Request for Proposal

Fixed Automated
Anti-icing Spray System

Red River Bridge Crossing
Located on I-94 between
North Dakota and Minnesota

ND Bridge Nos. 94-352.453R and 94-352.457L
MN Bridge Nos. 9066 and 9067

Prepared by

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
Bismarck, North Dakota
www.discovernd.com/dot

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MAINTENANCE AND ENGINEERING SERVICES DIVISION
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REQUEST FOR PROPOSAL

North Dakota Department of Transportation
Red River of the North I-94 Fixed Automated Spray Technology
Anti-Icing System

PROJECT SPECIFIC INFORMATION

Project Overview

The North Dakota Department of Transportation (NDDOT) in partnership with the Minnesota Department of Transportation (MnDOT) request proposals for a Fixed Automated Spray Technology (F.A.S.T.) fully automated bridge/roadway anti-icing system. NDDOT Bridge Numbers 94-352.453R/457L and MnDOT Bridge Numbers 9066/9067 has a potential for many vehicle accidents due to traffic congestion on the bridge, "black ice" formation due to freezing vehicle exhaust moisture on the bridge surface and unique meteorological conditions at the bridge. This automated anti-icing project is intended for the purpose of prolonging life expectancies of bridge structures, and to greatly reduce the number of vehicle accidents on the bridge and related property damages and threats to public health and safety and further demonstrate the technical, operational, and economic feasibility of fully automated bridge anti-icing technology.

Project Goal

It is the goal of this project that the Vendor, starting on or about May 11, 2005, will provide all necessary equipment, labor, parts, supplies, engineering, and materials (except anti-icing chemicals which will be provided by the respective Department of Transportations) for a fully automated anti-icing system to be located on the roadway of I-94, across the I-94 Bridge over the Red River or the North, on the North Dakota/Minnesota border, in the cities of Fargo, ND and Moorhead, MN. The Vendor will also provide for Project Management, Furnish and Install Automated Bridge Anti-icing, Interact the control software into the existing NDDOT and MnDOT system software interface or purpose alternate control, complete system check out, onsite and offsite system training, system documentation, warranty and support periods, permits and as-built plans. Installation and checkout of all project features will be completed by October 15, 2005.

This work will consist of the design, construction, testing, and maintenance of a fixed automated anti-icing system for the bridge and roadway approaches, if applicable. The proposal will include all equipment, and services necessary to perform all the tasks to complete the design, installation, testing, start-up, training, and maintenance of the anti-icing system.

The anti-icing system must be a fixed automated system that allows automatic treatment of the traffic lanes and other targeted areas. The anti-icing system shall be capable of utilizing a variety of anti-icing and de-icing chemicals by pumping the chemicals through a series of solenoid-controlled valves to nozzles mounted in the roadway (if applicable) and bridge deck. (The DOT's have specified that a

potassium acetate based product will be used with the installation.) Upon actuation, a remote processing unit, or RPU, controller opens solenoid valves in an automated sequence to spray the anti-icing liquid over the targeted area. The anti-icing cycle will be initiated automatically, requiring no human activation, based on information provided by active and passive sensors mounted in the bridge deck, and atmospheric sensors. The anti-icing cycle will also be capable of initiation by remote access by cell phone/radio, Internet web, and by manual activation from the pump house. The system must also be accessible remotely by the vendor for the purposes of trouble shooting the system. The system will be capable of dispensing varying quantities of liquid anti-icing agent in variable spray sequences depending on road surface conditions at the site, for example, black ice, snow, or freezing rain.

The system will operate with constant pressure throughout the system to supply a localized pressure boost to the spray nozzles. The liquid will flow through a pressurized piping system that is designed to permit the isolation of individual nozzles or groups of nozzles, while continuing to supply fully pressurized liquid to all remaining operational spray nozzles. The complete anti-icing system will be a fully integrated system, with individual components designed, manufactured, and tested to operate specifically as part of the anti-icing spray system. The system will be a proven design and shall not be a prototype.

The system and its operation will be completely independent of the NDDOT and MnDOT existing or planned road weather information system network. The system will be connected to each DOT anti-icing computer located at each District headquarters in Fargo, ND and Moorhead, MN, from which the system will be capable of remote control operation and monitoring. The system shall be capable individual lane control, i.e.; NDDOT will have manual control over the East Bound lanes and MnDOT will have manual control over the West Bound lanes. Refer to Appendix B, Communications.

Scope of Work and Deliverables

Project Management

- Supervision and coordination of any and all subcontractors
- Coordination with each State
- Bi-weekly written status reports and meetings

Installation of fully automated bridge anti-icing project

- Develop and deliver all contract drawings, specifications, and documents.
- Deliver equipment and material resources.
- Prepare work area, storage and staging area
- Provide electrical power, lighting, telephone, water supply and sanitation facilities for project duration.
- Provide traffic control
- Furnish and install all materials and equipment needed for the anti-icing system

System demonstration

- Complete check of all materials, hardware and software, fully tested

Training – operation and maintenance and repair

- On-site system operation
- Remote operations
- Operation software

System Documentation

- Manuals – System and training

Warranty and Support

- Warranty for 2 years after completion and acceptance
- Technical support for 30 months after warranty

See Appendix A for a more detailed description of work and deliverables. Vendors are encouraged to propose additional tasks or activities if they will substantially improve the results of the project. These items should be separated from the required items on the cost proposal.

Vendors are to respond to all the requested tasks and services listed in the RFP, no more, no less (basic services). Cost proposals are to be based on those basic services. Additional proposed services, alternative approaches, or services the Vendor does not deem necessary are to be addressed separately. Cost for those additional/alterative/not necessary services are to be itemized as subtractions or additions to the basic service cost. This is to ensure a consistent comparison between proposals.

Proposal Evaluation

All responses received by the deadline will be evaluated by representatives of both Departments of Transportation. In some instances, an interview may be part of the evaluation process. A 100-point scale will be used to create the final evaluation recommendation. The factors and weighting on which proposals will be judged are:

1. Project approach 50%
2. Project team 20%
3. Company Experience 20%
4. Cost detail 10%

Proposals will be evaluated on a best value as 90 percent qualifications and 10 percent on cost considerations. The cost proposal will not be opened by the review committee until after the qualifications points are awarded.

Proposal Submittal

All proposals must be sent to:

Ed Ryen, P.E., Assistant Maintenance Engineer
North Dakota Department of Transportation
Maintenance and Engineering Services Division
608 East Boulevard Avenue
Bismarck, ND 58505-0700

All proposals must be received not later than 2:00 P.M., Central Standard Time, March 24, 2005. All visitors to the building, including couriers, must check in at the first floor mail room. Please allow sufficient time in your delivery schedule to comply with security procedures.
Submit six copies of the proposal. Proposals are to be sealed in mailing envelopes or packages with the Vendor's name and address written on the outside. Each copy of the proposal must be signed, in ink, by an authorized member of the firm.

Proposal Questions
Prospective Vendors who have any questions regarding this request for proposal may contact:

Ed Ryen, P.E.
By E-mail (preferred): eryen@dot.state.nd.us

By Fax: (701) 328-4623
By U.S. Mail: 608 East Boulevard Avenue
Bismarck, ND 58505-0700

All questions must be received by 10:00 A.M. Central Standard Time, on February 25, 2005. All questions and answers will be sent to each prospective Vendor by March 11, 2005.

General Information
Vendors must adhere to all terms of this Request for Proposals.

Late proposals will not be considered.

All costs incurred in responding to this RFP will be borne by the Vendor.

Fax and e-mail responses will not be considered.

1. **Acceptance/rejection**. The right is reserved to accept or reject any or all proposal responses wholly or in part, at no penalty to the NDDOT Maintenance and Engineering Services Division or State of North Dakota.
2. **Addition of Terms and Conditions.** Any conditions submitted with a proposal response and any proposal with any additional terms and conditions may be rejected.
3. **Affirmative Action**. The Vendor will take affirmative action in complying with all Federal and State requirements concerning fair employment and employment of the handicapped, and concerning the treatment of all employees without regard to discrimination by reason of race, color, religion, sex, national origin or physical handicap.
4. **Alternate Proposal(s).** Vendors may submit alternate proposal responses(s) for the items(s) specified in the solicitation. Alternate proposal responses are to be clearly marked 'alternate' and all specifications, brand name, model number or trademark, if any, and/or any other information pertinent to identification must accompany the alternate proposal response.
5. **Alterations and/or Corrections.** The person signing the proposal response must initial any or all alterations and/or corrections (i.e. erasers, whiteouts,

correction tape, etc.) made to the proposal response. Those proposal responses with alterations and/or corrections to the unit or total price that are not initialed will be rejected.

6. **Award**. Proposals are not awarded at the proposal opening. Proposal responses will be firm for 30 days, unless stated otherwise.
7. **Awards, Splitting of;** The state reserves the right to make awards by item, groups of items, or on the total low proposal for all the items specified as indicated in the detailed specifications. Vendor's interested only in the total low proposal for all items are to state 'all or nothing' on their proposal response.
8. **Proposal Summary.** Proposal summaries will be mailed to those vendors who supply a self-addressed, stamped envelope with their proposal response. Proposal summaries are not mailed until the proposal has been awarded. Proposal summaries may be viewed and a copy obtained at the NDDOT Maintenance and Engineering Services Division during normal working hours.
9. **Vendors Must Be Approved Before Contract Award** Proposals will be accepted from vendors that are not currently approved vendors on the State's bidders list; however, the successful offeror will be required to become approved prior to award.
   To become an approved vendor, offerors must: 1) be registered with the North Dakota Secretary of State (fees apply), and 2) submit a completed Bidders List Application to the North Dakota Vendor Registry Office. Prospective offerors may access the Procurement Vendor Database on-line at www.state.nd.us/sec/ to verify whether their firm is currently on the bidders list.
10. **Vendor's Responsibility.** It is the vendor's responsibility to ensure that a proposal response is physically deposited with the NDDOT Maintenance and Engineering Services Division prior to the date and time specified for the date and opening. Late proposal responses will not be opened and will be rejected regardless of the degree of lateness or the reasons. It is the vendor responsibility to comply with the State of North Dakota's laws and regulations.
11. **Changes.** After a binding contract has been entered into, no changes (i.e. substitution of product or a price adjustment) may be made, unless prior approval has been obtained from the NDDOT Maintenance and Engineering Services Division.
12. **Clarifications/Interpretations.** Any and all questions regarding this document must be addressed to the NDDOT Maintenance and Engineering Services Division – Project Manager, listed below. The vendor is cautioned that the requirements of this solicitation can be altered only by written addendum and that verbal communications from whatever source are of no effect.

For information about purchasing procedures, policies and clarification of the bidding documents, hardware and software requirements contact:

Ed Ryen, P.E., Assistant Maintenance Engineer
Maintenance and Engineering Services Division
North Dakota Department of Transportation
608 East Boulevard Avenue
Bismarck, North Dakota 58505-0700
Telephone: 701-328-4274
E-Mail: eryen@state.nd.us

13. **Definitions**:
    - Vendor - any person or firm submitting a competitive proposal in response to a request for proposal
    - Proposal response – the executed document submitted by a vendor in response to a request for proposal
    - Contract – a deliberate written agreement between two or more competent persons to perform specific tasks
    - Vendor - any person or firm having a contract with a governmental body.
14. **Facsimile Proposals.** Proposal responses are not be faxed to the NDDOT Maintenance and Engineering Services Division. **PROPOSAL RESPONSES FAXED TO THIS OFFICE WILL BE REJECTED.** Faxed proposal responses are accepted only, if the proposal is faxed to a third party, who will put it in an envelope and deliver it to the NDDOT Maintenance and Engineering Services Division before the date and time specified in the solicitation.
15. **Review of the Proposals.** Proposals are not available for review until after award is made. After award, those interested in reviewing the proposal file are to make arrangements, with the NDDOT Maintenance and Engineering Services Division. The NDDOT Maintenance and Engineering Services Division hours are between 8:00 a.m. and 12:00 p.m. and 1:00 p.m. and 5:00 p.m. Monday through Friday.
16. **Receipt of Proposals**. All sealed proposals received by the NDDOT Maintenance and Engineering Services Division will be opened and recorded at the place, date, and hour specified in the solicitation. The contents of proposals are not available for public review until after the award is made.
17. **Rejection**. Proposal responses will be rejected if:
    - the proposal response is not legible.
    - the proposal response is not completed as requested.
    - the proposal response is completed and/or signed in pencil.
    - the proposal response is faxed to the NDDOT Maintenance and Engineering Services Division
    - the proposal response is unsigned.
    - the proposal response does not meet the required specifications of the solicitation.
    - changes or corrections to price on the proposal response that are not initialed.
    - the proposal response is received after the time and date specified.

- or a combination of the above.

18. **Signature.** The vendor submitting the proposal response or that vendor's duly authorized agent or representative must sign the proposal response manually in ink. The name and title of the person signing the proposal response must be typed or printed below the signature.
19. **Specifications**. All models shall be new, unused units under current production at the time of submitting response unless otherwise specified.

