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State of Vermont

VERMONT

Independent Review
Of a Proposed

Contract extension
for a vendor providing
Business Process Management System (BPMS)
technology

Submitted to the
State of Vermont, Office of the CIO
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Version 2.2

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1. Executive Summary

Under Bulletin 3.5, the State of Vermont, Office of the Chief Information Officer (CIO), and the Agency of Transportation engaged Coeur Business Group to conduct an Independent Review of a proposed contract extension for Appian Corporation which was previously selected through a competitive bid process to provide Business Process Management Systems (BPMS) SaaS and services to the Agency. The Agency of Transportation is proposing an extension to the vendor's contract which if approved, will result in the cost of this project exceeding one million dollars.

Under Vermont statute or at the CIO's discretion all Information Technology (IT) activities over $1,000,000 require an independent review by the Office of the CIO. The Independent Review is charged to examine the acquisition costs, perform an architecture review, assess the implementation plan, cost benefit analysis, readiness assessment, and deliver an impact analysis on net operating costs for the Agency of Transportation. The primary objective of the Independent Review is to identify risks and issues that may impact the success of the scope of work proposed in the contract extension and the project as a whole.

This Independent Review endeavors to examine the decision to implement Business Process Management (BPM) within the Agency of Transportation, the choice and performance of a Business Process Management System (BPMS) SaaS vendor, and the overall benefit versus cost for the system implementation in an effort to justify the overall BPMS effort and the individual projects while limiting the potential for failure.

Business Process Management is a set of methods, tools, and technologies used to optimize, and control organizational business processes. BPM is a process-centric approach for improving organizational performance and represents an effective collaboration between business people and information to foster effective, agile, and transparent business processes. BPM spans people, systems, functions, businesses, customers, suppliers, and partners. BPM combines established and proven process management methods with a relatively new class of enterprise business tools. The proven BPM approach has enabled breakthroughs in the speed and agility of how organizations improve business performance.

This Review looks back in time at the life of BPM at AOT, an initiative that began 7 years ago (2007), thru a completed and operational Pilot project, and forward to a proposed new project and the ongoing use of BPMS.

The majority cost of this initiative is attributed to costs for professional services, or more correctly stated: the labor hours for individual processes to be migrated into the BPMS SaaS. Early on, AOT made a strategic decision to first use external resources from a BPMS SaaS service provider to support the Pilot as it

attempted to migrate the initial 'Finals' process into the BPMS SaaS. Committing to a long term staff investment at the Pilot stage might have been unreasonable. There was never any doubt however, that resources could later be added as needed post-Pilot. This decision was brought about by a cost versus benefit performed by AOT early in the initiative. Heavily contributing to this decision was the low probability of securing new positions because of the tremendous constraints on the State and Agency budgets over the past several years.

As a result of our review of the overall BPM initiative, the Pilot project (Finals process), and the proposed new project (ROW project), it is the opinion of Coeur Group that the BPMS SaaS investment as a whole should be expected to deliver a positive Return on Investment resulting from improvements to operational processes which, in some examples, have been in place and virtually untouched since the 1950's.

1.1 Cost Summary

IT Activity Lifecycle: 20 Years		Federal 80%	State 20%
Lifecycle Costs			
FINALS:	$ 467,435	$ 373,948	$ 93,487
ROW:	$ 1,444,590	$ 1,155,672	$ 288,918
BPMS:	$ 1,912,025	$ 1,529,620	$ 382,405
Professional Services Costs	$ 368,465	$ 294,772	$ 73,693
FINALS:	$ 611,910	$ 489,528	$ 122,382
ROW:	$ 980,375	$ 784,300	$ 196,075
BPMS:			
New Annual Operating Costs	$ 2,545	$ 2,036	$ 509
FINALS:	$ 37,440	$ 29,952	$ 7,488
ROW:		$ 31,998	$ 7,997
BPMS:			
Difference Between Current and New Operating Costs:	-1,013,289		

1.2 Disposition of Independent Review Deliverables

Deliverable	Highlights from the Review Include explanations of any significant concerns
Acquisition Cost Assessment	**Cost savings may be available**
Technology Architecture Review	No significant concerns **Meets DII Guidelines**
Implementation Plan Assessment	No significant concerns **Overall Plan is Appropriate**
Cost Analysis and Model for Benefit Analysis	No significant concerns **Overall Analysis is Positive**
Impact Analysis on Net Operating Costs	No significant concerns **Overall State Impact is Minimal**

1.3 Identified High Impact &/or High Likelihood of Occurrence Risks

Risk Description	State's Planned Risk Response	Reviewer's Assessment of Planned Response
No High Impact Risks Identified		
No High Likelihood Risks Identified		

1.4 Other Key Issues

No Other Key Issues Identified

1.5 Recommendation

It is the opinion of the Coeur Group team performing this Independent Review that when the following Independent Review components are taken into consideration:

- Minimal risks identified with no significant risks
- High internal AOT support from executive to user levels
- Dedicated BPMS project oversight by the BPMC
- Low State developmental and operational costs
- Federal participation in the development and operational cost
- Productivity and efficiency increases

The use of State and Federal funds are being applied in an efficient and effective manner which are effecting positive changes in the operation of AOT thereby delivering products and services in a more efficient and effective manner to the State and the citizens of Vermont.

We do however also recommend that AOT investigate the possibility of lowering the hourly rate paid to Appian for their respective positions as referenced in the report. In addition we support AOT in their continued review of alternative lower priced technical resources from Appian Partners.

Based upon our observations, interviews, research, the above suggestions, and the understanding that AOT will continue to improve its processes to address the risks listed in this report, Coeur Group recommends the proposed contract extension with Appian Corporation and the continuance of the Business Process Management System initiative for Agency of Transportation be approved and continued.

1.6 Certification

I hereby certify that this Independent Review Report represents a true, independent, unbiased and thorough assessment of this technology project/activity and proposed vendor(s).

Dan McLane   October 15, 2014

Signature   Date

2. Scope of this Independent Review

2.1 In-Scope

The scope of this document is fulfilling the requirements of Vermont Statute, Title 3, Chapter 45, §2222(g): The Secretary of Administration shall obtain independent expert review of any recommendation for any information technology initiated after July 1, 1996, as information technology activity is defined by subdivision (a)(10), when its total cost is $1,000,000 or greater or when required by the State Chief Information Officer.

In accordance with the Statement of Work (SOW) issued on August 18, 2014 and awarded to Coeur Business Group on September 4, 2014, Coeur Group conducted an Independent Review of a Proposed Contract Extension for Appian Corporation and the associated Business Process Management System project review for Agency of Transportation. It is the intent of the State that the following items be addressed in the Independent Review:

- An acquisition cost assessment
- A technology architecture review
- An implementation plan assessment (which includes a Risk Analysis)
- A cost analysis and model for benefit analysis
- An impact analysis on net operating costs for the Agency of Transportation

The following overall Independent Review attributes were performed as needed to complete this Independent Review:

- Project Planning and kickoff with AOT and Coeur Group
- AOT developed a stakeholder contact list and provide the list to Coeur Group
- AOT and Coeur Group coordinated Critical Success Factor Interviews with the AOT Stakeholders. Coeur Group delivered three days of on-site meetings at AOT offices in Vermont collecting information and interviewing stakeholders
- Coeur Group also held a teleconference with Appian Corporation to interview their project team
- After initial interviews with AOT stakeholders, follow-up interviews were conducted via teleconference
- A Catalog of Risks were identified and strategies discussed to mitigate risks
- A series of AOT meetings and conference calls were facilitated by Coeur Group, to develop AOT's response to all risks and issues
- AOT Project Manager was responsible for documenting the AOT response, providing it to Coeur Group for inclusion in the Risks and Issues Management Plan
- Coeur Group wrote the independent review deliverable according to the Scope of Work, and delivers the draft document to the State Enterprise Project Management Office (EPMO) Project Manager and AOT Project Manager prior to the meeting with the CIO for initial review
- Enterprise Project Management Office PM works with Coeur Group to insure Risk Mitigations and plan is finalized with AOT for final review with CIO
- The EPMO Project Manager set up the Independent Review presentation with the CIO, AOT and Coeur Group to "discuss" the review and answer final questions
- Coeur Group will make final adjustments to the deliverable report and submitted the final independent review document(s) to the State
- EPMO PM "closed out" the IR with CIO once all Mitigation Risks and plans have satisfied the CIO to move forward with project

- EPMO PM will complete the Acceptance Form & billing approval for the Independent Review

2.2 Out-of-Scope

This Independent Review does not provide for Procurement Advisory Services.

The content of this report is limited to the information made available during interviews with Agency of Transportation stakeholders (see table below), interviews with the DII EPMO Project Manager, interviews with the Appian Corporation project team, and the documents provided by the Agency of Transportation BPMS Project Manager (see table below).

Throughout this report Coeur Group has relied upon the documentation and information obtained during interviews, email communications, and teleconferences and is therefore limited by the accuracy of the information provided.

3. Sources of Information

3.1 Independent Review Participants

The following individuals that participated in this Independent Review

Name	Employer and Title	Date of contact
Martha Haley	VT DII EPMO Project Manager	September 3, 2014
Faith Brown	VT, AOT, Director of Finance and Administration	September 30, 2014
June Burr	V T, AOT, BPMS Project Manager	September 3, 2014
Richard Tetreault	VT, AOT, Chief Engineer (Sponsor)	September 16, 2014
Rich Ranaldo	VT, AOT, Finals Supervisor	September 16, 2014
David Hoyne	VT, AOT, Construction Engineer	September 16, 2014
Chris Cole	VT, AOT, Director Planning and Intermodal Development Bureau	September 16, 2014
Tom Hurd	VT, AOT, CIO	September 17, 2014
Rob White	VT, AOT, Chief of Right of Way	September 17, 2014
Ryan Cloutier	VT, AOT, Right of Way Process Manager	September 17, 2014
Jack Conway	Appian, Account Executive	September 22, 2014
Adrienne Hubbard	Appian, Professional Services	September 22, 2014

3.2 Independent Review Documentation

The following documentation was utilized in part to compile this independent review. Documents are <u>not</u> listed in the order of receipt.

Document Name	Description	Source
IT_ABC_Form_Vtrans_ROW_BPMSv2.pdf	Activity Business Case & cost Analysis 8/13/2014 for ROW	Martha Haley
Final BPM RFP.pdf	RFP for SAAS BPMS and Professional Services 3/9/2011	Martha Haley
Email of VT AOT Stakeholders	VT AOT Stakeholder list 9/3/2014	June Burr
PS0205 1 (2)	VT contract summary between VT AOT and Appian 8/5/2013	June Burr
Negotiated (2).pdf	Attachment F from Appian RFP response 5/4/2011	June Burr
vtransengineering.vermont.gov_sites_ aot_program_development_files_ documents_publications_FlowChart.pdf	Process flow chart for projects undertaken by AOT	June Burr
Vtrans-Appian-v3-noIP (1).pdf	BPMS high level network and security diagram	June Burr
Appian Development Hours.pdf	Summary of billable hours 4/2013 to 2/2014	June Burr
Financials for Pilot Project "Finals".xls	XL sheet with expenditures to date and planned 7/2014	June Burr
Gartner_iBPMS_Report.pdf	Gartner consulting Magic Quadrant for Intelligent Business Process Management 9/2012	June Burr
Email regarding Appian certifications and accreditations for cloud offerings	Multiple certifications and accreditations	Jack Conway (Appian)
Memo to justify contract amendment for Appian		June Burr
Plot existing plans and titles	Visio flow chart showing existing processes to be	June Burr

	moved to BPMS (5 sheets)	
Appian ROW project costs.xls	Appian ROM cost breakdown for proposed services for ROW project	June Burr
Subjob_request_form_ROW_001.xls	Request to Fed to create a sub project for ROW and bill separately	June Burr
BPM Contract amendment 1.pdf	Contract amendment to raise amount from 200K to 492K increase of 292K	June Burr
Appian contract amendment Amend_2014_Appian.doc	Formal contract amendment request to increase contract from 492K to 1.69M increase of 1.2M	June Burr
08212014Memo to Justify Amendment Contract PS0205.doc	Memo to justify contract extension and contract maximum increase	June Burr
Charter-VTrans_Construction_Contracting_Finals_Pilot_Project_07162012[1]	Original Project Charter	Martha Haley
Cost_Model-VTrans_Construction_Contracting_Finals_Pilot_Project_Prelimin[1]	Preliminary cost projections for Finals Project	Martha Haley
Business-Case_VTrans_Construction_Contracting_Finals_Pilot_Project[1]	Original business case for Finals	Martha Haley
Appian project monthly invoice		June Burr
Appian project invoice justification		June Burr

4. Project Information

4.1 Historical Background

In 2008 a Business Process Management Committee (BPMC) was formed and charged with sponsoring improvement projects throughout VTrans. The Committee's primary objective is to translate the Agency's strategic goals pertaining to safety, excellence, planning, and preservation into tangible operational and managerial improvements through the employment of Business Process Management (BPM).

The BPMC collectively participate to strategically plan, manage, lead, and resource BPM efforts. They are comprised of the two Division Directors, a Deputy Director, IT management, Construction Engineers, and a Business Process Manager who will serve as the engagement project manager.

