is the Program's associated habitat area, which consists of channels within an area 3.5-miles either side of the centerline of the Platte River from the junction of U.S. Highway 283 and Interstate 80 near Lexington, Nebraska, to Chapman, Nebraska (approximately 95 miles).

2) Timing of annual monitoring should occur during an annual low flow (ideally between 250 and 500 cfs) that typically occurs between July 1 and August 31. This will maximize the amount of data available to track changes in channel topography and vegetation. Although monitoring will ideally be completed during low flows, monitoring will be completed annually even in years when flows remain high. Consultants' proposals should demonstrate their ability to complete annual monitoring at a variety of flow levels.

3) Anchor points have been placed along the centerline of the main channel of the Platte River at approximately 2.5-mile intervals, and each point has been labeled with a UTM location and U.S. Army Corps of Engineers river mile. Geomorphology and in-channel vegetation monitoring will use these anchor points and the accompanying geomorphology and vegetation transects as the basic sampling unit for data collection and analyses. A total of 40 anchor points have been established within the area of interest. Anchor points sampled in any given year will include 20 pure panel anchor points that are

sampled each year (approximately 5 miles apart), and 5 rotating panel anchor points. There are 4 groups of rotating anchor points, and each group will be revisited once every four years.

4) Channel Geomorphology Monitoring – designed to document trends in channel geomorphology throughout the First Increment. Monitoring will focus on measuring and tracking changes in river plandform, cross-section geometry, longitudinal bed profile, sediment loads, and grain size distribution. A group of three transects at 500 foot spacing, with the middle transect centered each of anchor point, will be used to survey topography.

5) In-channel Vegetation Monitoring – designed to provide system-wide status in areal coverage and elevation range of in-channel seedling and invasive vegetation. Vegetation monitoring will be conducted at the same pure panel and rotating panel anchor points as the geomorphology survey. Seven linear vegetation transects spaced approximately 165 feet apart will be monitored at each of the anchor points, with three of the transects corresponding with the three geomorphology transects. Vegetation monitoring data will be collected for all vegetation species, but data will be analyzed and reported only for Program species of interest. Current vegetation species of interest include woody vegetation less than 1.5 meters tall, including willows, cottonwood, false indigo, sltcedar, and Russian olive, as well as purple lossestrife, phragmites, and cattails.

6) Monitoring data to be collected by the Consultant will include topographic ground and vegetation surveys, bed material surveys, ground photography, flow measurements, and sediment transport measurements. Additional data to be provided to the Consultant for analysis includes color-infrared (CIR) orthophotography and light detection and ranging (LiDAR). Two annual sets of aerial photographs will be provided: early summer (May-June), and late fall (November-December). Annual LiDAR data will also be provideded, which will be collected concurrently with aerial photographs during the late fall. Data from the Program's 1-dimensional hydraulic model (e.g., stage-discharge rating curves) will also be provided to the Consultant to assist in the data analysis (described in the following section).

Data Analysis

The successful Consultant will be expected to provide an analysis of collected channel geomorphology and in-channel vegetation data in accordance with data needs as directed by the ED Office. A data analysis plan is currently being developed by the ED Office and the existing channel geomorphology and in-channel vegetation monitoring contractor. The following table summarizes data analyses that will be completed, and relates each of the analyses to the pertinent Program broad hypothesis. Specific analyses and protocols for analyses will be detailed in the forthcoming data analysis plan.

Program Hypothesis	Supporting Data Analyses
S-1: A combination of flow management, sediment management, and land management (i.e., Clear/Level/Pulse) will/will not generate detectable changes in the channel morphology of the Platte River on Program lands, and/or habitats for whooping crane, least tern, piping plover, pallid sturgeon, and other species of concern.	• Total channel width at Program reference flows • Wetted width at Program reference flows • Width-to-depth ratio at Program reference flows • Unvegetated channel width at Program reference flows • Braiding index at Program reference flows
S-2: A combination of non-managed flows, sediment management, and land management (i.e., Clear/Level/Mechanical Maintenance) will/will not generate detectable changes in the channel morphology of the Platte River, and/or habitats for whooping crane, least tern, piping plover, pallid sturgeon, and other species of concern.	• Total channel width at Program reference flows • Wetted channel width at Program reference flows • Unvegetated channel width at Program reference flows • Width-to-depth ratio at Program reference flows • Braiding index at Program reference flows
S-4: Program management actions will/will not be of sufficient scale and magnitude to cause detectable system wide changes in channel morphology and/or habitats for the target species.	• Total channel width at Program reference flows • Wetted channel width at Program reference flows • Braiding index at Program reference flows • Reach-averaged width-to-depth ratio at Program reference flows • Longitudinal profile (e.g., change in thalweg elevation and channel slope) • Reach-averaged channel volume
PP-1: Flows of varying magnitude, duration, frequency and rate of change affect the morphology and habitat quality of the river, including: • Flows of 5,000 to 8,000 cfs magnitude in the habitat reach for a duration of three days at Overton on an annual or near-annual basis will build sand bars to an elevation suitable for least tern and piping plover habitat; • Flows of 5,000 to 8,000 cfs magnitude in the habitat reach for a duration of three days at Overton on an annual or near-annual basis will increase the average width of the vegetation-free channel; • Variations in flows of lesser magnitude will positively or negatively affect the sand bar habitat benefits for least terns and piping plovers.	• Sand bar height (e.g., bed relief index) • Total channel width at Program reference flows • Unvegetated channel width at Program reference flows • Green line elevation relative to Program reference flows • Green line elevation relative to peak annual flow • Green line elevation relative to flow frequency during vegetation germination season • Vegetation percent cover • Vegetation species elevation relative to Program reference flows
PP-2: Between Lexington and Chapman, eliminating the sediment imbalance of approximately 400,000 tons annually in eroding reaches will: • Reduce net erosion of the river bed;	• Sediment load • Bed and bar material grain size distribution • Bank material grain size distribution

Program Hypothesis	Supporting Data Analyses
• Increase the sustainability of a braided river; • Contribute to channel widening; • Shift the river over time to a relatively stable condition, in contrast to present conditions where reaches vary longitudinally between degrading, aggrading, and stable conditions; and • Reduce the potential for degradation in the north channel of Jeffrey Island resulting from headcuts.	• Channel volume • Braiding index at Program reference flows • Longitudinal profile • Total channel width at Program reference flows • Wetted width at Program reference flows
PP-3: Designed mechanical alterations of the channel at select locations can accelerate changes towards braided channel conditions and desired river habitat using techniques including: • Mechanically cutting the banks and islands to widen the channel to a width sustainable by program flows at that site, and distributing the material in the channel • At specific locations, narrowing the river corridor and increasing stream power by consolidating over 85 percent of river flow into one channel will accelerate the plan form change from anastomosed to braided, promoting wider channels and more sand bars • Clearing vegetation from banks and islands will help to increase the width-to-depth ratio of the river	• Braiding index at Program reference flows • Total channel width at Program reference flows • Wetted channel width at Program reference flows • Width-to-depth ratio at Program reference flows • Unvegetated channel width at Program reference flows • Vegetation percent cover
Flow 1: ↑ the variation between river stage at peak (indexed by Q1.5 flow @ Overton) and average flows (1,200 cfs index flow), by ↑ the stage of the peak (1.5-yr) flow through Program flows, will ↑ the height of sand bars between Overton and Chapman by 30% to 50% from existing conditions.	• Sand bar height (e.g., bed relief index)
Flow #3: ↑ Q1.5 with Program flows will ↑ local boundary shear stress and frequency of inundation @ existing green line (elevation at which riparian vegetation can establish). These changes will ↑ riparian plant mortality along margins of channel, raising elevation of green line. Raised green line = more exposed sand bar area and wider unvegetated main channel.	• Unvegetated channel width at Program reference flows • Vegetation percent cover • Green line elevation relative to peak annual flow • Green line elevation relative to flow frequency during vegetation germination season
Flow #5: ↑ magnitude and duration of flow will ↑ riparian plant mortality along the margins of the river. There will be different relations (graphs) for different species.	• Green line elevation relative to peak annual flow • Green line elevation relative to flow frequency during vegetation germination season • Vegetation percent cover • Vegetation species elevation relative to Program reference flows

Program Hypothesis	Supporting Data Analyses
Sediment #1: Average sediment augmentation near Overton of 185,000 tons/yr under existing flow regime and 225,000 tons/yr under GC proposed flow regime achieves a sediment balance to Kearney.	• Sediment load • Bed and bar material grain size distribution • Bank material grain size distribution • Channel volume • Braiding index at Program reference flows • Longitudinal profile
Mechanical #2: ↑ the Q1.5 in the main channel by consolidating 85% of the flow, and aided by Program flow and a sediment balance, flows will exceed stream power thresholds that will convert main channel from meander morphology in anastomosed reaches to braided morphology with an average braiding index > 3.	• Braiding index at Program reference flows

Reporting

The successful Consultant will generate a draft (Microsoft Word) and final (Microsoft Word and PDF) report at the completion of each monitoring season that includes methods, results, data analysis (as requested by the Program), photographs of field work, and other associated data. Reports will be delivered electronically to the ED Office for review and comment by the ED Office and the Program's Technical Advisory Committee. The Consultant will be responsible for uploading annual monitoring data to the Program's online database in a format consistent with other Program data. The successful Consultant will also be required to prepare for, attend, develop an Executive Summary for, and deliver a presentation at the Program's annual AMP Reporting Session generally held in Denver, CO in early March of each year.

III. PROJECT BUDGET

An estimated project budget should be submitted in the proposal, on a not-to-exceed time and expense basis for the work to be completed. A final budget will be established as part of the Project Scoping and Kickoff and will depend upon the budget estimate provided in the proposal for the selected Consultant.

Proposals will be evaluated on criteria described in **Section VI** below, including understanding of the objectives of the project, qualifications of the team members, and clarity/content of project schedule, scope, and budget. **The work will not be awarded based solely on a lowest cost basis.**

IV. FIELD AND OFFICE EQUIPMENT

Potential Consultants will own or acquire all field and office equipment and software required to implement the In-channel Geomorphology and Vegetation Monitoring Protocol.

V. CONTRACT TERMS

The selected Consultant will be retained by: Nebraska Community Foundation
PO Box 83107
Lincoln, NE 68501

Proposal should indicate whether the Consultant agrees to the contract terms, as outlined in the attached Program's Consultant Contract (Attachment B), or provides a clear description of any exceptions to the terms and conditions.

The initial term of the contract will be for a period beginning in March 2012 and terminating in March 2016 with an option to renew at the sole discretion of the GC. Contracted services will be performed on a time and material not to exceed basis. Under the final contract, written Notice to Proceed from the ED will be required before works begins. All work will be contingent on availability of Program funding.

VI. SUBMISSION REQUIREMENTS

All interested parties having experience providing the services listed in this RFP are requested to submit a proposal.

Instructions for Submitting Proposals

One electronic copy of your proposal must be submitted in PDF format to Steve Smith at *smiths@headwaterscorp.com* *no later than 12:00 p.m. (noon) Central time on Thursday, February 2, 2012.* Maximum allowable proposal PDF size is 8MB, and proposals are to be limited to a total of 50 pages or less. A proposal is late if received any time after 12:00 p.m. Central time and will not be eligible for consideration.

Questions regarding the information contained in this RFP should be submitted to Steve Smith at *smiths@headwaterscorp.com*. A list of compiled Consultant questions and responses will be maintained on the Program web site (*www.PlatteRiverProgram.org*) in the same location as this RFP solicitation.

