State of Vermont

Independent Review
AOT ATMS – TIS
MOMA

Submitted to the
State of Vermont, Office of the CIO
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Version 3.0

Prepared by:

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Coeur Business Group

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1. EXECUTIVE SUMMARY

This section provides a summary of the Independent Review.

The State of Vermont Agency Of Transportation (VTrans), New Hampshire Department Of Transportation (NHDOT) and the State of Maine Department of Transportation (MEDOT) have collaboratively worked together to advertise and select a Request For Proposal (RFP) for an Advanced Traffic Management System (ATMS).

The parties have selected South West Research Institute (SWRI) as the vendor to supply, develop and manage the implementation of the ATMS/TIS system. The TIS is subcontracted to Leidos which previously was known as SAIC. Both systems will be cloud-based applications accessible via the web. The Tri-State consortium is currently in the process of submitting for approval, the contract between New Hampshire Department of Transportation and the vendor (SWRI).

A Memorandum of Understanding (MOU) was entered into between NHDOT, VTrans in Feb 2013 in which the Departments of Transportation for the States of Maine, New Hampshire and Vermont agreed to pursue a Tri-State contract for ATMS/TIS services. The purpose of this Independent Review (IR) is to review the Memorandum of Maintenance Agreement (MOMA) between VTrans and NHDOT which resulted from the contract between SWRI and NHDOT. The IR is looking for potential risk associated with the MOMA. In addition, during the course of conducting this IR, Coeur Group looked beyond the MOMA for risk associated with a multi-State implementation process and project management issues.

The goal of the Memorandum of Maintenance Agreement (MOMA) is to bind the Parties and creates a Financial Contract between the Parties. The MOMA constitutes the controlling operational agreement between the Parties for the purposes of controlling the ATMS/TIS development, changes and enhancements.

State of Vermont statute requires the Department of Information and Innovation (DII) to solicit an Independent Review (IR) for all information technology projects estimated to exceed $1,000,000. The State Office of the Chief Information Officer (CIO) sought an independent review of this project with regards to Acquisition Cost, Technology Architecture, Implementation Plan, Cost and Benefit Analysis, Negotiation Advisory Service (not required for this engagement) and an Impact Analysis on Net Operating Costs for the agency carrying out the activity. The primary objective of the Independent Review is to identify risks and issues that may impact the success of the scope of work.

The primary entities involved in this Independent Review include several stakeholders in the State of Vermont such as the DII, Enterprise Project Management Office (EPMO), the Agency of Commerce & Community Development (ACCD) and Vermont Agency of Transportation. In general, these stakeholders are referred to in this report collectively as "the State" unless

otherwise indicated. The entities involved in the interviews and data collection processes for this review are limited solely to the New Hampshire Department of Transportation ATMS/TIS leader and the prime vendor South West Research Institute and their sub-contractor Leidos.

The implementation of the system is generally known as the transportation 511 system. The implementation of this system is planned to result in a positive return on investment for the State of Vermont as well as the other members of the Tri-State consortium. In particular the State of Vermont will gain work process efficiencies from the automation of road safety and traveler information alerts through various social media and electronic formats.

This IR is focused on the Memorandum of Maintenance Agreement (MOMA) between the State of Vermont's Agency of Transportation and the New Hampshire Department of Transportation. Inasmuch as the technology, operations, and maintenance thereof will be managed by the New Hampshire Department of Transportation with the prime vendor SWRI, this IR is focused on risk mitigation especially in five key areas of interface between the State of Vermont AOT and the State of New Hampshire DOT. These areas include but are not limited to:

1 Business Terms
2 Technology Implementation and System Development
3 Network connectivity and security
4 New Hampshire Operation and management of the vendor and services
5 Continuity of Operations Planning and uptime guarantees

These critical areas of the MOMA will then be addressed in the categories of the Independent Review (IR) which include:

- An acquisition cost assessment;
- A technology architecture review;
- An implementation plan assessment;
- A cost analysis and a model for benefit analysis; and
- An impact analysis on net operating costs for the agency carrying out the activity.

In the review of the MOMA, findings indicate that the NHDOT is acting as a "Service Manager" to the State of Vermont and Maine. NHDOT will be contracted via the MOMA to provide the services identified in the MOMA as well as processes for operational effectiveness between the NHDOT and the Prime Vendor SWRI.

Summation

NHDOT will be managing 2 vendors during this operation. Multiple areas of concern were identified and listed as follows:

1. South West Research Institute (SWRI) is providing the Advanced Traffic Management System (ATMS). SWRI will be utilizing the services of Rack Space as the Cloud provider. Multiple vendors will require significant management effort on the part of SWRI.
2. NHDOT will also be managing a second set of vendors through the prime (SWRI) with the companion Travel Information System (TIS). TIS implementation will be provided by Leidos which is a fully separated company from its previous parent company SAIC. NHDOT will provide multiple tier vendor management via SWRI and Leidos and their Cloud providers.
3. Network connectivity and responsibility were not clearly defined in the MOMA. SWRI clarified their position and responsibility as the demarcation point from the Cloud provider to the internet connection. Therefore, there is no greater risk to the VTrans operations from the current environment as the MOMA security policy and planning addresses this for the ATMS-TIS.
4. New Hampshire DOT is acting as the "Service Manager" to both Vermont and Maine in this project. Early MOMA language was unclear in a number of areas regarding final authority for decision making. The NHDOT Lead has clarified final authority for the areas identified as potential risk.
5. Continuity of operations planning was not defined clearly in the MOMA. Based on interviews with both vendors (SWRI and Leidos) it became clear that sufficient processes are in place to ensure that a Continuity of Operations Plan (CoOP) will be developed during the project initiation stage. Leidos provided New Hampshire DOT lead with their CoOP template. In addition, uptime guarantees are part of the MOMA.

Tangible benefits are defined in the project case study. Most of the benefits for the State of Vermont are economic in nature as they are derived from easier communications with travelers and vacationers to Vermont and the New England States as a whole, thereby increasing customer satisfaction. Key benefits from the ATMS-TIS system drive AOT operational efficiencies and road safety effectiveness.

Even though the risks identified and researched have been mitigated and/or mitigation is planned during the implementation, it is Coeur Group's opinion that the unmitigated risks could still pose some project risk, especially during the *System Implementation* process over the next 12 to 18 months. The Tri-State consortium has indicated a willingness to mitigate the current identified risks and those identified as potential risk to the satisfaction of this IR. On-going diligence by VTrans and the AOT Project Lead will help ensure on-going mitigation of potential project risk and that they are grounded in key Project Management disciplines.

Coeur Group believes that if the risks are adequately managed and mitigated, they DO NOT pose significant concern to the State of Vermont to warrant foregoing the execution of the proposed Project.

Disposition: Coeur Group recommends approval of the ATMS-TIS Tri-State project.

Mark A. Peterson

Managing Partner
Coeur Business Group, Inc.

2. Summary of Key Findings

Through a series of interviews with Vermont AOT, Vermont Agency of Commerce and Community Development, NHDOT, SWRI, Leidos, the DII Commissioner, Vermont AOT's Assistant Attorney General, and DII Network Architecture divisions, Coeur Business Group, Inc. (Coeur Group) has identified key findings and potential risks.

As Coeur Group conducted this Independent Review (IR), we organized our meetings with the State and Vendor(s) and identified five major areas of risk in the MOMA.

Since this is a review of the Memorandum of Maintenance Agreement (MOMA) for the ATMS and TIS systems, the focus of the Independent Review (IR) is on the planning and implementation process of the systems involved. Of particular focus were the Business Terms, Technology Implementation, System Development, Network connectivity, New Hampshire operation and management of the vendor services, and Continuity of Operations Planning. These are the critical areas that will have impact to the State of Vermont during project implementation and on-going operations.

2.1 Key Findings Summary Table

Key findings are shown in the table below and address Acquisition Cost, Technology Architecture Review, Implementation Planning, Organizational Readiness, and Cost Analysis Review. Each finding has been assigned an individual identifier (example, AC1 is the first finding for Acquisition Cost). Any identified Risk is also called out with individual identifiers.

The following MOMA documents provided the majority of the IR input for MOMA content:

ATMS_SwRI_Part_3_Contract_Agreement_Draft_v2 16

ATMS_SwRI_Part_1_Contract_Agreement_Draft

ATMS_511_TriState_MOMA_9_11_2013

AOT_ATMS_BusinessCase_CostModel

AOT ATMS Business Case and Cost Analysis - Routing Slip

Cost Review 8-23-13 TIS SAIC

In addition to these documents, interviews were conducted with identified stakeholders. Multiple conversations were conducted with the project leads from NHDOT, VTrans, SWRI and Leidos.

Key Finding	Identified Risk	Risk Mitigation	Risk Status
Acquisition Cost (AC)			
Finding AC1: The Project Acquisition Costs for selected modules is not final as of this report. This is due in part to ongoing negotiation with SWRI surrounding the addition of "options" to the Deliverables for NHDOT, VTrans and MEDOT.	**AC1 Risk:** Risk identified to VTrans to ensure funding is available for any increased cost.	Risk addressed and mitigation statement as per AOT Project Lead.	**LOW**
Finding AC2: The Project Acquisition Costs are not final as of this report. This is due in part to some components of the Project Plan not being complete as well as the final contract not yet being signed. Comments from MEDOT will be incorporated with a final contract and financial agreements distributed by December 6th. Until then, specifics surrounding the deliverables and expectations of the parties to the contract cannot be finalized.	**AC2 Risk:** Risk identified to VTrans which indicated funding is available for final plan cost. Risk addressed and mitigation statement as per AOT Project Lead.	The final formalized vendor provided Project Plan will be completed upon full execution of the contract with NHDOT and SWRI.	**LOW**
Architecture (AR)			
Finding AR1: The technical escalation plan must be an integral part of the vendor's implementation plan. Discussions with the NHDOT project lead and the AOT Project Lead and the vendor indicated that they understood the need and will incorporate the technical escalation plan into the vendor's implementation plan.	**AR1 Risk:** Risk is still inherent and a Technical Escalation Plan should be completed by NHDOT and SWRI prior to the completion of the Project Planning phase and shared with VTrans.	SWRI has included a Technical Escalation Plan in the MOMA to ensure issues are properly elevated to the appropriate level during system implementation and on-going operations.	**LOW**

Finding AR2: A Security review was conducted with DII, NH DoIT and SWRI to ensure the solution has no access to sensitive information on the Vermont network. Security protection is defined in the MOMA and SWRI response is listed below. The MOMA indicates that the NHDOT will approve the vendor's security plan.	**AR2 Risk:** Risk addressed with New Hampshire Department of Information Technology (NHDOIT). Risk is not mitigated until the security plan is completed prior to the completion of the Project Planning Phase.	NHDOT and NH DOIT have provided their security policies. SWRI has provided their security policies for review and inclusion into the MOMA. Both policies provide evidence of meeting the Vermont DII security policies.	**LOW**
Finding AR3: Research found that CoOp plans will be provided and technical escalation management is to be integrated into the support plans. A Disaster Recovery Plan, or better known in the industry as the Continuity of Operations Plan (CoOP), is part of the Cloud computing environment provided to SWRI from Rackspace.	**AR3 Risk:** Risk addressed with AOT Lead. Risk will be mitigated when NHDOT has SWRI develop the CoOp plan prior to completion of the Planning phase of the project. NHDOT and SWRI indicated this will be part of the implementation plan.	A Coop plan template has been provided as part of the MOMA documentation by SWRI	**LOW**
Finding AR4: Operational Uptime Guarantees **The findings indicate the Service level Agreements will be part of the NHDOT contracted Service with the prime vendor SWRI. Due to the multiple levels of vendors involved it was determined that the vendor direct comments should be included here to ensure no misinterpretation of intent.**	**AR4 Risk:** Risk addressed with NHDOT and NHDOIT. Risk mitigation will require AOT Project Lead to monitor contracted uptime reporting.	SWRI has provided the uptime specifications and are currently part of the Exhibit J contract.	**LOW**
Finding AR5: The State-Wide WAN/LAN impact is likely minimal, however unknown for purposes of this IR. An increase in network traffic via the Traveler Information System (TIS) may result in the next few years. However based upon minimal internet traffic to support this implementation the impact is anticipated to be minimal. Monitoring of the actual traffic	**AR5 Risk:** Risk addressed with AOT Lead. Risk mitigation steps need to be taken to identify network loading during the ATMS-TIS system testing phase as called out in	AOT Project Lead has indicated a review of LAN traffic to be conducted as part of implementation testing phase	**LOW**

associated with the project must be maintained to ensure it remains a minimal impact and understood during the testing phase of implementation. Tools and processes should be in place to ensure the traffic is monitored and properly managed.	the MOMA		
Finding AR6: The technology selected and identified in the MOMA is adequate to support the needs to the VTrans business for the new 511 processes.	**AR6 Risk:** Risk mitigation for the MOMA items identified as potential risk should be mitigated and signed off prior to the completion of the Project Planning Phase.	The technology has been well defined in detail and the supporting hardware (Cloud Storage) has been defined with capacity specifications to the Cloud providers.	**LOW**
Finding AR7: Enterprise Architecture impacts were reviewed with Vermont DII. A discussion about areas of concern for DII regarding the ATMS-TIS system being hosted by SWRI and hosted at RackSpace and Amazon was conducted. Additional reviews were conducted with NH DOIT and SWRI to ascertain what architecture impact might be present as the ATMS-TIS system is implemented.	**AR7 Risk:** No significant risk was identified due to the ATMS-TIS web based application. Only the PC cache will hold any ATMS information. Since the application (ATMS) will be hosted by Amazon or RackSpace, there will be no hardware or software within the responsibility of DII for the State of Vermont.	**No Risk Identified**	**LOW**
Finding AR8: Policy compliance by the vendor's is defined in the MOMA. The MOMA stipulates compliance with the State of NHDOT and NH DoIT policies. During the course of the project implementation it will be the responsibility of the AOT Project Lead to continually ensure that policy changes or new policies are addressed in the Change Control Board meetings and that any changes are in compliance with the State of Vermont's	**AR8 Risk:** Risk still exists until these are confirmed with the VTrans Assistant Attorney General. Risk will be mitigated as the AOT Project Lead works with NHDOT lead	Current status indicates the Vermont AG office has agreed to the MOMA. Policies for security and uptime have been supplied by SWRI	**LOW**

policies.	to ensure policies enacted throughout the project implementation are consistent with those of the State of Vermont.		
Implementation Plan (IP)			
Finding IP1: The implementations plan provided by SWRI is contained in the document (ATMS_SwRI_Part_3_Contract_Agreement_Draft_v2 9) and contains sufficient timeline detail for a MOMA agreement.	IP1 RISK: No inherent risk, however any risk will be mitigated when the Implementation Plan is signed off by NHDOT.	A detailed Implementation Plan has been reviewed as part of this MOMA and evidence shows sufficient detail for a valid Project Plan.	**LOW**
Finding IP2: It will be the responsibility of the New Hampshire DOT Project Lead to ensure that all items listed are defined and documented in the final and approved Implementation Plan.	**IP2 RISK:** Risk addressed. Risk will be mitigated when the Implementation Plan is signed off by NH DOT.	Implementation Plan is provided in the MOMA	**LOW**
Finding IP3: A complete Continuity of Operations (CoOP) plan will be part of the project implementation plan by SWRI and Leidos. The Leidos project manager has supplied the New Hampshire DOT project lead with a Coop template for this purpose. A technical issues escalation plan will also become part of the final project plan which SWRI will provide the NHDOT.	**IP3 RISK:** Risk will be mitigated when NH DOT signs off on the completed MOMA and the vendor provides the CoOP plan prior to completion of the Project Planning phase.	A CoOP template has been provided to the NH DOT Project Lead.	**LOW**
Finding IP4: Business Terms and Process: Initial concern for business terms were that specific authority for final decision making was not defined clearly in a number of paragraphs.	**IP4 RISK:** Risk has been mitigated as final authority has been clarified and now resides with the State of New Hampshire DOT Project Lead and Change Control Board	**Resolution:** Risk Mitigated	**LOW**

