

CASE STUDY REPORT

NTCIP 9009 v01.05

**Washington State
Department of Transportation
Statewide ESS Procurement**

version 01.05, January 2003. A Recommended Information Report of the Joint Committee on the NTCIP.

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PREFACE

When early adopters began using the NTCIP in their deployment activities, there was limited guidance available. Since then, *The NTCIP Guide* (NTCIP 9001) has been developed to help users understand, specify, and deploy the family of standards. NTCIP 9001 version 03 was completed in 2002 and is available.

Early NTCIP deployments and the initial NTCIP case studies identified content ambiguities and shortfalls in the first version of several standards. Subsequent amendments addressed many of these issues.

Case study reports revealed that functional requirements within user specifications could be improved. As a result, a systems engineering approach to standards development has been adopted to help users better specify NTCIP-based systems. New versions of ITS standards will add sections on concepts of operation, functional requirements, traceability to the data dictionary, and dialogs and sequences.

Early adopters also revealed that testing was an issue in many of their deployments. An NTCIP working group on testing and conformity assessment was created in 2002 to further assess and define testing issues.

The case studies also revealed a general need for continued outreach, education, and training. These needs are being addressed through a variety of ongoing standards development organization activities.

These NTCIP case studies have proved valuable to the ITS community and have facilitated the continued improvement of the standards. As a result of lessons learned from the case studies, and improvements in the standards development process, future deployments are expected to face fewer challenges.

1. PURPOSE OF THE CASE STUDY

1-1 INTRODUCTION

Field deployment of NTCIP-conforming equipment has begun. State and local Departments of Transportation and their consultants are aware of the interoperability and interchangeability features promised by the NTCIP, and are including references to the NTCIP in their procurement documents. For all but a few, this is their first experience with the NTCIP.

The purpose of this project, sponsored by AASHTO, FHWA, ITE, and NEMA, is to:

- a. Prepare a second series of case studies that describe the lessons-learned by vendors, agencies, and consultants during another five of the early projects that required NTCIP compliance, and
- b. Update the existing three case study projects.

The objective is to compile an unbiased investigation that incorporates the perspectives from different implementation positions.

Two Environmental Sensor Systems (ESS)¹ projects, one Center-to-Center Project using NTCIP 2304 (DATEX-ASN), and two traffic signal control projects were selected for phase two of the study. The two Variable Message Sign (VMS) projects and the one signal control project investigated during phase one are to be revisited to update the status of these projects. Additional projects may be investigated in FY 2003.

The material for these eight case studies (5 new ones and 3 updates) were drawn from interviews with individuals who were directly involved in the NTCIP implementation and from project-related documents such as specifications, test plans, and procurement documents. An attempt was made to interview at least three individuals who performed different roles in each project, such as agency champion, procurement specification writer, agency field technician, and vendor representative. The interviews, conducted by individuals familiar with the NTCIP, were structured around an updated survey prepared for these case study investigations. Whenever possible, relevant project documents for each project are included in that case study report.

This document focuses on the implementation of devices using the NTCIP. It does not attempt to explain the details of the NTCIP. Additional information on the NTCIP, including specific NTCIP standards, is available on the NTCIP Website (www.ntcip.org)².

2. THE CASE STUDY

In 2000, the Washington State Department of Transportation (Agency) was approached by Qualimetrics (Vendor) with a proposal to demonstrate an NTCIP-conformant weather station in order to convince the agency that such products were available. The Agency agreed to this demonstration, which proved successful. As a result, the Agency undertook efforts to start using NTCIP on future procurements.

Prior to the project, the central system only supported Road Weather Information Systems (RWIS) stations provided by Surface Systems Incorporated (the System Provider) using its own proprietary protocol. In order to support the NTCIP, the Agency first upgraded their existing weather monitoring

1 Environmental Sensor Stations are considered a device subgroup addressed within the NTCIP Standard NTCIP 1204. The term ESS is used to address road weather information systems. ESSs are commonly referred to as Road Weather Information Systems (RWIS).

2 The White Paper "Understanding the NTCIP Class Profiles from an End User's Perspective," prepared by the NTCIP Profiles Working Group is an excellent example.

system to include the NTCIP device driver, which was offered as a standard upgrade option to the system by the System Provider. The system still uses a proprietary protocol to communicate with the older stations.