While the overall scope of the BPMC's effort includes the entire Agency, the initial priority was to focus on the improvement of related sub processes within the VTran's project delivery process. Project delivery is a core transportation process comprised of hundreds of sub processes, people, and systems, and is the mechanism by which approximately $300M in annual capital transportation projects is delivered to Vermont citizens.

To improve the project delivery process, VTrans chose to incorporate two frameworks:

- A change leadership process model and
- A Business Process Management discipline with supporting technology.

The change leadership model will work to address the challenges associated with behavioral transformation, while the BPM discipline and supporting technology will focus on the management, governance, and delivery of process improvements.

The initial focus of the improvements is solely on the interrelated sub processes of the Agency's core project delivery process. While predominately engineering in purpose (hydrology, survey, engineering design, construction, environmental permitting, right-of- way), the project delivery core process also includes project management, construction contracting, and business office sub processes. Collectively these sub processes number in the hundreds. At the time of the original RFP, well over 50 Project Delivery sub processes had been manually documented, over multiple years, through an effort to introduce BPM concepts and principles to approximately 35 staff members directly working on project delivery.

The initial project planned to pilot the implementation of a turnkey BPMS SaaS solution and left room in the scope to involve additional sub processes and/or iterations beyond the scope of the initial pilot project.

The approach to improve the project delivery process relies upon references from both BPM and change leadership frameworks. Change Management Consultants were placed under contract in August of 2010 and initially worked with the BPMC and a 17 member Leadership team to kick start the initiative.

VTrans' earliest efforts beginning in 2007, produced a (hybrid) prototype BPM process improvement methodology in 2008, and proved successful for small non-technology supported improvement projects. Further adaptation of the methodology was needed to accommodate use of a supporting technology and process governance. The preferred method to design, develop and implement improved processes into a BPMS SaaS model to utilize agile methods (e.g. rapid application development-RAD).

The BPMC understood that process improvements would be realized through many iterative improvement projects of varying scope under a Project Delivery Improvement Initiative. The Initiative's overall goals were to:

- Establish performance management at VTrans
- Improve the efficiency, effectiveness, customer satisfaction and agility of Project Delivery sub processes using the discipline of BPM, Change Leadership, and supporting technology
- Align organizational culture and performance within a BPMS SaaS environment
- Iteratively implement process governance to effectively support the BPMS model
- Optimize the management of VTrans' processes where work activities are continuously improved based on quantitative feedback
- Continually assess the value proposition of using a holistic BPMS approach in the VTrans environment

In order to support the goals and objectives of the BPMC, VTrans through the Vermont office of Purchasing and Contracting, published in March of 2011, an RFP for a Software as a Service (SaaS) business process management platform licenses; technical, support, training and consulting services to establish a BPMS environment with a turnkey solution for the Agency of Transportation.

The original RFP was seeking proposals from qualified consultants for platform technology and professional services in the following areas:

- SaaS subscription licenses for an entirely web-based, integrated BPM platform
- Professional services to document, design, configure, and implement improved sub processes into a BPMS SaaS environment
- Post-implementation BPMS support services
- BPMS training

Because the VTrans BPMS Project Manager was the only dedicated staff assigned to the BPMS effort, the BPMC understood that turnkey services would be necessary to support post-implementation activities until human resource requirements could be defined and obtained.

The focus of the Pilot project takes the BPM initiative to the next level by configuring one process, the Construction Contracting Finals (Finals) process within a BPMS SaaS model. The objective of the Pilot Project would wrap the BPM discipline and supporting technology around a specific business process to produce a fully operational BPMS SaaS application. Beyond the Pilot, additional BPM projects to improve VTrans process performance including the ROW project will be reconfigured to eventually transform the organizational workplace.

4.2 Project Goal

The near-term goals of the initial pilot and subsequent projects under this objective are to:

- Evolve the BPMS methodology, practices and supporting technology as an organizational discipline
- Establish an integrated BPMS solution using a SaaS delivery model
- Implement components of governance as needed
- Build sufficient change leadership capacity to support successful adoption and acceptance of the BPMS environment (transformation)

The goals of the latest Contract Extension and increase in the Maximum Limiting Amount, build upon the successes of the pilot goals listed above. The contract extension will add a new process into the BPMS model specifically targeted at a segment of the AOT construction process (ROW) on the Critical Path for of the core AOT process of project delivery.

Presently, there is no dedicated in-house staff available to further configure processes into applications on the Appian platform. Therefore the stated purpose is to extend access to professional consulting services to support continued configuring of business process management applications to automate the mission critical Right of Way (ROW) business sub process.

In addition, the Contract Extension and increase in the Maximum Limiting Amount, continue user access to Appian BPM platform licenses and SAAS environments for process participants, by providing for a minimum of fifty user licenses which are needed for existing and prospective users to access the deployed Construction Contract Finals (CCF) or to develop the prospective ROW applications.

4.3 Project Scope

The scope of the original BPMS RFP project was listed in a series of RFP requirements for the BPMS solutions providers. This extensive original list of requirements is contained in an attachment to this report in an effort to keep the primary sections of the report brief. In general the Scope of the original contract called for a SaaS solution with professional services to plan, install, operate, educate, and provide professional support to a BPMS model and to bring the first pilot process into the system.

The scope of the Contract Extension and associated Maximum Limiting Amount is inclusive of the original vendor requirements as accepted by the parties to the existing contract, but specifically increases the requirement to add the nine Right Of Way sub processes into the BPMS SaaS. No additional hardware or software is needed for this addition as this is fully SaaS. All scope additions for the contract extension are primarily professional services.

The Construction and the ROW sub process components are shown in the following flow chart.   (Note: It was necessary to reduce the size of the original graphic to fit on this page. The full graphic is available as an attachment)

Right Of Way
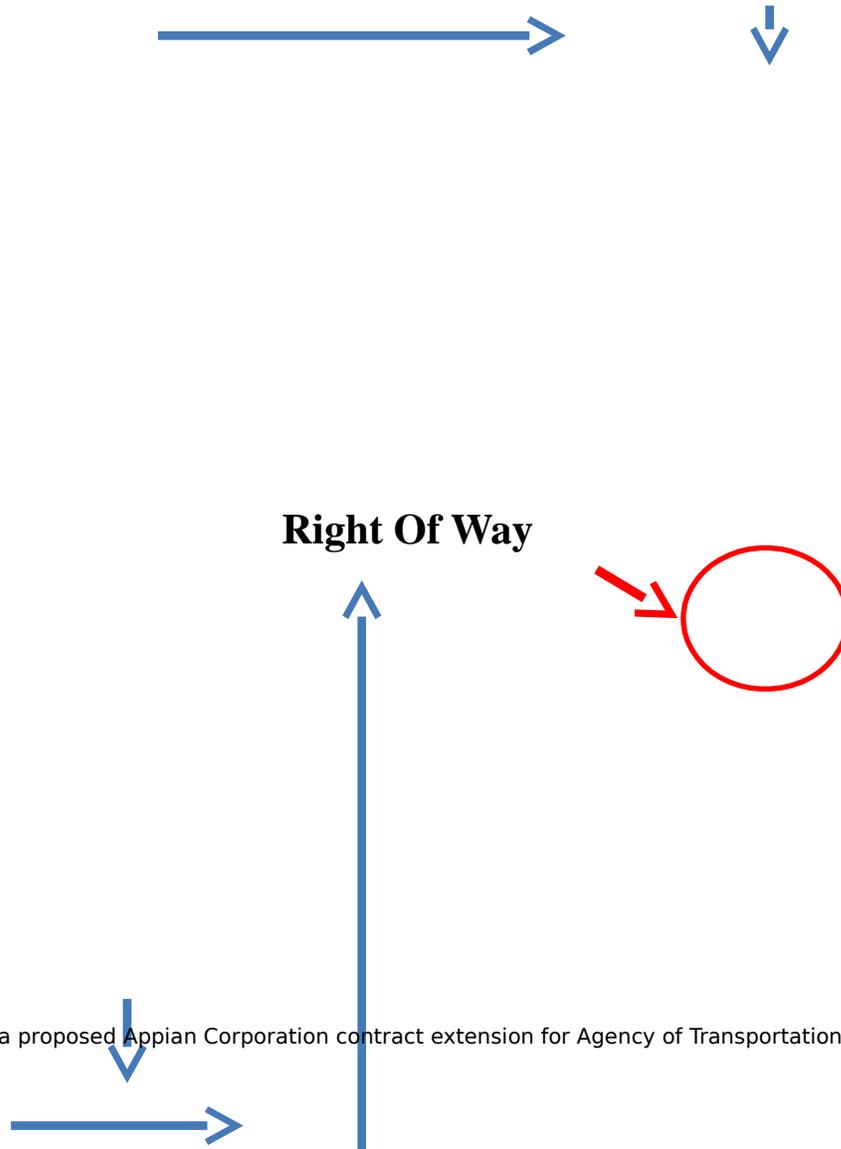
The specific additions to the requirements already accepted to both parties of the existing contract, are inclusive of the nine sub processes and other project related activities as follows:

- Foundational Design
- Plot Existing, Plans, & Titles & Document Prep
- Appraisal Request
- Waiver
- Cost Estimate Development
- External Consultant Considerations
- Perform Appraisal
- Developing Analysis
- Performs Review
- Negotiations
- Right of Way Clearance
- Templates
- Integrations
- User Acceptance Testing and Remediation
- Knowledge Transfer and Deployment
- Project Management

Major Deliverables

A high level work breakdown of the deliverables is as follows:

High-Level Functionality	Work Breakdown
Foundational Design	- Groups - Rules/Constants - Process Model Folders - Document Management - Tempo Feeds
Plot Existing, Plans, & Titles & Document Prep	- Process Model(s) - ROW Process Record - Document Upload and Management - Security - XSDs, CDTs, Tables - Memo Template to P&T Chief - Unit testing
Appraisal Request	- Process Model(s) - Appraisal/Waiver Record - Document Upload and Management - Security - XSDs, CDTs, Tables - Unit testing
Waiver	- Process Model(s) - Appraisal/Waiver Record - Document Upload and Management - Security - XSDs, CDTs, Tables - Unit testing
Cost Estimate Development	- Process Model(s) - Document Upload and Management - Security - XSDs, CDTs, Tables - Unit testing
External Consultant Considerations	- Process Model(s) - Document Upload and Management - Security - XSDs, CDTs, Tables - Unit testing
Perform Appraisal	- Process Model(s) - Document Upload and Management - Security - XSDs, CDTs, Tables - Unit testing
Developing Analysis	- Process Model(s) - Document Upload and Management - Security - XSDs, CDTs, Tables - Unit testing

Performs Review	- Process Model(s) - Document Upload and Management - Produce Report Summary - Security - XSDs, CDTs, Tables - Unit testing
Negotiations	- Process Model(s) - Document Upload and Management - Archive Process Data and Process Closeout - Security - XSDs, CDTs, Tables - Unit testing
Right of Way Clearance	- Process Model(s) - Document Upload and Management - Security - XSDs, CDTs, Tables - Unit testing
Templates	2 days per templates (19 templates)
Integrations	2 weeks per integration: - GIS - ROW DB - Town Road Maps - UVM Special Collection - Digital Print Room/Onbase - M Drive
User Acceptance Testing and Remediation	
Knowledge Transfer and Deployment	

4.4 Project Phases, Milestones and Schedule

The original Project Phases, Milestones and Schedule for the initial Pilot Project were managed individually under five Task Orders. The task orders specified the deliverables, timeframes, and payments. Critical Success Factor Interviews with a cross section of senior management at AOT as well as the participants in the Pilot Project suggest that the Pilot Project, which includes significant internal education and training as to the purpose, goals, and objectives of the BPMS, has been well received and supported throughout the organization.

Therefore, without a complete assessment of the Pilot Project Phases, Milestones, and Schedule it can still be stated in this Independent Review that the AOT organization as a whole presented no concerns with the rollout, installation, training, support, and implementation of the Pilot. This lack of concern or criticism is the best indicator that the Phases, Milestones, and Schedule were such that the needs of the organization were met.

As for the Contract Extension and associated ROW project Phases, Milestones, and Schedule, it was reported to Coeur Group that the individual Task Order components of the overall Project Plan were to be developed after the Contract Extension is approved and accepted by Appian and therefore were not available at the time of this Independent Review.

In general the AOT BPMS initiative presents itself as a tightly orchestrated strategic implementation that is overseen by the BPMC, managed by a formal Project Manager, implemented through the use of formal task orders, involves end user participants and management from the specific departments, while using agile development methods to ensure success and acceptance.

5. Acquisition Cost Assessment

The proposed Contract Extension and associated Maximum Limiting Amount provide for the operational costs of the completed Finals solution and add a second project under the AOT BPMS (ROW).

The Appian BPMS solution is a SaaS platform that in itself has minimal one-time costs to acquire. The majority of acquisition costs for the SaaS solution are derived from the developmental costs of external vendors used to configure the AOT processes into the Appian BPMS. License fees are charged on a quarterly basis and support the instances of the Appian BPMS SaaS, and the user licenses needed to access the system. A one-time start-up fee is charged by Appian and is reflected in the table under Implementation Services.

