Appendix V

Risk Management Plan Template

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1. Scope

1.1 Purpose

This Risk Management Plan (RMP) establishes the process for implementing proactive risk management as part of the overall management of an FDOT ITS project. The purpose of risk management is to identify potential problems before they occur, so that risk-handling activities may be planned and invoked as needed across the life of the project to mitigate adverse impacts on achieving objectives. Risk management is a continuous, forward-looking process that addresses issues that could endanger achievement of critical objectives and includes early and aggressive risk identification through the collaboration and involvement of relevant stakeholders. The risk management approach is tailored to effectively anticipate and mitigate the risks that have critical impact on project objectives. While technical issues are a primary concern both early on and throughout all project phases, risk management considers both internal and external sources for cost, schedule, and technical risk. Early and aggressive detection of risk is a ITS project objective because it is typically easier, less costly, and less disruptive to make changes and correct work efforts during the earlier, rather than later, phases of the project.

This document describes the process to:

- Identify risk events and risk owners
- Evaluate risks with respect to likelihood and consequences
- Assess the options for the risks and develop mitigation plans
- Track risk mitigation efforts
- Conduct periodic reassessments of project risks

The RMP should be updated as necessary and the identified risks will be tracked until they are retired.

1.2. Applicable Documents

1.2.1 Florida Department of Transportation Documentation

1.2.2 ITS Project Documentation

The following documents should be prepared as part of the project documentation:

- Project Management Plan (PMP)
- Systems Engineering Management Plan (SEMP)
- Software Development Plan (SDP)
- Hardware Development Plan (HDP)
- Configuration and Data Management Plan (CDMP)
- Quality Assurance Plan
- Statement of Work (SOW)

1.3 Definitions

This section defines any terms used in the RMP that may need clarification. Start with the following and tailor as necessary:

- **Risk** is a measure of the inability to achieve overall project objectives within defined cost, schedule, and technical constraints, and has two components: (1) the probability (or likelihood) of failing to achieve a particular outcome, and (2) the consequences of failing to achieve that outcome.

- **Risk Events** are those events within the project that, if unsuccessful, could result in problems in the development, production, and fielding of the system. Risk events should be defined to a level so that the risk and causes are understandable and can be accurately assessed in terms of likelihood/probability and consequences to establish the level of risk.

- **Technical Risk** is the uncertainty of achieving the program requirements for function, performance, and operability within the planned cost and schedule. Technical risks are associated with the ability of the system (i.e., product) design and production process to meet the level of performance necessary to satisfy the operational requirements. Failure to adequately address technical risk generally results in an inability to meet cost and schedule constraints while meeting technical requirements. Typical technical risk drivers include requirements, constraints, technology, and development approach.

- **Cost Risk** is the uncertainty in achieving the cost budget if none of the technical and none of the schedule risks should materialize. Cost risks are associated with the ability of the project to achieve its overall cost objectives. Two risk areas bearing on cost are (1) the risk that the cost estimates and objectives are inaccurate and/or unreasonable, and (2) the risk that project execution will not meet the cost objectives as a result of a failure to mitigate cost, schedule, and performance risks. Typical cost risk drivers include requirements, personnel availability, reuse, tools, and environment.

- **Schedule Risk** is the uncertainty of achieving the program schedule if none of the technical or cost risks should materialize. Schedule risks are those associated with the adequacy of the time estimated and allocated for the development, production, and fielding of the system. Two risk areas bearing on schedule risk are: (1) the risk that the schedule estimates and objectives are unrealistic and/or unreasonable, and (2) the risk that project execution will fall short of the schedule objectives as a result of failure to mitigate cost, schedule, and performance risks. Typical schedule risk drivers include requirements, need/delivery dates, technology availability, and resources.

- **Project Risk** is a risk that affects multiple project teams or spans the whole project structure and is subject to scrutiny at the highest levels of project management. Project risk is associated with the overall status of the project. These risks are generally associated with the ability of the project to maintain political and other support. Failure to meet cost, schedule and technical objectives can produce project risk. In addition, external budget, priority and political considerations can produce project risk.

