ALASKA IWAYS ARCHITECTURE UPDATE: IMPLENTATION PLAN

January 2017
Version 1.1

Revision History

Rev. #	Date	Author(s)	QC	Notes:
V 0.0	October 5, 2016	K. Swindler	L. Jacobson	Draft for internal review
V 1.0	January 6, 2017	K. Swindler	L. Jacobson	Initial submittal to ADOT&PF
V 1.1	January 25, 2017	K. Swindler	L. Jacobson	Incorporating ADOT&PF comments

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1 Introduction

This plan is a companion to the 2016 Alaska Iways Architecture (AKIA) report. The AKIA update was implemented in a way to lower the complexity and improve the readability of its corresponding documents in comparison to the previous update. The previous AKIA update was completed in 2009 and consisted of six core documents that breaks down the ITS goals, ITS functions, stakeholder needs, and connections between the technological transportation systems within the state. Although the information covered in the previous update was extensive, it resulted in a complex package that was difficult to read and navigate through. The aim of the 2016 update was to simplify all of those core documents into one concise AKIA report. The update adheres to the Federal Highway Administration (FHWA) National ITS conformity rule (23 CRF Part 940) and the FTA National ITS Architecture Policy on Transit Projects. Rule 940 states that an ITS architecture is required for ITS projects that are considered significant for the region and eligible for Federal funding.

This plan follows that trend of easy readability and simplicity. An Implementation Plan is important to any ITS Architecture to maximize the benefits of the architecture and to facilitate formulating new projects that reflect the needs identified by the stakeholders. Stakeholder input from webinars was incorporated into this plan to ensure its accuracy, relevancy and effectiveness.

ITS elements associated with projects phased for implementation and discussed later in this chapter should be reflected in the Alaska Iways Architecture. Every effort has been made to include potential ITS elements in the Alaska Iways Architecture already, however, projects may evolve over time necessitating that the architecture be revisited to include newly identified ITS elements. Therefore, before any new ITS project is funded, officials need to determine whether or not the proposed ITS project fits into the Iways Architecture. If all aspects of the project are completely covered then no action is needed and the project can be implemented. However, if some or all aspects are not accounted for in the Architecture, then a determination should be made of whether or not the project actually satisfies a transportation need for the region. If so, then the ADOT&PF will need to update the Statewide IWAYS Architecture to include the new ITS project, or the ITS elements associated with the project.

1.1 Purpose

The purpose of this ITS Implementation Plan is to identify, prioritize, and phase for implementation the technological solutions identified to address Alaska's transportation needs and desires. In the near-term, resource constraints would make it difficult for ADOT&PF to implement all the systems that would help fulfill Alaska's ITS Long-Range Vision. ITS projects must compete for funding with more traditional transportation, construction, and improvement projects. Because of this, phased ITS implementation will prove effective and help the ITS technologies identified in the Implementation Plan meet both ADOT&PF and Alaska travelers' diverse and unique needs.

By phasing projects, ITS implementation can occur in a controlled, cost effective, and efficient manner, allowing benefits to be realized in the near-term while providing the foundation needed to implement larger, more complex projects with additional benefits in the long-term. Phasing projects serves as a way to sequence projects so that they build off each other and are based on need, available funding, and institution agreement and cooperation. This Plan phases or sequences projects for implementation over the near- (0-3 years), mid- (3-5 years), and long-term (5-10 years), focusing on obtaining benefits in the near-term while supporting larger, more complex projects with greater benefits in the long-term.

1.2   Implementation Plan Development Process

The AKIA update relies heavily on stakeholder input and coordination to ensure that the architecture reflects their needs, including for development of the Implementation Plan. Figure 1 shows the development process.