Locally within the AOT firewall, one database table is needed to support the transfer of information between the Appian SaaS BPMS and existing legacy systems at AOT. The table resides on an AOT server that was in existence prior to the Pilot, therefore no additional hardware costs were incurred. The cost for setting up the necessary table on the existing server to provide the bidirectional link to AOT/State legacy data was provided by an AOT DBA in less than 60 hours and is listed under Integration Cost (see table below). It is anticipated that some modifications to the database table maintained on the AOT server by the AOT DBA will be required however the effort will be relatively minimal and therefore not reflected in the following chart.

Costs for AOT internal staff that participated in the Pilot project as well as the costs for staff that will participate in the ROW project are not considered as part of this project as they are already in the agency budget. AOT plans to hire one dedicated staff member for the upcoming ROW project and the cost of that staff addition are included in the chart.

The following chart illustrates the acquisition costs to deliver two operational BPMS SaaS solutions to AOT.

Acquisition Costs	Cost	Comments
Hardware Costs	$ 0	No new hardware was implemented. Existing AOT servers are used to support bidirectional data between the BPMS SaaS and legacy State systems
Software License Costs	Total: $ 76,400 Federal: $ 61,152 State: $ 15,288	Represents licenses required for two 12 month development cycles
Implementation Services	Total: $ 1200 Federal: $ 960 State: $ 240	A one-time setup fee to start the BPMS SaaS instance
System Integration Costs	Total: $ 2160 Federal: $ 0 State: $ 2160	Cost for AOT DBA to set up database tables on an existing AOT server
Professional Services	Total: $ 980,375 Federal: $ 784,300 State: $ 196,075	
Additional Staff	Total: $ 74,880 Federal: $ 59,904 State: $ 14,976	Staff added for use on the ROW project only
2nd Development Instance	Total: $17,250 Federal: $ 13,800 State: $ 3,450	
Total Acquisition Costs	Total: $ 1,152,305 Federal: $ 921,844 State: $ 230,461	

5.1 Cost Validation:

The acquisition costs listed in the previous table were validated through interviews with AOT project team members including individual contributors, management, AOT Information Technology staff, and members from the BPMC. Further validation was obtained through interviews with Appian to verify that no other costs were incurred and costs provided were accurate.

5.2 Cost Comparison:

As the costs for a BPMS project vary widely based on the complexity and quantity of processes undertaken, to provide a cost comparison, it is necessary to find a commonality between all projects. Coeur Group has selected the hourly cost of an Appian developer as the reference for our comparison.

The Appian contract lists Professional Services (Appian Developers) as follows:

Appian Corporation	Contract Hourly Rate	GSA Hourly Rate For 2001-2016 Contract: GS-35F-0092M	Contract v/s GSA Difference
Principal Consultant	$275	$248	-9%
Senior Consultant	$252	$214	-15%
Consultant	$215	$182	-15%

To compare the published contract rates with the current market, Coeur Group contacted a cross section of Appian solution partners and gained access to their published GSA pricing. The partner published GSA pricing for similar skill sets should represent the maximum hourly rate AOT would pay for the same services from the Appian partner.

Shown below are two Appian partners and their respective published GSA pricing which is a representative sample of the Appian partners examined.

Appian Partner #1 Published GSA Pricing	Hourly Rate	% Difference to Appian Contract
Application Architect	$166	-40%
Senior Application Developer	$136	-46%
Application Developer	$111	-48%

Appian Partner #2 Published GSA Pricing	Hourly Rate	% Difference to Appian Contract
Application Architect	$158	-43%
Senior Application	$138	-45%

Developer		
Application Developer	$123	-43%

5.3 Cost Assessment:

The above tables illustrate the differences between the current Appian contract rates and the rates of Appian partners. The difference between Appian and their partner developers averages approximately 44% less than the current hourly rate being paid by AOT. At a minimum, AOT should consider renegotiation with Appian for their current GSA pricing which could represent up to a 15% savings.

AOT is currently evaluating the quality of services provided by one of the many available Appian partners. Architect Solutions is an Appian partner and has recently been placed under contract with AOT for "break-fix" support of the BPMS, a support service that is not offered by Appian. AOT should be able to determine if the skills of the Appian partner are similar to the skills offered by Appian in a reasonable timeframe. Once the evaluation of the partner has provided adequate performance data, AOT may wish to consider using the partner for future development activity. At a minimum, AOT may be able to utilize the difference in pricing to negotiate a lower rate from Appian. However, it is unlikely that Appian would drop below their published GSA rates as it may jeopardize their current relationships.

Ultimately, AOT will need to weigh the cost differences between Appian and their partners as well as the cost for additional internal hires for BPMS development. It is our opinion that internal loaded cost for a developer of $36 per hour are not likely sustainable over time to meet the needs of the agency. The hourly salary to attract a fully qualified developer would likely be significantly higher. Based upon an average salary for Appian Developer positions (source: simply hired and career builder) the planned salary for an internal AOT developer is nearly 40% below market. The potential loss of internal staff after training should be considered, as it is unlikely the State will remain competitive with salaries in the marketplace and therefore the loss of staff after training by the state is higher.

As the costs of a BPMS project vary widely based on the complexity and quantity of processes being undertaken, Coeur Group did not attempt to compare and validate costs based upon the time for development. The validation and appropriateness of the costs were therefore reduced to an analysis of the hourly costs to the State for the external developers.   While the development time cannot be compared to other projects, the hourly costs associated to the development time can be assessed. Based upon our interviews and information from external sources, as referenced in this document, Coeur Group finds that while the costs for BPMS are valid, the appropriateness of the costs comes into question as evidenced above.   Therefore Coeur Group recommends at a minimum that the BPMC attempt to obtain the posted GSA pricing from Appian which could lower development costs. In addition we support the AOT plans to

identify alternative development resources and the training of internal staff which will continue to drive down costs.

6. Technology Architecture Review

6.1 State's IT Strategic Plan

The DII website indicates that its strategic direction is Cloud computing. The justifications for a Cloud based solution are numerous and give the State significant cost and operational advantages over those housed internally. The Appian SaaS solution chosen by AOT clearly plays to the advantages sought by the DII direction. The BPMS is delivered as SaaS, but could be moved in-house if the environment and agency need's dictate. Furthermore, the Appian solution provides for minimal operational costs over the lifecycle of the individual project as well as allowing future projects to build upon previous work. This particular BPMS SaaS initiative provides for rapid solution development, minimized operational overhead, while delivering significant benefits to the Agency, and little impact to Vermont State IT resources, which is in line with the State's Strategic IT Plan.

6.2 Service Level(s)

Appian warrants that AOT's production instance of the BPMS SaaS will be available ninety-nine and one-half percent (99.5%) of the time during the applicable Coverage Window (24x7, 365) on a monthly basis.

This Service Level and the associated technical architecture is appropriate for the BPMS and AOT as a whole considering no mission critical/urgent availability is required for existing AOT BPMS processes. Furthermore, should the Service Level agreement fall below the commitment, the contract provides for appropriate remedies as listed in the following table.

Failure of Appian to maintain the Service Level provides for the remedies listed in the following table:

Monthly cumulative availability less than 99.5%	Dedicated Server Service Offering (% Service Credit)
30 minutes	5%
31 – 90 minutes	10%
91 - 150 minutes	20%
151 - 210 minutes	30%
211 - 270 minutes	55%
Greater than 270 minutes	100%

6.3 Sustainability

The AOT BPMS SaaS solution is highly sustainable in that the solution requires virtually no effort on the part of AOT or DII to keep operational. Operational costs are minimal, dependence upon outside resources is mitigated as the service providers for the solution are well entrenched and have significant redundancies, and if by some chance, Appian as a company should no longer exist, the data, process and procedures created and used as part of the BPMS SaaS remain the property of the State.

6.4 License Model

From the Appian contract: *Commencing on the applicable Subscription Start Date and during the term of Subscriber's license to use the Service Offering, Appian shall grant Subscriber a non-transferable, non-exclusive license, without right of sublicense, to access the Service Offering via a username and password over the Internet.*

The contract calls for 50 user licenses to be paid on a quarterly basis. Additional licenses are available at the contractual rate. This license model is appropriate for AOT and will provide for expansion of the BPMS over time.

6.5 Security

The VTrans BPMS SaaS contains no PII or sensitive data. General security for the BPMS SaaS is managed through User Names, Passwords and security groupings typically found in most applications and is appropriate for this project. Internally within AOT and the State, two servers providing data interfaces to legacy systems at AOT and the State are maintained behind an AOT hardware firewall and monitored via AOT and DII security tools.

Appian utilizes Amazon Cloud Services for the hosting of the BPMS SaaS solution. The Appian BPMS SaaS is accessed through the existing DII/SOV WAN via a VPN tunnel to the Appian servers located in the Amazon cloud.

For BPMS SaaS cloud-based offering, Appian publishes a Service Organization Controls (SOC) 1, SOC 2, and ISAE 3402 audit report2. These audits complement Appian Cloud's existing security certifications and its control architecture has already helped clients meet both industry specific and geographic specific regulatory requirements, including PCI DSS, National Institute of Standards and Technology (NIST) 800-53 moderate controls, FDA 21 CFR Part 11, FISMA Moderate Authority to Operate (ATO), European Union Data Privacy and Australian Privacy Act.

Review of the Appian SOC2 was not performed due to security concerns listed in the following section. Because the security of the BPMS SaaS is based upon the security provided by Appian, no assessment of the security of the Amazon cloud was performed. Amazon security and associated disaster recovery depth and breadth is well documented within the industry and therefore not considered as part of this assessment.

6.6 Disaster Recovery

When interviewing Appian stakeholders concerning their Disaster Recovery Plans, we were referred to their SOC2 report.

SOC2 reports are intended to meet the needs of a broad range of users that need to understand internal control at Appian as it relates to security, availability, processing integrity, confidentiality and privacy. These reports are performed using the AICPA Guide: Reporting on Controls at a Service Organizations Relevant to Security, Availability, Processing Integrity, Confidentiality, or Privacy and are intended for use by stakeholders (e.g., customers, regulators, business partners, suppliers, directors) of the service organization that have a thorough understanding of the service organization and its internal controls. These reports can form an important part of stakeholder's oversight of the organization, vendor management program, internal corporate governance, and risk management processes.

By their very nature, the SOC2 reports are closely held and considered restricted distribution as they provide detailed insight to the inner workings of security and disaster plans. Therefore, while the reports were provided by Appian management, they were sent to the AOT BPMS Project Manager as part of the restricted distribution list. It was determined by the BPMS Project Manager not to provide the documents to Coeur Group.

The original RFP listed the following surrounding Disaster Recovery: Section 1.8.39: Describe technical support service practices and options including scheduled maintenance, exclusions, and practices for application updates, defects, disaster recovery, and backups.

Review of the Appian RFP response provided the following: Service Providers (Amazon Cloud) shall backup the Data on a nightly basis. The Data shall be maintained for at least twenty eight (28) calendar days.

Amazon Cloud Services and their associated Disaster Recovery and backup methodologies are well documented and vetted in the industry and by numerous users. These capabilities are well within the requirements of AOT and the State and are therefore appropriate for this initiative.

6.7 Data Retention

In general, it is accepted that all data contained in the BPMS SaaS will be available to AOT per the Service Level Agreement listed above. However a more critical understanding of what happens to the data in the event of a cancellation of the service agreement must also be understood. The following is an excerpt from the Appian Standard Cloud Agreement:

> *Before an agreement expires, customers are responsible for downloading any data they want to preserve. Once a site is shut down upon agreement expiration, Appian will keep the latest backup in an offline mode for 28 calendar days as per the standard cloud agreement, after which the data will be deleted.*

Options do exist for data deletion prior to the standard 28 day period at the request of the State.

The Data Retention agreement is understood and accepted by AOT and is appropriate to meet the needs of the organization.

6.8 Service Level Agreement

It is the opinion of Coeur Group that the Service Level Agreement as listed in the above section is appropriate to the needs of AOT, the BPMS project and the State of Vermont.

6.9 System Integration

Data integration between the BPMS SaaS and legacy AOT and State systems will be managed through the use of a staging platform at AOT. This staging platform is composed of a MSSQL Database running on a Server in the AOT Information Technology Department.

AOT and State legacy system data is "read" to the staging platform at AOT and stored in the form of a table in the Database. An interface from BPMS SaaS to the staging platform table was part of the requirements of the initial pilot project for Finals. Modifications to the staging table are provided as part of the requirements for the proposed ROW project and will be handled by the AOT DBA with minimal effort. When, or if, BPMS SaaS makes modifications or updates "writes" to the table, the interface completes the write of the data back to the legacy AOT or State system.

The platform Server and Database were in existence at AOT prior to the start of the BPMS project and support several applications across AOT, therefore the use of the platform and associated database represent no additional cost for AOT.

It is the opinion of Coeur Group that this type of integration represents a reliable and maintainable solution that presents minimal concern for future changes to either the BPMS or State Legacy systems and is therefore appropriate for this initiative.

