VIRGINIA DEPARTMENT OF TRANSPORTATION

Operations Division
Location and Design Division

INSTRUCTIONAL AND INFORMATIONAL MEMORANDUM

GENERAL SUBJECT: ITS (Roadway Operations Technology) Architecture Requirements	NUMBER: IIM-OD-21-02 IIM-LD-261
SPECIFIC SUBJECT: Systems Engineering and Architecture Compliance Rule 940	DATE: March 23, 2021
	SUPERSEDES:
Approval with Signature on file in office of the Operations Division: OPERATIONS DIVISION APPROVAL: Ali Farhangi, P.E. State Operations Engineer Approved (Signed copy on file)	
Approval with Signature on file in office of the Location and Design Division: LOCATION AND DESIGN DIVISION APPROVAL: Susan H. Keen, P.E. State Location and Design Engineer Approved (Signed copy on file)	

Changes are shaded.

CURRENT REVISION

- NA

EFFECTIVE DATE

- This IIM is effective immediately for all projects that include Intelligent Transportation System (ITS) components that will be integrated into VDOT systems or elements with the exception of traffic signals. For traffic signal projects please contact Traffic Engineering Division (Signal & Arterial Systems Coordinator) for guidance on ensuring FHWA Rule 940 compliance.

BACKGROUND

VDOT has developed regional and statewide ITS architectures to serve as a framework that will guide ITS planning, project development, and implementation to achieve increased integration of the region's transportation system. The regional and statewide ITS architectures satisfy a federal requirement for transportation projects that include roadway operations technologies.

- Regional ITS architecture is a regional framework for ensuring institutional agreement and technical integration for the implementation of ITS projects or roadway projects that include ITS elements. In addition to the architecture, VDOT has adapted a comprehensive process for ITS project planning and implementation termed Systems Engineering (SE), including an easy-to-use FHWA Rule 940 checklist.

- FHWA Rule 940 defines an ITS project as "...any project that in whole or in part 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." Simply put, we are talking about any ITS project, (standalone or as part of a larger project) where one transportation-related system communicates electronically as a system or with another system, (now or planned in the future). ITS projects include, but are not limited to, projects with traffic surveillance systems, managed travel lanes, traveler communication systems, etc.

- The communication between the systems is what makes an ITS project. The Architecture is the framework (or plan) to guide the integration of different systems, and System Engineering helps to minimize safety-critical risks and project risks of scheduling and cost overruns; it also increases the likelihood that the implementation will meet the user's needs. The FHWA has issued comprehensive guidelines for a Systems Engineering development Process.

§ **23 CFR 940.9 -** Regional ITS Architecture: Link to Title 23

(a) A regional ITS architecture shall be developed to guide the development of ITS projects and programs and be consistent with ITS strategies and projects contained in applicable transportation plans. The National ITS Architecture shall be used as a resource in the development of the regional ITS architecture. The regional ITS architecture shall be on a scale commensurate with the scope of ITS investment in the region. Provision should be made to include participation from the following agencies, as appropriate, in the development of the regional ITS architecture: Highway agencies; public safety agencies (e.g., police, fire, emergency/medical); transit operators; Federal lands agencies; State motor carrier agencies; and other operating agencies necessary to fully address regional ITS integration.

(b) Any region that is currently implementing ITS projects shall have a regional ITS architecture by April 8, 2005.

(c) All other regions not currently implementing ITS projects shall have a regional ITS architecture within four years of the first ITS project for that region advancing to final design.

(d) The regional ITS architecture shall include, at a minimum, the following:

(1) A description of the region

(2) Identification of participating agencies and other stakeholders

(3) An operational concept that identifies the roles and responsibilities of participating agencies and stakeholders in the operation and implementation of the systems included in the regional ITS architecture

(4) Any agreements (existing or new) required for operations, including at a minimum those affecting ITS project interoperability, utilization of ITS related standards, and the operation of the projects identified in the regional ITS architecture

(5) System functional requirements

(6) Interface requirements and information exchanges with planned and existing systems and subsystems (for example, subsystems and architecture flows as defined in the National ITS Architecture)

(7) Identification of ITS standards supporting regional and national interoperability; and

(8) The sequence of projects required for implementation

(e) Existing regional ITS architectures that meet all of the requirements of paragraph (d) of this section shall be considered to satisfy the requirements of paragraph (a) of this section.

(f) The agencies and other stakeholders participating in the development of the regional ITS architecture shall develop and implement procedures and responsibilities for maintaining it, as needs evolve within the region.

PROCEDURE

- The Final Rule on Intelligent Transportation Systems (ITS) Architecture and Standards Conformity and the Final Policy on Architecture and Standards Conformity were enacted by the FHWA on January 8, 2001. The Final Rule/Final Policy ensures that ITS projects or ITS elements within a project carried out using funds from the Highway Trust Fund conform to the National ITS Architecture and applicable ITS standards. Section 23 CFR 940.11 specifies seven activities, identified in Section 3.0 of the ITS Checklist, that are to be performed to accomplish a systems engineering analysis. **These activities must be completed prior to approval of Federal funds (**§**23 CFR 940**). The seven activities are:

  (1) Identification of portions of the regional ITS architecture being implemented;

  (2) Identification of participating agencies roles and responsibilities;

  (3) Requirements definitions;

  (4) Analysis of alternative system configurations and technology options to meet requirements;

  (5) Procurement options;

  (6) Identification of applicable ITS standards and testing procedures; and

  (7) Procedures and resources necessary for operations and management of the system.

- VDOT Project Coordinators/Managers are required to use the VDOT Rule 940 Form ITS Checklist (SWITS Scoping Worksheet - Intelligent Transportation Systems) to show that ITS project(s) or ITS elements within a project were developed using the FHWA Systems Engineering guidelines. The VDOT Rule 940 Form ITS Checklist (SWITS Scoping Worksheet - Intelligent Transportation Systems) satisfies the requirements of §23 CFR 940.9 for most ITS projects. The VDOT Rule 940 Form ITS Checklist (SWITS Scoping Worksheet - Intelligent Transportation Systems) will determine if additional documentation is required for complex projects. The VDOT Rule 940 Form ITS Checklist (SWITS Scoping Worksheet - Intelligent Transportation Systems) completion begins during the scoping phase of the project. This Form is required for Federal Authorization and **MUST** be included in the submission package.

- VDOT Project Managers/Coordinators for all ITS projects that include ITS components or services will check the ITS Architecture Requirements box on the PM-100 Form (Scoping Report) as well as complete the VDOT Rule 940 Form ITS Checklist (SWITS Scoping Worksheet - Intelligent Transportation Systems) and then send it to the ITS Architecture Coordinator in the Central Office Operations Division **ITSarchitecture@vdot.virginia.gov**. This is required for projects funded with highway trust funds with the exception of maintenance projects.

- Locality Project Manager/Coordinators shall provide certification that their project satisfies the FHWA Rule 940 requirements. It should be noted that localities ITS elements should be included with the state Regional architecture. Localities may use the VDOT Rule 940 Form ITS Checklist (SWITS Scoping Worksheet – Intelligent Transportation Systems) to satisfy the 23 CFR 904 requirements for most ITS projects.

COMPLETING THE PM-100 FORM (SCOPING REPORT) AND VDOT RULE 940 FORM ITS CHECKLIST (SWITS SCOPING WORKSHEET – INTELLIGENT TRANSPORTATION SYSTEMS)

- The PM-100 Form (Scoping Report) and the VDOT Rule 940 Form ITS Checklist (SWITS Scoping Worksheet – Intelligent Transportation Systems) can be found **here**.

If you have questions, please contact:
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