Appendix D

A Summary Report on the Analysis of the District Responses to the Current *Systems Engineering Capability Maturity Model (SE-CMM)* Questionnaire

ANALYSIS REPORT

District Responses to the Systems Engineering Appraisal Questionnaire Analysis Results

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Draft	6 September 2002	Dave Walter	Initial Draft
1.0	10 September 2002	Dave Walter	QCAP Review by John Bonds; Comments incorporated
2.0	11 September 2002	Dave Walter	Incorporated Traci Matthews's comments; Expanded the Focus Area ratings section; Added a Summary and Recommendation section.
3.0	22 October 22	Dave Walter	Incorporation of formatting and grammatical corrections and finalization for insertion into final documentation deliverable.

Analysis Report Executive Summary

The Electronic Industries Alliance Interim Standard (EIA/IS) 731.1, Systems Engineering Capability Model (SECM), is the reference model for this report. This appraisal is designed to meet the objectives of the Florida Department of Transportation (FDOT) Intelligent Transportation Systems (ITS) Office.

The SECM is structured to support a wide variety of improvement activities including appraisals, process improvements, and process designs. This model is intended for internal process improvements. The process improvement efforts, using the SECM reference model, are constructed to support the business goals of FDOT.

The components of this model are categories, focus areas, themes, and specific practices. The primary elements of the model are the focus areas, each of which is defined by a set of unique specific practices.

There are six (6) capability levels. Each capability level has practices and attributes associated with process and non-process characteristics. These capability levels are:

- 0 – Initial;
- 1 – Performed;
- 2 – Managed;
- 3 – Dedicated;
- 4 – Measured; and
- 5 – Optimized.

Capability levels are assessed based on performance in conducting practices of the focus areas for a given category that has presently been achieved, thus indicating the capability level of that Category at FDOT. The capability level assessments are documented in *Section 5*, *District Responses to the Systems Engineering Appraisal Questionnaire Results*.

A primary result of the appraisal process is a rating profile covering the appraised focus areas. The rating profile correlates with the appraisal findings and the two (2) are developed in a closely coupled process. The rating profile is developed and refined at specific points in the appraisal process. Ratings are the judgment of the appraisal team and are based on the degree to which FDOT performs all of the requirements (practices) at a given level.

The data gathered from the questionnaire is synthesized into a rating profile. This is accomplished by:

- A review Section 5 of the EIA/IS-731.1 for typical work products and practices that are found in the categories;

- An assessment of the capability level of the FDOT responses based upon the previous step;
- Documentation of the assessed capability level as provided in the FDOT district responses to the systems engineering questionnaire;
- Averaging the numerical equivalent scores for each capability level assessed on each district's response. The average is rounded off since there are no provisions for decimal capability levels. (i.e., 1.5 becomes 2.0; 1.4 becomes 1.0; etc.);
- Evaluating the individual theme scores to assess focus area placement on the scoring template for each category; and
- Completing the scoring templates for all three (3) categories. The scoring templates are contained in Section 3, *Focus Area Ratings*, of this document.

As a result of the above activities, the findings represent an assessment of the level of implementation of systems engineering processes within FDOT, as they are related to the SECM. These findings become the basis for the next step, which is to develop a work plan for the tasks required for developing the *Systems Engineering Management Plan* (*SEMP*) for FDOT.

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List of Acronyms

APL ..... Approved Product List
ATIS ..... Advanced Traveler Information System
CCB ..... Change Control Board
CCTV ..... Closed-Circuit Television
CMS ..... Changeable Message Sign
CPM ..... Construction Project Management
CVS ..... Concurrent Version Systems
DMS ..... Dynamic Message Sign
DPM ..... Design Project Management
EIA/IS ..... Electronic Industries Alliance Interim Standard
FDOT ..... Florida Department of Transportation
FHWA ..... Federal Highway Administration
FIHS ..... Florida Intrastate Highway System
INCOSE ..... International Council on Systems Engineering
IT ..... Information Technology
ITS ..... Intelligent Transportation Systems
LRTP ..... Long-Range Transportation Plan
MPO ..... Metropolitan Planning Organization
NITSA ..... *National ITS Architecture*
OIS ..... Office of Information Systems
QPL ..... Qualified Product List
RFP ..... Request for Proposal
SECM ..... Systems Engineering Capability Model
SEMP ..... *Systems Engineering Management Plan*
SM/SI ..... Systems Manager/Systems Integrator
TIP ..... Transportation Improvement Plan
TMC ..... Traffic Management Center
TranStat ..... Transportation Statistics (Office)
TSP ..... Technical Special Provisions
UPWP ..... Unified Planning Work Program

1. Introduction

The Florida Department of Transportation (FDOT) recently established an Intelligent Transportation Systems (ITS) Office to:

- Coordinate the deployment of statewide communications networks to support ITS;
- Coordinate the deployment of ITS along the five (5) principal Florida Intrastate Highway System (FIHS) corridors ([Interstate 4 (I-4), Interstate 10 (I-10), Interstate 75 (I-75), Interstate 95 (I-95), and Florida's Turnpike];
- Coordinate the deployment of advanced traveler information systems (ATIS); and
- Coordinate the development of statewide central data warehouses for ITS.

Successful deployments of these four (4) objectives will result in one of the largest coordinated deployments of ITS and communications infrastructure programs in the United States.

1.1 Project Overview

To deploy these services, a comprehensive systems engineering approach is needed to:

- Ensure deployments are aligned with FDOT's overall mission, goals, and objectives;
- Ensure deployments result in a fully integrated, coordinated, seamless, and effective system; and
- Ensure public resources are being utilized with maximum cost-efficiency and effectiveness.

The proposed approach for developing the *SEMP* was outlined in an issue paper prepared for FDOT in February 2002. The issue paper delineates tasks and responsibilities among the various stakeholders involved in ITS deployments along the five (5) principal FIHS corridors. This proposed approach is also intended to serve as FDOT's plan for implementing the requirements for systems engineering contained in the recently promulgated Federal Highway Administration (FHWA) Rule 940, *Intelligent Transportation Systems Architecture and Standards*, for these deployments.

A comprehensive *SEMP* is needed to expand the concepts outlined in the initial issue paper to develop, improve, and assess systems engineering capabilities for ITS in Florida and to specify the details of "how to" implement process activities. The *SEMP* will recommend methods and tools an engineer will employ for the development of ITS projects in Florida.

1.2 Document Overview

- Section 1, *Introduction*, contains the project identification information, system and document overviews, a list of the terms, definitions and acronyms used, and a list of the references used in the preparation of this document.

- Section 2, *Analysis Methodology*, describes the methodology used to evaluate the questionnaire responses.

- Section 3, *Focus Area Ratings*, contains the completed scoring templates for all three (3) categories.

- Section 4, *Summary and Recommendations*, documents the conclusions reached by the appraisal process and the recommended actions to take.

- Appendix A, *District Responses to the Systems Engineering Appraisal Questionnaire Results*, contains the district responses and the capability level assessment for each response.

1.3 Applicable Documents

The following documents were referenced in, or used in preparation of, this document.

- *Issue Paper – Proposed Systems Engineering Approach for ITS Deployments Along Florida's Limited-Access Corridors*, Version 12, February 19, 2002.

- EIA/IS-731.1, SECM, EIA G47 SECM Working Group, Version 1.1, 1996.

- EIA/IS-731.2, SECM Appraisal Method, EIA G47 SECM Working Group, Version 1.1, 1996.

- International Council on Systems Engineering (INCOSE), *Systems Engineering Handbook*, Version 2.0, July 2000.

- *Systems Engineering and Analysis*, Third Edition, Blanchard, Benjamin S., and Fabrycky, Wolter J., Prentice Hall, 1998.

2. Appraisal Methodology

The SECM is structured to support a wide variety of assessment and improvement activities including appraisals, process improvements, and process designs. This appraisal model employs a tailoring of the SECM to achieve and support FDOT internal process improvements. The process improvement efforts, using the SECM reference model, are constructed to support the business goals of FDOT.

2.1 Appraisal Method

The appraisal method used in this effort is based on the following assumptions that are relevant to developing the FDOT appraisal:

- The SECM is the reference model for this appraisal method;
- Users are familiar with the content and concepts of the SECM;
- Facilitators intending to use the SECM Appraisal Method (EIA/IS-731.2) are familiar with basic organizational appraisal techniques; and
- The focus and tone of this appraisal method is targeted towards improvement of FDOT specific practices.

This appraisal is designed to meet the systems engineering related objectives of the FDOT ITS Office. The scope of this appraisal is based on the following FDOT goals:

- Conduct a review of systems engineering requirements and the use of systems engineering processes by other agencies (non-FDOT) involved in ITS-related fields;
- Conduct an appraisal of current FDOT policies, procedures, and practices to assess the current use of systems engineering principles; and
- Develop consensus among the stakeholders within FDOT regarding the desired elements of the *SEMP* for the deployment of ITS along Florida's limited-access corridors.

This appraisal concentrates on specific focus areas that have been targeted for process improvements. The tailoring of the set of focus areas and the selection of the FDOT districts included in the appraisal are the two (2) choices that have the most significant impact on the duration of and resources required by this appraisal.

This document will serve as the basis for recommending process improvements to be developed fully in the *SEMP*. The *SEMP* will build on recommendations of an issue paper prepared by PBS&J, *Proposed Systems Engineering Approach for ITS Deployments Along Florida's Limited-Access Corridors*, which outlined the concepts to be explored in greater detail in the *SEMP*.

2.2 Model Structure and Components

The SECM spans the breadth of systems engineering by defining three (3) categories in the model, each defined by focus areas, and each focus area in turn defined by a set of unique specific practices. Systems engineering and provides depth to the architecture and is grouped into levels of maturity.

The components of the model are defined as follows:

- **Categories –** A category is a natural grouping of focus areas. The three (3) categories are Technical, Management, and Environmental.

- **Focus Areas –** A focus area is a set of related, unique practices that address some aspect of systems engineering. There are nineteen (19) focus areas assigned to three (3) categories.

- **Themes –** A theme is a subdivision of a focus area that defines a related set of specific practices. Themes put lists of practices into a logical context.

- **Specific Practices –** A specific practice is an activity that is essential to accomplishing the purpose of a focus area or that helps accomplish the purpose of the focus area more effectively or efficiently. Specific practices are associated with particular levels of capability within each focus area.

2.3 Capability Levels

2.3.1 Specific Practices

There are six (6) levels of capability for specific practices. These capability levels are shown in Table 1. Each level of capability has practices and attributes associated with process and non-process characteristics. The lowest level is Level 0 and the highest is Level 5. Characteristics of Level 5 represent the highest, or optimal, level of performance.