RFP Schedule

The ED Office expects to complete the selection process and award the work by approximately February 20, 2012. The following table represents the RFP schedule:

Description	Date	Time (Central)
Issue RFP	January 12, 2012	NA
Pre-proposal meeting	January 24, 2012	2:00 PM
Last day for respondents to submit questions regarding the RFP	January 30, 2012	12:00 PM
Proposals due from respondents	February 2, 2012	12:00 PM
Evaluation of proposals	February 2, 2012 to February 10, 2012	
Award of Work	On or before February 20, 2012	
Start of Work	Approximately March 15, 2012	
Completion of Work	Approximately March 31, 2016	

Pre-Proposal Meeting

A non-mandatory pre-proposal meeting of interested parties will be held on January 24, 2012 from 2:00 to 3:00 p.m. Central Time via conference call for the purpose of familiarizing the respondents with the work scope and requirements included herein before submitting a response to this RFP. Please email Steve Smith (smiths@headwaterscorp.com) for the conference call dial-in information along with a list of people from your party expected to join in the pre-proposal conference call by 12:00 p.m. Central time on January 20, 2012.

The meeting will include a brief overview by the ED Office regarding the objectives of the project, the scope of services, and the timeline. It is the Consultant's responsibility, while at the pre-proposal meeting/conference call, to ask questions necessary to understand the RFP so the respondent can submit a

proposal that is complete and in accordance with RFP requirements. It is highly recommended that all prospective Consultants participate in the pre-proposal meeting/conference call as there shall be no minutes distributed by the ED Office regarding the meeting.

Proposal Content

Proposals should respond to the following general topics:

1) **Executive summary** that presents a brief firm overview that condenses and highlights the contents of the proposal in such a way as to provide a broad understanding of the Consultant's qualifications and proposal.

2) **Project understanding** that demonstrates the Consultant understands project goals and objectives and identifies issues critical to project success.

3) **Project approach** that documents how the Consultant would organize and execute the scope of work detailed in this RFP and provides project team organization, resumes, and responsibilities and specifies which team members will work on each specific task.

4) **Qualifications and project experience** relevant to this project including the involvement/role of the proposed team in those projects. Be clear which team members will work on specific tasks outlined in the Project Approach and focus on those team members' qualifications specific to assigned task.

5) **Schedule** for completing the tasks identified in the project approach. Include potential constraints or challenges based on the tasks described above.

6) **Compensation** for services to complete the project for the term of the contract (i.e., 4 years of monitoring, data analysis, and reporting) – see Section III above for additional details. Assumptions used must be clearly stated and a total estimated cost must be included. Consultant must specify the estimated number of labor hours for each team member, billable rate and estimated direct expenses (e.g., travel), and total project cost to complete the each task/subtask detailed herein and Consultant's other recommended or optional tasks.

7) **Conflict of interest statement** addressing whether or not any potential conflict of interest exists between this project and other past or on-going projects, including any projects currently being conducted for the Program.

8) **Description of insurance** shall be provided with the proposal. Proof of insurance will be required before a contract is issued. Minimum insurance requirements are described in the attached Program's Consultant Contract (Attachment B).

9) **Acceptance of the terms and conditions** as outlined in the attached Program's Consultant Contract, or clear description of any exceptions to the terms and conditions.

Criteria for Evaluating Proposals

The GC will appoint a Proposal Selection Panel that will evaluate all proposals and select a Consultant based on the following principal considerations:

1. Understanding of the overall objectives of the project and approach to meeting those objectives and addressing critical project tasks and issues.

2. Qualifications and the relevant experience of the proposed project team members.

3. Clarity and content of the project schedule, scope, and budget.

Award Notice

After completing the evaluation of all proposals and, if deemed necessary, interviews, the Proposal Selection Panel will select a Consultant. That firm will negotiate with the ED Office to establish a fair and equitable contract. If an agreement cannot be reached, a second firm will be invited to negotiate and so on. If the Program is unable to negotiate a mutually satisfactory contract with a Consultant, it may, at its sole discretion, cancel and reissue a new RFP.

Program Perspective

The Program GC has the sole discretion and reserves the right to reject any and all proposals received in response to this RFP and to cancel this solicitation if it is deemed in the best interest of the Program to do so. Issuance of this RFP in no way constitutes a commitment by the Program to award a contract, or to pay Consultant's costs incurred either in the preparation of a response to his RFP or during negotiations, if any, of a contract for services. The Program also reserves the right to make amendments to this RFP by giving written notice to Consultants, and to request clarification, supplements, and additions to the information provided by a Consultant.

By submitting a proposal in response to this solicitation, Consultants understand and agree that any selection of a Consultant or any decision to reject any or all responses or to establish no contracts shall be at the sole discretion of the Program. To the extent authorized by law, the Consultant shall indemnify, save, and hold harmless the Nebraska Community Foundation, the states of Colorado, Wyoming, and Nebraska, the Department of the Interior, members of the GC, and the ED Office, their employees, employers, and agents, against any and all claims, damages, liability, and court awards including costs, expenses, and attorney fees incurred as a result of any act or omission by the Consultant or its employees, agents, sub-Consultants, or assignees pursuant to the terms of this project. Additionally, by submitting a proposal, Consultants agree that they waive any claim for the recovery of any costs or expenses incurred in preparing and submitting a proposal.

VII. AVAILABLE INFORMATION

The following pertinent Program-related documents can be accessed from the Program's website (*www.PlatteRiverProgram.org*):

- *Platte River Recovery Implementation Program: Final Program Document*. October 24, 2006.
- *Platte River Recovery Implementation Program, Attachment 3: Adaptive Management Plan*. October 24, 2006.
- *Platte River Recovery Implementation Program,*. October 24, 2006.
- *Platte River Recovery Implementation Program: Monitoring the Channel Geomorphology and In-Channel Vegetation of the Central Platte River*. April 23, 2010.
- *Platte River Recovery Implementation Program: Year 1 (2009) Report. Channel Geomorphology and In-Channel Vegetation Monitoring of the Central Platte River*. Prepared by Ayres Associates and Olsson Associates. February 2010.

405 • *Platte River Recovery Implementation Program: Year 2 (2010) Report. Channel Geomorphology and*
406 *In-Channel Vegetation Monitoring of the Central Platte River*. Prepared by Ayres Associates and
407 Olsson Associates. March 2011.

Attachment A

PRRIP Channel Geomorphology and In-Channel Vegetation Monitoring Protocol

PLATTE RIVER RECOVERY IMPLEMENTATION PROGRAM
Monitoring the Channel Geomorphology and In-Channel Vegetation of the Central Platte River

I. PURPOSE

The purpose of geomorphology monitoring is to document trends in channel geomorphology parameters in the area of interest during the thirteen-year First Increment (2007-2019) of the Platte River Recovery Implementation Program (Program), including documenting channel shape (including width), channel plan form, channel degradation or aggradation, grain sizes, and sediment loads.

The purpose of the in-channel vegetation survey is to provide system-wide status in areal coverage and elevation range of in-channel seedlings and invasive vegetation. This information is designed for use in the annual and long-term planning for implementation of the Program's Adaptive Management Plan (AMP) and use of water in the Environmental Account (EA) to evaluate the extent of existing native and non-native invasive species infestations, and to serve as a mechanism for identification of new invasive species populations before infestations become widespread.

Several priority hypotheses identified in the AMP are directly linked to river morphology and are influenced by in-channel vegetation. Data collected through this monitoring protocol will be utilized to determine effects and relationships that relate back to these priority hypotheses, the two management strategies identified in the AMP, and overall AMP implementation. Several priority hypotheses related to system form and function, physical processes, terns and plovers, whooping cranes, and pallid sturgeon (AMP, Table 2) are linked to aspects of geomorphology.

II. DESIGN CONSIDERATIONS

II.A. Area of Interest

The area of interest for geomorphology and vegetation monitoring consists of channels within an area 3.5-miles either side of the centerline of the Platte River and tributary basins beginning at the junction of U.S. Highway 283 and Interstate 80 near Lexington, Nebraska, and extending eastward to Chapman, Nebraska (approximately 95 miles). Certain areas within this stretch of the central Platte will be prioritized for monitoring based on key priority hypotheses, ecological need, and Program actions undertaken during the First Increment.

II.B. Definitions

- Accretion Zone – area encompassed by existing and former channels of the river.
- Active Channel – portion of the channel where inundation by water and movement of bed sediment occurs sufficiently often to maintain the area devoid of permanent woody vegetation.

- Anchor Points – a location every 4,000 meters (2.5 miles) in the main channel with a grouping of three cross sections. The cross sections are spaced approximately 150 meters (500 feet) apart with the middle cross section located at the anchor point.
- Belt Transect – a vegetation survey area centered on an anchor point, generally oriented perpendicular to flow, and extending 150 meters (500 feet) upstream and downstream, and from edge of Vegetation Survey Zone to edge of Vegetation Survey Zone.
- Cross Section – topography data on a line perpendicular to the main channel that traverses the active channel, accretion zone, and the full width of the floodplain.
- Left/Right Bank – the bank location as viewed looking downstream (may also be defined as left/right descending bank).
- Green Line – edge of vegetation on a sand bar or adjacent to a wetted channel, defined by at least 25 percent cover of vegetation.
- Pure Panel – a group of points sampled every year
- Rotating Panel – a group of points with one-fourth of points sampled every year.
- Sampling Point – data collected for analysis from locations such as an anchor point transect.
- Sample Site – an anchor point and 7 cross sections as defined previously.
- Section Data – topography data from either cross sections or transects.
- Species of Interest (for vegetation monitoring):
    - Woody species less than 1.5 meters high located within the belt transect including, but not limited to:
        - Willows
        - Cottonwood
        - False indigo
        - Saltcedar (all heights)
        - Russian olive
    - Herbaceous species of interest within the Vegetation Survey Zone, including but not limited to:
        - Purple loosestrife
        - Phragmites
        - Cattails
        - River bulrush
    - Species of interest can be added or removed from this list during the First Increment.
- Stratigraphy – the arrangement of strata as related to origin, composition, distribution, and succession.
- Thalweg – The line joining the deepest points of a stream or river channel.
- Transect – topography data on a line perpendicular to the channel that may traverse the active channel and/or accretion zone, but may not include the width of the floodplain.
- Vegetation Survey Zone – this is an area within the belt transect that includes active channel but generally excludes areas of permanent woody vegetation taller than 4 meters in height or other areas that are clearly beyond the effect of high water flows.

II.C. Channel Geomorphology Monitoring

Program geomorphology monitoring is designed to document trends in channel morphology within the entire study area throughout the First Increment. In addition, the data will provide information on trends at specific sites or groups of sites within the entire study area. Monitoring will focus on measuring and tracking changes in river planform, river cross-section geometry (including bed elevation and channel width), longitudinal bed profile, streamflow, sediment loads, and grain size distribution. The monitoring data will be collected through aerial photographs, airborne terrestrial LiDAR, topographic ground surveys, bed material surveys, ground photography, flow measurements at gaging stations, and sediment transport measurements. The overall strategy will focus on a randomized scheme, but there will be some sampling stratification (e.g. grain size) to reduce variability and improve future comparisons.

II.D. Anchor Points

A probability based systematic sample of points along the river will be "anchors" for data collection. These anchor points were systematically placed along the centerline of the main channel of the river. The anchor points are spaced at approximately 4,000-meter (2.5 mile) intervals along the centerline, and each point has been labeled with a UTM (Universal Transverse Mercator coordinate system) location and a U.S. Army Corps of Engineers (COE) river mile (using COE river mile shape file obtained from the Bureau of Reclamation). The proposed anchor points are listed by river mile in **Table 1**. The locations of anchor points can vary up to 800 meters (0.5 mile) from the 4,000-meter spacing to accommodate previously established cross sections with a historical database, and to potentially accommodate some land access issues. Monitoring will use a sample of these anchor points and three accompanying cross sections as the basic sampling unit for data collection and analyses. The anchor point cross sections will extend laterally across the historic flood plain and incorporate the current main channel as well as all primary split flow channels (i.e., those channels separated from the main channel by islands). Although the south channel (Reach 2) and north channel (Reach 1) of Jeffrey Island share the same anchor points, these two channels are treated as separate reaches of river for monitoring, measuring, and analysis.