AOT BPMS SaaS Network Diagram
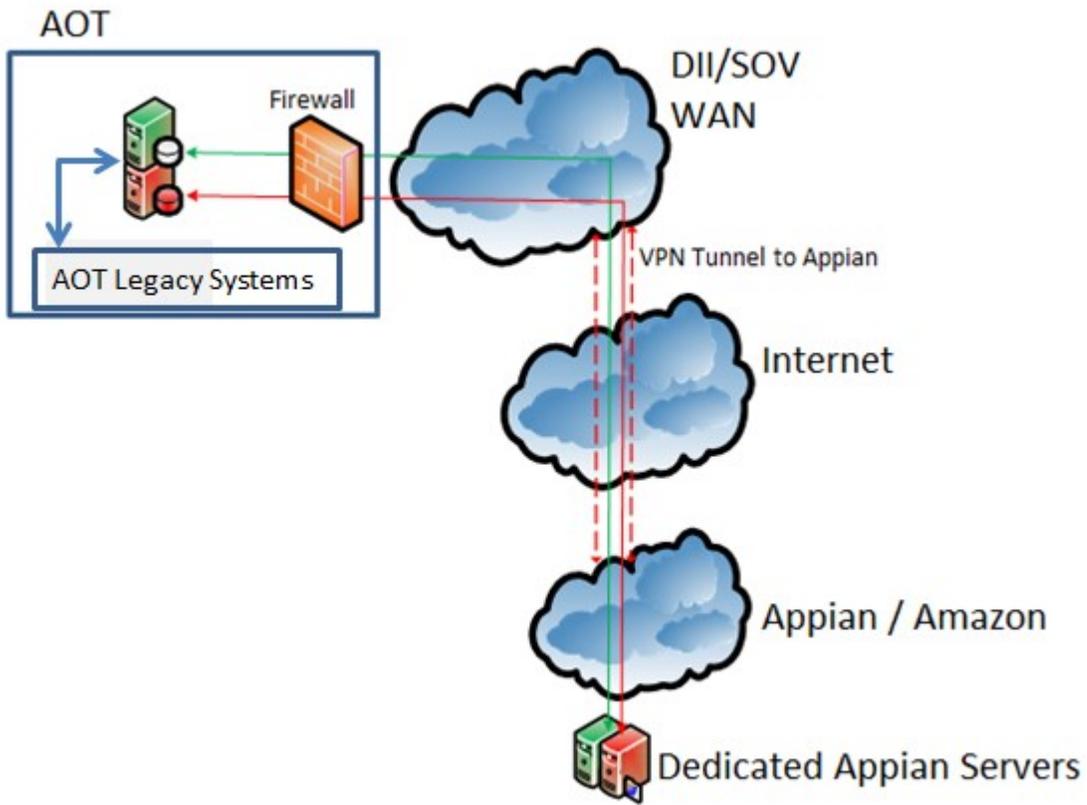
7. Assessment of Implementation Plan

BPMS Implementation planning began over 6 years ago with the education of key decision makers and influencers within AOT. In addition, involving each of the Process Owners in the design and ultimate use of the solution is a key factor in the acceptance, implementation, and utilization of the end product. Because of the iterative rapid prototyping involved in the design and testing, participants and users of the system are engaged from the beginning of the development process and remain involved thru project iterations until the final product is released for use. The Implementation Plan is part a collaborative process whereby the production release is determined by the users. Because participants are involved from the beginning, see the benefits during development, and are the ultimate quality control for the release, it is the opinion of Coeur Group that the overall Implementation Plan is appropriate for the needs of the Agency.

7.1 Implementation Readiness

7.1.1 The reality of the implementation timetable

The Implementation Timetable is initially set at the start of the project. Because of the iterative nature of the development process, all participants are aware that the release of the project to the users is based upon the number of iterations needed to meet the overall goals. After the initial production release, additional iterations are performed as part of perfecting the process until it is turned over to the users. After the production release, all modifications are based upon demand and handled under maintenance contracts, on an as-needed basis.

Based upon the design and development of the initial pilot project, it is clearly possible to deliver a working project within the planned implementation timetable. However, as more complex processes are added to the BPMS the length of a development timetable becomes more questionable. Review of the timetable for development of the proposed ROW process appears reasonable based upon past performance. This is due in some part to the re-use of modules already created for the Pilot and experience gained by the BPMS team. It is reasonable to assume that as more and more processes within AOT are migrated into the BPMS that each migration will take less and less time. Therefore the development and delivery implementation timetable appears appropriate and reasonable.

7.1.2 Training of users in preparation for the implementation

Training of BPMS internal end-users is expected to require less than an hour as the BPMS mimics the process workflows that those same users designed and participated in from the beginning of the project.

The process participation of internal process supervisors and their staff reflects the majority of interaction with the BPMS. Minimal training also

holds true for external process participants where task and decision making interaction is limited. The nature of BPMS application UI design provides for these end-users to intuitively step through the few procedural steps of their process task. Training for them is anticipated to take 0.5 hours. Additionally, a User Manual, Training Script and an At-A-Glance User's Guide are developed for ongoing support as job aids.

Feedback from interviews indicates this training method is well accepted by the process participants and is therefore appropriate for AOT.

7.1.3 Readiness of impacted divisions / departments to participate in this solution/project

Interviews with the departments, managers, staff and individual participants show a high level of acceptance and desire to participate in the BPMS process. The benefits and challenges of BPMS process integration are well understood and accepted by those interviewed. The readiness of the organization is further illustrated by the number of requests to add specific processes into the BPMS.

7.1.4 Adequacy of design, conversion, and implementation plans

Based upon a review of the overall design methods used by AOT to integrate processes into the BPMS, the limited complexity of data interfaces, and the acceptance of the users to the implementation plan, we find that the design, conversion, and implementation plans are appropriate for the needs of AOT.

7.1.5 Adequacy of support for conversion/implementation activities

Support of the BPMS is based upon a three tiered approach. At the first level, the users themselves have initial responsibility to bring other members of their respective teams up to speed on the solution, its use and functionality. Level 2 support for the conversion and implementation comes from the BPMS Project Manager through the use of classroom and one-on-one sessions with the new users. The BPMS Project Manager is also responsible for the identification and elevation of any issues related to the conversion and implementation to the BPMC. The Third level support for conversion and implementation comes from either internal DBA support for the interfaces or from a consultant when the issues are of a debugging nature. Software updates and maintenance are handled by the Cloud SaaS staff (included in the license fees.) Based upon this approach, support for conversion and implementation appears adequate and extensible to meet the needs of the project.

7.1.6 Adequacy of agency and partner staff resources to provide management of the project and related contracts (i.e. vender management capabilities)

AOT has dedicated a BPMS Project Manager that is overseen by the BPMC. Direct management of Appian, a future support contractor, and prospective dedicated BPMS staff will be supervised by the BPMS Project Manager. Review of the communications between the BPMS Project Manager and the contractor indicates a methodical and process driven approach with a limited scope or deliverable related issues. With two vendors involved in the BPMS solution and support, the use of the BPMS Project Manager with oversight from the BPMC appears adequate for proper vendor management.

7.1.7 Adequacy of testing plan/approach

BPMS testing is based upon a design, build, test rapid prototyping scenario that has direct user involvement in each step of the process. Because the users are directly involved in the process iterations, they also provide testing of the modules as they complete the iteration. This methodology helps to assure the final release of the process meets the needs of the organization and is also accepted. This approach is appropriate for the initiative and meets the needs of AOT.

7.1.8 General acceptance/readiness of staff

Through the initial education process BPMS has gained significant grassroots support within AOT. Interviews with the Finals participants and the future ROW participants present a significant desire to move to the BPMS solution and reap the benefits that have been demonstrated as a result of the Pilot. BPMS is seen within AOT as a holistic tool that will improve its agility, increase efficiency, increase productivity, build better relationships with vendors, and increase constituent satisfaction with the Agency. Most of the people interviewed could not wait until BPMS was brought to their processes, many of which have remained relatively unchanged since the 1950's. Several interviewees stated that BPMS would allow them to get back to "doing" what they were trained to do, verses being handcuffed to a desk, pushing paper. Process participants and process managers are readily accepting of the BPMS because the overall design process, interfaces to legacy systems, implementation, and training plans are initiated at the process owner level thereby creating user participation to help assure project acceptance.

Additional Comments on Implementation Plan

No additional comments on the Implementation Plan.

7.2 Risk Assessment & Risk Register

Risks associated to the design, configuration, use, and maintenance of the BPMS SaaS are minimal when compared to a wholesale ground-up software

development effort. This is brought about by the nature of the SaaS solution, coupled with the minimal AOT internal hardware/software footprint, and the plan, design, build, test, iterative nature of BPMS design. Initial BPMS SaaS risks likely peeked after selection of Appian as the vendor of choice, and because design, training, and implementation issues were significantly washed out during the first Finals Project, and are expected to continue to decline over time.

Big Picture risks for BPMS within AOT were primarily addressed with the selection of a firmly ensconced pure play vendor in Appian. With Appian being one of the three top rated vendors of BPMS and one of the dwindling pure play providers, dedication and availability of the vendor to support the installation and future projects is virtually secured. Mitigation for risks associated to loss of Appian as a SaaS vendor includes the ability to bring the application in-house if needed. Furthermore, all data contained in the BPMS and all process designed by AOT are the property of AOT and could be utilized and applied to a replacement vendor should the limited risk arise.

Risk Register

Risk ID	Big Picture Risks	Likelihood	Planned Mitigation	Assessment
1	Loss or reduction of Federal funding	Low	Demonstration of significantly improved processes that illustrate improved efficiency and productivity ultimately redirect federal funds from office work to delivering more FHWA projects to the field. Keep FHWA aware of the improvements on a frequent basis. Funding for the contract period has already been secured. Funding beyond the contract period is anticipated.	Needs to be part of an overall funding marketing plan that involves Federal and State. The mitigation plan to address this risk is appropriate.
2	Loss or reduction State funding	Low	Continued education of AOT and Legislature coupled with promotion of high value achievement gains. Keep internal financial requirements as lean as possible.	Likelihood of a reduction of State funding is high. However, the likelihood of AOT not adjusting expenditures to continue the success of this initiative is low. The mitigation plan to address this risk is appropriate.
3	Loss of Appian	Low	Select replacement vendor, RFP.	Loss of a vendor does not typically happen overnight. It is likely the BPMC management team will be provided advanced warning necessary to address the issue. The mitigation plan to

Risk ID	Big Picture Risks	Likelihood	Planned Mitigation	Assessment
				address this risk is appropriate.
4	Loss of Amazon (Appian cloud service provider)	Low	Move to a backup cloud service provider like Rack Space.	Extremely remote possibility. However prudence warrants the plan. The mitigation plan to address this risk is appropriate.
5	Long term loss of Internet connection to Appian servers	Low	Appian servers reside in the Amazon cloud. Amazon maintains multiple separate internet service providers. A catastrophic failure of the internet connection that would not resolve in an acceptable timeframe would warrant bringing the BPMS application in-house to eliminate the loss of connection.	Agreed, likelihood of occurrence is very low. The mitigation plan to address this risk is appropriate.
6	Failure in data connections to legacy databases	Med	AOT DBA is responsible for repair and reconnection to the databases. In the event the internal resource cannot repair the problem, external contracted vendors are available.	Database connection errors will happen. The mitigation plan to address them is appropriate.
7	Rejection of BPMS by process owners or process managers	Low	Process owners and process managers are integrated into the development of the resultant solution. Ensuring their participation and acceptance along the path of development will reduce the probability of rejection.	The methodology used to design, build, and test is inclusive of the participants. Likelihood of wholesale rejection of the final product is very low. The mitigation plan to address this risk is appropriate.
8	Loss of focus for BPMS at AOT	Low	Education within AOT surrounding the features and benefits of BPMS began many years ago and continues today. While it is possible to lose individual leaders in the BPMS initiative, AOT as a whole is not likely to lose focus. Requests for additional dedicated	Agree that the loss of focus is not likely. However, increasing the focus even more is recommended. For example: Placement of BPMS within IT, under Finance and Administration may no longer be appropriate to meet the needs of the entire organization. As you build the BPMS organization structure consider placing it under the

Risk ID	Big Picture Risks	Likelihood	Planned Mitigation	Assessment
			staffing for the BPMS initiative are underway. One goal of staff increase is to prevent a single point of failure of BPMS within AOT.	auspicious of the Deputy Secretary for example to bring additional focus and attention to and from the entire AOT. Raising the placement of BPMS within the organization may also assist in garnering additional attention from the legislature as well.
9	Risk of insufficient capacity to meet agency demand.	Med	Use of external contractors and hiring over time will help address.	AOT has significant demand for BPMS expansion. This demand MUST be constrained and controlled by the BPMC to prevent uncontrolled expansion thereby increasing risk of failure.
10	Inadequate dedicated leadership to meet the expanding demand	Med	Evaluation of the staffing needs as BPMS expands will be performed. Additional staff will be added as required.	The current BPMS Project Manager plays multiple roles including but not limited to: BPM Program Manager, BPM Committee chairperson, Organization and process strategist, Business Process Analyst, Data integration analyst, and BPMS System Administrator.

These roles have been performed by a single person since the beginning of BPMS at AOT which is not sustainable with expansion. As these roles are critical to the success of any BPMS, AOT must plan and dedicate resources to these positions if expansion of this initiative is expected to continue and be successful. |

Additional Comments on Risks

No additional comments on Risk.

8. Cost Benefit Analysis

8.1 Analysis Description

The cost benefit analysis for BPMS is based upon the completed Finals Project and the Planned ROW project. Analysis was conducted based upon verified costs and improvements from the completed Finals Project and are projected forward based on planned costs and anticipated improvements for the upcoming ROW Project.