20. **Taxes**. The State does not pay sales tax or federal excise tax. The state sales tax exemption number is E-2001. The federal tax free transaction number is 45-70-0010K.
21. **Withdrawal or changes to a proposal response prior to the proposal opening date and time.** A vendor may withdraw or make a change to his proposal prior to the proposal opening date and time. The request to make a change or withdraw must be in writing by a representative of the firm. The request to withdraw or change must be signed by the vendor or his designated representatives.
22. **Withdrawls after the proposal opening date and time.** Withdrawals after the proposal opening will be allowed only upon written approval from the NDDOT Maintenance and Engineering Services Division. Vendors continually withdrawing proposals after the proposal opening may be removed from the Vendor Database.
23. **Subcontractors.** Overall the vendor must assume responsibility for the proposal submitted in response to this RFP. The vendor submitting the winning proposal must be the prime Vendor and principal contact during the entire term of the resultant contract. All subcontractors the vendor plans to use in fulfilling the obligations of the resultant contract must be fully identified in the vendor proposal.
24. **Vendor Checklist.** HAVE YOU REMEMBERED TO:
    - Mark envelope as indicated
    - Review General Terms and conditions contained in this solicitation.
    - Sign your proposal on the cover sheet included (SFN 51460)
    - Initial all proposal/pricing changes you made.
    - Proposal responses must be submitted in ink or type written.
    - Review and complete all requirements contained in this solicitation to ensure compliance.
    - Register With the North Dakota Secretary of State Office

General Terms and Conditions

1. **Assignments, Transfers, Etc.** Contracts as a result of this request for proposal are not to be assigned, transferred, conveyed, sublet, or otherwise disposed of without previous consent, in writing, to the NDDOT Maintenance and Engineering Services Division.
2. **Attempt To Influence An Award.** No person on a bidders list or who submits or intends to submit a proposal shall give or offer to give, directly or indirectly, any money, article, or other thing of value to:

a. Any office or employee of the North Dakota Department of Transportation.
b. Any office or employee of any requisitioning agency that has submitted or may submit a requisition for any item sold such person.
c. Any office or employee of the State of North Dakota who is a member of a committee whose duty it is to recommend or adopt specifications for any commodity or equipment to be bought by the state that is sold by such person.

Any person attempting to influence an award, or making (or offers to make) a gift is prohibited. All proposals submitted by this person will be rejected and the firm will be barred from further making proposals for period of time, which will be determined by the North Dakota State Procurement Office. (Also see subsection 3 of section 4-03-13-01). The Office of Management and Budget will notify the Attorney General of any violation of this subsection. For such action as the Attorney General may deem appropriate. 4-03-08-01(6).

3. **Award.** Awards will be made to the responsible, responsive vendor whose proposal is determined to be most advantageous in consideration of price and all other state award criteria. Awards may not be made to any person, firm, or corporation in default of a contract or to any company having as its sales agent or representative, or as a member of the firm, an individual previously in default or guilty of misrepresentation.
4. **Binding Contract.** The acceptance of a proposal response in writing by the NDDOT Maintenance and Engineering Services Division shall constitute a contract between the vendor and the state. Written acceptance from the (State Procurement Office or NDDOT) will be in the form of a purchase order or a notification of award. Any oral agreement or arrangement by a vendor or vendor with an agency or buyer will have no force or effect unless reduced to writing. The successful vendor must perform in accordance with the terms and conditions of the contract and this article and purchasing laws of the state of North Dakota.
5. **Compliance with Laws.** The Vendor must, in performance of work under this contract, fully comply with all applicable federal, state, or local laws, rules and regulations. The Vendors must comply with the provisions of all appropriate federal laws, including title VI of the Civil Rights Act of 1964. Any subletting or subcontracting by the Vendor, subject subcontractors to the same provision.
6. **Cancellation of Contract.** If the contract is canceled for cause by the NDDOT Maintenance and Engineering Services Division, the Vendor is responsible for delivery of all items ordered prior to the cancellation, unless those orders had been cancelled by the ordering agency.
7. **Delivery of Equipment.** 30 days after receipt of purchase order.
8. **Discussions with Vendors.** The state reserves the right to hold discussions with vendors for the purposes of clarification, negotiations, and requesting best and final offers with vendors deemed susceptible for award.
9. **Estimated Volume.** The volume of this contract is estimated as listed in the proposal. Estimates are not to be considered as either a minimum or maximum, but rather an estimate based upon past and anticipated usage.

The Vendor or Vendors will be required to furnish actual requirements upon order. This contract will not include items of a similar nature, which must be bought for emergency use.

10. **Funding-out Clause/Appropriations Clause.** This contract shall become null and void, in total or in part, should the Legislature of the State of North Dakota fail to appropriate funds for any or all agencies, which are committed to the terms of this contract. Any such contract termination shall be at no cost to the state.

    The following clause will appear on all multi-year contracts or agreements: "NDDOT's obligation to pay those amounts due for those fiscal years following the next fiscal year are contingent upon legislative appropriation of funds for that purpose. Should said funds not be appropriated, NDDOT may terminate this agreement with respect to those monthly payments for succeeding fiscal years for which such funds are not appropriated. NDDOT will give the bidder thirty (30) days written notice of such termination and advise the bidder of the location of the equipment. All obligations of NDDOT to make payments after the termination date will cease and all interest of NDDOT in the equipment will terminate."

11. **Hold Harmless/Indemnification.** The Vendor agrees to indemnify the state, its officials, agents, and employees while acting within the scope of their duties as such, harmless from and against all claims, demands, and causes of action of any kind or character, including the cost of defense, arising in favor of the Vendor's employees or third parties on account of bodily or personal injuries, death, or damage to property arising out of services performed, goods or rights to intellectual property provided of omissions of services or in any way resulting from the acts or omission of the Vendor and/or its agents, employees, subcontractors or its representatives under this agreement, all to the extent of the Vendors negligence. The successful bidder must sign a contract that also contains our standard Risk Management Clause, which is attached as Appendix E.
12. **Investigations.** The State reserves the right to make an investigation or investigations of the materials, equipment, supplies, qualifications, or facilities offered by vendor or vendors determined to be susceptible for award. This investigation would be to determine whether or not the apparent low vendor or vendors could meet the requirements set forth in the solicitation.
13. **Material and Workmanship.** All material and workmanship shall be subject to inspection and testing by the state either at: (1) the point of manufacturer, or; (2) place of storage, or; (3) upon receipt.
14. **Rejection of any or all proposals.** The state reserves the right to reject any and all proposals in whole or in part.
15. **Title.** Title to items ordered shall not pass to the state until the items are received and accepted by the state. The Vendor shall be responsible for any loss prior to the actual receipt of the items by the state or it's agent.
16. **Subcontractors.** Overall the vendor must assume responsibility for the proposal submitted in response to this RFP. The vendor submitting the

winning proposal must be the prime Vendor and principal contact during the entire term of the resultant contract. All subcontractors the vendor plans to use in fulfilling the obligations of the resultant contract must be fully identified in the vendors proposal.

17. **Price Reductions.** NDDOT reserves the right to receive the benefit of any manufacturer-announced price reductions that occur prior to the delivery of the system components or maintenance contracts.
18. **Preparation of the Proposal.** Only signed proposals submitted on forms furnished by the NDDOT Maintenance and Engineering Services Division will be considered, and the bidder will be assumed to have familiarized themselves with the requirements of any and all special provisions by reference made a part of these specifications. Any unauthorized changes in or additions to the proposal form, including any reservations, will be considered sufficient grounds for rejection.
19. **Ties and Reservations.** No ties or reservations by the bidders are permitted.
20. **Incurring Costs.** NDDOT will not be liable for any costs associated with the preparation and presentation of a proposal submitted in response to this RFP.
21. **Proprietary Information.** NDDOT will consider all proposals received as public domain material and as such, they will be available for review. Any restrictions on the use of the data contained in the proposal must be clearly stated. Proprietary information submitted in response to this request will be handled in accordance with the statues of the State of North Dakota and the policies of the NDDOT. Innovations developed as, a result of this proposal may not be copyrighted or patented. All data, documentation, and innovations become the property of the NDDOT and will not be returned.
22. **Permits and Regulations.** The vendor shall procure and pay all permits, licenses, and approvals necessary for the execution of the contract. The vendor shall also comply with all laws, ordinances, rules, orders, and regulations relating to the performance of the work.
23. **Payments of Permits, Licenses, Etc.** Except as otherwise provided, all import permits, licenses, and the payment of all United States import duties and custom fees shall be the sole responsibility of the vendor
24. **Mandatory Requirements .** Requirements designated in this proposal as mandatory must be satisfied. Proposals, which do not meet this criterion, may be disqualified from further consideration. The vendor should be aware that when the heading of a section or a paragraph of this RFP proposal and Project Specifications document contains the word “Mandatory,” all requests or requirements of the vendor or the proposed equipment contained therein and statements further qualifying those requests or requirements will constitute mandatory requirements unless otherwise stated.

    Failure to meet a mandatory requirement (grounds for disqualification) shall be established by any of the following conditions:

The vendor states that a mandatory requirement cannot be met and does not propose a satisfactory functional equivalent.

The vendor fails to include information necessary to substantiate that a given mandatory requirement has been met.
The vendor fails to include information requested by a mandatory requirement.
The vendor presents the information requested by this RFP in a manner inconsistent with the instructions as stated by mandatory requirements of this RFP.
The evaluation team establishes reasonable doubt by a review of the available user references as to the vendor's ability to comply with one or more of the mandatory requirements of this RFP.

25. **Scope** This RFP contains the instructions governing the proposal to be submitted and the material to be included therein, mandatory requirements which must be met to be eligible for consideration, bidders' responsibilities, and the requirements to be met by each proposal
26. **Proposal Discrepancies.** In case of difference between written words and figures in the proposal, the amount stated in written words shall govern. In case of unit price differences from an extended figure, the unit price shall govern.
27. **Contract.** The successful vendor will be required to execute a contract satisfactory to NDDOT Maintenance and Engineering Services Division within 7 working days after notification. Preprinted contract forms, which represent the "complete and exclusive statement of agreement", are not acceptable. The contents of this specification, as well as the entire proposal submitted by the selected vendor, will become part of the contract. Preprinted contract forms, which are normally and regularly used by the bidders, may be submitted as addenda to the proposal, for consideration during proposal appraisal.
28. **Award of contracts – Bonds.** . For contracts in excess of $20,000. the successful bidder is required to furnish a suitable bond in at least the amount of the contract and with such surety as may be determined by the NDDOT and as approved by it.
29. **Acceptance of Proposal Content.** By submitting a proposal, the vendor agrees that the contents of the proposal will become part of the contract when accepted by the NDDOT Maintenance and Engineering Services Division in the manner prescribed under the standard contract.
    The selected bidder will be required to assume responsibility for delivery, installation, and maintenance of all equipment and support services proposed.
30. **Prime Bidder Responsibility.** A prime bidder is the bidder who offers the proposal to provide the service and receives payment for that service. NDDOT Maintenance and Engineering Services Division will consider the prime bidder to be the sole point of contact with regard to contractual matters, including the performance of services and the payment of any and all charges resulting from contractual obligations.
31. **Collaborative Proposals.** The firm(s) that will be ultimately responsible for installation (if applicable), warranty service, and maintenance service must be a party to the proposal and the resulting contract. Subcontracting of

maintenance must be with the original manufacturer's authorized service organization.

32. **Demonstration.** Selected top three vendors may be required to run a demonstration. The proposed equipment and system will be run on the vendor's supplied hardware to substantiate vendors claims with NDDOT personnel present. Failure to perform as reported in the proposal may result in disqualification.
    The results of the demonstration and data created during the demonstration will become the property of NDDOT, and NDDOT may distribute or publish any of this data, or grant permission to distribute or publish any of this data at NDDOT's discretion.
33. **Notification of Award.** An apparent successful bidder will be announced immediately following NDDOT management approval. This is expected to be within one month of opening bid proposals. Bidder will be notified
34. **Non-performance** of the vendor in terms of the specifications shall be a basis for the termination of the contract or portions thereof by NDDOT. Cancellation of the contract may be made by NDDOT for reasons of non-performance upon thirty (30) days written notice to the vendor. Further, NDDOT shall not pay for work not done or for work done in an unsatisfactory manner
35. **Down Time Attributions.** Down time shall not be attributed to vendor's equipment if failure of the proposed automated testing system equipment is due to "force majeure." The term "force majeure" as used herein shall mean without limitation; acts of God, strikes, or lockout; acts of public enemies; riots; epidemics; lightning; earthquakes; fire; storms; floods; washouts; droughts; arrests; restraint of government and people; civil disturbances and explosions.
36. **Payment.** NDDOT hereby agrees, in consideration of the covenants and agreements specified to be kept and performed by the vendor, to pay to the vendor when the term and conditions of the contract and specifications have been fully completed and fulfilled on the part of the bidder to the satisfaction of NDDOT, the sum of the individual order amount. Payment under the contract will be made in the manner provided by law for payment of claims against NDDOT.
37. **Bidder Questions.** All questions from vendors regarding the RFP or relating to this project must be submitted to NDDOT for clarification by March 14, 2005. Questions will be answered in writing and mailed, e-mailed, or faxed to all bidders by March 18, 2005. Questions must be in writing and mailed, faxed, or e-mailed to:

    Ed Ryen, P.E., Assistant Maintenance Engineer
    Maintenance and Engineering Services Division
    North Dakota Department of Transportation
    608 East Boulevard Avenue
    Bismarck, North Dakota 58505-0700
    Telephone: 701-328-2545
E-Mail: eryen@state.nd.us

Proposal Format

It is requested that the format and the content adhere to the requirements listed below of this RFP. It should be noted that although the response format is optional, the content is mandatory.

The proposals must be prepared on standard 8 ½ x 11 inch paper (charts and other large forms should be folded to fit the above size) and should be placed in a binder with tabs separating the major sections listed below. Optional extras may be quoted as additions in letterform on separate sheets attached to the proposal.