II.E. Pure and Rotating Panels

The anchor points sampled in any year under this protocol will be components of a pure panel and a rotating panel of sites. A panel is made up of a group of sampling sites that are always visited at the same time. The pure panel will consist of a group of sites that are visited at each sampling frequency. The rotating panel will consist of four groups of sites, with only one group visited at each sampling frequency and each group revisited once every four sampling frequencies.

There will be 25 sample sites surveyed each year: 20 pure panel anchor points (three transects per anchor point) and 5 rotating panel anchor points (three transects per anchor point). The sample sites in the pure panel will be surveyed each year while the sample sites in the rotating panel will be surveyed every four years (rotating between R1-R4 sites as denoted in Table 1). Each site in the rotating panel will be surveyed three times in the First Increment.

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TABLE 1 – PROPOSED ANCHOR POINT LOCATIONS

Anchor Point No.	Systematic Point at 4000 m (2.5 miles) (River Mile)	Closest Existing Cross Section	Recommended Anchor Point (River Mile)	Pure (P) or Rotating (R) Panel	Location
40	254	254.4	254.4	**R1**	Lexington
39	251.5 Bridge	250.5	250.8	**P**	Lexington bridge (Hwy 283)
38	249	249.5	249.0	**R2**	
37	246.5	246.5 N & 246.0 S	246.5 N & S	**P**	J2 Return - Jeffrey Island
36	244	244.0 N & S	244.0 N & S	**R3**	
35	241.5		241.5 N & S	**P**	
34	239	239.1	239.1	**R4**	d/s Overton bridge (Rd. 444)
33	236.5	237.3	236.4	**P**	Cottonwood Ranch transects
32	234	233.9	234.1 Main, N, S	**R1**	
31	231.5	231.5	231.5	**P**	u/s Elm Creek bridge (Hwy 183)
30	229	228.6	228.6	**R2**	d/s Kearney Diversion
29	226.5	226.4	226.4	**P**	
28	224 Bridge	224.3	224.3	**R3**	Odessa Rd. Bridge
27	221.5	222.0	221.9	**P**	
26	219	219.8	219.0	**R4**	
25	216.5		216.5	**P**	
24	214		214.0	**R1**	d/s Kearney bridge (Hwy 44)
23	211.5	210.6	211.5 Main & N1,N2	**P**	
22	209	208.4	208.4 Main & N1	**R2**	u/s 32 Rd. bridge (Hwy 10)
21	206.5	206.7 (no N)	206.7 Main & N1	**P**	
20	204	203.3 N&S	204.0 Main & N1	**R3**	
19	201.5	201.1 N maybe S	201.1 Main & N1	**P**	d/s Lowell Rd. bridge (Hwy 10C)
18	199	199.5	199.5	**R4**	
17	196.5	196.4	196.4	**P**	u/s Shelton Rd. bridge (Hwy 10D)
16	194	193.9	193.8	**R1**	
15	191.5	190.9	190.7	**P**	
14	189	189.3	189.3	**R2**	
13	186.5	187.0	186.7 Main & N1	**P**	d/s S. Nebraska Hwy 11 bridge
12	184	183.1	184.0 Main & N1	**R3**	
11	181.5	181.8 S	181.8 Main & N1	**P**	d/s S. Alda Rd. bridge
10	179	178.38 & 178.4 M & N	179.0 Main & N1,N2,N3	**R4**	
9	176.5	177.1	176.5 Main & N1,N2,N3	**P**	u/s SR 34/281 bridge (Doniphan)
8	174	174.6	174 Main & N1,N2,N3	**R1**	Grand Island
7	171.5	172.1 S & SM & N & NM	171.5 Main & N1,N2,N3	**P**	d/s I-80 bridge
6	169	168.7 N & S	169.1 Main & N1	**R2**	
5	166.5	166.9	166.9	**P**	d/s SR 34/Hwy 2 bridge
4	164	164.6	164.0	**R3**	
3	161.5	162.1	161.8	**P**	Phillips
2	159	158.7	158.7	**R4**	
1	156.5	157.3	156.6	**P**	d/s Bader Park Rd. br (Chapman)

New survey at systematic point

Use existing site (Holburn et al. 2008)

Use existing site if new transect can be aligned to match existing site using metal pins or coordinates

II.F. In-channel Vegetation Monitoring

The vegetation survey will document the areal extent and percent cover of woody and herbaceous species located within the Vegetation Survey Zone, with special emphasis on the species of interest. The system-wide anchor points will be used to locate the data collection in order to obtain estimates that are representative of the entire study area. The survey will utilize the topography survey conducted as part of the annual geomorphology monitoring. Since the objective of this monitoring is to identify trends in extent and elevation, the in-channel vegetation monitoring design will be conducted at the same pure panel and rotating panel anchor points as the geomorphology survey.

One fixed width (belt) transect at each anchor point will be used to estimate the area of the channel with vegetation of interest present. The belt transect will be centered on an anchor point and be generally oriented perpendicular to the flow. The length of each transect will be the length of the Vegetation Survey Zone between the historic high banks. The width of each belt transect will be approximately 300 meters (1,000 feet), extending for approximately 150 meters (500 feet) upstream and downstream of the anchor point. Within the belt transect, seven linear vegetation transects spaced approximately 50 meters (165 feet) apart will be established perpendicular to flow and generally parallel to the geomorphology transects. Three of the vegetation transects will correspond with the three geomorphology transects. On each transect, sample points will be assessed for percent canopy cover for each species occurring at the sample point using a plot canopy coverage method, and elevation. Sample points will be spaced on each linear transect at approximately 10 meters (33 feet) intervals within the Vegetation Survey Zone, as defined above.

Current vegetation species of interest include woody vegetation less than 1.5 meters tall, including willows, cottonwood, false indigo, saltcedar (all heights), and Russian olive, as well as purple loosestrife, phragmites, and cattails. The monitoring will identify all vegetation, including the above species of interest, at each sample point within the Vegetation Survey Zone.

II.G. Statistical Analysis Methods

The data analysis of change will be guided by theoretical laws of science that are focused by the priority hypotheses described in the AMP. In addition to this theoretically based means of analysis, the data will be scrutinized through statistical means. The statistical analysis is intended to complement the theoretical analysis by aiding in the detection of small changes, and by aiding in the determination of confidence in theoretically based conclusions.

All raw data will be retained in the Program database and will be summarized for each sample point. Summarization metrics will be calculated with this data and difference metrics will be calculated for each sample unit as the difference of any metric between two time periods.

The monitoring sampling program described in this protocol is designed as an observational study through time. There is no comparison of control and treatment. This monitoring plan is designed to detect trends in physical habitat and geomorphology metrics. Data will be summarized for each sampling point or location, such as anchor points or gage stations, and

statistics such as the mean and standard deviation will be compiled for the sample unit. In system-level monitoring, inferences will be made to the entire study area (or a river reach of interest) since each point will be placed systematically along the length of the river.

Analysis of trends for each parameter will follow the recommendations in the research and management protocols. Difference metrics will be calculated between survey times for each sampling unit. Trend analyses will be conducted using non-parametric techniques, least squares regression, or mixed models for longitudinal data (Chen et al. 1999, Helsel and Hirsch 1992). Selection of the method used to determine if trends are statistically significant will depend on the amount of missing data, data distribution, and historical use of methods for each parameter.

Post-stratification of the river by classifying sites into strata will enable analyses of the data within each stratum (Thompson 1992). Sites will be grouped into geomorphologic segments for analyses that are consistent with analyses that were conducted previously. Sites will be classified into strata before each analysis so that sites that have changed strata affiliation will be in the correct stratum for analysis.

III. SAMPLING AND ANALYSIS METHODS

III.A. Airborne Mapping of Topography

Topography information in the form of contour base mapping will be developed from airborne terrestrial LiDAR. Mapping with a plus or minus six-inch horizontal accuracy and one-foot contours (vertical accuracy) covering the area between the historic outer banks (approximately one mile in width) will provide baseline topographic information from Lexington to Chapman for monitoring channel changes. Topography information within the active channel will also be obtained from transect ground surveys (GPS or total station). Transects from ground surveys will then be extended to the full width of the floodplain (i.e., cross sections) and to the outer historic banks using LiDAR topography. Vegetation on the floodplain and on islands within the outer historic banks makes ground surveys laborious and costly outside the active channel or disked ground. Airborne terrestrial LiDAR flights for mapping will be flown at the beginning (baseline conditions) and end of the First Increment. LiDAR mapping will provide data for: planform mapping; topography for extending transects to cross sections; basic input to 1-D and 2-D flow, sediment, and vegetation modeling; and data for base mapping for designing sediment and planform (flow consolidation and other mechanical actions) management actions.

III.B. Ground Survey of Transects and Longitudinal Profile

Sample sites will be surveyed according to the schedule for pure and rotating panels, while the longitudinal survey will occur once at the start-up of the program and a second time a year before the end of the First Increment. The transect surveys should occur during an annual low flow [ideally between 250 and 500 cubic feet per second (cfs)] between July 1 and August 31 to track changes in measures of channel shape and slope. The longitudinal profile survey could be conducted at higher flows, preferably during spring runoff, to allow for the use of survey-grade, boat-mounted, GPS-based, depth-sounding equipment (e.g., fathometer). A GPS-based hydrographic survey is preferential because it is less time consuming and easier to conduct (i.e.,

using a boat versus physically walking the channel), is less costly (fewer person-hours and lower equipment costs), and provides significantly more topographic data. Regardless, the performance of survey work should be conducted in an effort to avoid tern and plover and whooping crane nesting seasons when possible.

The locations of established control points and permanent benchmarks will be identified prior to conducting the surveys. Where control points or benchmarks have been destroyed, damaged, or displaced, those points will be reestablished. In areas where there is insufficient survey control, new control points or permanent benchmarks may need to be established for use in conducting the transect and longitudinal profile surveys. All new or reestablished benchmarks and control points will be established and monumented using standard survey techniques and criteria.

III.B.1. Ground Transects

A group of three transects at 150 meter (500 feet) spacings, with the middle transect centered at the anchor point, will be measured at each anchor point selected for sampling. Each transect represents the surveyed active channel portion of a cross section at an anchor point. Each cross section will extend across all channels and islands of the Platte River in the 100-year flood plain, or between outer historic banks. The cross sections will be generally oriented perpendicular to average flow direction and high flow direction in the main channel.

Doglegs in the cross section may be used to align the cross section perpendicular to flow on other secondary channels that are not parallel to the main channel. However, future channel shifts may be problematic with regard to previously established dogleg alignments as well as with estimating year-to-year volumetric changes relative to channel aggradation or degradation at a cross section. Therefore, the hinge points for doglegs should be established on relatively permanent surfaces (such as islands) and far enough from the active channel to avoid the effects of active bank erosion and long-term channel migration. Dogleg hinge points should also be monumented with marker pins. Once a dogleg has been established in the first survey year, the dogleg should be maintained and surveyed as-is throughout the First Increment in order to accurately estimate year-to-year volumetric changes relative to channel aggradation or degradation at a cross section

Ground surveys will provide transect data within the active channel (accretion zone), while LiDAR mapping will be used to extend transects across the full width of the flood plain (i.e., translate transects to full cross sections). Ground-surveyed transects only need to extend along the cross sections where the ground has been inundated since the previous survey and should include areas where the ground has been disturbed by anthropogenic activities (i.e., areas that have been disked or mowed), where natural processes have created significant topographic changes (i.e., channels and islands where sediment could have deposited or been eroded), or locations where new dikes or other river training structures have been placed or removed by landowners (should be described and recorded in survey notes). The transect survey will include the channels, banks, and small islands within the accretion zone, but will not include the upland portions of the cross section beyond the potential bank erosion/deposition zone.