Because AOT has but a single experience with the efficiency gains delivered by BPMS, Coeur Group felt it necessary to apply a reasonableness factor to the efficiency gain projections listed in the ROW justification. While the BPMC anticipates an eventual overall ROW process improvement of 50%, an examination of multiple implementations of BPMS across other installations indicates a ramped increase in efficiency gains based upon multiple iterations over time. Therefore, while the efficiency gain for the Finals Project was verified at 25% and is anticipated to remain stable for the lifecycle, the efficiency improvements for ROW were factored down to 20% for the first year, then 35, 45, 50, 55 percent improvements over the next four iterations, or four years assuming one iteration per year.

Cost for hiring of a dedicated AOT BPMS Developer was added into the analysis as of January 2015 and is applied to the development of the ROW project only. Costs associated to the use of external developer staff is considered as part of this analysis.

The following costs were considered as part of this analysis:

Costs
Finals Professional Services Cost
Finals Licenses
Finals 2nd Dev Instance
Finals Monthly Development Costs
Finals Monthly Operational Run Cost
ROW Monthly Professional Services Cost
ROW Licenses
ROW 2nd Dev Instance
ROW Monthly Development Cost
ROW Monthly Operational Run Costs
BPMS One Time Start Up Fees
AOT New Internal Development Staff

While there are several tangible benefits listed in the following section, the only tangible benefit used in this analysis is the efficiency gain based upon the salary of process participants directly tied to AOT. Dollar values use to calculate efficiency gains are based upon the current salary costs for the process participants multiplied by the number of hours saved. Other tangible benefits listed in the following sections that can be quantified to dollar amounts are not used in the overall analysis as they do not directly tie to AOT.

8.2 Assumptions

- One-time costs for BPMS span two projects and are reflected as such in the analysis

8.3 Funding

Funding for the BPMS initiative and both projects is dependent upon State and Federal sources.   The majority of funding as listed below for both the development and operational support of this initiative comes from Federal dollars. Federal monies for the initial development as well as the proposed contract extension and the associated development and operational costs have already been approved by FHWA for the duration of the proposed contract extension. While the State monies required for the development and operational support of the initiative will certainly impact the budget of AOT, the minimal development and operational costs are not seen internally within AOT as significant in light of the overall AOT budget.

Funding Source Allocation	Federal	State
Acquisition	80%	20%
Operation	80%	20%

8.4 Tangible Benefits

The completion of the BPMS implementation of the Finals process has delivered overall performance and efficiency gains of 25% for the supervisor and one subordinate participating in the Finals process. This loaded salary and benefits of the participants are valued at $109K which when multiplied against the efficiency improvements equates to $27,250 per year. When extrapolated across the planned 20 year lifecycle of this project the total efficiency improvement equate to $545,000 and represents the tangible benefit used in the analysis.

Additional information surrounding tangible benefits:
- Construction Contract Finals process time cycle averaged 17.4 months before improvements were implemented. Upon implementation of BPM discipline to this one process, cycle time dropped to an average of 14 months, or 20%. Upon implementation of the BPMS SaaS on top of the BPM discipline cycle times are anticipated to decrease to 6-8 months representing an overall efficiency gain of 55%
- Auto-generating document templates for letters and memos decreased processing from 7.4 hours per contract to 1 hour per contract representing an 86% efficiency improvement.

- Baseline metrics for routing paper approvals and documents averaged 98 days between five internal work sections. BPMS SaaS reduced inbox wait times to near instantaneous turnaround; in twenty percent of the cases, electronic routing decreased delays from 98 days to 14 days representing over an 85% improvement.

  - Baseline measurements for contract throughput averaged 70 contracts per year. Based upon throughput measurements during the Pilot, overall throughput increased by 21% or 20 more contracts per year

  - Use of BPMS and its associated tracking and analytics provides measurable proof of financial and operational compliance to State and Federal auditing requirements

  - BPMS provides measurements and reporting not previously available. It is now possible to evaluate process performance through reporting and analytics.

- Through BPMS efficiency, process improvement, and analytical tools, the Finals Pilot project has not only sped the completion of the Finals process by 25%, it has directly identified approximately $10M of unobligated FHWA funds that were previously tied up in the slower process which will be re-obligated to new projects.

8.5 Intangible Benefits

Intangible benefits by their very nature are not quantifiable; therefore no dollar value is placed on these benefits. These benefits represent additional "Value" that AOT will receive as a result of the BPMS investment but which are not directly attributed to the cost benefit analysis.

The following list represents intangible benefits as a result of BPMS at AOT:

- BPMS documented process workflows provide visibility into work activities
- BPMS provides for business rules and requirements to assess performance management components at process and functional level
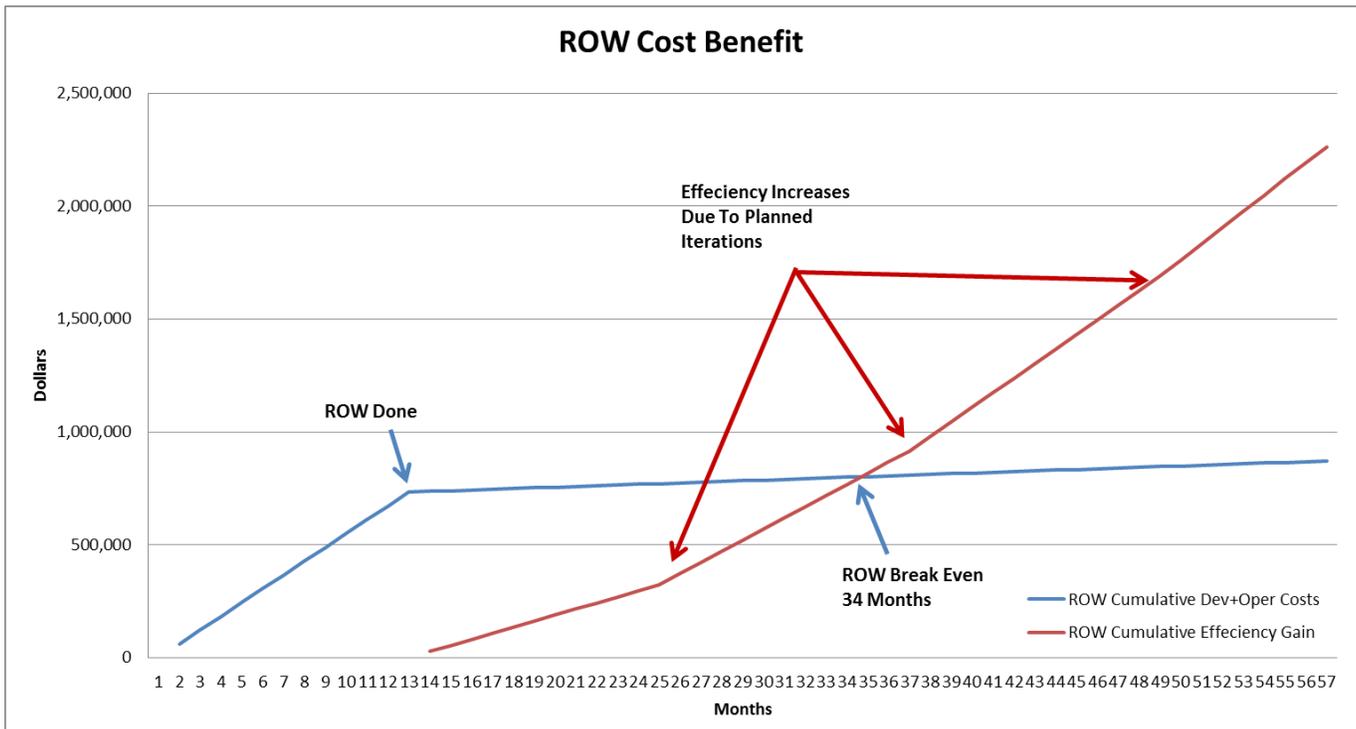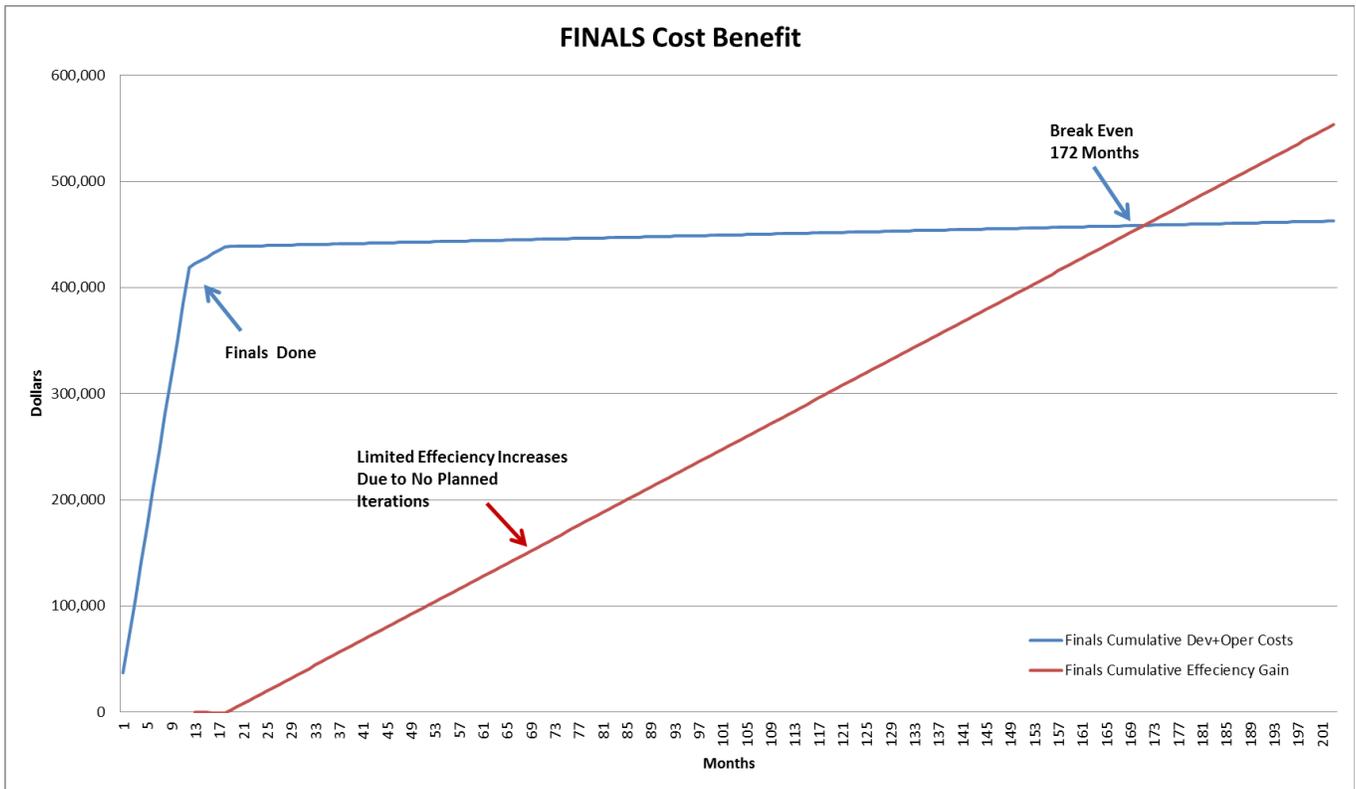
- BPMS documented processes allow for evaluation of the process linkage to AOT goals and objectives.
- BPMS enables collaboration between process managers and participants to identify "best practices."
- BPMS provides for process visibility to track and manage work effectively
- BPMS allows for monitoring of labor and process outcomes
- BPMS improves service levels and AOT construction contractor experience. Contractors perceive BPMS will save them time and therefore, money by eliminating administrative paperwork, providing a system audit trail, eliminating USPS expenses for certified mail, and maximizing convenience through 24/7 access to the mobile-enabled CCF application
- BPMS helps to decrease process defects such as rejection loops, customer dissatisfaction, output not meeting specifications or requirements, etc.
- Automation: Increased productivity, consistency, reduction in errors, maximized customer satisfaction, and compliance.
- Agility: Faster response times to issues, faster time to develop solutions, faster turnaround time.
- Flexibility: Combining the scale, scope, and capacity of legacy information systems with the agility, flexibility, and innovation of modern technologies.
- Enhancing of information platforms with the tools and techniques of CPI, Balanced Scorecards, methodology, governance, frameworks, and metadata.
- Visibility: Tracing individual business transactions (in real-time) throughout the entire process, drilling down into sub-processes, zooming up to the parent processes, and seeing the process through the perspective of any particular role.
- Collaboration: Alignment and participation in a common objective toward AOT goals.
- Governance: A strong model of management control and change that builds confidence in shareholders, partners, suppliers, regulators, and customers. BPM ensures policies of use and re-use are followed, and provides oversight to tasks and the flow of work.
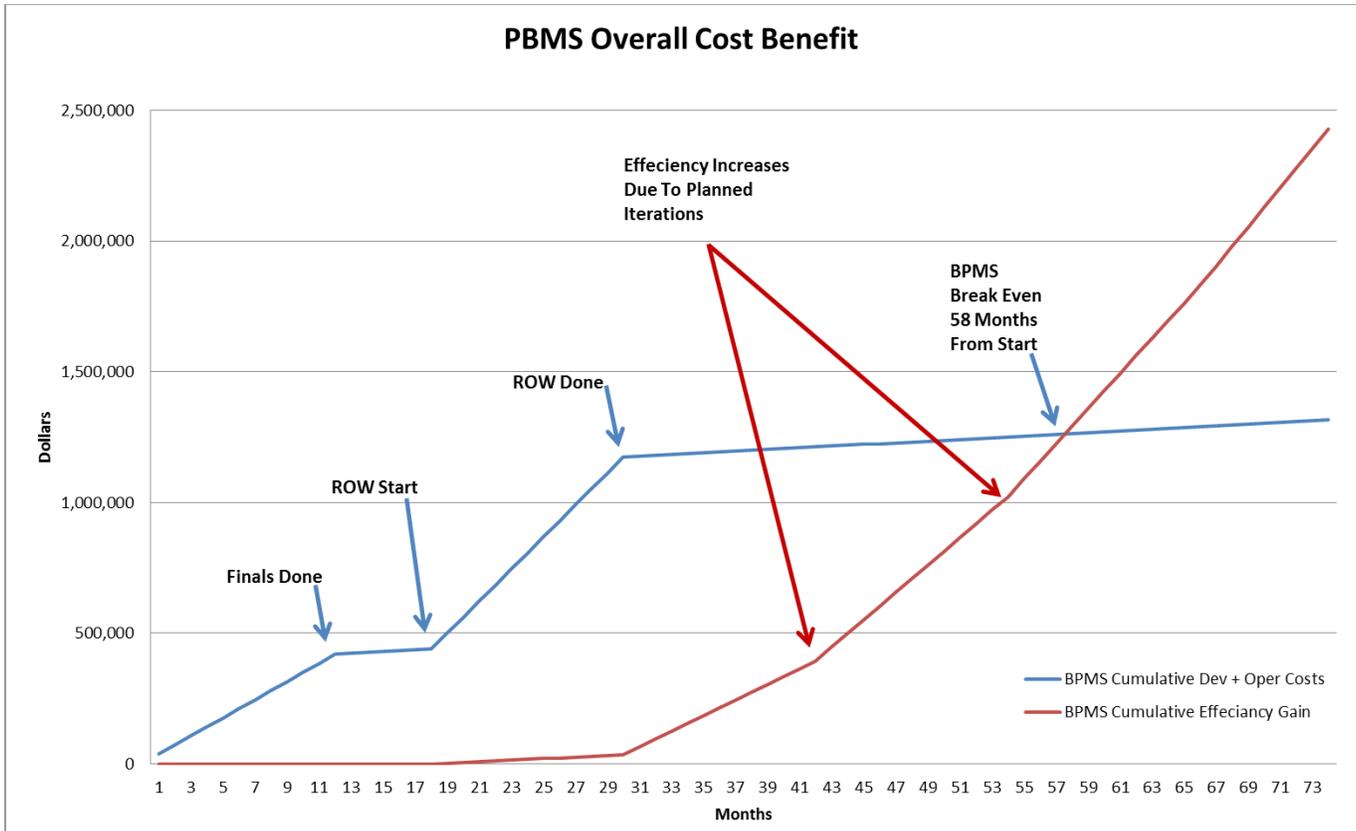
8.6 Costs vs. Benefits