	Chair.		
Finding IP5: Technology Implementation Vendor Management: Initial concern was that there was no documented escalation process for technical issues during project implementation. Since there are four separate vendors plus NHDOT and VTrans in the implementation structure it was imperative that a technical problem escalation path was included in the MOMA. It was recommended that a reference to the escalation plan be provided in the MOMA.	**IP5 RISK:** This risk should be mitigated prior to the completion of the Project Planning phase with a defined Technical Escalation Plan.	A documented escalation plan is being included into the MOMA	**LOW**
Finding IP6: New Hampshire Operational and Service Plan: The initial concern for risk was a lack of a clearly defined vendor management plan after the implementation and go live phase of the systems. This process would include a service level management agreement with SWRI. At this point sufficient evidence was provided during the vendor interviews with SWRI and Leidos to provide assurances that service level agreements will be completed prior the end of the Project Planning phase.	**IP6 RISK:** Resolution: Risk Mitigation completed for MOMA purposes as the Service Level Agreement (SLA) is defined in the MOMA. However the SLA will need ongoing management from NHDOT.	Risk Mitigated	**LOW**
Finding IP7: Network Connectivity: A concern for network connectivity and impact on the State of Vermont's network architecture were identified initially as a risk. After interviews with SWRI and Leidos, and based upon limited internet traffic required for system operation, it seems reasonable that there will be minimum impact on the State of Vermont's network. All updates and transactions to VTrans PCs will be Internet based to the web browser only.	**IP7 RISK:** Resolution: Risk Mitigation completed for MOMA Purposes.	Risk Mitigated	**LOW**
Finding IP8: The project plan contained in the document (ATMS_SwRI_Part_3_Contract_Agreement_Draft_v2 9) is detailed and addresses all critical issues of standard CMMI and project management disciplines. Leidos is	**IP8 RISK:** No risk determined.	No Risk Determined	**LOW**

both Capability Maturity Model Integration (CMMI) compliant and ISO 9001 certified.			
Finding IP9: It was determined that a full and detailed implementation plan will be provided to the NHDOT project lead once the initial project planning stage is competed. This item is still at risk until the full Implementation Plan is finalized prior to the completion of the Project Planning phase.	**IP9 RISK:** No risk determined	No Risk Determined	**LOW**
Organization Readiness (OR)			
Finding OR1: The Tri-state consortium staff has worked on previous multistate projects and is well versed in communication and issue resolution.	Risk from organizational maturity for this project should be limited risk.	No Risk Defined	**LOW**
Finding OR2: The tri-state consortium staff has developed a Change Control Board (CCB) consisting of two members from VTrans, two members from Maine DOT, and three members from New Hampshire DOT.		This Change Control Board provides the oversight management of the implementation vendor SWRI. Therefore organizationally, decisions have a clearly defined forum for resolution.	
Finding OR3: One of the remaining risk elements was the lack of definition for final authority for decisions from the Change Control Board (CCB), reference Exhibit G, section 4.0, Roles and Responsibilities. It is recommended that the language in the MOMA reflect the final authority position for this board. Risk has been mitigated by definition of final authority to NH DOT in the MOMA.	**OR3 RISK:** While the Change Control Board agreement describes the voting rights for the board, it does not describe the final authority for breaking a tie or committing resources from all three states.	Issue was with Exhibit G section 4.0. Mitigation action has been taken	**LOW**
Cost Benefit Analysis (CA)			

Finding CA1: The Project Costs are not final as of this report. This is due in part to ongoing negotiation with SWRI surrounding the addition of "Options" to the Deliverables.	Cost risks from potential changes, upgrades or add-ons are still present until the final cost is defined by the NH DOT and prime vendor at contract signature time.	Final Contract documentation is currently being provided to the NHDOT Project Lead for finalization.	**LOW**
Finding CA2: Benefits derived from these two systems will provide a focus for revenue generation from all three states due to higher levels of traveler information and directions. This is certainly true as these systems are focused largely on vacation travelers to the Tri-State area roadways.	No Risk Identified	No Mitigation Required	**LOW**
Finding CA3: Most of the benefits for the State of Vermont are economic in nature as they are derived from easier communications with travelers and vacationers to Vermont and the New England States as a whole, thereby increasing customer satisfaction. Key benefits from the ATMS-TIS system drive AOT operational efficiencies and road safety effectiveness.	Cost Benefits for 511 systems are generally found in the area of	No Mitigation Required	**LOW**

Coeur Group Findings Comments:

Due to the nature of the Tri-State agreement, NHDOT is the responsible party to Vermont and Maine. Throughout this IR, discussions and risk were identified with the multiple levels of management between Vermont AOT and the actual system operation.

One of the most critical components of the MOMA was the inclusion of a "Technical Escalation Plan" that defines in detail how Vermont AOT can elevate issues during implementation and more importantly during on-going operations post Go-Live.

The latest version of the contract (part 3) (ATMS_SwRI_Part_3_Contract_Agreement_Draft_v2 16) has the escalation plan in it to address the risk identified early on in this IR. Version 2.9 was the contract available at the Point in time of the IR.

3. OVERVIEW OF THIS DOCUMENT AND BACKGROUND

This section provides background information, approach, assumptions, and objectives of the Independent Review. This section describes the scope of the Independent Review to give readers appropriate context when reading the analysis and findings found in this report.

3.1 Scope of this Independent Review

In accordance with the Independent Review of Statement of Work (SOW), Coeur Group conducted an independent review of the Memorandum of Maintenance Agreement (MOMA) for the Departments of Transportation Tri-State Consortium for the Advanced Traffic Management System (ATMS) and the Traffic Information system (TIS) for Vermont Agency of Transportation, New Hampshire Department of Transportation and the Maine Department of Transportation. It is the intent of the State that the following items be addressed through the SOW:

- A Project Planning and Independent Review kickoff meeting with the primary goal to introduce the players and discuss the IR process going forward.
- Review of all pertinent materials, contracts, SOW's, project work plans and other documentation such as necessary to establish an understanding of the project(s) and proposed work being reviewed.
- On site meetings: Approximately 2 days on-site at State offices in Vermont collecting information and interviewing stakeholders.
- A teleconference call with the selected system vendor as needed.
- Identification of risks and cataloging them into a risk register (State can provide template if required)
- Facilitation of a discussion of strategies to mitigate risks with OPM, Project Sponsor and Stakeholders.
- Work with the various stakeholders to develop specific responses to each risk identified. It is our expectation that out of the risk analysis effort come specific plans/strategies and actions that are taken or planned to be taken to address those risks (i.e. accept risk, mitigate risk, transfer risk, etc.).
- Work with OPM to ensure the Risk Response Plan is finalized with Sponsor before final review with CIO.
- Conduct other meetings and collect other information as necessary.
- Create an Independent Review report according to the Scope of Work, and deliver the draft document to the OPM.
- Hold an on-site meeting with the State EPMO Project Manager, DII Deputy Commissioner, Sponsors & State CIO to present the final review report and answer any questions.

- Update the final report incorporating feedback and submit the final report for CIO approval. OPM will "close" out IR with CIO once all Risk response plans have satisfied the CIO.
- Via the OPM, obtain CIO sign-off to signify the acceptance of the IR deliverables at the conclusion of the IR engagement and give DII Contracts Specialist final IR and acceptance documents to close out task.

3 V.S.A. § 2222 (g) (1) reads as follows:

- The Secretary of Administration shall obtain independent expert review of any recommendation for any information technology activity initiated after July 1, 1996, as information technology activity is defined by subdivision (a)(10) of this section, when its total cost is $1,000,000.00 or greater or when required by the State Chief Information Officer.

- Documentation of this independent review shall be included when plans are submitted for review pursuant to subdivisions (a), (9) and (10) of this section. The independent review shall include:

- (A) an acquisition cost assessment;
- (B) a technology architecture review;
- (C) an implementation plan assessment;
- (D) a cost analysis and a model for benefit analysis; and
- (E) a procurement negotiation advisory services contract.; and
- (F) an impact analysis on net operating costs for the agency carrying out the activity.

3.2 Review Approach

In conducting our Independent Review, the following activities were completed:

Table 2 - SOW Requirements and Activities Performed

SOW Requirement	Activity Performed	Date(s) Performed
A Project Planning and Independent Review kickoff meeting with the primary goal to introduce the players and discuss the IR process going forward.	Kickoff Meeting	10/14/2013
Review of all pertinent materials, contracts, SOW's, project work plans and other documentation such as necessary to establish an understanding of the project(s) and proposed work being reviewed.	Documentation request to VTrans and Review of Materials. See documentation list attached.	Throughout the IR
On site meetings: Approximately 3 days on-site at State offices in Vermont collecting information and interviewing stakeholders	On site meetings and Interviews of Key Stakeholders	October 14 through 16
A teleconference call with the selected system vendor as needed.	Teleconference with New Hampshire DOT, SWRI and Leidos	October 16 through November 8th
Identification of risks and cataloging them into a risk register	Identification of Issues and Risks and cataloging into a Issues and Risk Register	Throughout the IR via the use of the ATMS/TIS Risk Review Register spreadsheet
Facilitation of a discussion of strategies to mitigate risks with OPM, Project Sponsor and Stakeholders	Facilitated multiple discussions between Stakeholders to mitigate Issues and Risks	Throughout the IR including NHDOT, SWRI and Leidos
Work with the various stakeholders to develop specific responses to each risk	Worked with Stakeholders to develop Issues and Risk responses	Throughout the IR and ongoing until IR completion.

identified.		
Work with OPM to ensure the Risk Response Plan is finalized with Sponsor before final review with CIO.	Worked with OPM to ensure the Risk Response Plan is finalized with Sponsor before final review with CIO.	Throughout the IR
Conduct other meetings and collect other information as necessary	Conducted other meetings and collected other information as necessary	Throughout the IR
Create an Independent Review report according to the Scope of Work, and deliver the draft document to the OPM	Developed an Independent Review report according to the Scope of Work, and delivered the draft document to the OPM, and VTrans	November 8, 2013
Hold an on-site meeting with the State EPMO Project Manager, DII Deputy Commissioner, Sponsors & State CIO to present the final review report and answer any questions	Held an on-site meeting with the State EPMO Project Manager, DII Deputy Commissioner, Sponsors & State CIO to present the final review report and answer any questions	Planned for December 11, 2013
Update the final report incorporating feedback and submit the final report for CIO approval. OPM will “close” out IR with CIO once all Risk response plans have satisfied the CIO.	Update the final report incorporating feedback and submit the final report for CIO approval.	To Be Determined
Via the OPM, obtain CIO sign-off to signify the acceptance of the IR deliverables at the conclusion of the IR engagement and give DII Contracts Specialist final IR and acceptance documents to close out task.	Via the OPM, obtained CIO sign-off to signify the acceptance of the IR deliverables at the conclusion of the IR engagement and delivered DII Contracts Specialist final IR and acceptance documents to close out task.	To Be Determined

3.3 Documentation Review

A variety of documents were reviewed during this study including budgets, vendor contracts, plans, vendor deliverables, and vendor proposals. Table 3 lists the documents provided to Coeur Group by the State for review during the Independent Review process.

Table 3 - Table of Documents Reviewed

Document Title or File Name	Provided By	Date
01 VT AOT-ATMS Risk Action Register V7.0 10 23 2013	Coeur Group	Weekly
01 VT ATMS IR Project Status Report 10.21.2013 V2.0	Coeur Group	weekly
01 VT AOT-ATMS Risk Action Register V5.0 10.21.2013	Coeur Group	weekly
VT AOT-ATMS Risk Action Register V4.0 10.18.2013	Coeur Group	weekly
Amazon EC2 Service Level Agreement	SWRI/Leidos	11/1/2013
Vermont MOU	Vermont	10/15/2013
SwRI Contract Comments 10-21-13	SWRI	10/30/2013
NHDOT ATMS RFP Requirements Consolidated 10-3-13	Vermont	10/17/2013
MOMA - Tri-State Restart 10-11-2013 - Most Current	Vermont	10/17/2013
ATMS_SwRI_Part_3_Contract_Agreement_Draft_v2 9	Vermont	10/15/2013
ATMS_511_TriState_MOMA_9_11_2013	Vermont	10/15/2013
ATMS_SwRI_Part_1_Contract_Agreement_Draft	Vermont	10/15/2013
ATMS_SwRI_Part_2_Contract_Agreement_Draft_v2	Vermont	10/16/2013
ATMS IR Statement of Work Agreement-Coeur	Vermont	10/14/2013
AOT ATMS Business Case and Cost Analysis - Routing Slip	Vermont	10/16/2013
AOT_ATMS_BusinessCase_CostModel	Vermont	10/16/2013
Contract Cost Review 10-9-13	Vermont	10/16/2013

3.4 Interview Schedule

The major sources of information used during the Independent Review process include interviews with Vermont DII, Vermont Agency of Transportation, New Hampshire Department of Transportation, South West Research Institute and Leidos Corporation. The following is a list of interviews performed during this Independent Review.

Table 5 - Table of Interviews

Person or Group Interviewed	People Present Curing Interview	Date of Interview
Robert T. White – VTrans ATMS/TIS system Project Lead	Jayna Guilford, Mark Peterson	10/15/2013
Richard Boes - Commissioner Department of Information & Innovation (DII)	Jayna Guilford, Mark Peterson	10/16/2013
Greg Gerdel – Agency of Commerce and Community Development	Jayna Guilford, Mark Peterson	10/15/2013
Erik Filkorn - VTrans	Jayna Guilford, Mark Peterson	10/15/2013
Tom Hurd – DOIT	Jayna Guilford, Mark Peterson	10/16/2013
Daniel Dutcher – Assistant Attorney General	Jayna Guilford, Mark Peterson	10/16/2013
Peter Kipp - Contracts and Procurement Specialist	Jayna Guilford, Mark Peterson	10/15/2013
Denise Markow – New Hampshire DOT ATMS/TIS Project Lead	Jayna Guilford, Mark Peterson	10/16/2013
Steve Lemire – New Hampshire DOTIT	Jayna Guilford, Mark Peterson	11/16/2013
Frank Costantino – DII Networks	Jayna Guilford, Mark Peterson	10/17/2013
Robert Heller – South West Research Institute – ATMS/TIS Vendor Project Manager	Mark Peterson	10/24/2013
Thomas Phillips – Leidos Corporation, TIS Vendor Project Manager	Mark Peterson	10/30/2013
Darwin Thompson – CTO For Architecture Review	Mark Peterson, Jayna Guilford	11/6/2013
Steve Dellenback – SWRI – Security and Uptime agreements	Mark Peterson	11/8/2013
John Williams – Colorado CDOT	Mark Peterson	11/5/2013

Coeur Group would like to acknowledge the significant time afforded to our Independent Review team by a number of individuals including Robert T. White, Denise Markow and Jayna Guilford.

4. PROJECT BACKGROUND

4.1 Project Historical Background

The State of Vermont's Agency of Transportation along with the NHDOT and MEDOT will implement a new regional (New England region) 511 phone and web system that incorporates road and weather information from all collaborating New England states on one website. The new 511 system will replace silo 511 systems in each state.

Currently VTrans is hosting an interim 511 system on an antiquated single GIS server in-house. The interim system utilizes Managing Assets for Transportation Systems (MATS) for the data entry and ESRI GIS services for displaying the results to the general public user on the web. Hosting 511 services in-house is not something VTrans nor the state network can currently support. Last winter during severe weather, hits to the website crippled VTrans and state network resources.

In addition to a new 511 system, the new system will also incorporate an Advanced Traffic Management System (ATMS) for managing and disseminating information from various VTrans, regional and metropolitan planning organizations transportation and weather resources. Data from all collaborating New England states will be gathered and disseminated from a central data hub hosted in the cloud. New Hampshire DOT is the lead agency on this effort.

4.2 The Project is being driven by the following needs:

Representatives from New Hampshire DOT (NH), Maine DOT (ME), and Vermont AOT collaboratively referenced herein as Tri-State along with members from Massachusetts DOT (MA), Rhode Island DOT (RI), and Connecticut DOT (CT) herein referenced as New England have been meeting and discussing the requirements for the New England Regional 511 system. A requirements matrix was drafted and utilized as the core for the RFP NH released to seek a vendor to implement the system. Like MATS, the new system will be modular based so that participating states can pick and choose the elements (modules) they need for their states' ATMS-511 system.

NH is the lead state and will contract with the selected vendor. VT and other states will develop memorandum of agreements to participate and utilize the vendor and the vendor's contracted services. Like MATS, the collaborating states will own the code. This is the unique and underlying special attraction of this system.

VT along with ME, NH, and RI were part of the Condition Acquisition and Reporting System (CARS) consortium along with seven other states. CARS was developed to provide pool funds for developing a state of the art 511 system. However over time, the vendor significantly increased pricing methods and started charging individual states for code developed for another state. After tropical storm Irene in 2011 in which VT's CARS 511

system failed miserably, it was decided to cease participation in the CARS consortium and to end the CARS 511 system in VT.

Because of the desire of Tri-State to continue to collaborate beyond what CARS could provide at a reasonable cost, NH made it clear in the RFP that Tri-State and New England would be the ultimate goal of the new system. Tri-State selected a vendor with a proven track record to implement the new system. Although the contract has not been finalized, the vendor selected has implemented ATMS-511 systems for California (CA), Texas (TX), and Florida (FL). The CA system was one of the first 511 systems implemented in the country. With the vendor's leadership, it has grown to what is now considered the standard for 511 systems in the US. The vendor has since implemented an open source ATMS – 511 system funded by TX and FL. New England will be able to utilize and enhance the code already developed for CA, TX, and FL. Utilizing and enhancing existing code that the states will own will reduce initial implementation costs, ongoing maintenance costs, and provide a continuing source of low cost enhancements as technology changes.

Pooled fund studies and projects are a great way for states with limited resources to get the most for their dollars. This IR concurs that the collaboration of Vermont, New Hampshire and Maine as the Tri-State consortium provide key savings for implementation and management of the ATMS-TIS systems. Additional collaboration with additional New England states will continue to reduce overall operating cost.

4.3 The Project is being driven by the following benefits:

The project is designed to eliminate a single point of failure (single GIS server). It will eliminate excess external traffic hitting and binding the state and VTrans networks by utilizing direct internet connectivity. It will eliminate several VTrans silos. Those silos being separate and disperse systems within VTrans including MATS (which was not designed for this purpose), adaptive signal ATMS, ESRI GIS, and multiple DBA database management systems. The new system will be one stop shopping for VTrans divisions trying to manage multi-modal and diverse systems. Because the new system will be hosted and maintained in the cloud, it will free up VTrans resources to concentrate on their primary duties.

VTrans staff that have been manually entering in, monitoring and removing data in the current system will only have to enter data in the new system with automated timestamps. The system will automatically request updates from the staff for events and if no response is given the system will automatically remove event data being displayed on the website. The new system will allow other entities not currently shown on the current system to enter and manage their event data. This will be extremely important and beneficial to towns and municipalities that maintain state highways.