Because of the presence of multiple active secondary channels separated by large islands, ground surveys between Kearney and Grand Island may require four or more sets of transect measurements with two marker pins per transect, to record measurements of all the active channels in a cross section. The transects on the secondary channels will only be surveyed once every four years, with the transects of the pure panel anchor points being surveyed in Year 1 and every time the R1 rotating panel anchor points are surveyed. The secondary channel transects on all the rotating panel points will be surveyed during the first year of their rotation and each time that rotating panel point is resurveyed.

When a transect is re-visited in the First Increment, repeat measurements will focus on breaks in slope. Changes in this measurement over time will indicate aggradation or degradation at a point in the river, indicate changes in the shape of the cross section, and provide geometry data for 1-D and 2-D modeling. The comparison of three transects at each anchor point over time allows calculation of an average change in the volume of sediment stored in the 300 m reach at the anchor point. These estimates will be used to indicate aggradation or degradation within the 300 meter sampled area and to infer changes in sediment storage throughout the 95-mile reach of interest.

III.B.2. Survey Methods for Ground Transects

The transects will be surveyed using a survey-grade global positioning system (GPS) to document the topography of features within the accretion zone, including the elevation and location of breaks in slope, banks, thalweg, bars, and islands. The horizontal reference datum for all surveys will be the North American Datum of 1983 (NAD 1983) and the vertical reference datum will be the North American Vertical Datum of 1988 (NAVD 1988).

Each transect within each cross section will be generally oriented perpendicular to the principal flow direction and will extend through all channels at the anchor point. Doglegs in the cross section line may be needed to remain perpendicular to flows in major side channels. The location of the cross section will be delineated on both historic outer banks with a permanent metal marker (pin) set above the flood elevation and far enough from the active channel to avoid all but the most severe erosion effects.

The location of cross-section marker pins, their monumentation, and the extent of the survey beyond the pins will be dependent on accessibility and private property requirements and restrictions. The marker pins will be composed of 1/2-inch (#4) rebar, approximately 18-inch long, driven flush with the ground surface, and topped with an aluminum cap that is stamped with the anchor point and transect identifier. The geographic coordinates and elevation of each marker pin will be established with vertical and horizontal accuracies of 0.1 feet or less using standard survey techniques and criteria, and a detailed description of the location of each pin will be documented in the surveyor's notes. Depending on the type, location, and extent of Program activities and other potential natural or man-made disturbances, marker pins may be lost, damaged, or displaced over time and will need to be reestablished as necessary during annual surveys.

The surveyor will take GPS readings and appropriately identify the following in the data recorder:

- top of bank
- toe of bank
- left and right edge of water
- main and secondary channel thalwegs
- water surface at exposed bars and islands
- bed or ground elevation
- edge of canopy of permanent woody vegetation > 1.5m tall
- edge of vegetation (green line)
- any other significant geomorphic feature in the transect

Surveyor's notes should also specify major substrates and vegetation cover types and boundaries in the section. The major vegetation cover types will be very general and consistent with the aerial photographic maps. When surveying topography in vegetated areas, a maximum height of vegetation will be recorded with the topography point to compute height of vegetation blocking observation view. In order to adequately define the channel bed, GPS readings will be taken at significant breaks in slope. If the channel bed or a portion of the channel bed is flat with no breaks in slope, a GPS survey point will be recorded every fifteen meters (50 feet). The repeat measurements will be taken along the identical orientation as the original transect, as located by the permanent metal pins and the horizontal coordinates. The survey could extend beyond the marker pins if the upland portions of the transects have been inundated since the previous survey.

All transect survey data collected each year will be downloaded and compiled electronically into spreadsheets for future use in identifying volumetric changes of the channel over time. The transect survey data will be differentiated as such in the spreadsheets. LiDAR data will be merged with the transect survey data to extend each anchor point's cross-sections and will be identified in the spreadsheet as LiDAR data. Individual spreadsheets will be developed for each anchor point and will include both the survey data for each transect and the LiDAR data for each cross section at that anchor point. Both the LiDAR and survey points for each cross section will be documented in the spreadsheet by their UTM easting and northing coordinate pair, elevation, and stationing from the left descending bank marker pin. The UTM zone, point identifiers and comments will be included. Formatted annual cross section point data and attributes will also be electronically uploaded and seamlessly incorporated into the Program database. Where the cross section is extended across the floodplain on the left bank, the stationing will be documented as a negative value. Since it is extremely difficult to precisely follow a pre-defined survey line for each transect, the stationing for each survey point will be defined by projecting a line perpendicular to the transect line from the surveyed point and where it intersects the transect line, that is the point at which stationing is calculated based on its distance from the left bank marker pin.

III.B.3. Measurements of Channel Width and Width/Depth Ratio from Transect Surveys

To detect small changes in wetted width and the width-to-depth ratio, compute these values from ground surveyed transects of the main channel at anchor points using two specified flows: 2,000 cfs generally representing mean annual flow, and 1,200 cfs, the tern and plover habitat reference flow. Flow measurements are based on the USGS discharge gage at Grand Island. The wetted width and width-to-depth ratio are measured for both the entire cross section (total) and for the main channel only. A width-to-depth ratio is the wetted width of the channel divided by the maximum depth of the channel.

Before calculating these values, the specified flow must be distributed between the multiple channels of the cross section, and the water surface computed at normal depth or computed from a step-backwater calculation. The division of flows amongst multiple channels and determination of water surface elevation is most easily and consistently accomplished by using a numerical flow model. This method makes it possible to compare these values consistently and to detect small changes in width to depth ratio and wetted width.

The main channel alignment should be checked when reducing data from annual ground surveys to ensure there have been no significant changes in flow direction at the transects. Large changes in flow alignment could introduce some error in the width and width-to-depth measure if the orientation of the topography survey transects are not adjusted.

The wetted surface width measured from ground survey transect data at a specified flow of 1,200 cfs should be compared to widths measured from aerial photographs at similar flow for the purpose of quality control.

III.B.4. Longitudinal Profile Survey

The longitudinal profile of the main channel thalweg will be monitored to provide data on irregularities in slope that may affect channel planform and cross section, and to evaluate trends in aggradation and degradation. The longitudinal profile should be measured with a hydrographic survey in Year 1 (or earliest possible year) and Year Twelve of the Program. The survey should include thalweg measurements in the main channel of the river between Lexington and Chapman and the south channel at Jeffrey Island between the Johnson-2 (J2) Return and the confluence with the main channel.

Prior to conducting the survey, the principal flow path within the main channel that contains the primary thalweg will be identified from the most current georeferenced aerial imagery and the flow path will be used to guide the hydrographic survey. Since there are multiple flow paths within and outside of the main active channel, the identified flow path that contains the primary thalweg will provide an accurate boundary within which the hydrographic survey can be conducted.

The profile survey will be conducted using a boat-mounted, survey grade, GPS-based fathometer. The horizontal and vertical accuracy of the survey should be to within 0.1 feet using NAD 1983 as the horizontal reference datum and NAVD 1988 as the vertical reference datum.

Where possible, the profile survey should be performed in a manner that accurately defines the position of the thalweg while minimizing the distance between thalweg points. This may be accomplished by closely following the thalweg where it is evident. If flow depths are sufficiently deep to preclude the accurate identification of the thalweg, a cross-channel zigzag or rectangular pattern of surveying that will identify the thalweg should be used. Where a zigzag or rectangular pattern is used, a maximum spacing between cross-channel survey lines of no more than 150 meters (500 feet) should be used. However, since the presence of numerous islands, high bars, and dense vegetation may locally limit a detailed survey at that spacing, every effort should be used to collect a reasonable number of surveyed points in those areas to accurately define the thalweg.

All survey point data will be downloaded and compiled electronically into a spreadsheet and defined by UTM easting and northing coordinate pairs and elevation. The main channel thalweg points will be extracted and compiled in a separate Excel spreadsheet, which will be used to develop the longitudinal thalweg profile for the project reach. The formatted thalweg survey point data and attributes will also be electronically uploaded and seamlessly incorporated into the Program database. Stationing for the profile can be based on the straight-line point-to-point distance upstream of the Chapman bridge (Bader Park Rd.) or can be rectified to COE river mile markers by projecting a line from the surveyed thalweg point perpendicular to a straight line connecting the mile markers. Where it intersects the mile marker connecting line that is the point at which stationing is calculated.

III.C. In-Channel Vegetation Survey

Three hundred meter wide belt transects (approximately 150 meters on either side of the anchor point) at each anchor point in the pure panel as well as that year's rotating panel will be visited once a year during the period specified in Section III.C.1. to document vegetation within the Vegetation Survey Zone.

Within the belt transect, seven linear vegetation transects will be established perpendicular to the flow at approximately 50 meter (165 feet) intervals. Three of the linear vegetation transects will be at the same locations as the geomorphology transects. Vegetation sample points will be taken along these linear transects only within the Vegetation Survey Zone as defined above.

The vegetation sample points will be established at intervals spaced approximately 10 meters (33 feet) apart along the transect. This interval will be continually evaluated for appropriateness and is, therefore, subject to change. At each sample point, a one-meter square quadrat will be used to determine species composition and percent vegetative cover. At each sample point, the following data will be collected:

- the GPS coordinates of the sample point using survey grade GPS equipment
- the elevation of the sample point using survey grade GPS equipment
- a list of all species occurring within the quadrat
- the percent cover of each species by visual estimation, recorded using the Daubenmire (1959) cover classification system (cover classes 1-6)

- an estimate of the average height of the woody vegetation
- an estimate of the average height of the herbaceous vegetation
- the community classification code using the system outlined in Steinauer and Rolfsmeier (2003)

In addition to the vegetation sample points, a data point documenting GPS coordinates and elevation will be taken at these locations:

- each edge of the Vegetation Survey Zone
- the "green line" at the edge of vegetated sand bars and wetted channel

III.C.1. Timing

The in-channel vegetation survey will take place annually between July 1 and August 31, water flows permitting, and at the same time as geomorphology monitoring activities. The elevation information will come from implementation of the geomorphology monitoring protocol. The information gained from this monitoring will be summarized for inclusion in planning documents related to implementation of the AMP and the Environmental Account Annual Operating Plan (AOP).

III.C.2. Analysis

The average elevation and areal extent of species of interest will be estimated with the in-channel vegetation survey. The data from each sample point will be analyzed to determine which species of interest occur at that point.

Frequency of Occurrence - For each belt transect, the frequency of occurrence for each species of interest will be calculated by dividing the number of sample points at which a species of interest was found by the total number of sample points at that belt transect. In addition, a shapefile will be prepared with an attribute table that will detail the presence or absence of each species of interest at each sample point.

Percent Cover - For each belt transect, the percent cover for each species of interest will be calculated by averaging the percent cover for that species at all sample points. In addition, an estimate of the areal coverage at each belt transect will be obtained by multiplying the percent cover of each species of interest by the estimated belt transect area.

Elevation Data - For each belt transect, and for each species of interest, the elevation data for sample points at which that species occurs will be averaged to determine the average elevation for that species at that belt transect. The average elevation for each species of interest at each anchor point will be converted to the elevation above water level at a base flow using nearby gaging information. The average elevation above water at a base flow for each anchor point will be weighted by the percent area covered for that anchor point, and the result will be combined across anchor points to obtain a frequency distribution of elevation for species of interest in the study area channel. This distribution will be used to determine

the proportion of species of interest present in the main channel at each elevation above the base flow water level.

