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A Report to the ITS Standards Community
ITS Standards Testing Program

FINAL TEST REPORT

For Advanced Traveler Information Systems (ATIS)
and Related Standards as Deployed by the
Nebraska Department of Roads

By

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Prepared for

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16. Abstract This report contains the results, findings and conclusions generated from the evaluation and field testing of a specific subset of ITS Standards applicable to the center-to-center exchange of advanced traveler information as deployed by the Nebraska Department of Roads (NDOR). The primary standards of interest for this testing effort at NDOR are SAE J2354 – Message Sets for Advanced Traveler Information Systems (ATIS) and, to the extent implemented by NDOR, SAE J2266 - Location Referencing Message Specification (LRMS) and ASE J2540-2 International Traveler Information Systems (ITIS) phrase list.			
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Executive Summary

Introduction

This executive summary provides an overview of the assessment of three ITS standards involved with the dissemination of advance traveler information as deployed by the Nebraska Department of Roads (NDOR). The three standards evaluated by this report are:

- SAE J2354, Message Sets for Advanced Traveler Information System (ATIS), February 2004
- SAE J2266, Location Referencing Message Specification (LRMS), October 2004
- SAE J2540-2, International Traveler Information Systems (ITIS) Phrase Lists, May 2004

The ITS standards are embodied as part of the Highway Conditions Reporting System (HCRS), which is used by NDOR to capture road conditions, construction and maintenance operations, and traffic-related incidents and events for their statewide 511 website. In addition to the website, NDOR communicates this HCRS information to Meridian, a third-party service provider, which in turn, provides the 511 telephone information system for NDOR. In this model, both HCRS and Meridian act as centers, and the ITS standards are embodied in the XML messages passed between these centers.

Test Methodology

Testing of the three ITS standards was accomplished in three phases. The first phase involved the collection and assessment of the body of the standards and the vendor documentation, specifications, and data as it related the HCRS deployment. This examination included a detailed review of the documentation, a search for consistency, completeness, and compatibility in the standards, and an analysis and evaluation of any issues or concerns discovered. This step was referred to as the static analysis.

The second phase involved generating and conducting a detailed questionnaire to investigate issues identified during the static analysis phase; to probe the experiences and issues encountered by the developer and to assess any non-testable technical features. These interviews were conducted with NDOR, the system developer (OZ Engineering), consumers of the HRCS data (Meridian), and representatives of the Standard Development Organization (SDO) working group. The texts of the interviews are attached in Appendix D of this report.

The third and final phase of the testing process involved the field testing of the deployed system and capture of XML messages for analysis. Testing was conducted in two parts. The first part was performed on-site by carrying out a controlled set of tests that systematically exercised all of the implemented features of the standards using a prescribed order and known results. A description of each test case is available in Appendix E of this document. The second part of the testing phase involved monitoring live data from the deployed system and capturing actual messages over the period of one week.

Deployment and Coverage

The results of static analysis indicated that, with the exception of some minor local extensions, the NDOR deployment strongly adheres to the ITS standards and shows a commitment to use the features of the standards as defined in the standards. The following table summarizes the components from each standard that were implemented at NDOR.

ATIS Standard	LRMS Standard	ITIS
2 Messages 9 Data Frames 5 Data Elements	12 Data Frames 11 Data Elements	91 Phrases

Summary of Results

On-site testing was successfully conducted in Phoenix, AZ on June 20, 2007 at the offices of OZ Engineering, the system developer. The live monitoring was conducted over the same timeframe beginning on June 18, 2007 through June 25, 2007. During this time, the live HCRS web service was polled once every hour.

The field testing phase yielded a large body of XML messages that are recorded and available on the companion CD accompanying this report. The test cases and live monitoring produces the following inventory of XML messages.

- A total of 111 XML messages were captured from the test cases.
- A total of 168 XML messages were captured from the live system monitoring.

Overall Findings

All of the information collected by the static analysis, questionnaire interviews, and field testing was compiled into the knowledge base. For each finding identified, a determination was made if it represented a genuine finding against the standards or was an artifact of some other influence such as versioning, legacy concerns, local requirements, misinterpretations, etc. All findings that were deemed noteworthy are annotated herein.

The findings are separated into two categories. The first category is the general findings that apply to the general use of the concepts presented in the standards but do not necessarily apply to any single feature. The second category is the specific findings, which are comments and issues directly relating to one item, such as a data object, document paragraph, diagram, etc.

The following list summarizes the general and specific findings. These findings are described in more detail in the main body of this report.

General Findings

1. The ATIS standard does not include the necessary components, in the form of User Needs and Functional Requirements, which indicate that the standard has been subjected to the Systems Engineering approach for development.
2. The ATIS standard is missing crucial components necessary to achieve the goal of interoperability. The standard provides the message schema for organizing the data content, but lacks standard dialogs and communication protocols required to exchange the information with other systems.
3. A deficiency in configuration control practices or policy was identified such that the consistency between the standards and the supporting electronic files, which in the case of ATIS is the XML schema, was not maintained. It appears that the ATIS standard itself was 'controlled', but the corresponding XML schema was the latest working copy and did not match the document.
4. The ATIS standards terminology describing Messages and Data Frames is confusing. There is no clear definition as to why one data sequence is referred to as a message, while another is referred to as a frame.
5. The vendor extended the local data structure for providing extended data elements to include Convoy and HAZMAT information. These data elements are be missing from the link traffic information data frame.
6. Overall, the ITIS phrases were considered ample for the system needs; however some free text descriptions were required to complete event descriptions. An examination of the free text fields revealed numerous phrases that were not considered unique or unusual and should be considered for adoption into the ITIS phrase lists.
7. The industry is trending toward a combined date/time field expressed by the World Wide Web Consortium (W3C) rather than the ATIS date-time data frame. This is ineffective and it would be beneficial to migrate to this industry standard format.
8. The Traffic Management Data Dictionary (TMDD) enumeration used for event severity by the ATIS messages is not suitable in the context of highway condition events. All events have a severity level and none are considered natural disasters.
9. Separate data elements for jurisdictional, ownership, and road number information are not available in the street information data frame in the LRMS standard. The lack of these fields forced this information to be encoded into a single text field as the street name, which is ineffective and can create interoperability issues.
10. The merging of the Mayday and Reduced Bandwidth messages into the ATIS standard is confusing since it appears to be incomplete. Most of the information for these messages remains in separate standards and the data objects for the Mayday messages are now defined in two places, creating possible ambiguity.

Specific Findings – ATIS

1. Several cases exist where the name or data types of sequence members were misspelled in the ASN.1 notation.
2. A number of data frames are defined in the standard whose only reference is another deprecated item.
3. The definition of the link speed data element exists in two separate locations, raising a risk of inconsistency between the two definitions.
4. The day-of-week data element is defined using a bit-weighted number in the ASN.1 notation but is defined as a different enumeration in the XML notation. These two approaches are not compatible.
5. The data frame for the contact setting sequence contains a placeholder for the address information whose type is from the LRMS standard; however it does not match the LRMS object name.

Specific Findings – LRMS

1. The data sequence in paragraph 5.4 contains a data member for the entity's Federal Information Processing Standards (FIPS) code whose name is misspelled.
2. The XML notation in paragraph 5.18 is missing the CHOICE block syntax.
3. The data type for the *roads* data element in paragraph 5.6 is misspelled.
4. The *location ID* element in the XML notation in paragraph 5.36 has the wrong data type.
5. The XML syntax in paragraph 5.26 is incomplete.

Conclusion

The ATIS standard does not define the operational user needs that it is intended to satisfy. As such, the suitability of the standard to meet the agency operational needs cannot be evaluated directly, but only inferred from an analysis of the suitability of the message schema. Overall, the deployed ATIS, LRMS and ITIS schemas were found to be suitable for the exchange of center-to-center communications with the exception of a few minor extensions to the ATIS schema, as discussed in the detailed findings in this report. A more complete evaluation of the suitability of the ATIS standard requires a complete set of operational user needs and functional requirements to be defined.

With the exception of few minor items, discussed in brief below and in detail in the main body of this report, the overall message schema used to embody the standard's content was found to be effective and consistent with accepted industry best practices. A need to coerce some information to encode it into the data frames and elements provided by the schemas was identified and is discussed in the detailed findings in this report. In particular, the translation between the ATIS data/time data frame to the more common W3C standard format was seen as an unnecessary nuisance and frustration to developers.

The ATIS standard does not provide adequate structures to achieve interoperability. Though the standard provides message schema structures, it lacks definitions for standard dialogs and communication protocols that are required to realize interoperability. As such, the dimension of interoperability cannot be evaluated for the standards used in this deployment. The NDOR deployment has overcome this shortcoming by implementing a customized web service design to exchange the ATIS messages. This technique, though effective, and sufficient to meet the needs of NDOR and the consumers of the information provided by them, precludes interoperability with other systems based on the merit of the ATIS standard alone.

Configuration control used in the standards development process needs to be more stringent to prevent deployments from being developed using incremental versions of the standards. The use of these non-released versions complicates the development, evaluation and acceptance of the ITS standards.

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1.0 Introduction

This report presents the results of the ITS Standards Testing Program for the evaluation, field testing and assessment of three SAE standards that apply in the domain of Advance Traveler Information Systems (ATIS). These three standards are identified and described in the following sections. This report fulfils the work product specified in Task 6.2 of Work Order BA34020.

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2.0 Background

2.1 ITS Standards Testing Program

The U.S. Department of Transportation (USDOT) Federal Highway Administration (FHWA) has created the Intelligent Transportation Systems (ITS) Standards Test Program, whose objective is to assess a standard's performance and evaluate the ability of the standard to accomplish interoperability and interchangeability in ITS deployments. The ITS Standards Test Team (ISTT) has been contracted by USDOT, in cooperation with the Standards Development Organizations (SDO) and USDOT, to evaluate the coverage and approach used by the site in deploying standards, and conduct both detailed static analysis and hands-on testing of the standard as used at the site.

2.2 ITS National Architecture

The ATIS standard is derived from the architecture flows identified in the National ITS Architecture version 5.0. The ATIS standard concentrates primarily on the interface between the Information Service Providers, such as Nebraska Department of Roads (NDOR), and those who use the information. The data flows of the ITS physical architecture that are subject to ATIS are shown in Figure 2.1.

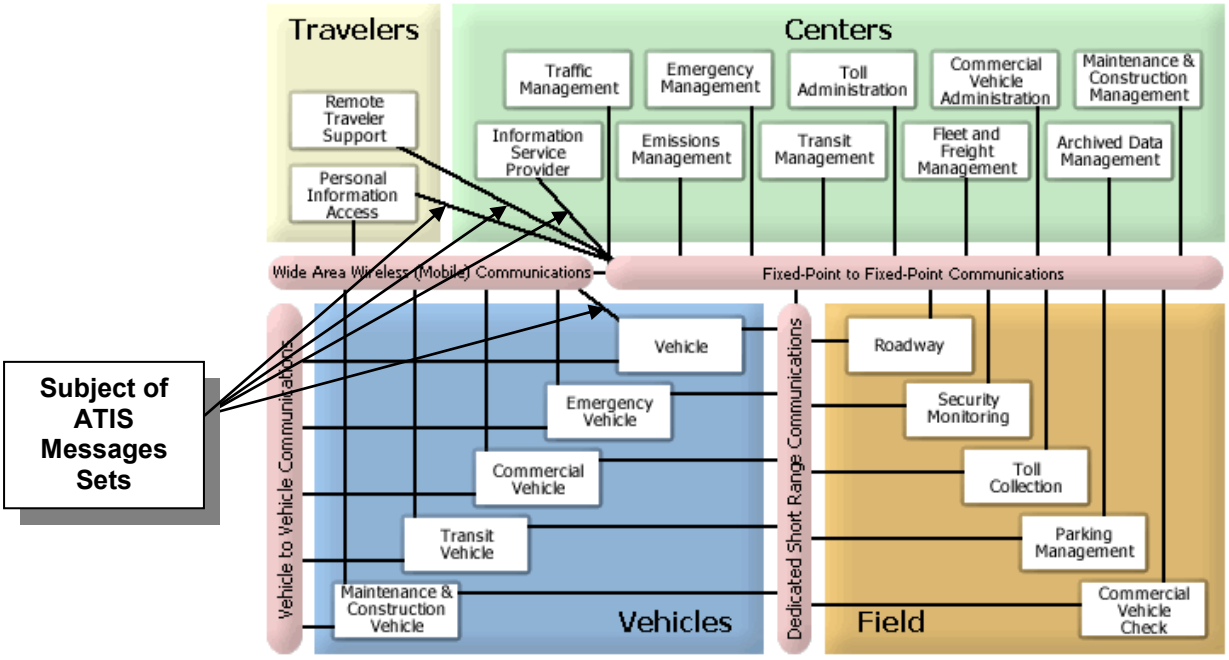

Figure 2.1. ITS Physical Architecture

The ITS national architecture defines ten ATIS market packages, which represent slices of the physical architecture that address specific services. The NDOR deployment employs portions of the Broadcast Traveler Information market package as shown in Figure 2.2.

This market package supports collecting traffic conditions, advisories, general public transportation, toll and parking information, incident information, roadway maintenance and construction information, air quality and weather information, and broadcasts the information to travelers using technologies such as FM sub-carrier, satellite radio, cellular data broadcasts, and Internet web casts. The information may be provided directly to travelers or provided to merchants and other traveler service providers so that they can better inform their customers of travel conditions.

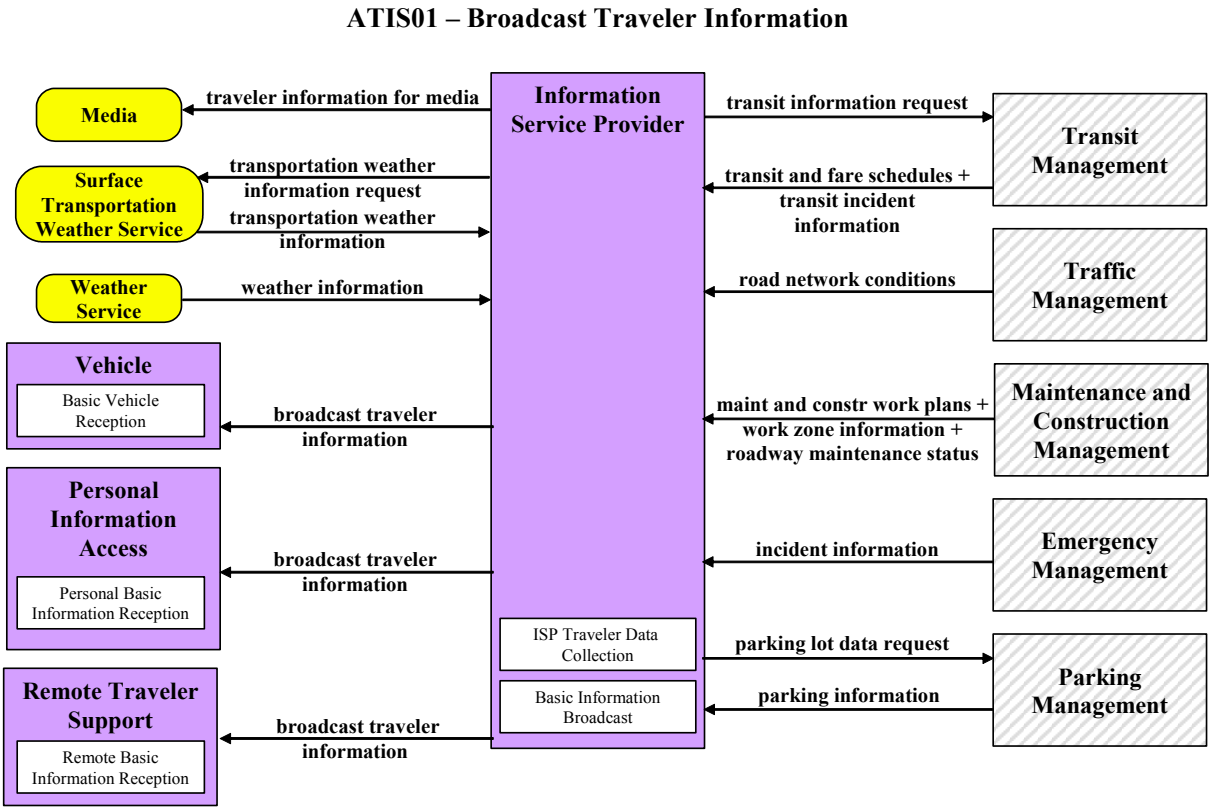

Figure 2.2. ATIS Market Package

The portions of this market package that are implemented at NDOR include the data flows for collecting information from Traffic Management, Maintenance and Construction Management, and Emergency Management centers and broadcasting this information to media outlets including internet web sites and 511 traveler information telephone services.

2.3 Standards of Interest

This report contains the results from the field testing of a specific subset of ITS standards applicable to the center-to-center exchange of advanced traveler information. The primary standards of interest for ITS standards testing at NDOR are the ATIS standard and, to the extent implemented by NDOR, the Location Referencing Message Specification (LRMS) standard and the International Traveler Information System (ITIS) phrase list. The standards of interest are enumerated in Table 2.1.

Table 2.1. Standards of Interest

Identification	Title	Date
SAE J2354	Message Sets for Advanced Traveler Information System (ATIS)	February 2004
SAE J2266	Location Referencing Message Specification (LRMS)	October 2004
SAE J2540-2	International Traveler Information Systems (ITIS) Phrase Lists	May 2004

The standards of interest listed in Table 2.1 reference other standards and protocols. These standards were not directly evaluated but are included here for reference.

- **ISO/IEC 8824-1**, (ASN.1): Specification of basic notation.
- **ISO/IEC 8824-2**, (ASN.1): Information object specification.
- **ISO/IEC 8824-3**, (ASN.1): Constraint specification.
- **ISO/IEC 8824-4**, (ASN.1): Parameterization of ASN.1 specifications.
- **TMDD TM1.01.4**, Standard for Functional Level Traffic Management Data Dictionary.
- **SAE J2313**, On-Board Land Vehicle Mayday Reporting Interface, September 1999.
- **SAE J2369**, ATIS Message Sets Delivered Over Reduced Bandwidth Media.
- **SAE J2540**, Messages for Handling Strings and Look-Up Tables in ATIS Standards.
- **SAE J2540-1**, RDS Phrase Lists.
- **SAE J2540-3**, National Names Phrase List.
- **SAE J2630**, Converting ATIS Message Standards from ASN.1 to XML.
- **IEEE 1488**, Trial-Use Standard for Message Set Template for ITS.
- **IEEE 1489**, Standard for Data Dictionaries for ITS.
- **IEEE 1512**, Standard for Common Incident Management Message Sets for Use by Emergency Management Centers.
- **ITE TCIP-IM**, Transit Communications Interface Profiles-Standard on Incident Management Objects, NTCIP 1402v01.02, December 2000.