Figure 1. AKIA Update Process

The Implementation Plan development builds on the architecture update in the previous steps. It also included a review of the following documents:

- Fairbanks Metro 2040 "A Roadmap to 2040"
- Interior Alaska Transportation Plan
- Northwest Alaska Transportation Plan, Community Transportation Analysis
- Prince William Sound Area Transportation Plan
- 2016 - 2019 Statewide Transportation Improvement Program (STIP)
- Southwest Alaska Transportation Plan Update
- Let's Get Moving 2030 - Alaska Statewide Long-Range Transportation Policy Plan
- Yukon-Kuskokwim Delta Transportation Plan
- Southeast Alaska Transportation Plan

After drafting the Implementation Plan, stakeholder review was accomplished through a series of three webinars. Each webinar provided an overview of the project types already in the STIP as well as proposed the proposed strategy types to fulfill the planned flows and elements in the updated architecture. Participants were asked for their input on the planned flows and elements as well as for their input on time horizons and priorities.

1.3   Document Overview

This report is organized to address the key requirements of the FHWA Rule 940, relating to ITS Architectures, and includes:

- **Chapter 1: Introduction**
  - o   This section provides information on the AKIA update, the purpose of the Implementation Plan, and an overview of the Implementation Plan.
- **Chapter 2: ITS Projects Identified in the Statewide Transportation Improvement Program (STIP)**
  - o   This chapter lists the current STIP projects that are closely related to ITS.
- **Chapter 3: Additional ITS Strategies for Potential Implementation**
  - o   This chapter list the ITS strategies that have been identified as desirable for Alaska through the IWAYS update process, but that are not covered by current STIP projects.
- **Chapter 4: Using the Systems Engineering Checklist for ITS Projects**
  - o   This chapter provides an introduction and references to the Systems Engineering Checklist for ITS Projects which is required by ADOT&PF to be in compliance with federal funding requirements.

2 ITS Projects Identified in the Statewide Transportation Improvement Program (STIP)

The Statewide Transportation Improvement Program (STIP) provides a set of transportation projects slated for implementation over the next several years. Within this set of projects, is a subset of projects that either contain or entirely deploy ITS elements. For this reason, ITS-related projects in the STIP are valid in determining the direction of ITS deployment in Alaska. These proposed and approved projects fill in gaps in ITS deployment and specifically address transportation-related needs. For instance, projects identified in the ADOT&PF STIP were derived in part through the transportation related needs documented in the ADOT&PF Needs List, as well as through other outreach activities. The Needs List is a database of the potential transportation projects in the state that is formed by the regions compiling all of the community-nominated projects. The Needs List is available through http://www.dot.state.ak.us/stwdplng/cip/stip/needslist/index.cfm. Programmed projects essentially serve as the near-term deployment of ITS in that they are either currently being deployed or are slated to be deployed in the next 3 years. These projects while setting the direction for ITS deployment, serve as the foundation from which future ITS deployment will occur. With that said, proposed and approved projects must be considered in recommending future projects, so that ITS deployment can occur in an incremental, phased fashion that builds upon previous efforts.

Projects listed in the STIP are funded through various sources available to the state most notably the Federal Highway Administration and Federal Transit Administration. The state receives several categories of funding from each of these agencies. Each category has distinctive rules for project eligibility, match ratios, and other programming factors.

Projects related to ITS that are included in the 2016-2019 STIP are shown in Table 1 below.