Because VTrans does not have the resources to provide 24x7x365 coverage for entering, monitoring, and updating events placed into the 511 system, the new system will allow NH to provide this service. NHDOT has a fully functioning Transportation Management Center (TMC) that is staffed year round with transportation, state police, fire and emergency and

local police staff. NH TMC staff is well trained in ATMS-511 management and will easily be able to handle VT after hour's needs.

4.4 Limitations of this Review

This Independent Review of the ATMS – TIS System project is limited by:

- Availability and schedules of key Stakeholders for interviews and follow-up clarifying conversations.
- Documentation provided to Coeur Group by the State (see Documentation Table).
- Throughout this Independent Review, Coeur Group has relied on the accuracy of the documents and interviews provided by the OPM, DII, Vermont AOT, NH DOT, SWRI and Leidos Corporation.
- Throughout this IR Coeur Group has gathered input from other states and has relied on the accuracy of their input.

5. Memorandum of Maintenance Agreement (MOMA) REVIEW

5.1 Project Goal

The project goals are defined in the Business Case section II.

(Reference document - BusinessCase_CostModel_AOT_ATMS-RTW)

- Implement a new regional (New England region) 511 phone and web system that incorporates road and weather information from all collaborating New England states on one website. Implement a new 511 system that will also incorporate an Advanced Traffic Management System (ATMS) for managing and disseminating information from various VTrans, regional and metropolitan planning organizations transportation and weather resources.
- Collect key traffic Data from all collaborating New England states and disseminated information from a central data hub hosted in the cloud.
- Collectively pool transportation funds across multiple States to maximize the investment capacity of the three States
- Decrease ATMS-TIS system lifetime cost by including gaining funding from additional States in the consortium of users
- Centrally manage the ATMS-TIS system with a readily available 24 hour Traffic Management Center (TMC) with New Hampshire DOT is the lead agency on this effort.

6. ACQUISITION COST ASSESSMENT

This section provides information and analysis on the costs of the proposed Project. -

6.1 Independent Review Findings Related to Acquisition Cost

Currently available acquisition cost is identified by all Tri-State parties in the cost benefit analysis documentation. In addition, Coeur Group validated pricing with SWRI, checked 4 other states and reviewed Intelligent Transportation International for relative order of magnitude pricing for systems, then for similar systems.

Based on information comparing VTrans portion of the cost for the system modules to be installed as well as high level comparison of other state Traffic Management Systems, the cost seems reasonable.

South West Research Institute (SWRI) is the primary vendor and implementation manager selected for the technology. Costs for this system appear to be in line with industry standards and within the operational limits set by NHDOT, VTrans and Maine DOT. A comparison of cost between the three states indicates a fair and reasonable sharing percentage based largely on individual modules implemented.

Finding AC1: Project Acquisition Costs for selected modules is not final as of this report. This is due in part to ongoing negotiation with SWRI surrounding the addition of "options" to the Deliverables for NHDOT, VTrans and MEDOT.

Comments from MEDOT will be incorporated with a final contract and financial agreements distributed by December 6th. The final formalized vendor provided Project Plan will be completed upon full execution of the contract with NHDOT and SWRI. Until then, specifics surrounding the deliverables and expectations of the parties to the contract cannot be finalized.

AC1 Risk: Risk addressed and mitigation statement concurred as per AOT Project Lead. The MOMA document will need to be updated to reflect final cost for the State of Vermont. Risk identified to AOT which indicated funding is available for final plan cost. Risk identified to AOT to ensure funding is available for any potential increase in cost.

6.2 Cost Factors Reviewed

As a method of reducing overall cost, state Departments of Transportation across the country have developed consortiums for implementing common infrastructure systems. These consortiums are providing significant cost savings from current operations as well as cost avoidance for new implementations. Inherent in the consortium approach across state

boundaries are risk associated with final authority, operational management and cost impacts. These are areas reviewed with particular vigor in this IR.

The Tri-State ATMS-TIS will utilize Open Source ATMS. The Open Source code is being licensed from the State of Texas DOT through and arrangement with Southwest Research Institute (SWRI). Other states including the State of Minnesota, California, Wyoming and Wisconsin have all implemented different versions of the Open Source ATMS. Minnesota has implemented the **IRIS** (**Intelligent Roadway Information System**) and is an open-source Advanced Traffic Management System (ATMS). It is used by the Minnesota DOT to monitor and manage interstate and highway traffic.

Intelligent Transportation Systems (ITS) are generally classified in three categories which generally include:

1 Technologies with ***clear and direct benefit to an agency*** its operating costs or capital expenditures. This includes technologies such as toll collection, work order systems and transit Automatic Vehicle Location (AVL). Automatic Vehicle Location is a key example of a noted cost benefit.
2 Second are technologies and applications that ***provide direct benefit to travelers*** and includes services like 511 and travel times on message signs for freeways or transit properties. The strong use of websites, message signs and 511 for traveler information is evident. Most states have implemented these systems are many are currently modernizing the 511 systems.
3 The third group includes technologies and ***applications that collect data or optimize system performance*** for safety and mobility. This group of technologies is where concern typically exists about slow deployment. These include Automatic Vehicle Identification (AVI) specifically for trucks and automated driver logs for safety.

The ATMS system and Transportation Information System which are the focus of this Independent Review (IR) are part of category 2 above. A review of multiple State level ATMS systems by Coeur Group and review of the cost provided during the IR indicate the State of Vermont will realize benefits which include:

- GIS enabled solution for pictorial and Map based references and information.
- Save time using the automated work flow based on the optimized processes.
- Seamless access to device data from GIS Map to Inventory information.
- Elimination of data duplication and unnecessary paper documents.
- Centralized data repository and access.
- Reduce cost and increase staff efficiency
- Built with a component based architecture, facilitates easy customization and minimizes implementation efforts

- Complete web-based, 24/7 access
- Faster and more accurate traveler information
- Traveler ease of gaining local information which enables income generation from tourist
- Increased highway safety for interstate travelers

Many of these cost benefits have been associated with the Tri-State ATMS-TIS system as well as reduction in current operating cost. Although in the case of the Tri-State ATMS-TIS systems the major savings are in the two major areas:

1. Shared use of the ATMS open source code from the State of Texas DOT
2. The consortium approach of New Hampshire, Maine and Vermont sharing the initial and on-going cost of operations.

6.3 Project Cost Summary

A cost review was conducted to assess the relative cost/benefit that is anticipated for the State of Vermont as well as for the Tri-State consortium.

Key items of note include the relatively low cost of the ATMS system as compared to industry averages (as depicted in the graphic below). This is due in large part due to the reuse of the ATMS code which was developed by the State of Texas DOT and shared with other State Government DOT agencies. This in itself provides a distinct cost advantage for the Tri-State consortium and therefore the State of Vermont.

As indicated in the cost chart in figure 1 below, the Tri-State Consortium will be sharing the cost of the ATMS-TIS system purchase based upon modules implemented for the system. In addition, all three states will equally share the cost of on-going operational cost.

Basic research indicates industry cost for ATMS systems range from approximately $700,000 to over $25 million. The major differences being in the specific software modules implemented the cost of hardware, application code development, customization and capital improvements as well as the development and implementation vendor fees included in the total project cost.

In addition, it was found that systems developed and customized by other states run between $3 million and $7 million dollars for similar system capabilities. The ATMS industry cost research indicates that the Tri-State consortium cost is in the first quartile of the mean averages. The State of Vermont's portion of the Tri-State is at the low end of the first quartile of mean averages as depicted in the graphic in figure 1.

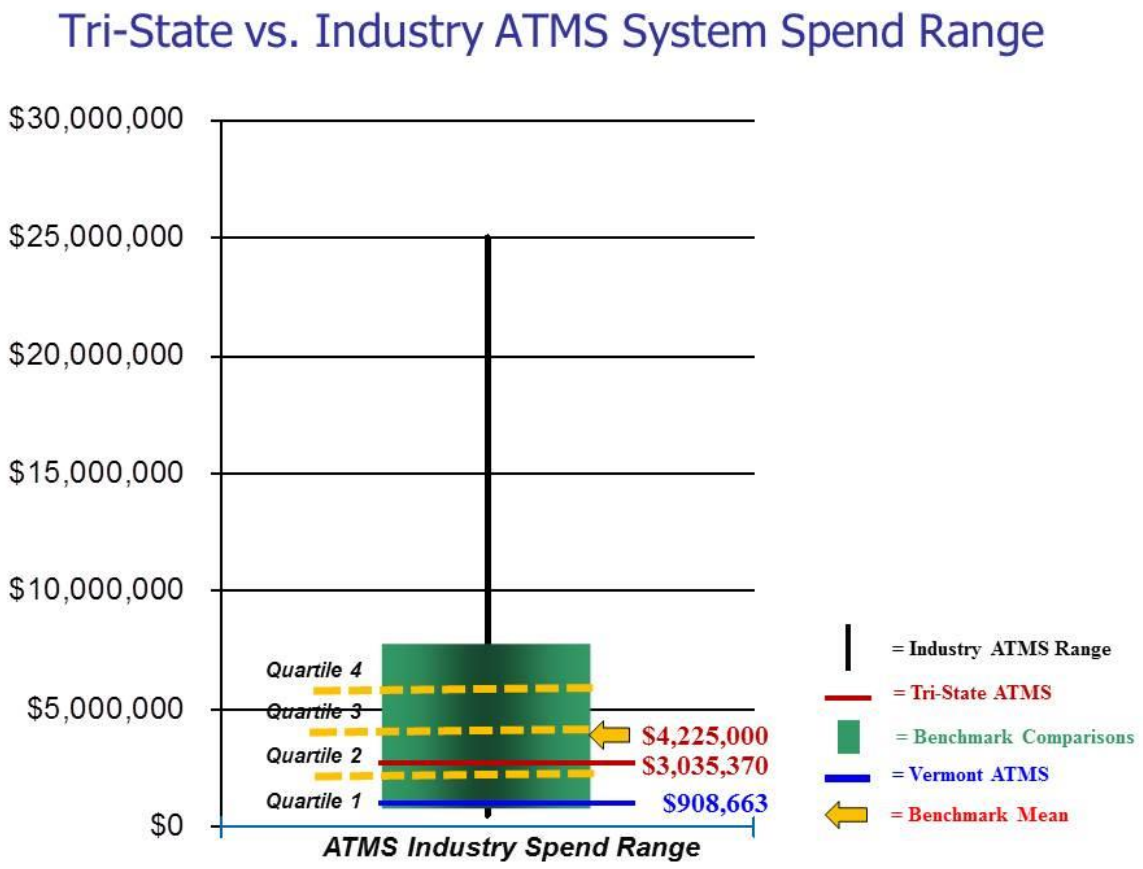

Figure 1 - ATMS Cost Range and Vermont Comparison

High level research [1]across various state and federal transportation organizations indicate that the Tri-State cost of $3,035,370 is significantly below the researched average of $4,225,000 due largely to the ability to reuse the code developed by the State of Texas DOT. With over 3 million lines of code for the Texas DOT (TxDOT) ATMS base system, the cost of purchasing custom development of a similar system would be significantly higher.

As shown in figure 1, the Vermont portion of the ATMS-TIS system cost ($908,663) are at the low end of the first quartile of comparable benchmark spending. The total Tri-State cost ($3,035,370) is at the low end of the second quartile of comparable benchmarked systems.

The hosting cost and maintenance cost for the Tri-State are shared equally as each of the systems are managed and hosted through the prime vendor SWRI.

The cost provided seems well within the normal standards for this type implementation and for a hosted solution. Benefits for long term operation would include:

[1] Basic research was conducted utilizing input from SWRI, other state Department of Transportation, U.S. Department of Transportation and Intelligent Transportation Systems International.

- Automatic updates of all application software reduces installation cost
- CoOP provided by the two cloud services providers Amazon and RackSpace reduces labor cost for VTrans.
- No increase in VTrans manpower to operate the system.
- No special training for VTrans personnel
- 24 x 7 operational support from the vendors SWRI, Leidos Amazon and RackSpace
- Reduced maintenance of systems
- Reduced implementation time for new systems
- Lower cost for upgrades and system enhancements
- VTrans avoidance of additional FTE cost

6.4 Acquisition Cost Detail

The detailed cost associated with each of the states for ATMS-TIS system modules and the first three (3) years of hosting are shown in figure 2 below.

ATMS Development			
	New Hampshire	Vermont	Maine
Deliverables	$178,876.00	$178,876.00	$178,876.00
Base Solution	$138,109.76	$138,109.76	$138,109.76
Required Modules See belov**	**$468,135.62**	**$170,892.26**	**$153,828.83**
Highly Desirable	$10,050.77	$10,050.77	$10,050.77
Acceptance Testing	$114,524.51	$114,524.51	$114,524.51
Training	$27,667.02	$27,667.02	$27,667.02
ATMS Warranty	$24,769.54	$24,769.54	$24,769.54
ATMS Capital Total	**$962,133.22**	**$664,889.86**	**$647,826.43**
Data Fusion Hub Development	$29,365.00	$29,365.00	$29,365.00
Data Hub Warranty	$10,616.00	$10,616.00	$10,616.00
TIS Development	$151,109.00	$151,109.00	$151,109.00
TIS Training & Acceptance	$26,268.00	$26,268.00	$26,268.00
TIS Warranty	$26,416.00	$26,416.00	$26,416.00
Total Capital Costs	**$1,205,907.22**	**$908,663.86**	**$891,600.43**
Hosting, M&O Costs			
Year 1 Hosting			
ATMS Hosting (99.95)	$22,471.71	$22,471.71	$22,471.71
Data Hub Hosting	$7,865.00	$7,865.00	$7,865.00
TIS Hosting (99.95)	$28,638.00	$28,638.00	$28,638.00
Hosting Total	$58,974.71	$58,974.71	$58,974.71
Year 1 M&O			
ATMS Maintenance	$66,666.67	$66,666.67	$66,666.67
TIS Maintenance	$16,587.00	$16,587.00	$16,587.00
Maintenance Total	$83,253.67	$83,253.67	$83,253.67
Maintenance & Hosting Total	**$142,228.38**	**$142,228.38**	**$142,228.38**
Year 2 Hosting			
ATMS Hosting (99.95)	$22,471.71	$22,471.71	$22,471.71
Data Hub Hosting	$7,865.00	$7,865.00	$7,865.00
TIS Hosting (99.95)	$28,639.00	$28,639.00	$28,639.00
Hosting Total	$58,975.71	$58,975.71	$58,975.71
Year 2 M&O			
ATMS Maintenance	$50,000.00	$50,000.00	$50,000.00
TIS Maintenance	$16,847.00	$16,847.00	$16,847.00
Maintenance Total	$66,847.00	$66,847.00	$66,847.00
Maintenance & Hosting Total	**$125,822.71**	**$125,822.71**	**$125,822.71**
Year 3 Hosting			
ATMS Hosting (99.95)	$22,471.71	$22,471.71	$22,471.71
Data Hub Hosting	$7,865.00	$7,865.00	$7,865.00
TIS Hosting (99.95)	$28,612.00	$28,612.00	$28,612.00
Hosting Total	$58,948.71	$58,948.71	$58,948.71
Year 3 M&O			
ATMS Maintenance	$33,333.33	$33,333.33	$33,333.33
TIS Maintenance	$17,100.00	$17,100.00	$17,100.00
Maintenance Total	$50,433.33	$50,433.33	$50,433.33
Maintenance & Hosting Total	**$109,382.04**	**$109,382.04**	**$109,382.04**

Figure 2 - Acquisition Cost Table from MOMA

6.5 Cost Comparison Between Tri-State Consortium Members

Coeur Group - Acquisition Cost Assessment IR Comments:

The information available for acquisition cost review was provided in (BusinessCase_CostModel_AOT_ATMS-RTW). This Cost model provides detailed cost information based on the currently available system configurations and implementation plans.

A Cost Analysis of the Tri-State provides the only relative comparison to see if Vermont's Cost is fair and relative to the cost of NH and ME.

Based on the chart in figure 4 below, the IR concludes that New Hampshire is starting with more ATMS capability (modules) than Vermont or Maine. The documentation (Cost Review 8-23-13 TIS SAIC.xls) provided the information below for comparison.

Coeur Group Comment: Based on the Tri-State comparisons, Vermont is receiving the 4 Base System Modules common to each state as well as a modified Weather (RWIS) module.

ATMS Modules/Requirements for NH, VT & ME				
3-state Base Modules	New Hampshire	Vermont	Maine	Comments
Event Management	**Note this module also contains requested modifications for all three states.**			
DMS/VSL	Use Base Module	Use Base Module	Use Base Module	
Performance Measure Reports	Use Base Module	Use Base Module	Use Base Module	
Weather (NWS)	Use Base Module	Use Base Module	Use Base Module	
State specific modules				
Weather (RWIS)	Add modifications to system module	Add modifications to system module	Not included in original pricing proposal	See original proposal worksheet for $19,151,75 cost- this should be
Weather (1086)	Add requirements to system for NH	Not included in original pricing	Not included in original pricing	
Travel Times	Add modifications to system module	Not included in original pricing proposal	Not included in original pricing proposal	
SP Cadd Integration	Add modifications to system module	Not included in original pricing proposal	Not included in original pricing proposal	
Video	Use Base Module	Not included in original pricing proposal	Not included in original pricing proposal	NH to use base module for now
VSL's	Added to DMS base module	Not included in original pricing proposal	Not included in original pricing proposal	Requirements merged with DMS base module for NH
Functionality to include at a later date:				
Twitter	Not included	Not included	Not included	NH Removed requiremen
Stream Guage	Not included	Not included	Not included	NH Removed requiremen
Vehicle Detector Sensor	Not included	Not included	Not included	Will incorporate later
AVL	Not included	Not included	Not included	
WIM	Not included	Not included	Not included	
VOIP	Not included	Not included	Not included	

Figure 3 - ATMS Module Comparison for the Tri-State Implementation

As shown in the Table in figure 4, Vermont is participating in 30.23% of the capital cost due to the number of modules selected for implementation by SWRI. Vermont will share equally in the cost for Hosting. It is anticipated by VTrans that the cost of Hosting will be reduced over time as other consortium states, notably Connecticut, Massachusetts and Maryland may join in utilization of this ATMS-TIS System in the near future.