2.4 The NDOR Deployment

The State of Nebraska Department of Roads (NDOR) has deployed an Advance Traveler Information System (ATIS) based on the Highway Conditions Reporting System (HCRS) developed by OZ Engineering. Authorized NDOR personnel enter events online, directly into the HCRS, which subsequently provides the data source for traveler information services. The HCRS system provides information to the public using two existing traveler information services including the Travel Information Portal (TIP) web site and the 511 telephone service. The ITS standards examined reside in the interface between the HCRS and the 511 telephone system. A system diagram of the HCRS system is shown in Figure 2.3.

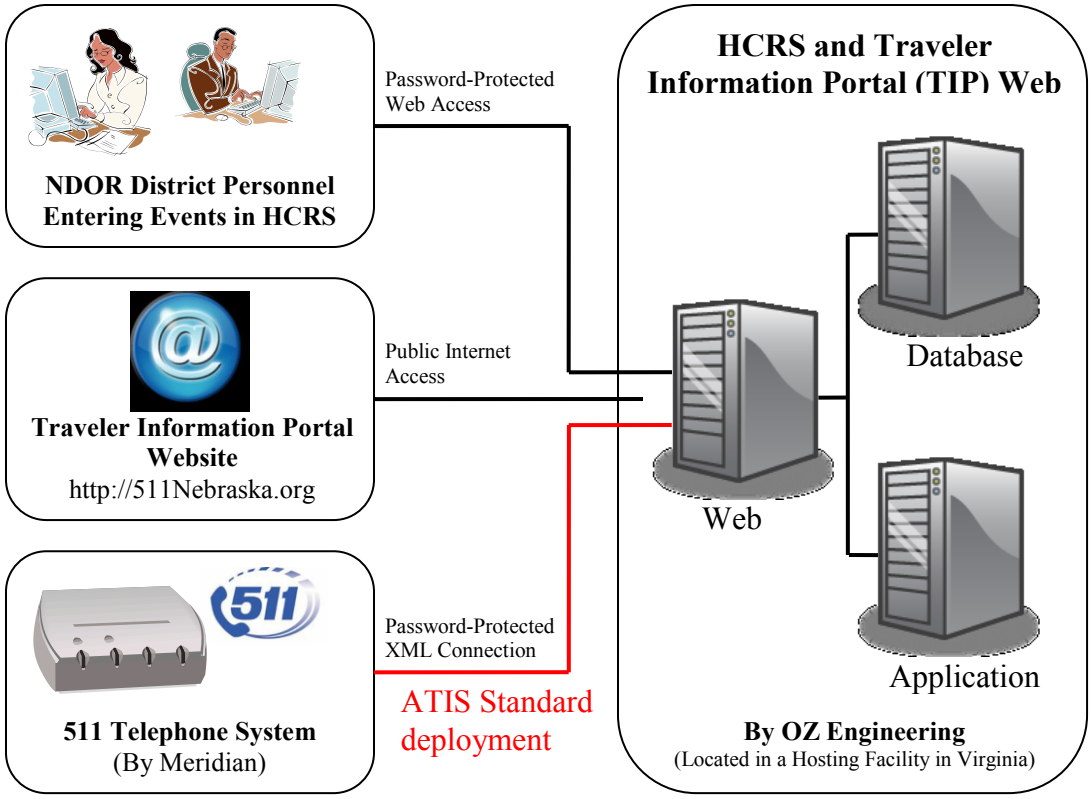

Figure 2.3. HCRS System Diagram

The HCRS system is a Java Applet application that runs in Microsoft® Internet Explorer 5.5 or higher with the Java Runtime Environment (JRE) version 1.3.1_02 or higher installed. A Web Service is provided that exposes a single password-protected service to return the complete list of all events recorded in the HCRS system. The description of each event is returned in an XML encoded document using the *ATISMessage* schema defined by the ATIS standard and implemented by the HCRS XML Data Export document, version 1.1.

2.4.1 Base Standards and Protocols

The ATIS, LRMS, and ITIS standards are employed in the communications between the HCRS and the 511 telephone system. Table 2.2 lists the base protocols used by the HCRS system.

Table 2.2. Base Protocols

Layer	Type	Comment
Application Layer	SOAP/XML over HTTP [1]	Industry standard used
Transport Layer	TCP[2]	Industry standard used
Network Layer	IP	Industry standard used

2.4.2 ATIS Message Groups

The ATIS standard includes the seven message groups shown in Table 2.3 that are organized into major groupings of A1-A7. The HCRS system implements the Event and Link information portions of the Traveler Information (A1) message group.

Table 2.3. ATIS Message Groups

ATIS Message Group	Group Designator
Traveler Information	A1
Trip Guidance	A2
Directory Services	A3
Parking	A4
Settings	A5
Mayday	A6
Reduced Bandwidth	A7

The diagram in Figure 2.4 provides a high-level illustration of the major ATIS and LRMS data objects that are implemented in the HCRS system. The implemented messages, data frames, and data elements are described in detail in Appendix A and B of this report.

[1] NTCIP 2306, which specifies the use of SOAP and HTTP, was not used for this deployment. The ATIS standard does not specify or require the use of any communication protocols.

[2] NTCIP 2202, which specifies the use of TCP/IP, was not used for this deployment.

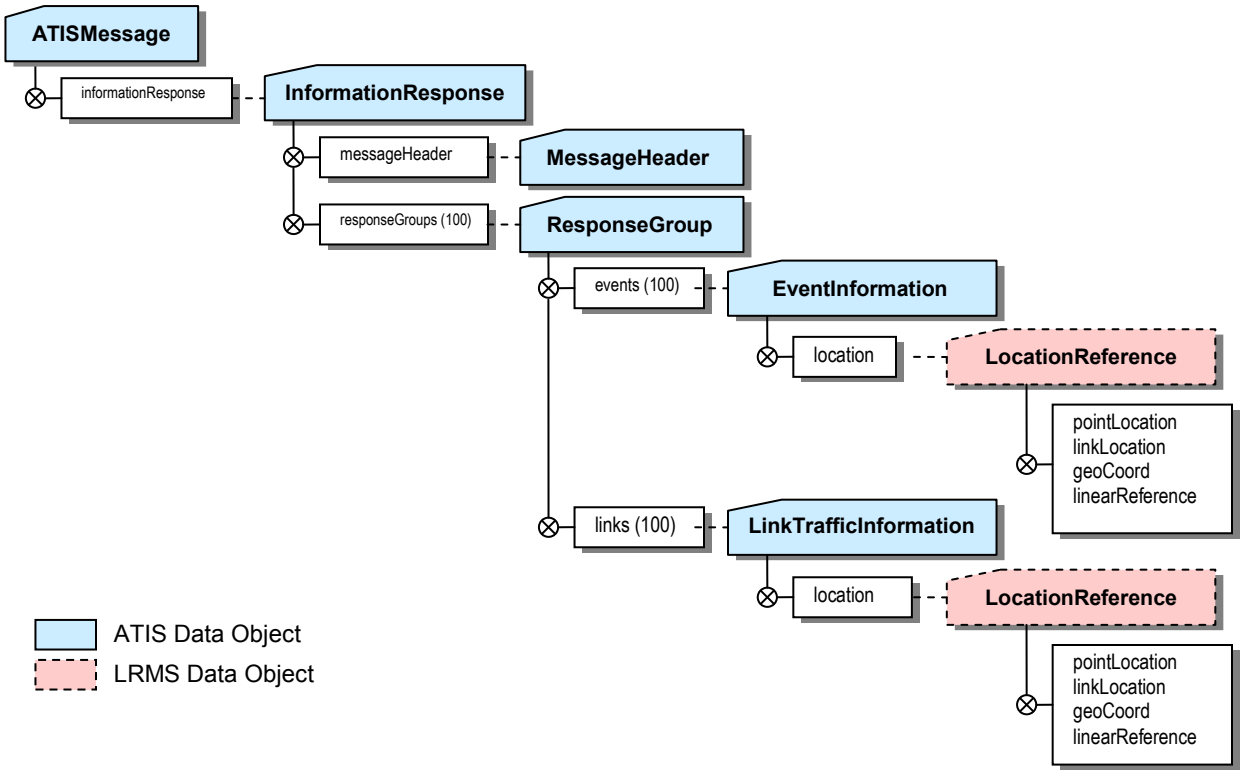

Figure 2.4. High-level Diagram of the Implemented ATIS and LRMS Objects

2.5 Requirements

The general requirement for the development of the HCRS system was to replace the existing legacy system and make road condition and event information available to the public. More specific requirements were not annotated, however the developer felt that overall the standards provided adequate coverage and they were able to find what they needed as their requirements evolved during development.

3.0 Testing Process Methodology

3.1 Scope of Test

The tests performed address the specific observable and testable features of the three SAE standards as they are embodied in the communication protocols of the HCRS system. The test is not a system acceptance test or stress test, which seeks to compare behavior of the test items to functional or contractual requirements. Rather, this test seeks to compare the usage of the test items to their intended usage described in the standard and identify the reasons for any variations.

> Note: The term *Testing* is used in two distinct contexts in this final report. In general, all work performed with respect to the static analysis, evaluation and interviews and on-site controlled experiments and data gathering of the standards are grouped under the general term *Testing*. Specifically, the process of performing a set of pre-defined, controlled experiments to acquire data from the deployed system and compare this data to known expected values is also referred to as the onsite *Testing* phase. Attempts have been made to ensure this distinction is clear in the context of the usage of the term.

3.2 Testing Goals

The overall goal of the ITS Standards Testing Program is to assess and evaluate the suitability, effectiveness and contribution to interoperability and interchangeability of ITS standards. To best focus on the process to assess and evaluate ITS standards, the test team has identified these three key elements as essential in understanding whether or not a particular standard is ready for field use. These three high-level categorical elements for assessment and evaluation are defined and expanded in the following discussion.

3.2.1 Suitability

The dimension of suitability addresses those aspects of a standard that make it appropriate for a given purpose, easy to understand and use, or the contrary. This also includes issues and measurements relating to a standard's completeness and coverage when defining all aspects of the problem domain and providing access to, and control of, the appropriate technologies. The impact of an unsuitable standard tends to happen early in the system development life-cycle by needlessly complicating or subverting the choice from suitable alternative standards. The evaluation of suitability will be based on quantitative and qualitative analysis of the standards, structured questionnaire responses, and product capabilities, requirements, and design tradeoffs.

3.2.2 Effectiveness

The dimension of effectiveness addresses those aspects of a standard that make its use an appropriate means to achieve the intended or desired effect. This also includes issues relating to how well the features of the standard enable a reasonable and effective implementation in terms

of performance requirements and other such operational and maintenance criteria. The impact of an ineffective standard will tend to happen during design and implementation of the system in terms of excessive resource requirements, negative effects on schedule, product performance, etc. The evaluation of effectiveness will be based on quantitative and qualitative analysis of the standards, structured questionnaire responses, operational use, and results from test trials.

3.2.3 Interoperability and Interchangeability

The dimension of interoperability addresses those aspects of a standard that contribute to the ability of systems to provide services to and accept services from other systems and to use the services so exchanged to enable them to operate effectively together. This necessitates that interoperability goes beyond the mere exchange of data and requires that the data exchanged must be usable by the other system. Further, interoperability is extended to interchangeability when characterized by standardized interfaces. The impact of standards that do not contribute positively to interoperability and interchangeability will tend to occur during the integration with other systems. The evaluation of the standards contribution to interoperability and interchangeability will be based on quantitative and qualitative analysis of the standards, logical characteristics of any external interfaces, and detailed examination of the syntactic and semantic content exchanged across those interfaces.

3.3 Testing Process Outline

This section presents an outline of the steps followed in the conduct of the ITS standards testing of the ATIS, LRMS, and ITIS standards. The test process steps outlined in Table 3.1 describes the effort for determining what data and information would be identified and collected and where and how that collection would be accomplished.

Table 3.1. Test Process Steps

Step	Description	Expected Outcome
Baseline Standards Content	• Examine implementation and project documentation. • Research and examine standards schemas and compile a list of specific versions and identify standard and custom implementations.	• Identify the features of the standard used by the deployment. • Identify any exceptions to the standard that has been implemented by the system. • Determine if additional detailed testing is warranted.
Interview Users, Vendors, and System Integrators	• Conduct structured, guided interviews using a prepared questionnaire developed from examination of the baseline standards content.	• Identify additional findings not apparent from the static analysis of the system documentation. • Collect expert engineering and operational opinions on the suitability and effectiveness of the standards.

Table 3.1. Test Process Steps (Continued)

Step	Description	Expected Outcome
Evaluate the Purity and Integrity of the External Interfaces	• Examine dialogs across external interfaces to identify any exceptions in terms of syntax or semantics.	• Ensure testing approach yields valid samples / outputs.
Conduct Field Testing	• Conduct a controlled experiment in the field at the operational site using well-defined and documented test conditions. • Test all standard functions and features accessible through the implementation and all exception conditions.	• Complete the knowledge base of the deployment with observations of real-world examples. • Further investigate findings developed thru the analysis of the system and interview questionnaires.

3.4 Establish and Verify Standards Baseline

This step in the process supplements the baseline knowledge of the standards content. It is an essential step to understand the standard's content baseline and contributes to the decision to proceed with full test planning and conduct. The test team qualitatively and quantitatively verified the degree of the use and conformance with the standards of interest. This process included static examination of standards, compilation, and examination of any XML schema (XSD) files and other technical documentation obtained from vendor/developers. This static analysis is the basis for the development of the detailed site interview questionnaire.

NDOR provided a robust package of documentation, specifications, and data as it related to their implementation of the ATIS, LRMS, and ITIS standards and HCRS. This documentation was examined and compared with the standards to determine percentage of coverage and to identify any exceptions or customizations to the standards. The results of this analysis indicated that, with the exception of some minor extensions (see paragraph 4.1.2), the NDOR deployment strongly adheres to the ITS standards and shows a commitment to use of the features of the standards as defined in the standards. This drove the decision to move forward with testing.

It should be noted that the vendor developed the HCRS system using a *Working* version of electronic schema when compared to that contained with the ATIS standard being evaluated here. The XSD file providing the schema for the standards messages, data frames, and data elements was generated on 14-April, 2003; however the revision date of the ATIS standard is February 2004. This fact, which is documented in the findings, required some additional analysis in order to facilitate testing to the standard. The differences between the standard and the implemented schema are identified in Table 3.2. This comparison is limited to the messages and data frames deployed by HCRS.

Table 3.2. Discrepancies in Implemented Schema

Discrepancy Description	Implemented by HCRS	Impact on Testing
ATIS Standard		
In the implemented schema, many data sequences that contain element arrays define only an upper limit for the number of elements that can exist in the array; however an upper and lower limit for each array is specified in the standard.	Yes	None
LRMS Standard		
The *LinkLocation* data frame includes a *linkType* data element in the standard that is not defined in the implemented schema.	No	None
The name of the linear reference member of the *LinkLocation* data frame is *linearReferenceLink* in the implemented schema; however it is called *linearReference* in the standard.	Yes	The tag for the linear reference data frame will not match the LRMS schema.
The *LocationReference* data frame includes a *nodeAttribute* data element in the standard that is not defined in the implemented schema.	No	None
The name of the geographic coordinate data element of the *LocationReference* data frame is *geographicCoordinate* in the implemented schema; however it is called *geoCoord* in the standard.	Yes	The geographic coordinate data element tag will not match the LRMS schema.
The *PointLocation* data frame includes both *pointType* and *adminArea* data elements in the standard; however these are not defined in the implemented schema.	No	None
The name of the linear reference member of the *PointLocation* data frame is *linearReferencePoint* in the implemented schema; however it is called *linearReference* in the standard.	Yes	The linear reference data element tag will not match the LRMS schema.
The *CrossStreetsLink* data frame has two direction fields in the implemented schema (*direction1*, *direction2*). However, the standard has only one direction field (*direction*).	Yes	The direction tags will not match the LRMS schema.

3.4.1 ATIS Standard Coverage

When considering percentage of coverage, it should be noted that in actual implementation and operational use, it is recognized that some message groups are used more often and contribute more value to functionality than others. In the case of the ATIS standard, the Traveler Information (A1) message group, and in particular the Event sub-messages, have been shown to be the most sought after capability embodied in the standard. Discussions with NDOR and the HCRS system developers as well as SDO representatives have shown a consensus that the vast majority of the ATIS message content that exists today is, in fact, Event messages.

Given that the overall weight of importance within the ATIS standard is overwhelmingly focused on the Event messages, it is reasonable to consider only the components of the Traveler Information (A1) message group in determining the effective coverage. Table 3.3 provides coverage percentages based on this reasoning as well as on the entire ATIS standard. The coverage of the ATIS standard provided by the HCRS is described in detail in Appendix A.

Table 3.3. LRMS Standard Coverage

LRMS	Implemented by HCRS	(Entire ATIS)		(Traveler Information Group)	
		Total	Coverage	Total	Coverage
Messages	2	47	4%	6	33%
Data Frames	9	58	16%	46	20%
Data Elements	5	169	3%	63	8%

3.4.2 LRMS Standard Coverage

Given the numerous location referencing methods designed into the LRMS standard, it is not expected that an implementation would or should cover all the methods provided. The HCRS system implements 4 of the 17 methods embodied in the standard. For the purpose of determining the effective coverage provided by the HCRS implementation, it is reasonable to consider only the components associated with the four location referencing methods implemented by the HCRS system. Table 3.4 provides coverage percentages based on this reasoning as well as on the entire LRMS standard. The coverage of the LRMS standard provided by the HCRS implementation is described in detail in Appendix B.

Table 3.4. LRMS Standard Coverage

LRMS	Implemented by HCRS	All of Data Frames and Elements in LRMS		Data Frames and Elements Associated with the 4 Methods used by HCRS	
		Total	Coverage	Total	Coverage
Data Frames	12	44	27%	28	43%
Data Elements	11	61	18%	53	20%

3.4.3 ITIS Standard Coverage

The ITIS coverage percentages are less informative than percentages for other standards due to the nature of the standard as a data dictionary of common phrases. Rather, it is more instructive to evaluate the correctness of how the phrases that have been implemented are used and to what extent they meet the needs of the developers in terms of any locally-developed codes or free text fields that were needed to augment the standard codes. The coverage of the ITIS standard provided by the HCRS implementation is described in detail in Appendix C.