The Agency then released an Invitation for Bids (IFB) in February 2001 for the procurement of NTCIP-conformant ESS equipment (Annex B). This IFB was later clarified through two separate addendums (Annex C and D). The IFB required that the delivered equipment interoperate with the Agency's existing weather monitoring system from the System Provider. It also scheduled a bid opening on April 9, 2001 and hardware delivery by June 30, 2001. Once the hardware was delivered, the Agency had a separate contractor install the equipment. This schedule is summarized in Table 1.

Table 1: Project Timeline

Agency	Vendor	NTCIP Standards Status	Date
Accepted Demonstration Proposal	Demonstration	NTCIP 1201 Published NTCIP 1201 Amend 1 Recommended NTCIP 1204 Approved NTCIP 1204 Amend 1 Recommended NTCIP 2103 WG User Comment	2000
IFB released			2 / 01
Pre-bid Conference		NTCIP 1201 Amend 1 Approved NTCIP 1204 Amend 1 Approved	3 / 01
Bid Opening			3 / 01
Award to Vendor	Contract Awarded		4 / 01
	Delivered and Demonstrated Hardware		6 / 01
Installed Hardware			Summer – Fall 2001

The objectives of the Agency in implementing this project were:

- To prove that NTCIP provided the required interoperability for weather stations.
- To establish a competitive procurement environment for weather stations rather than purchasing all equipment from one vendor.

The Vendor's goals were to:

- Demonstrate the availability of NTCIP-conformant ESS equipment.
- Demonstrate that this equipment would interoperate with systems from other manufacturers.

3. PROJECT PROCUREMENT

No explicit pre-qualification was required for the project; however, the IFB required delivery of the hardware no later than June 30, 2001. As a result, only two bids were received. The Agency indicated

that additional bids may have been received if additional time had been provided for the delivery of hardware.

Upon receipt of the bids, the Agency reviewed their contents in order to ensure that the equipment would meet all specifications and then made the final selection based on price.

4. SPECIFICATIONS

Once the Vendor had successfully demonstrated to the Agency that NTCIP-conformant equipment was available in the ITS marketplace, the Agency began its efforts to develop a procurement specification. The in-house specification development team consisted of individuals with previous exposure to communication protocols and ITS deployments as well as individuals with previous experience in developing ESS hardware specifications. The specification was based on the Agency's own needs with some input from the Minnesota Department of Transportation and the System Provider.

The process to develop these specifications was fairly typical to most other non-NTCIP specification development efforts, but some additional efforts were required in order to ensure that the resulting specification was compatible with the design of the NTCIP-driver of the central software. Thus, the Agency had to work closely with the System Provider in order to ensure that the specification properly reflected the system requirements. This process included obtaining the proprietary mechanism used by the System Provider to upload snapshot images of the site and including these definitions in the IFB (Page B-15).

The NTCIP specifications for this project identified the data elements that were required by referencing the conformance groups of NEMA TS 3.4 (now known as NTCIP 1201), and NEMA TS 3.7 (now known as NTCIP 1204). The specification also included wording to describe the communications environment by referencing NEMA TS 3.2 (now known as NTCIP 1101), and describing a dial-up environment using the Point-to-Point Protocol (PPP) and the TCP/IP protocols. However, these specifications were not as detailed as some NTCIP specifications used by other agencies or as suggested in the NTCIP Guide. For example, the specifications did not explicitly state required object ranges, response times, or the exact references for the PPP and TCP/IP protocols. Nonetheless, the specification did include a catch-all statement as follows:

Successful communications with the existing SSI server is a contract requirement. The vendor is required to demonstrate that their proposed equipment will communicate with the state's server after award and before installation.

This requirement combined with the fact that the Agency, Vendor, and System Provider were all interested in demonstrating the capabilities of this new standard to the industry resulted in a successful project.

4-1 PROJECT-RELATED NTCIP STANDARDS STATUS

The NTCIP standards relevant to this project are shown in the table below.

Table 2: Standards Related to the WSDOT Statewide ESS Procurement

Standard	Description
NTCIP 1201	Global Object Definitions – This standard defines data elements that are common to many different device types. For example, the standard defines data elements related to time and system identification.