ATMS Development						
	New Hampshire	Vermont	Maine	NH %	VT %	ME %
Total Capital Costs	**$1,205,907.22**	**$908,663.86**	**$891,600.43**	40.11%	30.23%	29.66%
Hosting, M&O Costs						
Year 1 Hosting						
Maintenance & Hosting Total	**$142,228.38**	**$142,228.38**	**$142,228.38**	33.33%	33.33%	33.33%
Year 2 Hosting						
Maintenance & Hosting Total	**$125,822.71**	**$125,822.71**	**$125,822.71**	33.33%	33.33%	33.33%
Year 3 Hosting						
Maintenance & Hosting Total	**$109,382.04**	**$109,382.04**	**$109,382.04**	33.33%	33.33%	33.33%

Figure 4 - Percentage of Cost Sharing for the Tri-state MOMA

Other Comparison Indicators

It is difficult to provide a side by side comparison of cost/benefit for the Tri-State ATMS-TIS system with any of the other statewide systems as they all have different modules implemented. States reviewed also utilized different system manufacturers and implementation vendors. However for a State to State comparison of the Tri-State, figure 5 below provides some comparable factors.

State	Interstate Roads	Interstate Miles	% of Tri-State Miles	# Visitors Per Year	% total	State Population	% Total Pop	ATMS cost	% of Total Cost
Vermont	I-89, I-91, I-93, I-189, I-289	320	35%	13,700,000	17.65%	626,000	19%	$908,683	29%
New Hampshire	I-89, I-93, I-95, 1-293, I-393	224	25%	33,900,000	43.69%	1,275,000	40%	$1,295,107	42%
Maine	I-95, I-195, I-295, I395, I-495	366	40%	30,000,000	38.66%	1,321,505	41%	$891,600	29%
Totals		**910**		**77,600,000**		**3,222,505**		**$3,095,390**	

Figure 5 - Tri-state Comparison of ATMS-TIS Cost vs. State Indicators

Some additional comparisons were developed to understand the relative value for each state in regards to their percentage of the program. Although each of the three states has different modules selected for implementation, a comparison is shown in the figure below. The State of New Hampshire is covering the majority of the cost as they also have almost twice the cost for customized modules selected as do Vermont or Maine. In relation to the total, cost comparisons, Vermont is paying 29% of the total. In a comparison to total

Federal Interstate miles (which is the primary focus of the ATMS-TIS system utilization), Vermont has 35% of the interstate miles with 29% of the system cost compared with 42% of the interstate miles for New Hampshire and 42% of the total system cost.

It should be noted that the New Hampshire DOT is utilizing its Traffic Management Center (TMC) to provide Vermont with 24 hour 7 day per week coverage of the system support and management. This is also included in the cost comparison.

Other State Comparisons

As an example for other state 511 systems, the Colorado DOT's Transportation Management System (CTMS) has currently spent over $25 million in federal and state dollars invested to date. The project includes deployment activities such as port-of-entry automation, dynamic message signs, closed circuit television, and other system improvements over the last couple years.

In addition checks were made with South Carolina DOT and Colorado DOT to gain insight on comparable pricing. Both this DOT's use a different vendor system and neither entity could provide any comparison modules with those of the Tri-State systems.

Current ATMS vendors contacted will not provide comparison cost for similar configurations of an ATMS-TIS system. Other states systems are customized configurations and many include cost for road right of way camera, sensing devices and (Automatic Vehicle Identification) AVI devices. These vendors are in a highly competitive market and competing for significant federal transportation funding for their projects and will not provide cursory project pricing.

Coeur Comment: The Cost Analysis for this IR indicates that the State of Vermont is paying a fair price for the product modules, services and operational management of the ATMS-TIS system. In addition, the Tri-State consortium is an advantageous approach for increasing value to the State of Vermont as well as reducing cost of large system implementation and ongoing operational cost impacts.

7. TECHNICAL ARCHITECTURE REVIEW

This section provides information on the technical overview of the proposed Project. This section looks at the Projects, technical capacity to meet the needs of the stated objectives.

7.1 Independent Review Findings Related to Technical Architecture

Finding AR1: The technical escalation plan must be an integral part of the vendor's implementation plan. Discussions with the NHDOT project lead and the AOT Project Lead and the vendor indicated that they understood the need and will incorporate the technical escalation plan into the vendor's implementation plan.

AR1 Risk: Risk is still inherent and a Technical Escalation Plan should be completed by NHDOT and SWRI prior to the completion of the Project Planning phase and shared with VTrans.

Finding AR2: A Security review was conducted with DII, NH DoIT and SWRI to ensure the solution has no access to sensitive information on the Vermont network. Security protection is defined in the MOMA and SWRI response is listed below. The MOMA indicates that the NHDOT will approve the vendor's security plan.

AR2 Risk: Risk addressed with New Hampshire Department of Information Technology (NHDOIT). Risk is not mitigated until the security plan is completed prior to the completion of the Project Planning Phase.

Finding AR3: Research found that CoOp plans will be provided and technical escalation management is to be integrated into the support plans. A Disaster Recovery Plan, or better known in the industry as the Continuity of Operations Plan (CoOP), is part of the Cloud computing environment provided to SWRI from Rackspace.

AR3 Risk: Risk addressed with AOT Lead. Risk will be mitigated when NHDOT has SWRI develop the CoOp plan prior to completion of the Planning phase of the project. NHDOT and SWRI indicated this will be part of the implementation plan.

Finding AR4: Operational Uptime Guarantees
The findings indicate the Service level Agreements will be part of the NHDOT contracted Service with the prime vendor SWRI. Due to the multiple levels of vendors involved it was determined that the vendor direct comments should be included here to ensure no misinterpretation of intent.

AR4 Risk: Risk addressed with NHDOT and NHDOIT. Risk mitigation will require AOT Project Lead to monitor contracted uptime reporting.

Finding AR5: The State-Wide WAN/LAN impact is likely minimal, however unknown for purposes of this IR. An increase in network traffic via the Traveler Information System (TIS) may result in the next few years. However based upon minimal internet traffic to support this implementation the impact is anticipated to be minimal. Monitoring of the actual traffic associated with the project must be maintained to ensure it remains a minimal impact and understood during the testing phase of implementation. Tools and processes should be in place to ensure the traffic is monitored and properly managed.

AR5 Risk: Risk addressed with AOT Lead. Risk mitigation steps need to be taken to identify network loading during the ATMS-TIS system testing phase as called out in the MOMA

Finding AR6: The technology selected and identified in the MOMA is adequate to support the needs to the VTrans business for the new 511 processes.

AR6 Risk: Risk mitigation for the MOMA items identified as potential risk should be mitigated and signed off prior to the completion of the Project Planning Phase.

Finding AR7: Enterprise Architecture impacts were reviewed with Vermont DII. A discussion about areas of concern for DII regarding the ATMS-TIS system being hosted by SWRI and hosted at RackSpace and Amazon was conducted. Additional reviews were conducted with NH DOIT to ascertain what architecture impact might be present as the ATMS-TIS system is implemented.

AR7 Risk: No significant risk was identified due to the ATMS-TIS web based application. Only the local PC cache will hold ATMS information. Since the application (ATMS) will be hosted by Amazon or RackSpace, there will be no hardware or software within the responsibility of DII for the State of Vermont.

Finding AR8: Policy compliance by the vendor's is defined in the MOMA. The MOMA stipulates compliance with the State of NHDOT and NH DoIT policies. During the course of the project implementation it will be the responsibility of the AOT Project Lead to continually ensure that policy changes or new policies are addressed in the Change Control Board meetings and that any changes are in compliance with the State of Vermont's policies.

AR8 Risk: Risk still exists until these are confirmed with the VTrans Assistant Attorney General. Risk will be mitigated as the AOT Project Lead works with NHDOT lead to ensure policies enacted throughout the project implementation are consistent with those of the State of Vermont.

7.2 Support for the State's Strategic Enterprise Systems Direction

The DII web site as of June 3, 2013 states that its strategic direction is moving toward Private Cloud computing.

This ATMS/TIS system is a vendor-hosted server based system. Cloud implementations are the preferred method for future systems for the State of Vermont. The justifications for a Private Cloud are accessibility of data and reduced resource needs, which allows the State of Vermont government agencies to focus on providing core mission and less on data access and personnel management. Furthermore a Cloud based solution allows VTrans to pay only for the resources needed and used.

Coeur Group views the use of Cloud Services as aligned with DIIs stated objectives for Architecture. In addition, both systems (ATMS and TIS) utilize industry leading Cloud providers and this is recognized by Gartner Group.

In both cases (ATMS and TIS) the systems are hosted by third Party Vendors (Amazon and RackSpace) and directly managed by SWRI, with NHDOT being the State of Vermont's "Service Manager".

AR1 Risk: Risk is still inherent and a Technical Escalation Plan should be completed by NHDOT and SWRI prior to the completion of the Project Planning phase and shared with VTrans.

7.3 Technology Architecture Review

Indications from interviews with SWRI, Leidos, NH DoIT, AOT CIO and DII indicate that there should be minimal impact on the current DII architecture for these systems.

The Technology Architecture for this project will have minimum impact as none of the technology or application software interface with any of the State of Vermont's network other than via a Pc web browser. The Cloud Hosting approach provides all hardware for system operation in the form of Software as a Service (SaaS). The SaaS is hosted by two different cloud providers.

The Advanced Traffic Management System (ATMS) is provided and implemented by Southwest Research Institute. SWRI will be using RackSpace as the cloud service provider to host the system. RackSpace provides a facility for this operation in Chicago Illinois.

Rackspace Basic Cloud Architecture

Gartner Group identified Rackspace is a major player in the cloud storage ecosystem, with its Cloud Files service augmented by a robust set of accompanying services,

including compute infrastructure and a Content Delivery Network (CDN) powered by Akamai. For high-performance storage needs, it has Cloud Block Storage, which has high input-output capabilities. RackSpace Hosting Cloud Files are served from 219 Akamai CDN edge locations across the globe, including the site in Chicago were the TIS system will be hosted. In the case of the TIS system, SWRI is responsible for data transfer from RackSpace to its internet connection.

Appropriate Architecture for Cloud Service

The following is an excerpt from RackSpace Regarding its duplication: RackSpace utilizes VMware® vCenter™ Site Recovery Manager™ in concert with Rackspace Array-based Replication to deliver fast, reliable recovery thanks to automated processes and non-disruptive testing. The combination of SRM and Array-based Replication helps you protect your critical data. It also allows you to group VMs based on dependencies and prioritize their recovery in order to meet your RPO and RTO targets.

In addition RackSpace utilizes VM Replication, Data Base Replication, Array-Based Replication and DNS Failover processes.

Amazon Cloud Services Architecture

Gartner research indicates Amazon Web Services is considered a market leader in cloud storage and services. It's been an early and aggressive player in the market and its services drive offerings from competitors. Amazon defines its storage as Simple Storage Service (S3) which is its basic object storage. As part of the storage architecture Amazon utilizes Elastic Block Storage is for storage volumes that can be attached to S3 instances or set aside temporarily.

The following is an excerpt from Amazon Regarding its duplication: Amazon RDS allows you to run your DB Instances in Amazon Virtual Private Cloud (Amazon VPC). Amazon VPC enables you to isolate your DB Instances by specifying the IP range you wish to use, and connect to your existing IT infrastructure through industry-standard encrypted IPsec VPN. To learn more about Amazon RDS in VPC, refer to the Amazon RDS User Guide.

Coeur Point: From the perspective of this MOMA it is beyond the scope of this IR to further define the storage architecture of the cloud service providers. However this IR has researched both companies' storage architectures and they are utilizing current industry standard methods for short and long term cloud storage. See pages 40 and 41 of this document for detailed response from SWRI regarding uptime guarantees from Amazon and RackSpace.

Further detail for cloud storage failover, recovery time objectives and data backup and Service Level Agreements (SLAs) are defined in Contract 2013-051-Part 3 Exhibit G on page 32 of the document.

7.4 Security Analysis

The system security is addressed in the MOMA in Exhibit E. The MOMA states that the ATMS-TIS security MUST meet as a minimum the State of New Hampshire's DOT and DOIT security standards.

The project calls for generally acceptable security methods including the use of virus protection, network monitoring tools and methods, as well as internet firewalls where needed. The AOT Project Lead has the responsibility to ensure its standard Web Browser security is in place and operational.

State of Vermont Security Standards

The State of Vermont has information security policies that apply to hardware and digital media and are found at http://dii.vermont.gov/Policy_Central. Agency specific confidentiality and privacy policies may also apply. These may include, but are not limited to:

- **The State Information Security Best Practice Guideline at:** http://vermontarchives.org/records/standards/pdf/InformationSecurityBestPractice_Ef.20090501.pdf

Coeur Group Comment: Security statements within the MOMA (as indicated above) and discussions with SWRI, New Hampshire DOT and DOIT as well as AOT CIO and DII CTO indicated that the security for the ATMS-TIS systems should have sufficient safeguards for the implemented systems.

AR2 Risk: Security risk was addressed with NHDOIT. Although NH DOIT has provided their security policies the security risk is not mitigated until the security plan is completed prior to the completion of the Project Planning Phase.

A review of the security for the systems is limited to the statements documented in the MOMA and interviews with NH DoIT Security personnel and SWRI. The NH DoIT provided the following statement (in **BLUE** text):

"The Security Design shall be approved by NHDOT and DoIT before Preliminary System Design acceptance."

Below are the locations within the contract where system security is referenced.

- The RFP references the NHDoIT Vendor Resources Web-site for NHDOIT security standards and guidelines at: http://www.nh.gov/doit/internet/vendors.php which contains the NH Application Security Policy and security guidelines.

- Contract Agreement – Part 2 section 4.5 Page 16 references the sections of the contract and RFP documents related to security of the states' data and systems.
  - All components of the Software shall be reviewed and tested to ensure they protect the State's hardware and software and its related Data assets. See RFP Section 2.2.1 – *Preliminary System Design, Security Diagram, Contract Agreement Part 3, Exhibit E-1: Security and Infrastructure* and *Contract Agreement –Part 3 – Exhibit F: Testing* for detailed information on requirements for Security testing.
  - In addition to the sections of the RFP and the Contract documents, the Requirements Matrix includes general security requirements and hosting security requirements that the vendor has to meet.
  - In addition, the test plan documented in Part 3 Exhibit F Testing includes a verification process that will be used to ensure security of the system.
  - Contract Agreement Part 2 Use of State's information, Confidentiality
  - The Security Section Contract Part 3 Exhibit E-1 requires 24 x 7 monitoring and management against network intrusion attacks.
  - BAFO Matrix includes security requirements

A review of the Security plans by NH DoIT, indicate they will Security associated with the ATMS-TIS systems have been noted in the MOMA. The risk will be mitigated to a minimal extent if a security review is completed by NH DoIT prior to the completion of the Implementation phase of this project. For purposes of this MOMA the NH DoIT security policy and standards indicate restricted access to secure data as well as public data gathered by the TIS system.

The MOMA states that the Preliminary System Design shall include Security Diagram(s) that show interconnections between the separate networks (i.e. NHDOT, VTrans, & Maine DOT IT Networks, Vendor networks, etc.) and what ports are open/closed in the diagram.

The MOMA commits SWRI and the NH DOT to ensure that appropriate levels of security are implemented and maintained in order to protect the integrity and reliability of the Tri-State consortium (States') information technology resources, information, and services according to NH DoIT standards.

The MOMA States that as a minimum, the security design shall include:

- Data center physical security and access control.
- Virtual Private Network (VPN) connectivity for user access to the ATMS servers granted on an as needed basis.
- Firewall network protection granted on an as needed basis for network connectivity to the ATMS servers. The ATMS servers will reside behind a second firewall to provide additional security from the Data Fusion Hub servers that interact with data exchange clients over the Internet.
- Carefully controlled access to user account credentials for physical and virtual servers. Periodic password credential changes will be mandatory.
- 24x7 monitoring and management against network intrusion attacks

The Security Design shall be approved by NHDOT and NHDoIT before Preliminary System Design acceptance.

7.5 Disaster Recovery Plan

Because this Project calls for a Cloud based or Hosted solution, the selected Cloud vendor is responsible to meet all MOMA defined requirements for Cloud based Disaster Recovery.

The ATMS system will be hosted in Cloud Services provided by RackSpace, Inc. on servers in the Chicago area. The Service Level Agreement standards are listed below in paragraph AR4. Continuity of Operations (CoOP) compliance for the data and system site separation are well removed from the local area in case of natural disasters or other localized damaging elements and exceed the Federal Government guidelines of over 50 miles from the user source.

The TIS system managed via Leidos, Inc. will reside on Cloud based servers at Amazon Cloud services. In this case the Amazon Cloud Services provide additional backup support via a split location of Amazon East or Amazon West.

In both cases (ATMS and TIS) the systems will be supported by CoOp plans provided by the vendor SWRI as well as a technical escalation management integrated into the support plans. Risk will be mitigated when the CoOP is completed by SWRI prior to the completion of the Project Planning Phase.