3.5 Interview Product Vendor/Developers

This step includes structured technical interviews conducted at the vendor/contractor facilities and follow-up by phone. Interview questionnaires are prepared in advance and are derived from the static examination of the standards and HCRS system documentation. Although the questionnaires will primarily consist of questions related to the vendor's implementation of the standards, it also included questions directed to programmatic issues, Standards Development Organizations (SDO), and users of the HCRS system. These interviews aid in the understanding of the vendor's implementation and address at least three potential categories of issues:

1) Issues related to exceptional conditions discovered by the developer.
2) Subjective and qualitative coverage and data collection for assessment of non-testable technical features.
3) Verification of standards content baseline prior to the commitment of resources to the more specific and extensive field testing.

The initial interview questionnaire for the ATIS, LRMS, and ITIS standards testing was conducted in Phoenix, AZ at the offices of OZ Engineering in January of 2007. Follow-up telephone conversations were later conducted to complete the questionnaire with Meridian and SDO representatives. The text of the questionnaire, along with the responses from the various participants, is included in Appendix D of this document.

Upon completion of these interviews, the results were reviewed and a document of preliminary findings was generated. These findings have been further clarified over time via additional question and answer discussions with NDOR and through on-site testing. These findings, both general and specific, are described in the findings section of this report.

3.6 Evaluate the Purity and Integrity of the External Interfaces

This step in the testing process was designed to examine the external interface employed in the system to determine that all communications and protocols used were consistent in terms of syntax and semantic content, and that there is no unexplained communications activity on the web service interface.

The test team used the Web Service Definition Language (WSDL) document provided by the developer to create test software to connect to and receive the ATIS messages from the HCRS system. The test team then examined the XML documents returned from HCRS and made the following determinations:

- The HCRS messages were well-formed XML documents.
- The HCRS messages conformed to the ATIS, LRMS and ITIS schemas with the exception of the version-related anomalies described in Table 3.2.

This step proved to be an important confidence builder in that it was a successful test of the ability to communicate with HCRS system and served to reduce risk and eliminate distractions prior to conducting on-site testing.

3.7 Conduct Field Testing

This is the final step of the testing process and is designed to collect empirical data through exercise and observations of the testable features of the standards embodied in the HCRS deployment. The ATIS test plan is comprised of two components:

1) Live Monitoring. Real-world data was collected via live monitoring of the deployed HCRS system. The live monitoring of the HCRS system was done by periodically polling the HCRS web service to capture all currently active events. A record of all of the XML event descriptions captured by the live monitoring was kept for analysis.
2) Controlled Test. A detailed test plan was created that described a total of 111 specific test cases that would systematically exercise all implemented features of the ATIS, LRMS, and ITIS standards in a controlled fashion. The test cases are presented in Appendix E of this document.

3.8 Test Approach

The testing techniques utilized the HCRS test platform available at the OZ Engineering facility located in Phoenix. The test platform is a replica of the deployed HCRS systems and is used for the development and verification of HCRS prior to its live publication. The testing configuration is shown in Figure 3.1.

For each test case included in the test plan, the HCRS Java applet was used to describe and post events that utilize and exercise all the implemented features of the standards. The HCRS web service was then polled after each event was entered to retrieve the ATIS messages describing the event and the resulting XML document was captured and saved for analysis. The XML document is the test result.

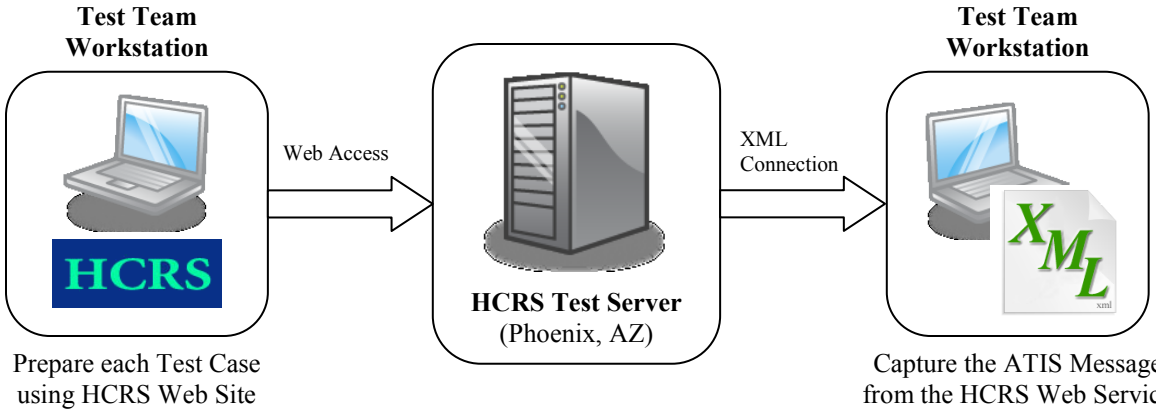

Figure 3.1. Test Configuration

3.9 Test Results

The live monitoring test was conducted over a one week timeframe beginning on June 18, 2007 through June 25, 2007. During this time, the live HCRS web service was polled once every hour, resulting in the capture of a total of 168 ATIS messages. The results of this testing reside in the *Live Monitoring* directory on the companion CD as XML text files and are recorded in the *tdLiveData* table in the test results database.

The controlled testing was carried out on June 20, 2007. All the test cases described in Appendix E were executed and in all cases, the test case passed, resulting in the capture of a total of 111 ATIS messages. The results of this testing reside in the *Test Cases* directory on the companion CD as XML text files and are recorded in the *tdTestData* table in the test results database.

Prior to analyzing the test results, the raw test data was processed to create a table listing all the unique values of all the unique data elements that appear in the captured XML files. This processing was done for both the monitored and controlled test data and recorded in the *tdLiveElements* and *tdTestElements* tables in the test results database, respectively. Formatting the raw data in this fashion facilitated the data analysis. Table 3.5 shows the number of unique element/value pairs that were identified for both the live and test raw data.

Table 3.5. Number of Unique Element/Value Pairs

	Raw Data Records (XML messages)	Processed Data Records (Unique elements/values)
Live Data	168	7,455
Test Data	111	1,103

3.10 Data Analysis

The analysis of the resulting captured ATIS messages includes evaluating the message for properly formed XML message and determining the completeness and correctness of each message against the schemas for the ATIS, LRMS, and ITIS standards, respectively. The content of each data element was also examined and compared to any ranges, usage, limits, or restrictions defined by the appropriate standard. Variations were noted.

The ITIS phrases were evaluated for their appropriate use with respect to event-type categories as well as their use in the event descriptions, cause, and advice. The use of any locally-developed ITIS codes and the intermixing of ITIS phrases with free text fields was also evaluated to determine if any such phrase remains useful and meaningful if the additional free text information is removed, thus promoting interoperation. The correctness of the grammar, capitalization, white space, punctuation, etc. was also be evaluated.

Table 3.6 provides a high-level breakdown of a typical sample ATIS message XML produced by the HCRS system and includes any noteworthy annotations about each XML segment.

Table 3.6. Sample ATIS Message XML Produced by HCRS

XML Sample	Annotation
<atisMessage> <informationResponse> <messageHeader> <responseGroups> <responseGroup> <events> <event> </events> </responseGroup> <responseGroup> <links> <link> </links> </responseGroup> </responseGroups> </informationResponse> </atisMessage>	The <atisMessage> tag is the root tag of the XML message, which contains the <informationResponse> tag. The <informationResponse> tag contains the <messageHeader> tag and one or two <responseGroup> tags. The first <responseGroup> contains the HCRS events while the optional second group contains the link restrictions. If there are no HCRS events, the first group will be empty. If none of the events have restrictions, the second group will not be included.
<event> <head> <location locationID="freeway"> <locationName> <pointLocation> <linkLocation> <geographicCoordinate> <linearReference> </location> <typeEvent> <severity> <description> <startTime> <repeatTimes> <clearTime> </event>	Each <event> tag contains header and location information and the event descriptions including the type and severity of the event and its duration. Either the <pointLocation> tag or the <linkLocation> will be included in the location reference information, but not both. When an event is continuous, only the <startTime> and <endTime> tags are included. For recurring events, the <repeatTimes> tag is also present.
<link> <head> <location locationID="freeway"> <locationName> <pointLocation> <linkLocation> <geographicCoordinate> <linearReference> </location> <restrictionHeight> <restrictionLength> <restrictionWeight> <restrictionWidth> </link>	Each <link> tag contains header and location information and the restriction that applies to the link. Either the <pointLocation> tag or the <linkLocation> will be included in the location reference information, but not both. Only the restriction tags that apply to the link will be included.

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4.0 Observations and Findings

This section presents the general test findings derived and determined from examination, interpretation, and analysis of all test data and information. It is organized into general findings that relate to the standards as whole and specific findings that relate to a specific section or paragraph of the noted standard.

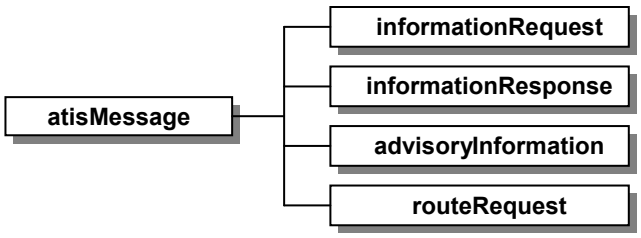
4.1 General Findings

Item	4.1.1
Document	J2354 (ATIS), Rev. Feb 2004
Page	General
Paragraph	General
Title	User Needs and Functional Requirements not Defined
Comment	Discussion: The ATIS standard does not define the operational user needs and functional requirements that it is intended to satisfy. Without defined user needs, it cannot be easily determined if the ATIS standard is a suitable solution for any given purpose. Furthermore, since the message schemas are organized by message groups rather than user needs, there is no reliable means to determine which messages should be implemented to fulfill a given purpose. This promotes interoperability problems caused by different interpretations of message usage. While it is inferred that a systems engineering approach was indeed used to establish the message and features embodied in the standard, it is not apparent. Recommendations: The standard should be, if not already, subjected to a systems engineering process for developing a set of operational user needs and their associated functional requirements should be developed and added to the ATIS standard and mapped to the existing message schemas.

Item	4.1.2
Document	J2354 (ATIS), Rev. Feb 2004
Page	General
Paragraph	General
Title	Standard Dialogs and Protocols not Defined
Comment	Discussion: The ATIS standard does not define any standard dialogs or protocols to be used in the exchanged of messages. Interoperability cannot be achieved using only a set of standard message schemas with no standard data exchange mechanism. To overcome this issue, the developer created a custom web service to exchange the ATIS messages, which precludes interoperability with any system not specifically, designed to use the custom solution. Recommendations: To achieve interoperability, a set of standard dialogs and communication protocols should be developed and added to the ATIS standard.

Item	4.1.3
Document	J2354 (ATIS), Rev. Feb 2004; J2266 (LRMS), Rev. Oct 2004
Page	General
Paragraph	General
Title	Stronger Configuration Control of the Standards Needed
Comment	Discussion: As documented in Table 3.2, the implemented schema used by the HCRS system does not correspond to a released version of the standards. The use of non-released versions of the standard message schemas complicates the development, evaluation and acceptance of the ITS standards and can preclude interoperability between deployed systems. Recommendations: Stronger configuration control should be enforced on the ITS standards to ensure that incremental updates are not used for the development of deployed systems and that the standard document itself is consistent with the electronic support files, which in this case, consist of an XML schema.

Item	4.1.4
Document	J2354 (ATIS), Rev. Feb 2004
Page	General
Paragraph	General
Title	Severity Levels
Comment	Discussion: The developer felt that the TMDD `[Severity]` enumeration used by the `[EventInformation]` data frame was ineffective in the context of highway condition events. All incidents have a severity level, therefore the value of *None* was not applicable and highway condition events would never be considered natural disasters. Therefore, the vendor translates the severity values to their own enumeration of *Low*, *Medium*, and *High*. Recommendation: If possible, it would be ideal to modify the severity enumeration in the TMDD standard to include other values that would make it more versatile for use in other standards. Alternatively, a severity data element could be added to the ATIS standard that would better meet its needs.

Item	4.1.5
Document	J2354 (ATIS), Rev. Feb 2004
Page	General
Paragraph	General
Title	Confusing Terminology
Comment	Discussion: The ATIS standard's terminology describing Messages and Data Frames is confusing. There is no clear definition as to why one data sequence is referred to as a message, while another is referred to as a frame. The standard defines these terms as follows: **Data Frame:** Any construct (including DEs) used to represent the contents of a Data Dictionary…They don't represent the contents of a data dictionary directly, they organize them within a framework where useful systems can be constructed… they present the contents of a Data Dictionary in a useful way. **Message:** A grouping of data elements and message attributes used to convey information… a message is a prescribed set of instances of elements, in a defined order, with some elements optional in transmission. These definitions lack a clear, unambiguous distribution between these two concepts. The confusion created here is only deepened by the object definitions themselves that seem to use these terms inconsistently. For example, the figure below is the object diagram for the *atisMessage* sequence. It would seem intuitive that the four components would be data frames that contribute their respective structures of the overall hierarchy of the top-level ATIS message. However, in the standard, all of these components are identified as being messages thus creating ambiguity as to the nature of their intended use. Furthermore, the data frame concept is noticeably absent in the Directory, Mayday, Parking, and Settings message groups where all the data objects are identified as being messages.  Recommendations: The different terms imply to a reader that there is indeed a difference that should be accounted for in design and usage. This terminology should be applied consistently where a message refers to an object that can serve as a top-level structure while a data frame refers to all other objects.

<table>
<tr><td>Item</td><td>4.1.6</td></tr>
<tr><td>Document</td><td>J2354 (ATIS), Rev. Feb 2004</td></tr>
<tr><td>Page</td><td>General</td></tr>
<tr><td>Paragraph</td><td>General</td></tr>
<tr><td>Title</td><td>Severity Levels</td></tr>
<tr><td>Comment</td><td>Discussion: A needed existed to extend the local data structure to provide data elements for Convoy and HAZMAT information, as was required by their consumer (Meridian), within the <code>[LinkTrafficInformation]</code> data frame as shown in the table below. The table shows excerpts from two ATIS data frames. Although most of the restriction types listed in the <code>[VehicleRestrictions]</code> frames is duplicated in the link information, the last few were not, driving the need for the extended data elements.

<table>
<tr><th>LinkTrafficInformation</th><th>VehicleRestrictions</th></tr>
<tr><td>{…
restrictionAxleCount
restrictionAxleWeight
restrictionClass
restrictionHeight
restrictionLength
restrictionWeight
restrictionWidth
…
local:hasHAZMAT
local:convoy
…}</td><td>{…
axleCount
axleWeight
vehicleWeight
vehicleHeight
vehicleLength
vehicleWidth
vehicleClass
hasHAZMAT
hasWaste
convoy
slowVehicle
…}</td></tr>
</table>

Recommendations: The [LinkTrafficInformation] data frame should be modified to include all of the vehicle restriction types. This could be done by either adding data elements for the remaining restrictions types, or by replacing all of the data elements with an instance of the [VehicleRestrictions] data frame.</td></tr>
</table>

Item	4.1.7
Document	J2354 (ATIS), Rev. Feb 2004
Page	General
Paragraph	General
Title	Severity Levels
Comment	Discussion: The vendor stated that the ITIS phrases were more detailed than the descriptions of the legacy system that HCRS replaced and were considered suitable for the system needs. A total of 91 individual ITIS phrases are implemented as listed in Appendix C. Though the ITIS phrase lists were adequately effective, some free text descriptions were required to complete event descriptions. The use of free text fields is permitted by the ITIS standard and is expected to typically be limited to unusual nouns or unique explanatory phrases. The standard also recommends phrase sets, which use free-text fields that remain useful if the additional free text information is removed. An examination of the test results revealed numerous event descriptions that were not considered neither unique nor unusual but still had to rely heavily on free text fields. The event descriptions listed in following table is a representative sample of this reliance on free text fields derived from the test case results. The free text portion of each description is represented in bold.

Test Case	Event Description Phrase List
TC-004	**normal seasonal driving conditions**
TC-023	ice **covered**
TC-048	**roadway** reduced to one lane
TC-051	**shoulder** blocked
TC-052	**three lane** closed
TC-053	**turning lane** blocked
TC-054	**two lane** closed
TC-060	closed **to** through traffic
TC-061	**off – ramp** blocked
TC-075	**utility work** on **shoulder. caution**
TC-095	**cattle drive. caution**

Recommendations: It is felt that the text fields used by these event descriptions are common terms and should be available as standard ITIS phrases. The following table provides a suggested mapping of these phrases to the phrase groups defined in the ITIS standard.

(Continued)

Group	Code (High Octet)	Text
Roadwork	04	utility work
Obstructions	05	cattle drive
Delays, Status, and Cancellations	06	sporadic delays
Pavement Conditions	23	ice-covered normal seasonal driving conditions
Instructions	28	caution
Qualifiers	30	off to one two three contact
Lane / Roadway Description	32	roadway lane shoulder turning lane ramp

Item	4.1.8
Document	J2354 (ATIS), Rev. Feb 2004
Page	General
Paragraph	General
Title	Date/Time should use Industry Standard Format
Comment	Discussion: The industry is trending toward a combined date/time field expressed by the World Wide Web Consortium (W3C) rather than the ATIS `[DateTimePair]` data frame. The W3C date and time format leverages the International Standard Organization (ISO) 8601 standard for the representation of dates. It defines six levels of granularity in the date and time and provides for two methods of handling time zone offsets. This comment was received from numerous independent sources; each stating a level of frustration with the need to translate the ATIS date/time field to the standard W3C format used by the rest of their systems. This indicates that the date/time data frame of the standard, though adequate, is a less than effective solution. Recommendations: The ATIS data frames and elements associated with the date and time information should be replaced with object structures that conform to the formats specified by the W3C standard.

Item	4.1.9
Document	J2354 (ATIS), Rev. Feb 2004
Page	General
Paragraph	General
Title	Jurisdictional, Ownership and Road Number Information

Comment	Discussion: In the deployment, jurisdictional and highway number information associated with the location of events has been combined into a text string. To be useful to the consumer, this information must then be parsed back out of the text, which creates an uncomfortable level of uncertainty about the quality of the data. It would be more effective if this information was encoded as separate data elements.
	
	For example, from the standpoint of location reference, events are usually described either as point locations or as links that are bounded by endpoints that ultimately reference a cross-street and offset distance as shown in the following XML excerpt.
	