Standard	Description
NTCIP 1204	Object Definitions for Environmental Sensor Stations – This standard defines those data elements that are specific to environmental sensor stations, such as road/weather stations.
NTCIP 2301	Application Profile for Simple Transportation Management Framework – This standard defines the rules for exchanging messages between a management system and a managed device.
NTCIP 2202	Transport Profile for Internet– This standard defines how to exchange application level messages between computers across a network.
NTCIP 2103	Subnet Profile for Point-to-Point Protocol – This standard defines the rules for exchanging data with a dial-up field device and includes the requirement to use an Internet standard authentication protocol in order to prevent unauthorized access to the device.

Knowledge of the NTCIP standards was largely provided by the System Provider and Vendor, although the Agency did also have some in-house knowledge of the NTCIP.

The NTCIP standards used in this project remained fairly stable throughout its course, although there were some minor complications resulting from amendments to NTCIP 1201 (Global Objects). The Vendor originally based their deployment on the original standard whereas the System Provider had based their implementation on the amended standard. Once the problem was identified, the Vendor was able to quickly update their system to reflect the minor change in the standard. While this did require some additional work, the overall effort to integrate the systems was easier than the parties expected.

5. NTCIP FUNCTIONS AND FEATURES

This section discusses the NTCIP functions and features implemented. NTCIP Conformance Groups are listed in ANNEX A.

5-1 OBJECTS & CONFORMANCE GROUPS

This project added NTCIP-conformant ESS devices to an existing road/weather information system; the intent was to improve the performance of the system by adding additional sensor sites with functionality that was identical to the existing sites. The specifications defined the conformance groups to be supported as well as the hardware requirements for the sensors (i.e., their accuracy and range requirements). The specification also required interoperability with the NTCIP driver of the existing central system.

The conformance groups implemented for this project are shown in Table A-2³; The Vendor indicates that they did not find it necessary to sub-range any objects. This object definition set included most of the objects defined within the mandatory and optional conformance groups of NTCIP 1204 and the most applicable objects defined within NTCIP 1201.

The vendor implemented a few proprietary objects in order to offer extended features to their customers; however, most of these features were not required as part of this project. These features used proprietary extensions to the standard because there was no apparent solution offered in the ESS standard. These extensions have since been submitted to the NTCIP effort for their consideration in future versions of the standard. Such features included:

³ See Annex A

- The ability to upload a camera snapshot of the site.
- The ability to upload an historical log.
- The ability to monitor and control a bridge sprayer.

The data elements to control the camera snapshot upload feature were developed by the System Provider and required by the Agency within the IFB. The unique object identifiers (OIDs) for these data elements are located under the System Provider's node address. Thus, the sites delivered by the Vendor support objects that are stored under the System Provider's (a competitor's) node. While this may seem odd, it demonstrates how the NTCIP can be extended to provide new functionality, and, if that functionality proves desirable, it can then be implemented by others to benefit the customer.

Definitions

Interchangeability: the capability to exchange devices of the same device type (e.g., a signal controller from different vendors) without changes to the software beyond updating the appropriate parameters and variables. Some non-standard functions and features might not be available.

Interoperability: the capability to operate devices from different manufacturers, or different device types (e.g., signal controllers and DMS) on the same communications wire/channel.

The historical log feature was required by Section 3 of the first amendment to the IFB and designed by the Vendor with the unique OIDs residing under the Vendor's node. While this feature was not tested, due to the fact that the central system did not implement this functionality, the Agency has initiated efforts to work with the System Provider in order to support historical data "in an open protocol that is within the intent of NTCIP."

The bridge sprayer feature was defined by the Vendor in order to meet the needs of other clients, but it was not needed or used in this project. At the time of this interview, the Agency did not have any plans to use this feature and did not obtain any documentation regarding the feature.

5-2 INTERCHANGEABILITY & INTEROPERABILITY

This system provides the anticipated interoperability between the System Provider's central system and the Vendor's ESS equipment. This fact has been proven through the successful operation of the system to date.

The system is also believed to provide the desired interchangeability, i.e., the ability to operate NTCIP-conformant ESS equipment from multiple vendors using the same central software and device driver. While this theory was not explicitly tested in this project, the System Provider has indicated that the NTCIP software used in the project is the same as that used in other deployments where they are controlling their own NTCIP-conformant equipment. Assuming this is an accurate assertion, interchangeability among at least these two vendors has been achieved.