III.D. Bed and Bank Material Sampling

Bed and bank material samples will be taken at the anchor point transects to track changes in measures of bed material grain size distribution. Changes in grain size distribution over time will indicate coarsening or fining of the sediment at the system level. Due to natural variation in grain sizes in river channels, a stratified sampling scheme is necessary to reduce variance in order to evaluate long-term trends.

III.D.1. Bed Material Sampling Methodology

Bed material will be documented using grain size distributions of bed material samples collected during each successive annual topographic survey; however, bank material sampling will not be repeated at successive annual topographic surveys except for the final year of the First Increment. Up to 10 bed material samples and one composite bar sample will be collected at each of the 25 surveyed anchor points annually. The total number of bed and bar samples collected annually will vary depending on site conditions and the number of flow splits associated with active secondary channels at each anchor point. The bed material samples will be collected as follows:

Main and Secondary Channel Bed Samples - Three main channel samples will be collected from each of the three transects at each anchor point. Each transect will be divided into three equally spaced increments with one sample from the thalweg in the increment that contains the thalweg and a representative bed sample from the other two increments. If the channel bed in the other two segments contain flowing water, samples should be collected from the active bed portion of those segments. If there is no flow in one or both of the other segments, samples should be collected from the lowest surface that was most recently exposed. If additional smaller channels separated from the main channel by small islands or large bars are present, one sample will be collected from the thalweg of the middle transect on the second largest channel at the anchor point. The location of each of the samples will be georeferenced using GPS and the range of materials noted/described.

Sand Bars in Main Channel - Samples will be collected from both natural high flow sand bars and, where they exist, mechanically created sand bars at all anchor points. Natural high flow bars are those bars that were naturally formed, were active during the last major flow event, and have elevations significantly different from the existing channel bed. Natural bar sites can be selected for sampling from anywhere in the main channel at the anchor point. Bars that are mechanically created or modified by Program activities and are expected to be maintained by subsequent high flows will be sampled as necessary, since the sampling of these bars will be dependent on the timing of flow events of sufficient magnitude and duration to modify and maintain the bar once it has been created. One set of three samples representing materials found on the sampled sand bars will be collected. The three individual samples should be collected in close proximity to each other at the head of the bar and should be representative of the materials that comprise the bar. The three samples will be combined

to form a single composite sample. A location that is central to the samples will be established and georeferenced. The range of materials that comprise the bar will be noted/described. Any surface armor layer or coarse surface lag should also be noted and removed prior to sampling.

Bed sediment samples should be collected using a sampler that will collect a sample that accurately reflects the material in the upper 15-25 cm (6-10 inches) of the channel bed. This would include the top 7.5 centimeters (3 inches) of the surface of the bed in order to provide similar data to the BM-54 cable-and-reel bed-material sampler used at bridge sections (Edwards and Glysson 1999) and to sample bed material that is most readily available for transport.

One method of sampling is to use a rigid can or tube that contains slightly less volume than the sample bags being used to hold the samples. The can or tube should have a beveled end to allow for easy dredging and the other end should be open and covered with a very fine mesh screen or heavy filter cloth that traps all the sediment, but allows water to pass through. Using a sampler that has slightly less volume than the sample bags allows the entire sample to be placed directly into the bag without the potential for sorting or loss of fines. This would also allow for a similar volume of material to be sampled each time at each sample point. Other types of bed material samplers and sampling procedures can be found in Bunte and Abt (2001).

At each sample point within each increment, the can/tube dredge sampler is pushed vertically or diagonally into the bed of the river in the upstream direction until the sampler is full. All bed samples taken from the main channel and any secondary channels will be transferred to individual sample bags that are labeled with the sampled anchor point, transect ID, increment ID or sample number, and the date the sample was taken.

All samples will be transferred to a certified geotechnical lab and analyzed for grain size distributions. Each sample will be oven-dried and weighed to determine total weight and the sample will be placed in a sieve stack and agitated for 25 minutes using a Ro-Tap (or similar) sieve shaker. The weight of material retained on each sieve will be recorded after transferring the material to a tared dish. The process will be repeated for every sieve in the stack to yield the grain-size distribution for a sample (Guy 1969). A dry sieve analysis will be performed on all samples using the following phi sieve sizes: 4.0, 3.0, 2.0, 1.0, 0.0, -1.0, -2.0, and -4.0. The results reported for each sample will be compiled in Microsoft Excel and will include the sample description, total sample weight, and the weight and percent passing for each of the sieve sizes. The $D_{5,}$ D_{10}, D_{16}, D_{30}, D_{50}, D_{60}, D_{84}, D_{95}, and sorting (square root of D_{84}/D_{16}) of each sample will also be reported.

III.D.2. Bank Material Sampling Methodology

Bank material will be documented in the first year of the topographic surveys using stratigraphy and grain size distribution of the bank material; however, the bank material sampling does not have to be repeated at successive topographic surveys. The bank material sampling will only be repeated during the final year of the First Increment. One drawing, accompanied by ground photography, will be created for a left bank and a right bank in the main channel at each pure

panel anchor point. Since the bank material sampling occurs on the main channel, the samples will be collected from one or both outer banks or from the bank of an island, depending on the location of the main channel. There will be one sediment sample taken from the same site of each drawing. There will be a total of 40 drawings and 40 bank sediment samples collected.

At each bank, the sediment stratigraphy will be described using sketches and notes in a waterproof field notebook and a sampler will be used to take a representative composite sample of the bank. The bank face will be cleared of vegetation and debris where possible and a representative sample of the entire bank above the low flow water line will be obtained. Sediment samples will be collected using a method that will accurately reflect the volume of the individual sedimentary horizons found within the bank section being documented. This can be accomplished with a hand corer, but the use of a hand corer is often restricted where there is a dense growth of roots at the bank surface or within the bank or where there are coarse materials such as gravels and cobbles within the bank. Therefore, it is recommended that a method of sampling be used that is not extensively affected by these factors. It is also recommended that the sampler that is used should be relatively quick and easy to use as well as inexpensive to construct and operate.

One type of sampler that could be adapted for use in coarse grained and/or rooted bank conditions is an open-faced steel box sampler. This type of sampler is made from sheet steel with the dimensions of approximately 12 inches long by 6 inches wide by 2.5 inches deep. This type of box sampler is pushed into the cleared bank face until it is flush. The corners and outer closed edges of the sampler should be reinforced so that they can be tapped on with a hammer if the sampler edge meets any resistance when being pushed into the bank face. A steel plate that is slightly larger than the box should be used to separate the sediment sample in the box from the bank face by sliding the plate down along the open side of the box. It may be necessary to sharpen the leading edge of the plate to facilitate the cutting of any roots that may extend into the sample in the box. Banks that are taller than the sampler length will require a series of successive stacked samples of the bank face, but any overlap of the sampling zones on the bank face should be avoided to reduce the potential for bias.

The sampled bank material will be composited and transferred to a sample bag that is labeled with the sampled anchor point, transect ID, increment ID or sample number, and the date the sample was taken. All samples will be transferred to a certified geotechnical lab and analyzed for grain size distributions using the same procedures, sieve sizes, and results reporting as described above for the bed material samples (see Section III.D.1).

Documentation of the stratigraphy of the bank face will include the color and texture of each major stratigraphic horizon, the average grain size or range of sizes of each major horizon, and the thickness of each major horizon along the vertical axis of the bank. Where distinct soil or clay horizons exist, Munsell Soil Color Charts should be used to document the texture and color of the material. In addition, photographs will be taken at each bank to provide additional documentation of bank stratigraphy at the sampling sites. Photographs of bank stratigraphy will include an appropriate scale with visible measurement increments (such as a photo scale or stadia

rod). The location of the bank material sampling will be georeferenced using GPS and the documented bank stratigraphy and sedimentary characteristics will be incorporated into the Program database.

III.E. Aerial Photography

Aerial photographs will be used to document changes in river plan form and as verification of the channel width measures from transect surveys. This protocol requires no additional aerial photography than what has been outlined by the Program's aerial photography protocol. The February 19, 2009 draft *Protocol for Aerial Photography in the Central Platte River Valley* calls for annual CIR photography to be obtained between late-May and June, taken at a 2-foot digital resolution (approximately equal to a scale of 1:4800), and will include the entire 90-mile length defined in the proposed Program, plus 3.5 miles either side of the centerline of the river. The photography will be obtained during flows as close to 1,200 cfs as possible. Measurements of total and main channel wetted width from the aerial photography will be used to verify widths from transect surveys in the Cooperative Agreement study area to obtain a system-level estimate. Ortho-rectified aerial photographs (see aerial photo and mapping protocol) will be analyzed after several years of data collection using GIS software.

River planform monitoring will rely on mapping from aerial photography and LiDAR data. Planform descriptions of meandering, anastomosing, and braiding will be assessed by reach from aerial photography. However, planform descriptions are qualitative and coarse in scale so more quantitative indicators such as number of channels, braiding index of the main channel, and width-to-depth ratio will be used to monitor channel change at a finer scale. The width-to-depth ratio is calculated from transect ground surveys (see Measurement of Channel Width and Width-to-Depth Ratio from Transect Ground Surveys), while the number of channels and braiding index are measured from aerial photos in GIS mapping and the number of channels is verified using LiDAR baseline mapping. Measurements of the number of channels and braiding index are made at the anchor points and at locations one-half mile or less between anchor points using GIS to compute average values. Changes in channel width are more accurately monitored through measurements based on transect ground surveys. Measurements of total and main channel wetted width can be approximated from aerial photos and the LiDAR data and used to verify width measurements based on ground surveys.

Measurements of the braiding index, number of channels, and channel width will be acquired from aerial photographs for each year of the First Increment that aerial photos are available. The measurements are made for the main channel of the entire study reach. However, in Reach 4 (Kearney to Grand Island), where the river is divided into two to four channels by large islands, the number of channel measurements are computed only for the main channel. In addition, Reach 1, which encompasses the north channel at Jeffrey Island, is treated separately from Reach 2, which encompasses the south channel at Jeffrey Island.

III.E.1. Measurement of the Number of Channels from Aerial Photography

Channels are detected in the measure of number of channels, from continuous linear water surfaces, or from continuous lineal breaks in vegetation on aerial photos. Small channels may be

difficult to detect on aerial photos due to the presence of vegetation canopies, or the total absence of vegetation resulting from disking. LiDAR mapping provides good definition of ground surfaces and can be used to verify the presence of small channels.

III.E.2. Measurement of the Braiding Index from Aerial Photography

Braiding index is measured for the main channel only. This will include a count of the average number of sub channels in the main channel (channel that conveys the most flow). The average number is based on bisecting the wetted main channel perpendicular to flow direction a minimum of four bisections per mile, at an approximate flow of 1,200 cfs, the flow specified for aerial photos. A sub-channel is an individual flow path within the main channel, separated from other flow paths by bars or bed forms. The bars or bedforms can be submerged, but are still identifiable from aerial photos. For example, the braiding index is three when the active channel area of the main channel has three flow paths divided by two bedform or bar features. Vegetation removal by disking can confound determination of the active channel area so measuring the braiding index in the wetted area at 1,200 cfs, rather than measuring braiding index in the active channel area, should reduce the associated error.

III.E.3. Measurements of Channel Width from Aerial Photography

Measures will be made of active channel width and water surface width of the main channel at transects, and of total active channel widths and total wetted surface width (a summation of main and side-channel width measures). The edge of woody and substantial herbaceous vegetation normally denotes the edge of the active channel. The width of the water surface measured from aerial photos is a factor of the flow on the day of the aerial photo flight. The aerial photography protocol specifies 1,200 cfs as measured at the USGS gages at Overton, Kearney, and Grand Island. Measurements of width on the photographs will occur at each anchor point in the associated habitats reach to obtain a system-level estimate.