- **Risk Assessment** is the translation of risk data into information for evaluating risk and determining the likelihood and consequence. A risk assessment (or rating) is the value or level that is given to a risk event based on the analysis of the likelihood/probability and consequences of the event.

- **Risk Metrics** are measures used to indicate progress or achievement on risk events, for example, technical performance measures (TPMs).

2. Project Summary

2.1 Project Scope

This section should provide a brief description of the project's procuring agency and scope of the project to which this RMP applies.

2.2 System Description

This section should briefly describe the system being proposed, developed, managed, analyzed, modified, integrated, supported, and/or tested.

3. Risk Management Strategy

The project risk management strategy is to identify and handle project risks, both technical and nontechnical, before they become problems and cause serious cost, schedule, or performance impacts. The project will continuously and proactively assess critical areas identified to determine specific risks, analyze their potential impacts, determine mitigation actions, and monitor the risks.

This section should provide a common vision of success that describes the desired future project outcomes in terms of the product that is delivered, its cost, and its fitness. Elements of a project's risk management strategy to be discussed include:

- Scope of the risk management effort

- Methods and tools to be used for risk identification, risk analysis, risk mitigation, risk monitoring and communication

- Risk management database, including descriptions of software, content, outputs, maintenance of risk history status, etc.

- Project specific sources of risks

- How these risks are to be organized, categorized, compared, and consolidated

- Parameters, including likelihood, consequences, and thresholds, for taking action on identified risks

- Risk mitigation techniques to be used, such as prototyping, simulation, alternative designs, or evolutionary development

- How risk management results will be integrated into project performance management

- Definition of risk measures to monitor the status of the risks

- Time intervals for risk monitoring or reassessment

- Plans for tracking risks identified during the capture phase throughout the project execution phase

- Implementation schedules and milestones

The project will adhere to the following principles in the approach to risk management:

- **Keep it simple.** Do not bother with complex mathematical equations. Use high, medium, and low. Rank the risk and develop mitigation actions accordingly.
- **Everyone must participate.** Successful risk management is not a one-person job. Everyone must identify and rank the risks for their area as well as identify mitigation options.

- **Monitor risks frequently.** Events that can alter risks occur rapidly and, thus, must be looked at frequently. Do not spend a lot of time reporting the risks, but spend enough. Remember, what gets measured gets done.

- **Communicate the truth.** Have faith in your management and customer. Remember, they hate surprises more then bad news, and often appreciate being asked to help. They can fix requirements that violate the laws of physics or suggest innovative solutions using their assets. Honesty and early reporting is the best policy.

4.   Risk Management Process

The risk management process is comprised of four phases: identification, assessment, handling, and monitoring. (Refer to Figure A.4.1.) The following paragraphs describe the process used by the project to identify and manage its risks.