5-3 THE LEARNING CURVE

The System Provider was an active participant on the ESS Working Group and had already implemented an NTCIP driver. The System Provider was therefore very familiar with the contents of the standards. The Vendor had also implemented the standards by the time the project had begun and was similarly familiar with the standards. The Agency was less familiar with the standards but had some experience with communication protocols in ITS implementations and was aware enough of the potential benefits to support the adoption of the NTCIP.

During the development effort, the participants used the NTCIP Guide, off-the-shelf textbooks, the NTCIP web site, and the standards themselves as their primary resources to understand the details of the standards.

6. TESTING COMPLIANCE

No specific test plan was required under the contract; however, the Vendor was required to demonstrate interoperability with the System Provider. This integration effort went relatively smoothly with only minor interpretation issues being discovered, which were easily resolved once identified.

6-1 TESTING TOOLS

Although the Vendor initially tried to use the NTCIP Exerciser, it was unsuccessful in getting it to work as expected. Further, the NTCIP Exerciser does not support the dial-up environment used by this project. As a result, they used various UNIX routines to get and set certain variables via SNMP. They also used a line analyzer to monitor the exact details of the data stream flowing across the wire.

The Vendor did indicate that the availability of better testing tools would have simplified the testing process and would have allowed for more rigorous testing (e.g., fault testing) to be conducted. The Vendor indicated that this should be considered a high priority item for the NTCIP effort.

7. USING THE STANDARDS

The Agency and Vendor representatives were asked to briefly describe their experience.

7-1 FROM THE AGENCY'S PERSPECTIVE

The Agency believes the project was successful and is surprised at how easy the integration was compared to their previous experiences on other projects. They attribute much of the success in achieving interoperability to the NTCIP standards.

The Agency considers the IFBs used for this project satisfactory and was only surprised at how easily the systems integrated given their previous experiences with ITS integration projects prior to the NTCIP standards.

7-2 FROM THE SYSTEM INTEGRATOR'S PERSPECTIVE

The Vendor indicated that they were happy with the existence of the standards. They believe it will improve competition in the marketplace, which will ultimately benefit their customers. However, they did indicate that making the standards freely available on-line would improve the acceptance of the standards.

8. RECOMMENDATIONS FOR IMPROVEMENTS TO THE STANDARDS

When asked to comment on what needs to be improved about the NTCIP effort, the Agency and Vendor identified the following as high priority items:

- **Provide tools to assist in conformance testing.** Providing tools (test plans, software tools, and/or certification) that ensured conformance would allow for more thorough testing of deployments.

-
- **Add functionality.** Need to support camera snapshots of ESS site, historical data, and bridge sprayers.
 - **Develop a reduced bandwidth solution.** The versions of the standards used by this project required a great deal of bandwidth and for some communications links this is a problem.

ANNEX A – NTCIP Equipment Descriptions

ANNEX A: NTCIP EQUIPMENT DESCRIPTIONS

Table A1: Existing and New Equipment

Equipment information	Before project non-NTCIP	After project Non-NTCIP	After Project NTCIP
Number of devices	41	41	8
Device Types	40 ESS; 1 Statewide Observation Database	40 ESS; 1 Statewide Observation Database	ESS
Controller Connection	Microwave; lowband radio; cellular; radio through microwave; etc.	Microwave; lowband radio; cellular; radio through microwave; etc.	Dial-up

Table A2: NTCIP Conformance Groups Implemented for Environmental Sensor Stations

Conformance Group	Reference Standard	Conformance Status	Requested	Implemented
Configuration	1201	Mandatory	Yes	Yes
Database Management	1201	Optional	No	No
Time Management	1201	Mandatory	Yes	Yes
Timebase Event Schedule	1201	Optional	No	No
Report	1201	Optional	No	No
STMF	1201	Optional	No	No
PMPP	1201	Optional	No	No
ESS Configuration	1204	Mandatory	Yes	Yes
ESS Location	1204	Mandatory	Yes	Yes
Pressure	1204	Optional	Yes	Yes
Wind Data	1204	Optional	Yes	Yes
Mobile Wind Data	1204	Optional	No	No
Base Temperature Data	1204	Optional	No	Yes

