Washington State Department of Transportation

PMG
Statewide Program Management Group

A Strategic Delivery Plan for the Washington State Department of Transportation's Capital Construction Program

Phase 1 Final Report

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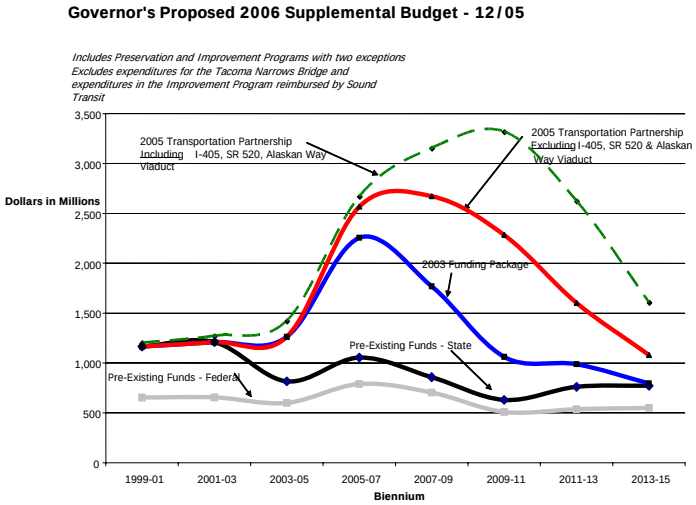
Section 1. Executive Summary

Program Delivery Needs

On May 9, 2005, the Governor signed into law the "2005 Transportation Partnership Funding Package." This major capital construction program provided a $7.1 billion increase in spending for highways, ferries and other multi-modal transportation projects over the next 16 years. When added to existing funding, the total program profile creates a "Mt. Rainier" peak in biennium spending as shown in Figure 1. Spending is programmed to rapidly increase from $1.5 billion in the 2003-2005 biennium to $3.3 billion by the 2009-2011 biennium.

Figure 1 – WSDOT Construction Spending



The Washington State Department of Transportation (WSDOT) has recognized that the delivery of a program of this size requires more than just working harder and longer. It needs to leverage its own internal capabilities, use extensive outsourcing resources, improve its project delivery management processes and systems, and have the authority to make certain adjustments to project components in order to respond to changes.

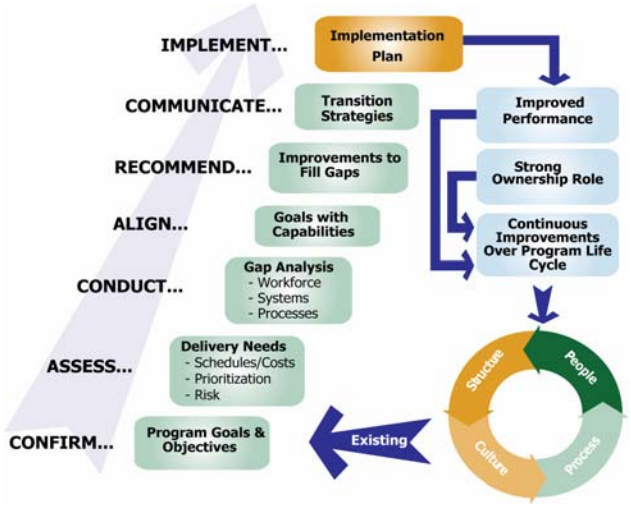
Strategic Delivery Plan Mandate

Legislation requires a strategic plan for program and project delivery to manage Washington's unprecedented $15 billion capital construction program. The response to this is:

1. Interim report submitted 3/1/2006
2. Strategic Plan due 6/30/2006
3. Supplemental Report on capital budgeting and reporting option due 7/31/2006.

WSDOT retained the Statewide Program Management Group (SPMG) to assist in the plan preparation and implementation. Figure 2 provides an overview of the Strategic Plan Process. This report presents final recommendations from the Phase 1 Strategic Planning effort.

Figure 2 – Phase 1 Strategic Plan Process



Statewide Program Management Plan Objectives:

- Identify what actions are needed to enable WSDOT to *deliver* projects successfully
- *Report* on projects and programs properly.

This plan provides recommendations on the following:

1. Management approaches
2. Changes in control and reporting systems,
3. Workforce improvements, and
4. Project management processes.