Figure V.1 – Risk Management Process
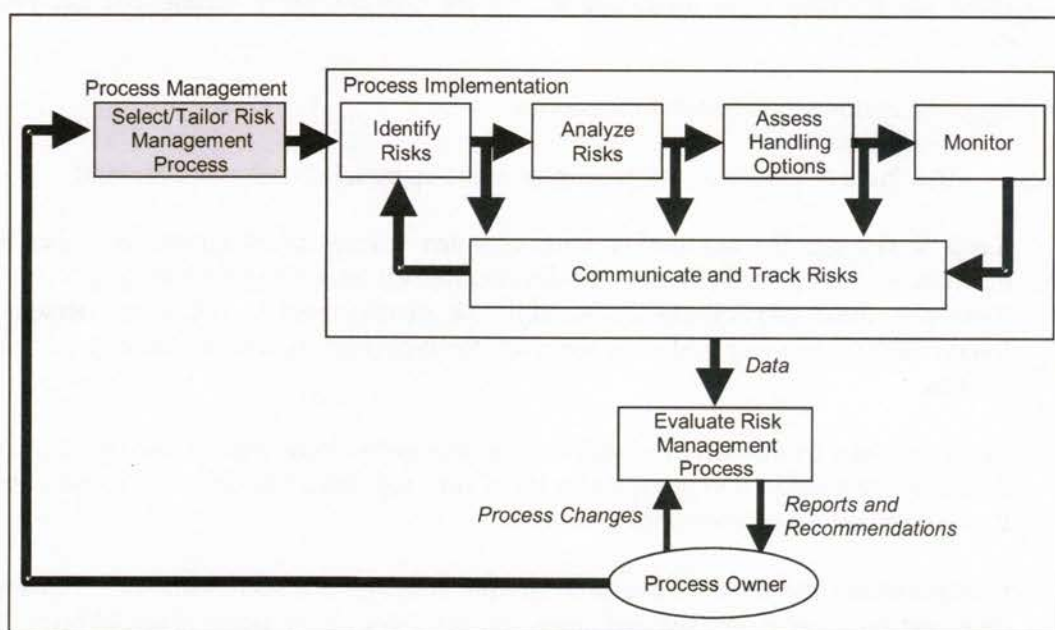
The following sections describe the suggested risk management process. Projects may tailor this process to best meet the needs of the project and/or satisfy the customer. The risk management process includes the following elements:

- **Risk Identification** – Examine all project elements in detail. Identify, describe, and document cost, schedule, technical, financial, and other risks. Begin the identification process during the capture phase and continue throughout the project life cycle.

- **Risk Assessment** – Evaluate the identified risks for probability of occurrence and potential impact. Estimate project exposure and establish risk-handling priorities. Qualitative assessments may be used as an initial filter but all medium and high risks must be assessed quantitatively. Express quantitative assessments (e.g., rough order of magnitude [ROM], range of impact, factored impact, etc.) in terms of dollars, time, and performance impact, as applicable.

- **Risk Handling** – Identify risk-handling options (i.e., mitigation, transfer, avoidance, assumption) and action plans, including contingency actions with implementation criteria and decision dates. Assign an owner to each risk and action plan. Ensure that risk handling plans document the criteria (i.e., observable, test, data, documentation) that justify the planned, sequential reduction of quantitative risk levels over time.

- **Risk Monitoring** – Track progress against action plans and established metrics to ensure timely completion of actions. Include action plans in the project integrated master schedule (IMS). Include risk name, description, identification date, owner, action plans, milestones, status, and contingency actions in the risk management database. Risk owners must provide status at least monthly.

4.1   Risk Identification

Risk identification is the process of examining the project areas and each critical technical process to identify and document the associated risk. The identification of potential issues, hazards, threats, and vulnerabilities that could negatively affect work efforts or plans is the basis for the risk management strategy. The project utilizes several methods for identifying risk:

- Examination of the work breakdown structure (WBS) to uncover risk areas
- Conductance of a risk assessment
- Interviews with subject-matter experts (SME) (i.e., engineering, manufacturing, etc).
- Reviewing risk management efforts from similar products
- Examination of lessons-learned documents or databases
- Examination of design specifications and agreement requirements

Cost, schedule, and performance risk identification takes place during the concept phase and continues throughout the project's life cycle. Cost risks may include those associated with funding levels, funding estimates, and distributed budgets. Schedule risks may include risks associated with planned activities, key events, and milestones. Performance risks may include risks associated with the following:

- Requirements
- Analysis and design
- Application of new technology/processes

- Physical size
- Shape
- Weight
- Manufacturing and fabrication
- Functional performance and operation
- Verification
- Validation
- Performance maintenance attributes
- Resources (i.e., people, funds, schedules, tools, etc.)