Table 1. ITS-Related Projects in the 2016-2019 STIP

Need ID	Project Name	Description	Service Areas						
			Traffic Management	Winter Maintenance	CVO & Freight	Public Trans-portation	Incident and Emergency Management	Traveler Information	Data Archive
29609	RWIS Air Quality Sensor Operations & Maintenance	This project provides for air quality data analysis, program, management, sensor calibration, maintenance checks, troubleshooting, travel, and repair of air quality sensors, collocated at five Fairbanks Road Weather Information Station collocated at five Fairbanks Road Weather Information Station Environmental Sensor Stations.		✓					
21314	Transit Security / Associated Transit Improvements	Purchase and install surveillance equipment system-wide, and other security expenses as appropriate, transit enhancement projects system-wide such as rest rooms, wheel chair lifts, intuitive signage and other enhancements as may be identified.				✓			
26469	Road Weather Information System (RWIS)	This project will fund the ongoing maintenance and operations of the network and sites, including utilities. This also includes web application development and upgrades to support the large customer base.		✓					
26470	3rd Gen 511 Phone and Web Maintenance and Operations	This project will fund the maintenance and operations of the 3rd Gen 511 traveler information website, 5-1-1 telephone and internal reporting system (RIDE). This includes funding the 511 Management Center operations, 24/7 technical support, and ongoing M&O activities.						✓	
26471	Highway Performance Monitoring System (HPMS)	Develop an Alaska solution to meet all aspects of the FHWA reporting requirements for the National HPMS Database. The project will develop a production solution using the department's Geographic Information System database, new Traffic Server (traffic data system) and other state systems such as Pavement Management System (PMS). This project entails following the FHWA systems engineering analysis that will result in replacing the State's legacy HPMS program suite and manual data processes and ongoing support to keep the system up to date with the FHWA data requirements and data validations.							✓

Need ID	Project Name	Description	Traffic Management	Winter Maintenance	CVO & Freight	Public Trans-portation	Incident and Emergency Management	Traveler Information	Data Archive
		Service Areas							
27269	Geographic Information System Development	This project supports the Geographic Information System (GIS) development for Department decisions involving resource allocation, project selection, and results based budgeting. The project will directly support the Highway Performance Monitoring System, Traffic Data System, Crash Data System, and Transportation Asset Management Information System.							✓
27270	Roadway Data Collection	This project supports the collection and processing of road centerlines, roadway inventory features, and roadway attributes. Project activities include: data collection planning, data collection, data processing, data quality assurance, and acquisition of data storage hardware and software. The resulting data will directly support: the Highway Performance Monitoring System, the Traffic Data System, the Crash Data System, and the Maintenance Management System.							✓
27689	GIS Enabled Highway Crash System	This project supports the new CRASH (Crash Reporting and Analysis for Safer Highways) used to analyze crashes and produce crash reports for Strategic Highway Safety Plan (SHSP), the Alaska Highway Safety Performance Plan and the Highway Safety Improvement Program (HSIP). The project will: complete the install; support maintenance and operations; support roadway data system (RDS) revisions as needed to support crash locations and mapping needs; support IT hardware and software; and will support integration with the Departments transition to a Transportation Asset Management Information System (TAMIS).							✓
27690	Traffic Data Management and Reporting System	The first two years of the project will fund the development of a new traffic data management and reporting system. The out years will provide ongoing operations, maintenance and support of the system. Scope of work includes integration into the GIS Highway Data Warehouse, system upgrades (hardware & software) to keep up with Department needs, ongoing operational support and data migration, federal reporting requirements, data visualization and information sharing tools.							✓

Need ID	Project Name	Description	Service Areas						
			Traffic Management	Winter Maintenance	CVO & Freight	Public Trans-portation	Incident and Emergency Management	Traveler Information	Data Archive
28129	Road Weather Information System (RWIS) AURORA	This project will fund ADOT&PF's contribution to the international pooled fund for RWIS research known as AURORA.	✓						
28309	IWAYS Architecture Update	This project will fund reviewing and updating necessary sections of the Alaska Iways Architecture. The update is required to ensure that ADOT&PF continues to meet and conform to the National ITS requirements. The existing Alaska Iways Architecture, last updated in 2008, will be reviewed and updated using consulting services to ensure ADOT&PF is using the latest ITS Architecture framework, and incorporating the updated processes and flows in the revised National ITS Architecture. This update will also ensure DOT&PF is complying with the current systems engineering requirements and corresponding ITS Systems Engineering Checklist.	✓	✓	✓	✓	✓	✓	✓
23810	3rd Gen 511 Phone and Web Enhancements	This project will fund planned and unplanned enhancements and system integration for the 511 phone, public website, entry tool system and Apps. Planned enhancements include: real-time traffic speed reporting, real-time information from external sensors and additional cameras as they become available. This project will fund purchasing the GPS components for portable message boards necessary to integrate signs with the 511 map.	✓					✓	
28311	Traveler Information Systems Marketing	This project will fund marketing Alaska road weather information systems, the 511 phone, website, smartphone apps, and social media utilities. This will also include public outreach and education, training, marketing materials, media kits and consultant services.						✓	
29910	Weigh-In-Motion Maintenance and Operations	Maintain, operate and enhance the current network of weigh-in-motion equipment, communications, software, databases, and data visualization and reporting tools.			✓				