ANNEX A – NTCIP Equipment Descriptions

Conformance Group	Reference Standard	Conformance Status	Requested	Implemented
Enhanced Temperature Data	1204	Optional	Yes	Yes
Basic Precipitation Data	1204	Optional	Yes	Yes
Standard Precipitation Data	1204	Optional	Yes	Yes
Enhanced Precipitation Data	1204	Optional	No	Yes
Emerging Precipitation Data	1204	Optional	No	No
Solar Radiation	1204	Optional	Yes	Yes, but sensors were not connected during testing
Visibility Data	1204	Optional	Yes	Yes
Standard Pavement Sensor Data	1204	Optional	Yes	Yes
Enhanced Pavement Sensor Data	1204	Optional	Yes	Partial
Standard Sub-Surface Sensor Data	1204	Optional	Yes	Yes
Enhanced Sub-Surface Sensor Data	1204	Optional	Yes	Partial
Emerging Mobile Platform	1204	Optional	No	No
Pavement Treatment	1204	Optional	No	No
Air Quality	1204	Optional	No	No
Staffed Station	1204	Optional	No	No

ANNEX B – WSDOT Invitation for Bid

STATE OF WASHINGTON



Department of General Administration, Office of State Procurement

201 GA Building P O Box 41017 Olympia Washington 98504-1017

Visit our Internet site: <http://www.ga.wa.gov/purchase>

INVITATION FOR BID (IFB)

Site, Road, Weather Environmental Sensor Station

Contract Number

01501

Prebid Meeting Date & Time

March 8, 2001 – 10:30 AM

Bid Opening Date & Time

March 20, 2001 - 2:00 PM.

Please return bids to above address

[Rick Burns](#)

State Procurement Officer

Phone (360) 902-7426 FAX (360) 586-2426

E-mail: rburns.ga.wa.gov

I. ANNOUNCEMENT

This invitation includes two separate parts. This document, entitled [Invitation for Bid](#), is Part 1. Part 1, when completed signed and submitted becomes your official [bid](#) document. Part 2, entitled Competitive Procurement Standards contains the Standard Terms and Conditions, Instructions to Bidders, and Standard Definitions applicable to the [bid](#) document. You do not need to return Part 2, however, the most current version should be retained for future reference. See Offer and Award page for revision date.

Bids submitted against this IFB that take exception to terms and conditions set forth in this solicitation will be judged non-responsive.

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II. SPECIAL INFORMATION

1. PREBID CONFERENCE

A conference to address contractual requirements will be held at the time and location indicated below. Prospective bidders are encouraged to be present. If changes are required as a result of the conference, written bid addenda will be issued.

Note: Assistance for disabled, blind or hearing impaired persons who wish to attend is available with pre-arrangement with the Office of State Procurement (OSP). Contact the State Procurement Officer identified on the face page of this document.

Pre Bid Date: **March 8, 2001**
Pre Bid Time: **10:30 AM**
Pre Bid Location: **1551 North Wenatchee Avenue**
Wenatchee, Washington 98807

2. SCOPE

The purpose of this IFB is to establish a contract to furnish Site, Road, Weather Environmental Sensor Station(s) (ESS) for the Washington State Department of Transportation (WSDOT). The purchaser will be responsible for the installation of the stations. This is a new first time contract.

DOT North Central Region will place orders against the resulting contract for 2 to 4 stations prior to the end of March. In order to be considered for the award of this IFB, the bidder shall be able to provide up to 4 stations prior to June 30, 2001. Other stations purchased against this contract will be on a convenience use, as needed basis.

Environmental Sensor Stations (ESS) collect information from embedded road sensors and weather sensors near the roadway. ESS saves collected data and processes it to provide color-coded highway displays showing road surface conditions. The main purpose of the (ESS) is to provide weather and pavement information to support maintenance and operation activities, particularly snow and ice control on highways.

At the heart of the ESS is the intent to infuse decision making with weather information tailored to meet decision-maker's needs. To that extent, accurate and reliable weather information must be collected, processed and shared among the users. The ESS will improve information available to the decision-makers in advance of actual storms or other weather related impacts. Development of the ESS will supplement existing weather data with additional meteorological observation sites in order to increase the operator's understanding of oncoming weather events, and to enhance the database and analysis on which forecasts are based.