1. **Multiple Proposals.** Multiple proposals involving alternative methods of meeting the objectives may be submitted and are encouraged. Each proposal must conform to the format specified in these instructions. Each proposal must be clearly marked Proposal # one, Proposal #2, etc. on the cover.
2. **Collaborative Proposals**. The firm(s) that will be ultimately responsible for installation (if applicable), warranty service and maintenance service must be a party to the proposal and the resulting contract. Subcontracting of maintenance must be with the original manufacturer's authorized service organization.
3. **Proposal**. The vendor must agree, in writing, that information contained in all material submitted is valid and will remain so for at least six (6) months form the due date of this RFP.
4. **Proposal Specifics:**

   The vendor shall submit proposals as follows:

   a. The proposal shall be printed in ink or typed
   b. Proposals must be submitted in sealed envelopes or containers, and must be clearly identified as proposals submitted in response to the solicitation.
   c. All proposals are to be submitted complete and in their entirety
   d. One original and six (6) copies of the proposal shall be submitted.
   e. Vendor should provide a table of contents and provide label divider tabs.
   f. Alterations or erasures must be crossed out, and the corrections thereof printed in ink or typewritten adjacent thereto. The person signing the proposal must initial the corrections in ink.
   g. All proposals must comply with and not deviate from the provisions of the Project Specifications and/or other bid or contract documents, if any.
   h. Revisions, or interpretations, made by NDDOT shall be by addendum issued prior to the letting date.
   i. Changes to the language in the proposal may be cause for rejection of said proposal.
   j. Vendors must certify the validity of their proposals by the signature of an officer of the vendor's organization authorized to commit the vendor to the proposal content. It is the NDDOT intention to include the vendor proposal as part of the resulting contract.

5. **Catalogs and Specifications.** Catalogs, specification sheets, or other literature giving detailed information of the item quoted on, shall be filed with the proposal. The items shall be identified in the catalog, specification sheet, or literature by model name or number. Modifications or deviations from printed literature will include a written statement to describe accessory items not covered by printed literature. If any additional information is required to properly evaluate the proposal, it shall be furnished during the evaluation period.

Proposal Content Section Headings

1. **General**. There is no intent to limit the contents of proposals and the proposal format instructions to permit the inclusion of any additional information a bidder deems pertinent. It is the request of the NDDOT that the following section headings be used in the vendor responses to this RFP and that they be arranged in the order listed in this proposal.
2. **Section Headings**

A. Vendor Profile (Mandatory)

You are requested to include in this section facts you wish to present about your company. Keep this section brief. A copy of the vendor's latest annual report, Dunn and Bradstreet's current rating, if available, or other sources of financial information must be provided to permit NDDOT and MnDOT to be satisfied with the financial stability of the bidder.

B. Proposed System (Mandatory)

This section will include a detailed narrative describing the equipment and software being proposed. A response to all items is required based off the project specifications (attached). All equipment prices should be listed by line item with a total project rollup.

C. Maintenance, Service, and Support (Mandatory)

The vendor is requested to provide an explanation of the maintenance bid in response to the mandatory requirements listed in the specifications section. This should include a discussion of your firm's maintenance philosophy and capabilities and how you will meet your responsibilities as the prime vendor. Provide a detailed description of your preventative maintenance program and remedial maintenance plan as well as the Qualifications of the Maintenance Personnel. Details regarding maintenance, service and support are shown in Appendix A.

D. Training and Manual/Documentation Requirements (Mandatory)

The vendor is requested to describe briefly the scope of specific training recommended, the duration of basic training (in hours), training aids required (including manuals, skills of people to be trained, and the cost. Include cost to meet Mandatory Training Requirements listed in the attached project specification.

E. Special Conditions (If appropriate)

Detail any special conditions that apply to your response to this RFP

F. Environmental and Physical Specifications (Mandatory)
In this section the vendor is requested to describe the environmental requirements of the equipment bid.

G. Additional Information (If Appropriate)
The vendor may wish to supply additional information if appropriate. The additional information should be relevant to the bid.

H. Outright Purchase (Mandatory)
NDDOT, at its option, may procure under this RFP, using an outright purchase method of financing for hardware and software. Upon installation, acceptance, and final payment (due after acceptance by NDDOT), NDDOT will receive clear title to hardware and the right to use the licensed software per the bidder's Software License Agreement. The vendor is requested to provide and bid this method of acquisition.

I. Annual Payments – Recurring costs (mandatory)
Vendors are invited to propose annual as well as monthly payments for recurring costs (such as maintenance). NDDOT is prohibited by law from making advance payments for maintenance services unless the maintenance agreement is essentially a warranty providing for repair or replacement in the event of failure. Routine preventive maintenance services are construed to be "services" for which no advance payment is legal. Maintenance charges will begin at the end of any warranty period offered with the product.

J. Price Proposal (Mandatory)
The vendor is requested to quote purchase and maintenance prices which will be firm for one year following the expiration of the warranty period. The vendor shall include all maintenance, service, and repair costs. These would be associated costs after the warranty period has expired.

In the event of a price decrease for purchase or maintenance of the proposed equipment to the general trade during the term of the contract, NDDOT shall have the benefit of any lower prices offered the general trade. The bidder is requested to declare this concurrence with this requirement.

K. Delivery Requirements (Mandatory)
The proposal must stipulate typical delivery times following receipt of NDDOT purchase order and signed contract. The vendor must provide NDDOT Maintenance and Engineering Services Division with proposed installation dates. Early and/ or partial deliveries will not be permitted without express written approval by the NDDOT Maintenance and Engineering Services Division.

L. References (Mandatory)
NDDOT requests references of three installations that are similar to what the NDDOT is requesting. Include names, address, and phone numbers

of the contacts. Of the systems installed, indicate how many are currently installed and operating.

> **NOTE:** The NDDOT reserves the right to contact users of vendor systems other than those supplied and to use the information so gathered in the evaluation

M. Warranty Guarantee (Mandatory)

Provide warranty on labor, equipment and installation.

N. Equipment Standard of Performance and Acceptance (Mandatory)

The vendor shall certify to the NDDOT in writing when the system is installed and ready for use. The performance period shall commence on the first State workday following certification, at which time operational control becomes the responsibility of NDDOT. During the acceptance test period of November 1, 2005 through February 1, 2006, the system shall perform successfully in accordance with all the mandatory requirements specified in this proposal. Should the system fail during this 90-day acceptance period, vendor will be required to correct the issue which caused the failure. This correction shall be made within a commercially reasonable time period. Once the correction has been made, a new acceptance period of thirty days shall commence.

Appendix A – Scope of Services

1. Proposal

The Vendor will provide a proposal and bid to the State for all work set forth in this document. There will be no additional cost to the State over and above the lump sum bid price for items included in this document.

2. Vendor Qualifications

The Vendor shall be experienced in the design, installation, and maintenance of fixed automated anti-icing spray systems for roadways and bridges, and will have been responsible for the complete installation of at least five fully functioning fixed automated anti-icing spray systems.

The Vendor shall be experienced in the installation of the active pavement sensors, to be used on this project, specifically for the automatic control of fixed automated anti-icing spray systems, and will have been responsible for the complete installation of at least five fully functioning systems based on active pavement sensor technology. The Vendor will be approved by the anti-icing system manufacturer for the design, construction, testing, and maintenance of the anti-icing system.

The Vendor's designated superintendent performing the work will have at least four years of experience in this work. The Vendor's personnel and equipment will have the capacity to undertake the work, and will be sufficient to complete the work within the specified contract time.

The Vendor will provide documentation of his qualifications, experience record, prior project references, and the availability of the designated personnel. All prior project references will be currently available personnel who can verify the quality of the Vendor's previous work, and will include name, address, and telephone number. This documentation will reference the experience of the Vendor and his designated superintendent in the complete design, installation, and maintenance of fixed automated anti-icing spray systems for roadways or bridges.

3. Project Schedule

The Vendor will develop and provide plans, drawings and specifications for approval by NDDOT's Project Manager by May 6, 2005 and install the complete system by October 15, 2005.

Failure to complete the installation of the complete system by October 15, 2005 will result in the assessment of liquidated damages according to Specification 108.04 J, Failure to Complete the Work on Time, as outlined in the NDDOT Standard Specifications for Road and Bridge Construction, 2002 Edition.

4. Project Management

Vendor will provide all project management needed to develop and deliver all contract drawings, specifications, and documents to NDDOT's Project Manager, deliver equipment and material resources to the project site, and complete installation and checkout of all project features. The Vendor shall provide a bar graph progress chart prior to beginning the project according to Section 108.01.B of the North Dakota Standard Specifications for Road and Bridge Construction 2002

The work will be performed under the supervision of the Vendor's designated superintendent, who will be on site during **all** phases of the installation, who will be fully knowledgeable and experienced, as defined herein, in the design, installation, and maintenance of similar fixed automated anti-icing spray systems.

Vendor will provide all necessary supervision of subcontractors involved in the provision and installation of system features at the project site.

Vendor will be responsible for coordinating all work on, under, or near the bridge with NDDOT's Project Manager. The Vendor must identify their project manager and support staff and their experience with Fixed Automated Spray Technology (F.A.S.T.) systems.

Vendor will maintain continuous coordination with the NDDOT Project Manager and NDDOT Project Inspector for inspection of the automated bridge anti-icing project.

Vendor will provide bi-weekly written reports and meetings on project status, schedule, and progress to NDDOT's Project Manager at the NDDOT Fargo District headquarters.

5. Design of Fully Automated Bridge Anti-Icing Project

The Vendor will comply with the North Dakota Department of Transportation's Standard Specifications for Road and Bridge Construction, 2002 Edition.

All necessary drawings and specifications must be submitted in English units. Some of the dimensions given in this Request for Proposal are in Metric units. It will be the Vendor's responsibility to convert the Metric measurements to English equivalents and adjust the English units to coincide with the nearest Standard English dimensions for a given item.

All parts of this system will be Standard English Units parts, including, but not limited to gaskets, bolts, fasteners, gauges and piping. Converting a Metric part to English units will not be acceptable. The parts themselves need to be English units parts for future replacement purposes.

The Vendor will provide plans, drawings, and specifications to the NDDOT Project Manager. The Vendor will design and construct a pump and liquid

anti-icing storage building that contains all F.A.S.T. components (electronics, hydraulics, electrical pumps, and tanks at the project site).

5.1. Pumphouse

The pumphouse will consist of a precast concrete panelized building system to be field-erected on a cast-in-place, (CIP) concrete foundation. The foundation shall have 6 inches of Class 5 aggregate base as specified in Section 816 of the North Dakota Standard Specifications for Road and Bridge Construction 2002. The CIP concrete foundation will serve as a secondary containment area for the anti-icing chemical that is to be stored within the pumphouse. The containment area will be capable of holding 110% of the volume of the largest tank. The containment area will have a liner impervious to chemicals that may be used for anti-icing. The containment area will be sloped to one corner and drain into a 4 inch deep by 18-inch square sump area. Installation of electrical components within the pumphouse will be in accordance with the requirements of the National Electrical Code, including clearances.

The CIP concrete will be Class AE-3 concrete according to Section 802 of the North Dakota Standard Specifications for Road and Bridge Construction 2002.

The roof and wall panels will be precast and produced as single component monolithic panels, and no intermediate roof or wall joints are allowed, except at corners. The roof and wall panels shall conform to local building codes.

The precast wall panels will have an exposed aggregate architectural finish on all exterior surfaces.

Interior surfaces of precast roof and wall panels will have a smooth steel form finish. The walls and roof panels will be primed and painted.

The pumphouse building will be designed in accordance with the local building codes.

The Vendor will submit for review and approval of the structural engineering design calculations and working drawings for the pumphouse precast concrete building that have been prepared and sealed by a Professional Engineer registered in North Dakota. The design calculations and working drawings will be submitted for review and approval by NDDOT's Project Manager.

Precast concrete will be Class AE-3 concrete. Precast panels will be reinforced with deformed steel bars.

All joints between panels will be caulked on the exterior and interior surface of the joints using Dow Corning 888 or Syk/Flex or approved equal.

Floor grating will be fiberglass, minimum 1.5 inches thick, grade 304 stainless steel supports, with access to the containment area by stairs or ladder.

The Vendor will submit design calculations and working drawings for the stair or ladder framing, including connections that have been prepared and sealed by a Professional Engineer registered in North Dakota, for review and approval. Structural members will be sized to safely carry a uniform live load.
If the Vendor requires a handrail system, it must meet Federal requirements and must be removable.
Two pumphouses, one on the Minnesota side and one on the North Dakota side will be constructed, at locations approved by each State.
Sealed openings will be provided for all needed power supply and piping connections. Building and exterior piping to bridge spray system will be constructed to meet or exceed local building codes.

5.1.1. Required Pumphouse Features

- A **ventilator fan** sized appropriately for the structure, mounted on a powered shutter with 24 hour timer, painted weather hood and removable filter for storage building ventilation.
- One Built-in commercial grade electric **wall heater** sized appropriately for the structure.
- **heavy duty Industrial fluorescent lighting fixtures** sized appropriately for the structure.
- One **personnel entrance door** 3’ wide x 7’ high made of 18 gauge painted aluminum, the door will have an insulating value of R factor 11. Adjust doors to swing open and shut without binding, and to remain in place at any angle without being moved by gravitational influence. 18 gauge aluminum frame with latch guard threshold weather-strip, stainless steel hinges, locksets keyed as required by NDDOT and MnDOT. Rust proofed hold open arm.
- Two exterior weather proof lights.
- Clear sight glasses installed in the supply and return lines.

5.1.2. Instrumentation in Pumphouse

- Pressure Gauges: Analog type, industrial grade, all Type 316 stainless steel, minimum pressure range = 0 to 300 PSI. Pressure gauge and pressure control regulator for liquid pressure and flow readings.
- Flowmeter Transmitter: senses flow rate in system and sends signal to RPU spray system controller. Flowmeter will be fabricated from durable noncorrosive materials. All metallic parts will be non-corrosive. Minimum flow rate range = 0.3 to 6 meters (feet) per second.
- Pressure Switch Transducer: senses pressure in system and sends signal to RPU spray system controller. All metallic parts will be Type 316 stainless steel. Pressure range = 0 to 2,000 kPa (ft/lbs).