Need ID	Project Name	Description	Traffic Management	Winter Maintenance	CVO & Freight	Public Transportation	Incident and Emergency Management	Traveler Information	Data Archive
			Service Areas						
28690	Kenai Peninsula Region Decision Support System (MDSS) RWIS	This project will upgrade one existing Road Weather Information System (RWIS) site and add one new RWIS site to support the Central Region Maintenance Decision Support System (MDSS) program. The existing RWIS site at Sterling Highway MP 54.8 will be upgraded to full RWIS reporting capability. New RWIS sites will be deployed near MP 161 and 114. The project includes system design, hardware, sensors, cameras, software, and installation association with the site. The RWIS information will be available directly to the MDSS program and will be posted on the 511 traveler information and RWIS web sites.		✓				✓	
27471	Temperature Data Probe Network	This project will upgrade the statewide temperature data probe (TDP) network that provides the vertical temperature profiles for the seasonal weight restriction program. Non-working TDP sensors will be replaced, selected new sites will be installed, and communication hardware upgraded. The project includes TDP purchase, TDP installation, data loggers, and communication equipment.			✓				✓
29909	Weight-In-Motion (WIM) Program	Design and installation of federally required WIM equipment sites at MP 358 of the Richardson Highway (at the existing weight station) and on the Parks Highway near Ester.			✓				
27010	Northern Region Signal Improvement	Improve capabilities of the Northern Region to communicate with signals, allowing for troubleshooting, signal timing modifications, and monitoring at single/multiple location(s). Project will include upgrades at NR Headquarters and incorporate improvements to interconnecting communication systems (for security and reliability), controller upgrades, signal timing plans, and other related items. Provide any related items and Training, Maintenance, and Operational funding as allowed by ITS.	✓						
28809	Highway Data Equipment Acquisition and Installation (IWAYS)	Design, construct or rehabilitate traffic data collection sites and develop software for the State's federally required Traffic Monitoring system for Highways (TMS/H). This project includes purchase of items such as: traffic data counters; cameras; computers; software for in office data retrieval; program evaluations; and IT needs for data collection, communications, and software.	✓						✓

Need ID	Project Name	Description	Service Areas						
			Traffic Management	Winter Maintenance	CVO & Freight	Public Trans-portation	Incident and Emergency Management	Traveler Information	Data Archive
28793	Southcoast Region - Hwy Data equipment Acquisition and Installation	Design, construct, or rehabilitate traffic data collection sites for the state's federally required Traffic Monitoring System for Highways (TMS/H). This project includes purchase of items such as: traffic data counters; cameras; computers; software for in office data retrieval; program evaluations; and, IT needs for data collection, communications, and software.	✓						✓
29879	Southcoast Region WIM Infrastructure Installation	Install WIM infrastructure on both the Haines and Klondike Highways.			✓				

3 Additional ITS Strategies for Potential Implementation

During the ITS architecture update process, the planned flows, elements, and strategies in the service packages were compared to the projects on the STIP to identify gaps. The gaps were then mapped to potential new project components. Through a series of webinars, stakeholders provided input on the strategies, including the time horizon and priority. The results are summarized in Table 2.

