Systems Engineering Review Form
Programmatic ITS - Instructions

SERF-Programmatic Instructions

The Systems Engineering process is used for the development of all ITS deployments, from the construction of device facilities and/or implementation of software programs so that the development considers all phases of the ITS system's lifecycle and the affected stakeholders. Suitable documentation should be maintained depending on the complexity of the ITS. The Systems Engineering Review Form has been developed to document the results of the Systems Engineering completed.

A template form has been developed for deployment of ITS that meets the requirements for programmatic ITS as defined in Section VIII of the STEWARDSHIP AGREEMENT, see below. ITS deployments that are not standard and covered under the programmatic definition require additional documentation.

Programmatic Concept of Operations
A. Description: The level of Systems Engineering required for deployment is dependent on the complexity of the proposed system. A programmatic approval is established for those deployments that do not require a Concept of Operations submission before proceeding with the Systems Engineering for the proposed deployment.
B. Project types covered by programmatic approval for compliance with ITS Architecture and 23 CFR 940: Development and deployment of standard ITS systems, individual components or complete systems, within an ITS stand alone project or incorporated within other projects, and the operation and maintenance of existing ITS systems.
C. Standard ITS systems include Traffic Cameras (CCTV), Dynamic Message Signs (DMS), Highway Advisory Radio (HAR), Weigh-in-Motion stations (WIM), Weather Stations (RWIS), Controlled Traffic Signals, and TRANSMIT/Radar/Microwave/loop detectors/other established in-pavement based traffic data sensors, and other software or systems previously used in New Jersey.

Submission of a SERF is not required if the project only is replacing "in-kind" existing ITS facilities that are impacted by the project. IE: mill/resurfacing projects would require replacing the loop detectors in the pavement for WIMS, TVS, or CTSS; Bridge replacements would need to reinstall fiber on the structure. If the project has any new deployment and replacements, the SERF would still have to be done and can note the replacement work. An "in-kind" replacement can provide for upgrading to the current technology, but any change to the original need and function would have to be described in a SERF.

FORM COMPLETION AND SUBMITTAL

1. Download MSWord.doc and Save As (*suggested filename format*: "CONTRACT REF" or "PROJECT I.D." + "- SERF" + "yymmdd".doc; e.g., CM8005508 SERF 100101).
2. Enter fully written format (Document Date) where indicated in the document header (if filename date given is ". . . yymmdd.doc" = ". . . 100101.doc", then date on header should read, "January 1, 2010").
3. Complete SERF using the saved document.
4. Double-click header line to enter Document Date (fully written format), then close header.
5. Enter project information where required by the form.
6. Complete Parts 1 thru 7, see Part specific Guidelines below in addition to instructions in the template. It is critical that the requirements/"needs" are clearly defined with Traffic Operations since that sets the criteria that further design must ensure it meets.
7. **Delete all text shown in [*red*]**
8. Save completed form.
9. Create PDF copy to be submitted for review and concurrence by Traffic Operations during "scoping" and prior to initiating design. The Communications Report can be submitted as part of the SERF submission or separately, but must be approved prior to initiating final design.
10. With the Final Design Submission, attach the previously approved SERF with a listing of the final determinations and any revisions developed during design. Submit for concurrence by the Project Manager and review and approval by ITS Engineering.

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NOTES

1. ITS Designers usual do the detailed investigations and evaluation to develop ITS, however, this template form and instructions can be used by all parties involved in projects that contain ITS.
2. ITS Designers completing the SERF should gather all reference material developed for the project that would contain the project's particulars, relevant information, process/design documentation, engineering studies, analyses, etc. that can be summarily used to satisfy the SERF.
3. ITS Designers should be familiar with the New Jersey Statewide ITS Architecture, the ITS Investment Strategy, and other related documents as available through the NJDOT ITS web site: http://www.state.nj.us/transportation/eng/elec/ITS/
4. The entries provided in the Programmatic Form template are typical of the Department's projects deploying ITS for Statewide Traffic Operations and shall be maintained as instructed unless otherwise directed by Traffic Operations or ITS Engineering. The Completion Guides below provide specific examples for Part 3 of STO deployments and general guides for non-STO deployments or unique features that may be part of any project.
5. Discuss with respective ITS SME Unit(s) for projects with deployment of other ITS facilities that are not managed by Statewide Traffic Operations.