AR3 Risk: Risk addressed with AOT Lead. Risk will be mitigated when NHDOT has SWRI develop the CoOp plan prior to completion of the Planning phase of the project. NHDOT and SWRI indicated this will be part of the implementation plan.

Operational Uptime Guarantees

The ATMS system will be hosted in Cloud Services provided by RackSpace, Inc. on servers in the Chicago area. This provides additional Continuity of Operations (CoOP) compliance as the data and system are well removed from the local area in case of natural disasters or other localized damaging elements.

The TIS system managed via Leidos, Inc. will reside on Cloud based servers at Amazon Cloud services. In this case the Amazon Cloud Services provide additional backup support via a split location of Amazon East or Amazon West.

The findings indicate the Service Level Agreements will be part of the NHDOT contracted Service with the prime vendor SWRI. Due to the multiple levels of vendors involved it was determined that the vendor direct comments should be included here to ensure no misinterpretation of intent.

AR4 Risk: Risk addressed with NHDOT and NHDOIT. Risk mitigation will require AOT Project Lead to monitor contracted uptime reporting. The following are responses received from the prime SWRI regarding uptime guarantees and are in BLUE text:

Both the ATMS and TIS will be using hosting services from high reputation, well known cloud service provider companies.

- **Coeur Group Request: How do Amazon and/or RackSpace guarantee this uptime?**
    a. ATMS (on Rackspace): Guarantees: 100% Network Uptime and 1-Hour Hardware Replacement backed by our SLA. You can find the details regarding credits here: http://www.rackspace.com/managed_hosting/support/servicelevels/managedsla/ Note from Rackspace: this is our guaranteed uptime via SLA, our true network uptime track record has been 99.999% based on ping power and pipe up through compute calculated using actual minutes per month over the last 12 quarters.
    b. TIS: (Amazon): will be using multizone deployment without shared production servers so single zone outage will not affect the TIS. Such architecture is recommended by Amazon to leverage their 99.95% availability in SLA. In addition the TIS will have disaster recovery system as a warm stand-by in different Amazon Web Services region (e.g. East vs. West Coast) to provide recovery options in case of regional outage and guarantee Recovery Time objective. Stand-by system will be kept in synch with primary system using log and data backup "shipping" at predefined frequency to guarantee Recovery Point objective.
- **Coeur Group request: What is contracted for?**

These are the up-time we have included in our proposal negotiation over the last several months – the vendors are potentially offering higher levels of service:

    a. ATMS: 99.95%
    b. TIS: 99.9%
- **Coeur Group request: Does a Service Level Agreement exist?**
    a. ATMS: see the managed SLA above
    b. TIS: http://aws.amazon.com/ec2-sla/
- **Coeur Group Request: What are the penalties, if any for missing this uptime?**
    a. ATMS: from Rackspace
        i. 100% Network Uptime: We guaranty that our data center network will be available 100% of the time in a given month, excluding scheduled maintenance. The data center network means the portion of the Rackspace network extending from the outbound port on your edge device to the outbound port of the data center border router and includes Rackspace managed switches, routers, cabling. Rackspace Guaranty: We will credit your account 5% of the monthly

fee for each 30 minutes of network downtime, up to 100% of your monthly fee for the affected server.

ii. Infrastructure: We guaranty that data center HVAC and power will be functioning 100% of the time in a given month, excluding scheduled maintenance. Power includes UPSs, PDUs and cabling, but does not include the power supplies on your servers. Infrastructure downtime exists when a particular server is shut down due to power or heat problems. Rackspace Guaranty: Rackspace will credit your account 5% of the monthly fee for each 30 minutes of infrastructure downtime, up to 100% of your monthly fee for the affected server(s).

iii. Hardware: We guaranty the functioning of all server hardware components and will replace any failed component at no cost. "Hardware" means the processor(s), RAM, hard disk(s), motherboard, NIC card and other related hardware included with the server. Hardware replacement will begin once we identify the cause of the problem. Hardware replacement is guaranteed to be complete within one hour of problem identification.

Rackspace Guaranty: We will credit your account 5% of the monthly fee per additional hour of downtime, up to 100% of your monthly fee for the affected server(s).

Coeur Group Comment: AOT Project Lead will be responsible for follow-up with New Hampshire Project Lead to ensure security standards and uptime guarantees are included onto the final version of the MOMA contract Exhibit J.

7.6 State-wide WAN/LAN Impact

Impact to the Vermont State-wide WAN/LAN is expected to be minimal. Most information is transmitted via the Internet using independent internet connections at each Agency and the State connection for the Transportation Department.

The internet browser presentation layer traffic is the extent of the impact to the DII network. As noted in the risk findings, the traffic loading must be an item for testing during the project testing phase to determine any adverse effects to the Vermont network.

AR5 Risk: Risk addressed with AOT Lead. Risk mitigation steps need to be taken to identify network loading during the ATMS-TIS system testing phase as called out in the MOMA.

7.7 Ability of the Technology to Support the Business Needs

The Proposed Technology approach (utilization of Cloud Services) affords VTrans the opportunity to take advantage of considerable efficiencies, both technical and procedural.

The Technology will be accompanied by a review of business processes and a re-engineering of those that can benefit from revision. From the perspective of the current 511 System, the proposed Technology dramatically reduces the risk of a system wide failure. The proposed Technology positions the VTrans to act on increasing vacationer and traveler opportunities through ability to implement new promotional programs, better access to traveler data, and opportunities for improved efficiencies, leading to better customer service, reduced costs, and increased State of Vermont revenue generation.

AR6 Risk: Risk mitigation for the MOMA items identified as potential risk should be mitigated and signed off prior to the completion of the Project Planning Phase.

AR7 Risk: No significant risk was identified due to the ATMS-TIS web based application which will reside on VTrans PCs. Since the application (ATMS) will be hosted by Amazon or RackSpace, there will be no hardware or software within the responsibility of DII for the State of Vermont.

7.8 Vendor Compliance to Required Project Policies, Guidelines and Methodologies

At the time of this IR, NHDOT and NH DoIT policies were being reviewed by the Assistant Attorney General to validate compliance in the MOMA. Differences in policy between NH DOT and VTrans must be managed by the VTrans ATMS-TIS Project Lad. Risk still exists until these are confirmed with the VTrans AG.

Agency specific confidentiality and privacy policies may apply. These may include, but are not limited to:

- **The State's Information Technology Policies & Procedures at**: http://dii.vermont.gov/Policy_Central
- **The State's Record Management Best Practice at:** http://vermontarchives.org/records/standards/pdf/RecordsManagementBestPractice.pdf
- **The State Information Security Best Practice Guideline at:** http://vermontarchives.org/records/standards/pdf/InformationSecurityBestPractice_Ef.20090501.pdf
- **The State Digital Imaging Guidelines at:** http://vermont-archives.org/records/standards/pdf/RecordsManagementBestPractice.pdf
- **The State File Formats Best Practice at:** http://vermont-archives.org/records/standards/pdf/FileFormatsBestPractice_Eff.20071201.pdf

- **The State File Formats Guideline at:**
  http://vermont-archives.org/records/standards/pdf/FileFormatsGuideline2008.pdf
- **The State Metadata Guideline at:**
  http://vermont-archives.org/records/standards/pdf/MetadataGuideline2008.pdf
  how media, such as the hard drives sent from VENDOR, is disposed of.

AR 8 Risk: Risk still exists until these are confirmed with the VTrans Assistant Attorney General. Risk will be mitigated as the AOT Project Lead works with NHDOT lead to ensure policies enacted throughout the project implementation are consistent with those of the State of Vermont.

7.9 Vendor Management responsibility

The MOMA positions NHDOT as the project manager and as the on-going 511 system Service Manager for the Vermont AOT and Maine DOT. The contract contained in Contract 2013-051-Part 3 defines the responsibilities of SWRI and NHDOT as managers of the contract and resulting services to New Hampshire DOT, Vermont AOT and Maine DOT.

Coeur Group - Architecture IR Comments:

The architecture impact from this implementation of the ATMS-TIS system will have minimal loading on Vermont's technology architecture and network. Review of any ATMS software upgrades was discussed and found that the impact is limited to updating the Vermont VTrans user PC web browser cache. This should have little or no impact on the Vermont's technology architecture.

Coeur Point: It is determined for the purposes of this MOMA IR, that risk areas for Architecture and security aspects should be mitigated if the NH DOT Project Lead ensures inclusion of the mitigation items in the Project Planning Phase with the prime vendor SWRI.

8. ASSESSMENT OF IMPLEMENTATION PLAN

This section provides information and analysis on the implementation plan for the proposed Project. It addresses the proposed timeline, vendor management and implementation approach, the training methodology, and other considerations when relevant.

8.1 Implementation Plan Assessment

An implementation plan was assessed and validated against large project implementation norms. Key information for the implementation plan IR was taken from the MOMA with additional discussions held with both the prime vendor (SWRI) and the sub vendor for the TIS system (Leidos). A review of the Implementation Plan was performed. The full implementation plan is contained in the document (ATMS_SwRI_Part_3_Contract_Agreement_Draft_v2 16).

Exhibit J documents the proposed Work Plan from SWRI to the State of New Hampshire. The overall timeline is shown below

CONTRACT 2013-051- PART 3
EXHIBIT J
WORK PLAN OVERVIEW

Coeur Group comment: This Implementation Plan provides the level of detail expected in a contract for development, testing and implementation services. In addition, the New Hampshire DoIT organization has defined Software Development Life Cycle policies in place to validate the vendor development plan.

8.2 Key Findings and Identified Implementation Plan Risk Summary

Finding IP1: The implementations plan provided by SWRI is contained in the document (ATMS_SwRI_Part_3_Contract_Agreement_Draft_v2 9) and contains sufficient timeline detail for a MOMA agreement.

IP1 RISK: No inherent risk, however any risk will be mitigated when the Implementation Plan is signed off by NHDOT.

Finding IP2: It will be the responsibility of the New Hampshire DOT Project Lead to ensure that all items listed are defined and documented in the final and approved Implementation Plan.

IP2 RISK: Risk addressed. Risk will be mitigated when the Implementation Plan is signed off by NH DOT.

Finding IP3: A complete Continuity of Operations (CoOP) plan will be part of the project implementation plan by SWRI and Leidos. The Leidos project manager has supplied the New Hampshire DOT project lead with a Coop template for this purpose. A technical issues escalation plan will also become part of the final project plan which SWRI will provide the NHDOT.

IP3 RISK: Risk will be mitigated when NH DOT signs off on the completed MOMA and the vendor provides the CoOP plan prior to completion of the Project Planning phase.

Finding IP4: Business Terms and Process: Initial concern for business terms were that specific authority for final decision making was not defined clearly in a number of paragraphs.

Risk has been mitigated as final authority has been clarified and now resides with the State of New Hampshire DOT Project Lead and Change Control Board Chair.

IP4 RISK: Resolution: Risk Mitigated

Finding IP5: Technology Implementation Vendor Management: Initial concern was that there was no documented escalation process for technical issues during project implementation. Since there are four separate vendors plus NHDOT and VTrans in the implementation structure it was imperative that a technical problem escalation path was included in the MOMA. It was recommended that a reference to the escalation plan be provided in the MOMA.

IP5 RISK: This risk should be mitigated prior to the completion of the Project Planning phase with a defined Technical Escalation Plan. SWRI has provided NH DOT with a template for a Technical Escalation Plan. If the plan is put in place, this risk will be mitigated.

Finding IP6: New Hampshire Operational and Service Plan: The initial concern for risk was a lack of a clearly defined vendor management plan after the implementation and go live phase of the systems. This process would include a service level management agreement with SWRI. At this point sufficient evidence was provided during the vendor interviews with SWRI and Leidos to provide assurances that service level agreements will be completed prior the end of the Project Planning phase.

IP6 RISK: Resolution: Risk Mitigation completed for MOMA purposes as the Service Level Agreement (SLA) is defined in the MOMA. However the SLA will need ongoing management from NHDOT.

Finding IP7: Network Connectivity: A concern for network connectivity and impact on the State of Vermont's network architecture were identified initially as a risk. After interviews with SWRI and Leidos, and based upon limited internet traffic required for system operation, it seems reasonable that there will be minimum impact on the State of Vermont's network. All updates and transactions to VTrans PCs will be Internet based to the web browser only.

IP7 RISK: Resolution: Risk Mitigation completed for MOMA Purposes.

Finding IP8: The project plan contained in the document (ATMS_SwRI_Part_3_Contract_Agreement_Draft_v2 9) is detailed and addresses all critical issues of standard CMMI and project management disciplines. Leidos is both Capability Maturity Model Integration (CMMI) compliant and ISO 9001 certified.

IP8 RISK: No risk determined.

Finding IP9: It was determined that a full and detailed implementation plan will be provided to the NHDOT project lead once the initial project planning stage is competed. This item is still at risk until the full Implementation Plan is finalized prior to the completion of the Project Planning phase.

IP9: RISK: No risk determined

8.3 The Reality of the Plan and Timetable

The implementation plan calls out a specific timeline for key events and milestones. The timeline in the MOMA is shown below and provides details on the activities and deliverables and the time frame in which they will happen after the project initiation.

The full implementation plan is documented in the updated contract dated 12/19/2013 named: ATMS_SwRI_Part_3_Contract_Agreement_Draft_v2 16

Activity, Deliverable or Milestone	**Deliverable Type**	**NTP + date**
Complete Project Kickoff Meeting	Non Software	NTP + 1 week
Status Meetings	Non-Software	Weekly
System Performance Measures/Data Reports	Written	NTP + 45 days
Project Work Plan	Written	NTP + 60 days
Project Schedule	Written	NTP + 60 days
Existing System Memoranda*	Written	14 days prior to system design
Preliminary System Design:	Non Software	NTP + 90 days
System Installation/Migration Plan*	Written	NTP + 90 days
Configuration Management Plan	Written	NTP + 100 days
Final System Design:	Non Software	NTP + 128 days
Final System Requirements Matrix	Written	NTP + 6 mo
System Development Test Plan	Written	NTP + 7 mo
Software Development		
TIS Development Milestone 1	Software	NTP + 5 mo
Map & Map Tiles Integration Test Report	Written	NTP + 6 mo
TIS Development Milestone 2	Software	NTP + 6 mo
TIS Development Milestone 3	Software	NTP + 7 mo
Minimum Video Management Integration Test Report	Written	NTP + 7 mo
Misc (Coordinate, Joystick, Bookmarks) Integration Test Report	Written	NTP + 7 mo
User Interface Changes (Spell Check, etc.) Integration Test Report	Written	NTP + 7 mo
TIS Development Milestone 4	Software	NTP + 8 mo
Event Management Modifications Integration Test Report	Written	NTP + 9 mo
TIS Development Milestone 5	Software	NTP + 9 mo
Third Party Travel Time Integration Test Report	Written	NTP + 9 mo
Performance Measures Integration Test Report	Written	NTP + 10 mo
TIS Development Milestone 6	Software	NTP + 10 mo
1201 Feed Integration Test Report	Written	NTP + 10 mo
Event Management Highly Desirable Integration Test Report	Written	NTP + 10 mo
Logging Archiving, Device Testing Integration Test Report	Written	NTP + 10 mo
Weather (NWS, 1086 & RWIS) Integration Test Report	Written	NTP + 11 mo

Activity, Deliverable or Milestone	Deliverable Type	NTP + date
TIS Development Milestone 7	Software	NTP + 11 mo
State Police CAD Integration Test Report	Written	NTP + 11 mo
Data Fusion Hub Implementation Integration Test Report	Written	NTP + 11 mo
Data Fusion Hub Operational Prep Report	Written	NTP + 11 mo
TIS Development Milestone 8	Software	NTP + 12 mo
TIS Development Milestone 9	Software	NTP + 13 mo
TIS Development Milestone 10	Software	NTP + 14 mo
Site Acceptance Testing Plan*	Written	NTP + 8 mo
System Training Plan	Written	NTP + 8 mo
State Development & Test Environments (SwRI Hosted)	Non Software	NTP + 10 mo
System Burn-In Plan	Written	NTP + 10 mo
System Maintenance Plan	Written	NTP + 10 mo
System Development Testing	Non Software	NTP + 17 mo
Site Acceptance Testing*	Non Software	NTP + 18 mo
Training*	Non Software	NTP + 18 mo
Documentation	Written	NTP + 18 mo
User Acceptance Testing (Burn-In)*	Non Software	NTP + 20 mo
Warranty Quarterly Payment 1	Non Software	NTP + 23 mo
Warranty Quarterly Payment 2	Non Software	NTP + 26 mo
Warranty Quarterly Payment 3	Non Software	NTP + 29 mo
Warranty Quarterly Payment 4	Non Software	NTP + 32 mo
Year 1 Hosting	Non-Software	NTP + 23 mo
Year 1 M&O	Non-Software	NTP + 23 mo
Year 2 Hosting	Non-Software	NTP + 35 mo
Year2 M&O	Non-Software	NTP + 35 mo
Year 3 Hosting	Non-Software	NTP + 47 mo
Year 3 M&O	Non-Software	NTP + 47 mo

Figure 6 - MOMA Project Implementation Plan Milestones and Deliverable Timeframes Are Well Defined

Exhibit J of CONTRACT 2013-051- PART 3 contains the full preliminary Work Plan in a 67 page document.

The timeframe for implementation is an 18 month window after project initiation. In addition to the milestones the MOMA contains a well detailed installation and migration strategy (example shown in figure 4).

In addition to these areas the implementation plan defines the different system operational environments including a Development environment, Test environment and New Hampshire DOT Production environment.

The implementation plan utilizes CMMI and Software Development Life Cycle (SDLC) disciplines.