Table 2: Additional ITS Strategies for Potential Implementation

Element/ Flow/ Strategy	Time Horizon (Soonest Implementation)	Priority	Service Area						
			Traffic Management	Winter Maintenance	CVO & Freight	Public Trans-portation	Incident and Emergency Management	Traveler Information	Data Archive
Camera Images	Near (at least in Anchorage)	Low/Medium	✔						
Transportation Operations Center	Virtual –Medium Building - Long	Medium	✔	✔		✔	✔	✔	
Traffic Probe Data	Near	High	✔						
Third Party Data to Traffic Management	Near	Medium	✔						
Railroad Work Schedules	Near	Medium		✔					
Maintenance and Construction Plans/ Feedback	Medium	Medium		✔					
Road Weather Data Archive	Medium	Medium		✔					
CVIEW Subset (ADOT Instance) Update	Long	Low			✔				
Credential Information (Federal Motor Carrier – MSCVE)	Near/ Medium (depends on which part)	Medium / Low			✔				
Border Crossing Information	Long	Low			✔				
Route Restrictions (Superload into 511)	Near	Medium			✔				
Connection 511 Internal – Motor Carriers	Long	TBD (likely Medium)			✔				
ITS Software Upgrade	Near to Medium	Medium					✔		
Avalanche Detection System	Near	High						✔	

Element/ Flow/ Strategy	Time Horizon (Soonest Implementation)	Priority	Service Area						
			Traffic Management	Winter Maintenance	CVO & Freight	Public Transportation	Incident and Emergency Management	Traveler Information	Data Archive
EMS Dispatch – 511 Internal Reporting	Medium	Medium					✓		
Law Enforcement Dispatch – 511 Internal Reporting	Medium	Medium					✓		
3rd Party Information Services	Near	High						✓	
Transit and Ferry Information on 511	Long	Low						✓	
Traffic Images on the 511 Website	Near	High						✓	
Data Archive	Long	Low							✓

4 Using the Systems Engineering Checklist for ITS Projects

ITS architectures, including the AKIA, provide valuable input in at least four contexts: planning, program development, project development, and project design. Additional detail is available in the AKIA Use and Maintenance Guide. All of these contexts are necessary for successfully implementing ITS project.

The ITS architecture also provides information to aid in the completion of the Systems Engineering Checklist. The Systems Engineering Checklist is both required for ITS projects that use Federal funds and is an AKDOT & PF institutional requirement.

Copies of the checklist and its instructions are included below. Both documents are also available online at http://www.dot.state.ak.us/iways/sys-eng.shtml.

Statewide Alaska Iways Architecture (AKIA) and **Anchorage Regional ITS Architecture (ARIA)** **Systems Engineering Checklist**	**1a. Date**	
	1b. Project Title	
The AKIA, ARIA, and this systems engineering checklist adhere to the Federal Highway Administration (FHWA) National ITS conformity rule (23 CRF Part 940) and the FTA National ITS Architecture Policy on Transit Projects. Rule 940 states that system engineering, including an ITS architecture, is required for ITS projects that are considered significant for the region and eligible for Federal funding.	**1c. ADOT & PF STIP Need ID**	
	1d. IRIS # *(if available)*	
	1e. Name	
• For more information on Systems Engineering, see: http://www.dot.state.ak.us/iways/sys-eng.shtml	**1f. Title**	
• For more information on the Iways Architecture, see: http://iways.alaska.gov/	**1g. Phone Number**	
	1h. E-Mail	
• For more information on MOA Architecture, see: http://www.muni.org/Departments/OCPD/Planning/AMATS/Pages/1_ITS.aspx		
The instructions for this form contain additional information, including guidance on when a project is subject to these requirements. *The instructions are available through the Systems Engineering link above.*	**1i. Project Contact** *(if not listed above)*	

2. Brief Project Description including purpose of the project and major ITS elements (*see table on page 2 for complete list of service areas and ITS elements*). Additional items may be included as well, such as the nature of work and relationships to any other projects and phases.