Measures of active channel width measured from aerial photographs will enable repeatable estimates that are obtained using the same techniques through time. However, disking limits interpretation of this measurement since the definition of active channel width is dependent on the natural edge of vegetation. All areas cleared of vegetation by disking need to be noted on photos. Information on cleared and disked areas may be available from the Vegetation protocol. Water surface widths measured from aerial photography will vary from upstream to downstream due to changes in discharge on the day of the flight, from flow fluctuations, groundwater losses, and withdrawals. Because of these limitations, small changes in width will not be detectable from aerial photos, but this information should be compared to width measurements computed from surveyed ground transects (see Measurement of Channel Width and Width-to-Depth Ratio from Transect Ground Surveys) for quality control.

III.F. Documentation of Bank and Channel Features Using Ground Photography

Ground photography will be conducted on each transect survey to document and describe bank stability and composition, vegetation type and structure, and the conditions of the main channel. A series of photographs will be obtained at each anchor point. At a minimum, a series of four photographs will be taken at each geomorphic transect to document bank and channel conditions

at the transect location: one taken from each bank looking cross-channel toward the other bank and one taken from a short distance out into the channel looking back toward each bank. In addition, a photo looking upstream and one looking downstream should be taken at the downstream and upstream transects, respectively, to document general channel conditions within the site. Additional photographs will be obtained to document the banks and channel conditions in split flow channels and of other unique or special geomorphic or vegetative features as deemed necessary. These photographs will be archived by the Program for use in clarifying changes detected by the topography survey. The vegetation delineations will also be documented with photographs for use in the interpretation of aerial photographs.

All ground photography will be obtained with a good quality digital camera that maintains a time and date stamp, a 3X or greater optical zoom lens, and an effective image capture size of five megapixels or greater. Transect and point identification, photo number, and azimuth will be recorded for each photograph. Photographs will be cataloged after fieldwork is completed and all data/photos will be stored in the Program database. GPS-based cameras or software that georeferences digital ground photography should be used to facilitate incorporation of the ground photos into the Program database.

III.G. Gaging Stations

Stream gages in the area are operated and maintained by the U.S. Geological Survey (USGS) or the Nebraska Department of Natural Resources (DNR) according to USGS guidelines (Buchanan and Somers 1968, Buchanan and Somers 1969, Carter and Davidian 1968). Discharge and stage will be measured by the USGS at each gaging station and used to estimate a standard USGS rating curve (Kennedy 1984).

III.G.1. Discharge

Discharge and stage will be monitored continuously using real-time gaging station data from existing gages at Cozad, Overton, Odessa, Kearney, and Grand Island, and from a new gage installed at Shelton. River stage is measured approximately hourly at these gaging stations, and discharge is estimated using rating curves. The rating curves will be maintained by periodic measurements of depth and flow rate and by shifting the rating curves as needed. The uncorrected hourly discharge and stage values, along with corrected daily summaries will be stored in either the Nebraska DNR or the USGS database (depending on the entity overseeing the operation of the gaging station). The rating curves used for predicting discharge will be documented and stored with the data to detect changes in channel morphology (Wahl and Weiss 1995).

III.H. Sediment Transport Measurements

Transported sediment in the Platte River is primarily composed of bedload, which is of principal interest in understanding channel change. Measuring bedload on an easily deformable bed like the Platte River makes accurate sampling difficult and, therefore, suspended sediment measurements (sediment concentration) in some instances can be used as a surrogate for computing bedload transport and can be less variable since bedload measurements in sand bed rivers are susceptible to variations from migrating dune movement. However, accurate

measurements of suspended sediment on the Platte River is also difficult at lower flows (<5,000 cfs). Therefore, both suspended sediment and bedload measurements will be used to estimate absolute values of sediment transport. Estimates of transported sediment load will be combined with volume of aggradation and degradation measured with topographic ground surveys to monitor the sediment budget between Lexington and Chapman. Both Helley-Smith bedload sampling and depth-integrated sampling across the width of the stream at five-gaged bridge sites are proposed since, together, they provide better representation of the channel and are common approaches used historically.

III.H.1. Bedload and Depth-Integrated Suspended Sediment Sampling

Bedload and suspended sediment will be monitored under specific flow conditions during the course of each year at bridge crossings near Lexington (SH-L24A/Rd 755), at Overton (SH-L24B/Rd 444), at Kearney (SH-44/S. 2nd Ave.), at Shelton (SH-L10D/Shelton Road), and near Grand Island (US-34/Schimmer Drive). Samples will be collected using USGS standards for a bedload sampler and a depth-integrated sampler at 20 equally spaced locations (20 verticals for suspended sediment sampling) in the river cross section. This will allow inclusion of historical bedload and suspended sediment measures from USGS and others in the data set. Samples will be collected at each bridge site annually, but the sampling schedule will be dependent on flow conditions during the year. Ideally bedload sampling should include samples obtained from each of three different flow increments: three samplings in the 1,000 to 3,000 cfs flow range; two samplings in the 3,000 to 5,000 cfs flow range; and if possible at least one sampling of flows greater than 5,000 cfs. A single depth-integrated suspended sediment sampling effort will also be conducted during the bedload sampling under the >5,000 cfs flow increment. Local gaging stations and weather conditions should be monitored regularly throughout the year to identify potential events that may produce these flow ranges.

The 20 bedload samples collected at each bridge site using a Helley-Smith bedload sampler will be combined to make one composite bedload sample for that bridge site. The 20 vertical depth-integrated suspended sediment samples collected at each bridge site will be combined to make a single composite sample for that bridge site. Bedload samples will be collected using procedures defined in Edwards and Glysson (1999) and FISP (1999). Suspended sediment will be measured using procedures from Edwards and Glysson (1999) and Thomas and Lewis (1993).

All bedload sediment and suspended sediment samples will be analyzed by a certified geotechnical lab. The suspended and bedload sediment samples will be analyzed by dry sieving to determine their mechanical composition. Each sample will be dried and weighed to determine total weight. The sample will be placed in a sieve stack (ranging from 4.0 phi to 0.0 phi) with 1/2 phi gradations and agitated for 25 minutes using a Ro-Tap (or similar) sieve shaker. The weight of material retained on each sieve will be recorded after transferring the material to a tared dish. The process will be repeated for every sieve in the stack to yield the grain-size distribution for a sample (Guy 1969). The grain size distributions will be determined and reported as described above (see Section III.D.1).

Total sediment load will be estimated directly from the bedload data and computed from suspended sediment measures using the modified Einstein equation.

IV. ANNUAL REPORTING AND DELIVERABLES

Annual monitoring deliverables will include draft and final reports (in Microsoft Word) that document the activities completed during each monitoring season, any difficulties encountered, and recommendations, if any, for revising the protocol methodologies. The draft report shall be submitted for review at the beginning of each October to the Program who will have 30 days to review the draft report. A final report that addresses any review comments will be submitted within 14 days after receipt of review comments. Other deliverables to be included with the final annual report will include any raw data (including survey and parametric data), survey and mapping data, UTM locations of monitoring and sampling sites, ground photographs and field documentation of project activities, and other documents or materials collected and/or developed as a part of annual monitoring activities. Where appropriate, all data will be compiled in Excel spreadsheet format and incorporated into the Program database. Data will be reported in accordance with guidelines outlined in the Program's AMP and the Program's Database Management System.

V. FIELD SAFETY

Since this protocol defines a significant field data collection effort, the safety of field personnel should be a priority when conducting the field work. There are inherent risks and hazards associated with field work, especially when working around water and in or near vehicular traffic, so every effort should be made to minimize those hazards and risks. If a corporate or agency safety manual is not available for use by field personnel, it is highly recommended that a safety plan be developed prior to conducting the tasks defined in this protocol. The safety plan should address issues related to working around and on water, boating safety, traffic safety, severe weather, and wildlife.

All federal and state guidelines should be adhered to when conducting field work using boats and other watercraft. Field personnel should wear U.S. Coast Guard approved personal flotation device (PFD) at all times while working on or over water. Safe boating procedures should be followed at all times and standard emergency equipment such as fire extinguishers and first aid kits should be included on all manned watercraft. When working over water such as at bridge railings, field personnel should wear PFD's and appropriate safety harnesses tethered to the bridge railing or other structural feature that will prevent the wearer from being injured from a fall.

When working in or traversing the river by foot, quicksand can be a potential threat. Although drowning in quicksand is impossible, becoming temporarily trapped in quicksand is possible. Therefore, field personnel working in or traversing the river by foot should wear a PFD and be familiar with the procedures to remove themselves from quicksand, should that be necessary.

It is recommended that weather forecasts for the study area be checked frequently for potentially severe storms. Severe thunderstorms that can include lightning, hail, high winds, and even tornadoes pose a significant hazard to field crews in isolated areas where shelter may not be

readily available. Field crews should be prepared for and be able to deal with severe weather at all times.

As part of this protocol, field crews will be required to obtain suspended sediment samples from bridge sites within the study area and, therefore, will be required to deal with traffic and bridge safety issues. Although the Grand Island, Shelton, Kearney, and Overton bridges have a wide shoulder to work from, minimum traffic safety and control items will be required. These include temporary warning signs placed at each end of the bridge, regularly spaced high visibility traffic cones placed along the area where the work will be performed, and appropriate high-visibility reflective apparel to be worn by all field personnel. Field vehicles should be parked as far off of the traveled lanes as practicable. It is recommended that field vehicles have flashing hazard lights and supplemental flashers, such as strobe lights and light bars, on the vehicle activated at all times. Vehicles should be parked such that the visibility of oncoming traffic and the field crews are unobstructed.

In addition, field personnel should be familiar with basic first aid and should know the locations of all local emergency medical facilities and hospitals within the study area. In the case of a severe or life threatening injury, field personnel should rely on emergency 911 services. For non-life threatening and non-severe injuries, injured field personnel should be transported as soon as possible to a local medical facility such as an urgent care facility or hospital.

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Attachment B

PRRIP Consultant Contract

Company
Address 1
Address 2
TIN# 00-0000000

Nebraska Community Foundation, Inc.
PO Box 83107
Lincoln, NE 68501-3107
TIN# 47-0769903

PLATTE RIVER RECOVERY IMPLEMENTATION PROGRAM

Contract between Nebraska Community Foundation, Inc., Platte River Recovery Implementation Program, and [Company].

[Project Name]

1. Parties. This Contract is made and entered into by and between the Nebraska Community Foundation, Inc. ("Foundation") of Lincoln, Nebraska, representing all signatories to the Platte River Recovery Implementation Program ("Program") and _____ ("Consultant"). The following persons are authorized to represent the parties through this Contract: Diane Wilson of the Foundation, Dr. Jerry Kenny of the Program; and [Name] of the Consultant.

2. Purpose of Contract. The purpose of this Contract is to allow the Foundation, acting as the fiscal agent for the Governance Committee (GC) of the Program, to retain the services of the Consultant to render certain technical or professional services hereinafter described in connection with an undertaking to be financed by the Program, and to delegate the Executive Director's Office ("ED Office") through its Executive Director or his designee the authority to administer this Contract.

TERMS AND CONDITIONS

3. Term of Contract and Required Approvals. This Contract is effective when all parties have executed it and all required approvals have been granted. The term of this Contract is from *(contract initiation date)* through *(contract expiration date)*. The services to be performed under this Contract will commence upon receipt of authorization to proceed. All services shall be completed during this term.

If the Consultant has been delayed and as a result will be unable, in the opinion of the Program, to complete performance fully and satisfactorily within this Contract period, the Consultant may be granted an extension of time, upon submission of evidence of the causes of delay satisfactory to the Program.

4. Payment.

A. Reimbursement of Expenses. The Program agrees to pay the Consultant an amount based on the approved budget depicted in Exhibit B and hourly rate and reimbursable expenses price schedules depicted in Exhibit C, attached to this Contract and incorporated by reference as part of this Contract, for the services described in Exhibit A, attached to this Contract and incorporated by reference as part of this Contract. Total payment under this Contract shall not exceed _____ dollars ($_____).