- (Ultrasonic) Level Sensor: ultrasonic device to detect the level of chemical in the storage tanks. The ultrasonic level sensor will be connected to an alarm horn mounted on the exterior of the pumphouse to alert personnel filling the tanks when the tanks are full. The ultrasonic level sensor will also send signals to a digital level display located in the housing for the chemical fill tube on the exterior of the pumphouse.
- Pumps with salt (sodium chloride, calcium chloride, potassium acetate and/or magnesium chloride) tolerant seals and bearings.
- Pressure control device, safety return bypass with control valve, and flow transmitter measuring outflow and connection of pressure pipe
- Two Liquid filters in stainless steel housing pressure rated to 250 PSI, PP25 or better w/pressure gauge on the inlet & output lines.
- Valves to control tank overflow and automatic control of security collection basin
- 2500-gallon cylindrical tanks or larger with NDDOT and MnDOT approval.
- Complete external fill pipe assembly, schedule 80 two-inch PVC pipe with ball valve, swing check valve and locking cap assembly. A 2 inch hose that will remain flexible in extreme cold temperatures, with quick connect couplings, properly length for easy filling of the anti-icing tanks.
- Test water storage tank, (for summer flushing) ND/DOT and MnDOT approved polyethylene tank. 1 ¼" drainage flange and cap and automatic flow level control, adequately sized to flush the system.

The chemical tank will have an entry port through the top and removable cover. The tank will be vented at the top. The tank will be rated for a maximum fluid specific gravity of 1.5 or greater and will be made from polyethylene material. Any metal components of the tank will be type 316 stainless steel. Galvanized steel will not be permitted.

Note: All pump station equipment will be contained within secure pump and liquid anti-icing storage building.

5.2. Spray Disks and Valve Units

The anti-icing spray system will dispense a non-chloride deicing agent such as CF7® as illustrated and described as follows:

- Pavement spray disks installed in bridge deck with power and liquid spray supply connections at bottom of pavement.
- Spray disks sealed in pavement with NDDOT and MnDOT approved sealing compound that is Spec Bond 100, Pro-Poxy 100 or equivalent.
- Pavement spray disks to be installed on the bridge will be spaced according to Vendors specifications. Spray disks to be installed on the approach of the eastbound roadway prior to the bridge at the

recommendation of the Vendor. Spray disks to be installed on the approach of the westbound roadway prior to the bridge at the recommendation of the Vendor.

- The spray disks will be mounted in the bridge deck or roadway surface, with the disk top surface just below the surface of the bridge deck or roadway, and will be capable of withstanding high-volume interstate traffic and snow plowing procedures conducted with maintenance trucks. All metallic components of the spray disk will be non-corrosive. The spray disks mounted in the bridge deck will have piping connections located on the underside of the disk. The spray disks mounted in the roadway approach pavement off the bridge will have side-mounted pipe connections. The spray disks will be fabricated in such a manner that the nozzle directions can be adjusted while the disk is embedded in the bridge deck or roadway surface without removal of the disk assembly. The spray disks will provide uniform coverage of all traffic lanes. The nozzles will be self-cleaning.
- Valve unit with associated electrical connecting cable and liquid supply pipe to be placed by the Vendor in such a manner that access to the valves can be easily achieved for maintenance purposes.
- A non-corrosive fixture must be provided at each valve location to affix valve body to the bridge.
- Valve units will control the flow of anti-icing chemical from the main supply line to each spray disk. Valve units will consist of electronically-controlled solenoid valves.

5.3. Piping and Cables

The tanks, piping and cables will have the following requirements:

- Pressure piping – to spray disk: Plastic pipe, ¾-inch Nylon 11 with non-corrosive connections, joints, elbows, fixed points and pipe clamps. Nylon 11 tube couplings are not permitted in tubing runs between junctions, or in remote, inaccessible locations.
- Pressure piping - valve unit supply line: The chemical pressure pipe will be Nylon 11, or approved equal, tubing. Nylon 11, or approved equal, tube couplings are not permitted in tubing runs between junctions, or in remote, inaccessible locations. All pipe connections, joints, elbows, fixed points, and pipe clamps will be non-corrosive.

Chemical pressure pipe within the pump house will be durable non-corrosive rigid pipe with socket fused or threaded joints, rated for the system pressure.

- Protective pipe - hydraulic pressure lines: Galvanized pipe to fully contain pressure pipe includes connections and elbows, fixed points at pump station, valve assemblies, hot dipped galvanized pipe clamps, and mounting hardware. NOTE: Any fasteners penetrating the deck will be stainless steel. Expansion joints will be installed in appropriate numbers to compensate for all anticipated expansion and contraction associated with this bridge. Chemical pressure piping will be routed within a protective conduit system consisting of non-metallic conduit

where embedded in concrete or buried in the ground and galvanized steel conduit where exposed. Conduit and all fittings, connections, elbow, and mounting hardware will be approved by the Project Manager.

- Protective pipe - electrical cables: Fasteners should be stainless, Clamps should be hot-dipped galvanized. Galvanized pipe for protection of electrical cables. Including connections and elbows, stainless steel fixed points, pipe clamps, mounting hardware and expansion joints. Expansion joints will be installed in appropriate numbers to compensate for all anticipated expansion and contraction associated with this bridge.
- Shielded cable - control cable
- Color coded, with ground, Shielded cable-telephone
- Sensor control cable and power cable for RPU Slave Unit will be routed within a protective conduit system consisting of non-metallic conduit where embedded in concrete, and galvanized steel conduit where buried or exposed. The Project Manager will approve conduit and all fittings, connections, elbow, and mounting hardware.
- All fasteners required to mount conduits shall be hot dipped galvanized steel and any fasteners penetrating the deck will be stainless steel.

5.4. Anti-icing spray control system

The anti-icing spray system will be controlled by a microprocessor with capacity for 256 valves maximum and ability to monitor pump functions and tank fluid levels, and will include the following:

- The anti-icing system will be controlled by a microprocessor-based RPU controller with capacity for this project spray disks and the ability to monitor pump functions, system pressure, flow characteristics, and tank fluid levels.
- The RPU spray system controller will be able to interpret between various signals from sensors to initiate different spray programs to apply measured amounts of liquid anti-icing chemical to the roadway surface.
- The control of the application of anti-icing chemical will be fully automated, with provisions for operator intervention and notification.
- The automated control system will include atmospheric sensor capabilities and active and passive pavement sensor technology.
- The RPU spray system controller will be capable of storing and running different algorithms (scenarios) for automatic spray activation sequences. Algorithms (scenarios) shall be listed in the proposal.
- The RPU spray system controller will have the capability to vary the length of time each solenoid valve is opened, thus varying the quantity of liquid anti-icing agent that is applied to the roadway surface, and will

be capable of changing the length of time for pauses between sprays, according to different conditions on the roadway surface.

- Fully automatic operation will have manual override capability, with the options for manual pushbutton operation from the pumphouse, remote control device with a range of no less than 100 feet, and computer activation from web-based software.
- The system will provide surge protection for the incoming telephone line.
- The RPU will have the capability of detecting failures of system components and initiating automatic system shutdown in the event of a failure.

The RPU spray system controller will be contained within a wetherproof stainless steel or aluminum housing with lockable lid. The Vendor will be able to demonstrate experience in the operation of the RPU spray system controller software in automated liquid anti-icing spray systems.

Requirements are as follows:

- Switch for manual activation of spray system

5.5. Automatic Spreading Control System and Pavement Sensors

Vendor will provide a complete automated spreading system, which will include a complete field measuring station for measuring selected site environmental parameters. This microprocessor controlled station will include the following components:

Active Pavement Sensor: The active pavement sensor will be capable of cooling the sensor surface temperature using an electronic peltier device to a point approximately 2 degrees Fahrenheit below the current pavement temperature, and returning the sensor surface to an above freezing temperature, in a continuous cycle; and will be capable of detecting ice formation on its surface. The sensor will be capable of continually measuring the “freeze point temperature” of the moisture/chemical mixture on the roadway surface. This sensor will be capable of accurately detecting freeze point temperature in the range of 32 degrees to minus 4 degrees Fahrenheit using an electronic peltier device.

Passive Pavement Sensor: The passive pavement sensor will be capable of measuring the passive conductivity reading of the moisture/chemical mixture on the pavement surface to compare the active sensor measurement to the passive conductivity measurement. The passive pavement sensor will measure the pavement surface temperature for comparison with the other pavement sensor measurements.

Air Temperature & Relative Humidity Sensor: Temperature measurement range equal to -40° C to +70° C, temperature sensing accuracy throughout range = ± 0.3° C, relative humidity measurement range 10 percent to 100 percent, with an accuracy of less than ±5 percent in the range from 10 percent to 100 percent RH.

Sensor will have a wind and solar radiation shielded housing. Sensor will be mounted in such a manner as to achieve the optimal readings above bridge deck.

Precipitation Sensor: The precipitation sensor will be able to detect the rate and type of precipitation by sensing falling particles, and will be capable of distinguishing between rain, freezing rain, drizzle, and snow. Operating temperature range will be -50° C to +50° C. False alarm error rate for precipitation will be less than 0.2 percent. Precipitation intensity error rate will be less than 5 percent for the range 10 mm/hour to 100 mm/hour, and less than 10 percent for the range 3 mm/hour to 500 mm/hour. The sensor will be mounted in such a manner as to achieve the optimal readings above bridge deck.

Wind Measurements: The anemometer shall be capable of measuring wind speeds in excess of 100 mph and wind detected from any direction between 0? and 360?.

RWIS Remote Processing Unit: There is an existing RWIS at the bridge location and is not NTCIP compliant. It is preferred the existing RWIS remain and be made a part of the system. The Vendor will have as an option, to update the current RWIS or replace the existing RWIS. The remote processing unit, or RPU, of the RWIS shall be able to collect and store data from the various sensors. The RPU will be part of a standard product line and not custom or specially produced for this project. The RWIS RPU will transmit data to the RPU spray system controller in the required formats when polled. The RWIS RPU will consist of a microprocessor of current manufacture that is capable of performing all of the required functions. The RPU layout will provide the data bus for the microprocessor, and individual components will be replaceable to perform maintenance and repairs. The RPU will include serial ports, analog and digital drivers, and inputs to fully support and correctly interpret the pavement and meteorological sensors. The RPU will be supplied with a host serial port for interfacing to a laptop computer to perform diagnostic and calibration functions. The RPU will have the capability for four future expansions of the number of serial ports, and will be capable of adding digital outputs. Where pavement or meteorological sensors are located more than 350 feet from the main RPU, additional “slave” RPU units will be provided within 350 feet from the subject sensors, to collect and store analog data from the sensors, and to transmit the data in digital form to the main RPU. The “slave” RPU units will be fully compatible with, and meet the same requirements as the main RPU. RWIS RPU and slave RPU units will be contained within heavy-duty durable non-metallic enclosures with lockable lids that are sealed against moisture when closed and protected from snow discharged from snowplow trucks during snow plowing operations.

RWIS Mounting Pole: Existing RWIS equipment and tower will be utilized if possible. New RWIS towers shall be aluminum with fold over capabilities for easy maintenance. Any modifications required for the tower will be made by the Vendor upon approval from NDDOT Project Manager.

5.5.1. Sensor Requirements

- Sensors to be installed on the bridge will be placed to achieve the optimal readings possible in each direction of travel.
- The pavement sensors will be mounted in the bridge deck and roadway with the top surface of the sensor below the surface of the bridge deck, and will be capable of withstanding high-volume interstate traffic and snow plowing procedures conducted with maintenance trucks.
- The pavement sensors mounted in the bridge deck will have electrical side-mounted or bottom mounted connections.
- Pavement sensors will provide the following minimum information:
  - Pavement Surface Temperature Range: -40 degrees C to +85 degrees C;
  - Pavement Surface Temperature Accuracy: ± 0.3° C;
  - Presence of wet surface condition;
  - Presence of moisture on pavement;
  - Presence of frost or ice on pavement;
  - Presence of anti-icing chemical;
  - Freezing point temperature of moisture considering concentration of Anti-icing Chemical measured directly in degrees F by active sensor, and estimated in degrees F by passive sensor. Freezing Point Temperature range: 32° F to -4° F
  - Presence of snow, ice, or wet surface condition when surface temperature is below 32° F.

The RWIS system and associated Remote Processing Units will allow for total flexibility in the selection of meteorological sensors and the system adaptability. The system will include the integration of active and passive pavement sensors.

5.6. Remote Operation of System

The Vendor shall use the existing software currently installed and used by both NDDOT and MnDOT. If the existing system is deemed non-functional for the spray system, the Vendor will provide fully automatic remote control operation with data collection and graphical user interface capability, including the following components: .

5.6.1. Modem

Modems shall be fiber optic capable. Dial-up access will be from the Fargo district office for both systems. NDDOT will provide the analog lines.

5.6.2. Software

Required software:

Existing control software shall be used for control and collecting of data. If the existing system is deemed non-functional for the spray system the Vendor shall supply the necessary software to operate the system and collect data. The software shall use WIN 2000/XP Graphical User Interface to include the

following functions:

- Pull-down menus and icons
- Visualizing of meteorological data, time and alarms in a graphical and numerical format
- Free programmable groups of measuring stations
- Multi windows screen
- Summer and winter scale and visualization of a two and 24 hour history of selected values and periods
- Quitting of alarm messages
- Window for system messages
- Starting of other applications or other RWIS-RPU modules
- Printer driver
- Individual password protection, back-up and restore data
- Complete software description shall be included in the proposal.

The specified software and hardware will provide for DOT system operation from a manual control in the pumphouse, and from NDDOT Fargo District and MnDOT Moorhead District locations. NDDOT will identify the applicable telephone company to be involved in system operations. All software supplied to NDDOT will include installation media (CD).

5.7. Anti-Icing System Operations

Ambient Environment – The system will be able to withstand temperatures in the range of -40° C to +65° C with no permanent loss of function or component failure.