Process attributes address how the practices of each focus area are performed. Non-process attributes are indicative of the judgment used in executing the focus area practices, the effectiveness of the work, and the value of the work and work products.

Capability levels are defined based on the observed performance that FDOT has achieved. These capability levels can be used as goals, guidance, benchmarks, or as another means to assist FDOT in structuring their improvement efforts.

Table 1 – Capability Levels

Capability		Process Attributes	Results
0	Initial	• Practices are not performed. • There are general failures to perform activities. • Work products are not easily identifiable. • No proof tasks are accomplished.	• Activities and work products have little effectiveness or value. • There are no assurances of success. • Information is difficult to identify. • Driving forces for activities are indeterminate. • There are no assurances of complexity management. • There is no focus on the principles of systems engineering.
1	Performed	• Specific practices are performed. • Activities are done informally. • There are non-rigorous plans and tracking. • There is a dependency on "heroes." • Work products are in evidence. • There is a general recognition of need for activity.	• Activities are marginally effective and work products are of marginal utility. • Information is ad hoc. • Activities are driven only by immediate contractual or customer requirements. • The focus on systems engineering is limited.
2	Managed	• Specific practices are performed. • Policies define the need for activities. • Processes are program specific. • Activities are planned, tracked, measured, and verified. • Corrective actions are taken to assure the program specific processes are followed. • Work products are reviewed for adequacy. • Defects are removed from work products. • Work products are controlled.	• Activities are adequately effective and work products are of adequate utility. • Key information is managed. • Customer and stakeholder needs drive activities in a suitable manner. • The systems engineering focus is on requirements through design.
3	Defined	• Specific practices are performed. • Processes are well defined. • The organization has standard systems engineering processes. • Tailoring guidelines exist for the standard systems engineering processes. • The standard systems engineering processes are tailored and used by each program. • Tailoring is reviewed and approved. • Customer feedback is obtained. • Data is collected on the performance of the tailored processes. • Qualitative process improvements are performed on both standard and tailored processes.	• Activities are significantly effective and work products are of significant utility. • There are consistent program successes. • Information is managed and integrated. • Activities are driven by benefits to the program. • The focus is on systems engineering requirements through operation.

Table 1 (Continued)

Capability		Process Attributes	Results
4	Measured	• Specific practices are performed. • Metrics are derived from data on the tailored processes. The tailored processes are quantitatively understood. • Performance of the tailored processes can be predicted. • Tailored process-induced defects are identified. • Measurable quality goals are established for systems engineering work products. • Causal analyses are performed for the tailored processes. • Tailored processes are quantitatively improved. • Standard processes continue to be qualitatively improved.	• Activities are measurably effective and work products are of measurably significant utility. • All information is fully integrated. • Activities are driven by systems engineering benefits. • The focus is on all phases of product life cycles for systems engineering processes.
5	Optimized	• Specific practices are performed. • Process effectiveness goals are established for the program based on business objectives. • Causal analyses are performed for the standard processes. • Standard processes are quantitatively improved. • Improvements to the standard processes are flowed down into each tailored process.	• Activities are effectively balanced and work products effectively provide their intended utility. • Activities are driven by systems engineering and organizational benefits. • Complexity management is fully scaleable. • The focus in the systems engineering processes is on product life cycle and strategic applications.

2.4 Ratings Development

A primary result of the appraisal process is a rating profile covering the appraised focus areas. The rating profile correlates with the appraisal findings, and the two are developed in a closely coupled process. The rating profile is developed and refined at specific points in the appraisal process. Ratings are the judgment of the appraisal team and are based on the degree to which FDOT performs all of the requirements at a given level.

2.4.1 Ratings Process

The ratings process involves synthesizing the data gathered from the FDOT district questionnaire, interviews, and artifact reviews into a rating profile. This is accomplished by:

- Reviewing the data and preliminary findings;
- Allocating those findings to focus area practices and formulating the ratings; and
- Review the proposed ratings and establishing a consensus on the focus area rating profile for each category.

2.4.2 Ratings Steps

The following steps were used to develop the ratings and to score each focus area in each category.

- **Review the rating procedure.**
  Walk through the scoring rules and answer any questions.

- **Review the questionnaire data.**
  Review the questionnaire results for each focus area.

- **Review the interview data.**
  Review the data collected during the interview process for each focus area.

- **Review the process artifacts and work products.**
  The appraisal team will review the data collected during the review of the organization's process artifacts and work products.

- **Review the SECM (EIA/IS-731.1, Section 5).**
  Review the SECM (EIA/IS-731.1, Section 5) for typical work products and practices that are found in the categories.

- **Discuss the issues.**
  Walk through each focus area and have a facilitator moderate each activity to give every team member an opportunity to be heard. Based on the data collected, the team must develop a consensus on whether each specific practice has been achieved, as well as the utility of the process being applied to the applicable focus area.

- **Establish the ratings.**
  Assess the capability level of the FDOT responses based on the SECM. Using the results of the review of the SECM and any discussed issues, the appraisal team completes the scoring charts based on the scoring rules described in the next section. As the final findings are being determined, the ratings are reviewed against the findings and strengths to ensure there is continuity between these two (2) parts of the report.

- **Document the ratings.**
  At the theme level, document the FDOT district responses to the Systems Engineering Appraisal Questionnaire by documenting the assessed capability level in a column next to each district's response. These results are contained in Appendix A, *District Responses to the Systems Engineering Appraisal Questionnaire – Analysis Results*, later in this document.

- **Average the ratings.**
  At the theme level, average the numerical equivalent scores for each capability level assessed on each district's response. The average is rounded off since there are no provisions for decimal capability levels (i.e., 1.5 becomes 2.0; 1.4 becomes 1.0; etc.).

- **Score each focus area.**
  At the focus area level, average the numerical equivalent scores for each theme level assessed on each district's response. The average is rounded off since there are no provisions for decimal capability levels (i.e., 1.5 becomes 2.0; 1.4 becomes 1.0; etc.).

- **Evaluate the focus areas and complete the scoring templates.**
  Evaluate the individual focus area ratings to assess placement on the scoring template for each category (i.e., Technical, Management, and Environmental). See Section 3, *Focus Area Ratings*, in this document.

3. Focus Area Ratings

The number of boxes completed (shaded) on the scoring template determines the focus area rating. This rating is obtained by obtaining the average of the individual focus area ratings, which in turn determines the placement on the scoring template for each category.

- If scoring on whole points, the rating is the highest level that has all the boxes filled and all the lower level boxes filled. If there is an unfilled box at a lower level, the appraisal team may award the score for the highest level with all boxes filled if at least half of the practices associated with the unfilled box have been achieved.

- If scoring on the three-quarters point scale, the rating is the average result of the individual focus area ratings of at least three-quarters of the specific practices in the focus area.

- If scoring on the half-point scale, the rating is the average result of the individual focus area ratings of at least half of the specific practices in the focus area.

- If scoring on the quarter-point scale, the rating is the average result of the individual focus area ratings of at least a quarter of the specific practices in the focus area.

The following tables exhibit the scoring templates for all three (3) categories.

3.1 Technical Category Focus Area

Table 2 is a graphic representation of the FDOT district responses for the SECM Technical Category's focus areas. The shaded components of Table 2 represent the capability level assessed for the focus areas in the Technical Category of the model.

Table 2 – Technical Category Focus Area Fating

Technical Category	Level 1 – Specific practices are performed.	Results are at least of marginal utility.	Level 2 – Specific practices are performed.	Level 2 – Generic practices are performed.	Results are at least of adequate utility.	Level 3 – Specific practices are performed.	Level 3 – Generic practices are performed.	Results are at least of significant utility.	Level 4 – Specific practices are performed.	Level 4 – Generic practices are performed.	Results are at least of a measurably significant utility.	Level 5 – Specific practices are performed.	Level 5 – Generic practices are performed.	Results are of optimum utility.
1.1 Define Stakeholder and System Level Requirements	■	■	■	■										
1.2 Define Technical Problems	■	■	■											
1.3 Define Solutions	■	■												
1.4 Assess and Select	■	■												
1.5 Integrate the System	■													
1.6 Verify the System	■	■												
1.7 Validate the System	■	■												
	Level 1		**Level 2**			**Level 3**			**Level 4**			**Level 5**		

3.2 Management Category Focus Area

Table 3 is a graphic representation of the FDOT district responses for the SECM Management Category's focus areas. The shaded components of Table 3 represent the capability level assessed for the focus areas in the Management Category of the model.

Table 3 – Management Category Focus Area Rating

Management Category	Level 1 – Specific practices are performed.	Results are at least of marginal utility.	Level 2 – Specific practices are performed.	Level 2 – Generic practices are performed.	Results are at least of adequate utility.	Level 3 – Specific practices are performed.	Level 3 – Generic practices are performed.	Results are at least of significant utility.	Level 4 – Specific practices are performed.	Level 4 – Generic practices are performed.	Results are at least of a measurably significant utility.	Level 5 – Specific practices are performed.	Level 5 – Generic practices are performed.	Results are of optimum utility.
2.1 Plan and Organize	■	■												
2.2 Monitor and Control	■	■												
2.3 Integrate Disciplines	■	■												
2.4 Coordinate with Suppliers	■	■												
2.5 Manage Risk	■													
2.6 Manage Data	■													
2.7 Manage Configurations														
2.8 Ensure Quality														
	Level 1		**Level 2**			**Level 3**			**Level 4**			**Level 5**		

3.3 Environmental Category Focus Area

Table 4 is a graphic representation of the FDOT district responses for the SECM Environmental Category's focus areas. The shaded components of Table 4 represent the capability level assessed for the focus areas in the Environmental Category of the model.

Table 4 – Environmental Category Focus Area Rating

Environmental Category	Level 1 – Specific practices are performed.	Results are at least of marginal utility.	Level 2 – Specific practices are performed.	Level 2 – Generic practices are performed.	Results are at least of adequate utility.	Level 3 – Specific practices are performed.	Level 3 – Generic practices are performed.	Results are at least of significant utility.	Level 4 – Specific practices are performed.	Level 4 – Generic practices are performed.	Results are at least of a measurably significant utility.	Level 5 – Specific practices are performed.	Level 5 – Generic practices are performed.	Results are of optimum utility.
3.1 Define and Improve the Systems Engineering Process														
3.2 Manage Competency	■													
3.3 Manage Technology	■													
3.4 Manage the Systems Engineering Support Environment	■													
	Level 1		**Level 2**			**Level 3**			**Level 4**			**Level 5**		

4. Summary and Recommendation

4.1 Technical Category

Ninety-six percent (96%) of the focus areas in the SECM Technical Category are performed. This indicates that there is a solid foundation of practices in the Technical Category performed at Capability Level 1. The focus areas assessed at one hundred percent (100%) of Capability Level 1 are:

- Define Stakeholder and System Level Requirements;
- Define Technical Problems;
- Define Solutions;
- Assess and Select;
- Verify the System; and
- Validate the System.