B. Project Budget. The Project budget for each task included in Exhibit A is as follows:

Task	Estimated Cost
Phase I.	
Subtotal Phase I	
Phase II.	
Subtotal Phase II	
Total Project Cost	

The amounts for each task are estimates only, but are not to be exceeded unless authorized in writing by the Program. The Contract total amount is controlling. Payment shall be made directly to the Consultant. The Consultant shall maintain hourly records of time worked by its personnel to support any audits the Program may require. Billing reports shall be submitted no more often than monthly for activities and costs accrued since the last billing report. A brief project progress report summarizing project activities in the billing period must be submitted with each billing.

C. Billing Procedures. The Consultant shall send billing reports for services performed for the various tasks outlined in Exhibit A to the ED Office (address included below). The Program's Executive Director, upon receiving the billing report, will approve the bill and submit the bill for payment. The submittal for payment will then be reviewed by the Signatory Parties of the Program who will advise the Foundation of approval. The Foundation will make payment of these funds directly to the Consultant within 30 days of notice of approval by the Signatory Parties. Payments of bills are due within 60 days after the billing date of the Consultant.

Billing Point of Contact (Program):
Dr. Jerry F. Kenny, Executive Director
Platte River Recovery Implementation Program
Headwaters Corporation
4111 4th Avenue, Suite 6
Kearney, Nebraska 68845
Phone: (308) 237-5728
Fax: (308) 237-4651
Email: kennyj@headwaterscorp.com

D. Money Withheld. When the Program has reasonable grounds for believing that the Consultant will be unable to perform this Contract fully and satisfactorily within the time fixed for performance, then the Program may withhold payment of such portion of any amount otherwise due and payable to the Consultant reasonably deemed appropriate to protect the Program against such loss. These amounts may be withheld until the cause for the withholding is cured to the Program's satisfaction or this Contract is terminated pursuant to Section 8U. Any amount so withheld may be retained by the Program for such period as it may deem advisable to protect the Program against any loss. This provision is intended solely for the benefit of the Program and no person shall have any right against the Program by reason of the Program's failure or refusal to withhold monies. No interest shall be payable by the Program on any amounts withheld under this provision. This provision is not intended to limit or in any way prejudice any other right of the Program.

E. Withholding of Payment. If a work element has not been received by the Program by the dates established in Exhibit A, the Program may withhold all payments beginning with the month following that date until such deficiency has been corrected.

F. Final Completion and Payment. The final payment shall be made upon acceptance of the final report and receipt of the final billing.

5. <u>Responsibilities of Consultant</u>.

A. Scope of Services. The Consultant shall perform the specific services required under this Contract in a satisfactory and proper manner as outlined in Exhibit A. If there is any conflict between this Contract and the provisions of the specific requirements of Exhibit A, the specific requirements shall prevail.

B. Personnel. All of the services required hereunder will be performed by the Consultant or under its supervision, and all personnel engaged in the work shall be fully qualified and shall be authorized, licensed, or permitted under state law to perform such services, if state law requires such authorization, license, or permit.

C. Subcontracts.

(i) Approval Required for Subcontracts. Any subcontractors and outside associates or consultants required by the Consultant in connection with the services, work performed or rendered under this Contract will be limited to such individuals or firms as were specifically identified in the proposal and agreed to during negotiations or are specifically authorized by the Program during the performance of this Contract. The Consultant shall submit a list of the proposed subcontractors, associates or consultants; the scope and extent of each subcontract; and the dollar amount of each subcontract prior to Contract execution to the Program for approval. During the performance of the Contract, substitutions in or additions to such subcontracts, associates, or consultants will be subject to the prior approval of the Program. The Program approval of subcontractors will not relieve the Consultant from any responsibilities outlined in this Contract. The Consultant shall be responsible for the actions of the subcontractors, associates, and subconsultants.

(ii) Billings for Subcontractors. Billings for subcontractor, associates or subconsultants services will not include any mark up. The subcontract costs will be billed to the Program at the actual costs as billed to the Consultant. Subcontract costs will be documented by attaching subcontractor billings to the Consultant's billing submittals.

(iii) Copies of Subcontracts. The Consultant shall provide to the Program copies of each subcontractor contract immediately following execution with the subcontractor. All subcontracts between the Consultant and a subcontractor shall refer to and conform to the terms of this Contract. However, nothing in this Contract shall be construed as making the Program a party of any subcontract entered between the Consultant and a subcontractor.

D. Requests from the Program. The Consultant shall be responsible and responsive to the Program and the ED Office in their requests and requirements related to the scope of this Contract.

E. Presentation of Data. The Consultant shall select and analyze all data in a systematic and meaningful manner so as to contribute directly in meeting the objectives of the Project, and shall present this information clearly and concisely, in a professional manner.

F. Draft of Final Report. The Consultant shall present the Program a draft of the final report covering all work elements of the Project including maps, charts, conclusions and recommendations prior to the publication of any final report and no later than the date specified in Exhibit A. Draft Reports will be provided to the Program in Microsoft Word format for distribution and review. The Program will respond with written comments to the Consultant as soon as possible. The Consultant will address the comments of the Program in the final report. Final Reports will be provided to the Program in Microsoft Word and PDF format.

G. Project Completion Report. A final project completion report in the form described in Exhibit A shall be submitted to the Program by the date specified in Exhibit A.

H. Reports, Maps, Plans, Models and Documents. One (1) copy of maps, plans, worksheets, logs, field notes and other reference or source documents prepared for or gathered under this Contract, and one (1) copy of each unpublished report prepared under this Contract shall be submitted to the Program. If the Consultant writes or uses a computer program or spreadsheet as a part of this project, the Consultant shall submit to the Program for approval all proposed program names and data formats prior to beginning work on that task. All data shall be submitted to Program in written and digital forms with the final report. Digital media shall be labeled by the Consultant to provide sufficient detail to access the information on the media. All user manuals shall be submitted by the Consultant to Program providing complete documentation of computer programs developed under this Contract. The user manual shall also specify the source code language and the type of computer equipment necessary to operate the program(s). Any programs or computer software generated as a part of this Contract shall be the sole property of the Program.

I. Inspection and Acceptance. All deliverables furnished by the Consultant shall be subject to rigorous review by the Program's ED Office prior to acceptance.

6. <u>Responsibilities of the Program.</u>

A. Designated Representative. The Executive Director of the Program shall act as the Program's administrative representative with respect to the Consultant's service to be performed under this Contract and shall have complete authority to transmit instructions, receive information, and interpret and define the Program's policies and decisions with respect to services covered by this Contract.

B. Data to be Furnished to the Consultant. All information, data, reports, and maps as are available to the Program and necessary for the carrying out of the Scope of Services set forth herein shall be furnished to the Consultant without charge and the ED Office shall cooperate with the Consultant in the carrying out of the project.

C. Review Reports. The ED Office shall examine all studies, reports, sketches, opinions of the construction costs, and other documents presented by the Consultant to the Program and shall promptly render in writing the Program's decisions pertaining thereto within the time periods specified in Exhibit A.

D. Provide Criteria. The ED Office shall provide all criteria and full information regarding its requirements for the project.

7. Special Provisions.

A. No Finder's Fees. No finder's fee, employment agency fee, or other such fee related to the procurement of this Contract shall be paid by either party.

B. Publication. It is understood that the results of this work may be available to the Consultant for publication and use in connection with related work. Use of this work for publication and related work by the Consultant must be conducted with prior authorization from the Program's Technical Point of Contact.

C. Publicity. Any publicity or media contact associated with the Consultant's services and the result of those services provided under this Contract shall be the sole responsibility of the Program. Media requests of the Consultant should be directed to the Director of Outreach and Operations in the ED Office.

D. Monitor Activities. The Program shall have the right to monitor all Contract related activities of the Consultant and all subcontractors. This shall include, but not be limited to, the right to make site inspections at any time, to bring experts and consultants on site to examine or evaluate completed work or work in progress, and to observe all Consultant personnel in every phase of performance of Contract related work.

D. Kickbacks. The Consultant certifies and warrants that no gratuities, kickbacks or contingency fees were paid in connection with this Contract, nor were any fees, commissions, gifts, or other considerations made contingent upon the award of this Contract. If the Consultant breaches or violates this warranty, the Program may, at its discretion, terminate this Contract without liability to the Program, or deduct from the Contract price or consideration, or otherwise recover, the full amount of any commission, percentage, brokerage, or contingency fee.

E. Office Space, Equipment, and Supplies. The Consultant will supply its own office space, equipment, and supplies.

8. General Provisions.

A. Amendments. Any changes, modifications, revisions or amendments to this Contract which are mutually agreed upon by the parties to this Contract shall be incorporated by written instrument, executed and signed by all parties to this Contract.

B. Applicable Law/Venue. The construction, interpretation and enforcement of this Contract shall be governed by the laws of the State of Nebraska. The Courts of the State of Nebraska shall have jurisdiction over this Contract and the parties.

C. Assignment/Contract Not Used as Collateral. Neither party shall assign or otherwise transfer any of the rights or delegate any of the duties set forth in this Contract without the prior written consent of the other party. The Consultant shall not use this Contract, or any portion thereof, for collateral for any financial obligation, without the prior written permission of the Program.

D. Audit/Access to Records. The Program and any of its representatives shall have access to any books, documents, papers, and records of the Consultant which are pertinent to this Contract. The Consultant shall, immediately upon receiving written instruction from the Program, provide to any independent auditor, accountant, or accounting firm, all books, documents, papers and records of the Consultant which are pertinent to this Contract. The Consultant shall cooperate fully with any such independent auditor, accountant, or accounting firm, during the entire course of any audit authorized by the Program.

E. Availability of Funds. Each payment obligation of the Program is conditioned upon the availability of funds and continuation of the Platte River Recovery Implementation Program. If funds are not allocated and available for the continuance of the services performed by the Consultant, the contract may be terminated by the Program at the end of the period for which the funds are available. The Program shall notify the Consultant at the earliest possible time of the services which will or may be affected by a shortage of funds. No penalty shall accrue to the Program in the event this provision is exercised, and the Program shall not be obligated or liable for any future payments due or for any damages as a result of termination under this section. This provision shall not be construed to permit the Program to terminate this Contract to acquire similar services from another party.

F. Award of Related Contracts. The Program may undertake or award supplemental or successor contracts for work related to this Contract. The Consultant shall cooperate fully with other contractors and the Program in all such cases.

G. Certificate of Good Standing. Consultant shall provide Certificate of Good Standing verifying compliance with the unemployment insurance and workers' compensation programs prior to performing work under this Contract.

H. Compliance with Law. The Consultant shall keep informed of and comply with all applicable federal, state and local laws and regulations in the performance of this Contract.

I. Confidentiality of Information. All documents, data compilations, reports, computer programs, photographs, and any other work provided to or produced by the Consultant in the performance of this Contract shall be kept confidential by the Consultant unless written permission is granted by the Program for its release.

J. Conflicts of Interest

(i) Consultant shall not engage in providing consultation or representation of clients, agencies or firms which may constitute a conflict of interest which results in a disadvantage to the Program or a disclosure which would adversely affect the interests of the Program. Consultant shall notify the Program of any potential or actual conflicts of interest arising during the course of the Consultant's performance under this Contract. This Contract may be terminated in the event a conflict of interest arises. Termination of the Contract will be subject to a mutual settlement of accounts. In the event the contract is terminated under this provision, the Consultant shall take steps to insure that the file, evidence, evaluation and data are provided to the Program or its designee. This does not prohibit or affect the Consultant's ability to engage in consultations, evaluations or representation under agreement with other agencies, firms, facilities, or attorneys so long as no conflict exists.