The pavement sensors and nozzles will withstand temperatures up to +85° C.

Operating Environment – The system will accurately apply liquid anti-icing chemicals to a pavement surface in the temperature range of -30° C to +5° C.

Chemical Environment – The system will be able to safely store and apply the commonly encountered liquid anti-icing chemicals. Those liquid chemicals include but are not limited to: Calcium Chloride – $CaCl_2$, Magnesium Chloride – $MgCl_2$, Potassium Acetate – Kac, Sodium Chloride – NaCl, Calcium Magnesium Acetate – CMA, and CMA/KAc blend – CMAK

The entire permanent anti-icing spray system component will consist of materials that are resistant to corrosion from whatever chemical is selected by the Department for use in the system. All metallic valves, connections, elbows, fixed points, and pipe clamps shall be non-corrosive.
Communications and Software – The system communication software will be delivered that meets standard communication protocol specifications and the needs of the DOT's. The system will communicate functions such as automatic system operation and display, the system software programs in the controller, tank level, pressure and fluid flow control along with manual operation of the system. The system data collection software will run as a background service on the central computer. The central computer need not be logged on to each Department's network to continue to log data from the anti-icing system.

Operating System –Microsoft Windows 2000 and server requirements must be Microsoft Windows Server 2003.

Software/Firmware – Client software will not require Windows administrative privilege to operate. Software/Firmware manufacturer will support bug fixes and maintenance upgrades for a minimum of two year after system acceptance.

Software Licensing – Vendor will provide a minimum of five remote access licenses.

Security – All communication to and from the RPU will be verified by user name and password. The system will provide two levels of password security, one with administrative configuration abilities, and the other as read-only access.

1. All passwords will be stored in an encrypted format with no clear text.

2. User accounts names and passwords will be user definable and changeable.

3. The system will support a minimum of two user accounts within the RPU.

Regulatory Requirements – The System will comply with all applicable national, state, and local construction and safety codes.

The System provided will be capable of two-way communication with the users using all of the following methods:

Computer Network: The System provided will be capable of networking with wide area networks. The System provided will utilize a Windows 2003 Server.
The server provided will network with standard computers via modem, network router, and frame relay, etc.
Telephone Modem: The System provided will be capable of supporting conventional telephone modem operation. This capability will include the ability to originate, or receive, calls to remote control sites.
Onsite Hook-up: The System provided will provide the for local on-site connection of a portable computer to the RPU spray controller and RWIS
RPU using the supplied RS-232C serial interface protocol.

5.7.1. User Control Options

The system will allow for the control of the liquid chemical application with full automation.

The system will be capable of the following control modes:

1. Fully Automated: The System operation will be automatic utilizing user defined parameters and the pavement and weather conditions sensed by the RWIS.
2. Manual Override: The System provided will allow for manual override of the automated mode. The system will make this vailable locally at the site, remotely at RTMC.
3. Fully Manual: The System provided will respond only to a user – generated command. Manual control options will include the override ability by networked computers, modem and manual on-site switch.

5.7.2. (This Section Intentionally left Blank.)

5.7.3. Fault Detection and Remediation

The System provided is able to detect problems, compensate for these problems and notify the user of the problems by the following methods:

1. Self-Check: The System provided will be able to detect chemical leakage and restrictions within the spray system. Additionally, the System provided will be capable of detecting hardware failures in all other connecting systems including pavement sensors and alerting the system user of the problem. AS AN OPTION: The Vendors

shall propose an isolation system in the event of a failure or other leakage.

2. Remediation: The System provided will provide for a single push button reset of normal functions upon completed system repairs or inspections. The system will automatically detect system defects and take action without operator intervention to prevent system damage or environmental damage.

3. User Notification: The System will automatically notify system user through the central computer of detected problems including location of abnormalities and actions taken. The notification system will include user-definable and configurable alarms/notifications.

4. Vendor Access: The System set up in a manner to allow the vendor access to the system for trouble shooting purposes.

5.7.4. Inventory Tracking and Control

As part of the software, the system will automatically provide tracking of material used by the anti-icing system. The system will provide inventory control. The system will have the ability to detect and report liquid levels in the tank throughout the range from full tank to empty tank. The status of the tank level will be reported to the user using the communications system. The system also will have alarms for low level requiring refilling, and empty - not sufficient chemical to operate the system, providing an alarm to the operator and system shut-off to prevent system damage. All level alarms will be configurable by system user.

5.7.5. Basic Operating Capabilities

The system will have the following basic operating capabilities as a minimum:

1. Automatic system tests on a preprogrammed and timed basis. The system will measure system pressure and quantity of liquid flow and prevent system operation if parameters exist outside of acceptable operating conditions.

2. The system will monitor and alarm for tank levels for two conditions: low and empty.

3. The system will monitor and alarm for liquid in the containment area.

4. Ability to activate a warning device before the spraying operation commences.

5. The system will be capable of going through a system evaluation before activating the spraying operation. This system evaluation will check for system leaks, low chemical reservoir levels, and other system defects and will not activate the system if any of these conditions exist. During system activation, the system will evaluate if individual spray valves do not activate and will document in system log and alert the operator of these conditions.

6. Autonomous operations based on various weather parameters in the RWIS.

7. The RWIS and pavement sensor technology will include the following:

a. The sensor technology must insure that the sensor will work with any anti-icing chemical, multiple chemicals, varying water depths, oils, dirt, and other remaining residuals on the road surface that can change the freezing point temperature. This includes any potential chemical applied on the surface by maintenance trucks.

b. The technology must allow user definable parameters. The pavement and atmospheric sensors will allow the following detection of the system:

i. Comparison of active and passive pavement sensors utilizing the advantages of each.

ii. Detection of accurate Freeze Point Pavement Temperature on the pavement which does not require re-calibration with each chemical used; can work with multiple chemicals, for example when exposed to various combinations of truck-applied chemicals; allows for system activation at different thresholds before freezing, for example, 1, 2, or 3 degrees before freezing, and provides accurate detection of freeze point temperature to -20 degrees Fahrenheit.

8. The System provided will allow for software logic programs that utilize all of the capabilities of the RWIS remote processor to properly interface with the anti-icing spray system controller. The System provided will have user settable thresholds for adjusting automatic operation of the system:

a. System activation when road moisture is at or near freezing via user settable thresholds;

b. System activation when freeze point temperature sensors detect when pavement surface moisture is near freezing via user settable thresholds;

c. System activation when chemical dilution is occurring via user settable thresholds;

d. System activation and accurate freeze point temperature measurements even when multiple chemicals are used via user settable thresholds;

e. Accurate system activation without calibration of pavement sensors with changing chemicals;

f. Immediate system activation when falling snow or freezing precipitation is detected via user settable thresholds;

g. The ability to include other weather parameters in the system logic such as low pavement temperature lockout according to different anti-icing chemicals for minimum temperature, relative humidity, wind etc. via user settable thresholds.

9. The system will be a double loop system, allowing half of the system loop to be disabled by the operator, while allowing the other half of the loop system to function in its treatment of the roadway and bridge.

10. Manual override of system operation from any of the manual options.

11. Manual operation locally and remotely; system options:

a. Manual pushbutton at the site;

b. Activation by web-based software.

5.8. Submittals

The Vendor will submit to the NDDOT's Project Manager for review and approval of the following items:

- Detailed design and installation working drawings for the complete anti-icing spray system with sufficient detail to allow review of all power and communications for compliance with the Specifications. Working drawings will clearly indicate any and all deviations from the contract documents. The working drawings will include specific details and exact locations of all system components including proprietary equipment. The working drawings will be in English units.

- Communications Infrastructure Plan showing routing of electronic communications between devices in the field, between devices and computers, between systems, and between the field computers/systems and remote users.
- Installation schedule that will outline the steps the Vendor intends to make to complete the contract. The installation schedule will be revised and resubmitted if there is a significant change to the schedule.
- Documentation of proven field operation of the active pavement sensors in automated liquid anti-icing spray systems.

- Documentation of proven field operation of the programmable system controller software in automated liquid anti-icing spray systems.
- Structural engineering design calculations and working drawings in English units for the pumphouse precast concrete building prepared and sealed by a Professional Engineer registered in North Dakota.
- Working drawings and product data for doors, louvers, frames and all accessories and hardware for the pumphouse in English units.
- Design calculations and working drawings for the pumphouse stair framing in English units that have been prepared and sealed by a Professional Engineer registered in North Dakota.
- Product data sheets or certificates of conformance with the Specifications, and Quality Assurance reports for the following system components:

  1. Spray disks;
  2. Pavement sensors;
  3. Chemical pressure piping;
  4. Conduit for chemical pressure piping;
  5. Valve units;
  6. System control cable;
  7. Sensor control cable;
  8. Conduit for sensor control cable and RPU slave unit power cable;
  9. Anti-icing chemical storage tanks;
  10. Flush water storage tank;
  11. Pump and motor;
  12. RPU spray system controller;
  13. RWIS RPU and all meteorological sensors;
  14. Modems;
  15. Concrete for precast building;
  16. Epoxy resin waterproofing for exterior concrete surfaces;
  17. Deformed steel reinforcing bars, epoxy-coated;
  18. Silicone sealant and bond breaking tape for building joints;
  19. Floor grating for building;
  20. Removable handrail for building;

- Operations and Maintenance Manual (Four (4))– The Vendor will furnish an Operations and Maintenance Manual, or O&M Manual, for

the anti-icing system in English units. The O&M Manual will include operation and maintenance instructions for all systems and items of equipment provided under the contract. The O&M Manual will be in the form of neatly formatted bound ring binders and electronic format in the form of two (2) CD-ROM disks. Prior to completion of the work, and at least 90 days prior to final payment, the Vendor will furnish for the Engineer's review three O&M Manual draft copies. Prior to completion of the work, and at least 30 day prior to final payment, the Vendor will furnish for the Engineer's review four (4) copies of the final O&M Manual. The final O&M Manual will be approved by the Engineer before a final acceptance of the work. The O&M Manual will consist of product data sheets, brochures, bulletins, charts, schedules, approved working drawings corrected to as-built conditions, assembly drawings, wiring diagrams, operation and maintenance information for equipment, and other information necessary for the Department to establish an effective operating maintenance program. Oversized sheets and working drawings larger than 8 inches by 11 inches will be neatly folded to that size with title block exposed along one edge, and bound or placed in pockets within the Manual. The O&M Manual will include:

1. Title page giving the name and location of the facility, bridge plan numbers, and project numbers;
2. Performance curves for all pumps and equipment;
3. Approved working drawings of each component;
4. Approved product data sheets and dimensioned drawings of each piece of equipment, and details of all replacement parts;
5. Manufacturer's installation, operation, and maintenance instructions for each piece of equipment and complete listing of nameplate data;
6. Complete wiring diagrams of all individual pieces of equipment and systems including one line diagrams, schematic or elementary diagrams, and interconnection diagrams;
7. Complete piping and interconnection drawings;
8. Complete parts list with parts assembly drawing preferably by exploded view, names and addresses of spare parts suppliers, recommended list of spare parts to be kept on hand by the Department, and sample order forms for ordering spare parts. Lead time required for ordering spare parts will be estimated;
9. Instructions with easily understood schematics or diagrams for disassembling and assembling the equipment for overhaul or repair;

Delivery of O&M Manual satisfactory to the NDDOT's Project Manager is an essential part of project delivery. Incomplete or inadequate manuals will be returned to the Vendor for correction and resubmission.

The Vendor will not start construction or installation of any part of the anti-icing system until the complete design and installation working drawings and installation schedule have been received and reviewed, and written approval to begin construction has been issued by the NDDOT's Project Manager. Such approval will not relieve the Vendor of responsibility for results obtained by the use of these designs and drawings or any of the Vendor's other responsibilities under the contract.

6. Installation of Fully Automated Bridge Anti-Icing Project.

Vendor will comply with the North Dakota Department of Transportation's Standard Specifications for Road and Bridge Construction, 2002 Edition.

Vendor will furnish and install all materials and equipment.

Vendor will ensure that all materials, equipment and installation procedures meet all applicable local and state codes. Vendor will also provide all drawings, specifications, parts list with pricing in English units, required for the orderly and accurate installation of project materials, equipment, subsequent operation and maintenance of the project.

6.1. Staging and Construction

The Vendor will prepare a work area, equipment storage area, and project staging area within NDDOT and/or MnDOT rights-of-way at the end of the bridge for secure storage of equipment and materials required for the duration of this Contract. This area will be large enough to include a shipping container and truck access to the container. NDDOT and MnDOT will provide a site boundary map of State owned right-of-way at the project site.

The Vendor will be responsible for providing required electrical power via gasoline-powered generator both underneath and on top of the bridge during duration of project. The Vendor will also be responsible for providing work area lighting, telephone, drinking water supply and sanitation facilities for the duration of this Contract.

6.2. Traffic Control

The Vendor will provide all necessary traffic control (as determined by NDDOT's Project Manager) on or adjacent to the bridge to ensure public and worker safety for the duration of this contract. All traffic control devices and layouts will be in accordance with the Manual of Uniform Traffic Control Devices - MUTCD. All traffic control devices will be removed prior to deck/roadway work closure periods unless specifically approved by NDDOT. **NOTE: Traffic control shall be coordinated with all other projects that may be in the area along I-94.**

The Vendor will obtain approval from NDDOT's Project Manager prior to any lane closures or restrictions. A traffic control plan must be submitted and

approved prior to lane closures or restrictions. Additionally, notification must be given to the NDDOT Project Manager at least 24 hours in advance of lane closures or restrictions so that information can be entered into the NDDOT Traveler Information System. Lane closures will only be permitted as long as there are workers present in the work zone.

Two adjacent through lanes in each direction must be maintained between the hours of 6:00 A.M. and 7 P.M. Monday through Friday.