It's anticipated that the

- A. Estimated Usage: We estimate that purchases over the two-year initial term of the contract will approximate \$400,000.00. Estimates are based on past usage. The state does not guarantee any minimum purchase. Orders will be placed on an as needed basis.
- B. Purchasers: the primary purchaser will be the State Department(s) of Transportation. Based upon contractor's agreement, the contract will be made available to political subdivisions and non-profit organizations which are members of the State of Washington Purchasing Cooperative (WSPC) and/or State of Oregon Cooperative Purchasing Program (DASCPP/ORCPP). A list of Washington members is available on the Internet

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<http://www.ga.wa.gov/pca/cooplist.htm>. A list of Oregon members is available through the Vendor Information Program (VIP) which you can access from their Internet site under “Contracts and Bids” at <http://www.das.state.or.us/pages/purchasing/new/index.html>. Contractors shall not process state contract orders from unauthorized purchasers.

- C. While use of the contract by members of the WSPC and DASCPP/ORCPP is optional, the state encourages them to use state contracts. Their use of the contracts may significantly increase the purchase volume. Their orders are subject to the same contract terms, conditions and pricing as state agencies. The state accepts no responsibility for payment by WSPC or DASCPP/ORCPP members
- D. Term: From March 30, 2001 to March 18, 2003 or date of award to March 29, 2003 with the option to extend for additional terms or portions. Extensions will be subject to mutual agreement. The total contract term should not exceed six (6) years.
- E. The State of Washington is piloting an eCommerce initiative, which will further facilitate the use of technology in our business environment. This initiative is expected to improve access to state contracts and increase contract usage. To be considered responsive for this solicitation, bidders are encouraged to do business via the state’s eCommerce system (The Ultimate Purchasing System) no later than 90 days following award. Bidders should refer to the OSP website <http://www.ga.wa.gov/purchase> for additional information.

3. TECHNICAL CONTACT PERSONS:

Larry Senn, ITS Project Manager, (206)543-6741, larsenn@u.washington.edu

Bob Stowe, Regional Maintenance Engineer, (509)667-3065, stoweb@WSDOT.WA.GOV

III. SPECIAL TERMS AND CONDITIONS

1. AWARD METHOD

It is the intent of the state to award this bid for the following two systems: (1) ESS systems with active surface sensor(s) and (2) ESS system with passive surface sensor(s).

This IFB will be awarded to the bidder(s) whose offer conforms to the specification and solicitation, who is deemed responsive/responsible, who demonstrates that they possess the technical and facility capabilities necessary to perform and who are judged to be most advantageous to the state.

2. EQUIPMENT ELECTRICAL CERTIFICATION:

As required by RCW 19.28.010 and WAC 296-24-956, all electrical equipment purchased shall conform to, and be identified in, the applicable standard(s), or otherwise be certified as applicable, as of the bid opening date and time, by Underwriters Laboratories, Inc., or other recognized laboratory facility. Bidder must provide satisfactory documentation with returned bid that all such equipment meets the applicable product standard or has otherwise been certified as outlined above. Unless indicated in the bid document, the above certification shall apply to the equipment itself, not the individual components of that equipment.

3. PACKAGING

- A. Specifications: All costs for containers shall be borne by the bidder. All products shall conform to the provisions set forth in the federal, county, state and city laws for their product, handling, processing and labeling. Packages shall be so constructed to ensure safe transportation to point of delivery.
- B. Labeling: Individual shipping cartons shall be labeled with the name of the ordering agency, order number, contract number, contractor, state stock numbers, and where applicable, date of manufacture, batch number, storage requirements, conditions, and recommended shelf life. Bidders are encouraged to offer product packaging with recycled content.

4. REPAIR FACILITIES

Bidder shall provide a list of authorized factory repair facilities, which will honor the warranty of items on contract. The list will include the facility (ies) name, address, telephone number, and contact person. Evidence showing qualification of each facility to perform maintenance must be included as follows:

Bids that are submitted from manufacturers that require service through dealer outlets must include a letter signed by each dealer certifying full understanding and compliance with bid and servicing requirements.

5. PRICING AND ADJUSTMENTS

Unless otherwise stipulated all bids must include unit prices and extensions where applicable and be otherwise in the format requested.

All bid pricing is to be FOB Destination, freight prepaid and included, for any destination within the State of Washington.