Individual team members involved in the detailed day-to-day technical, cost, and scheduling aspects of the program are the most aware of the potential problems (i.e., risks) that need to be managed. Program management must instill in the staff the discipline for and the importance of identifying these potential risk sources. Part of the risk assessment process will be to survey the team members for potential risk events and circumstances. The process accumulates and documents information on events or circumstances that will be evaluated to determine any potential adverse impact on the program from a technical, cost, or schedule viewpoint. The following indicators should be used:

- Lack of stability, clarity or understanding of requirements
- Failure to use best practices
- New processes
- Any process lacking rigor
- Insufficient resources
- Test failure
- Qualified supplier availability
- Negative trends or forecasts

4.2 Risk Assessment

Risk assessment is the process of analyzing known risks and prioritizing them based on their threat in the attainment of project goals. During the assessment phase, the project analyzes each risk to isolate its cause and to determine its effects. The project rates the risk in terms of its probability of occurrence and its severity of impact to cost (i.e., dollars), schedule (i.e., time), and technical performance, as applicable.

The probability of a risk issue is the chance that the risk will materialize as a "real project problem." This probability can be expressed in quantitative (e.g., ROM, range of impact, factored impact, etc.) or qualitative terms (i.e., high, medium, or low). The risk impact is a measure of how the project is affected if the risk issue materializes. Qualitative assessments may be used as an initial filter, but all high and medium risks must be assessed quantitatively.

The criteria for qualitative assessments follows.

- A high-occurrence of the undesirable event will result in:

  o Inability of the system to meet primary functional requirements
  o Unacceptable system performance to the customer
  o Late system delivery
  o A project cost overrun that is not containable within management reserve

- A medium occurrence of the undesirable event will result in:

  o Some system requirements not being met
  o A negative impact to a particular feature important to the customer
  o Major intermediate milestones not being met
  o A cost overrun that is containable within management reserves

- A low occurrence of the undesirable event will result in:

  o Some system requirements not being met
  o Minor degradation of system performance
  o Intermediate milestones not being met, therefore, putting a major milestone in jeopardy
  o An overrun at cost account level that is offset by underruns

Overall risk assessment is the product of combining the probability of occurrence with the severity of impact as follows:

PROBABILITY OF OCCURRENCE	SEVERITY OF IMPACT	OVERALL PROJECT RISK
High	High	
High	Medium	High
Medium	High	
High	Low	
Low	High	Medium
Medium	Medium	
Medium	Low	
Low	Medium	Low
Low	Low	

Once the risks are assessed, they are categorized into defined risk categories, providing a means of looking at risks according to their source or taxonomy, and are prioritized from 1 to n, 1 being the most effective area to which resources for mitigation are applied to achieve the greatest positive impact to the project.

4.3   Risk Handling

Risk handling is the process that identifies, evaluates, selects, and implements options to set risk at acceptable levels given project constraints and objectives. This includes the specifics on what should be done, when it should be accomplished, who is responsible, and associated cost and schedule. The handling strategy is determined by the overall risk assessment rating as indicated below.

Overall Risk Assessment	Handling Strategy
High	The project manager and project engineer status the risk on a <u>daily basis</u> until the risk is closed. The risk owner documents risk avoidance actions (i.e., actions taken to avoid or eliminate the source of the risk, and reduce the probability of occurrence to zero), risk mitigation actions (i.e., actions taken to mitigate the severity of the impacts of a risk and reduce the consequence to zero), and contingency actions (i.e., actions taken to protect the attainment of the project goals and to lower risk items).
Medium	This strategy provides the same handling as that for high risks, but on a less frequent basis (i.e., <u>periodic risk status reviews</u>, instead of daily).
Low	The project manager and project engineer add the risk to the "watchlist" for possible escalation.

For each of these actions, measurable tracking criteria and decision dates are documented.

The most critical component of risk handling is the development of alternative courses of action, workarounds, and fallback positions, with a recommended course of action for each critical risk. Options for handling risks typically include alternatives such as the following:

- Risk avoidance by changing or lowering requirements, while still meeting user needs

- Risk control by taking active steps to minimize risks

- Risk transfer by reallocating design requirements to lower the risks

- Risk monitoring by watching and periodically reevaluating the risk for changes to the assigned risk parameters

- Risk acceptance by acknowledging the risk but not taking any action

4.4   Risk Monitoring

Risk monitoring is the process that systematically tracks and evaluates the performance of risk-handling actions against established metrics throughout the acquisition process and develops further risk-handling options, as appropriate.   To effectively control and manage risks during the work effort, the project regularly monitors the risks and the status/results of risk-handling actions.   This includes the establishment of a schedule for each risk-handling activity that includes the start date and anticipated completion date, a list of commitment of resources for each to allow successful execution of the risk-handling activities and the ultimate results of the actions taken.