	`<location>`
	`  <pointLocation>`
	`  <crossStreetsPoint>`
	`  <onStreetInfo><name>Interstate 70</name></onStreetInfo>`
	`  <atStreetInfo><name>Elm Street</name></atStreetInfo>`
	`  <offset><miDec>1.0</miDec></offset>`
	`  <direction>east</direction>`
	`  </crossStreetsPoint>`
	`  </pointLocation>`
	`</location >`
	
	The street information is provided by the LRMS `[StreetInfo]` data frame, which specifies either a street name or index. This approach works well when the street has a name or index but is less effective when the street is referred to by its jurisdictional label and highway number. In such cases, the discrete elements must be combined into a single text string and encoded into the `[Name]` element, as is the case in the above example.
	
	Recommendation: Adding a third choice to the LRMS `[StreetInfo]` data frame that provides a data sequence comprised of jurisdictional, ownership, and road number information would be more effective and satisfy this need.

Item	4.1.10
Document	J2354 (ATIS), Rev. Feb 2004
Page	General
Paragraph	General
Title	Mayday and Reduced Bandwidth Messages
Comment	Discussion: The ATIS standard includes message groups that were originally developed as the SAE J2313 standard for land vehicle mayday reporting and the SAE J2540 standard for coding of messages and phrase lists for communications with limited bandwidth, which are now merged into this standard. In the case of the Mayday messages, the ASN.1 notation for the message definitions from the original standard is duplicated in the ATIS standard. However the discussion portions and concept of operations for these messages are retained in the original standard. This is confusing since it seems that the standard is only half-merged. Also, the duplication of the ASN.1 notation means that the data structures for the messages are defined in two documents, creating an opportunity for discrepancies to occur, which can lead to ambiguity as to what the proper structure should be. In the case of the Reduced Bandwidth messages, an ATIS message group (A7) has been defined but no portion of the SAE J2540 standard has actually been merged with the ATIS standard. The standard states that this is due to the messages using a form of in-line bit level encoding, which does not lend itself to being easily described in ASN.1 formats. This is confusing since it seems to imply that on one hand, these standards are merged while on the other hand, they are not. Recommendations: If the intent is to merge the SAE J2313 standard with the ATIS standard, then it should be merged completely and the original standard should be deprecated, otherwise they should be left as separate standards. If merging the SAE J2540 standard is not practical due to limitations of the ASN.1, then these too should be left as separate standards.

Item	4.1.11
Document	J2354 (ATIS), Rev. Feb 2004
Page	General
Paragraph	General
Title	Typographical Issues and Edits
Comment	In the course of analyzing the standards, a number of minor editing inconsistencies and errors were found. These items are listed below. ATIS Standard 1. Paragraph 6.13. The paragraph title is misspelled as DE_DatabaseNumber. This misspelling also appears in other parts of the document. 2. Paragraph 6.94. The paragraph title DE_On-Expire does not match the object name, as is the norm for the other paragraphs. The title should be DE_ExpireAction. 3. Paragraph 4.10. InformationResponse is misspelled in two places in Table 4. 4. Paragraph 6.90. The paragraph title DE_MiddleName is mistyped. ITIS Standard 1. Paragraph 5.4. The data element for the State FIPS code is misspelled. 2. Paragraph 5.13. The paragraph title GeographicCoordinate does not match the object name, as is the norm for the other paragraphs. The title should be GeoCoord. 3. Paragraph 6.29. The paragraph title LRPositiveOffsetDirection does not match the data element name, as is the norm for the other paragraphs. It should be LRPosOffsetDir. 4. Paragraph 6.30. The paragraph title LROffsetReference does not match the data element name, as is the norm for the other paragraphs. It should be LROffsetRef. 5. Paragraph 6.31. The paragraph title LRReferenceMethod does not match the data element name, as is the norm for the other paragraphs. It should be LRMethod.

4.2 Specific Findings

Item	4.2.1
Document	J2354 (ATIS), Rev. Feb 2004
Page	87
Paragraph	5.21
Comment	This data sequence contains an optional data member whose name is misspelled as `[coinfirm]`. It should be spelled `[confirm]`.

Item	4.2.2
Document	J2354 (ATIS), Rev. Feb 2004
Page	101
Paragraph	5.55
Comment	This data sequence contains an optional data member whose name is misspelled as `[prine-status]`. It should be spelled `[prime-status]`.

Item	4.2.3
Document	J2354 (ATIS), Rev. Feb 2004
Page	106
Paragraph	5.6 3
Comment	This data frame is only referenced by the `[StopPoint]` data sequence, which has been deprecated. This data frame should also be deprecated along with the following external data elements: • PI-Amenity-Type (paragraph 7.104) • PI-AmenityID (paragraph 7.105) • PI-AmenityName (paragraph 7.106) • PI-AmenityStatus (paragraph 7.107)

Item	4.2.4
Document	J2354 (ATIS), Rev. Feb 2004
Page	129
Paragraph	5.95
Comment	This data frame is only referenced by another data frame `[TransitRouteLegInformation]` which has been deprecated. This data frame should also be deprecated along with the following external data elements: • PI-NextArrivalCountdown (paragraph 7.109)

Item	4.2.5
Document	J2354 (ATIS), Rev. Feb 2004
Page	133
Paragraph	5.102
Comment	This data frame is only referenced by the data frame `[PreferenceExpression]` which has been deprecated. This data frame should also be deprecated along with the following data elements: • Setting-PreferenceSubType (paragraph 6.109) • Setting-PreferenceType (paragraph 6.110)

Item	4.2.6
Document	J2354 (ATIS), Rev. Feb 2004
Page	228
Paragraph	6.137
Comment	The `[Link-speed]` data element is defined in this paragraph as an enumeration representing a range of speeds. However `[Link-speed]` is also defined in paragraph 7.88 as an external data element taken from the TMDD standard and is an integer ranging from 0 to 255. The `[LinkTrafficInformation]` data frame uses the external TMDD version of this data element; therefore this paragraph should be deprecated.

Item	4.2.7
Document	J2354 (ATIS), Rev. Feb 2004
Page	137
Paragraph	6.3
Comment	The ASN.1 notation defines the day of the week code as a bit string where each bit represents a day of the week with the eighth bit used to denote holidays, however the XML notation defines a different set of enumeration values as shown in the following table. The enumerated values of the XML notation should be changed to match those of the ASN.1 notation.

ASN1. Notation		XML Notation	
holiday	-- 10000000 B (128)	holiday	(0)
sunday	-- 01000000 B (64)	sunday	(1)
monday	-- 00100000 B (32)	monday	(2)
tuesday	-- 00010000 B (16)	tuesday	(3)
wednesday	-- 00001000 B (8)	wednesday	(4)
thursday	-- 00000100 B (4)	thursday	(5)
friday	-- 00000010 B (2)	friday	(6)
saturday	-- 00000001 B (1)	saturday	(7)

Item	4.2.8
Document	J2354 (ATIS), Rev. Feb 2004
Page	85
Paragraph	5.19
Comment	This data frame contains an `[address]` data element defined as an `[LRMS.AddressPointProfile]` data type, however in the LRMS standard, this data type is named `[AddressPoint]` instead.

Item	4.2.9
Document	J2354 (ATIS), Rev. Feb 2004
Page	General
Paragraph	General
Comment	There are numerous data elements defined in the standard that are either not referenced or are only referenced by data frames that have been deprecated. These data elements should be depreciated also: Paragraph 6.41. BasicTypes Paragraph 6.49. LotInformationType Paragraph 6.79. Message-word-cnt Paragraph 6.81. Sender-features Paragraph 6.82. Sender-status Paragraph 6.84. Sequence-number Paragraph 6.166. Trigger-Event Paragraph 6.167. RequestErrorType Paragraph 6.170. Vehicle-Identity

Item	4.2.10
Document	J2354 (ATIS), Rev. Feb 2004
Page	219
Paragraph	6.113
Comment	This data element is not referenced by any ATIS data frames or messages. Rather, it is only referenced by an external data frame from the IEEE 1512 Incident Management (IM) standard. As such, it would be more reasonable for this data element to be placed in the IM standard instead of the ATIS standard.

Item	4.2.11
Document	J2266 (LRMS), Rev. Oct 2004
Page	16
Paragraph	5.4
Comment	This data sequence contains a data member for the entity Federal Information Processing Standards (FIPS) code whose name is misspelled as `[entityIPS]`. Rather, it should be spelled `[entityFIPS]`.

Item	4.2.12
Document	J2266 (LRMS), Rev. Oct 2004
Page	31
Paragraph	5.18
Comment	The ASN.1 notation wraps the grid data members in a CHOICE block; however this syntax is missing from the XML notation.

Item	4.2.13
Document	J2266 (LRMS), Rev. Oct 2004
Page	18
Paragraph	5.6
Comment	The data type for the roads data element in the ASN.1 notation is misspelled as `[StreeetInfo]`. Rather, it should be `[StreetInfo]`.

Item	4.2.14
Document	J2266 (LRMS), Rev. Oct 2004
Page	49
Paragraph	5.36
Comment	In the XML notation, the `locationID` data member is defined to have a data type of `[IdType]` which does not match the ASN.1 notation. Rather, it should have the `[String-index64]` data type instead.

Item	4.2.15
Document	J2266 (LRMS), Rev. Oct 2004
Page	38
Paragraph	5.26

Comment	The ASN.1 notation for the IDType data frame is missing the name of the data frame. It should appear as:
	`IDType ::=SEQUENCE {`
	`intOrAlpha CHOICE {`
	`id Int-index32,`
	`idAlpha String-index64},`
	`databaseID String-index64`
	`}`

5.0 Conclusion

As stated in the Section 3.0 of this final report, the overall goal of the ITS Standards Testing Program is to assess and evaluate the suitability, effectiveness and contribution to interoperability and interchangeability of standards. The measure of these three key elements is essential in understanding whether or not a particular standard is ready for field use. The conclusion is therefore stated in terms of these measures.

5.1 Suitability

The ATIS standard does not define the operational user needs that it is intended to satisfy. As such, the suitability of the standard to meet the agency operational needs cannot be evaluated directly, but only inferred from an analysis of the suitability of the message schema. Overall, the deployed ATIS, LRMS and ITIS schemas were found to be suitable for the exchange of center-to-center communications with the exception of a few minor extensions to the ATIS schema, as discussed in the detailed findings in this report. A more complete evaluation of the suitability of the ATIS standard requires a complete set of operational user needs and functional requirements to be defined.

5.2 Effectiveness

With the exception of few minor items, discussed in brief below and in detail in the main body of this report, the overall message schema used to embody the standard's content was found to be effective and consistent with accepted industry best practices. A need to coerce some information to encode it into the data frames and elements provided by the schemas was identified and is discussed in the detailed findings in this report. In particular, the translation between the ATIS data/time data frame to the more common W3C standard format was seen as an unnecessary nuisance and frustration to developers.

5.3 Interoperability and Interchangeability

The ATIS standard does not provide adequate structures to achieve interoperability. Though the standard provides message schema structures, it lacks definitions for standard dialogs and communication protocols that are required to realize interoperability. As such, the dimension of interoperability cannot be evaluated for the standards used in this deployment. The NDOR deployment has overcome this shortcoming by implementing a customized web service design to exchange the ATIS messages. This technique, though effective, and sufficient to meet the needs of NDOR and the consumers of the information provided by them, precludes interoperability with other systems based on the merit of the ATIS standard alone.

5.4 Other Key Observations

Configuration control used in the standards development process needs to be more stringent to prevent deployments from being developed using incremental versions of the standards. The use of these non-released versions complicates the development, evaluation and acceptance of the ITS standards.

Appendix A

ATIS Coverage and Implementation

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Appendix A: ATIS Coverage and Implementation

ATIS Message Groups

The following table identifies the ATIS message groups defined by the standard and identifies which message groups are implemented by HCRS. The messages are organized into seven major messages groups designated A1-A7.

ATIS Message Group	Group Designator	Implemented by HCRS
Traveler Information	A1	Yes
Trip Guidance	A2	No
Directory Services	A3	No
Parking	A4	No
Settings	A5	No
Mayday	A6	No
Reduced Bandwidth	A7	No

ATIS Messages

The following table identifies the ATIS messages defined by the standard, cross references each of them to the ATIS message group to which they belong, and identifies which messages are implemented by HCRS.

ATIS Message	Message Group							Implemented by HCRS
	A1	A2	A3	A4	A5	A6	A7	
ATISMessage	●							Yes
Ack-Msg						●		No
Acknowledge-Data						●		No
AdvisoryInformation	●							No
Cargo-Info						●		No
Current-Position						●		No
Data-msg						●		No
DirectoryAdvancedRequest			●					No
DirectoryAppointmentReply			●					No
DirectoryAppointmentRequest			●					No
DirectoryDetailReply			●					No
DirectoryDetailRequest			●					No
DirectoryExtendedInformationEntry			●					No
DirectoryExtendedInformationReply			●					No
DirectoryExtendedInformationRequest			●					No
DirectoryExtendedRequest			●					No
DirectoryInformation			●					No

ATIS Message	Message Group							Implemented by HCRS
	A1	A2	A3	A4	A5	A6	A7	
DirectoryNameRequest			●					No
DirectoryRequest			●					No
InformationRequest	●							No
InformationResponse	●							Yes
Init-Msg						●		No
Last-DSRC						●		No
Message-Set-List						●		No
Occupant-Info						●		No
Occupant-SRS						●		No
ParkingSpaceReply				●				No
ParkingSpaceRequest				●				No
Position-History						●		No
Position-LRMS						●		No
Position-Text						●		No
Prior-Position						●		No
Proprietary-Info						●		No
Req-Msg						●		No
Request-Data						●		No
RouteRequest	●							No
Start-Position						●		No
Text-Info						●		No
TravelerBroadcastWrapper	(Unused)							No
TravelerDeviceSetting	●		●		●			No
TravelerSettingsReply					●			No
TravelerSettingsRequest					●			No
Vehicle-Details						●		No
Vehicle-Info						●		No
Vehicle-Security						●		No
Vehicle-Sensors						●		No
Vehicle-SRS						●		No

ATIS Data Frames

The following table identifies the ATIS data frames defined by the standard, cross references each of them to the ATIS message group to which they belong, and identifies which data frames are implemented by HCRS.

ATIS Data Frames	Message Group							Implemented by HCRS
	A1	A2	A3	A4	A5	A6	A7	
AirlineTravelInformation	●							No
Amenity	(Unused)							No
ComplexTime	●							Yes
ContactInformation	●		●		●			No
ContactSetting	●		●		●			Yes
Database	●							No
DatabaseIdentity	●							No
DateTimePair	●	●	●	●				Yes
DirectoryCoreRequest			●					No
DirectoryEntry			●					No
DirectoryKeywordPair			●					No
DirectoryTypePair			●					No
EventInformation	●							Yes
Head	●	●	●					Yes
Identifier	●	●	●					No
IdentityOrLocation	●							No
IncidentInformation	●							No
InformationRequestType	●							No
Inline-model-Expanded							●	No
Itinerary	●	●	●					No
Leg	●							No
LinkTrafficInformation	●							Yes
LotInformation	●							No
ManeuverInstruction	●							No
MessageHeader	●		●	●	●			Yes
ParkingInstructions	●							No
ParkingLotInformation	●							No
ParkingRequestDetails	●							No
ParkingSpaceTypes	●							No
PhoneInformation	●		●					No
Point	●	●	●					No
PriceSchedule	●							No
PriceScheduleEntry	●							No
RequestStatus	●							No
ResponseGroup	●							Yes
Route	●	●	●					No
RouteOrLocation	●		●					No
RouteStatus	●							No
SearchRadius			●					No
ServerStatus	●							No
SettingEntries					●			No

ATIS Data Frames	Message Group							Implemented by HCRS
	A1	A2	A3	A4	A5	A6	A7	
StatusBlock	●							No
SubscribeForm	●							No
Tail	●		●					No
TheModelExpanded							●	No
TimePair	●		●					Yes
TimePriceInterval	●							No
TimeSchedule	(Unused)							No
TransitInstructions	●							No
TravelTimes	●							No
TripConstraints	●							No
TripPreferences	●							No
TypePreferencePair	(Unused)							No
VehicleRestrictions	●			●				No
VehiclesInvolved	●							No
WeatherInformation	●							No
Weather-SkyConditions	●							No
WideAreaTravelInformation	(Unused)							No

ATIS Data Elements

The following table identifies the ATIS data elements defined by the standard, cross references each of them to the ATIS message group to which they belong, and identifies which data elements are implemented by HCRS.