The one remaining focus area in the Technical Category, *Integrate the System*, was assessed at three-quarters of Capability Level 1, indicating that there is a need for the development of additional specific practices and that compliance with those practices is required to bring this area up to a Capability Level 1.

In addition, eleven percent (11%) of the focus areas in the Technical Category are performed at some part of Capability Level 2, representing an initial capability beyond Level 1. These Technical Category's focus areas are:

- Define Stakeholder and System Level Requirements;
- Define Technical Problems; and
- Define Solutions.

The observations for the focus areas in the Technical Category and their effects are summarized in Table 5.

Table 5 – Technical Category Focus Area Observations and Effects

Observations	Effects
• Technical specific practices are mostly performed.	• Technical activities are marginally effective and work products are of marginal utility.
• Project activities are performed informally.	• Information is ad hoc.
• Non-rigorous plans and tracking are in evidence.	• Technical activities are driven only by immediate contractual or customer requirements. The systems engineering focus is limited.
• There is a dependence on individuals with historical project knowledge.	
• Work products are in evidence.	
• There is a general recognition of a need for activity.	

4.2 Management Category

Forty-seven percent (47%) of the focus areas in the SECM Management Category are performed. This indicates that the practices in the Management Category are performed at less than half of Capability Level 1. The focus areas that have the foundation for a Capability Level 1 are:

- Plan and Organize;
- Monitor and Control;
- Integrate Disciplines; and
- Coordinate with Suppliers.

Focus areas in the Management Category with little or no capability level are:

- Manage Risk;
- Manage Data;
- Manage Configurations; and
- Ensure Quality.

The observations for the focus areas in the Management Category and their effects are summarized in Table 6.

Table 6 – Management Category Focus Area Observations and Effects

Observations	Effects
• The Management Category's specific processes are not regularly performed.	• Management activities and work products have little effectiveness or value.
• There is a general failure to perform Management Category activities.	• There is no assurance of success.
• There are no easily identifiable work products.	• Information is difficult to identify.
• In most cases, there is no proof that tasks are accomplished.	• The driving force for activities is indeterminate.
	• There is no assurance of successfully completing complex management activities.
	• There is no focus on the principles of systems engineering.

4.3 Environmental Category

Thirty-one percent (31%) of the focus areas in the SECM Environmental Category are performed. This indicates that the practices in the Environmental Category are performed at a little over a quarter of Capability Level 1. The focus areas that have at least a fifty percent (50%) foundation for a Capability Level 1 are:

- Manage Competency; and
- Manage Technology.

The Environmental Category's *Manage the Systems Engineering Support Environment Focus Area* was assessed at one-quarter of Capability Level 1, indicating that there is a significant need for the development of additional specific practices and that compliance with those practices is required to bring this area up to a Capability Level 1.

The Environmental Category's *Define and Improve the Systems Engineering Process Focus Area* was assessed with no capability level of performance.

The observations for the focus areas in the Environmental Category and their effects are summarized in Table 7.

Table 7 – Environmental Category Focus Area Observations and Effects

Observations	Effects
• The Environmental Category's specific practices are not regularly performed.	• The environmental Category's activities and work products have little effectiveness or value.
• There is a general failure to perform Environmental Category activities.	• There is no assurance of success.
• There are no easily identifiable work products.	• Information is difficult to identify.
• In most cases, there is no proof that tasks are accomplished.	• The driving force for activities is indeterminate.
	• There is no assurance of successfully completing complex management activities.
	• There is no focus on the principles of systems engineering.

4.4 Recommendation

Based on . . . . ., it is recommended that a detailed plan to identify the specific practices needed to improve the capability level performances of all three (3) categories be developed. A consensus should be developed on the content, format, processes, and performance criteria to be included in this plan. The plan should be designed with interim, verifiable goals of performance at a specific capability level before advanced to a higher capability level.

5. District Responses to the Systems Engineering Appraisal Questionnaire Results

This appendix contains the responses from each district for the focus areas. The assessed capability level data in the tables was used to provide the information to evaluate and score the focus areas as presented in the previous section.

5.1 Technical Category Focus Areas

5.1.1 Focus Area 1.1 – Define Stakeholder and System Level Requirements

Note: In this section of the document, the notation "N/A" means "not answered," rather than "not applicable."

1.1-1 How does your organization identify and analyze the needs and expectations for the design of a system?

District	District Response	Assessed Capability Level
District 1	In the past, we conducted a feasibility study. Today, we conduct an ITS master plan study that identifies the needs and expectations for a system and also outlines a concept of operations for how the system will be operated and maintained.	**Performed**
District 2	Needs and expectations are identified and analyzed using input from stakeholders, studies, and past project experience.	**Performed**
District 3	Interaction with local stakeholders, in-house and consultant expertise, and feasibility processes are used.	**Managed**
District 4	Interviews are conducted with stakeholders and the input is utilized from the data gathered.	**Performed**
District 5	District 5's main goal is integrated, regional ITS services. The existing systems we will integrate will determine how new ones will be designed and implemented.	**Performed**
District 6	Based on the District's understanding of its system needs, a scope of services is developed.	**Performed**
District 7	System design needs and expectations are identified and analyzed using input from stakeholders and the *National ITS Architecture* (*NITSA*).	**Performed**
Turnpike Enterprise	We determine needs functionally by interviews with designers/developers and the end users of the system (operations and maintenance). See the attached flow chart.	**Managed**
	Average Assessed Capability Level	**Performed**

1.1-2 In your organization, how are concepts developed which satisfy the needs and expectations of a system?

District	District Response	Assessed Capability Level
District 1	The *ITS Master Plan* evaluates system alternatives/concepts using a utility ranking that evaluates how well a concept meets the established goals and objectives	**Defined**
District 2	The ITS Office analyzes and determines a "best practices" solution.	**Performed**
District 3	Concepts are developed using site visits, vendor presentations, and interaction with other industry professionals.	**Performed**
District 4	Discussions with stakeholders help identify needed systems.	**Performed**
District 5	With a regional integrated system in mind, an overall deployment plan was developed for the entire district.	**Managed**
District 6	The ITS staff meets to develop the district needs.	**Performed**
District 7	The *NITSA* and stakeholders determine the user services and market packages that are necessary based on user requirements.	**Managed**
Turnpike Enterprise	It is generally driven by priorities and current needs and issues and tends to be safety and/or customer focused.	**Performed**
	Average Assessed Capability Level	**Managed**

1.1-3 How does your organization select among the various system concepts?

District	District Response	Assessed Capability Level
District 1	System concepts are selected by applying a utility ranking and using engineering judgment.	**Managed**
District 2	System concepts are selected by using comparative analysis to other FDOT districts and other agencies.	**Managed**
District 3	System concepts are selected using engineering judgment, in consideration of feasibility and design constraints.	**Performed**
District 4	Cost feasibility and maximum result achievability are used in selecting the various system concepts.	**Performed**
District 5	Crucial missing links are selected that allow our stand-alone systems to be joined.	**Initial**
District 6	The ITS staff develops a matrix of requirements and each one of the concepts are evaluated against the matrix.	**Managed**
District 7	Standard FDOT project development process and other agencies are used in selecting the various system components. A comprehensive technical review and assessment is done as part of the feasibility study after market packages are selected.	**Managed**
Turnpike Enterprise	It is an iterative process that takes into account how the alternative concepts meet the needs, technical issues, budget, and schedule. See the attached flow chart.	**Managed**
	Average Assessed Capability Level	**Managed**

1.1-4 What is your role in your organization's system concept definition?

District	District Response	Assessed Capability Level
District 1	The project manager is responsible for ITS studies, design, and construction liaison.	**Performed**
District 2	The role includes analyzing current situations, researching relative technology, and determining solutions that fit the needs identified.	**Managed**
District 3	The role includes stakeholder, user, owner, and project manager.	**Performed**
District 4	My role is district project manager.	**Performed**
District 5	Role includes technical, field review, and design responsibilities.	**Performed**
District 6	The district helps develop the concept definition.	**Performed**
District 7	Production, technical support, project management, operations, and planning are included in my role.	**Performed**
Turnpike Enterprise	The ITS design section performs this function with input from management, operations, maintenance, and other non-ITS offices.	**Performed**
	Average Assessed Capability Level	**Performed**

5.1.2 Focus Area 1.2 – Define Technical Problems

1.2-1 How does your organization's project management confirm that the documented requirements accurately address the need(s) the system is intended to satisfy?

District	District Response	Assessed Capability Level
District 1	Project management confirms that the requirements will address the needs by developing plans and functional specifications for a system that will satisfy the needs, goals, and objectives outlined in the *ITS Master Plan*.	**Managed**
District 2	The review of requirements prior to initiation and the assessment of whether identified needs are fulfilled aid in confirming the documentation of accurate requirements.	**Managed**
District 3	In-house teams and consultant expertise provide confirmation that requirements will address needs accurately.	**Performed**
District 4	Iterative review process between stakeholders and FDOT provide confirmation that requirements will address needs accurately.	**Managed**
District 5	Reviewing the operational needs versus the documented requirements provides confirmation that requirements will address needs accurately.	**Performed**
District 6	All documents produced by consultants or internally are independently reviewed by the ITS staff.	**Managed**
District 7	Comparison with feasibility studies, the *NITSA*, and stakeholder needs, and a performance plan and technology review provide confirmation that requirements will address needs accurately.	**Managed**
Turnpike Enterprise	An iterative process is used where all parties involved are given opportunities to review the requirements throughout the development process. See the attached flow chart.	**Managed**
	Average Assessed Capability Level	**Managed**

1.2-2 In the requirements capture process, how are the interests of each technical discipline represented?