The Vendor may elect to work on weekends where one adjacent through lane is maintained in one direction and two adjacent through lanes are maintained in the opposite direction for spray disk and pavement sensor installation. The weekend period will be defined as the 59 consecutive hours beginning Friday at 7 P.M. and ending Monday at 6:00 A.M. The Vendor may keep lane restrictions in place for up to 59 hours on the weekends as long as workers are present in the work zone. The Vendor will notify the Project Manager at least a week in advance if the weekend closure option will be utilized. There will be no additional costs to the State if the Vendor elects to utilize this option.
Work, which will restrict or interfere with traffic, will not be performed between 12:00 noon on that day preceding and 9:00 AM on the day following any consecutive combination of a Saturday, Sunday and legal holiday. NDDOT Project Manager will have the right to lengthen, shorten or otherwise modify the foregoing periods of restrictions as project area traffic conditions may warrant. If the Vendor is negligent in adhering to the established time schedule, he will be subject to the hourly charge as defined in the following paragraph.

Ramp restrictions will be dependent on the Anti-Icing System Design.

Vendor will be subject to an hourly charge for failure to remove temporary restrictions outside the permitted hours as set fourth in this document unless authorized by NDDOT's Project Manager. Non- compliance charge, for each incident, will be assessed according to Section 704.03 of the North Dakota Standard Specifications for Road and Bridge Construction 2002 for any portion thereof with which the Project Manager determines that the Vendor has not complied with the work zone schedule.

7. System Checkout (Punch List) October 17th

Vendor will, as accompanied by NDDOT and MnDOT Operations personnel and NDDOT Project Manager, and others as necessary, perform a complete checkout of the complete installation to demonstrate accurate and trouble-free system operation in an on-site manual mode, and remote central desktop (web-based) computer mode from NDDOT's Fargo District and MnDOT Moorhead District. Vendor will replace all and any defective materials, equipment, or structures identified during this system checkout.

Vendor will checkout and demonstrate that all liquid anti-icing delivery systems operate without leaks at prescribed pressures and flow rates at each nozzle location.

Vendor will also demonstrate the following through the Acceptance Period of November 1st, 2005 and February 1st, 2006.

1. That installed road sensors, other environmental sensors, associated algorithms that accurately detect ice formation over the full range of materials and equipment are properly installed and functions as designed during all road surface temperatures between -20ºF (-29ºC) and +35ºF (+2ºC).
2. Vendor will document that the air temperature sensor and the optical precipitation sensor operates accurately as designed over this full design range of operation.

7.1. Deliverables

- A complete checkout of all materials, hardware and software needed to use the system over its full range of operation.
- Replacement of any material, equipment, and software found to be defective and/or inoperable over the specified full range of performance.
- Vendor will provide fully tested and configured software for future NDDOT and Mn/DOT system maintenance.

8. Training

On-site training will be provided by a qualified representative. This training will cover operation, commissioning, seasonal commissioning/decommissioning and maintenance of the permanent automatic anti-icing system.
Vendor will fully train personnel in on-site (manual) system operation, in remote operations and in total system operation capability from the NDDOT Fargo District and MnDOT Moorhead District Offices. This training of Operations District personnel will include the use of all operations software over its full range of capability. Vendor will also provide training for system materials and equipment excluding electronic equipment, wiring, and sensors. Vendor will train up to two NDDOT and up to two Mn/DOT electrical/electronic specialists in the operation, maintenance, and repair of all electrical and electronic equipment, and all wiring and sensors (repair of sensors excluded).

9. System Documentation

Vendor will provide complete documentation of all system components including necessary drawings, charts, tables, and diagrams that describe system operations over its full range of capability (minimum -20ºF to +35ºF). Vendor will also provide complete documentation of all communications and

operating software including system actuation algorithms for full range of system operations.

9.1. Deliverables

- Four (4) complete manuals including complete documentation as outlined above, plus and electronic version of all manuals.

10. Warranty and Support Periods

Warranty Period shall begin upon satisfactory completion of all tasks per the approved Acceptance Test Procedures. Vendor will warranty all parts, materials, and labor for the complete system for a period of two full years after NDDOT and Mn/DOT acceptance of the completed project based on satisfactory Vendor completion of all tasks as determined by NDDOT Project Manager. All necessary replacement parts and materials will be shipped to NDDOT Fargo Districts Headquarters at 503 38th St. S, Fargo, ND 58103-1198 within three days after notification by the NDDOT Project Manager.

Vendor will provide technical support at no charge to NDDOT and MnDOT technical expertise requested by NDDOT or MnDOT for repair and/or replacement of any system component or software. It will include on-site technical support (maximum of two days per occurrence) during system startup in October 2005, and system shut down in April 2006, system startup in October 2006, and system shutdown in April 2007. Technical support questions or actions, must be satisfied within 48 hours of notification of the problem. Software upgrades shall be provided free of charge during the full Acceptance Period and during the two-year warranty period. The vendor shall also submit, as an option, additional maintenance and service options after the warranty period (Extended Warranty).

MNDOT and NDDOT are to provide Traffic Control for any work done during both the Acceptance Period and the Warranty Period.

11. Commissioning, Testing, and Training

A qualified representative will provide for the installation of the automatic anti-icing system including the start up, alignment, and testing of the entire system. The chemical storage tanks and the entire system will be filled to capacity with anti-icing chemical at commissioning of the system. The flush water storage tank will be filled to capacity with clean, potable water at commissioning of the system.

11.1. Testing Requirements

Installation Testing: An installation test of the system will be conducted at the conclusion of installation in the presence of the Project Manager. The installation test will simulate the full range of functions the anti-icing system is intended to provide. A successful installation test is required before the endurance test may begin.

PAYMENT SCHEDULE

DELIVERABLES	FULL PAYMENT*
1. Completion and delivery of all final engineering drawings and detailed specifications.	15% of Total Project Cost
2. Complete installation of liquid spray system including pavement sensors and spray nozzles. Complete construction of pump storage equipment shelter with all pumping and liquid storage facilities completed therein. Receipt of all system control equipment (communications equipment, computers, control panels, and interface hardware) and software.	20 % of Total Project Cost
3. Complete installation of system control equipment and software. Complete system checkout.	30 % of Total Project Cost
4. Completion of all on and off-site training including provision of three system operation and maintenance manuals.	25 % of Total Project Cost
5. Completion of assistance for the bridge system startup and system shutdown in November 2005 and April 2006.	5 % of Total Project Cost
6. Completion of assistance for bridge system startup and system shutdown in October 2006 and April 2007.	5 % of Total Project Cost

***Includes retainage as specified in the** North Dakota Standard Specifications for Road and Bridge Construction 2002 **.**

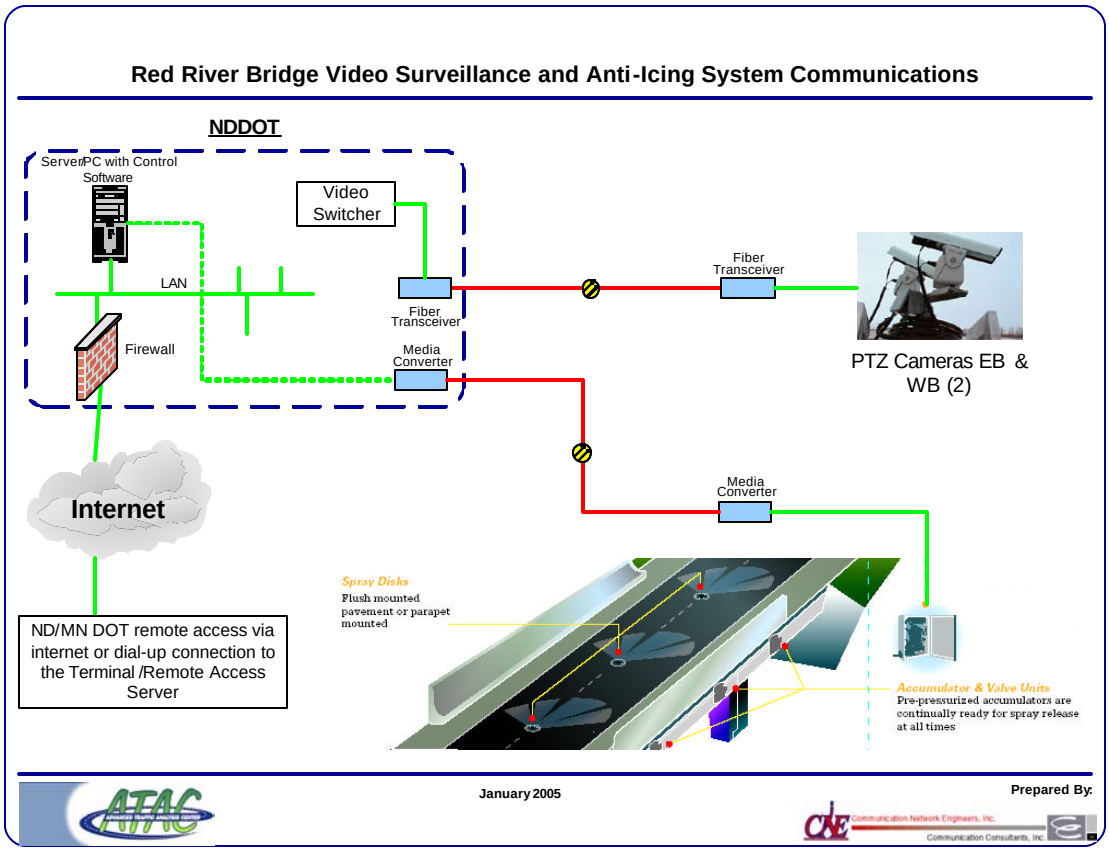
Appendix B - Communications

1. Description

This section covers communications specifications for supporting the following systems:

1. NDDOTand MnDOT Anti-icing system plus video surveillance cameras

Existing Camera/Joystick Software should be utilized. In this section Below is a block diagram showing the concept for the communications system for the Red River Bridge anti-icing and video surveillance systems.



1.1 NDDOT Anti-icing and Video Surveillance System

Both the anti-icing system and the video surveillance camera will be supported by fiber optics communication terminating at the NDDOT Fargo District office. Please note that the fiber specifications are included in Appendix C. The video images and control of the camera should be accessible by the current video switching system (American Dynamics MegaPower 1024) at the Fargo District. It should be noted that the final connection from the last fiber terminal point to the anti-icing system may vary

depending on the vendor specifications for the anti-icing system. However, it is expected that the bridge anti-icing system will provide a web-based interface supported via dial-up communications to allow for remote system operations and checking the status of the system. This access would have to be via a standard internet connection to the server. The web interface will also be used to provide video snapshots from the supplemental video surveillance camera installed with the anti-icing system.

2. Scope

2.1 Anti-Icing System Communications Infrastructure

The anti-icing system communications infrastructure shall consist of the following components:

1. Install, splice, and test fiber cable (28,755 Ft) from the Fargo District Office to the Red River Bridge. This fiber is to be placed in existing conduit. Please reference Appendix C for the fiber specification.
2. Install, splice, and test fiber from the last splice location on the existing conduit to each pump house. This fiber is to be placed in new conduit at a minimum of 36” deep. Please reference Appendix C for the fiber specification.
3. Define, supply, and install all hardware, software, and services needed for designated users to connect to and manually operate the spray controller via the fiber optics communications system. This will at a minimum include media converters to convert the signal from the controller to the fiber, media converters to convert the signal from the fiber to a Terminal/Remote Access Server, and any control software that may be needed for server and/or stand alone machine installation.
4. Define, supply, and install all hardware, software, and services needed to collect and make the RWIS data available for viewing by users via the fiber optics communication system. This will at a minimum include media converters to convert the signal from the controller to the fiber, media converters to convert the signal from the fiber to a Terminal/Remote Access Server, and any control software that may be needed for server and/or stand alone machine installation. (Please note that this may be the same infrastructure as in the above item)

2.2 Video Surveillance Communications Infrastructure

The video surveillance system (NDDOT camera and MnDOT camera) communications infrastructure shall consist of the following components:

1. Install, splice, and test fiber cable per 2.1.1.
2. Install, splice, and test fiber from the last splice location on the existing conduit to the camera locations. This fiber is to be placed in new conduit at a minimum of 36" deep. Please reference Appendix C for the fiber specification.
3. Define, supply, and install all hardware, software, and services needed to connect to the existing video matrix switch / PTZ controller at the Fargo District Office via the fiber optics communications system. The existing system is an American Dynamics MegaPower 1024. This will at a minimum include fiber transceivers to connect the PTZ cameras to the Fargo District Office.

3. System Functional Requirements

3.1 Anti-Icing System Communications Infrastructure

The communications infrastructure shall provide users both directly connected to or remotely connected to the DOT LAN the ability monitor and manually operate the spray controller. The remote connection shall be through a secure connection either via the web or dialup access into the DOT LAN.

3.2 Video Surveillance Communications Infrastructure

The communications infrastructure shall provide for control of the PTZ cameras and view full motion video at the Fargo Traffic Ops Center. This shall be accomplished through the utilization of their current video matrix switch / PTZ controller. The system shall also be capable of providing snapshot images to users via a standard dial-up system.

3.3 Video Camera Specifications

1.0 DESCRIPTION

The NDDOT is installing an automated anti-icing system on the Red Rive Bridge along I-94 in Fargo for the eastbound traffic. A similar system is being installed by Mn/DOT for the west bound traffic. In conjunction with this installation, the NDDOT will install a video surveillance camera to monitor the anti-icing systems operations (for both directions). The camera will send video feed to the NDDOT District office in Fargo. It is also expected that the

surveillance camera will support fiber optics hook up in order to provide real-time and full-motion video at the Fargo District. The new surveillance camera is also expected to be controlled using an existing Sensormatic AD2088 PTZ controller and American Dynamics AD 1024 Video matrix Switch which is currently housed at the Fargo District office.