(ii) A conflict of interest warranting termination of the Contract includes, but is not necessarily limited to, representing a client in a adversarial proceeding against the Platte River Recovery Implementation Program, its signatories, boards, commissions or initiating suits in equity including injunctions, declaratory judgments, writs of prohibition or *quo warranto.*

K. Entirety of Contract. This Contract, consisting of *(example) twelve* (*12*) pages, Exhibit A, consisting of *eleven* (*11*) pages, Exhibit B, consisting of *one* (*1*) page, and Exhibit C, consisting of *one* (*1*) page, represents the entire and integrated Contract between the parties and supersedes all prior negotiations, representations, and agreements, whether written or oral.

L. Force Majeure. Neither party shall be liable for failure to perform under this Contract if such failure to perform arises out of causes beyond the control and without the fault or negligence of the nonperforming party. Such causes may include, but are not limited to, acts of God or the public enemy, fires, floods, epidemics, quarantine restrictions, freight embargoes, and unusually severe weather. This provision shall become effective only if the party failing to perform immediately notifies the other party of the extent and nature of the problem, limits delay in performance to that required by the event, and takes all reasonable steps to minimize delays. This provision shall not be effective unless the failure to perform is beyond the control and without the fault or negligence of the nonperforming party.

M. Indemnification. The Consultant shall indemnify and hold harmless the Foundation, the Program, the ED Office, and their officers, agents, employees, successors and assignees from any and all claims, lawsuits, losses and liability arising out of Consultant's failure to perform any of Consultant's duties and obligations hereunder or in connection with the negligent performance of Consultant's duties or obligations, including but not limited to any claims, lawsuits, losses or liability arising out of Consultant's malpractice.

N. Independent Contractor. The Consultant shall function as an independent contractor for the purposes of this Contract, and shall not be considered an employee of the Program,

Foundation or ED Office for any purpose. The Consultant shall assume sole responsibility for any debts or liabilities that may be incurred by the Consultant in fulfilling the terms of this Contract, and shall be solely responsible for the payment of all federal, state and local taxes which may accrue because of this Contract. Nothing in this Contract shall be interpreted as authorizing the Consultant or its agents and/or employees to act as an agent or representative for or on behalf of the Foundation or the Program, or to incur any obligation of any kind on the behalf of the Foundation or the Program. The Consultant agrees that no health/hospitalization benefits, workers' compensation and/or similar benefits available to Foundation or Program employees will inure to the benefit of the Consultant or the Consultant's agents and/or employees as a result of this Contract.

O. Notices. All notices arising out of, or from, the provisions of this contract shall be in writing and given to the parties at the address provided under this Contract, either by regular mail, facsimile, e-mail, or delivery in person.

P. Notice and Approval of Proposed Sale or Transfer of the Consultant. The Consultant shall provide the Program with the earliest possible advance notice of any proposed sale or transfer or any proposed merger or consolidation of the assets of the Consultant. Such notice shall be provided in accordance with the notice provision of this Contract.

Q. Ownership of Documents/Work Product/Materials. All documents, reports, records, field notes, data, samples, specimens, and materials of any kind resulting from performance of this Contract are at all times the property of the Program.

R. Patent or Copyright Protection. The Consultant recognizes that certain proprietary matters or techniques may be subject to patent, trademark, copyright, license or other similar restrictions, and warrants that no work performed by the Consultant or its subcontractors will violate any such restriction.

S. Proof of Insurance. The Consultant shall not commence work under this Contract until the Consultant has obtained the following insurance coverages and provided the corresponding certificates of insurance:

(i) Commercial General Liability Insurance. Consultant shall provide coverage during the entire term of the Contract against claims arising out of bodily injury, death, damage to or destruction of the property of others, including loss of use thereof, and including products and completed operations in an amount not less than Five Hundred Thousand Dollars ($500,000.00) per claimant and One Million Dollars ($1,000,000.00) per occurrence.

(ii) Business Automobile Liability Insurance. Consultant shall maintain, during the entire term of the Contract, automobile liability insurance in an amount not less than Five Hundred Thousand Dollars ($500,000.00) per occurrence. Coverage will include bodily injury and property damage covering all vehicles, including hired vehicles, owned and non-owned vehicles

(iii) Workers' Compensation or Employers' Liability Insurance. The

Consultant shall provide proof of workers' compensation coverage Consultant's insurance shall include "Stop Gap" coverage in an amount not less than Five Hundred Thousand Dollars ($500,000.00) per employee for each accident and disease.

(iv) Professional Liability or Errors and Omissions Liability Insurance. The Consultant shall provide proof of professional liability insurance or errors and omissions liability insurance to protect the Foundation, Program and ED Office from any and all claims arising from the Consultant's alleged or real professional errors, omissions or mistakes in the performance of professional duties in an amount not less than One Million Dollars ($1,000,000.00) per claim.

T. Taxes. The Consultant shall pay all taxes and other such amounts required by federal, state and local law, including but not limited to federal and social security taxes, workers' compensation, unemployment insurance and sales taxes.

U. Termination of Contract. This Contract may be terminated, without cause, by the Program upon fifteen (15) days written notice. This Contract may be terminated immediately for cause if the Consultant fails to perform in accordance with the terms of this Contract.

V. Third Party Beneficiary Rights. The parties do not intend to create in any other individual or entity the status of third party beneficiary, and this Contract shall not be construed so as to create such status. The rights, duties and obligations contained in this Contract shall operate only between the parties to this Contract, and shall inure solely to the benefit of the parties to this Contract. The provisions of this Contract are intended only to assist the parties in determining and performing their obligations under this Contract.

W. Time is of the Essence. Time is of the essence in all provisions of the Contract.

X. Titles Not Controlling. Titles of paragraphs are for reference only, and shall not be used to construe the language in this Contract.

Y. Waiver. The waiver of any breach of any term or condition in this Contract shall not be deemed a waiver of any prior or subsequent breach.

9. Contacts.

Administrative Point of Contact (Foundation):
Diane M. Wilson
Chief Financial and Administrative Officer
Nebraska Community Foundation
PO Box 83107
Lincoln, Nebraska 68501-3107
Phone: (402) 323-7330
Fax: (402) 323-7349
Email: dwilson@nebcommfound.org

Admin. Point of Contact (Program):
Dr. Jerry F. Kenny, Executive Director
Platte River Recovery Implementation Prog.
Headwaters Corporation
4111 4th Avenue, Suite 6
Kearney, Nebraska 68845
Phone: (308) 237-5728
Fax: (308) 237-4651
Email: kennyj@headwaterscorp.com

Technical Point of Contact (Program):
Name, Title
Platte River Recovery Implementation Prog.
Headwaters Corporation
Address 1
City, State ZIP
Phone: (000) 000-0000
Fax: (000) 000-0000
Email: email

Media Point of Contact (Program):
Dr. Bridget Barron, Director of Outreach
Platte River Recovery Implementation Prog.
Headwaters Corporation
4111 4th Avenue, Suite 6
Kearney, Nebraska 68845
Phone: (308) 237-5728
Fax: (308) 237-4651
Email: barronb@headwaterscorp.com

Administrative Point of Contact (Consultant):
Name, Title
Company
Address 1
City, State ZIP
Phone: (000) 000-0000
Fax: (000) 000-0000
Email: email

Technical Point of Contact (Consultant):
Name, Title
Company
Address 1
City, State ZIP
Phone: (000) 000-0000
Fax: (000) 000-0000
Email: email

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10. Signatures. By signing this Contract, the parties certify that they have read and understood it, that they agree to be bound by the terms of the Contract, that they have the authority to sign it.

NEBRASKA COMMUNITY FOUNDATION

_____ _____

Diane M. Wilson Date
Chief Financial and Administrative Officer

[***CONSULTANT***]

_____ _____

[*Name, Title*] Date

EXHIBIT "A"
SCOPE OF SERVICES

A. PROJECT DESCRIPTION

1. Location: *[Text]*

2. Purpose: *[Text]*

3. History: [*Text*]

B. PROJECT REQUIREMENTS

1. Monthly Progress Reports and Billing Statements

The Consultant shall submit a brief monthly progress report outlining the study status, progress, and results to date, regardless of whether or not a billing statement is submitted, on or before the last working day of the month. The progress report will also show the percentage of the job completed by task and the percentage of budget spent. The progress report will also include a billing projection for the upcoming month for the purpose of Program reimbursement request planning.

Each billing statement must include a task-by-task report justifying the cost items contained in the billing statement. The monthly progress report may be used as the justification for the billing statement as long as all cost items covered in the billing statement are addressed in the progress report.

2. Computer Models, Statement of Assumptions, Project Work File

a. If the Consultant writes or uses a computer program or spreadsheet as a part of this project, the Consultant shall submit to the Program for approval all proposed program names and data formats prior to beginning work on that task. All data shall be submitted to the Program in written and digital forms with the final report. Digital media shall be labeled by the Consultant to provide sufficient detail to access the information on the media. User manuals shall be submitted by the Consultant to the Program providing complete documentation of computer programs developed under this project. The user manuals shall also contain the source code language and the type of computer equipment necessary to operate the program(s). The computer programs and spreadsheets (written and digital forms) are due on the same date as the final report, which contains the information generated by the programs.

b. To facilitate the Program's accurate evaluation of the Consultant's work product, computations, conclusions and recommendations, the Consultant shall:

* Include in the final report a section describing the assumptions and methodology used by the Consultant in generating the data and conclusions contained in that chapter.

* Maintain a project work file containing the materials used in project analysis. This file will be available for review by the Program and should be organized in such a way as to allow replication of the steps and procedures used by the Consultant to reach the conclusions described in the study.

* Prepare a project notebook containing a description of the assumptions and methodologies used in the project analysis. The notebook shall be organized in such a way as to allow replication of the steps, calculations, and procedures used by the Consultant to reach conclusions, described in the draft final report. The project notebook shall be submitted with the draft final report.

3. Final Report

The Consultant shall use the Contract Scope of Services as the outline for draft and final reports so that Consultant compliance with Contract provisions can be verified. If the final report contains information of an engineering nature, the cover of the final report, all plates, and the executive summary must be stamped and signed by a Professional Engineer licensed in the State of Nebraska or other state if appropriate to location of project site. If the final report contains information of a geologic nature, the cover of the final report, all plates, and the executive summary must be stamped and signed by a Professional Geologist licensed in the State of Nebraska. If the final report contains information of both an engineering and geologic nature, the cover of the final report, all plates, and the executive summary must be stamped and signed by both a Professional Engineer and a Professional Geologist licensed in the State of Nebraska. At a minimum, the reproducible original to be submitted as part of the deliverables required herein must utilize an original seal(s) and original signature(s).

4. Final Report - Digital Format

In addition to the paper submittal described in Section C.4 above, the Consultant shall also provide the final documents and related materials in a digital format. This digital report shall, to the extent feasible, be assembled into one file rather than separate files for text, tables, graphics, etc. This digital report shall be contained on a CD(s) or DVD(s), and shall be in both Word and Adobe Acrobat format. Any plates, figures, etc. not suitable for Word shall be in AutoCAD, ArcGIS, Adobe Acrobat, or compatible format. Other formats may be used if approved in advance by the ED Office. The final documents will also be provided

fully assembled into one file, in a complete “internet ready” digital format to facilitate their distribution via the Office website.

5. Project Access

The ED Office shall be responsible for obtaining access as required for project tasks.

6. Stand-By Time

The Program will not reimburse the Consultant for stand-by time charges for the Consultant's supervisory personnel.

C. SCOPE OF SERVICES

EXHIBIT “B”
BUDGET

EXHIBIT "C"
HOURLY RATE AND REIMBURSABLE EXPENSES
PRICE SCHEDULE 2010