District	District Response	Assessed Capability Level
District 1	N / A	**Initial**
District 2	Interests are represented through discussions, e-mail, and other correspondence.	**Initial**
District 3	Opportunities are presented during design, specifically the plans review phase, as well as technical committee meetings.	**Performed**
District 4		**Initial**
District 5	I do not know.	**Initial**
District 6	Each discipline is represented by the staff member that has the knowledge and skill of that discipline	**Performed**
District 7	Each disciplines interests are represented through meetings, e-mails, and distribution of review material between program and project managers, planning, production, utilities, work program and funding groups, ITS and design/plans review committee meetings, and externally with metropolitan planning organizations (MPOs) and other stakeholders.	**Performed**
Turnpike Enterprise	Each discipline – design, software development, operations, and maintenance – are represented in person at requirements progress meetings.	**Performed**
	Average Assessed Capability Level	**Performed**

1.2-3 How are changes to the requirements managed?

District	District Response	Assessed Capability Level
District 1	Changes are documented and a revised schedule for completion is produced.	**Performed**
District 2	Requirements changes are managed with reassessment and cost/benefit analysis.	**Performed**
District 3	Requirements generally do not change.	**Initial**
District 4	Requirements changes are only allowed when significant benefit is apparent.	**Initial**
District 5	Requirements changes are usually managed through the Technical Special Provisions (TSP) document.	**Performed**
District 6	The proposed changes are tracked by the project manager.	**Performed**
District 7	Requirements changes are evaluated by a project manager, reviewed and discussed with design/plans committee(s) for cost and schedule impacts, may involve district production director or secretary, and may require that a change order or new task order be issued.	**Managed**
Turnpike Enterprise	Requirements changes are handled through the configuration control process. See the attached *Configuration Management Plan*.	**Defined**
	Average Assessed Capability Level	**Performed**

1.2-4 What is your role in system requirements management for your organization?

District	District Response	Assessed Capability Level
District 1	The project manager is responsible for ITS studies and design and is a construction liaison.	**Performed**
District 2	My role is to lead determination through guidance and recommendation from Central Office ITS.	**Performed**
District 3	N / A	**Initial**
District 4	I am the district project manager.	**Performed**
District 5	None.	**Initial**
District 6	The ITS staff develops and tracks compliance to the system requirements.	**Managed**
District 7	The ITS program manager has overall approval authority on all projects. Project assignments are based on expertise and are typically divided into traffic design/operations and architecture.	**Managed**
Turnpike Enterprise	The ITS design section develops and documents the requirements based on needs.	**Defined**
	Average Assessed Capability Level	**Performed**

5.1.3 Focus Area 1.3 – Define Solutions

1.3-1 How are system solutions developed in your organization?

District	District Response	Assessed Capability Level
District 1	System solutions are developed and evaluated with an *ITS Master Plan* for an area.	**Performed**
District 2	System solutions are developed with guidance from Central Office ITS.	**Performed**
District 3	System solutions are developed with stakeholder input and engineering judgment.	**Performed**
District 4	System solutions are developed through feasibility studies and master planning efforts.	**Managed**
District 5	System solutions are developed with regional integration being the main goal.	**Performed**
District 6	Depending on the issue at hand, the solution is developed in-house, with consultants, or with both.	**Performed**
District 7	System solutions are designed using architecture development, planning, and feasibility studies (i.e., PD&E).	**Performed**
Turnpike Enterprise	The ITS design section applies the functional requirements to various available solutions. Refinement is based on past experience, the legacy system, technical research, and interviews with solution providers.	**Managed**
	Average Assessed Capability Level	**Performed**

1.3-2 In your organization, how do related engineering groups participate in system design?

District	District Response	Assessed Capability Level
District 1	Related stakeholders are involved in reviews and monthly project management meetings throughout the life of the project.	**Performed**
District 2	Engineering groups participate in system design through discussion, e-mail, and correspondence.	**Performed**
District 3	Periodic steering committee meetings and review processes are conducted.	**Managed**
District 4	Consulting services are retained to perform system design.	**Performed**
District 5	System design is by ITS personnel only.	**Performed**
District 6	The ITS Office works with consultants to develop system designs.	**Performed**
District 7	They participate in design/plans review committee meetings.	**Managed**
Turnpike Enterprise	Engineering groups participate in system design through a formalized review process.	**Managed**
	Average Assessed Capability Level	**Performed**

1.3-3 How does your organization establish that system designs are satisfactory?

District	District Response	Assessed Capability Level
District 1	We conduct an ITS master plan study, which satisfactorily establishes a system design.	**Managed**
District 2	Satisfaction is established through review of system performance and effect.	**Performed**
District 3	Change orders, time, and the budget are tracked through ordinary consultant project management techniques.	**Performed**
District 4	System design satisfaction is established by ensuring that the scope of work is satisfied and system design includes desired functional areas.	**Managed**
District 5	Satisfaction is established through review.	**Performed**
District 6	Satisfaction is established through a review and audit process.	**Performed**
District 7	Performance evaluations establish system design satisfaction.	**Performed**
Turnpike Enterprise	Informal peer reviews are conducted. Preliminary hardware and software testing is performed prior to the procurement phase.	**Performed**
	Average Assessed Capability Level:	**Performed**

5.1.4 Focus Area 1.4 – Assess and Select

1.4-1 What process does your organization use to ensure that the right complement of technical disciplines is identified to solve a technical problem?

District	District Response	Assessed Capability Level
District 1	The project manager is responsible for identifying problems and coordinating the input from various technical disciplines.	**Performed**
District 2	An analysis of the problem is performed to determine whether it is hardware or software related	**Managed**
District 3	This is handled at the discretion of the project manager.	**Performed**
District 4	Ideas and/or concepts are presented and interested or affected parties are contacted.	**Performed**
District 5	The technical problem identifies the technical discipline needed to solve the problem.	**Performed**
District 6	The ITS Office uses in-house expertise or consultants to assess and solve technical problems.	**Managed**
District 7	Technical problems are determined by the project manager, as well as appropriate disciplines for DRC.	**Performed**
Turnpike Enterprise	There is no formalized process. This is a project/program management function.	**Initial**
	Average Assessed Capability Level	**Performed**

1.4-2 How is communication and coordination accomplished among the assembled technical disciplines?

District	District Response	Assessed Capability Level
District 1	The project manager provides oversight of all activities and ensures that communications and coordination is maintained.	**Performed**
District 2	Communications is accomplished through e-mail and telephone and discussions related to the system are assessed and selected.	**Performed**
District 3	Communications is accomplished using available technologies.	**Initial**
District 4	E-mail, telephone, and written correspondence are used in communications.	**Performed**
District 5	Phone, e-mail, and meetings are used in communications.	**Performed**
District 6	Communications is accomplished with weekly staff meetings, consultant meetings, and e-mail with the project manager.	**Performed**
District 7	Monthly DRC meetings are held, where review documents are circulated for comment and special provisions are included.	**Performed**
Turnpike Enterprise	Communications are coordinated through a team environment with an effective team leader.	**Performed**
	Average Assessed Capability Level	**Performed**

1.4-3 How is team leadership established?

District	District Response	Assessed Capability Level
District 1	The project manager takes the lead and coordinates with the leaders from the other technical disciplines.	**Performed**
District 2	Facility or task owner establishes leadership.	**Performed**
District 3	This is primarily the role of the project manager, and any other stakeholders who step up to the plate.	**Performed**
District 4	There is a consensus among members whose agency is funding system implementation.	**Performed**
District 5	Supervisory personnel establish leadership.	**Performed**
District 6	A project manager is assigned to coordinate the work effort.	**Performed**
District 7	The production director assigns the project manager.	**Performed**
Turnpike	This is a project/program management function.	**Performed**
	Average Assessed Capability Level	**Performed**

1.4-4 How does the project arrive at solutions and implement them?

District	District Response	Assessed Capability Level
District 1	Solutions are recommended by evaluating the alternatives utilizing a utility ranking.	**Performed**
District 2	Solutions are reached through the research and analysis of best practices methods.	**Performed**
District 3	There is a stakeholder consensus within constraints	**Performed**
District 4	N / A	**Initial**
District 5	Solutions and their implementation are reviewed with the staff and consultants.	**Performed**
District 6	The project manager evaluates all the solutions and implements the best solution.	**Performed**
District 7	Project architecture and programming are reviewed to determine if user requirements are met. Information is shared with the local government and MPOs.	**Managed**
Turnpike Enterprise	Solutions are reached and implemented through the previously mentioned processes that lead into the standard FDOT processes.	**Managed**
	Average Assessed Capability Level	**Performed**

1.4-5 How are candidate solutions analyzed to select the optimal solution?

District	District Response	Assessed Capability Level
District 1	The alternative solutions are evaluated utilizing a utility ranking.	**Managed**
District 2	Determining factors in solution selection are needs and budget. The most important needs should be filled first with a limited budget.	**Performed**
District 3	Stakeholder consensus and engineering judgment are used to analyze possible solutions.	**Performed**
District 4	Cost benefit and feasibility are used to analyze possible solutions.	**Performed**
District 5	Possible solutions are review with staff and consultants.	**Performed**
District 6	The ITS Office uses a traceability matrix to consider all the requirements developed during the concept operations phase.	**Managed**
District 7	Solutions are analyzed in the same way as system technical problems.	**Performed**
Turnpike Enterprise	A design and cost-benefit analysis is performed between competing alternatives during the concept development and preliminary design.	**Managed**
	Average Assessed Capability Level	**Performed**

5.1.5 Focus Area 1.5 – Integrate the System

1.5-1 In your projects, how is system integration performed?

District	District Response	Assessed Capability Level
District 1	System integration is the responsibility of the contractor.	**Initial**
District 2	The consultant performs system integration and prior documentation is used.	**Initial**
District 3	A third party performs system integration.	**Initial**
District 4	N / A	**Initial**
District 5	System integration will be accomplished through the new gigabyte Ethernet system now being constructed.	**Initial**
District 6	It is performed by the designer of record or the contractor.	**Initial**
District 7	Integration with existing systems is performed via feasibility studies and the use of a systems manager/systems integrator (SM/SI).	**Performed**
Turnpike Enterprise	System integration will be performed in-house through general consultant services.	**Performed**
	Average Assessed Capability Level	**Initial**

1.5-2 How do your projects prove that the integrated system satisfies the documented needs?

District	District Response	Assessed Capability Level
District 1	We conduct a before and after analysis to document the system improvements.	**Performed**
District 2	Projects include burn-in periods to ensure that the consultant has met expectations.	**Performed**
District 3	Approved test procedures are used.	**Managed**
District 4	Thorough testing and acceptance procedures are used.	**Managed**
District 5	Testing / Review is used.	**Performed**
District 6	Review the results and track them back to when the project started.	**Performed**
District 7	The SM/SI is accountable and responsible.	**Performed**
Turnpike Enterprise	Integration is performed on a developmental environment and extensive testing performed against the requirements. The production system is then integrated in phases with testing performed on each phase.	**Managed**
	Average Assessed Capability Level	**Performed**

1.5-3 How do your projects respond to issues identified during integration?