ATIS Data Elements	Message Group							Implemented by HCRS
	A1	A2	A3	A4	A5	A6	A7	
ADA-Access	●		●					No
Ack						●		No
AirportCode	●							No
Amp							●	No
Appointment-Confirmation			●					No
BasicTypes	(Unused)							No
Beacon-id						●		No
Bit-Count							●	No
Broadcast-Wrapper	(Unused)							No
Byte-X							●	No
CapabilityCode			●					No
CharSet	●	●	●					No
CompassDirection	●							No
ConfirmationNumber			●					No

ATIS Data Elements	Message Group							Implemented by HCRS
	A1	A2	A3	A4	A5	A6	A7	
ConstrainByProfile			●					No
Cost	●	●	●					No
Crc							●	No
DatabaseName	●							No
DatabaseNumber	●							No
DatabaseVersion	●							No
Data-cargo						●		No
Data-door-status						●		No
Data-proprietary						●		No
Data-sensor						●		No
Data-text						●		No
Date	●	●	●	●				Yes
Day-of-week	●						●	Yes
Description			●					No
Device-Identity	●		●		●			No
Device-Setting	●		●		●			No
Device-TransferSpeed	●		●		●			No
Direction							●	No
Email	●		●		●			No
Envoke-time							●	No
Error-NotificationCode	●							No
Event-type							●	No
EventTypes	●							No
ExpireAction	●	●	●					No
ExtendedInfo			●					No
ExtendedInfoType			●					No
Extension	●		●					No
Fine-time							●	No
FirstName	●		●		●			No
Flight-GateNumber	●							No
FlightTypes	●							No
Flow							●	No
Frame-CRC						●		No
Frame-word-cnt						●		No
Free-Flow-Rate							●	No
FreeText	●	●	●		●			No
GovernmentSubType			●					No
Grid-status							●	No
Heading						●		No
HonorificName	●		●		●			No
Identity			●					No
Identity-carrier-id						●		No

ATIS Data Elements	Message Group							Implemented by HCRS
	A1	A2	A3	A4	A5	A6	A7	
Identity-DL-number						●		No
Identity-ESN						●		No
Identity-name						●		No
Identity-number						●		No
Identity-plate						●		No
Identity-plate-origin						●		No
Identity-plate-type						●		No
Identity-VIN						●		No
Incident-num							●	No
Index -8							●	No
Index-12							●	No
Index-16							●	No
Inline-model							●	No
InternationalAccessCode	●		●					No
Issuing-Time							●	No
Item-byte-cnt							●	No
Item-cnt							●	No
Keywords			●					No
LastName	●		●		●			Yes
Len-time							●	No
LimitReturns			●					No
LinkAttributes							●	No
Link-speed	●						●	No
Location-alt						●		No
Location-lat						●		No
Location-long						●		No
Location-quality						●		No
Location-tech						●		No
LotInformationType	(Unused)							No
Lot-Name	●							No
ManeuverLocationType	●							No
Mapping-seg							●	No
Message-Bit-List						●		No
Message-Confidence	●	●	●					No
Message-type						●		No
Message-word-cnt	(Unused)							No
MiddleName	●		●		●			No
Mode	●	●	●					No
Model-shape							●	No
MSG-Revision	●		●	●	●			No
Name	●		●					No
Name-field							●	No

ATIS Data Elements	Message Group							Implemented by HCRS
	A1	A2	A3	A4	A5	A6	A7	
NameSuffix	●		●		●			No
Occupancy							●	No
Occupant-sensor-identifier						●		No
OrderEntriesBy			●					No
Overlay							●	No
ParkingSpaceKind	●							No
ParkingTypes	●							No
Percent	●							No
Phone	●		●					No
PhoneRole	●		●					No
PointRole	●	●	●					No
Pollution-AirQualityIndex	●							No
Pollution-HydroCarbon	●							No
Pollution-SmogAlert	●							No
PreferredRoadType	●							No
Price-DayType	●							No
Private							●	No
ReplayVerbosity	●							No
RequestErrorType	(Unused)							No
RestaurantSubType			●					No
Revision							●	No
RoadTypes	●							No
RouteSelection	●							No
RouteTypes	●							No
Scaling							●	No
SearchOperator			●					No
Sender-features	(Unused)							No
Sender-status	(Unused)							No
Sensor-status						●		No
Sequence-number	(Unused)							No
SetAction					●			No
Setting-ExtendedInformation								No
Setting-Identity	●		●		●			No
Setting-PreferenceSubType	(Unused)							No
Setting-PreferenceType	(Unused)							No
SettingType					●			No
ShortDescription			●					No
Side							●	No
SpecialAbilities	●							No
SplitReason	(Unused)							No
Start-time							●	No
SubscribeType	●							No

ATIS Data Elements	Message Group							Implemented by HCRS
	A1	A2	A3	A4	A5	A6	A7	
SubType			●					No
Table	●	●	●					No
Technology							●	No
T-F							●	No
The-Delta							●	No
The-Grid							●	No
The-LL							●	No
The-Model							●	No
The-Point							●	No
The-String							●	No
Time	●	●	●	●				Yes
TimeInterval	●	●	●	●				No
Time-minutes						●		No
TimeOffset	●	●	●	●				Yes
TransitTypes	●							No
Traveler-Identity	●		●	●	●			No
Traveler-Setting	●		●		●			No
Trigger-Event	(Unused)							No
TurnType	●							No
Type			●					No
URL-Link	●	●	●		●			No
Vehicle-Color						●		No
Vehicle-Identity	(Unused)							No
Vehicle-sensor-identifier						●		No
Velocity						●		No
VerticalType	●							No
Way							●	No
WeatherTypes	●							No
Zoom							●	No

Implemented ATIS Messages and Data Frames

The HCRS system implements one ATIS message group using a total of 11 ATIS messages and data frames. The following tables list the ATIS messages and data frames that are implemented by the HCRS system and identify which members of each sequence that are required and implemented.

ATISMessage

Member Name	Required	Implemented
informationRequest	No	No
informationResponse	No	Yes
advisoryInformation	No	No
routeRequest	No	No

InformationResponse

Member Name	Required	Implemented
messageHeader	Yes	Yes
responseGroups	No	Yes
statusBlocks	No	No

ComplexTime

Member Name	Required	Implemented
start	No	No
end	No	No
weekly	No	Yes
day	Yes	Yes
times	Yes	Yes
occurrences	No	Yes
date	Yes	Yes
times	No	Yes
furtherData	No	No

ContactSetting

Member Name	Required	Implemented
agencyIdentifier	No	Yes
agencyLocation	No	No
agencyName	No	No
userIdentity	No	No
userSetting	No	No
deviceIdentity	No	No
person	Yes	Yes
honorific	No	No
firstName	No	No
middleName	No	No
lastName	No	Yes
nameSuffix	No	No
contacts	No	No
address	No	No
devices	No	No
tail	No	No

DateTimePair

Member Name	Required	Implemented
date	Yes	Yes
time	Yes	Yes
offset	No	Yes

EventInformation

Member Name	Required	Implemented
head	No	Yes
location	Yes	Yes
isForecast	No	No
coverageTime	No	No
forecastExpires	No	No
typeEvent	Yes	Yes
severity	No	Yes
status	No	No
cause	No	No
description	No	Yes
advice	No	Yes
affectedLanes	No	No
vehiclesInvolvedCount	No	No
types	No	No
injuries	No	No
startTime	No	Yes
clearTime	No	Yes
repeatTimes	No	Yes
furtherData	No	No
tail	No	No
localEventInformation	No	No

Head

Member Name	Required	Implemented
id	No	Yes
references	No	Yes
pedigree	No	No
language	No	No
charSet	No	No
table	No	No
issuingAgency	No	Yes
updateTime	No	Yes
expiryTime	No	No
onExpiry	No	No
confidence	No	No
urgency	No	No

LinkTrafficInformation

Member Name	Required	Implemented
head	No	No
location	Yes	Yes
isForecast	No	No
coverageTime	No	No
forecastExpires	No	No
affectedLanes	No	No
capacity	No	No
delay	No	No
density	No	No
lanesMinimumNumber	No	No
lanesNumberOpen	No	No
length	No	No
levelofService	No	No
medianType	No	No
name	No	No
occupancy	No	No
pavementType	No	No
restrictionAxleCount	No	No
restrictionAxleWeight	No	No
restrictionClass	No	No
restrictionHeight	No	Yes
restrictionLength	No	Yes
restrictionWeight	No	Yes
restrictionWidth	No	Yes
roadNumber	No	No
shoulderWidthLeft	No	No
shoulderWidthRight	No	No
speed	No	No
speedLimit	No	No
status	No	No
surfaceConditions	No	No
travelTime	No	No
truckSpeedLimit	No	No
nodeDelay	No	No
nodeLinksNum	No	No
nodeName	No	No
nodeStatus	No	No
owner	No	No
jurisdiction	No	No
tmddOther	No	No
furtherData	No	No
tail	No	No
localLinkTrafficInformation	No	Yes

MessageHeader

Member Name	Required	Implemented
sender	Yes	Yes
messageID	Yes	Yes
responseTo	No	No
timeStamp	Yes	Yes
revision	No	No

ResponseGroup

Member Name	Required	Implemented
head	No	No
coverageArea	No	No
weatherReports	No	No
links	No	Yes
incidents	No	No
events	No	Yes
flights	No	No
routes	No	No
itineraries	No	No
detours	No	No
detourItineraries	No	No
parkingLots	No	No
furtherData	No	No
tail	No	No
localResponseGroup	No	No

TimePair

Member Name	Required	Implemented
date	No	No
start	Yes	Yes
end	Yes	Yes

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Appendix B

LRMS Coverage and Implementation

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Appendix B: LRMS Coverage and Implementation

LRMS Location Referencing Methods

The LRMS standard defines 17 methods of location referencing designated as A1-A17. The following table identifies the location referencing methods defined by the LRMS standard and identifies which methods are implemented by HCRS.

Reference Designator	Location Referencing Method	Implemented by HCRS
A1	Point Location	Yes
A2	Link Location	Yes
A3	Area Location	No
A4	Chain	No
A5	Transition	No
A6	Group Location	No
A7	Route Location	No
A8	Geometry	No
A9	Geographic Coordinate	Yes
A10	Grid	No
A11	Linear Reference	Yes
A12	Cross Streets	No
A13	Address	No
A14	Pre-Coded	No
A15	Node Attribute	No
A16	Spatial Object	No
A17	Public Grid	No

LRMS Data Frames

The following table identifies the LRMS data frames defined by the standard and cross references each of them to referencing method(s) to which they belong, and identifies which data frames are implemented by HCRS.

LRMS Data Frame	Location Referencing Method																	Implemented by HCRS
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	
Address						●							●					No
AddressLink		●				●	●						●			●		No
AddressPoint	●	●	●			●	●	●	●		●		●			●		No
AdminAreaGroup	●	●				●	●	●	●		●		●			●		No
Angle	●	●	●			●		●	●		●					●		No
AreaLocation			●			●	●									●		No
Attributes						●										●		No
Chain				●		●		●								●		No
CrossStreets						●						●						No
CrossStreetsLink		●				●	●					●				●		Yes
CrossStreetsPoint	●	●	●			●	●	●	●		●	●				●		Yes
Distance	●	●	●	●	●	●	●	●	●		●	●	●		●	●	●	Yes
GeoCoord						●			●									Yes
GeoLocation	●	●	●	●		●	●	●	●		●	●			●	●		Yes
GeoLocationDelta						●			●									No
GeoLocationLink		●				●	●	●	●							●		No
Geometry						●		●										No
Grid						●				●								No
GridArray						●				●								No
GridInfo						●				●								No
GridPoint	●	●	●			●	●	●	●	●	●					●		No
GridPointPair		●				●	●			●						●		No
GridPointSequence						●				●								No
GroupLocation						●												No
Height	●	●	●	●		●	●	●	●		●	●	●		●	●	●	No
IdType	●	●	●	●	●	●	●	●	●		●	●	●		●	●	●	Yes
LinearReference	●	●	●			●	●	●	●		●					●		Yes
LinkGeneral		●				●	●									●		Yes
LinkLocation		●				●	●									●		Yes
LocationReference	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	Yes
NodeAttribute				●		●		●							●	●		No
PointLocation	●	●	●			●	●	●	●		●					●		Yes
PointOffset	●	●	●			●	●	●	●		●					●		No
PolarCoordinates	●	●	●			●	●	●	●		●					●		No
Polygon			●			●		●								●		No
PreCoded		●	●			●	●							●		●		No
PublicGrid	●	●	●			●	●	●	●		●					●	●	No
PublicGridLocalReference	●	●	●			●	●	●	●		●					●	●	No
PublicGridStatePlane	●	●	●			●	●	●	●		●					●	●	No
PublicGridUSNG	●	●	●			●	●	●	●		●					●	●	No
RouteLocation						●	●									●		No

LRMS Data Frame	Location Referencing Method																	Implemented by HCRS
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	
SpatialObject						●										●		No
StreetInfo	●	●	●	●		●	●	●	●		●	●	●		●	●		Yes
Transition					●	●		●								●		No

LRMS Data Elements

The following table identifies the LRMS data elements defined by the standard and cross references each of them to referencing method(s) to which they belong, and identifies which data elements are implemented by HCRS.

LRMS Data Element	Location Referencing Method																	Implemented by HCRS
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	
AlertCountryCode		●	●			●	●							●		●		No
CountryCode	●	●	●			●	●	●	●		●	●	●	●		●		No
Direction	●	●	●			●	●	●	●		●	●	●			●		Yes
GridAltitude						●				●								No
GridAltitudeDelta		●				●	●			●						●		No
GridLatitude						●				●								No
GridLatLonPointDelta						●				●								No
GridLongitude						●				●								No
GridPointAltitudeDelta	●	●	●			●	●	●	●	●	●					●		No
GridPointCoordinateType	●	●	●			●	●	●	●	●	●					●		No
GridPointLatitude	●	●	●			●	●	●	●	●	●					●		No
GridPointLatLonDelta	●	●	●			●	●	●	●	●	●					●		No
GridPointLongitude	●	●	●			●	●	●	●	●	●					●		No
GridPointOffsetDistance	●	●	●			●	●	●	●	●	●					●		No
GridPointPairCoordinateType		●				●	●			●						●		No
GridZoom						●				●								No
HorizontalDatum	●	●	●	●		●	●	●	●		●	●			●	●	●	Yes
IntersectionType	●	●	●			●	●	●	●		●	●				●		No
Int-index12		●	●			●	●							●		●		No
Int-index16	●	●	●	●		●	●	●	●		●	●	●	●		●	●	No
Int-index32	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	Yes
Int-index8	●	●	●			●	●	●	●	●	●	●	●	●		●		Yes
Int-latitude32	●	●	●	●		●	●	●	●			●			●	●		Yes
Int-loccode16		●	●			●	●							●		●		No
Int-loctable8		●	●			●	●							●		●		No
Int-longitude32	●	●	●	●		●	●	●	●			●			●	●		Yes

LRMS Data Element	Location Referencing Method																	Implemented by HCRS
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	
Latitude	●	●	●	●		●	●	●	●		●	●			●	●		Yes
LinkType		●				●	●									●		No
LocationCode		●	●			●	●							●		●		No
LocationTable		●	●			●	●							●		●		No
Longitude	●	●	●	●		●	●	●	●		●	●			●	●		Yes
LRMethod	●	●	●			●	●	●	●		●					●		No
LROffsetRef	●	●	●			●	●	●	●		●					●		No
LRPosOffsetDir	●	●	●			●	●	●	●		●					●		No
NodeOrigin				●		●		●							●	●		No
NodeValence				●		●		●							●	●		No
NormalizedDistance	●	●	●			●	●	●	●	●	●					●		No
NumericIDXSize12		●	●			●	●							●		●		No
NumericIDXSize16		●	●			●	●							●		●		No
NumericIDXSize32		●	●			●	●							●		●		No
NumericIDXSize8		●	●			●	●							●		●		No
PointType	●	●	●			●	●	●	●		●					●		No
PostalCode	●	●	●			●	●	●	●		●	●	●			●		No
PreCodedIdType		●	●			●	●							●		●		No
PublicGridEasting16	●	●	●			●	●	●	●		●					●	●	No
PublicGridEasting32	●	●	●			●	●	●	●		●					●	●	No
PublicGridEastWestDelta	●	●	●			●	●	●	●		●					●	●	No
PublicGridGridSquare	●	●	●			●	●	●	●		●					●	●	No
PublicGridGridStep	●	●	●			●	●	●	●		●					●	●	No
PublicGridGridZone	●	●	●			●	●	●	●		●					●	●	No
PublicGridNorthing16	●	●	●			●	●	●	●		●					●	●	No
PublicGridNorthing32	●	●	●			●	●	●	●		●					●	●	No
PublicGridNorthSouthDelta	●	●	●			●	●	●	●		●					●	●	No
PublicGridStatePlaneZone	●	●	●			●	●	●	●		●					●	●	No
SequenceNum				●		●		●								●		No
Side	●	●	●			●	●	●	●	●	●	●	●			●		Yes
String-index64	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	Yes
Text-name255	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	Yes
Text-name-presuf4		●	●	●		●	●	●	●		●	●	●		●	●		No
VerticalDatum	●	●	●	●		●	●	●	●		●	●	●		●	●	●	No
VerticalLevel	●	●	●	●		●	●	●	●		●	●	●		●	●	●	No

Implemented LRMS Data Frames

The HCRS system implements 4 of the 17 LRMS location referencing methods using a total of 11 of the LRMS data frames. The following tables list the LRMS data frames that are implemented by the HCRS system and identify which members of each sequence are required and implemented.

CrossStreetsLink

Member Name	Required	Implemented
onStreetInfo	Yes	Yes
fromStreetInfo	Yes	Yes
toStreetInfo	Yes	Yes
startGeoLocation	No	No
endGeoLocation	No	No
startIntersectionType	No	No
endIntersectionType	No	No
offset1	No	Yes
offset2	No	Yes
direction	No	Yes
side	No	No
height	No	No
adminAreas1	No	No
adminAreas2	No	No

CrossStreetsPoint

Member Name	Required	Implemented
onStreetInfo	Yes	Yes
atStreetInfo	Yes	Yes
geoLocation	No	No
intersectionType	No	No
offset	No	Yes
direction	No	Yes
side	No	No
height	No	No
adminAreas	No	No

Distance

Member Name	Required	Implemented
m	No	No
mDec	No	Yes
mm	No	No
mmDec	No	No
dm	No	No
dmDec	No	No
dy	No	No
dyDec	No	No
ft	No	No
ftDec	No	No
in	No	No
inDec	No	No
mi	No	No
miDec	No	Yes
km	No	No
kmDec	No	No
block	No	No
blkDec	No	No

GeoCoord

Member Name	Required	Implemented
locationName	No	No
geoLocationPoint	No	Yes
geoLocationLink	No	No
polarCoordinates	No	No
geoLocationDelta	No	No
locationID	No	No

GeoLocation

Member Name	Required	Implemented
latitude	Yes	Yes
longitude	Yes	Yes
horizontalDatum	No	Yes
height	No	No

IdType

Member Name	Required	Implemented
intOrAlpha	Yes	Yes
id	No	Yes
idAlpha	No	No
databaseID	Yes	Yes

LinearReference

Member Name	Required	Implemented
locationName	No	Yes
linearRefMethod	No	No
transElement	No	Yes
startRefPoint	No	No
endRefPoint	No	No
startDistance	No	Yes
endDistance	No	Yes
startNormDistance	No	No
endNormDistance	No	No
distanceDirection	No	No
lateralOffsetRef	No	No
positiveOffsetDir	No	No
startLateralOffset	No	No
endLateralOffset	No	No
travelDirection	No	No
side	No	Yes
startHeight	No	No
endHeight	No	No
startAdminAreas	No	No
endAdminAreas	No	No
locationID	No	No

LinkGeneral

Member Name	Required	Implemented
startLocation	Yes	Yes
endLocation	Yes	Yes

LinkLocation

Member Name	Required	Implemented
linkName	No	Yes
linkEndpoints	No	Yes
linkId	No	Yes
addressLink	No	No
linearReference	No	Yes
crossStreetsLink	No	Yes
geoLocationLink	No	No
gridLink	No	No
preCodedLink	No	No
adminAreas	No	No
linkType	No	No
locationID	No	No

LocationReference

Member Name	Required	Implemented
locationName	No	Yes
externalID	No	No
pointLocation	No	Yes
linkLocation	No	Yes
areaLocation	No	No
chain	No	No
transition	No	No
groupLocation	No	No
routeLocation	No	No
geometry	No	No
geoCoord	No	Yes
grid	No	No
linearReference	No	Yes
crossStreets	No	No
address	No	No
preCoded	No	No
nodeAttribute	No	No
spatialObject	No	No
publicGrid	No	No
locationID	No	Yes