ANNEX B – WSDOT Invitation for Bid

All pricing shall include the costs of bid preparation, servicing of accounts, and all contractual requirements. During contract period pricing shall remain firm and fixed for at least 365 calendar days after effective date of contract.

Adjustments in pricing will be considered after firm fixed price period on a pass through basis only. A minimum of 45 calendar days advance written notice of price increase is required which is to be accompanied by sufficient documentation to justify the requested increase. Documentation must be based on United States published indices such as the Producer Price Index. Acceptance will be at the discretion of the State Procurement Officer and shall not produce a higher profit margin than that established on the original contract pricing. Approved price adjustments shall remain unchanged for at least 365 calendar days thereafter.

During the contract period, any price declines at the manufacturer's level or cost reductions to Contractor shall be reflected in a reduction of the contract price retroactive to Contractor's effective date.

6. MATERIALS AND WORKMANSHIP

The Contractor shall be required to furnish all materials, equipment and/or services necessary to perform contractual requirements. Materials and workmanship in the construction of equipment for this contract shall conform to all codes, regulations and requirements for such equipment, specifications contained herein, and the normal uses for which intended. Materials shall be manufactured in accordance with the best commercial practices and standards for this type of equipment.

7. CONTRACTOR PERFORMANCE

- A. General Requirements: The state, in conjunction with purchasers, monitors and maintains records of Contractor performance. Said performance shall be a factor in evaluation and award of this and all future contracts. Purchasers will be provided with product/service performance report forms to forward reports of superior or poor performance to the State Procurement Officer.
- B. Liquidated Damages: The state has an immediate requirement for the materials, equipment or services specified herein. Bidders are urged to give careful consideration to the state's requirements and to the manufacturer's production capabilities when establishing a delivery date(s). Liquidated damages will be assessed in the amount of actual damages incurred by the state as a result of Contractor's failure to perform herein.

8. PROPRIETARY DATA

Any document(s) or information which the bidder believes is exempt from public disclosure (RCW 42.17.310) shall be clearly identified by bidder and placed in a separate envelope marked with bid number, bidder's name, and the words "Proprietary Data" along with a statement of the basis for such claim of exemption. The state's sole responsibility shall be limited to maintaining the above data in a secure area and to notify bidder of any request(s) for disclosure within a period of five (5) years from date of award. Failure to so label such materials or failure to provide a timely response after notice of request for public disclosure has been given shall be deemed a waiver by the bidder of any claim that such materials are, in fact, so exempt.

9. CATALOGS AND PRICE SHEETS

Bidder or Contractor shall furnish all necessary catalogs and latest dated published manufacturer's price lists as required by the State Procurement Officer. Failure to do so may cause bid to be rejected, or contractor to be in default of performance requirements.

10. RETENTION OF RECORDS

The contractor shall maintain, for at least three years after completion of this contract, all relevant records pertaining to this contract. This shall include, but not be limited to, all records pertaining

ANNEX B – WSDOT Invitation for Bid

to actual contract performance from the date of contract award. It shall also include information necessary to document the level of utilization of MWBE's and other businesses as subcontractors and suppliers in this contract as well as any efforts the contractor makes to increase the participation of MWBE's. The contractor shall also maintain, for at least three years after completion of this contract, a record of all quotes, bids, estimates, or proposals submitted to the Contractor by all businesses seeking to participate as subcontractors or suppliers in this contract. The State shall have the right to inspect and copy such records. If this contract involves federal funds, Contractor shall comply with all record keeping requirements set forth in any federal rules, regulations, or statutes included or referenced in the contract documents.

11. OSHA AND WISHA REQUIREMENTS

Contractor agrees to comply with conditions of the Federal Occupational Safety and Health Acts of 1970 (OSHA), as may be amended, and, if it has a workplace within the State of Washington, the Washington Industrial Safety and Health Act of 1973 (WISHA), as may be amended, and the standards and regulations issued thereunder and certifies that all items furnished and purchased under this order will conform to and comply with said standards and regulations. Contractor further agrees to indemnify and hold harmless purchaser from all damages assessed against purchaser as a result of Contractor's failure to comply with the acts and standards thereunder and for the failure of the items furnished under this order to so comply.