District	District Response	Assessed Capability Level
District 1	Issues are confirmed and presented to the contractor for resolution.	**Performed**
District 2	Issues are addressed during the burn-in period.	**Performed**
District 3	This is a third party problem.	**Initial**
District 4	Final acceptance is not issued until identified problems are mitigated.	**Performed**
District 5	Response depends on the issues.	**Initial**
District 6	Response depends on the issues; however, functionality is not sacrificed.	**Initial**
District 7	Technical problems are resolved by the SM/SI and verification is provided through the *NITSA*.	**Managed**
Turnpike Enterprise	Response is provided through a formal system problem/change request procedure. Generally, integration problems are solved on the developmental system and not the production system. See the attached *Configuration Management Plan*.	**Defined**
	Average Assessed Capability Level:	**Performed**

1.5-4 How are system interfaces defined and managed for your projects?

District	District Response	Assessed Capability Level
District 1	N / A	**Initial**
District 2	Interfaces are defined and managed utilizing the NTCIP, Florida MIB, and Central Office ITS direction.	**Performed**
District 3	System interfaces are defined and managed through third parties.	**Initial**
District 4	N / A	**Initial**
District 5	System interfaces are defined by plans and are managed by a system manager.	**Performed**
District 6	System interfaces are defined and managed by the designers of the system.	**Performed**
District 7	System interfaces are defined but no deployments have occurred yet.	**Performed**
Turnpike Enterprise	System interfaces are defined and managed through the development and management of the system and communications architecture(s). New interfaces are managed through the Change Control Board (CCB).	**Defined**
	Average Assessed Capability Level	**Performed**

5.1.6 Focus Area 1.6 – Verify the System

1.6-1 How is system verification performed?

District	District Response	Assessed Capability Level
District 1	Verification of the system is confirmed through extensive testing of the field and central hardware and software.	**Performed**
District 2	System verification is performed utilizing test methods with various scenarios.	**Performed**
District 3	This systems engineering process is not formally addressed.	**Initial**
District 4	Evaluation and testing is used to verify the system.	**Performed**
District 5	Testing is used to perform system verification.	**Performed**
District 6	System verification is performed by comparing system output with its requirements.	**Performed**
District 7	No formal procedure has been implemented yet.	**Initial**
Turnpike Enterprise	System verification is performed through review of software and hardware specifications documentation and components and subsystem testing of the design requirements.	**Performed**
	Average Assessed Capability Level	**Performed**

1.6-2 How does the project prove that the system satisfies its requirements?

District	District Response	Assessed Capability Level
District 1	Testing proves the system satisfies the functional requirements of the project.	**Performed**
District 2	Various test methods provides proof of requirements satisfaction.	**Performed**
District 3	Requirements satisfaction is accomplished through a comparison with plans and specs.	**Performed**
District 4	Thorough testing and acceptance procedures are used to verify that the system satisfies its requirements.	**Performed**
District 5	Testing is used to prove that the system satisfies its requirements.	**Performed**
District 6	See above.	**Performed**
District 7	This will be developed when verification is performed.	**Initial**
Turnpike Enterprise	Detailed system testing procedures prove that the system satisfies its requirements.	**Managed**
	Average Assessed Capability Level	**Performed**

1.6-3 How does the project respond to issues identified during verification?

District	District Response	Assessed Capability Level
District 1	Issues are confirmed and presented to the contractor for resolution.	**Performed**
District 2	The consultant takes initiate corrective action.	**Performed**
District 3	This is a third party contractual problem.	**Initial**
District 4	Final acceptance is not issued until identified problems are mitigated.	**Performed**
District 5	Resolution depends on the issues.	**Initial**
District 6	Issues are tracked and traceability is assured to the requirement definition.	**Managed**
District 7	I don't know.	**Initial**
Turnpike Enterprise	Issues are addressed through a formal system problem/change request procedure and/or formalized acceptance testing.	**Managed**
	Average Assessed Capability Level	**Performed**

5.1.7 Focus Area 1.7 – Validate the System

1.7-1 How is system validation performed?

District	District Response	Assessed Capability Level
District 1	System validation is performed through an extensive test of the hardware and software.	**Performed**
District 2	The consultant performs testing.	**Initial**
District 3	This systems engineering process has not been formally addressed.	**Initial**
District 4	Thorough testing and acceptance procedures are used for system validation.	**Performed**
District 5	Testing and operation and technical review is used for system validation.	**Performed**
District 6	System validation is performed by assuring that the system matches the users' needs and that the system meets the requirements.	**Managed**
District 7	Don't know	**Initial**
Turnpike Enterprise	Through system testing of functional (high-level) requirements.	**Performed**
	Average Assessed Capability Level	**Performed**

1.7-2 How does the project prove that the system will satisfy the needs of its users?

District	District Response	Assessed Capability Level
District 1	We conduct a before and after analysis to document the system improvements.	**Performed**
District 2	This Issue is still under development; full integration is necessary to provide a valid answer.	**Initial**
District 3	Not applicable.	**Initial**
District 4	User needs should be identified in scoping process, not after system completion.	**Initial**
District 5	Testing and operation and technical review is used to verify that the system will meet user needs.	**Performed**
District 6	The traceability matrix will be used to verify that the system satisfy the needs of its users.	**Managed**
District 7	I don't know.	**Initial**
Turnpike Enterprise	User review and the use of a burn-in period will be used to verify that the system will meet the needs of the users. The end users are witnesses in the system testing.	**Performed**
	Average Assessed Capability Level	**Performed**

5.2 Management Category Focus Areas

5.2.1 Focus Area 2.1 – Plan and Organize

2.1-1 Describe how planning is done for projects in your organization.

District	District Response	Assessed Capability Level
District 1	An ITS master plan study is conducted for all projects.	**Managed**
District 2	Analysis of needs is performed and a long-range scope is developed.	**Performed**
District 3	Planning is accomplished utilizing the architectures, the master plan, and stakeholder interaction.	**Performed**
District 4	Planning is managed in coordination with counties, cities, and internal planning.	**Performed**
District 5	Planning is done by supervisory personnel.	**Performed**
District 6	The regional partners, district management, and ITS staff handle planning.	**Performed**
District 7	External planning is handled by the MPOs through the Long-Range Transportation Plan (LRTP), the Transportation Improvement Plan (TIP), and the Unified Planning Work Program (UPWP), and by utilizing the measures in Rule 940. Internal planning is handled by a single person who coordinates, develops, and manages ITS plans, works with ITS committees, and develops training programs.	**Managed**
Turnpike Enterprise	Currently, system architectures and the work program cycle process are utilized. The *ITS Business Plan* is under development.	**Managed**
	Average Assessed Capability Level	**Performed**

2.1-2 How are estimates derived for engineering tasks for your projects?

District	District Response	Assessed Capability Level
District 1	Estimates are derived using historic pricing data.	**Performed**
District 2	Estimates utilize previous cost expenditures and information provided by the FHWA.	**Performed**
District 3	Engineering judgment and historical data are used for estimates.	**Performed**
District 4	Estimates use data from other areas.	**Performed**
District 5	Industry standards are used for estimates.	**Performed**
District 6	Estimates are derived from previous projects (in or out of state) or from consultants.	**Performed**
District 7	The Production Office prepares estimates through the long-range estimation technique and project budgets are developed for the work program. More accurate engineering estimates are prepared during the design phase.	**Managed**
Turnpike Enterprise	Engineers utilize unit costs based on national averages, recent similar projects, engineering judgment, and market conditions.	**Performed**
	Average Assessed Capability Level	**Performed**

2.1-3 How are changes in requirements reflected in the project plan?

District	District Response	Assessed Capability Level
District 1	A change in requirements will result in revisions to the appropriate documents.	**Performed**
District 2	Requirements changes are reflected through the use of an open contract and design/build projects.	**Performed**
District 3	There are generally no changes.	**Initial**
District 4	N / A	**Initial**
District 5	Changes are reflected through either a request for proposal (RFP) or TSP.	**Performed**
District 6	N / A	**Initial**
District 7	There is a mandatory review process consistent with Florida Statutes and the changes may have to go before boards, the legislature, or the governor's office.	**Performed**
Turnpike Enterprise	Project planning does not get down to the requirements level.	**Initial**
	Average Assessed Capability Level	**Performed**

2.1-4 How are systems engineering methodologies used in your planning process?

District	District Response	Assessed Capability Level
District 1	N / A	**Initial**
District 2	An analysis of needs is performed, including what products would best fill those needs, what companies manufacture them, the cost to purchase/install, and the life expectancy.	**Performed**
District 3	Methodologies are used in stakeholder coordination.	**Initial**
District 4	N / A	**Initial**
District 5	See 3.1-1. No official systems engineering is used at this time.	**Initial**
District 6	N / A	**Initial**
District 7	Architecture is developed in planning with some assistance from traffic operations and production. Techniques are pulled from the *NITSA* systems engineering process.	**Performed**
Turnpike Enterprise	Systems engineering methodologies are used in the planning process by verifying that projects conform to the system architecture and through the iterative work program development process.	**Performed**
	Average Assessed Capability Level	**Initial**

5.2.2 Focus Area 2.2 – Monitor and Control

2.2-1 For your projects, what technical, cost, and schedule parameters are tracked?

District	District Response	Assessed Capability Level
District 1	All technical tasks outlined in the Scope of Services are tracked. All project costs and all scheduled tasks are reviewed monthly.	**Performed**
District 2	All software integration/programming is documented and an operation and maintenance cost record is kept.	**Performed**
District 3	Parameters are tracked through ordinary design project management (DPM) and construction project management (CPM) techniques.	**Performed**
District 4	N / A	**Initial**
District 5	Cost is not tracked in design build. Technical parameters are tracked by plan reviews, cut sheets, and testing. The schedule is tracked by actual construction.	**Performed**
District 6	N / A	**Initial**
District 7	Coordinated tracking mechanisms are used where the work program tracks by project and facility, and production tracks schedules and costs by implementation phase.	**Performed**
Turnpike Enterprise	The parameters outlined in the design criteria, RFP, scope, plans, TSP, specifications, national and state standards, and/or standard FDOT procedures such as pay item number, quantity, unit cost, percent complete, and milestones are used.	**Performed**
	Average Assessed Capability Level	**Performed**

2.2-2 For your projects, how are effort, cost, and schedule tracked?