PointLocation

Member Name	Required	Implemented
pointName	No	Yes
pointNodeId	No	No
pointType	No	No
pointOffset	No	No
polarCoordinates	No	No
linearReference	No	Yes
addressPoint	No	No
crossStreetsPoint	No	Yes
grid	No	No
publicGrid	No	No
geoLocationPoint	No	No
adminArea	No	No
locationID	No	No

StreetInfo

Member Name	Required	Implemented
prefix	No	No
name	Yes	Yes
suffix	No	No
streetIndex	No	No

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Appendix C

ITIS Phrases Implemented in HCRS

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Appendix C: ITIS Phrases Implemented in HCRS

Code	ITIS Phrase
513	accident
1553	all services fully booked
7723	and
1290	animal on roadway
1287	bicyclists on roadway
5908	black ice
4866	blizzard
775	blocked
776	blocked ahead
5390	blowing dust
5385	blowing snow
8229	bridge
1038	bridge maintenance operations
770	closed
771	closed ahead
772	closed intermittently
769	closed to traffic
1284	debris on roadway
1537	delays
558	derailed train
534	disabled vehicle
7713	due to
3852	fair
3073	flash flood
1301	flooding
5378	fog
3592	football game
3083	forest fire
5911	freezing rain
4874	frost
3087	grass fire
260	heavy traffic
1292	herd of animals on roadway
5906	ice
5907	icy patches
7941	in road construction area
543	jackknifed semi-trailer
5901	loose gravel
3841	major event
517	multi vehicle accident
1033	narrow lanes
382	no problems to report
2571	no through traffic
1281	obstruction on roadway
7688	on
7937	on bridges

Code	ITIS Phrase
1032	opposing traffic
554	overturned vehicle
3858	parade
1299	pavement buckled
1029	paving operations
3095	rail crash
2323	railroad crossing equipment failure
2562	ramp restrictions
777	reduced to one lane
779	reduced to three lanes
778	reduced to two lanes
6929	repairs in progress
7986	rest area
1025	road construction
1036	road maintenance operations
1037	road marking operations
3598	road race
1298	road surface collapse
5904	road surface in poor condition
1309	rockfall
5393	sandstorms
3354	security incident
7547	shoulder travel no longer allowed
5897	slippery
2059	slow moving maintenance vehicle
259	slow traffic
5386	smoke hazard
4868	snow
5916	snow on roadway
552	spilled load
3585	sports event
258	stop and go traffic
257	stopped traffic
1285	storm damage
1050	temporary traffic lights
4357	test message
9473	through traffic
6926	traffic being directed around accident area
263	traffic congestion
8233	tunnel
5912	wet and icy roads
5895	wet pavement
5384	white out
1030	work in the median
1046	work on underground services

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Appendix D

Interview Questionnaire

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Appendix D: Interview Questionnaire

General Questions

Question	Response	Remarks / Analysis / Action Items
1. Completeness		
1.1. Were there any other ITS standards used in the NDOR system other than the three addressed by this questionnaire? Specify.	OZ: Yes – TMDD and possibly the source of *Convoy*.	No findings.
1.2. Are there any legacy messages that you think should be considered as industry standard messages?	OZ: Originally, there were legacy reporting terms such as "10% snow covered". This had meaning, but through outreach and training, the ITIS phrases became accepted.	No findings.
1.3. Are there any tasks you would like to accomplish, but cannot using the standards?	OZ: No – the standard fit the need for pull data Meridian: Could not look at a particular event to a degree with certainty of location. Need external data set to identify highway. Data set is a comma separated file provided by NDOR or OZ. Felt that the location information was near to being a free text field. Jurisdictional designation, highway number, etc. needs to be parsed. It would be better if they were separate tags. Need to address milepost direction (E-W or W-E).	Additional detail should be added to the LRMS street information objects to provide separate fields for the jurisdictional and highway number information.

Question	Response	Remarks / Analysis / Action Items
1.4. Did you need to implement any custom messages/data elements? Please describe the custom messages.	OZ: Yes – Local XSD. There are 2 data frames and 4 data elements defined. *LinkTrafficInformation* is used in ATIS. Others are no longer used. Oz originally used the *LocalEventInformation*, not knowing where to put the information, but after contacting ATIS folks, now moved to the elements in the ATIS *EventInformation* frame and the *LinkTrafficInformation* frame. The *publicNotes* and *publicContactPhone* elements are now both in *Advise* element of the ATIS *EventInformation* frame.	The link information data object duplicates some, but not all of the vehicle restriction data elements. Either they all should be duplicated or they all should be replaced with an instance of the vehicle restriction data frame.
1.5. Are there standard messages/frames/ elements you could have used but chose not to? What and why?	OZ: Choice of LRMS objects based on HCRS being graphical system (GIS) versus a text system. On, from/to; For example On I-80, from MP 1 to 25 is how OZ thinks about a location. Originally, the *Gridpoint* object was used for location, but was changed to use the *LinkLocation* object because it was better suited. It is thought that the *Grid* objects in the LRMS are intended to be used for weather locations, though the standard does not actually state that.	No Findings.
1.6. Are there messages/frames/elements available that you cannot conceive of using in a traveler information system? Why?	OZ: They found what they needed and did not look beyond that.	No Findings.

Question	Response	Remarks / Analysis / Action Items
2. Clarity		
2.1. Are the standards clear?	OZ: In LRMS, the name of a highway was tagged in *transElement*, which Ken felt was not intuitive. Meridian: Yes.	The transportation element is described in the LRMS standard in the terms and definitions section and the linear referencing examples. No Findings.
2.2. Are the standards unambiguous?	OZ: Yes and No. There are completely unambiguous pieces such as lat/long. However, using the *GridPoint* was confusing. Are the *Grid* objects for use with weather reporting? Initially, first attempt was to use grid for location, but changed to use *linkEndpoints*. The LRMS *LinearReference* frame has a *Side* data element and a *travelDirection* element. Both are similar enumerations; they are not clear how to use. Meridian: Yes.	The standard discusses each location referencing profile and provides examples of the use of some of them including the Chain, Cross Streets, Linear Referencing, and Transition profiles. Additional examples for the remaining profiles could be added and would be beneficial.
2.3. Are there any messages/frames/elements that are confusing or inappropriate in the standards?	OZ: They found what they needed and did not look beyond that.	No Findings.

Question	Response	Remarks / Analysis / Action Items
2.4. Were there any areas of the standards regarding their purpose or implementation that were not understandable?	OZ: Needed clarification on how to use LRMS. See question 2.2. Meridian: No.	No Findings.
2.5. Were there any messages or elements of the standards that were open ended or could be interpreted in more than one way? Please provide examples and rationale of your resolutions.	OZ: *GridPoint* verses *LinkLocation* in LRMS. See question 2.2. Meridian: No.	No Findings.
2.6. Were there any areas of the standards where you needed or sought guidance or clarification? • what's the data purpose/meaning • how it is encoded • units of measure • etc. What technical assistance did you receive in interpreting the standards?	OZ: Metric versus English units originally was not defined, however in current version of the standard, it is annotated. Received guidance to use integers for mile measurements, however OZ chose to use *miDec* instead for future possibility of tenth-of-mile measurements. (Richard Glassco) Meridian: No.	No Findings.

Question	Response	Remarks / Analysis / Action Items
3. Effectiveness		
3.1. Are the standards effective in the exchange of information for reporting, updating, and providing traveler information describing events and road conditions to other centers or information service providers?	OZ: Yes Meridian: Yes.	No Findings.
3.2. What area could messages, frames, or elements be added or changed to improve the effectiveness of the standards in providing advanced traveler information?	OZ: The underlying system (HCRS) was event with a location, which aligned with the standard. Could see a system which is location based with events which would also fit. Meridian: Really like to know the true definition of the road network.	Road network information falls more under the scope of the TMDD standard than the ATIS standard. No Findings.
3.3. Did the use of the ITS standards simplify the procurement specification process?	NDOR: Originally no. However, new procurements going on today do require use of the standards and they do simplify the process.	No Findings.
3.4. To what level of detail were the ITS standards specified in procuring your system? • specific standards / versions • specific messages / data elements • etc.	NDOR: Specific standards are specified in procurement. OZ: Although not a requirement, OZ drove the effort to make the exchange to Meridian ATIS based.	No Findings.

Question	Response	Remarks / Analysis / Action Items
3.5. Did the use of the ITS standards simplify your life cycle process for requirements, design, build, evaluate and deploy?	OZ: Yes, it did for deployment. Data consumers can pick up the ICD document and run with it. Meridian: Neutral. Same amount of work either way. Meridians XML "driver" for NDOR is different from one used for Minnesota. Not sure if Minnesota system in compliance or up to the current standard.	
4. Suitability		
4.1. Are the messages/frames/elements suitable for implementation of the advanced traveler information system?	OZ: Yes, data frames/elements that were used were suitable.	No Findings.
4.2. Are there any areas of the standard that seem either deficient or out of scope of its purpose?	OZ: No, for the portion of the standard that was used. Meridian: No.	No Findings.
4.3. Are there any messages/frames/elements that could be added or changed that would improve the suitability of the standard in providing advanced traveler information?	OZ: No	No Findings.

Question	Response	Remarks / Analysis / Action Items
4.4. Do you feel that there were any programmatic, technical or operational impacts on you (positive or negative) because of the use of the ITS standards?	OZ: Yes, the positive was that it was a standardized implementation and permitted new associates to receive this information easily. The standard allowed them to do more with the same amount of money. Though there was a learning curve to interpret the standards but it was still more efficient. Meridian: Diluted data a little. ITIS phrases come in text form and are parsed into small pieces. "Snow and Ice on Roadway" is a five element ITIS phrase. Originally this created some problems assembling the voice recording for the 511 system.	The consensus is that after the initial learning curve, the ITS standards had an overall positive impact. No Findings.
4.5. Did you adapt your operational needs to the standards? Were adaptation recognized as having a positive or negative effect?	OZ: Probably would have used SOAP and XML via web service, but the body of the XML message was dictated by the standard. The standard technique for storing lat/long data in integer data type and multiplying by 1 million (micro-degrees). This was deemed a very effective approach by OZ that they may not have used if going their own way. Meridian: No. Used an XML "driver" to adapt the ITIS phrases to their existing 511 system.	Overall, users did not need to significantly adapt their processes to align with the standards way of encoding data. Switching to the use of the ITIS phrases required some retraining but was generally seen as an improvement to the legacy system that they replaced. No Findings.

Transportation Related Items

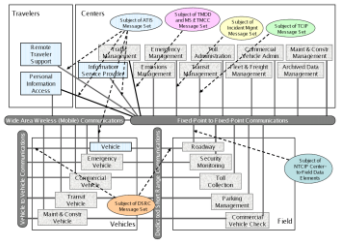
Question	Response	Remarks / Analysis / Action Items
5. Transportation Functions Facilitated by the NDOR System		
5.1. Were there any challenges in selecting the hand-full of events from the large number of ITIS phrases? What was the rationale for short listing the events eventually used in HCRS?	NDOR: Yes – it was a challenge, but not overwhelming. It was facilitated by drawing on the experiences of numerous individuals in transportation domain. Approach was to map the ITIS phrases to the existing NDOR processes. OZ: Key benefit was that the standards gave more description than NDOR was using with their old system. Parsing down a large number of phrases is much easier then starting with a blank sheet of paper and building it up.	The ITIS phrases provided ample coverage to meet the user needs though some text fields were used to augment them. Evaluation of the text fields will need to be done to determine if any are candidates to be considered for additions to the ITIS phrase lists.
5.2. What were agency and developer's roles in defining the operational requirements for HCRS?	OZ: Hired by Nebraska to implement their statewide reporting system. Was based on the AZDOT. Replaced NDOR's old system. Other requirement was support for Meridian 511. Meridian originally had specified FTP type flat file, but the parties all agreed move to ATIS.	No Findings.

Question	Response	Remarks / Analysis / Action Items
5.3. Does NDOR have any plans to offer the HCRS XML data connection to other traveler information service providers, other than Meridian? Are the standardized ICD and use of ITS standards expected to simplify the sharing of traveler information?	NDOR: Currently working with the State Patrol, but this has not moved along a far as hoped. Web sites like traffic.com, etc. have contacted NDOR but decided they didn't have what they were looking for right now. OZ: Yes, the standardized ICD and use of standards without a doubt.	No Findings.
5.4. Continued improvements were mentioned in the kickoff meeting in Lincoln (for example, location reference). How would the changes be incorporated by Meridian?	OZ: Period of time where both systems are running with eventual phase out of old system.	No Findings.
5.5. How many HCRS events/variables were actually adopted by the Meridian's 511 system?	OZ: The viewpoint is the every event is being used; however, not every field is necessarily used. Need to ask Meridian. Meridian: They are not using Lat/Long but are not sure about any others.	No Findings.

Question	Response	Remarks / Analysis / Action Items
5.6. Were there any challenges for Meridian to interpret the HCRS ICD developed by OZ?	NDOR: Jaimie did not indicate any concerns. OZ: Most were general, web service type connectivity issues, such as password. Mitretek has similar situation for ITS world demonstration. Meridian: No	No Findings.
5.7. Were any special tools used to assist in the selection and implementation of ATIS and/or ITIS phrases?	OZ: Mini-Edit is an indispensable tool, as is a tool similar to XML Spy. Improvement to the search option would be of benefits. (based on 2004 version)	No Findings.
5.8. In addition to the HCRS ICD, to what extent was the ATIS documentation used in understanding the message sets.	Meridian: Not sure. Original programmer is no longer with the organization.	No Findings.
5.9. Are the ITIS phrase lists used by the HCRS system adequate for your needs?	Meridian: Yes.	No Findings.

Documentation Questions

Question	Response	Remarks / Analysis / Action Items
6. References (section 2)		
6.1. Were the references listed in the standards complete and useable?	OZ: Don't know. They did not use the standards documents rather they started with XSD and used the Mini-Edit tool.	Not using the standards documentation probably contributed to the early confusion with the LRMS profiles noted earlier. No Findings.
6.2. Were there any superfluous references?	OZ: Don't know. See question 6.1	No Findings.
6.3. Did you or members of your team consult any of the external references and, if so, did they contribute positively to your understanding of the standards?	OZ: No.	No Findings.
7. Terms and Definitions (section 3)		
7.1. Did the terms, definitions, and acronyms meet your needs in understanding and using the standards?	OZ: Don't know. They did not use the standards documents rather they started with XSD and used the Mini-Edit tool.	No Findings.
7.2. Are there any definitions, terms or acronyms that need to be added or revised?	OZ: Don't know. See question 7.1	No Findings.
7.3. Were there any superfluous definitions, terms or acronyms?	OZ: Don't know. See question 7.1	No Findings.

Question	Response	Remarks / Analysis / Action Items
8. Figures and Tables		
8.1. Did the figures and tables in the standards aid in your understanding of the standard and its intended use?	OZ: Don't know. They did not use the standards documents rather they started with XSD and used the Mini-Edit tool.	No Findings.
8.2. ATIS – Do you consider Figure 1 an accurate diagram of the ITS physical architecture? Did it aid in your understanding of the role played by ATIS message set in the ITS architecture? Are there any changes or improvements that can be made to this figure? See Figure 1.	OZ Yes – This diagram was helpful in starting the process for use of the standards. Although OZ did not directly use the standards documentation, they did look at the national standards overview documents.	

Schema Questions

Question	Response	Remarks / Analysis / Action Items
9. Schema		
9.1. Were there any cases where you sub-ranged any data elements or enumerations in the standards? Why? • Increase the range • Decreased the range	OZ: Had to fix a couple of ITIS phrases in the XSD by adding underscore characters. This was an issue in the original XSD file and is no longer a problem. In the ATIS spec, under *day-of -week* data element, are enumerated beginning with *Sunday* = 1 and *Holiday* = 0, however the Java enumeration begins with *Sunday* = 0. This was missed this in early implementation but is being fixed. In the encoded XML, the ITIS enumeration numbers are not used; rather OZ uses enumeration text. In OZs experience, there can be different versions of the coded ITIS list that exists and using numbers can cause a disconnect between systems. HCRS translates the *Severity* element of the *EventInformation* frame. The standard specifies the TMDD *Event-incident-severity* enumeration (none, minor, major, natural-disaster) however HCRS uses its own *Priority* enumeration (high, medium, low). When the XML is created, HCRS translates to the standard *Severity* enumeration elements. Meridian: No, but Meridian does not think bit size for a data element should be defined in the standard.	In ATIS, the *day-of-week* data element uses the value of 1 to 7 for the days of the week and uses 0 for holidays. However, it also defines a bit-weight value for each day that produces a completely different value than the enumeration. This is probably a case of the standard being deficient in allowing for a priority rating.

Question	Response	Remarks / Analysis / Action Items
9.2. Were there any cases where you changed the array size of any data array elements in the standards? Why?	OZ: No, but they felt that there was some limitation. Think that maybe there was some mechanical reason (tool limit) for this. Suggest discussing with David. Meridian: No.	No Findings.
9.3. Were there any cases where you changed the data type of any data elements in the standards? Why?	OZ: No, but the industry is trending towards the combined *datetime* field as expressed by the W3C. Meridian: No.	The W3C standard for data and time, which is based on the ISO 8601 standard, should be adopted by the ITS standards.
9.4. Were there any cases where you did not implement a data frame/element that was required by the standard? Why?	OZ: No. Meridian: Not known. Used needed information that was provided by the OZ system.	No Findings.
9.5. Did you implement any features using the LOCAL data frames/elements in any of the data frames?	OZ: Yes, *LinkTrafficInformation* local data frame was used. See question 1.4.	See findings described in question 1.4.

Question	Response	Remarks / Analysis / Action Items
9.6. Would you consider any cases where you implemented a feature using the LOCAL data frames/elements significant enough to be considered for revision of the standard?	OZ: Could go either way. In retrospect, there are some items in ITIS that are close to the implemented Locals, but it is still felt that they were distinct enough to implement, as done.	Some of the local text phrases implemented by HCRS should be considered for the ITIS phrase lists.
9.7. ATIS – Did you implement any features using the Tail data frame?	OZ: No	No Findings.
9.8. ATIS – Would you consider any cases where you implemented a feature using the Tail data frame significant enough to be considered for revision of the standard?	Not applicable.	No Findings.
9.9. Why are the Mayday data frames/elements and messages sets defined in SAE-J2313 redefined and repeated in the ATIS standard?	SDO: The *Mayday* messages should be retired and removed as they are a vestigial tail that needs to be trimmed away. It is not believed that the typical ATIS developer would find any value with the *Mayday* or *Directory* messages. Also the *Reduced Bandwidth* messages could be scrubbed away since obsolescence leaves no point in maintaining them.	The duplication of the Mayday messages in the ATIS standard creates a possibility of discrepancies between the two standards which leads to ambiguous definitions. Either the entire Mayday standard should be merged with the ATIS standard and the original deprecated or they should be left as separate standards. The point of merging them is unclear.