12. PROCUREMENT OF RECOVERED MATERIALS

This purchase is exempt from WAC 236-48-096 Procurement of Recovered Materials.

13. REPORTS

The contractor(s) must provide the following report(s) to Office of State Procurement.

Sales and Subcontractor Report

A quarterly Sales and Subcontractor Report (attached) shall be submitted in the format provided by the Office of State Procurement. Total purchases for each State Agency, University, Community and Technical Colleges must be shown separately. Total purchases for all political subdivisions and non-profit organizations may be summarized as one customer. Additionally, all purchases by the State of Oregon or other purchasers must be reported as an aggregate total.

The report shall include sales information (Section A) and amounts paid to each subcontractor during the reporting period (Section B).

Reports should be rounded to nearest dollar. Contractors will be provided with all necessary sample forms, instructions, and lists. Reports are due thirty (30) days after the end of the calendar quarter, i.e., April 30th, July 31st, October 31st and January 31st.

SPO Required Report

This report will be designed by the SPO to obtain information needed for IFB design, contract negotiation, or any other SPO determined need.

14. PURCHASES BY NONPROFIT CORPORATIONS

Recently enacted legislation allows nonprofit corporations to participate in state contracts for purchases administered by OSP. By mutual agreement with OSP, the contractor may sell goods or services at contract pricing awarded under this contract to self-certified nonprofit corporations. Such organizations purchasing under this contract shall do so only to the extent they retain eligibility and comply with other contract and statutory provisions. The contractor may make reasonable inquiry of credit worthiness prior to accepting orders or delivering goods or services on contract. The state accepts no responsibility for payments by nonprofit corporations. Contractor may not change contracted payment terms for nonprofit orders.

ANNEX B – WSDOT Invitation for Bid

15. CONTRACTOR'S REPRESENTATIVE

- A. Designation: Bidder shall provide name, address, and phone number of contractor(s) representative as required in bid documents.
- B. Responsibility: Contractor's representative shall function as the primary point of contact, shall ensure supervision and coordination and shall take corrective action as necessary to meet contractual requirements.
- C. Availability: Contractor's representative, or designee, shall be available at all times during normal working hours by telephone throughout the term of the contract.

16. PURCHASING CARD ACCEPTANCE

In an effort to streamline the purchasing and payment process, the State is encouraging agencies to use the state contracted purchasing card to facilitate small dollar purchases. While at the present time, it is not mandatory that contractors accept credit card purchases, we encourage all state contractors to consider this alternate payment process. Please indicate in Bid Submittals which card(s) you presently accept and payment discount you may offer the state. The current card available for state agency use is a VISA product.

17. VOLUNTARY MWBE GOALS

Voluntary numerical MWBE participation goals have been established for this [bid](#).

Minority Business Enterprises: (MBE's): 10% and Woman's Business Enterprises (WBE's): 8%

These goals are voluntary, but achievement of the goals is encouraged. However, unless required by federal statutes, regulations, grants, or contract terms referenced in the contract documents, no preference will be included in the evaluation of bids/proposals, no minimum level of MWBE participation shall be required as a condition for receiving an award or completion of the contract work, and bids/proposals will not be rejected or considered non-responsive if they do not include MWBE participation. Bidders may contact OMWBE at 360-753-9693 to obtain information on certified firms for potential subcontracting arrangements.

18. BIDDER COMPLIANCE

The State reserves the right to consider the actual level of bidder's compliance with the requirements specified in this IFB, and to consider a bid responsive if it substantially complies with the state's intent relative to overall bid requirements and specifications.

Literature provide by the bidder which contains terms and conditions that conflict with terms and conditions reflected in this solicitation will not be considered unless specifically addressed in Section V, Supplemental Information, Exceptions.

19. SERVICE EXPECTATION

Upon the award of this contract, the successful bidder will review the impact of this award and take the necessary steps to ensure coverage and contract compliance. We expect the State to be designated as a preferred customer as a result of this contract.

The contractor shall have representatives available to answer technical questions related to ESS systems. Indicate names and territories of, technical representatives in Section V, Attachment 3 Supplemental Information.

The user will monitor RWIS performance and provide diagnostics with telephone support from the vendor. The purchaser will remove malfunctioning components and return them to the vendor for repair or replacement. The vendor shall provide on-site support should problems arise that are beyond the technical expertise of the purchaser.