2.0 SCOPE

Video monitoring and surveillance system, installation hardware, and operating software:

a. One video surveillance camera with PTZ capability, preferably through a built-in PTZ, capable of continuous 360^{o} rotation and minimum of 12X zoom.
b. Supervisor software in Windows NT/2000 capable of supporting system operations.
c. Power supply
d. Additional equipment and supplies required to have a ready-to-operate system.

Hook-ups to remote devices at the NDDOT District in Fargo to operate the system and receive and display video.

Communications devices to support system operations using fiber optics, including required fiber termination points, but not the actual fiber.

On-site training and technical support.

3.0 SYSTEM REQUIREMENTS

Surveillance Camera:

1. Provide full-motion video and work with a PTZ unit to allow remote control of camera operations, including pan, tilt, and zoom.
   a. The camera shall produce NTSC output at no less than 30 frames per second.

2. The camera shall be 1/3-inch color CCD that outputs NTSC video, with a resolution no less than 350 TV lines (horizontal) and 350 TV line (vertical).

3. The camera lens shall be pre-focused at the factory and shall not require field adjustments. The zoom optics shall maintain focus throughout the operating range from 7 to 74 degrees horizontal field of view (5 to 58 degrees vertical field of view).

4. The surveillance camera zoom optics shall provide a minimum of 12X optical zoom.

Environmental Requirements:

1. The video camera shall operate from -40 to 140 degrees F (-40 to 60 degrees C) and a humidity level of up to 95% relative humidity. The camera enclosure shall be waterproof and dust-tight to NEMA-4 specifications.

2. The video cameras shall be equipped with provisions to prevent fogging.

3. The video cameras shall meet FCC class B and CE requirements for electromagnetic interference emissions.

4. The communication panel shall operate under a temperature range of -30 to 166 degrees F (-34 to 74 degrees C) and up to 95% relative humidity, non-condensing.

Power supply

The cameras, heater, and PTZ unit shall operate on 24 VAC at 50/60 Hz or 120 VAC nominal 60 Hz and conform to NEMA 2.1.2 Standard TS2 specifications.

The video output, communication, and power stages of the sensor shall include transient protection to prevent damage to the camera due to voltage transient occurring on the cable leading from the sensor to other field terminations.

Appendix C – Fiber Optic Specification

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

INTERCONNECT CABLE

HSP-8-094(053)352

1. DESCRIPTION

This provision sets forth the minimum requirements for a fiber optic interconnection system to establish communication between ITS equipment as specified.

2. GENERAL

The bid shall include all necessary labor, equipment and material to install the interconnect cable and connections such that the communication link is complete and fully operational.

The fiber optics cable shall be a 36-fiber, single mode optical cable suitable for outside plant operations.

A. Fiber Optic Cable Specification

1. The purpose of this specification is to describe a fiber optic cable for a duct installation application, for the purpose of communication between various ITS devices.

2. Cable Specification

   The optical cable shall be:

   a. Dielectric
   b. Loose-tube
   c. Dry Block
   d. Single polyethylene jacket
   e. Reinforced with aramid yarn (Kevlar)
   f. Suitable for duct installation

3. Optical Specifications shall meet RUS 7 CFR 1755.900 (PE-90) and Telcordia GR-20 standards for single-mode cable. The cable shall also meet the following criteria:

   a. Single-mode, 8.3/125 micrometer, zero water peak.

b. The attenuation shall be less than or equal to 0.4 dB/km at 1310 nm; 0.32 dB/km at 1383 nm and 0.3 dB/km at 1550 nm.

4. Mechanical Specifications

   a. The maximum tensile load rating shall not be greater than 2700 Newtons (600 lbf).
   b. The minimum bend radius shall be 40 times the cable diameter, but not less than 18 inches in diameter, under load and 20 times the cable diameter under no load.
   c. The temperature range shall be -40^{o}C to +70^{o}C Documentation.

5. The cable manufacturer shall provide documentation indicating the attenuation and bandwidth for individual fibers on each reel within five (5) business days after delivery of the cable.

B. Splicing requirements

1. The purpose of this specification is to describe splicing requirements for the installed fiber optic cable.

2. All splicing shall occur in a Coyote Pup splice enclosure or an equivalent splice enclosure. Any alternative splice enclosure must be approved by the DOT prior to installation.

3. Each fusion splice shall be 0.10 dB loss, with a maximum acceptable splice loss of 0.20 dB.

4. For the fiber optic connectors, a 0.50 dB loss for each connectorized junction is allowable. This includes the connector loss and the fusion splice on the connector.

5. All splice losses are assumed to be a bidirectional average.

C. Fiber Optic Connectors

1. The purpose of this specification is to describe single-mode fiber optic connectors for mating the ends of the fiber with other fiber optic devices.

2. The fiber optic connectors shall be single-mode connectors of “ST” Type.

3. The ITS device locations shall be provided with a wall or rack mounted patch panel frame with capacity to terminate all fibers entering or exiting the location. Only fibers to be immediately connected to equipment are required to be terminated.

D. Breakout Cable

1. The purpose of this specification is to describe a single-mode fiber optic cable which shall be sufficiently flexible to connect an ITS device location with the backbone cable, while being sufficiently robust to withstand the most common environmental hazards due to personnel handling and other dangers associated with its environs.

2. The single-mode fiber optic breakout cable shall be a ruggedized cable with six (6) or twelve (12) fibers individually subjacketted for ease in connector installation. The subjackets shall be color coded or numbered for easy identification. The cable shall be manufactured by Corning or OFS.

3. SHOP DRAWINGS

Shop drawing submittals shall be complete and indexed and shall include, but not be limited to the following:

A. Complete details of all components and sections showing all materials.

B. A listing of all applicable North Dakota DOT, UL and AASHTO specification.

C. Name of the manufacturer and supplier.

4. TESTING

End-To-End Conformance Testing using Optical Time Domain Reflectometer (OTDR). The contractor shall test each fiber of each cable run and provide results of the test and the reel packing label test results from the manufacturer to NDDOT. If the individual cable runs do not match the test results of the packing label test results less the connection and splice losses, the cable shall be replaced at the Contractor's expense.

5. INSTALLATION REQUIREMENTS

A. Interconnect shall be installed per the manufacturers recommendation with warning tape placed 12 inches above the cable.

B. The contractor shall include a No.14 AWG 1 unspliced, insulated copper conductor running the full length and parallel to any fiber that is not installed in an existing conduit system with the tracer wire already installed. The purpose of this conductor is for locating the fiber. This is not a separate bid item and the cost shall be included in the price bid for the fiber optic cable.

C. The Contractor shall identify the foot mark of the cable of the incoming and outgoing cable of each hand-hole. The identifying mark shall be recorded and a

label shall be placed in the hand-hole. A summary of all identifying marks shall be provided to NDDOT.

D. The Contractor shall leave a minimum of 50 feet of cable slack in each hand-hole. At strategic locations, additional cable length may be needed. This information will be provided on a case-by-case basis.

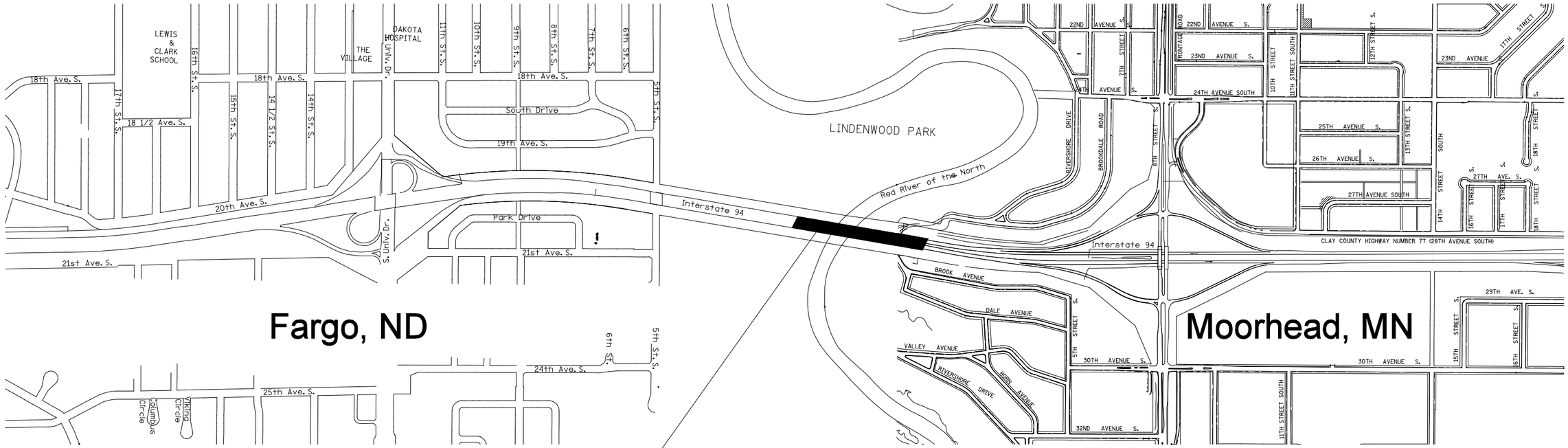
E. Splicing of fiber and breakout cables shall occur in a Coyote Pup enclosure or equivalent. An alternative splice enclosure may be used, but authorized by the DOT prior to installation.

F. The Contractor shall provide 200 feet of cable from each reel to NDDOT District Sign Shop for restoration and maintenance purposes. Attach a tag to each length of cable provided identifying the reel from which the cable was taken.

6. METHOD OF MEASUREMENT

The interconnect cable shall be measured per each linear foot installed. This shall include labor, equipment, and material to install fiber cable. The connectors and breakout cable shall be incidental to the linear feet of fiber cable installed.

Appendix D – Project Layouts

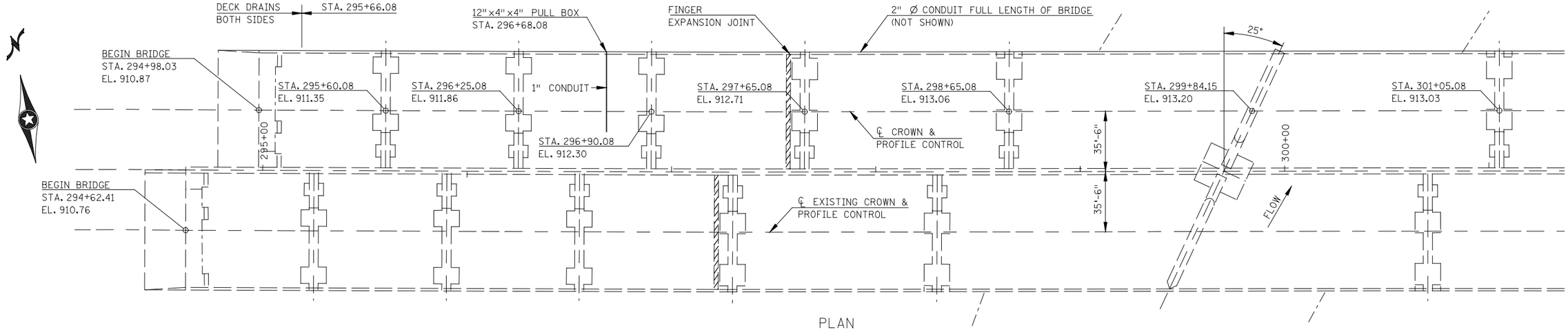


PROJECT LOCATION
ND Bridge No's. 94-352.453R & 94-352.457L
MN Bridge No's. 9066 & 9067

FIXED AUTOMATED
ANTI-ICING SPRAY SYSTEM
Red River Bridge Crossing Located on
I-94 between North Dakota & Minnesota

Exhibit 1
PROJECT LOCATION

...\Exhibit 1.dgn 01/13/2005 10:44:07 AM



NOTE:

DUPLICATE OF BRIDGE PLAN DETAILS
INCLUDED IN SHEET NO. 336 OF
N.D. PROJ. NO. NHI-8-094(007)352

FIXED AUTOMATED
ANTI-ICING SPRAY SYSTEM
Red River Bridge Crossing Located on
I-94 between North Dakota & Minnesota