District	District Response	Assessed Capability Level
District 1	Monthly submittals are reviewed for effort and schedule and costs are approved and tracked with the FDOT Consultant Invoice System.	**Performed**
District 2	Effort, cost, and schedule are tracked through personal experience and correspondence.	**Initial**
District 3	Effort, cost, and schedule are tracked through ordinary project management techniques.	**Performed**
District 4	N / A	**Initial**
District 5	See above. Cost is not tracked in design build. Technical issues are tracked by plan reviews, cut sheets, and testing. The schedule is tracked by actual construction.	**Performed**
District 6	Monthly progress reports that detail the efforts completed and match the efforts to the invoices submitted for the month.	**Performed**
District 7	Each individual phase cost is derived as a standard percentage of the total deployment cost.	**Performed**
Turnpike Enterprise	We utilize standard FDOT procedures, such as periodic progress meetings, periodic status reports, testing, and inspection.	**Performed**
	Average Assessed Capability Level	**Performed**

2.2-3 For your projects, how are tracking issues identified and appropriate actions initiated?

District	District Response	Assessed Capability Level
District 1	The project manager reviews the items being tracked and identifies issues to be resolved by the consultant.	**Performed**
District 2	Once an issue is discovered, a work order is generated for the maintenance contractor to address.	**Performed**
District 3	Issues are identified and actions initiated through ordinary project management techniques.	**Performed**
District 4	N / A	**Initial**
District 5	See 3 1-1. No official systems engineering is used at this time.	**Initial**
District 6	Discrepancies between the Scope of Services and scheduled tasks are identified and brought to the attention of the project manager. Through discussions between the project manager and other staff, corrective measures are identified and implemented.	**Performed**
District 7	Production management keeps a synchronized periodic review of the work program and production.	**Performed**
Turnpike Enterprise	Issues are identified and actions initiated through standard FDOT procedures, such as periodic progress meetings, periodic status reports, testing, and inspection.	**Performed**
	Average Assessed Capability Level	**Performed**

2.2-4 For your projects, how is process compliance verified?

District	District Response	Assessed Capability Level
District 1	N / A	**Initial**
District 2	Process compliance is verified through comparison to the stated requirements.	**Performed**
District 3	This systems engineering process is not utilized.	**Initial**
District 4	N / A	**Initial**
District 5	N / A	**Initial**
District 6	Process compliance is verified by comparing the monthly progress reports, deliverables, and schedule to the Scope of Services that defines the contract requirements.	**Performed**
District 7	This is the same as the previous question. Production management keeps a synchronized periodic review of the work program and production.	**Performed**
Turnpike Enterprise	It is not currently verified except by project results.	**Initial**
	Average Assessed Capability Level	**Initial**

5.2.3 Focus Area 2.3 – Integrate Disciplines

2.3-1 What role does systems engineering play in establishing inter-group relations for your projects?

District	District Response	Assessed Capability Level
District 1	N / A	**Initial**
District 2	A determination of needs and expectations must be made prior to project initiation.	**Performed**
District 3	Periodic technical meetings are held and the plans review process is used.	**Performed**
District 4	N / A	**Initial**
District 5	See 3 1-1. No official systems engineering is used at this time.	**Initial**
District 6	At this time, our process for establishing inter-group relations is not called systems engineering; however, we establish relations through e-mails, staff meetings, and participation in the review of plans and documents.	**Performed**
District 7	There is a formal and informal coordination between disciplines to discuss integration and interface issues and interoperability with current systems	**Performed**
Turnpike Enterprise	The iterative process lends itself to multiple levels of stakeholder meetings that help build consensus.	**Performed**
	Average Assessed Capability Level	**Performed**

2.3-2 How are people made aware of issues that different disciplines face on the program for your projects?

District	District Response	Assessed Capability Level
District 1	Monthly project management meetings are held with all stakeholders to discuss issues.	**Performed**
District 2	Group sessions are held.	**Performed**
District 3	Issues are discussed at periodic technical meetings and the plans review process is used.	**Performed**
District 4	N / A	**Initial**
District 5	Phone, e-mail, meetings, etc., are used to make people aware of the issues.	**Initial**
District 6	At the staff meetings, problems are discussed so staff can learn and avoid similar problems.	**Performed**
District 7	There is a sharing of information at formal and informal meetings.	**Performed**
Turnpike Enterprise	Individual issue meetings, dissemination of meeting minutes, electronically submitted comments on plans and TSPs, and a Monthly Progress Report are used to make people aware of the issues.	**Performed**
	Average Assessed Capability Level	**Performed**

2.3-3 For your projects, how are interdisciplinary issues addressed?

District	District Response	Assessed Capability Level
District 1	N / A	**Initial**
District 2	Group sessions are held.	**Initial**
District 3	Interdisciplinary issues are addressed at periodic technical meetings and through the plans review process.	**Performed**
District 4	N / A	**Initial**
District 5	Phone, e-mail, meetings, etc., are used to address interdisciplinary issues.	**Initial**
District 6	After reaching consensus, the appropriate actions are initiated and tacked by the project manager.	**Performed**
District 7	There is a sharing of information at formal and informal meetings	**Performed**
Turnpike Enterprise	Interdisciplinary issues are addressed through analysis of the issues, meetings, and ultimately a decision by the project manager.	**Performed**
	Average Assessed Capability Level:	**Performed**

2.3-4 For your projects, how is communication and coordination accomplished among the assembled technical disciplines?

District	District Response	Assessed Capability Level
District 1	The project manager is responsible for all coordination and communications on the project.	**Performed**
District 2	Communications and coordination is accomplished through the use of e-mails and correspondence.	**Performed**
District 3	Communications and coordination is accomplished through periodic technical meetings and the plans review process, along with all available media.	**Performed**
District 4	N / A	**Initial**
District 5	Phone, e-mail, meetings, etc., is used to accomplish communications and coordination among the technical disciplines.	**Performed**
District 6	See 2.3-1. At this time, our process for establishing inter-group relations is not called systems engineering; however, we establish relations through e-mails, staff meetings, and participation in the review of plans and documents.	**Performed**
District 7	Technical review comments are discussed at committee meetings. Plans for review are e-mailed or reports are distributed for review prior to meetings. Interaction with MPO technical review committees is maintained.	**Performed**
Turnpike Enterprise	Periodic meetings, dissemination of meeting minutes, electronically submitted comments on plans and TSPs, and a Monthly Progress Report are used for communications and coordination.	**Performed**
	Average Assessed Capability Level	**Performed**

5.2.4 Focus Area 2.4 – Coordinate with Suppliers

2.4-1 For your projects, how is the selection of technically qualified suppliers assured?

District	District Response	Assessed Capability Level
District 1	It is the contractor's responsibility to ensure the suppliers they chose are technically qualified. Also, all signal equipment used in the state must be certified by the State Traffic Operations Engineer.	**Performed**
District 2	The ITS Lab-recommended vendor list is used.	**Performed**
District 3	Approved Product List (APL), Qualified Product List (QPL), site visits, interviews, in-house and consultant expertise, and stakeholder input is used to assure vendor qualifications.	**Performed**
District 4	Technical specifications are developed.	**Performed**
District 5	Suppliers must qualify as to their expertise.	**Performed**
District 6	The district's consultant/contractor acquisition process is used to assure the selection of technically qualified suppliers.	**Performed**
District 7	Selection is assured through an invitation to bid. Vendor products are reviewed with respect to developing project technical specs, which contain project requirements and vendor capabilities.	**Performed**
Turnpike Enterprise	Selection of technically qualified suppliers is assured by utilizing the FDOT's APL, QPL, pre-qualification, and standard FDOT procurement procedures.	**Performed**
	Average Assessed Capability Level	**Performed**

2.4-2 How are technical efforts coordinated with suppliers?

District	District Response	Assessed Capability Level
District 1	It is the contractor's responsibility.	**Initial**
District 2	Technical efforts are coordinated through the contractor.	**Initial**
District 3	This is a third party responsibility.	**Initial**
District 4	N / A	**Initial**
District 5	What technical efforts? More specific…	**Initial**
District 6	Technical efforts are coordinated through face-to-face meetings, correspondence, and telephone conversations (including teleconferences)	**Performed**
District 7	The coordination of technical efforts is reviewed through the SM/SI process.	**Performed**
Turnpike Enterprise	Technical efforts are coordinated through product demonstrations, on-site evaluations, and technical meetings/discussions.	**Performed**
	Average Assessed Capability Level	**Initial**

2.4-3 For your projects, how are commitments and changes with suppliers obtained and recorded?

District	District Response	Assessed Capability Level
District 1	Change management is the contractor's responsibility.	**Initial**
District 2	Change management is handled through invoices and contractor-submitted documents	**Performed**
District 3	Ordinary contractual methods are used.	**Initial**
District 4	Bids and supplements are used.	**Performed**
District 5	Commitments and changes are documented and placed in the project folder.	**Performed**
District 6	Change management is handled via supplemental agreements or changes in the allocation of budget due to task changes. These changes could be required by the FDOT or the consultant/contractor.	**Performed**
District 7	Contractual forms, contract change orders, and purchase orders are used.	**Performed**
Turnpike Enterprise	Change management is handled through upfront discussions and a formalized acceptance process.	**Performed**
	Average Assessed Capability Level	**Performed**

5.2.5 Focus Area 2.5 - Manage Risk

2.5-1 For your projects, describe how risks are identified and addressed.

District	District Response	Assessed Capability Level
District 1	We do not formally identify risks. If problems occur, the stakeholders meet to evaluate and determine a solution.	**Initial**
District 2	A back-up plan to offset obstacles is developed.	**Performed**
District 3	Industry standards are used to identify and address risks.	**Initial**
District 4	N / A	**Initial**
District 5	See 3.1-1. No official systems engineering is used at this time.	**Initial**
District 6	There is no risk management program in place.	**Initial**
District 7	Risks are assessed in three (3) areas: • Cost – This risk involves the use of contingency funds for supplements and other change orders. These risks are formally addressed due to FDOT caution. • Technology – The pros and cons are reviewed to minimize risk for ITS devices. Those with a proven track record should usually be selected. • Implementation – This area usually addresses operational and functional risks such as redundancy in fiber optic communications networks.	**Performed**
Turnpike Enterprise	Risks are identified and addressed through analysis of the risk, proactive meeting(s) with all involved parties, and documentation of the outcome.	**Performed**
	Average Assessed Capability Level	**Initial**

2.5-2 How are risks communicated and actions coordinated?