5.   Risk Management Roles and Responsibilities

This section describes the project risk management organization including the following areas:

- Responsibility and authority of the risk management organization and the integration of risk management functions with other project activities such as technical reviews

- Interfaces between the project risk management organization, and the customer and major subcontractors

- Insert a high-level organization chart for the project or reference a document that contains it.

Training requirements should be addressed in this section.   Include the following roles as applicable and necessary. The following sections provide a guide.

5.1   Project Manager

The project manager has the overall responsibility for risk management on the project.   The project manager may delegate this authority to another individual or team.   If this is the case, state it here.

The PM is responsible for the following:

- Establishing the RMP

- Providing the resources necessary to implement the RMP

- Approving the implementation of risk mitigation plans for risks rated high and providing the necessary resources

- Reviewing the project risks and directing actions as necessary

- Communicating risk activities to the project team

- Participating in the identification of risks

5.2   Risk Manager

The risk manager is the overall coordinator of the RMP. The risk manager is responsible for the following:

- Maintaining the RMP
- Maintaining the risk management database
- Reviewing risk control actions for completeness, feasibility, and adequacy
- Evaluating costs associated with risk control actions
- Performing risk status accounting
- Tracking efforts to reduce medium and high risks to acceptable levels
- Providing risk management training
- Facilitating risk assessments
- Preparing risk briefings, reports, and documents as required for project reviews

5.3   Project Engineer

The project engineer is responsible for the following:

- Facilitating risk identification
- Assembling risk assessment information from systems engineering activities
- Reviewing the RMP for completeness, feasibility, and adequacy
- Ensuring a timely and complete statusing of all systems engineering risk issues
- Reporting systems engineering risk status as part of internal reviews

5.4   *Risk Individual Contributor*

The risk individual contributor is responsible for the following:

- Supporting risk identification
- Developing risk assessments
- Supporting risk filtering as necessary
- Developing and recording status of own risk mitigation and contingency actions
- Evaluating the effectiveness of any control actions
- Identifying and assessing any new risks as necessary
- Reporting risk status as part of internal reviews

5.5   *Customer and Stakeholder Participation*

This section should describe how the customer and stakeholders will be involved in the project risk management activities. If customer and stakeholder involvement is planned, the project leadership team works with the customer to define the details of this involvement. and this definition is documented and communicated to the project team and to the customer.

5.6   *Supplier Participation*

This section should describe how the suppliers will be involved in the project risk management activities. Suppliers can be a key part of controlling risks and supplier participation should be strongly considered. If supplier involvement is planned, the project leadership team works with suppliers to define the details of this involvement, and this definition is documented and communicated to the project team and to the customer.

6.   Opportunity Management

The risk management process is also intended to identify opportunities for potential cost savings, schedule enhancements, and quality improvements. The processes, roles, and responsibilities described above for risks are directly applicable to opportunities. Similar to risks, opportunities are identified and assessed for potential impact to the project. Opportunities represent potential benefits to the project and are to be exploited and realized rather than mitigated or avoided. Opportunities are often less obvious than risks and can be more difficult to identify.

Opportunities must be assessed on a cost and benefit basis, and the plan to exploit the opportunity must exhibit an advantageous cost-to-benefit ratio. Because of this, opportunities have more stringent qualification criteria than risks, and there is attendant risk assumed by the project when an opportunity exploitation plan is implemented simply because the plan may fail and the resources expended will have been wasted or, at best, not have provided the expected return.

7.   Acronyms and Notes

This section contains any general information that aids in understanding this document. This section will contain an alphabetical listing of all acronyms and abbreviations, and their meanings as used in this document, and a list of any terms and definitions needed to understand this document.