Based on the deliverables and milestones which are defined in the MOMA, the independent review finds a well-defined project timeline which utilizes well defined Project Management disciplines, Software Development Life Cycle (SDLC) disciplines and event driven deliverables.

The project timeline is well-constructed and contains a detailed project development and migration plan. The development and migration plan includes areas such as network services, security, testing and acceptance, test planning and preparation.

Detail areas for testing documented in the MOMA include:

- Unit testing
- Integration testing
- System testing
- Migration testing
- Installation testing
- Performance testing
- Stress testing
- Performance tuning
- Regression testing
- Documentation testing
- Backup and recovery testing
- User acceptance testing
- Security review and user testing

Final System Acceptance is the final step in the MOMA Installation and Migration Strategy.

8.4 Vendor Implementation Plan

The implementation plan in the MOMA provides specific and sufficient detail to provide indication that the vendors (SWRI and Leidos) have a defined and disciplined approach to providing system implementation. A final Project Plan will be developed during the Project Planning phase. This plan should be reviewed by the AOT Project Lead to ensure final detail is appropriate to safeguard Vermont.

The implementation plan reviewed includes the following excerpt from the SWRI project plan in the MOMA shown in **BLUE** text on the following page:

1. INSTALLATION/MIGRATION STRATEGY

(source ATMS_SwRI_Part_3_Contract_Agreement_Draft_v2 9)

1.1 Key Components

A. SWRI shall employ an Installation/Migration strategy with a timeline set forth in accordance with the migration strategy presented in the SWRI Proposal and summarized below:
The Draft System Installation/Migration Plan shall be submitted to NHDOT for each state no later than ninety (90) days after NTP. The Final System Installation/Migration Plan shall be submitted to NHDOT no later than 30 days prior to the scheduled date of installation and/or migration for each state. The final System Installation/Migration Plan shall be reviewed and accepted by NHDoIT prior to the Vendor proceeding with the deployment.

The System Installation/Migration Plan shall include, at a minimum:

- Scope and description of work – including plans and phasing schedules for all facilities, locations and subsystems by state.
- Prerequisites and their dependencies for each state
- Tools required for each state
- Key installation personnel and their roles for each state
- Planned access dates and times of installation/migration for each state
- NHDOT\VTrans\MeDOT resources required for each location
- Operational impact to NHDOT\VTrans\MeDOT facilities and services, if any
- Installation procedures for each component (hardware and software) of each subsystem, including any software and configuration setting and changes.
- Final Installation (as built) drawings for each state,
- Descriptions and drawings of any intermediate or temporary configurations required which differ from final configuration.
- Detailed physical layout drawings with parts-list keyed to layouts, if required.
- Cable and conduit schedules, if required, showing exactly where each cable is to be installed. Include and identify raceways, cable trays, conduit, junction boxes, pull boxes, manholes, hand-holes and floor boxes by type, size and number.
- Cable and wiring connectors and terminal assignments.
- Wiring diagrams,
- Electrical power diagrams and panel and power strip schedules,
- Mounting, securing and installation details for all equipment and materials
- Rack face elevations for each piece of equipment, including all intra-rack and inter-rack wiring and cabling to be installed
- Power connection, panel schedules and grounding connections

The full implementation plan provided by SWRI is contained in the document (ATMS_SwRI_Part_3_Contract_Agreement_Draft_v2 16) and contains sufficient timeline detail for a MOMA agreement.

8.5 Adequacy of the Vendor's Proposed Implementation and Risk Management Plan

A full and completed version of the Project Plan was not available at the time of the Independent Review. However the plan detailed in the MOMA was of sufficient nature to indicate that all necessary elements will be included.

8.6 Independent Review Findings Related to the Implementation Plan

The initial concern for risk was the absence of a clearly defined vendor management plan after the implementation and go live phase of the systems. This process would include a signed Service Level Agreement (SLA) with SWRI. At this point sufficient evidence was provided during the vendor interviews with SWRI and Leidos to provide assurances that SLA's will be completed prior the end of the Project Planning phase.

A concern for network connectivity and impact on the State of Vermont's network architecture was identified initially as a risk. After interviews with SWRI and Leidos, and based upon limited internet traffic required for system operation, it seems reasonable that there will be minimum impact on the State of Vermont's network. All updates and transactions to VTrans PCs will be Internet based to the web browser only.

The project plan contained in the document (ATMS_SwRI_Part_3_Contract_Agreement_Draft_v2 9) is detailed and addresses all critical issues of standard CMMI and project management disciplines. Leidos is both CMMI compliant and ISO 9001 certified.

It was determined that a full and detailed implementation plan will be provided to the NHDOT project lead once the initial project planning stage is competed. This item is still at risk until the full Implementation Plan is finalized prior to the completion of the Project Planning phase.

Coeur Group – Implementation Plan IR Comments:

The implementation plan contained in the MOMA provides adequate detail for this stage of the MOMA contract. The project plan contains a phased approach to implementation including the level of detail expected at this stage defining the software customization for development environment, testing environment and production environment acceptance.

Coeur Point: It is determined for the purposes of this MOMA IR; low risk exists from the Implementation Plan. System development and testing phases provide clear examples of the expected stages and are well defined in the MOMA documentation.

9. ASSESSMENT OF ORGANIZATIONAL READINESS

This section provides information and analysis on the readiness of the State and NH DOT to execute a contact and provide or receive the services therein.

9.1 Key Findings and Identified Organizational Readiness Risk

The independent review of this MOMA reviewed the organizational readiness to conduct this Tri-State system implementation. Interviews were conducted with New Hampshire DOT as well as New Hampshire DOIT as the responsible vendor management entities. Both organizations provided sufficient evidence to indicate that they are capable and ready to manage the vendor for the Tri-State consortium for ATMS – TIS system.

In addition VTrans personnel as well as the VTrans CIO were interviewed to determine organizational readiness. A key point of organizational readiness is validating the ability for all parties to manage across state organizational boundaries.

Since both of the VTrans entities have participated in the AOT MATS project which is also a Tri-State consortium project, they are already familiar with the interactions and working relationship with New Hampshire DOT.

Finding OR1: The Tri-State consortium staff has worked on previous multistate projects and is well versed in communication and issue resolution. Therefore risk from organizational maturity for this project should be limited risk.

Finding OR2: The Tri-State consortium staff has developed a Change Control Board (CCB) consisting of two members from VTrans, two members from Maine DOT, and three members from New Hampshire DOT. This Change Control Board provides the oversight management of the implementation vendor SWRI. Therefore organizationally, decisions have a clearly defined forum for resolution.

Finding OR3: One of the remaining risk elements was the lack of definition for final authority for decisions from the Change Control Board (CCB). While the Change Control Board agreement describes the voting rights for the board, it does not describe the final authority for breaking a tie or committing resources from all three states. It is recommended that the language in the MOMA reflect the final authority position for this board. Risk has been mitigated by definition of final authority to NH DOT in the MOMA.

OR3 RISK: Risk Issue G1, mitigation action taken

The contents of the MOMA indicate an organization structure for roles and responsibilities as shown below.

The State of New Hampshire Department of Transportation is the lead Tri-State project manager. VTrans and Maine Department of Transportation are essentially buying services from New Hampshire DOT for this project. New Hampshire DOT is acting as a provider of services to Vermont and Maine.

New Hampshire DOT project lead is the main interface to the Prime vendor South West Research Institute (SWRI). SWRI has responsibility for supplying the Advanced Traffic Management System (ATMS).

Leidos will be providing the Traffic Information System (TIS). The TIS system is a proven system in the State of California and the City of San Francisco.

Key to organizational risk mitigation was to ensure that the vendor management capability of the state of New Hampshire, SWRI, and Leidos were sufficient to ensure that any technical issues had a documented and effective path of issue resolution. To ensure that a clear escalation path was available to VTrans for any issues especially during the implementation phase of this engagement, the independent review (IR) focused on very specific technical escalation plan development which was recommended to be put into the implementation plan itself.

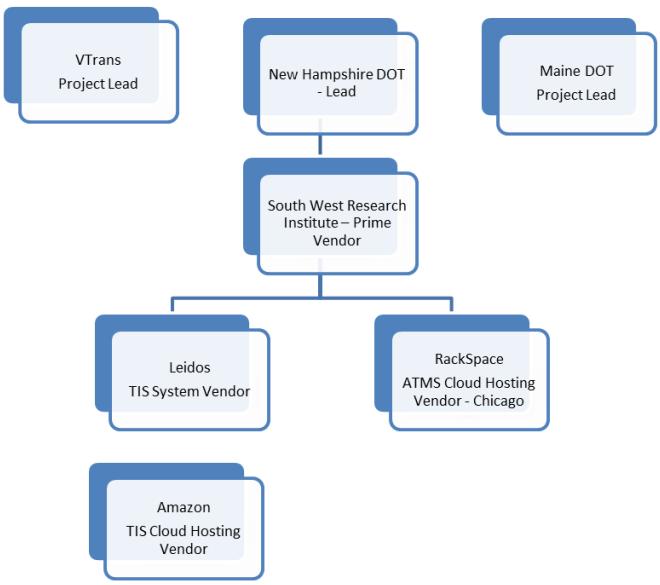

Figure 7 - ATMS-TIS Vendor and Support Organization Structure

9.2 General Project Acceptance / Readiness of Staff

Interviews with Mr. Robert Heller from SWRI and Mr. Thomas Phillips from Leidos provided sufficient evidence to indicate that the staff on both of these vendor project teams were ready and able to provide good implementation services.

9.3 State Staffing

This project requires no increase to VTrans staffing or any additional need by DII to provide support staff. VTrans staff will have the Vermont project lead which will also become a change control board member to manage implementation and ongoing system operational oversight. Part of the Cost Benefit is the advantage of VTrans not requiring additional FTE's for this project.

9.4 Agency Staffing

VTrans agency staff interviews were conducted including Mr. Tom Hurd, CIO for VTrans. No additional risks were identified within AOT or impact to DII network management due to utilization of the ATMS-TIS by AOT personnel.

9.5 State OPM Project Oversight Manager

EPMO staff has been assigned to this project for the purpose of oversight, monitoring and reporting. The EPMO Oversight manager has been involved in the majority of the interviews and clearly understands the basis of the project and all items defined in this report.

9.6 Project Managers

Based on the documentation and interviews there are three Project Managers that have defined roles and responsibility for this project. The Project Managers include:

- AOT Project Lead
- New Hampshire DOT Project Lead
- SWRI vendor Project Lead and prime contractor
- Leidos vendor Project Manager for TIS system

Each of these Project Managers has been interviewed and has provided sufficient evidence to show that they are clearly ready and capable to provide implementation support in both and problem areas.

Coeur Group – Organizational Readiness IR Comments:

The State of VTrans personnel have been working with New Hampshire and Maine for a number of years. This project is another example of the Tri-State consortium collaborating together to maximize resources and manage across state organizations. One of the key elements the organizational part of the IR is the governance of the organization and decision making in the Tri-State consortium.

A number of risk were identified (although low risks) by the fact that it was unclear for decision-making authority when business issues or technical issues required a final authoritative decision. These risks were mitigated when the MOMA was changed to indicate that New Hampshire DOT project lead has the final authority for that decision-making. In addition a Change Control Board was set up to ensure that decision-making had collaborative input from Vermont and Maine for any of the decisions required. The change control board has two members from Vermont two members from Maine and three members from New Hampshire. Voting rights are according to board member positions.

Coeur Point: Unclear authority of roles and responsibilities was an initial concern of this MOMA IR. In the current release this has been sufficiently defined in the MOMA to ensure clarity of understanding by all parties in the Tri-State agreement. In addition, a technical issue escalation process will be documented to ensure that all three organizations in the Tri-State consortium are able to follow a predetermined process for issues and resolution.

10. ISSUES AND RISK MANAGEMENT PLAN

This Section describes the issues and risks, along with Coeur Group's recommendations for mitigation and management of them. This Section also includes narratives for each identified risk and issue describing the State's approach to mitigation and management.

The Issues and Risk Management Plan is the primary deliverable of this Independent Review of the proposed Project. As a result of the interviews conducted during the week of October 14th, 2013 and following, Coeur Group identified key findings in each of the following topic areas:

- MOMA Terms
- Technology Implementation management
- Technical Escalation Plans
- Ongoing Operational Management
- Network Connectivity
- Security (access and data)
- Service Level Agreements (SLAs)
- Uptime Guarantees

The findings were then analyzed to determine if they result in Issues or Risks. If the findings resulted in Issues or Risks, they were included in the Issue Log or Risk Register respectively. The Issue Log and Risk Register are provided in this section.

The Risk management plan items were provided by VTrans, NHDOT, SWRI, Leidos, DII or NHDoIT as indicated in the Risk Action Register for each identified risk.

10.1 Independent Review Issue Log

The Risk Action Register is shown in **Exhibit A** on page 73 of this IR and provides the Initial Risk Potential and the Current Risk potential after *Risk Mitigation Action*s were taken.

The Risk/Mitigation log is a working document utilized during the Independent Review (IR) process and contains the potential risks identified, any recommended risk mitigation actions and the mitigation action plan statements taken or responded to by VTrans or the Tri-State consortium for the ATMS-TIS system and MOMA.

The initial risk potential level (High-Medium-Low) is indicated as well as the Independent Review assessment of the risk potential after mitigation action was defined.

All individual Risks are also defined in the specific section of the IR Report with additional detail.

11. Key Issues and Risks Defined

11.1 Identified Potential risk

Coeur Group identified both Issues and Risks as a result of this Independent Review. All identified potential risks have been tracked in the Issue and Risk Action Register. Once a potential risk has been identified, it is reviewed with the AOT ATMS lead or the responsible party. A review of the potential risk then leads to a response by AOT ATMS lead defining "Best Actions" for mitigation. Best Actions provide either mitigation or a response to mitigate the potential risk at a defined future date.

11.2 Risk Action Register and Summary Disposition

During Coeur Group's review of the proposed project issues were identified. Each Risk item is assigned a Risk Item Number which corresponds to the section of the MOMA in document ATMS_SwRI_Part_3_Contract_Agreement_Draft_v2 9

Risk #	Risk Item	Risk Mitigation/Action	Initial Risk Level	Final Risk Level
Risk:G1 - **4**.0 Roles and Responsibilities	Undefined Authority level for Roles and Responsibilities	RTW - change board will provide input to NH. NH is contracting authority and will have final say.	**Low**	**Low**

Risk G1: This risk identified a lack of final authority designation among the Tri-State Change Control Board for making decisions regarding additional cost for implementation. Mitigated when NHDOT defined this in the MOMA.

Risk #	Risk Item	Risk Mitigation/Action	Initial Risk Level	Final Risk Level
Risk:G2 – 4.1.1 final System Design	Design Changes are coordinated by NHDOT IT and QA oversight. Not clear how any key tie vote is managed	RTW - control board will have odd number so that majority vote will occur.	**Low**	**Low**

Risk G2: This risk identified a lack of final authority for accepting Change orders from the implementation vendor, especially during the development and integration phase of the project. Change Orders by nature increase the cost of implementation. If no agreement is stipulated as to a final authority for the Tri-State consortium, this becomes a key risk. The risk was mitigated as NH DOT changed the Change Control Board language to define voting authority and rights.

Risk #	Risk Item	Risk Mitigation/Action	Initial Risk Level	Final Risk Level
Risk:G3 - 4.1.3 Incident notification	Although an incident escalation process is called out in 2013-051SwRI Contract Agreement-Part 2, page 26, for Management Disputes, there is no reference to a working "Escalation Process" for problems in development and implementation phases of the engagement.	Conversation with Robert Heller of SWRI indicated that the technical escalation process will be part of the "Implementation Project Plan" and various levels of technical escalation functions will be defined in that plan.	**High**	**Low**

Risk G3: No technical issue escalation process was called out in the MOMA. Without a reference in the MOMA to a technical escalation plan as part of the initial project planning phase, this becomes a high risk since there are three and four levels of different companies involved in providing the services to the State of Vermont.

An example is the State of Vermont depends on New Hampshire DOT to be a service manager for the ATMS/TIS system. Vermont DOT manages SWRI the prime contractor. SWRI manages Leidos a subcontractor to provide the TIS system. Leidos in turn utilizes cloud service provider Amazon to provide the cloud hosting. In this scenario an issue with the cloud provider is 4 levels removed from VTrans. Without a documented technical escalation plan, particularly during the development and implementation phases, severe problems will likely not be resolved quickly. This risk is mitigated as NH DOT has agreed to include a Technical Escalation Plan in the MOMA and contract with the prime vendor.

Risk #	Risk Item	Risk Mitigation/Action	Initial Risk Level	Final Risk Level
Risk:G4 - 4.1.3 Incident notification	Since NHDOT is managing the relationship with the ATMS vendor (SWRI), they indicated they will have a Technical Escalation Plan in place to be written in the Project Plan. A secondary potential risk is identified since the ATMS Vendor is managing the relationship between SWRI and RackSpace (cloud vendor).	Conversation with Robert Heller of SWRI indicated that the technical escalation process will be part of the "Implementation Project Plan" and various levels of escalation functions will be defined in that plan. NHODT via VT AOT needs to ensure the Technical Escalation Plan includes management and escalation of RackSpace for potential outages even thought the uptime should be 99.9x%.	**High**	**Low**

Risk G4: It is recommended that the MOMA should only reference a Technical Escalation Plan in the contractual document. The actual Technical Escalation Plan should be documented during the project initiation and planning stage of this project. The lead vendor project manager (NHDOT) concurred that a technical escalation plan will be provided at that time. Risk mitigated

A second conversation with Leidos Project Manager for the TIS system also agreed that a Technical Escalation Plan is needed and indicated they already have a fully functional technical escalation plan. Leidos provides a project update every two weeks and that includes attendance by two additional levels of Leidos management.