District	District Response	Assessed Capability Level
District 1	N / A	**Initial**
District 2	Risks are communicated and actions coordinated through the project manager and the contractor.	**Performed**
District 3	The risks and actions have not been formally addressed.	**Initial**
District 4	N / A	**Initial**
District 5	See 3.1-1. No official systems engineering is used at this time.	**Initial**
District 6	Risks are communicated and actions coordinated through date management.	**Initial**
District 7	This process is Identified in the contract and communicated through change order(s).	**Performed**
Turnpike Enterprise	Risks are communicated and actions coordinated through meetings and the dissemination of meeting minutes.	**Initial**
	Average Assessed Capability Level	**Initial**

2.5-3 For your projects, what types of risk are managed?

District	District Response	Assessed Capability Level
District 1	N / A	**Initial**
District 2	Equipment selection, integration, and project coordination are managed.	**Performed**
District 3	Time, budget, and constraints are managed, but not actively and formally.	**Performed**
District 4	N / A	**Initial**
District 5	See 3.1-1. No official systems engineering is used at this time.	**Initial**
District 6	N / A	**Initial**
District 7	Risks are assessed in three (3) areas: • Cost – This risk involves the use of contingency funds for supplements and other change orders. These risks are formally addressed due to FDOT caution. • Technology – The pros and cons are reviewed to minimize risk for ITS devices. Those with a proven track record should usually be selected. • Implementation – This area usually addresses operational and functional risks such as redundancy in fiber optic communications networks.	**Performed**
Turnpike Enterprise	Financial, technical, personnel, safety, and schedule issues are addressed.	**Performed**
	Average Assessed Capability Level	**Performed**

5.2.6 Focus Area 2.6 – Manage Data

2.6-1 How is data management accomplished for your projects?

District	District Response	Assessed Capability Level
District 1	During design, the consultant uses the procedures identified in the FDOT CADD Manual to manage data. Once a system is built, the local maintaining agencies have their own process for managing data.	**Performed**
District 2	Data management is accomplished using an Oracle database system and back-up procedures.	**Performed**
District 3	This systems engineering process is not formally addressed.	**Initial**
District 4	N / A	**Initial**
District 5	See 3.1-1. No official systems engineering is used at this time.	**Initial**
District 6	Data management is accomplished by using Microsoft Access.	**Initial**
District 7	The Transportation Statistics (TranStat) Office collects real-time traffic data from permanent and portable measuring sites and telemetered sites. Crash data is collected and compiled at the FDOT Central Office. Few district field devices and little local data is available yet.	**Performed**
Turnpike Enterprise	Data management is handled through the Turnpike Enterprise's OIS procedures and the utilization of in-house general consultant personnel to customize databases, store, and back-up data on the network, CD-ROMs, and tapes.	**Performed**
	Averaged Assessed Capability Level	**Performed**

2.6-2 What types of things are placed under data management for your projects?

District	District Response	Assessed Capability Level
District 1	N / A	**Initial**
District 2	Data management includes all detection outputs, changeable message sign (CMS) information, and inventory information.	**Performed**
District 3	Not applicable.	**Initial**
District 4	N / A	**Initial**
District 5	See 3.1-1. No official systems engineering is used at this time.	**Initial**
District 6	All services performed by the Road Rangers are tracked.	**Performed**
District 7	N / A	**Initial**
Turnpike Enterprise	Equipment inventory, schedule, photos, supplies, configurations, plans, reports, and other documents are categorized under data management.	**Performed**
	Average Assessed Capability Level	**Initial**

2.6-3 How is compliance with the data management process verified?

District	District Response	Assessed Capability Level
District 1	N / A	**Initial**
District 2	Data management process compliance is verified through review of the information technology (IT) system.	**Initial**
District 3	Not applicable.	**Initial**
District 4	N / A	**Initial**
District 5	See 3.1-1. No official systems engineering is used at this time.	**Initial**
District 6	Data management process compliance is verified by producing reports and comparing them against historical data.	**Performed**
District 7	N / A	**Initial**
Turnpike Enterprise	Data management process compliance is verified through the Turnpike Enterprise's OIS procedures and the configuration management process.	**Performed**
	Average Assessed Capability Level	**Initial**

5.2.7 Focus Area 2.7 – Manage Configurations

2.7-1 For your projects, how are technical products identified for baselining?

District	District Response	Assessed Capability Level
District 1	N / A	**Initial**
District 2	Technical products are identified for baselining through recommendations from consultant(s) and the Central Office ITS.	**Initial**
District 3	A third party vendor is responsible.	**Initial**
District 4	N / A	**Initial**
District 5	See 3.1-1. No official systems engineering is used at this time.	**Initial**
District 6	All the elements required for the baseline of the product are identified. This could include, but not be limited to, the hardware, software, and test procedures, and tracking, documentation, and standards.	**Performed**
District 7	Feasibility studies start with inventory of the legacy system. Their functions and locations are generally determined.	**Performed**
Turnpike Enterprise	The initial products in a given subsystem are baselined upon final acceptance of the project.	**Performed**
	Average Assessed Capability Level	**Initial**

2.7-2 For your projects, how are baselined items controlled?

District	District Response	Assessed Capability Level
District 1	N / A	**Initial**
District 2	Baselined items are controlled through communications with Central Office ITS.	**Performed**
District 3	A third party vendor is responsible.	**Initial**
District 4	N / A	**Initial**
District 5	See 3.1-1. No official systems engineering is used at this time.	**Initial**
District 6	Changes to the baseline are described to those that are essential and affordable.	**Initial**
District 7	Update with a state-of-the-art configuration process. This information is collected and identified at a general level; there is no information at a specific level of detail.	**Performed**
Turnpike Enterprise	Baselined items are controlled through the Turnpike's Configuration Management Plan. See attached Configuration Management Plan.	**Managed**
	Average Assessed Capability Level	**Initial**

2.7-3 How is configuration management accomplished for your projects?

District	District Response	Assessed Capability Level
District 1	N / A	**Initial**
District 2	Configuration management is accomplished through the systems engineer.	**Performed**
District 3	A third party vendor is responsible.	**Initial**
District 4	N / A	**Initial**
District 5	See 3.1-1. No official systems engineering is used at this time.	**Initial**
District 6	N / A	**Initial**
District 7	N / A	**Initial**
Turnpike Enterprise	See the attached *Configuration Management Plan*.	**Managed**
	Average Assessed Capability Level	**Initial**

2.7-4 For your projects, what types of things are placed under configuration management?

District	District Response	Assessed Capability Level
District 1	N / A	**Initial**
District 2	Configuration management includes CMS, detectors, and video software programming.	**Performed**
District 3	A third party vendor is responsible.	**Initial**
District 4	N / A	**Initial**
District 5	See 3.1-1. No official systems engineering is used at this time.	**Initial**
District 6	Hardware, software, processes, tests are placed under configuration management.	**Performed**
District 7	N / A	**Initial**
Turnpike Enterprise	Documents, software, and hardware, including traffic management center (TMC)) equipment and field equipment, are placed under configuration management.	**Performed**
	Average Assessed Capability Level	**Initial**

2.7-5 How is compliance with the configuration management process verified?

District	District Response	Assessed Capability Level
District 1	N / A	**Initial**
District 2	The system engineer verifies compliance.	**Performed**
District 3	Compliance is not verified.	**Initial**
District 4	N / A	**Initial**
District 5	See 3.1-1. No official systems engineering is used at this time.	**Initial**
District 6	Configuration management process compliance is verified with the traceability matrix that includes requirements, specifications, implementations, and acceptance tests.	**Performed**
District 7	N / A	**Initial**
Turnpike Enterprise	Configuration management process compliance is verified through the configuration control quality assurance manager.	**Performed**
	Average Assessed Capability Level	**Initial**

5.2.8 Focus Area 2.8 – Ensure Quality

2.8-1 For your projects, what is quality management applied to?

District	District Response	Assessed Capability Level
District 1	Quality management is applied to the entire project. It is outlined in a quality control plan.	**Performed**
District 2	Quality management is applied to all steps in the process, from concept to operations.	**Performed**
District 3	Quality management is applied to contractual (enforceable) items.	**Initial**
District 4	N / A	**Initial**
District 5	See 3.1-1. No official systems engineering is used at this time.	**Initial**
District 6	Quality management is applied to all phases of the project.	**Performed**
District 7	N / A	**Initial**
Turnpike Enterprise	We currently do not utilize a formal quality management program.	**Initial**
	Average Assessed Capability Level	**Initial**

2.8-2 How are systems engineering products quality measured?

District	District Response	Assessed Capability Level
District 1	N / A	**Initial**
District 2	Products quality is measured through burn-in testing and manufacturer documented testing.	**Performed**
District 3	Not applicable.	**Initial**
District 4	N / A	**Initial**
District 5	See 3.1-1. No official systems engineering is used at this time.	**Initial**
District 6	The quality of systems engineering products are measured by following established validation, verification, and quality assurance requirements developed at the beginning of the project.	**Performed**
District 7	N / A	**Initial**
Turnpike Enterprise	Product quality is measured informally through peer review and the FDOT Turnpike Enterprise's review process.	**Performed**
	Average Assessed Capability Level	**Initial**

2.8-3 How is systems engineering process quality measured?

District	District Response	Assessed Capability Level
District 1	N / A	**Initial**
District 2	We are still working on this issue.	**Initial**
District 3	Not applicable.	**Initial**
District 4	N / A	**Initial**
District 5	See 3.1-1. No official systems engineering is used at this time.	**Initial**
District 6	The systems engineering process quality is measured by testing at the unit, subsystem, and integrations phases.	**Initial**
District 7	N / A	**Initial**
Turnpike Enterprise	We currently do not utilize a formal quality management program.	**Initial**
	Average Assessed Capability Level	

2.8-4 For your projects, how are quality issues addressed?

District	District Response	Assessed Capability Level
District 1	Quality issues are discussed with the consultant. Consultants are given interim and final grades for quality using the FDOT Professional Services Grading System.	**Performed**
District 2	Group discussions are held to address methods of quality improvement for the system.	**Initial**
District 3	Quality issues are addressed by complying with the contract documents.	**Initial**
District 4	N / A	**Initial**
District 5	See 3.1-1. No official systems engineering is used at this time.	**Initial**
District 6	All documentation is reviewed in detail and approved in writing. Software is usually reviewed by consultants that specialize in the type of software under analysis.	**Performed**
District 7	N / A	**Initial**
Turnpike Enterprise	We currently do not utilize a formal quality management program.	**Initial**
	Average Assessed Capability Level	**Initial**

5.3 Environmental Category Focus Areas

5.3.1 Focus Area 3.1 – Define and Improve the Systems Engineering Process

3.1-1 Describe your organization's systems engineering processes.