SERF PARTS	**COMPLETION GUIDES** (instructions, entry examples and reference material)
1	Identify which user services, physical subsystems, information flows, and market packages are being completed as part of the project and how these pieces are made part of the statewide architecture. Market Package(s): Refer to the latest revision of the *New Jersey Statewide ITS Architecture*, Part 5 User Needs And Services for various groupings of Market Packages; list all other market packages applicable. Examples of some non-STO facilities market packages MC03 Road Weather Data Collection [*RWIS*] MC04 Weather Information Processing and Distribution [*RWIS*] CVO06 Weigh-In-Motion *[WIMS]* Subsystem(s): Refer to the latest revision of the *New Jersey Statewide ITS Architecture*, Part 4 ITS Inventory Statistics for all other possible subsystems; list all other subsystems (or ITS elements) mapped to the statewide architecture. Architecture Flow: Refer to the latest revision of the *New Jersey Statewide ITS Architecture*, Subpart 5.2.3 Technical Approach, for information exchange at the architecture flow level; then refer to the various flow diagrams included in Part 6 Operational Concepts and Agreements; summarize other flow of information based on the project's stakeholder agreements and concept of operations.
2	For the user services to be implemented, define the high-level operations of the system, including where the system will be used, functions of the system capabilities, performance parameters, the life cycle of the system, and who will operate and maintain the system. Establish requirements or agreements on information sharing and traffic device control

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SERF PARTS	**COMPLETION GUIDES** (instructions, entry examples and reference material)
	responsibilities
3	Based on the concept of operations in Part 2. above, define the "what" and not "how" of the system. The applicable high-level functional requirements from the Statewide Architecture are a good starting point for discussion Example clauses to be used for Device Specific requirements. Designers must coordinate with the respective Traffic Operations Center to define the requirements. Ensure it addresses ITS work that may be outside the physical limits of the overall project improvement. Install a DMS on I-80 EB to alert motorists prior to the I-280 interchange to divert traffic to other available routes for delays ahead, and provide travel times for the common destination of the George Washington Bridge to allow motorists to determine travel impacts and potential rerouting. *DMS* – designer to *describe not the specific MP location, but the purpose*. Install CCTV to monitor traffic conditions in the vicinity of the interchange between I-80 and Route 206. Video coverage should provide for at least ½ mile along each approach on I-80 and to the ramp entrances on Route 206. Install CCTV to monitor the section of I-78 between MP 12 and 14 due to high volumes and roadway geometry. *CCTV - designer to identify any other specific visual coverage limits.*
4	The analysis of system alternatives should outline the strengths and weaknesses, technical feasibility, institutional compatibility, and life cycle costs of each alternative.
5	Verify proposed project procurement with the Department if not part of a standard highway project. Some procurement (contracting) options to consider include: consultant design/low bid contractor, systems manager, systems integrator, task order, and design/build. Deciding on the best procurement option should consider the level of agency participation, compatibility with existing procurement methods, role of system integrator, and life cycle costs.
6	Include documentation on which standards will be incorporated into the system design and justification for any applicable standards not incorporated. The standards report from the Architecture is a good starting point for discussion.
7	Verify resources with the Department. Document any internal policies or procedures necessary to recognize and incorporate the new system into the current operations and decision-making processes. Resources necessary to support continued operations, including staffing and training must also be recognized early and be provided for. Such resources must also be provided to support necessary maintenance and upkeep to ensure continued system viability.