Question	Response	Remarks / Analysis / Action Items
9.10. Data structures defined in the standards are classified as either Messages or Data Frames. What is the criterion for a structure to be considered a message rather than a frame? • For example, why would not the InformationResponse structure be classified as a data frame; which is in turn be used by the ATISMessage message?	SDO: Historically, this terminology has become blurred over time as data messages later became data frames for other messages. The ASN.1 does not differentiate between message and frame concepts; however for the XML schemas it is important because only top level messages are an element, everything else is an abstract type. Agrees that a common and consistent nomenclature would be beneficial to the understandability of the standard.	The difference in terms leads a reader to believe that there is indeed a difference that must be accounted for in design and usage of the data objects. The Message and Data Frame term should be more clearly defined and applied consistently.
9.11. LRMS – There are a number of data frames that contain a *locationID* data element. The ASN.1 representation of these data frames indicates that this data element is optional; however, the XML representation indicates that it is required. Should this element be required or optional?	OZ: HCRS uses the *locationID* data element, but not necessarily as the standard may have intended. SDO: This element is listed in the XML as an attribute which are implied to be optional. ASN.1 identifies elements that are attributes using #ATTRIB notation. ISTT: Note that not all *locationID* elements have the #ATTRIB notation in the ASN.1.	The *locationID* data element in the LRMS standard is an optional attribute in the XML. It can be used to identify a previously defined location reference profile to increase efficiency of repeated references or can also be used of other application-specific purposes. The location ID elements that do not include the #ATTRIB notation will be noted.
9.12. LRMS – In the data frame AdminAreaGroup, is the data element *entityIPS* suppose to be *entityFIPS?*	SDO: Agrees this is a typo. Should be *entityFIPS* and has been previously identified and is in record tracking for correction.	The entity FIPS data element is misspelled.

Question	Response	Remarks / Analysis / Action Items
9.13. LRMS – In the data frame *Grid*, the ASN.1 notation indicate that data elements describing the grid are wrapped in a *Choice* block; however the XML notation does not include the *Choice* syntax. Which notation is correct?	SDO: ASN.1 is the superseding notation so probably the *Choice* syntax is correct, however need to compare against the original ASN.1 to confirm. Translating between ASN.1 notations to XML notation can odd conditions due to nuances XML encoding rules (see example). Thus the necessity to maintain the ASN.1 as the governing notation.	Investigate the original ASN.1 to compare to the XML schema for this data frame. Example: Setting XML *manicures* = 0 correlates to the ASN.1 *Optional* notation, but this does not preclude multiple occurrences of the element in XML message where only a single instance is permitted in the ASN.1 notation. This is probably not an issue since the XML encoding rules state that, when omitted, the *maxOccurs* tag is implied to be 1.

Object Specific Questions

Question	Response	Remarks / Analysis / Action Items
10. ATIS Objects		
10.1. InformationResponse – Message 5.3. • Why is this structure categorized as a message instead of a data frame?	SDO: See Answer to question 9.10.	No Findings.
11. LRMS Objects		
11.1. GeoCoord – Frame 5.13. • The HCRS implementation does not include the locationID data element. If this element is required, why was it not implemented? (see question 9.11)	OZ: Did not uncover any errors associated with the data element. SDO: The *LocationID* element is an attribute and is optional. See Answer to question 9.11.	No Findings.
11.2. LinearReference – Frame 5.27. • The HCRS implementation does not include the locationID data element. If this element is required, why was it not implemented? (see question 9.11)	See 11.1 answer.	No Findings.
11.3. LinkLocation – Frame 5.29. • The HCRS implementation does not include the locationID data element. If this element is required, why was it not implemented? (see question 9.11)	See 11.1 answer.	No Findings.

Question	Response	Remarks / Analysis / Action Items
11.4. LocationReference – Frame 5.30. • The HCRS implementation uses the element name geographicCoordinate instead of geoCoord as defined in the standard. Is there a reason this change was required? • The HCRS implementation does not include the locationID data element. If this element is required, why was it not implemented? (see question 9.11)	OZ: The *geographicCoordinate* element is defined in the LRMS XSD file. See 11.1 answer.	The version of the XSD used by HCRS is different than the standard documentation. No Findings.
11.5. PointLocation – Frame 5.32. • The HCRS implementation uses the element name linearReferencePoint instead of linearReference as defined in the standard. Is there a reason this change was required? • The HCRS implementation does not include the locationID data element. IF this element is required, why was it not implemented? (see question 9.11)	See 11.4 answer.	No Findings.

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Appendix E

Test Cases and Results

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Appendix E: Test Cases and Results

Location Reference

Test Case: TC001	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; accident; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Incidents/Accidents ITIS Description: Accident Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC001	
2	Poll HCRS web service and store returned XML document.	TC001.xml
	Overall Result:	Passed

Test Case: TC002	**Description:** Highway event; on Interstate 80 east/west; between milepost 400 and milepost 450; accident; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: From 400 To 450 Crosses: (nearest to milepost) ITIS Category: Incidents/Accidents ITIS Description: Accident Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC002	
2	Poll HCRS web service and store returned XML document.	TC002.xml
	Overall Result:	Passed

Test Case: TC003	**Description:** Highway event; on Nebraska 50 north/south; at milepost 60; accident; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: State Route Highway: 50 Direction: NS Milepost: At 60 Crosses: (nearest to milepost) ITIS Category: Incidents/Accidents ITIS Description: Accident Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC003	
2	Poll HCRS web service and store returned XML document.	TC003.xml
	Overall Result:	Passed

Test Case: TC004	**Description:** Segment event; in Tecumseh; normal seasonal; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Area: Tecumseh Location: (first location) ITIS Category: Road Conditions ITIS Description: Normal seasonal driving conditions Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC004	
2	Poll HCRS web service and store returned XML document.	TC004.xml
	Overall Result:	Passed

Priority (Severity)

Test Case: TC005	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; accident; open ended; medium priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Incidents/Accidents ITIS Description: Accident Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Medium Contact Phone: F-NDOR-ATIS-1 TC005	
2	Poll HCRS web service and store returned XML document.	TC005.xml
	Overall Result:	Passed

Test Case: TC006	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; accident; open ended; high priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Incidents/Accidents ITIS Description: Accident Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: High Contact Phone: F-NDOR-ATIS-1 TC006	
2	Poll HCRS web service and store returned XML document.	TC006.xml
	Overall Result:	Passed

Public Notes (Advice)

Test Case: TC007	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; accident; open ended; low priority; with advice and contact phone.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Incidents/Accidents ITIS Description: Accident Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Public Note: (text string exceeding 100 characters) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC007	
2	Poll HCRS web service and store returned XML document.	TC007.xml
	Overall Result:	Passed

Duration

Test Case: TC008	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; accident; 2 hour duration; continuous; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Incidents/Accidents ITIS Description: Accident Start Time: (current date, 6:00 pm) End Time: (current date, 8:00 pm) Repeat Information: Continuous Days and Times: (current day) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC008	
2	Poll HCRS web service and store returned XML document.	TC008.xml
	Overall Result:	Passed

Test Case: TC009	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; accident; 1 week duration, 2 hours per day; recurring daily; all days; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Incidents/Accidents ITIS Description: Accident Start Time: (current date, 6:00 pm) End Time: (1 week duration, 8:00pm) Repeat Information: Recurring Frequency: Daily Days and Times: (all days) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC009	
2	Poll HCRS web service and store returned XML document.	TC009.xml
	Overall Result:	Passed

Test Case: TC010	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; accident; 1 week duration, 2 hours per day; recurring daily; weekdays, daytime; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Incidents/Accidents ITIS Description: Accident Start Time: (current date, 6:00 pm) End Time: (1 week duration, 8:00pm) Repeat Information: Recurring Frequency: Daily Days and Times: (weekdays), at Day Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC010	
2	Poll HCRS web service and store returned XML document.	TC010.xml
	Overall Result:	Passed

Test Case: TC011	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; accident; 1 week duration, 2 hours per day; recurring daily; weekdays, nighttime; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Incidents/Accidents ITIS Description: Accident Start Time: (current date, 6:00 pm) End Time: (1 week duration, 8:00pm) Repeat Information: Recurring Frequency: Daily Days and Times: (weekdays), at Night Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC011	
2	Poll HCRS web service and store returned XML document.	TC011.xml
	Overall Result:	Passed

Test Case: TC012	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; accident; 1 month duration, 2 hours per day; recurring weekly; weekends; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Incidents/Accidents ITIS Description: Accident Start Time: (current date, 6:00 pm) End Time: (1 month duration, 8:00pm) Repeat Information: Recurring Frequency: Weekly Days and Times: Saturday, Sunday Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC012	
2	Poll HCRS web service and store returned XML document.	TC012.xml
	Overall Result:	Passed

Restrictions

Test Case: TC013	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; accident; open ended; with height, width, length and weight restrictions; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Incidents/Accidents ITIS Description: Accident Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Restrictions - height: 12 feet, 8 inches Restrictions - length: 40 feet, 6 inches Restrictions - width: 10 feet, 4 inches Restrictions - weight: 35 tons Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC013	
2	Poll HCRS web service and store returned XML document.	TC013.xml
	Overall Result:	Passed

Test Case: TC014	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; accident; open ended; with HazMat restrictions; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Incidents/Accidents ITIS Description: Accident Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) HazMat Prohibited: True Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC014	
2	Poll HCRS web service and store returned XML document.	TC014.xml
	Overall Result:	Passed

Test Case: TC015	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; accident; open ended; with escort vehicle required; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Incidents/Accidents ITIS Description: Accident Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Escort Vehicle: True Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC015	
2	Poll HCRS web service and store returned XML document.	TC015.xml
	Overall Result:	Passed

Categories / Descriptions (ITIS)

Test Case: TC016	**Description:** Segment event; in Tecumseh; black ice; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Area: Tecumseh Location: (first location) ITIS Category: Road Conditions ITIS Description: Black Ice Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC016	
2	Poll HCRS web service and store returned XML document.	TC016.xml
	Overall Result:	Passed

Test Case: TC017	**Description:** Segment event; in Tecumseh; blizzard; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Area: Tecumseh Location: (first location) ITIS Category: Road Conditions ITIS Description: Blizzard Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC017	
2	Poll HCRS web service and store returned XML document.	TC017.xml
	Overall Result:	Passed

Test Case: TC018	**Description:** Segment event; in Tecumseh; blowing dust; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Area: Tecumseh Location: (first location) ITIS Category: Road Conditions ITIS Description: Blowing Dust Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC018	
2	Poll HCRS web service and store returned XML document.	TC018.xml
	Overall Result:	Passed

Test Case: TC019	**Description:** Segment event; in Tecumseh; blowing snow; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Area: Tecumseh Location: (first location) ITIS Category: Road Conditions ITIS Description: Blowing Snow Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC019	
2	Poll HCRS web service and store returned XML document.	TC019.xml
	Overall Result:	Passed

Test Case: TC020	**Description:** Segment event; in Tecumseh; closed due to snow and ice or roadway; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Area: Tecumseh Location: (first location) ITIS Category: Closure ITIS Description: Closed due to snow and ice on roadway Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC020	
2	Poll HCRS web service and store returned XML document.	TC020.xml
	Overall Result:	Passed

Test Case: TC021	**Description:** Segment event; in Tecumseh; fog; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Area: Tecumseh Location: (first location) ITIS Category: Road Conditions ITIS Description: Fog Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC021	
2	Poll HCRS web service and store returned XML document.	TC021.xml
	Overall Result:	Passed

Test Case: TC022	**Description:** Segment event; in Tecumseh; freezing rain; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Area: Tecumseh Location: (first location) ITIS Category: Road Conditions ITIS Description: Freezing Rain Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC022	
2	Poll HCRS web service and store returned XML document.	TC022.xml
	Overall Result:	Passed

Test Case: TC023	**Description:** Segment event; in Tecumseh; ice covered; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Area: Tecumseh Location: (first location) ITIS Category: Road Conditions ITIS Description: Ice Covered Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC023	
2	Poll HCRS web service and store returned XML document.	TC023.xml
	Overall Result:	Passed

Test Case: TC024	**Description:** Segment event; in Tecumseh; icy patches; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Area: Tecumseh Location: (first location) ITIS Category: Road Conditions ITIS Description: Icy Patches Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC024	
2	Poll HCRS web service and store returned XML document.	TC024.xml
	Overall Result:	Passed

Test Case: TC025	**Description:** Segment event; in Tecumseh; icy patches on bridges; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Area: Tecumseh Location: (first location) ITIS Category: Road Conditions ITIS Description: Icy Patches on Bridges Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC025	
2	Poll HCRS web service and store returned XML document.	TC025.xml
	Overall Result:	Passed

Test Case: TC026	**Description:** Segment event; in Tecumseh; sandstorms; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Area: Tecumseh Location: (first location) ITIS Category: Road Conditions ITIS Description: Sandstorms Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC026	
2	Poll HCRS web service and store returned XML document.	TC026.xml
	Overall Result:	Passed

Test Case: TC027	**Description:** Segment event; in Tecumseh; slippery due to frost; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Area: Tecumseh Location: (first location) ITIS Category: Road Conditions ITIS Description: Slippery due to Frost Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC027	
2	Poll HCRS web service and store returned XML document.	TC027.xml
	Overall Result:	Passed

Test Case: TC028	**Description:** Segment event; in Tecumseh; smoke hazard; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Area: Tecumseh Location: (first location) ITIS Category: Road Conditions ITIS Description: Smoke Hazard Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC028	
2	Poll HCRS web service and store returned XML document.	TC028.xml
	Overall Result:	Passed

Test Case: TC029	**Description:** Segment event; in Tecumseh; snow and ice on roadway; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Area: Tecumseh Location: (first location) ITIS Category: Road Conditions ITIS Description: Snow and Ice on Roadway Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC029	
2	Poll HCRS web service and store returned XML document.	TC029.xml
	Overall Result:	Passed

Test Case: TC030	**Description:** Segment event; in Tecumseh; wet and icy roads; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Area: Tecumseh Location: (first location) ITIS Category: Road Conditions ITIS Description: Wet and icy roads. Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC030	
2	Poll HCRS web service and store returned XML document.	TC030.xml
	Overall Result:	Passed

Test Case: TC031	**Description:** Segment event; in Tecumseh; wet pavement; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Area: Tecumseh Location: (first location) ITIS Category: Road Conditions ITIS Description: Wet Pavement. Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC031	
2	Poll HCRS web service and store returned XML document.	TC031.xml
	Overall Result:	Passed

Test Case: TC032	**Description:** Segment event; in Tecumseh; white out; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Area: Tecumseh Location: (first location) ITIS Category: Road Conditions ITIS Description: White Out. Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC032	
2	Poll HCRS web service and store returned XML document.	TC032.xml
	Overall Result:	Passed

Test Case: TC033	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; all services fully booked; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Delays ITIS Description: All services fully booked Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC033	
2	Poll HCRS web service and store returned XML document.	TC033.xml
	Overall Result:	Passed

Test Case: TC034	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; delays; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Delays ITIS Description: Delays Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC034	
2	Poll HCRS web service and store returned XML document.	TC034.xml
	Overall Result:	Passed

Test Case: TC035	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; fair; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Information ITIS Description: Fair, Slow Traffic Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC035	
2	Poll HCRS web service and store returned XML document.	TC035.xml
	Overall Result:	Passed

Test Case: TC036	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; football game; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Information ITIS Description: Football game, Slow traffic Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC036	
2	Poll HCRS web service and store returned XML document.	TC036.xml
	Overall Result:	Passed

Test Case: TC037	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; major event; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Information ITIS Description: Major event, Slow traffic Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC037	
2	Poll HCRS web service and store returned XML document.	TC037.xml
	Overall Result:	Passed

Test Case: TC038	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; parade; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Information ITIS Description: Parade Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC038	
2	Poll HCRS web service and store returned XML document.	TC038.xml
	Overall Result:	Passed

Test Case: TC039	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; rest area closed; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Information ITIS Description: Rest area closed Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC039	
2	Poll HCRS web service and store returned XML document.	TC039.xml
	Overall Result:	Passed

Test Case: TC040	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; road race; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Information ITIS Description: Road race Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC040	
2	Poll HCRS web service and store returned XML document.	TC040.xml
	Overall Result:	Passed

Test Case: TC041	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; security incident; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Information ITIS Description: Security incident, Delays Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC041	
2	Poll HCRS web service and store returned XML document.	TC041.xml
	Overall Result:	Passed

Test Case: TC042	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; sports event; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Information ITIS Description: Sports event, Slow traffic Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC042	
2	Poll HCRS web service and store returned XML document.	TC042.xml
	Overall Result:	Passed

Test Case: TC043	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; This message is for test purposes only; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Information ITIS Description: This message is for test purposes only Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC043	
2	Poll HCRS web service and store returned XML document.	TC043.xml
	Overall Result:	Passed

Test Case: TC044	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; lane blocked; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Lane Restrictions ITIS Description: Lane blocked Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC044	
2	Poll HCRS web service and store returned XML document.	TC044.xml
	Overall Result:	Passed

Test Case: TC045	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; lane closed; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Lane Restrictions ITIS Description: Lane closed Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC045	
2	Poll HCRS web service and store returned XML document.	TC045.xml
	Overall Result:	Passed

Test Case: TC046	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; narrow lanes; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Lane Restrictions ITIS Description: Narrow lanes Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC046	
2	Poll HCRS web service and store returned XML document.	TC046.xml
	Overall Result:	Passed

Test Case: TC047	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; opposing traffic; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Lane Restrictions ITIS Description: Opposing traffic Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC047	
2	Poll HCRS web service and store returned XML document.	TC047.xml
	Overall Result:	Passed

Test Case: TC048	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; roadway reduced to one lane; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Lane Restrictions ITIS Description: Roadway reduced to one lane Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC048	
2	Poll HCRS web service and store returned XML document.	TC048.xml
	Overall Result:	Passed

Test Case: TC049	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; roadway reduced to two lanes; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Lane Restrictions ITIS Description: Roadway reduced to two lanes Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC049	
2	Poll HCRS web service and store returned XML document.	TC049.xml
	Overall Result:	Passed

Test Case: TC050	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; roadway reduced to three lanes; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Lane Restrictions ITIS Description: Roadway reduced to three lanes Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC050	
2	Poll HCRS web service and store returned XML document.	TC050.xml
	Overall Result:	Passed

Test Case: TC051	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; shoulder blocked; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Lane Restrictions ITIS Description: Shoulder blocked Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC051	
2	Poll HCRS web service and store returned XML document.	TC051.xml
	Overall Result:	Passed