District	District Response	Assessed Capability Level
District 1	Our process for plans production is outlined in the FDOT Plans Preparation Manual.	**Performed**
District 2	Processes are still under development.	**Initial**
District 3	The conventional FDOT methods (i.e., feasibility, DPM, CPM), though formal systems engineering per se, is not addressed.	**Performed**
District 4	N / A	**Initial**
District 5	No official systems engineering is used at this time.	**Initial**
District 6	Processes include planning, design, implementation, testing of input, and integration of the system.	**Initial**
District 7	N / A	**Initial**
Turnpike Enterprise	We utilize iterative processes involving all affected parties.	**Initial**
	Average Assessed Capability Level	**Initial**

3.1-2 How are your organization's systems engineering processes established, maintained, and improved?

District	District Response	Assessed Capability Level
District 1	The plans production process was established and is maintained by the Central Roadway Design Office.	**Initial**
District 2	Systems engineering processes are established, maintained, and improved through group discussion and correspondence.	**Initial**
District 3	Formal systems engineering has not been addressed.	**Initial**
District 4	N / A	**Initial**
District 5	See 3.1-1. No official systems engineering is used at this time.	**Initial**
District 6	Systems engineering processes are established, maintained, and improved by identifying stakeholders, developing a vision, and working on the details.	**Initial**
District 7	N / A	**Initial**
Turnpike Enterprise	Systems engineering processes are handled informally at this point.	**Initial**
	Average Assessed Capability Level	**Initial**

3.1-3 What guidelines and procedures are available to help individuals accomplish systems engineering tasks?

District	District Response	Assessed Capability Level
District 1	N / A	**Initial**
District 2	Guidelines and procedures are still under development.	**Initial**
District 3	Conventional project management is used. Formal systems engineering has not been addressed.	**Initial**
District 4	N / A	**Initial**
District 5	See 3.1-1. No official systems engineering is used at this time.	**Initial**
District 6	The appraisal method that uses the SECM.	**Performed**
District 7	N / A	**Initial**
Turnpike Enterprise	The Turnpike Enterprise's *Configuration Management Plan* is the primary reference. In addition, we have and will continue to send employees to FDOT-sponsored training where materials are provided.	**Performed**
	Average Assessed Capability Level	**Initial**

5.3.2 Focus Area 3.2 – Manage Competency

3.2-1 Describe the organization's competency development programs.

District	District Response	Assessed Capability Level
District 1	The FDOT has each employee and their supervisor develop an individual training plan for the employee each year.	**Performed**
District 2	Training is being provided on a monthly basis to staff.	**Performed**
District 3	Mentoring, training, and conferences are used in competency development.	**Performed**
District 4	N / A	**Initial**
District 5	N / A	**Initial**
District 6	Districts 4 and 6 use a regional approach to training. ITS courses are provided on dynamic message signs (DMS), closed-circuit television (CCTV), etc.	**Performed**
District 7	N / A	**Initial**
Turnpike Enterprise	Training costs are shared by the Turnpike Enterprise and its general consultants and is encouraged by both. Extended resources are available through home office general consultant staff.	**Performed**
	Average Assessed Capability Level	**Performed**

3.2-2 How are the organization's competency development needs identified?

District	District Response	Assessed Capability Level
District 1	A list of training courses is maintained by the FDOT and training is provided for courses with a demand. The Central Office ITS also provides training to ITS professionals.	**Performed**
District 2	Competency development needs are identified through recommendations from management, FHWA, and Central Office ITS.	**Performed**
District 3	Judgment and subordinate feedback are used, along with the standard individual training plan process.	**Performed**
District 4	N / A	**Initial**
District 5	N / A	**Initial**
District 6	The FDOT looks at project requirements and establishes the development of needs to reach the requirements.	**Performed**
District 7	N / A	**Initial**
Turnpike Enterprise	Needs are identified informally through the solicitation of needs from both management and staff.	**Initial**
	Average Assessed Capability Level	**Performed**

3.2-3 How are the program's competency development needs identified?

District	District Response	Assessed Capability Level
District 1	N / A	**Initial**
District 2	Competency development needs are identified through recommendations from management, FHWA, and Central Office ITS.	**Initial**
District 3	N / A	**Initial**
District 4	N / A	**Initial**
District 5	N / A	**Initial**
District 6	This is the same as above. The FDOT looks at project requirements and establishes the development of needs to reach the requirements.	**Performed**
District 7	N / A	**Initial**
Turnpike Enterprise	Needs are identified informally through the solicitation of needs from both management and staff.	**Initial**
	Average Assessed Capability Level	**Initial**

3.2-4 What system engineering activities are supported by your organization's training and education program?

District	District Response	Assessed Capability Level
District 1	N / A	**Initial**
District 2	No systems engineering activities are supported yet.	**Initial**
District 3	None are formally supported.	**Initial**
District 4	N / A	**Initial**
District 5	Project management/engineering are supported.	**Performed**
District 6	Systems engineering training is provided by the FDOT.	**Performed**
District 7	N / A	**Initial**
Turnpike Enterprise	No systems engineering activities are supported actively. We rely on the global FDOT-sponsored training.	**Initial**
	Average Assessed Capability Level	**Initial**

5.3.3 Focus Area 3.3 – Manage Technology

3.3-1 How are new product technologies identified and selected for your projects?

District	District Response	Assessed Capability Level
District 1	A State of the Art Report is produced as part of the *ITS Master Plan* that identifies technologies for the project.	**Performed**
District 2	Product technologies are identified and selected through internet research, the Central Office ITS Lab, and consultant recommendations.	**Performed**
District 3	Product technologies are identified and selected through the education of industry standards and the development of expertise.	**Performed**
District 4	N / A	**Initial**
District 5	The research and review of new product technologies is used.	**Initial**
District 6	Vendor presentations, staff research, and consultant recommendations are used to identify and select new product technologies.	**Performed**
District 7	N / A	**Initial**
Turnpike Enterprise	Extensive research, actual experience, and project demonstrations, combined with cost-benefit analyses and technical alternative comparisons, are used.	**Performed**
	Average Assessed Capability Level	**Performed**

3.3-2 How are new product technologies for your projects introduced into the organization?

District	District Response	Assessed Capability Level
District 1	The State of the Art Report and networking with suppliers and manufacturers at conferences and seminars introduce new technology to the organization.	**Performed**
District 2	Preliminary field tests are performed to determine if expectations are met.	**Performed**
District 3	Engineering judgment is used to introduce new product technologies.	**Initial**
District 4	N / A	**Initial**
District 5	Some new product technologies are introduced by consultants and some by the ITS staff.	**Initial**
District 6	Pilot projects introduce some new product technologies.	**Performed**
District 7	N / A	**Initial**
Turnpike Enterprise	New product technologies are introduced through the conceptual design and system design processes.	**Performed**
	Average Assessed Capability Level	**Performed**

3.3-3 How are new process technologies identified and selected?

District	District Response	Assessed Capability Level
District 1	N / A	**Initial**
District 2	New process technologies are identified and selected using internet analysis, documented analysis, and prior usage by other agencies.	**Performed**
District 3	Nothing formal has been developed.	**Initial**
District 4	N / A	**Initial**
District 5	Not sure what a process technology is???	**Initial**
District 6	Same as 3.3-1. Vendor presentations, staff research, and consultant recommendations assist in identifying and selecting new process technologies.	**Performed**
District 7	N / A	**Initial**
Turnpike Enterprise	Extensive research, actual experience, and project demonstrations, combined with cost-benefit analyses and technical alternative comparisons, assist in identifying and selecting new process technologies.	**Performed**
	Average Assessed Capability Level	**Initial**

3.3-4 How are new process technologies introduced into the organization?

District	District Response	Assessed Capability Level
District 1	N / A	**Initial**
District 2	New process technologies are introduced through internet analysis, documented analysis, and prior usage by other agencies.	**Initial**
District 3	Nothing formal has been developed.	**Initial**
District 4	N / A	**Initial**
District 5	See above. Not sure what a process technology is???	**Initial**
District 6	Same as 3.3-2. Pilot projects are used.	**Initial**
District 7	N / A	**Initial**
Turnpike Enterprise	New process technologies are introduced through the conceptual design and system design processes.	**Performed**
	Average Assessed Capability Level	**Initial**

5.3.4 Focus Area 3.4 – Manage the Systems Engineering Support Environment

3.4-1 What systems engineering tools are available for your projects?

District	District Response	Assessed Capability Level
District 1	FDOT software is available for scheduling and tracking progress on projects.	**Performed**
District 2	Courses through Global Intergy are available.	**Initial**
District 3	Apart from ordinary project management techniques, nothing formal has been developed.	**Initial**
District 4	N / A	**Initial**
District 5	See 3.1-1. No official systems engineering is used at this time.	**Initial**
District 6	Rational Configuration Management software, Microsoft Project Scheduling software, and the SECM.	**Performed**
District 7	N / A	**Initial**
Turnpike Enterprise	Currently, TrackRecord is used to track SPCR's; concurrent version systems (CVS) are used for software version control; GNU Compiler is used for software code organization; Microsoft Access databases are used for hardware inventory/tracking; and Adobe Acrobat is used for document storage/retrieval.	**Managed**
	Average Assessed Capability Level	**Performed**

3.4-2 How is the systems engineering support environment tailored to the project's needs?

District	District Response	Assessed Capability Level
District 1	N / A	**Initial**
District 2	Currently, staff is being trained on various areas of systems engineering.	**Initial**
District 3	N / A	**Initial**
District 4	N / A	**Initial**
District 5	See 3.1-1. No official systems engineering is used at this time.	**Initial**
District 6	We develop tasks by using Microsoft Project and track them back to the project requirements.	**Performed**
District 7	N / A	**Initial**
Turnpike Enterprise	Generally, it is tailored to whether the project involves software, TMC hardware, field hardware, or some combination of the three (3).	**Performed**
	Average Assessed Capability Level	**Initial**

3.4-3 How does your organization identify and insert new tools?

District	District Response	Assessed Capability Level
District 1	N / A	**Initial**
District 2	New tools are identified and inserted through analysis, consultation from other districts, and the Central Office ITS.	**Performed**
District 3	Identification and insertion of new tools is at the discretion of management.	**Initial**
District 4	N / A	**Initial**
District 5	See 3.1-1. No official systems engineering is used at this time.	**Initial**
District 6	New tools are identified and inserted by obtaining consultant recommendation(s) and through staff research.	**Performed**
District 7	N / A	**Initial**
Turnpike Enterprise	Generally, new tools are identified through industry best practices and inserted through the CCB process.	**Performed**
	Average Assessed Capability Level:	**Initial**