Risk #	Risk Item	Risk Mitigation/Action	Initial Risk Level	Final Risk Level
Risk:G5 – 4.1.4 Trouble shooting	Potential for impact to VT DII for network issues and the need to interface directly with the vendor access to vendor to escalate and resolve issues of network nature	Robert Heller (SWRI): SWRI via Rack Space has responsibility for connectivity to the Rack Space VPN connection to the internet. Each State will have the responsibility to ensure their connectivity through there VPN to the internet is working.	**Medium**	**Low**

Risk G5: The MOMA indicates that SWRI has responsibility for ensuring connectivity to a demarcation point. In conversations with SWRI, they have defined that demarcation point as the Internet connection from the cloud provider. Since each of the states involved in the Tri-

State consortium are responsible for their own Internet connectivity and networks, the risk potential for this issue would be the same as for any network issue within the State of Vermont. Therefore the final risk level remains low.

Risk #	Risk Item	Risk Mitigation/Action	Initial Risk Level	Final Risk Level
Risk:G6 – 4.1.4 Trouble shooting	Network connection demarcation points for vendor responsibilities are not defined. At this point it is not determined what the demarcation point is referencing nor what data, voice or video information will travel over the Vermont state network.	Robert Heller (SWRI): The Demarcation point is defined as the VPN connection point at the Cloud Provider. In this case the provider is RackSpace in its Chicago, IL. Location. .	**Medium**	**Low**

Risk G6: The MOMA indicates that SWRI has responsibility for ensuring connectivity to a demarcation point. In conversations with SWRI, they have defined that demarcation point as the Internet point at the Cloud provider. Since each of the states involved in the Tri-State consortium are responsible for their own Internet connectivity and networks, the risk potential for this issue would be the same as for any network issue within the State of Vermont. Therefore the final risk level remains low.

Risk #	Risk Item	Risk Mitigation/Action	Initial Risk Level	Final Risk Level
Risk:G7 - 4.1.5 Scheduled Maintenance and Software upgrades	Unclear definition of software updating process for end user "Thin Client". Will this impact the Vermont Network if the PC "Client" is upgraded and downloaded each instance of PC startup?	Robert Heller (SWRI): The Thin Client is strictly providing updating to the Internet Explorer (IE) cache on each PC. Therefore no updates are actually made to any software on the User PC.	**Low**	**Low**

Risk G7: It was initially unclear in the MOMA how the software upgrades were to be handled and what impact that would have on the Vermont PC environment. It was clarified by SWRI that thin client upgrades are pushed to the PC based cache via the web upon PC startup. If there are no upgrades the cache is not upgraded. The push has little impact to the network. However another risk pops up if the push fails or the upgrade is not properly tested prior to the push. The impact in this scenario is low.

Risk #	Risk Item	Risk Mitigation/Action	Initial Risk Level	Final Risk Level
Risk:G8 – 4.1.5 Trouble shooting	Conflict resolution for software upgrades are not defined as to whom will have the final decision? (NHDOT-VTAOT-MEDOT)	RTW - control board will provide input to NH. NH is contracting authority and will have final say.	Low	Low

Risk G8: Further discussion provided a mitigation that New Hampshire will have the final contracting authority as per changes in the MOMA.

Risk #	Risk Item	Risk Mitigation/Action	Initial Risk Level	Final Risk Level
Risk:G9 – 4.1.8 Future Modifications	Change Control Board "Final Decision" authority is not defined	RTW - NH is contracting authority and will have final say.	Low	Low

Risk G9: The issue of who has authority to commit funds for future modifications in the case of a tie among the Tri-State consortium was the issue. This has been clarified and defines New Hampshire as the project lead having that authority.

Risk #	Risk Item	Risk Mitigation/Action	Initial Risk Level	Final Risk Level
Risk:G10 – 4.1.9 Conflict Resolution	This term implies that NHDOT has final authority for conflict resolution along with a consultant. Who in fact will have final authority for making these decisions?	RTW - NH project manager (Denise Markow)	Low	Low

Risk G10: The definition of conflict resolution was not clear in the MOMA. Definition has been clarified and is now stated as the New Hampshire Project lead and Change Control Board Chair has this authority.

Risk #	Risk Item	Risk Mitigation/Action	Initial Risk Level	Final Risk Level
Risk:G11 – 5.0 Cost Allocation	Conflicts for Cost Resolution are not clearly defined for final authority. Similar to other "Final Decision" and Authority comments.	RTW - control board will provide input to NH. NH is contracting authority and will have final say.	Low	Low

Risk G11: The definition of conflict resolution was not clear in the MOMA for additional cost commitments. Definition has been clarified and is now stated as the New Hampshire Project lead and Change Control Board Chair has this authority.

Risk #	Risk Item	Risk Mitigation/Action	Initial Risk Level	Final Risk Level
Risk:B1- Contact Information	Contact should include a Technical level "Escalation Process" that should be defined as part of the Project Planning and Initiation process with the vendor and also contain the Escalation contact information for SWRI and SAIC response to development and implementation issues. Same issue as G3	Robert Heller (SWRI): Indicated that this process will be included in the Implementation Project Plan provided to the State of New Hampshire.	Low	Low

Risk B1: **Risk B1 is identified from Appendix B -** Operational Contact Information, of the MOMA. The risk was identified due to the multiple levels of vendors involved in the process. In the case of the TIS system, this includes Vermont, NH DOT, SWRI, Leidos and Amazon Cloud Services. It was agreed to include a Technical Escalation process in the project implementation plan with contact information. The risk will be mitigated when the Technical Escalation plan and contact information is defined prior to the completion of the Project Planning phase.

Risk #	Risk Item	Risk Mitigation/Action	Initial Risk Level	Final Risk Level
Risk C1: Table 1 - Voting Member	It is unclear who has the final decision and authority in cases of a tie vote	RTW - control board will provide input to NH. NH is contracting authority and will have final say.	Low	Low

Risk C1: Risk C1 is identified from Appendix C - Change Control Board of the MOMA. The risk was identified due to undefined final decision process of the Change Control Board. Final resolution mitigates this risk issue as NHDOT will have the authority.

Risk #	Risk Item	Risk Mitigation/Action	Initial Risk Level	Final Risk Level
Risk C2: Table 1 - Voting Member	Who are the specific CCB personnel that will have 2 votes for Vermont?	RTW - Robert T. White and Erik Filkorn or their designees if unavailable	Low	Low

Risk C2: Risk C2 is identified from Appendix C - Change Control Board of the MOMA. The risk was identified due to undefined Change Control Board members from Vermont. Final resolution has designated the Change Control Board Membership for Vermont.

12. COST BENEFIT ANALYSIS

This section provides analysis of the Tangible and Intangible benefits with the proposed Project as described in the Cost Analysis document (BusinessCase_CostModel_AOT_ATMS) and Cost Review 8-23-13 TIS SAIC.xls documentation which was available at the time of cost review.

12.1 Cost Benefit Statements Contained in the MOMA

This project incorporates road and weather information from all collaborating New England states on one website. The new 511 system will replace silo 511 systems in each state. Currently VTrans is hosting an interim 511 system on an antiquated single GIS server in-house. The interim system utilizes Managing Assets for Transportation Systems (MATS) for the data entry and ESRI GIS services for displaying the results to the general public user on the web. Hosting 511 services in-house is not something VTrans nor the state network can currently support. Last winter during severe weather, hits to the website crippled VTrans and state network resources.

In addition to a new 511 system, the new system will also incorporate an Advanced Traffic Management System (ATMS) for managing and disseminating information from various VTrans, regional and metropolitan planning organizations transportation and weather resources. Data from all collaborating New England states will be gathered and disseminated from a central data hub hosted in the cloud. New Hampshire DOT is the lead agency on this effort.

Representatives from New Hampshire DOT (NH), Maine DOT (ME), and Vermont AOT collaboratively referenced herein as Tri-State along with members from Massachusetts DOT (MA), Rhode Island DOT (RI), and Connecticut DOT (CT) herein referenced as New England have been meeting and discussing the requirements for the New England Regional 511 system. A requirements matrix was drafted and utilized as the core for the RFP NH released to seek a vendor to implement the system. Like MATS, the new system will be modular based so that participating states can pick and choose the elements (modules) they need for their states' ATMS-511 system.

NH is the lead state and will contract with the selected vendor. VT and other states will develop memorandum of agreements to participate and utilize the vendor and the vendor's contracted services. Like MATS, the collaborating states will own the code. This is the unique and underlying special attraction of this system.

VT along with ME, NH, and RI were part of the Condition Acquisition and Reporting System (CARS) consortium along with seven other states. CARS was developed to provide pool funds for developing a state of the art 511 system. However over time, the vendor got greedy and started charging individual states for code developed for another state. After

tropical storm Irene in 2011 in which VT's CARS 511 system failed miserably, it was decided to cease participation in the CARS consortium and to end the CARS 511 system in VT.

Because of the desire of Tri-State to continue to collaborate beyond what CARS could provide at a reasonable cost, NH made it clear in the RFP that Tri-State and New England would be the ultimate goal of the new system. Tri-State selected a vendor to implement the new system with a proven track record. Although the contract has not been finalized, the vendor selected has implemented ATMS-511 systems for California (CA), Texas (TX), and Florida (FL). The CA system was one of the first 511 systems implemented in the country. With the vendor's leadership, it has grown to what is now considered the standard for 511 systems in the US. The vendor has since implemented an open source ATMS – 511 system funded by TX and FL. New England will be able to utilize and enhance the code already developed for CA, TX, and FL. Utilizing and enhancing existing code that the states will own will reduce initial implementation costs, ongoing maintenance costs, and provide a continuing source of low cost enhancements as technology changes. Yes it will eliminate a single point of failure (single GIS server).

Instead of the customer going to the website to see road and weather information for just Vermont, the customer will be able to view road and weather information for Tri-State. Eventually the customer will have one stop shopping for traveler information for all of New England.

As previously discussed, the new system will expand coverage to roads maintained by local towns and municipalities. They system will also have the capability for social media input direct from users. Two options not available with the current system. In the event of another major event like tropical storm Irene, the new system will be able to communicate directly with Vermont Emergency Management system, the new Vermont Alert System, as well as with Tri-State, New England, and federal partners. Will eliminate excess external traffic hitting and binding the state and VTrans networks. It will eliminate several VTrans silos. Those silos being separate and disperse systems within VTrans including MATS which was not designed for this purpose, adaptive signal ATMS, ESRI GIS, and multiple DBA database management. The new system will be one stop shopping for VTrans divisions trying to manage multi-modal and diverse systems. Because the new system will be hosted and maintained in the cloud, it will free up VTrans resources to concentrate on their primary duties.

VTrans staff who have been manually entering in, monitoring and removing data in the current system will only have to enter data in the new system with automated timestamps. The system will automatically request updates from the staff for events and if no response is given the system will automatically remove event data being displayed on the website. The new system will allow other entities not currently shown on the current system to enter and manage their event data. This will be extremely important and beneficial to towns and municipalities that maintain state highways.

Because VTrans does not have the resources to provide 24x7x365 coverage for entering, monitoring, and updating events placed into the 511 system, the new system will allow NH to provide this service. NH has a fully functioning Transportation Management Center (TMC) that is staffed year round with transportation, state police, fire, emergency and local police staff. NH TMC staff are well trained in ATMS-511 management and will easily be able to handle VT after hour's needs.

Pooled fund studies and projects are a great way for states with limited resources to get the most for their dollars. By getting NH and ME to continue the Tri-State consortium and also getting the remaining New England states to agree to join in at a future date.

Coeur Group Cost Benefit Analysis Comments:

Cost benefit detail identifying specific areas of cost reduction, cost elimination or cost avoidance were not clearly articulated in the MOMA itself. Since this was a review of the MOMA, a contractual document and not the initial project justification, a full Cost Benefit review is limited to the high level information gained in the interviews and full review of the available documentation.

Top 5 Benefits to the State of Vermont

1. Improve Customer Service for travelers and vacationers
2. Improves communication with customers & /or partners
3. Reduces hardware, software and/or other IT infrastructure needs
4. Increases employee and process productivity
5. Increases ability to respond to road safety issues

The key data to support Cost Benefits were captured during the interviews and research of the full set of MOMA supplied documentation and as shown in figure 8 and figure 9 cost charts.

Interviews identified several items that comprise "Hard Cost" reductions (figure 8). These items were validated with VTrans. This indicated at least a $152,200 dollar annual cost savings from replacement of the 511 system in us today in Vermont.

12.2 Independent Review Findings Related to Cost Benefit Analysis

Cost Analysis including Impact on Agency Net Operating Costs

Reference: BusinessCase_CostModel_AOT_ATMS-JKG

A review of the cost and benefits of the ATMS-TIS system indicated that increases in operational effectiveness and organizational efficiencies will likely be gained immediately as well as over time. Since this system will share initial cost across three States, the investment for each state is reduced. In addition, other New England states have already indicated a desire to join the Tri-State consortium in the future. This will significantly reduce the overall maintenance and operating cost in future years.

Finding CA1: The Project Costs are not final as of this report. This is due in part to ongoing negotiation with SWRI surrounding the addition of "Options" to the Deliverables. **Therefore cost risks are still present until the final cost is defined by the NH DOT and prime vendor at contract signature time.**

Finding CA2: Benefits derived from these two systems will provide a focus for revenue generation from all three states due to higher levels of traveler information and directions. This is certainly true as these systems are focused largely on vacation travelers to the Tri-State area roadways.

Finding CA3: It is typical for a project of this size and complexity to utilize a Cost Benefit Analysis as part of the justification for the Project. In this particular case the real Cost Benefit is focused in two areas which include:

1. Vacationer revenue generation capability of the Traveler Information System (TIS) to provide quick information access to road drive times, vacation spots, restaurants and other income producing vacation attractions.
2. Cost improvements for AOT from operational efficiencies gained from the AMTS system. This will allow AOT road crew's better information for accessing road safety information as well as information for assigning maintenance requirements.

The Cost Benefit document has been approved on 10.29.2013 by the Commissioner of DII. Coeur Group's review does not see any abnormal cost or lack of benefits for the State of Vermont.

12.3 Cost Benefits:

Cost benefits for this project covered under the MOMA are not defined as risk and are at this time unable to be quantified in relative dollars amounts. Based on the input derived from the IR, the system will likely provide a hard cost advantage over the existing system.

The benefits were stated and defined in the IR as high level benefits to the State of Vermont as well as the states of New Hampshire and Maine and include:

- Anticipated increased traveler satisfaction due to less dropped calls to the Tourism Call Center (TCC). This is due to the Traffic Management Center (TMC) provided by the NHDOT being a 24 x 7 operation and manned by professional DOT knowledge personnel.
- Increased state revenue due to traveler information in real time and commercial venues being provided via the TIS system.

In addition to the hard cost, the intangible benefits from traveler satisfaction indicate a gain of value to the State of Vermont.

These soft and intangible benefits include providing travelers with the ability to have immediate access to whether and road hazard information increasing a “safe traveler” value. In addition to travel conditions, the systems will provide vacation destination information which will likely provide the State of Vermont as well as the Tri-State consortium states with an additional income potential from travelers. Lodging will be a major point of information provided to the traveling public which will provide easier engagement of travelers for lodging and meals.

An additional benefit from the systems will be the cross connects from the 511 system to a 911 intercept system for safe travelers. Other benefits include; Traveler easy access to information via smartphones, Traveler road safety, income generation via interstate directions to local events and attractions, no more CARS maintenance payments, uncoupling of using the AOT Work order system for unintended purposes, faster and specific location information for AOT road response to Traveler inputs saving travel cost.

Based on IR Interviews and cost data for Vermont AOT the following are viewed as beneficial items from this system:

- Internal VTrans efficiencies from reduced data entry and entry mistakes
- Reduced single point of failure due to use of end of life systems
- Single point if VTrans personnel usage for road and traffic events
- Avoidance of developing a Traffic Management Center manned 24x7
- Single point of 511 calls for the Tri-State
- Future connectivity with FEMA in case of disaster alerts
- Traveler easy access to information via smartphones,
- Traveler road safety,
- 911 intercept
- Road weather (RWIS)
- Active Traffic Management (ATM)
- Dynamic message signs
- Real time Traffic Monitoring
- Income generation via interstate directions to local events and attractions,
- No more CARS maintenance payments,
- Uncoupling of using the AOT Work order system for unintended purposes,
- Faster and specific location information for AOT road response to Traveler inputs saving travel cost.

12.4 Project Cost Analysis

The Cost Analysis table shown below is taken from: BusinessCase_CostModel_AOT_ATMS-JKG.

Cost Reductions

Most cost reduction values for this cost analysis are not absolute and may vary from anticipated reductions until defined further by the AOT Project Lead.

Hard value cost reductions identified in this IR include:

- Utilization of a single website for 511 activities
- An additional $152,228.00 per year savings from eliminating CARS maintenance
- Yearly decreases in Hosting and Maintenance and Operations cost

Cost reductions derived from move to the new ATMS-TIS system have been identified (shown in the Figure 10). The IR validated these cost with AOT to determine hard dollar value net benefits.