3. Project Controls

3a. Does this project qualify as a **Major or Minor ITS project**? (see instructions for criteria)   Major ☐   Minor ☐

3b. Check to indicate if this is a **New Federal Project** (a new request for Federal funds) ☐ or a **Modification** of an existing Project ☐

3c. If the project amount is $25,000 or more, has the **DOA IT Spend Review Form** been reviewed and approved? Yes ☐ No ☐ N/A ☐

3d. Has the **ISSD Collaboration Form** been reviewed and approved?   Yes ☐   No ☐

3e. If the project has a communications component, has the PM coordinated with the **State Frequency Manager**?   Yes ☐ No ☐ N/A ☐

4. Documentation of Federal Systems Engineering Requirements

• For the six Systems Engineering Elements listed in the table below, indicate how it is met or fulfilled. Additional documents can be referred to or attached as needed. See instructions for additional guidance.

• The seventh systems engineering element - Portions of the Regional ITS or Statewide Iways Architecture Being Implemented – is covered by the Service Areas and ITS Elements tables that follow the Systems Engineering Element table.

Systems Engineering Elements	Existing from Previous Project or Document?	How Element is Met/Fulfilled
4a. Identify Participating Agencies Roles & Responsibilities (could be in Concept of Operations). Also list agreements needed.	☐	
4b. Define Systems Requirements.	☐	
4c. Analyze alternative system configurations and technology options to meet requirements.	☐	
4d. Identify procurement/ contracting options.	☐	
4e. Identify applicable ITS standards; developed testing procedures (could include a System Acceptance Plan and Verification Plan).	☐	
4f. Outline procedures and resources necessary for operations and management.	☐	

5. Architecture Service Areas and ITS Elements – The following two tables contain the service areas for the statewide Alaska Iways Architecture (AKIA) and for the Municipality of Anchorage's Anchorage Regional ITS Architecture (ARIA). Please check all included service areas affected by this project and list all included ITS elements or attach copies of the service area diagrams with the project components highlighted. See the instructions to this form for more detailed references to the service area descriptions and ITS elements in the AKIA and ARIA.

AKIA Service Areas	Included in Project?	ITS Elements Included in Project
Traffic Management	☐	
Winter Maintenance	☐	
CVO & Freight	☐	
Public Transportation	☐	
Incident & Emergency Management	☐	
Traveler Information	☐	
Data Archive	☐	

ARIA Service Areas	Included in Project?	ITS Elements Included in Project
Archive Data Services	☐	
Arterial Management	☐	
Roadway Maintenance and Construction	☐	
Transit Operations	☐	
Traveler Information	☐	

Reviewed for Completeness

_____   _____
Signature   Date

Print Name: _____

Title: _____

DO NOT COMPLETE THIS SECTION – For Internal Use Only

Are any changes recommended to either the AKIA or ARIA due to this project?   Yes ☐   No ☐

   If yes, provide detail:

Is a Systems Engineering Analysis required?   Yes ☐   No ☐

To be Completed by the ITS Coordinator

Statewide Alaska Iways Architecture (AKIA) and
Anchorage Regional ITS Architecture (ARIA)
Systems Engineering Checklist & Instructions

Background

On January 8, 2001, the Final Rule on Intelligent Transportation Systems (ITS) Architecture and Standards Conformity (Final Rule) and the Final Policy on Architecture and Standards Conformity (Final Policy) were enacted by the FHWA and FTA respectively. The Final Rule/Final Policy ensures that ITS projects or ITS elements within a project carried out using funds from the Highway Trust Fund including the Mass Transit Account conform to the National ITS Architecture and applicable ITS standards.

The Final Rule requires that all ITS projects or ITS elements within a project that use Federal Funds be developed using a systems engineering analysis. Section 23 CFR 940.11 specifies seven activities that are to be performed to accomplish a systems engineering analysis. These seven activities are identified on the Systems Engineering (SE) Checklist in items 4 and 5.

Determining Which Projects Require a Systems Engineering Checklist

Project managers are required to complete a systems engineering analysis (SEA) for "...any project in whole or in part that funds the acquisition of technologies or systems of technologies, that provide or significantly contribute to the provision of one or more ITS user services, as defined in the National ITS Architecture. In other words, an ITS project is any project that may provide an opportunity for integration at any point during its life." This applies to all projects or portions of projects. Systems that stand alone, that are not and will not integrate with another system is not subject to a systems engineering analysis.