Exhibit 2
BRIDGE PLAN & ELEVATION

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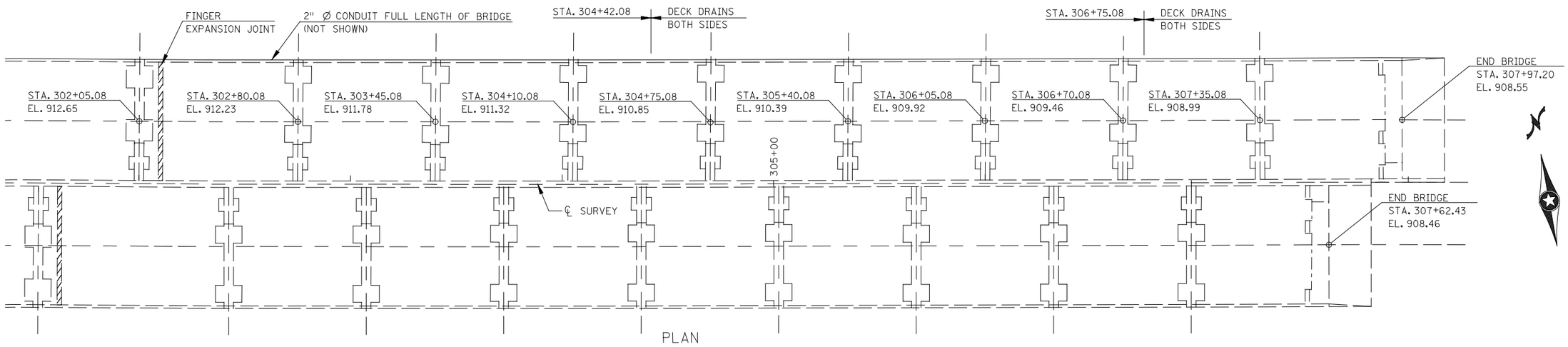
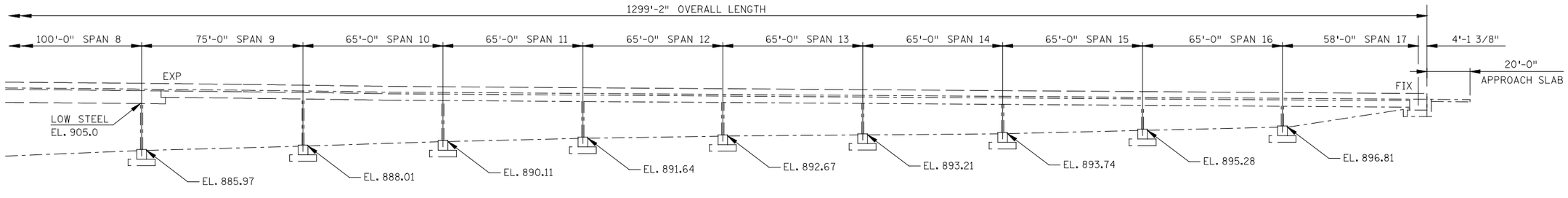
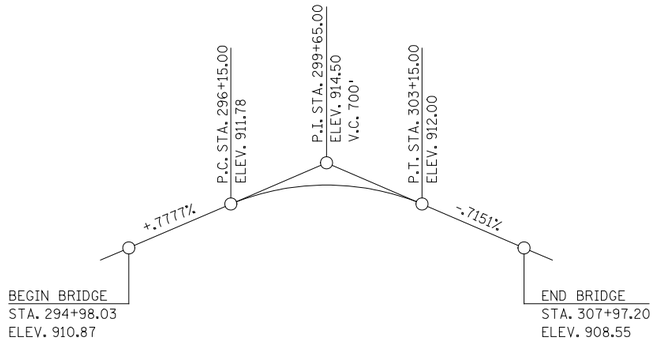


PLAN



ELEVATION



VERTICAL CURVE DATA
AT ℄ CROWN & PROFILE CONTROL

NOTE:

DUPLICATE OF BRIDGE PLAN DETAILS
INCLUDED IN SHEET NO. 337 OF
N.D. PROJ. NO. NHI-8-094(007)352

FIXED AUTOMATED
ANTI-ICING SPRAY SYSTEM
Red River Bridge Crossing Located on
I-94 between North Dakota & Minnesota

Exhibit 3
BRIDGE PLAN & ELEVATION

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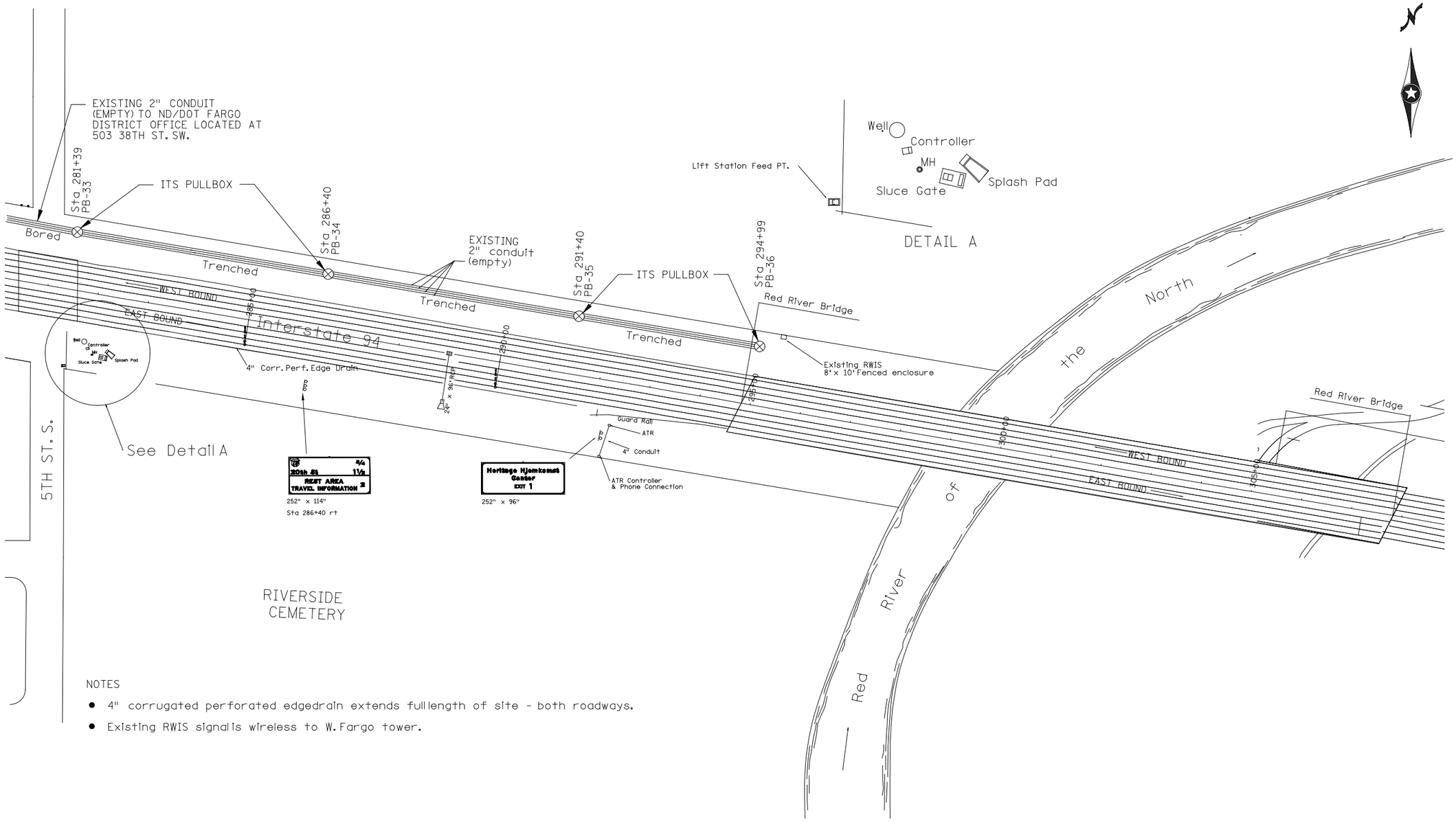

NOTES

- 4" corrugated perforated edgedrain extends full length of site - both roadways.
- Existing RWIS signals wireless to W. Fargo tower.

FIXED AUTOMATED
ANTI-ICING SPRAY SYSTEM
Red River Bridge Crossing Located on
I-94 between North Dakota & Minnesota

Exhibit 4
EXISTING SITE LAYOUT

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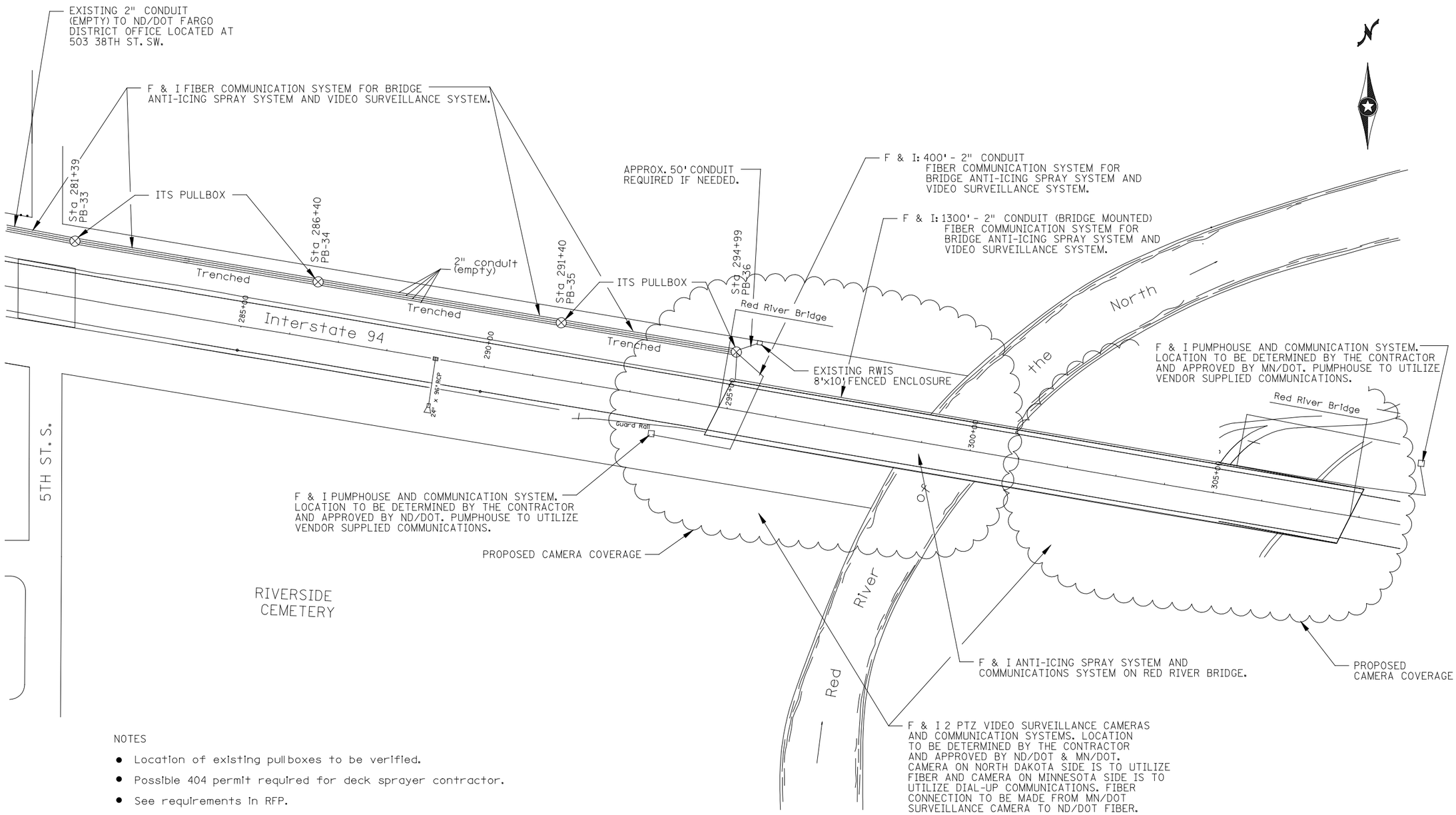

NOTES

- Location of existing pullboxes to be verified.
- Possible 404 permit required for deck sprayer contractor.
- See requirements in RFP.

FIXED AUTOMATED
ANTI-ICING SPRAY SYSTEM
Red River Bridge Crossing Located on
I-94 between North Dakota & Minnesota

Exhibit 5
PROPOSED WORK

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Appendix E – Risk Management

Risk Management Appendix

Service Contracts with Private Individuals, Companies, Corporations, Etc.:

Contractor agrees to indemnify, save and hold harmless the state of North Dakota, its agencies, officers and employees (State), from claims resulting from the performance of the Contractor or its agent, including all costs, expenses and attorney's fees, which may in any manner result from or arise out of this agreement. Contractor also agrees to indemnify, save and hold the State harmless for all costs, expenses and attorney's fees incurred in establishing and litigating the indemnification coverage provided herein.

Contractor shall secure and keep in force during the term of this agreement, from insurance companies, government self-insurance pools or government self-retention funds authorized to do business in North Dakota, the following insurance coverages covering the Contractor for any and all claims of any nature which may in any manner arise out of or result from this agreement:

1) **Commercial general liability** and **automobile liability** insurance – minimum limits of liability required are **$250,000 per person** and **$1,000,000 per occurrence.**
2) **Workers compensation** insurance meeting all statutory limits.
3) The State of North Dakota, its agencies, officers, and employees (State) shall be endorsed as an **additional insured** on the commercial general liability and automobile liability policies.
4) Said endorsements shall contain a **"Waiver of Subrogation"** in favor of the state of North Dakota.
5) The policies and endorsements may not be canceled or modified without **thirty (30) days prior written notice** to the undersigned State representative.

Contractor shall furnish a certificate of insurance evidencing the requirements in 1 through 5 above to the undersigned State representative prior to commencement of this agreement.

The State reserves the right to obtain complete, certified copies of all required insurance documents, policies, or endorsements at any time. Any attorney who represents the State under this contract must first qualify as and be appointed by the North Dakota Attorney General as a Special Assistant Attorney General as required under N.D.C.C. Section 54-12-08.

When a portion of a Contract is sublet, the Contractor shall obtain insurance protection (as outlined above) to provide liability coverage to protect the Contractor and the State as a result of work undertaken by the SubContractor. In addition, the Contractor shall ensure that any and all parties performing work under the Contract are covered by public liability insurance as outlined above. All SubContractors performing work under the Contract are required to maintain the same scope of insurance required of the Contractor. The Contractor shall be held responsible for ensuring compliance with those requirements by all SubContractors.

Contractor's insurance coverage shall be primary (i.e., pay first) as respects any insurance, self-insurance or self-retention maintained by the State. Any insurance, self-insurance or self-retention maintained by the State shall be excess of the Contractor's insurance and shall not contribute with it. Any deductible amount or other obligations under the policy(ies) shall be the sole responsibility of the Contractor. This insurance may be in a policy or policies of insurance, primary and excess, including the so-called umbrella or catastrophe form and be placed with insurers rated "A" or better by A.M. Best Company, Inc. The State will be indemnified, saved, and held harmless to the full extent of any coverage actually secured by the Contractor in excess of the minimum requirements set forth above.

RM Consulted 1997
Revised 11-04