The cost versus benefit represented in the following charts reflects the tangible costs and tangible benefits as reference in the above paragraphs.

Considering the tangible efficiency improvements which are directly tied to AOT versus the direct cost of the BPMS implementation to the State of Vermont, it is the opinion of Coeur Group that the benefits as a result of BPMS outweigh the costs. Our opinion is further enhanced when the tangible benefits are combined with the intangibles as listed above.

The tangible cost versus tangible benefit of BPMS at AOT is represented in the following charts:

FINALS Cost Benefit

- Finals Done
- Limited Effeciency Increases Due to No Planned Iterations
- Break Even 172 Months

Finals Cumulative Dev+Oper Costs
Finals Cumulative Effeciency Gain

ROW Cost Benefit

- ROW Done
- Effeciency Increases Due To Planned Iterations
- ROW Break Even 34 Months

ROW Cumulative Dev+Oper Costs
ROW Cumulative Effeciency Gain

PBMS Overall Cost Benefit

8.7 IT ABC Form Review

The ABC form provided for this Independent Review is targeted at the Contract Extension and associated Maximum Limiting Amount for the upcoming ROW Project. The form does not take into account the previous Pilot Finals Project and therefore is not a full accounting or presentation of the BPMS project as a whole.

That being stated, review the IT ABC form created by AOT for the Contract Extension and associated ROW Project does not appear to be entirely consistent with the financial justifications also reviewed. Specifically, the ABC form appears to have been completed without a full understanding of the field definitions and their associated impact on the resulting calculations. In addition, the form contains inconsistently applied amounts from AOT. Specifically some of the amounts reflect both the Finals Project AND the ROW Project as a whole, and some amounts reflect ONLY the ROW project. Therefore the inconsistency of the amounts makes the resultant calculations incorrect.

The following list represents discrepancies found in the ABC form:
Section II
- Section II-3-B (Annual Maintenance Agreement) indicates an annual cost of 25K when no annual maintenance charges were shown in the pilot project.

- Section II-3-C (Hosted Cloud Provider Service) is listed at 18K when no listing of Hosted Cloud Provider Service charges are shown in the Pilot Project expenses. Upon discussion with the PM, this number actually reflects the cost for adding a Development Instance of the Appian BPMS, not Hosted Cloud Provider Service. The previous expenses for the Pilot do show these costs. Titling of the field is not representative of the expense.
- With incorrect information in the above fields, the subtotals would be incorrect.
- With the subtotal cost of the new solution incorrect, the total cost of the new solution would be incorrect.

Section IV
- Section IV Current – Implementation costs would be incorrect based upon discrepancies as listed above
- Section IV-Operating Costs would be incorrect based upon discrepancies as listed above

Section V
- Section V-1 bases the business case entirely upon the ROW project further illustrating the concerns surrounding the mixed use of ROW and FINALS in the amounts.

Section VIII
- Section VIII-1 Net Impact on State Operating Costs of -34.560M represented in red, indicating a negative, is in our opinion highly misrepresentative of the reality of this BPMS project as a whole or the ROW project specifically. While we are not certain as to the calculations behind this number, it certainly appears to utilize the 1.8M listed in Section 2-1-A which contains the labor hours associated to ALL ROW staff, and would be further slanted if the labor hours of the Finals Project were included. Furthermore, we cannot ascertain if the calculation takes into consideration the use of Federal funding of the project.
- Section VIII-2 This question further illustrates misrepresentation of the financial reality of this BPMS project. Because the BPMS project does not generate additional revenue, there is no consideration to the quantifiable savings the project will bring to the operational bottom line of AOT.

Additional Comments on the Cost Benefit Analysis
No additional comments.

9. Impact Analysis on Net Operating Costs

The following analysis of the impact on net operating costs is broken down by individual project, and then combined for the BPMS initiative as a whole. As the current costs to perform these processes are built into the salaries of the staff, Coeur Group considers the Net Impact to the Agency to be the cost increases incurred as a result of the initiative.

Realistically the State could predict the operational license costs from Appian will increase over time, however as the BPMS market continues to mature, competitive pressures could in fact lower license costs as well. Based upon the previous example, our analysis assumes all operational costing for the lifecycles of both projects and BPMS as a whole to be flat over the lifetime.

Federal funding for the development and ongoing operational costs has been secured thru the term of this contract extension. In addition it is anticipated by AOT that Federal funding for operational costs beyond the current contract extension will be secured in the future. Therefore our analysis assumes that Federal funding for operational costs will remain constant for the entire lifecycle.

AOT funding for the ongoing operational costs of BPMS represent a minimal impact on the AOT budget as a whole. Therefore our analysis assumes that AOT funding for operational costs will remain constant for the entire lifecycle.

As illustrated in the following charts, both the Finals project and the ROW project have a positive ROI over their respective lifetimes. However when considering the ROI based upon actual AOT costs versus the efficiency gains, the individual projects, as well as BPMS as a whole, represent a positive investment for AOT.

Table to illustrate the Net Operating Cost Impact for the Finals Project:

FINALS Project		Federal Contribution	State Contribution
Finals Total Professional Services Cost	368,465	294,772	73,693
Finals Lifetime Licenses Costs	87,360	69,888	17,472
Finals Total 2nd Dev Instance Cost	8,250	6,600	1,650
Finals Total DEV Costs	419,075	335,260	83,815
Finals Lifetime Operational Run Cost	48,360	38,688	9,672
FINALS Total Dev Cost + Lifetime Operational Cost	467,435	373,948	93,487
Finals Lifetime Efficiency Gain	712,500		
NET GAIN= Lifetime Efficiency Gain - Total Dev Cost - Lifetime Operational Run Cost	245,065		
Finals Overall Lifetime ROI	0.52		
Finals State ROI	**6.62**		
Finals State Investment Gain	**$1 State Investment = $6.62 Return**		
Finals Months to Break Even	172		
Finals Annual Impact to State Operating Cost	**509**		

Table to illustrate the Net Operating Cost Impact for the ROW Project:

ROW Project		Federal Contribution	State Contribution
ROW Total Professional Services Cost	611,910	489,528	122,382
ROW Lifetime Licenses Costs	748,800	599,040	149,760
ROW Total 2nd Dev Instance Cost	9,000	7,200	1,800
ROW Additional AOT Staff	74,880	59,904	14,976
ROW Total DEV Costs	733,230	586,584	146,646
ROW Lifetime Operational Run Cost	711,360	569,088	142,272
ROW Total Dev Cost + Lifetime Operational Cost	1,444,590	1,155,672	288,918
ROW Lifetime Efficiency Gain	18,540,000		
NET GAIN= Lifetime Efficiency Gain - Total Dev Cost - Lifetime Operational Run Cost	17,095,410		
ROW Lifetime ROI	11.83		
ROW State ROI	**63.17**		
ROW State Investment Gain	**$1 State Investment = $63.17 Return**		
ROW Months to Break Even	34		
ROW Annual Impact to State Operating Cost	**7,488**		

Table to illustrate the Net Operating Cost Impact for the BPMS initiative as a whole:

AOT BPMS OVERALL DEV AND OPERATIONAL COST		Federal Contribution	State Contribution
FINALS Total Dev Cost + Total Operational Cost	467,435	373,948	93,487
ROW Total Dev Cost + Total Operational Cost	1,444,590	1,155,672	288,918
BPMS Total Dev + Total Operational Cost	1,912,025	1,529,620	382,405

AOT BPMS OVERALL EFFECIENCY GAIN	
Finals Lifetime Efficiency Gain	712,500
ROW Lifetime Efficiency Gain	18,540,000
BPMS Lifetime Efficiency Gain	19,252,500

AOT BPMS OVERALL VALUE	
BPMS Total Development Cost + BPMS Total Operational Cost = Total Cost	1,912,025
BPMS Total Efficiency Gain	19,252,500
BPMS NET GAIN	**17,340,475**

AOT BPMS OVERALL	
BPMS Lifetime Total Gain	19,252,500
BPMS Lifetime Total Cost	1,912,025
BPMS Lifetime ROI	**9.07**
BPMS Lifetime State ROI	**50.34**
BPMS State Investment Gain	**$1 of State Investment = $50.34 Return**
BPMS Months to Break Even	**58**
BPMS Annual Impact to State Operating Cost	**7,997**

AOT Operating Cost	
Current Operating Cost	1,950,000

New Operating Cost (based on efficiency gains)	936,711
Difference	**1,013,289**

10. Attachment 1 - Illustration of System Integration
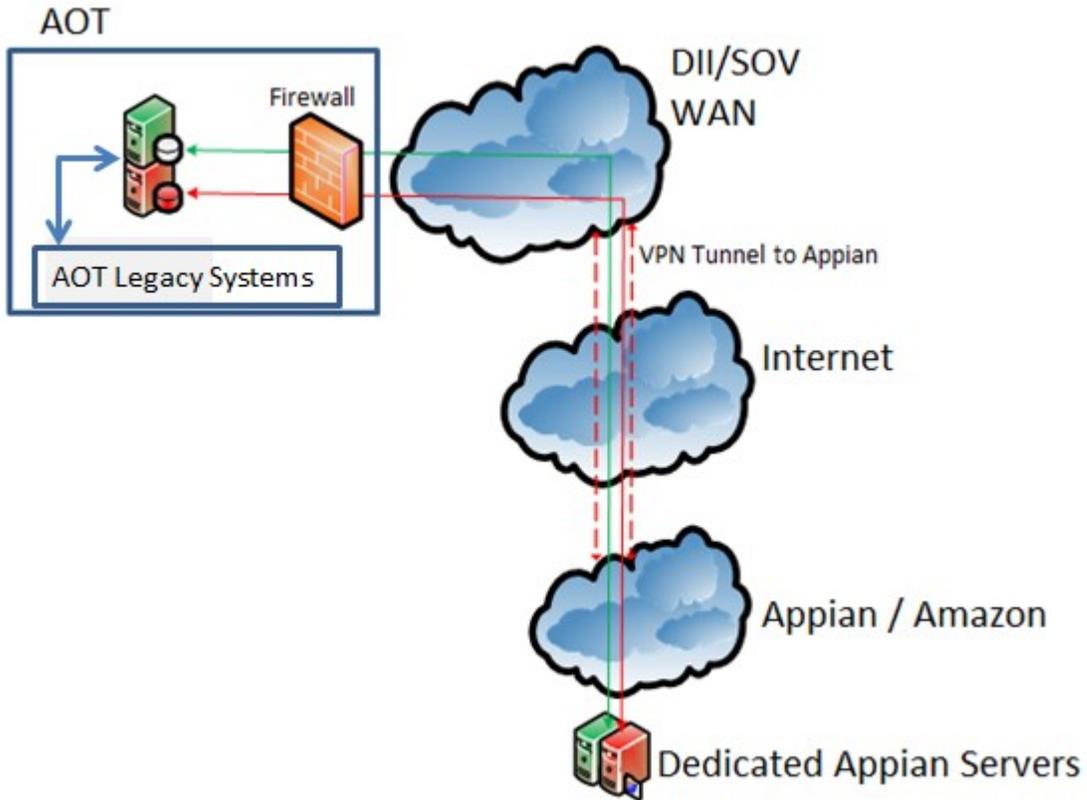
11. Attachment 2 - Original RFP Scope