A project is a Non-Systems Engineering Project (NSE), and does not require the Systems Engineering Checklist to be filled out if the project:

- Does not include any ITS devices
- Only includes signal system equipment upgrades, signal re-timing / coordination
- Only includes stand-alone ITS devices that do not / will never communicate
- Only include fiber or conduit

General Instructions for Completing the Systems Engineering (SE) Checklist

Project managers are required to use the SE Checklist to demonstrate that their ITS project(s) or ITS element within a project were developed using a systems engineering approach. For Alaska DOT&PF projects, this checklist is a required Appendix to Design Study Report (DSR) for projects with ITS elements that require a DSR. See section 480.4 of the Preconstruction Manual.

The SE checklist can be found at http://iways.alaska.gov or http://web.dot.state.ak.us.

For larger projects, there may be separate documents that cover one or more of the systems engineering requirements. In those cases, a summary of the relevant information should be included in the SE Checklist and the document should be referenced. References should include: the full name of the plan or document; date and year the document was prepared; and the heading/heading number of the section within the document where the information is provided

If documents or plans do not exist for the necessary information, all the relevant information must be entered in the SE Checklist. For minor or straightforward projects, the required information may only be one or two paragraphs for each of the seven required systems engineering elements. For complex projects, documentation for some of the elements will likely be much longer and a separate document that can be attached to the checklist may be in order.

More detailed instructions for documenting each of the required systems engineering elements is provided in this package, on the pages following the checklist.

Questions?

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Detailed Instructions for Completing the Systems Engineering Checklist

The instructions below are numbered to correspond to the fields in the checklist form.

1. **Basic Information:** The date of the form (1a) and project identification information (1b – 1i).

2. **Brief Project Description:** Information to convey the key project aspects.

3. **Project Controls:** This series of questions covers items of particular importance for ITS projects.

    3a. Major or Minor ITS Project – All ITS projects require systems engineering analyses. If all items in this Systems Engineering Checklist can be identified at 30% design, the project is considered a "minor" ITS project. Otherwise, the project is considered a "major" ITS project and a formal System Engineering Analysis must be undertaken and a SE Checklist submitted to FHWA for approval. Note: the SE Checklist must be filled out and testing and verification will need to occur during construction for both Major and Minor ITS projects.

4. **Documentation of Federal Systems Engineering Requirements**

    - If documentation exists from previous projects and would apply to the current project without modification (for typical deployments, i.e. DMS signs), attach to the checklist or list where it is available.
    - Note that some projects have multiple ITS elements, only some of which will have the required documentation. Please check all that apply to the project.
    - Responses can reference sections of the project's DSR.

4a. Identify participating agencies roles and responsibilities

Summarize and reference the document(s) that define agency roles and responsibilities as they pertain to ITS system design, purchase, installation, operation, maintenance, and modification. Chapters 4 and 5 of the latest version of the AKIA and of the ARIA (Operational Concept and Interfaces and Information Exchanges respectively) may provide an initial starting point for satisfying this requirement. Also, check to see if there is a project level or system concept of operations that might include discussion of participating roles and responsibilities.

If there are no existing documents that define agency roles and responsibilities as they pertain to ITS system design, purchase, installation, operation, maintenance, and modification, then this section of the Systems Engineering Checklist should provide this description.

Also list agreements that are either in place or are needed.

4b. Define Systems Requirements

Summarize and reference the documents(s) that define "what" the subject ITS project or element is required to do. This includes all items necessary to complete a fully operational system including hardware, software, installation, training, etc. For many projects, there may be a formal requirements document that is developed. For example, you might have a requirements list included with an RFP. If there is no existing requirements document, this section should identify high-level requirements for the project. The ITS architecture provides high level requirements for each of the ITS elements included. If no other document provides more project specific requirements, those included in the ITS architecture provide a good starting point (see Appendix B in the architecture document for either the AKIA or ARIA). Please note that requirements are "what" statements. They are later further developed into "how" statements (or specifications) during the design process. Refer to the U.S. Department of Transportation report titled [Developing Functional Requirements for ITS Projects](#) for specific guidance on developing functional requirements.