Investments/Savings	20 Year Lifetime Totals
Total 20 Year Investment for AOT	$3,145,900
Total 20 Year Cumulative Savings	$3,650,800
Total 20 Year Net savings	$504,900

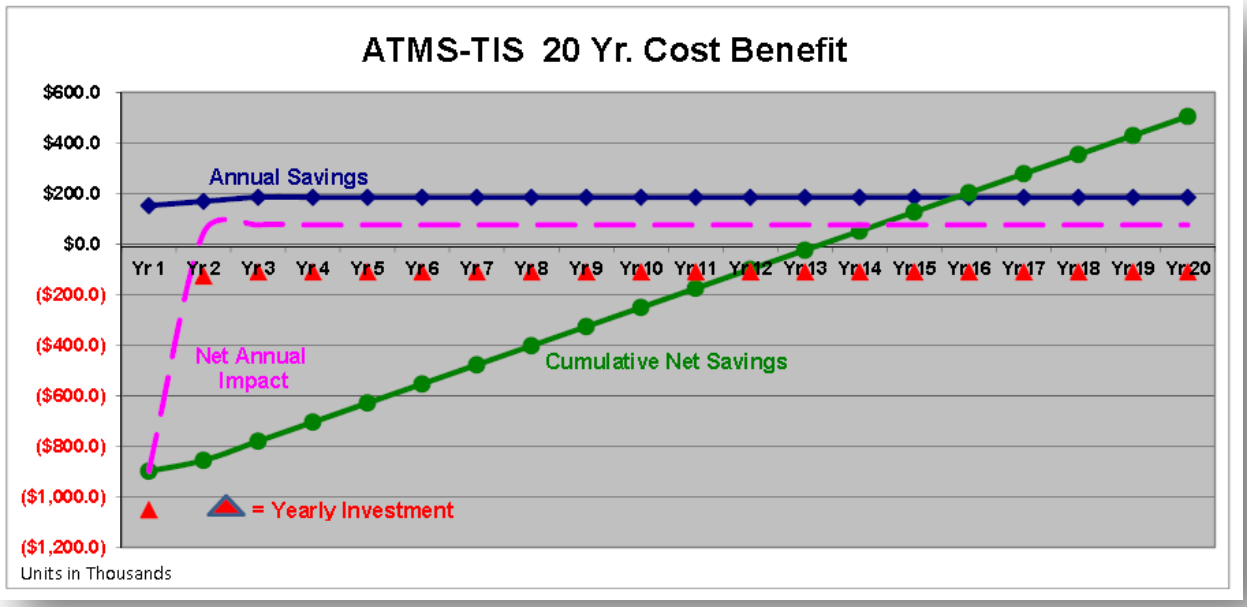

Figure 8 - Cost Benefit Analysis Shows a 14 Year Break Even Point

The Chart above shows a total program investment of $3,145,900 over the 20 year life cycle of the project with a 20 year cumulative savings of $4,233,200 over todays cost.

As depicted in figure 10, a Break Even point based on identified investments and hard savings is at year 14 with a Net savings over the 20 year program life of $504,900.

Coeur Group – Net Operating Cost IR Comments

Net operating cost have been review and validated for the MOMA to date.
All ATMS-TIS systems operating cost covered by this MOMA will be shared equality between the three MOMA parties (NHDOT, VTrans and ME DOT) as shown in Figure 3, page 11 of this document.

These costs are risk to be reduced in future years. The Tri-State Consortium already has requests for other States to join in utilization of this ATMS-TIS system. Notably the States of Connecticut, Massachusetts and Maryland have requested information and a future participation.

The current yearly operating costs from the MOMA indicate a year one to year two reduction of 11.5% and a year two to year three cost reduction of 13%.

In addition to the cost savings defined in the *Business Case*, it seems additional cost reductions will accumulate over the next 5 years which are not part of the calculated Break Even point since they are not identified as hard cost savings at the time of this IR. These will likely include; reduced cost of Hosting and Maintenance & Operations from other States signing on to the program, reduced Hosting cost as the industry matures, and potential reduced cost if 511 calls are eventually transitioned from the Vermont call center to the NH DOT Traffic Management Center. All these will impact the Break Even point.

It would be expected that year three cost of operations would be flat for a period of years after that. Funding for the VTrans portion of this is covered by current AOT Budget.

Coeur Point: It was determined for the purposes of this MOMA IR that Net Operating Cost for Vermont's 511 program will become less over the initial three year period as part of the contracted MOMA agreement. Additional cost reduction to the State of Vermont AOT will likely take place as additional states such as Connecticut, Massachusetts and Maryland join the Tri-State consortium to utilize this system. Vermont's annual M&O cost for hosting. This cost will be further divided across additional states as they joint the 511 consortium. The ATMS-TIS system vision is to have New England wide systems for road information and management.

Final Recommendation for this Independent Review:

Coeur Group's Final IR Recommendation: **Coeur Group recommends a Go-Ahead position and approval of this Independent Review for this engagement.**

Exhibit A

The Risk Action Register is a working document capturing "Point in Time" identified issues or risk, the actions taken to mitigate the issue/risk and the final status of either High, Medium or Low risk potential.

The Issue and Risk Action Register log (figure 10 and 11) contain the potential risks identified, any recommended risk mitigation actions and the mitigation action plan statements taken or responded to by VTrans or the Tri-State consortium for the ATMS-TIS system and MOMA.

The initial risk potential level (High-Medium-Low) is indicated as well as the Independent Review assessment of the risk potential after mitigation action was defined.

All individual general issues and potential risks (figure 12) are also defined in the specific section of the IR Report with additional detail.

The following exhibit contains the Issue and Risk Action Register. The first section includes identified risk from the Contract Exhibits B, E, and F.

ID	Item/Function Issue	Potential Risk Event/Comments	Mitigation Recommendation	Mitigation Action Plan	Initial Risk Potential	Current Mitigation Action
	CONTRACT 2013-051 PART 3					
	Exhibit B - Price and Payment Schedule					
B1	B 1.1 Payment Schedule is currently not completed	Need to ensure that payment schedule is consistent with approved funding levels and timing for AOT budget	VTrans should ensure funds for potential cost increases before the final contract and payment schedule are completed	RTW - will not be completed until contract w/SWRI is signed- MAP- Robert indicated that funds are available to cover cost increases. In addition, Robert is a member of the change control board and has voting rights for these decisions.	Low	Low
	EXHIBIT E - Installation/Migration Services					
E 1	E 1.1	Installation/Migration procedures are clearly defined and called out in this MOMA Exhibit. Interviews with both vendors indicate that both companies clearly follow CMMI Standards and SDLC disciplines. The Potential Risk in this category is the fact that the final Project Implementation Team has not yet been identified, so for the purposes of this MOMA IR, this item remains a low risk	The Change Control Board should ensure that the Implementation Team has members with credentials to successfully provide high quality implementation services.	VTrans indicates they will interview all project team candidates	Low	Low
	EXHIBIT E-1 - SECURITY AND INFRASTRUCTURE					
E1-1	E1-1.1	Security of data and access to the network are potentially at risk due to "Cloud Services" being provided outside the firewall of VTrans.	NHDOIT should manage the security access to the "Cloud" based systems with the same levels as they do with the State Network	Validated that the NH DOIT security policy is sufficient for access and data protection as Vermont DII policy and practices	Medium	Low
	EXHIBIT F - SYSTEM TESTING SERVICES					
F1	F 1.1	System Testing Procedures are clearly defined and called out in this MOMA Exhibit. Interviews with both vendors indicate that both companies clearly follow CMMI Standards and SDLC disciplines. The Potential Risk in this category is the fact that the final Project Implementation Team has not yet been identified, so for the purposes of this MOMA IR, this item remains a low risk	The Change Control Board should ensure that the Implementation Team has members with credentials to successfully provide high quality implementation services and clearly follow the system testing procedures outlined in the MOMA	VTrans indicates they will interview all project team candidates	Low	Low

Figure 9 - Exhibit B, E and F from Contract Part 3

This section of the Issue and Risk Action Register contains the Risk identified from the MOMA Exhibit G., Appendix B and Appendix C.

ID	Item/Function Issue	Potential Risk Event/Comments	Mitigation Recommendation	Mitigation Action Taken	Initial Risk Potential	Current Mitigation Action
	Exhibit G - SYSTEM WARRANTY AND WARRANTY SERVICES					
	General Terms					
G1	4.0 Roles and Responsibilities	Potential cost increases from vendor Change Orders, who has authority? Although spelled out to a certain extent in the MOMA, there is not definition of a FINAL Authority.		RTW - change board will provide input to NH. NH is contracting authority and will have final say.	Low	Low
G2	4.1.1 Final System Design	Design Changes are coordinated by NHDOT IT and QA oversight. Not clear how any key tie vote is managed		RTW - control board will have odd number so that majority vote will occur.	Low	Low
G3	4.1.3 Incident notification	Although an incident escalation process is called out in 2013-051SwRI Contract Agreement-Part 2, page 26, for Management Disputes, there is no reference to a working "Escalation Process" for problems in development and implementation phases of the engagement.	It is recommended that a problem management escalation process be developed and defined within the vendors project **Implementation Plan** documentation that provides for escalations of application development and implementation issues that require resolution on an immediate basis as part of the daily management process for program implementation. (Mark A. Peterson–Coeur Group)	Conversation with Robert Heller of SWRI indicated that the Technical Implementation process will be part of the **"Implementation Project Plan"** and various levels of escalation functions will be defined in that plan.	High	Low
G4	4.1.4 Trouble shooting	Potential for impact to VT DII for network issues and the need to interface directly with the vendor access to vendor to escalate and resolve issues of network nature		Conversation with Robert Heller of SWRI indicated that the Technical Implementation process will be part of the **"Implementation Project Plan"** and various levels of escalation functions will be defined in that plan. NHODT via VT AOT needs to ensure the Technical Escalation Plan includes management and escalation of RackSpace for potential outages even thought the uptime should be 99.95%.	Medium	Low
G5	4.1.4 Trouble shooting	Network connection demarcation points for vendor responsibilities are not defined. At this point it is not determined what the demarcation point is referencing nor what data, voice or video information will travel over the Vermont state network.		Robert Heller (SWRI): SWRI via Rack Space has responsibility for connectivity to the Rack Space VPN connection to the internet. Each State will have the responsibility to ensure their connectivity through there VPN to the internet is working.	Medium	Low
G6	4.1.5 Scheduled Maintenance/Software upgrades	Unclear definition of software updating process for end user "Thin Client" . Will this impact the Vermont Network if the PC "Client" is upgraded and downloaded each instance of PC startup?		**Robert Heller (SWRI):** The Thin Client is strictly providing updating to the Internet Explorer (IE) cache on each PC. Therefore no updates are actually made to any software on the User PC.	Low	Low
G7	4.1.5 Scheduled Maintenance/Software upgrades	Conflict resolution for software upgrades are not defined as to whom will have the final decision? (NHDOT-VTAOT-MEDOT)		RTW - control board will provide input to NH. NH is contracting authority and will have final say.	Low	Low
G8	4.1.8 Future System Modification and Asset Replacement	Change Control Board "Final Decision" authority is not defined		RTW - control board will provide input to NH. NH is contracting authority and will have final say.	Low	Low
G8	4.1.9 Conflict Resolution	This term implies that NHDOT has final authority for conflict resolution along with a consultant. Who in fact will have final authority for making these decision?		RTW - NH is contracting authority and will have final say.	Low	Low
G9	5.0 Cost Allocation	Conflicts for Cost Resolution are not clearly defined for final authority. Similar to other "Final Decision" and Authority comments.		RTW - control board will provide input to NH. NH is contracting authority and will have final say.	Low	Low
G10	5.0 Cost Allocation	It is unclear when the cost charges are a percentage of the Tri-State or attributed to one party or all parties equally. This is also defined in QA Consultant cost paragraph in table.	Answers were found in the Cost Allocation folder in TriState SharePoint site. (Mark Peterson - Coeur Group)	No Action Required as the cost allocation was included in the MOMA documentation	Low	Low
	Appendix B - Operational Contact Information					
B1	Contact Information	Contact should include a Technical level "Escalation Process" that should be defined as part of the ***Project Planning and Initiation*** process with the vendor and also contain the Escalation contact information for SWRI and SAIC response to development and implementation issues. Same issue as G3		Robert Heller (SWRI): Indicated that this process will be included in the Implementation Project Plan provided to the State of New Hampshire.	Low	Low
	Appendix C - Change Control Board					
C1	Table 1 - Voting Member	It is unclear who has the final decision and authority in cases of a tie vote or undecided voters		RTW - control board will provide input to NH. NH is contracting authority and will have final say.	Low	Low
C2	Table 1 - Voting Member	Who are the specific CCB personnel that will have 2 votes for Vermont?		RTW - Robert T. White and Erik Filkorn or their designees if unavailable	Low	Low

Figure 10 - Issue and Risk Action Register (Exhibit G, Appendix B and Appendix C

ID	Item/Function Issue	Potential Risk Event/Comments	Mitigation Recommendation	Mitigation Action Taken	Initial Risk Potential	Current Mitigation Action
	IR Report Section Categories					
AC	**Acquisition Cost**					
AC3	No final modules of the system are defined at this time	AC3 Risk: Risk identified to VTrans to ensure funding is available for any increased cost.		Risk addressed and mitigation statement as per AOT Project Lead.	Low	Low
AC4	Final system configurations are not final at this time.	AC4 Risk: Risk identified to VTrans which indicated funding is available for final plan cost.		Risk addresses and mitigation statement as per AOT Project Lead.	Low	Low
	Architecture					
AR1	Lack of a technical escalation plan	AR1 Risk: Risk is still inherent and a Technical Escalation Plan should be completed by NHDOT and SWRI prior to the completion of the Project Planning phase and shared with VTrans.		NHDOT, VTrans, SWRI and Leidos have concurred to put this into the Project Plan	Low	Low
AR2	Unvalidated Security Plan	AR2 Risk: Risk addressed with NHDOIT. Risk is not mitigated until the security plan is completed prior to the completion of the Project Planning Phase.		NHDOT, VTrans, SWRI and Leidos have concurred to put this into the Project Plan with a focus on security policy and processes.	Medium	Low
AR3	No CoOP plan at this stage	AR3 Risk: Risk addressed with AOT Lead. Risk will be mitigated when NHDOT has SWRI develop the CoOp plan prior to completion of the Planning phase of the project. NHDOT and SWRI indicated this will be part of the implementation plan.		NHDOT, VTrans, SWRI and Leidos have concurred to put this into the Project Plan	Low	Low
AR4	Uptime guarantees in MOMA, Will require on-going monitoring	AR4 Risk: Risk addressed with NHDOT and NHDOIT. Risk mitigation will require VTrans Project Lead to monitor contracted uptime reporting.		NHDOT, VTrans, indicated this was part of the plan	Low	Low
AR5	Vermont Network loading concern.	AR5 Risk: Risk addressed with AOT Lead. Risk mitigation steps need to be taken to identify network loading during the ATMS-TIS system testing phase as called out in the MOMA		The network loading will be monitored by NH DoIT during the implementation process.	Low	Low
AR6	Technology sufficient to support the Business	AR6 Risk: Risk mitigation for the MOMA items identified as potential risk should be mitigated and signed off prior to the completion of the Project Planning Phase.		The ATMS -TIS systems are defined to support the business they were intended to improve. NHDOT lead will manage the project to ensure the systems are implemented to specification.	Low	Low
AR7	Technology sufficient to support the Business	AR7 Risk: No significant risk was identified due to the ATMS-TIS web based application which will reside on VTrans PCs. Since the application (ATMS) will be hosted by Amazon or RackSpace, there will be no hardware or software within the responsibility of DII for the state of Vermont.		The ATMS -TIS systems are defined to support the business they were intended to improve. NHDOT lead will manage the project to ensure the systems are implemented to specification.	Low	Low
AR8	Technology Policy	confirmed with the VTrans Assistant Attorney General. Risk will be mitigated as the VTrans project lead works with NHDOT lead to ensure policies enacted throughout the project implementation are consistent with		Risk will be mitigated as the VTrans project lead works with NHDOT lead to ensure policies enacted throughout the project implementation are consistent with those of the State of Vermont.	Low	Low
	Implementation Plan					
IP2	A final implementation is required during project planning	IP2 RISK: Risk addressed Risk will be mitigated when the Implementation Plan is signed off by NH DOT.		NHDOT lead indicated this will be completed	Low	Low
IP3	Lack of a CoOP plan in the contract was identified	IP3 RISK: Risk will be mitigated when NH DOT signs off on the completed MOMA and the vendor provides the CoOP plan prior to completion of the Project Planning phase.		NHDOT lead indicated this will be completed	Low	Low
IP4	Lack of defined final decision making authority	IP4 RISK: Resolution: Risk Mitigated as the MOMA now reflects the final decision maker as the NHDOT project lead.		NHDOT project lead is now defined as the project final decision authority	Low	Low
IP5	Lack of a technical escalation plan	IP5 RISK: This risk should be mitigated prior to the completion of the Project Planning phase with a defined Technical Escalation Plan.		NHDOT lead indicated this will be completed	Low	Low
IP6	Service Level Agreements were not defined in the MOMA	IP6 RISK: Resolution: Risk Mitigation completed for MOMA purposes as the Service Level Agreement (SLA) is defined in the MOMA. However the SLA will need ongoing management from NHDOT.		NHDOT lead indicated this will be completed. SWRI sent copies of the SLA's	Low	Low
IP7	Network connectivity impact concern	IP7 RISK: Resolution: Risk Mitigation completed for MOMA Purposes		NHDoIT will monitor loading levels during implementation	Low	Low
	Organizational Readiness					
OR3	Lack of final authority in MOMA concerning who has final decision	OR3 RISK: Risk Issue G1, mitigation action taken	Provide a decision roles and responsibilities definition	NHDOT lead is now clarified as having final decision authority	Low	Low

Figure 11 - IR Report Format General Issues and Risk Mitigation List

End of Report