BPMS SaaS Licenses
- To provide approximately 50 SaaS subscription licenses for an entirely web- based, integrated BPMS
- One Administrator license (if required and distinct from end-user license)

BPMS SaaS Services to
- Model (As Is-To Be), design, develop, and implement processes and process improvements into a licensed BPMS
- Perform professional facilitation of process improvement projects to integrate selected sub processes into the licensed BPMS environment
- Work collaboratively with VTrans project improvement participants to deliver improved processes utilizing agile process methods such as rapid application development (RAD)
- Analyze processes to identify improvement opportunities
- Identify, gather, clarify and validate with project participants process requirements needed for the new improved design to be developed and deployed in the BPMS
- Design improvements with functional support (metrics, reports, etc.) to continually measure, analyze, and monitor process performance.
- Identify and develop meaningful baseline (performance) process metrics and measures.
- Design improvements to include reports, dashboards, and other analytical tools to monitor and control improved processes.
- Design and implement electronic forms and documents.
- Design collaborative environments for iterative reviews (e.g. documents, design plans) and signoff of process outputs such as engineering plans, contracts, permits, and other documents.
- Design processes to maximize integration of processes, data, business logic/rules, documents, files (of varied formats e.g. videos, photos, etc.), content, and other information.
- Design processes to be documented and auditable.
- Design task, document, and content management functionality to automate much of the administrative tasks such as routing, escalations, distributions, communications, and alert messaging.
- Design and develop process performance analytics (e.g. reports, dashboards, etc.)
- Deliver turnkey process improvement solutions.
- Document and analyze process performance of information flow, and human interactions.
- Implement performance metrics to ensure improvements and process monitoring is possible.
- Where needed integrate BPMS activities with change leadership activities. Change leadership in this regard will support behavior changes required by staff to successfully adopt process improvements, new workflows, governance, etc.
- Support the integration of BPMS agile activities with change leadership activities.
- Define and implement temporary process structures and systems as needed to transition improvements from a test to production environment.
- Perform pre-implementation tests (simulations, alpha, beta, etc.) on improvements as needed.
- Perform user acceptance testing of new designs and improvements as needed.
- Support managerial assessments to determine the value BPMS delivers to VTrans.
- Perform system integration services (e.g. via web services, APIs, data/information connectivity, etc.) as needed.
- Deploy improved processes to production environment
- Perform administrative duties to add process participant identities to BPM environment.

BPMS Support Services

- Provide turnkey BPMS support services that include: technical maintenance, support, and upgrades for the licensed BPMS environment as needed.
- Provide technical support to VTrans staff supporting any modules or components of the BPMS environment e.g. modeler, identity management, system administration, etc.
- Provide customer support for end-users of the BPMS.

BPMS Training Services

- Provide BPMS training as needed for end-users, management, support staff, and executive staff members.
- Provide technical training for prospective VTrans staff needed to support the BPMS environment including that which is required to internally administrate the licensed BPMS environment.
- Mentor all levels of staff during BPMS agile activities through the implementation of processes within the BPMS environment including the learning and adoption of the BPMS and BPM principles, techniques, best practices and governance.
- Perform the training services using different delivery methods e.g. presentations, training, workshops, and coaching for individuals, and teams, as appropriate.
- Assess BPM/S training needs for (up to fifty) process participants.

BPM Consulting Services

- Collaboratively develop and execute a BPM/S road-map.
- Provide strategic performance management, business process management, and innovation guidance on the Initiative, pilot project, and subsequent improvement iterations, and projects.
- Strategically consult BPMC on the initial planning, identification, implementation, and monitoring of needed process governance components.
- Collaboratively design and implement BPM/S governance components customized to meet VTrans requirements.
- Using BPM/S, collaboratively align VTrans operational activities with strategic objectives.
- Collaboratively plan, design, implement and monitor the initial components of process governance (i.e. process ownership, roles, responsibilities, recommended procedures, linking BPM to organizational objectives, etc.).
- Help establish a performance mindset to improve efficiency, effectiveness (internal and external customer satisfaction) agility, productivity, and quality output.
- Guide VTrans in designing, deploying, monitoring, and improving processes using systematic business process management methodology and tools that integrate process models.
- Collaboratively develop and execute executive, managerial, and operational process measurement strategies.

REQUIREMENTS OF SERVICES (Technology)

- The SaaS license subscription will provide BPMS services over the Internet to VTrans and designated users that may include employees, agents, contractors, or suppliers of services that have a need to use the services to participate in VTrans' process activities.
- BPMS service components and functionality will be integrated and mostly include but not limited to a portal; process modeler (with process execution); reporting and analytics; collaboration, document, and content management; rules engine; task management; integration and development tools, and security administration (identity management).
- The BPMS service shall be compliant with Business Process Modeling Notation (BPMN) and business process execution language (BPEL).
- Agile development practices will be used to deliver improved processes. The consultant is expected to facilitate and work collaboratively with all VTrans project

improvement participants including (change leadership) consultants when delivering services.

REQUIREMENTS OF SERVICES (Consultant)
- The consultant must have demonstrated experience and expertise with the integrated BPMS product components or modules listed in Requirement 1.7.2.
- The consultant must have experience in providing information technology and BPMS technical consulting; BPMS training, support and professional services.
- The consultant must be willing to provide fixed costs bids for specified deliverables.
- The consultant must be willing to provide all tools and systems for development and testing.
- The consultant must be willing to provide web-based support.
- The consultant must be willing to work off-site as appropriate. (VTrans will provide working space and meeting rooms when needed on–premise.)
- The consultant must be willing to ensure staff and end-users are implementation ready. That is, trained sufficiently on BPMS technology to competently perform their work duties within the implemented BPMS environment.
- BPMS consultant and cloud provider must verify it complies with State of Vermont Agency of Administration's data protection policy and standards available at: http://dii.vermont.gov/sites/dii/files/pdfs/DII-Data_Protection_Policy.pdf http://dii.vermont.gov/sites/dii/files/pdfs/DII-Data_Protection_Standard.pdf
- Through the VTrans Project Manager all consultants will coordinate and integrate engagement activities. Consultant interactions are expected to be collaborative.
- The consultant must have demonstrated experience and knowledge, regarding the transformational impact of BPM on organizations.