4c. Analyze Alternative System Configurations and Technology Options to Meet Requirements

Summarize and reference the document(s) that list the alternatives that were considered during the development of the ITS project or element. Such a document should list strengths and weaknesses, technical feasibility, institutional compatibility, and life cycle costs of each alternative, and the preferred alternative. If there is a project level or system concept of operations that covers this project, it should include an alternatives analysis that could be referenced here.

If there are no existing documents that list the alternatives that were considered, then this section of the Systems Engineering Checklist should provide this listing.

4d. Identify Procurement/ Contacting Options

Summarize and reference the document(s) that identify procurement options for the ITS project or element, or list the procurement method used on the Systems Engineering Checklist.

If there are no existing documents that identify procurement options, then this section of the Systems Engineering Checklist should describe the procurement options.

4e. Identify Applicable ITS Standards that are being Implemented and Testing Procedures that will be used upon Project Implementation

Summarize and reference the document(s) that identify the ITS standards that apply to new ITS projects or elements. A list of standards applicable to projects identified in the AKIA and ARIA can be found in Appendix E (ITS Standards) of the respective architecture documents. Depending on the elements of the new ITS project, additional ITS standards may have been approved since the initial development of the AKIA and ARIA. Also, check to see if there is a project level or system concept of operations that might include a discussion of standards.

If there are no existing documents that identify the ITS standards that apply, then this section of the Systems Engineering Checklist should identify the applicable standards.

4f. Outline Procedures and Resources Necessary for Operations and Management of the System

Summarize and reference the document(s) that identify the internal policies or procedures necessary to recognize and incorporate the new system into current operations and decision processes. Resources that support continued operations, including staffing and training should also be referenced.

If there are no existing documents that identify the procedures and resources necessary to operate and manage the ITS elements of the project, then this section of the Systems Engineering Analysis form should identify the needed O&M procedures and resources.

5. Identify Portions of the Regional ITS or Statewide Iways Architecture being Implemented – Architecture Service Areas and ITS Elements

Use the ARIA and/or AKIA service area tables depending on the project scope.

Summarize and reference the document(s) that describe the new ITS project or elements and how they meet the functional needs of one or more of the ITS Service Areas identified in the ITS Architecture. ITS elements are the basic building blocks of an architecture represented by a box in the architecture. Some examples are specific field systems, centrally located systems, users of the system, or operators of the system. ITS elements and information flows are grouped into Service Areas.

In both the AKIA and ARIA, Chapter 4 (Operational Concept) may provide an initial starting point for meeting this requirement. The list of Elements can include a reference to attached copies of relevant Service Areas marked with the ITS elements and flows included in the project. The following table lists the service areas and their corresponding sections in their ITS Architectures:

Architecture	Service Area	Reference
AKIA	Traffic Management	AKIA Section 4.4
	Winter Maintenance	AKIA Section 4.5
	CVO & Freight	AKIA Section 4.6
	Public Transportation	AKIA Section 4.7
	Incident & Emergency Management	AKIA Section 4.8
	Traveler Information	AKIA Section 4.9
	Data Archive	AKIA Section 4.10
ARIA	Archive Data Services	ARIA Section 4.4
	Arterial Management	ARIA Section 4.5
	Roadway Maintenance and Construction	ARIA Section 4.6
	Transit Operations	ARIA Section 4.7
	Traveler Information	ARIA Section 4.8

Also, check to see if there is a project level or system concept of operations that might include a discussion of the portions of the architecture being implemented.

If there are no existing documents that describe new ITS project or elements and how they meet the functional needs of one or more of the ITS Service Areas identified in the ITS Architecture, then this section of the Systems Engineering Checklist should provide this description.

Reviewed for Completeness

This section is for use by the DOT&PF or MOA depending upon the project jurisdiction.

ITS Administrator Section

To be completed by the ITS Administrator for both DOT&PF and MOA projects.