Test Case: TC052	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; three lanes closed; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Lane Restrictions ITIS Description: Three lanes closed Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC052	
2	Poll HCRS web service and store returned XML document.	TC052.xml
	Overall Result:	Passed

Test Case: TC053	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; turning lane blocked; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Lane Restrictions ITIS Description: Turning lane blocked Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC053	
2	Poll HCRS web service and store returned XML document.	TC053.xml
	Overall Result:	Passed

Test Case: TC054	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; two lanes closed; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Lane Restrictions ITIS Description: Two lanes closed Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC054	
2	Poll HCRS web service and store returned XML document.	TC054.xml
	Overall Result:	Passed

Test Case: TC055	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; blocked; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Closures ITIS Description: Blocked Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC055	
2	Poll HCRS web service and store returned XML document.	TC055.xml
	Overall Result:	Passed

Test Case: TC056	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; bridge closed; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Closures ITIS Description: Bridge closed Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC056	
2	Poll HCRS web service and store returned XML document.	TC056.xml
	Overall Result:	Passed

Test Case: TC057	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; closed; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Closures ITIS Description: Closed Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC057	
2	Poll HCRS web service and store returned XML document.	TC057.xml
	Overall Result:	Passed

Test Case: TC058	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; closed ahead; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Closures ITIS Description: Closed ahead, slow traffic Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC058	
2	Poll HCRS web service and store returned XML document.	TC058.xml
	Overall Result:	Passed

Test Case: TC059	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; closed intermittently; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Closures ITIS Description: Closed intermittently Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC059	
2	Poll HCRS web service and store returned XML document.	TC059.xml
	Overall Result:	Passed

Test Case: TC060	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; closed to through traffic; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Closures ITIS Description: Closed to through traffic Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC060	
2	Poll HCRS web service and store returned XML document.	TC060.xml
	Overall Result:	Passed

Test Case: TC061	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; off-ramp blocked; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Closures ITIS Description: Off-ramp blocked Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC061	
2	Poll HCRS web service and store returned XML document.	TC061.xml
	Overall Result:	Passed

Test Case: TC062	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; on-ramp closed; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Closures ITIS Description: On-ramp closed Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC062	
2	Poll HCRS web service and store returned XML document.	TC062.xml
	Overall Result:	Passed

Test Case: TC063	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; ramp restrictions; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Closures ITIS Description: Ramp restrictions Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC063	
2	Poll HCRS web service and store returned XML document.	TC063.xml
	Overall Result:	Passed

Test Case: TC064	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; Tunnel blocked; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Closures ITIS Description: Tunnel blocked Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC064	
2	Poll HCRS web service and store returned XML document.	TC064.xml
	Overall Result:	Passed

Test Case: TC065	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; bridge maintenance operations; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Construction Zone ITIS Description: Bridge maintenance operations Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC065	
2	Poll HCRS web service and store returned XML document.	TC065.xml
	Overall Result:	Passed

Test Case: TC066	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; closed due to rail crossing repair; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Closures ITIS Description: Closed due to rail crossing repair Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC066	
2	Poll HCRS web service and store returned XML document.	TC066.xml
	Overall Result:	Passed

Test Case: TC067	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; closed due to road construction; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Closures ITIS Description: Closed due to road construction Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC067	
2	Poll HCRS web service and store returned XML document.	TC067.xml
	Overall Result:	Passed

Test Case: TC068	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; paving operations; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Construction Zone ITIS Description: Paving operations Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC068	
2	Poll HCRS web service and store returned XML document.	TC068.xml
	Overall Result:	Passed

Test Case: TC069	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; road construction; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Construction Zone ITIS Description: Road construction Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC069	
2	Poll HCRS web service and store returned XML document.	TC069.xml
	Overall Result:	Passed

Test Case: TC070	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; road maintenance operations; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Construction Zone ITIS Description: Road maintenance operations Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC070	
2	Poll HCRS web service and store returned XML document.	TC070.xml
	Overall Result:	Passed

Test Case: TC071	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; road marking operations; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Construction Zone ITIS Description: Road marking operations Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC071	
2	Poll HCRS web service and store returned XML document.	TC071.xml
	Overall Result:	Passed

Test Case: TC072	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; slow moving maintenance vehicle; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Construction Zone ITIS Description: Slow moving maintenance vehicle Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC072	
2	Poll HCRS web service and store returned XML document.	TC072.xml
	Overall Result:	Passed

Test Case: TC073	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; temporary traffic lights; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Construction Zone ITIS Description: Temporary traffic lights Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC073	
2	Poll HCRS web service and store returned XML document.	TC073.xml
	Overall Result:	Passed

Test Case: TC074	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; utility work on shoulder, caution; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Construction Zone ITIS Description: Utility work on shoulder, caution Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC074	
2	Poll HCRS web service and store returned XML document.	TC074.xml
	Overall Result:	Passed

Test Case: TC075	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; utility work; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Construction Zone ITIS Description: Utility work, caution Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC075	
2	Poll HCRS web service and store returned XML document.	TC075.xml
	Overall Result:	Passed

Test Case: TC076	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; work in the median; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Construction Zone ITIS Description: Work in the median Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC076	
2	Poll HCRS web service and store returned XML document.	TC076.xml
	Overall Result:	Passed

Test Case: TC077	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; work on buried services; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Construction Zone ITIS Description: Work on buried services Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC077	
2	Poll HCRS web service and store returned XML document.	TC077.xml
	Overall Result:	Passed

Test Case: TC078	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; heavy traffic; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Traffic Congestion ITIS Description: Heavy traffic Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC078	
2	Poll HCRS web service and store returned XML document.	TC078.xml
	Overall Result:	Passed

Test Case: TC079	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; slow traffic; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Traffic Congestion ITIS Description: Slow traffic Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC079	
2	Poll HCRS web service and store returned XML document.	TC079.xml
	Overall Result:	Passed

Test Case: TC080	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; stop and go traffic; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Traffic Congestion ITIS Description: Stop and go traffic Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC080	
2	Poll HCRS web service and store returned XML document.	TC080.xml
	Overall Result:	Passed

Test Case: TC081	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; stopped traffic; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Traffic Congestion ITIS Description: Stopped traffic Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC081	
2	Poll HCRS web service and store returned XML document.	TC081.xml
	Overall Result:	Passed

Test Case: TC082	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; traffic congestion; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Traffic Congestion ITIS Description: Traffic congestion Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC082	
2	Poll HCRS web service and store returned XML document.	TC082.xml
	Overall Result:	Passed

Test Case: TC083	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; accident in road construction area; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Incident/Accident ITIS Description: Accident in road construction area Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC083	
2	Poll HCRS web service and store returned XML document.	TC083.xml
	Overall Result:	Passed

Test Case: TC084	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; traffic being directed around accident area; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Incident/Accident ITIS Description: Accident, Traffic being directed around accident area Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC084	
2	Poll HCRS web service and store returned XML document.	TC084.xml
	Overall Result:	Passed

Test Case: TC085	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; blocked due to spilled load; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Closures ITIS Description: Blocked due to spilled load Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC085	
2	Poll HCRS web service and store returned XML document.	TC085.xml
	Overall Result:	Passed

Test Case: TC086	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; closed due to accident; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Closures ITIS Description: Closed due to accident Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC086	
2	Poll HCRS web service and store returned XML document.	TC086.xml
	Overall Result:	Passed

Test Case: TC087	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; closed due to disabled vehicle; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Closures ITIS Description: Closed due to disabled vehicle Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC087	
2	Poll HCRS web service and store returned XML document.	TC087.xml
	Overall Result:	Passed

Test Case: TC088	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; closed due to train derailment; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Closures ITIS Description: Closed due to train derailment Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC088	
2	Poll HCRS web service and store returned XML document.	TC088.xml
	Overall Result:	Passed

Test Case: TC089	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; jackknifed semi-trailer; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Incident/Accident ITIS Description: Jackknifed semi-trailer Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC089	
2	Poll HCRS web service and store returned XML document.	TC089.xml
	Overall Result:	Passed

Test Case: TC090	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; multi-vehicle accident; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Incident/Accident ITIS Description: Multi-vehicle accident Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC090	
2	Poll HCRS web service and store returned XML document.	TC090.xml
	Overall Result:	Passed

Test Case: TC091	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; road blocked due to overturned vehicle; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Closures ITIS Description: Road blocked due to overturned vehicle Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC091	
2	Poll HCRS web service and store returned XML document.	TC091.xml
	Overall Result:	Passed

Test Case: TC092	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; spilled load; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Incident/Accident ITIS Description: Spilled load, Slow traffic Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC092	
2	Poll HCRS web service and store returned XML document.	TC092.xml
	Overall Result:	Passed

Test Case: TC093	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; animals on roadway; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Obstruction Hazard ITIS Description: Animals on roadway, Caution Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC093	
2	Poll HCRS web service and store returned XML document.	TC093.xml
	Overall Result:	Passed

Test Case: TC094	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; blocked due to storm damage; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Closures ITIS Description: Blocked due to storm damage Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC094	
2	Poll HCRS web service and store returned XML document.	TC094.xml
	Overall Result:	Passed

Test Case: TC095	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; cattle drive; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Obstruction Hazard ITIS Description: Cattle drive, Caution Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC095	
2	Poll HCRS web service and store returned XML document.	TC095.xml
	Overall Result:	Passed

Test Case: TC096	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; closed due to flooding; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Closures ITIS Description: Closed due to flooding Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC096	
2	Poll HCRS web service and store returned XML document.	TC096.xml
	Overall Result:	Passed

Test Case: TC097	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; closed due to road surface collapse; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Closures ITIS Description: Closed due to road surface collapse Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC097	
2	Poll HCRS web service and store returned XML document.	TC097.xml
	Overall Result:	Passed

Test Case: TC098	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; cyclists on roadway; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Obstruction Hazard ITIS Description: Cyclists on roadway, Caution Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC098	
2	Poll HCRS web service and store returned XML document.	TC098.xml
	Overall Result:	Passed

Test Case: TC099	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; debris on roadway; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Obstruction Hazard ITIS Description: Debris on roadway Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC099	
2	Poll HCRS web service and store returned XML document.	TC099.xml
	Overall Result:	Passed

Test Case: TC100	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; flash flood; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Obstruction Hazard ITIS Description: Flash flood, Caution Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC100	
2	Poll HCRS web service and store returned XML document.	TC100.xml
	Overall Result:	Passed

Test Case: TC101	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; flooding; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Obstruction Hazard ITIS Description: Flooding, Caution Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC101	
2	Poll HCRS web service and store returned XML document.	TC101.xml
	Overall Result:	Passed

Test Case: TC102	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; forest fire; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Obstruction Hazard ITIS Description: Forest fire Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC102	
2	Poll HCRS web service and store returned XML document.	TC102.xml
	Overall Result:	Passed

Test Case: TC103	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; grass fire; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Obstruction Hazard ITIS Description: Grass fire Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC103	
2	Poll HCRS web service and store returned XML document.	TC103.xml
	Overall Result:	Passed

Test Case: TC104	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; loose gravel; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Obstruction Hazard ITIS Description: Loose gravel, Caution Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC104	
2	Poll HCRS web service and store returned XML document.	TC104.xml
	Overall Result:	Passed

Test Case: TC105	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; obstruction on roadway; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Obstruction Hazard ITIS Description: Obstruction on roadway, Caution Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC105	
2	Poll HCRS web service and store returned XML document.	TC105.xml
	Overall Result:	Passed

Test Case: TC106	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; pavement buckle; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Obstruction Hazard ITIS Description: Pavement buckle Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC106	
2	Poll HCRS web service and store returned XML document.	TC106.xml
	Overall Result:	Passed

Test Case: TC107	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; rail crash; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Obstruction Hazard ITIS Description: Rail crash Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC107	
2	Poll HCRS web service and store returned XML document.	TC107.xml
	Overall Result:	Passed

Test Case: TC108	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; road surface collapse; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Obstruction Hazard ITIS Description: Road surface collapse, Caution Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC108	
2	Poll HCRS web service and store returned XML document.	TC108.xml
	Overall Result:	Passed

Test Case: TC109	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; road surface in poor condition; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Obstruction Hazard ITIS Description: Road surface in poor condition, Caution Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC109	
2	Poll HCRS web service and store returned XML document.	TC109.xml
	Overall Result:	Passed

Test Case: TC110	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; rockfall; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Obstruction Hazard ITIS Description: Rockfall, Caution Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC110	
2	Poll HCRS web service and store returned XML document.	TC110.xml
	Overall Result:	Passed

Test Case: TC111	**Description:** Highway event; on Interstate 80 east/west; at milepost 400; spilled load on roadway; open ended; low priority.	
Step Number	**Test Procedure**	**Result**
1	Define Event: Highway System: Interstate Highway: 80 Direction: EW Milepost: At 400 Crosses: (nearest to milepost) ITIS Category: Obstruction Hazard ITIS Description: Spilled load on roadway, Caution Start Time: (current date and time) End Time: Open Repeat Information: Continuous Days and Times: (current day of week) Priority Level: Low Contact Phone: F-NDOR-ATIS-1 TC111	
2	Poll HCRS web service and store returned XML document.	TC111.xml
	Overall Result:	Passed

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Appendix F

Contents of the Companion CD ROM

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Appendix F: Contents of the Companion CD ROM

The companion CD ROM that accompanies this report contains an electronic copy of the entire set of test results collected during the conduct of the test procedure and live monitoring of the HCRS system.

The following is a list of the contents of the CD ROM.

Test Software

This directory contains the .NET source software that was used to monitor and test the HCRS system and to capture and store the result XML files.

Test Results\Database

This directory contains a Microsoft® Access 2000 database that contains all of the test results.

Test Results\Test Cases

This directory contains all of the test results from the test cases defined in Appendix E. In each case, the file name corresponds to the test case number to which it applies. Each of these messages is also recorded in the database.

TC001.xml	TC024.xml	TC047.xml	TC069.xml	TC092.xml
TC002.xml	TC025.xml	TC048.xml	TC070.xml	TC093.xml
TC003.xml	TC026.xml	TC049.xml	TC071.xml	TC094.xml
TC004.xml	TC027.xml	TC050.xml	TC072.xml	TC095.xml
TC005.xml	TC028.xml	TC051.xml	TC073.xml	TC096.xml
TC006.xml	TC029.xml	TC052.xml	TC074.xml	TC097.xml
TC007.xml	TC030.xml	TC053.xml	TC075.xml	TC098.xml
TC008.xml	TC031.xml	TC051.xml	TC076.xml	TC099.xml
TC009.xml	TC032.xml	TC054.xml	TC077.xml	TC100.xml
TC010.xml	TC033.xml	TC055.xml	TC078.xml	TC101.xml
TC011.xml	TC034.xml	TC056.xml	TC079.xml	TC102.xml
TC012.xml	TC035.xml	TC057.xml	TC080.xml	TC103.xml
TC013.xml	TC036.xml	TC058.xml	TC081.xml	TC104.xml
TC014.xml	TC037.xml	TC059.xml	TC082.xml	TC105.xml
TC015.xml	TC038.xml	TC060.xml	TC083.xml	TC106.xml
TC016.xml	TC039.xml	TC061.xml	TC084.xml	TC107.xml
TC017.xml	TC040.xml	TC062.xml	TC085.xml	TC108.xml
TC018.xml	TC041.xml	TC063.xml	TC086.xml	TC109.xml
TC019.xml	TC042.xml	TC064.xml	TC087.xml	TC110.xml
TC020.xml	TC043.xml	TC065.xml	TC088.xml	TC111.xml
TC021.xml	TC044.xml	TC066.xml	TC089.xml	
TC022.xml	TC045.xml	TC067.xml	TC090.xml	
TC023.xml	TC046.xml	TC068.xml	TC091.xml	

Test Results\Live Monitoring

This directory contains all of the captured messages from the live monitoring of the HCRS system. In each case the name of the file identifies the date and the time that the XML message was captured. Each of these messages is also recorded in the database.

HCRS_6-18-2007_184610.xml
HCRS_6-18-2007_194617.xml
HCRS_6-18-2007_204618.xml
HCRS_6-18-2007_214621.xml
HCRS_6-18-2007_224623.xml
HCRS_6-18-2007_234623.xml
HCRS_6-19-2007_004624.xml
HCRS_6-19-2007_014625.xml
HCRS_6-19-2007_024626.xml
HCRS_6-19-2007_034627.xml
HCRS_6-19-2007_044628.xml
HCRS_6-19-2007_054630.xml
HCRS_6-19-2007_064631.xml
HCRS_6-19-2007_074632.xml
HCRS_6-19-2007_084633.xml
HCRS_6-19-2007_094635.xml
HCRS_6-19-2007_104636.xml
HCRS_6-19-2007_114637.xml
HCRS_6-19-2007_124639.xml
HCRS_6-19-2007_134641.xml
HCRS_6-19-2007_144644.xml
HCRS_6-19-2007_154645.xml
HCRS_6-19-2007_164644.xml
HCRS_6-19-2007_174645.xml
HCRS_6-19-2007_184647.xml
HCRS_6-19-2007_194648.xml
HCRS_6-19-2007_204648.xml
HCRS_6-19-2007_214649.xml
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HCRS_6-19-2007_234649.xml
HCRS_6-20-2007_004650.xml
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HCRS_6-20-2007_034656.xml
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HCRS_6-20-2007_114709.xml
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HCRS_6-20-2007_134711.xml
HCRS_6-20-2007_144713.xml
HCRS_6-20-2007_154714.xml
HCRS_6-20-2007_164714.xml
HCRS_6-20-2007_174715.xml
HCRS_6-20-2007_184717.xml
HCRS_6-20-2007_194718.xml
HCRS_6-20-2007_204718.xml
HCRS_6-20-2007_214720.xml
HCRS_6-20-2007_224721.xml
HCRS_6-20-2007_234722.xml
HCRS_6-21-2007_004722.xml
HCRS_6-21-2007_014723.xml
HCRS_6-21-2007_024724.xml
HCRS_6-21-2007_034726.xml
HCRS_6-21-2007_044727.xml
HCRS_6-21-2007_054728.xml
HCRS_6-21-2007_064729.xml
HCRS_6-21-2007_074730.xml
HCRS_6-21-2007_084731.xml
HCRS_6-21-2007_094735.xml
HCRS_6-21-2007_104737.xml
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HCRS_6-21-2007_124742.xml
HCRS_6-21-2007_134743.xml
HCRS_6-21-2007_144744.xml
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HCRS_6-21-2007_164746.xml
HCRS_6-21-2007_174747.xml
HCRS_6-21-2007_184748.xml
HCRS_6-21-2007_194749.xml
HCRS_6-21-2007_204751.xml
HCRS_6-21-2007_214752.xml
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HCRS_6-22-2007_084803.xml
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HCRS_6-23-2007_204847.xml
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HCRS_6-23-2007_224849.xml
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HCRS_6-25-2007_174940.xml

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