Information security, privacy and confidentiality
- The consultant and cloud provider must be willing to guarantee the highest level of information security and privacy where information security processes reliably protect information before, during, and after a transaction. This includes strong data protection practices to ensure data is effectively partitioned and processed appropriately.
- The consultant and cloud provider must report all information regarding data security problems and breaches to VTrans as soon as they become aware of them including the response to the problem(s) and breach(es).
- The consultant and cloud provider may be required to work with confidential information. The consultant, associated staff, and any third parties must sign a statement agreeing to abide by confidentiality agreements (to be provided as needed).
- Upon specific request, identify those persons (and roles) having direct access to VTrans data stored in the BPMS.
- The consultant and cloud provider need to verify hosting and backup of VTrans data either physically or virtually shall be within the jurisdiction of the United States of America.
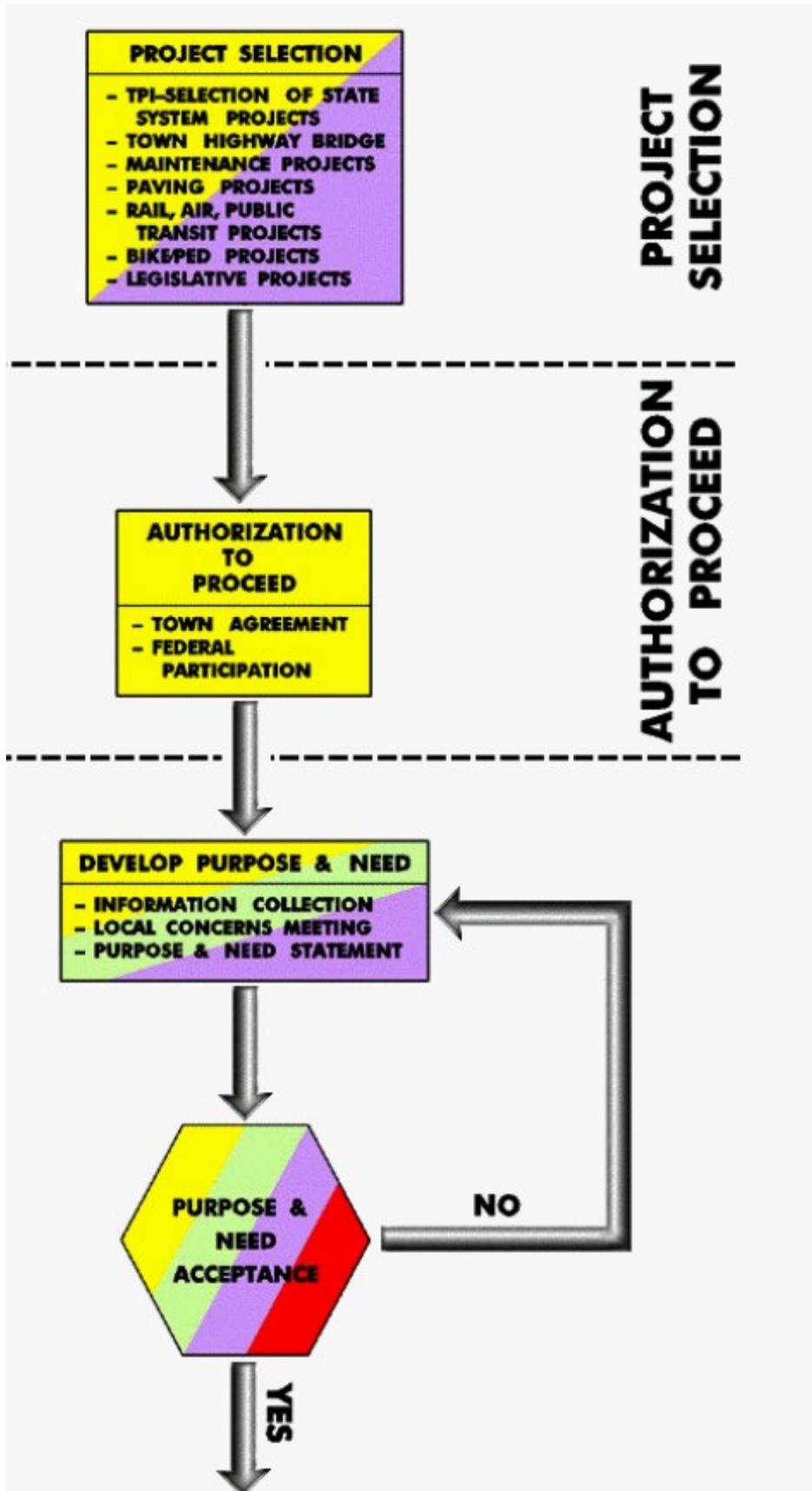
Support & Maintenance
- For technical services, provide a warranty period from the date of the last user acceptance. The warranty period will be used to identify and fix problems that result from the solution or problems with the design discovered during the warrant period. This includes but is not limited to resolving any software or interface problems, training questions, or malfunctions.
- VTrans will have all ownership rights to their business processes; process data and information, as well as associated documentation designed, developed, or implemented.
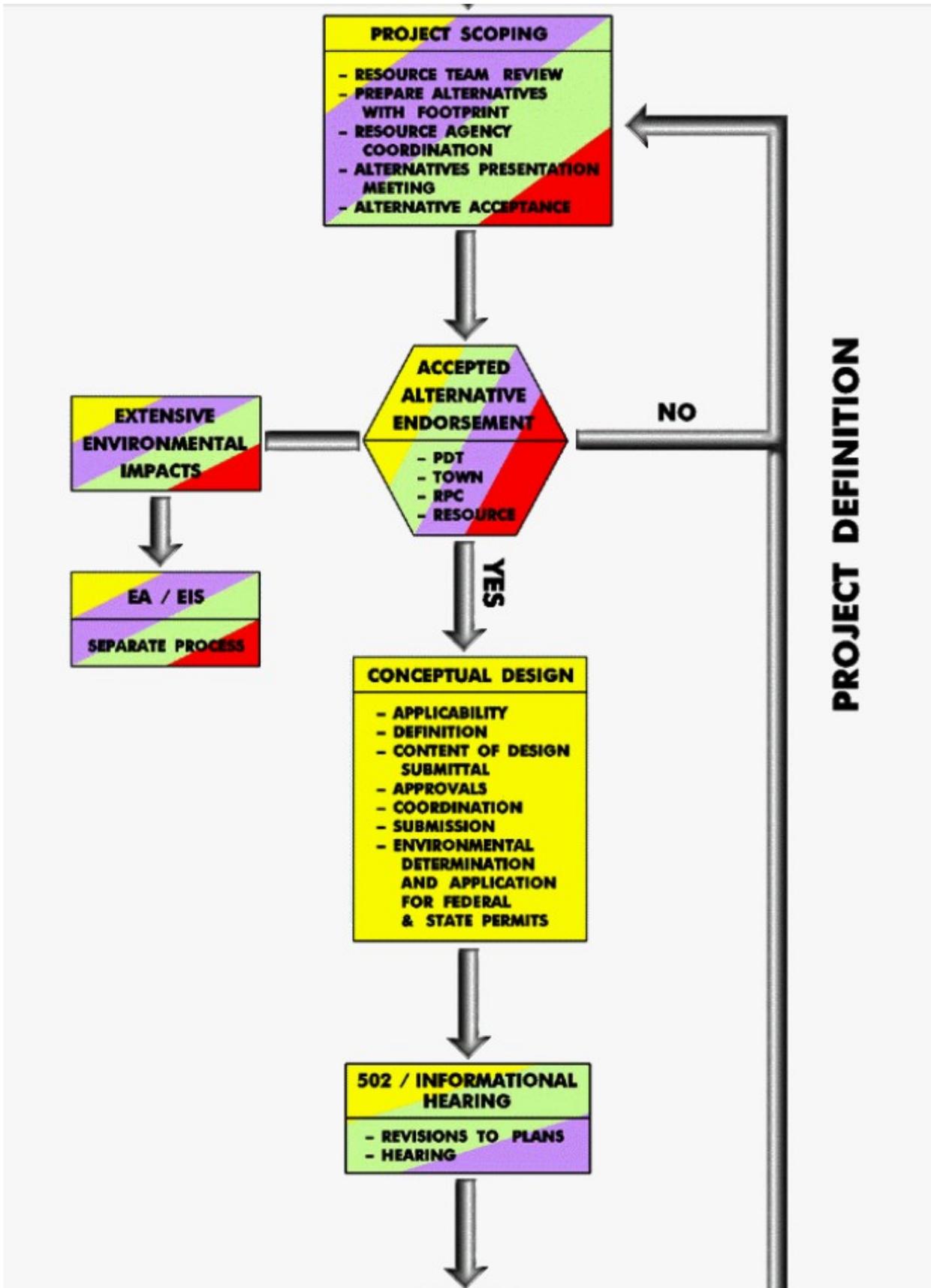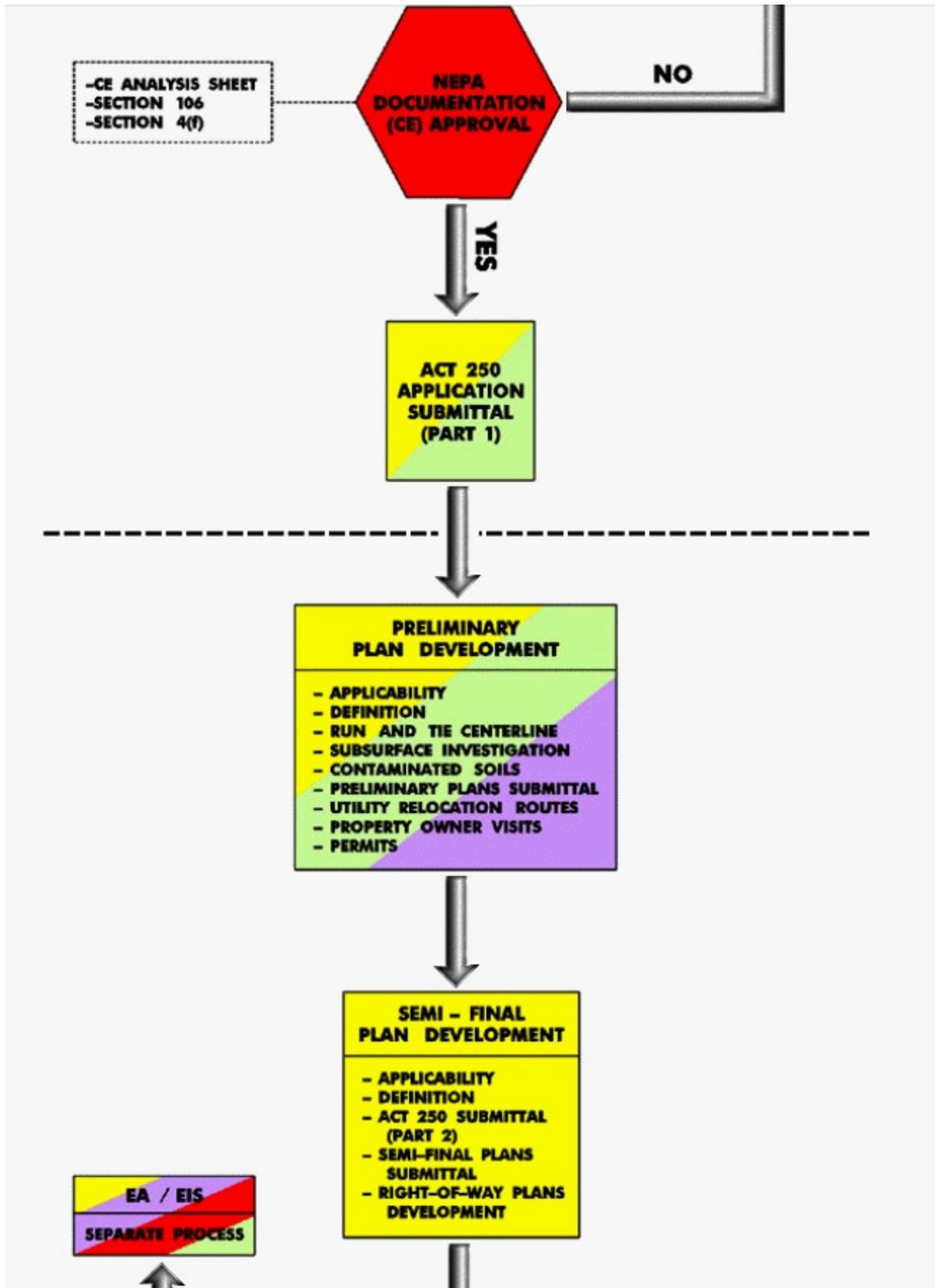
BPMS training
- The consultant must provide options for off-site, on-site and online training.
- The consultant must offer BPMS skill development and certifications for (prospective) technical staff to use and support the BPMS and associated tools.

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12.   Attachment 3 - AOT Construction Process

PROJECT SELECTION
- TPI–SELECTION OF STATE SYSTEM PROJECTS
- TOWN HIGHWAY BRIDGE
- MAINTENANCE PROJECTS
- PAVING PROJECTS
- RAIL, AIR, PUBLIC TRANSIT PROJECTS
- BIKE/PED PROJECTS
- LEGISLATIVE PROJECTS

PROJECT SELECTION

AUTHORIZATION TO PROCEED
- TOWN AGREEMENT
- FEDERAL PARTICIPATION

AUTHORIZATION TO PROCEED

DEVELOP PURPOSE & NEED
- INFORMATION COLLECTION
- LOCAL CONCERNS MEETING
- PURPOSE & NEED STATEMENT

PURPOSE & NEED ACCEPTANCE

NO

YES

Independent Review of a proposed Appian Corporation contract extension for Agency of Transportation
Page 56

PROJECT DESIGN

NO

RE – EVALUATION OF THE CE
– CE 3 YEARS OLD
– CHANGE IN :
  SCOPE
  IMPACTS
  MITIGATION

YES

CE RE-EVALUATION APPROVAL

YES

NO

ACT 250 PERMIT ISSUANCE

New BPMS Right Of Way Project Focus

AUTHORIZATION TO ACQUIRE RIGHT–OF–WAY

– FINAL ROW PLANS
– NECESSITY HEARING
– APPRAISAL
– APPRAISAL REVIEW
– NEGOTIATION
– COMPENSATION HEARING
– ROW CLEARANCE CERTIFICATE

FINAL PLAN DEVELOPMENT

- APPLICABILITY
- DEFINITION
- FINAL PLANS DESIGN MEMO
- UTILITY AGREEMENTS/SPECIAL PROVISIONS
- RAILROAD AGREEMENTS
- FINAL PLANS SUBMITTAL
- SPECIAL PROVISIONS
- CONTRACT PLANS SUBMITTAL
- AUTHORIZATION TO ADVERTISE FOR RECEIPT OF BIDS

EA / EIS

SEPARATE PROCESS

CE RE-EVALUATION APPROVAL

NO

RE-EVALUATION OF THE CE
- CE 3 YEARS OLD
- CHANGE IN :
  SCOPE
  IMPACTS
  MITIGATION

YES

YES

NO

CONSTRUCTION
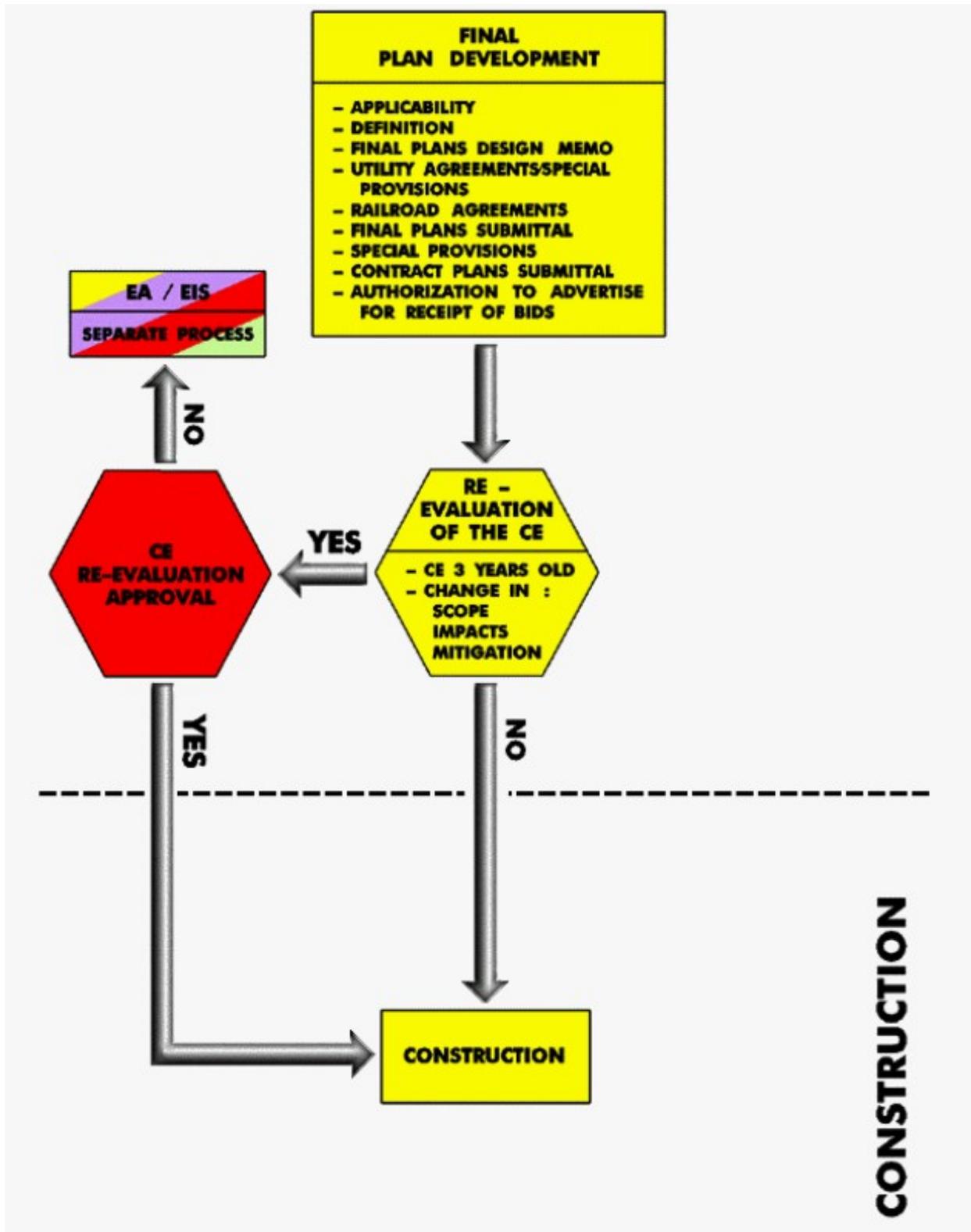
CONSTRUCTION

13. Attachment 4 - Cost Benefit Spreadsheets

Raw Data for Calculations on the following charts

Resultant Costs for FINALS Page 1 of 2

Resultant Costs for Finals Page 2 of 2

Resultant Costs for ROW Page 1 of 6

Resultant Costs for ROW Page 4 of 6

Resultant Costs for ROW Page 5 of 6