Summary of Findings, Conclusions, and Recommendations

Overview

WSDOT is committed to delivering the projects made possible by the Nickel and Transportation Partnership programs. WSDOT recognizes that doing so means anything but "business as usual." The strategic planning process has identified many issues which, for the most part, can be seen as three over-arching points of strategic focus. Each point requires significant and immediate actions for WSDOT to meet its mandate of program delivery over the next 15 years. As with the three legs of a stool, failure of any one to carry its share of the load will mean that the total enterprise will be jeopardized.

Each of the three strategic points of focus requires attention, and all are capable of supporting the delivery program, so to speak, if the required actions are taken. The strategic plan focuses heavily and in detail on what these actions should be. In summary terms, they involve the following:

1. Enhance the capacity of WSDOT and its local industry partners to mobilize and expand now to provide the optimal mix of state and consultant workforce resources. This requires a doubling of capacity to meet the programmed needs in this and the next biennium.

Figure 3 – Strategic Focus for Success

2. Outdated and disjointed management systems inconsistently applied throughout WSDOT need to be upgraded and integrated to keep scopes, schedules and budgets in continuous focus and to facilitate the inevitable adjustments that will be required. Implementation of Best Management Practices (BMP), methods and computerized tools to enable WSDOT to anticipate changes and manage them proactively is the key to success. Likewise, WSDOT should train staff to use these tools and employ Best Management Practices effectively.

3. WSDOT management, while continuing its unparalleled progress in transparency, accountability and reporting, must be afforded greater flexibility to respond to changes in conditions and circumstances by refining scopes, schedules and budgets that will sustain overall program feasibility. Recent increases in construction costs coupled with low competition in the construction marketplace are examples of changes facing WSDOT's delivery of the program as presently planned.

"Technology is changing, the (WSDOT) program is growing, management issues are more complex, the challenge to the construction and engineering industry to deliver is enormous with the largest capital program in the country... There isn't a business in the world that would embark on a $15-$20 billion capital program without building a world-class system. We're moving there -- let's not lose the vision of where we need to go.... Don't lose this energy." *Russ East, WSDOT, June 2006*

WSDOT's Delivery Plan for Capital Construction – Recommendation

Peer Review Process

As part of the overall program delivery analysis, SPMG conducted a Peer Review of the WSDOT delivery plan using national specialists in transportation program delivery. These individuals brought public agency and private industry experience in transportation capital programs delivery totaling 150 years. The Peer Review team met with WSDOT's Executive Oversight Committee (EOC) in April 2006. The EOC posed specific questions to the Peer Review Team as a means of articulating direction and advice from the assembled body. These questions were categorized into four topic areas as follows:

- Program delivery approach
- Program management issues
- Workforce issues
- Organizational issues of immediate importance.

The Peer Review findings and conclusions addressed each area and are summarized in Section 2 of this report.

Summary Findings and Conclusions

In general, the Peer Review team recognized that WSDOT has taken significant steps to formulate a feasible delivery approach but suggested the following be emphasized in developing and implementing the Strategic Plan:

- Instill a sense of immediate urgency to the overall culture in the same manner that senior management has promulgated accountability, transparency and communications into the agency.
- The overall delivery approach is sound in its planning and in initial implementation but is facing barriers in staffing, change management and reporting tools that will impact the ultimate success of the program.
    - Recruitment and staffing needs to be expanded to a national focus with emphasis on selling the state program to attract needed skills.
    - Few states constrain DOT budgets to individual projects. Many states have successfully appropriated funds for a list of projects; said list includes a programmatic-level contingency amount not tied directly to individual projects. Coupled with periodic reporting of individual project delivery milestones and overall program financial feasibility, they have found this to be an effective balance between accountability and flexibility.

WSDOT and Office of Financial Management (OFM) should continue to work with the Legislature to relax the extraordinarily tight controls on project-specific appropriations since changes will occur in specific projects scheduled for delivery over 16 years. WSDOT needs the flexibility to manage change through use of program-wide contingencies and timely action.

  - Continue to report all changes to stakeholders.

- Incentivize the contracts of the major project General Engineering Consultants (GECs) to emphasize efficient delivery and transparent accountability.
- As costs are escalating, particularly in response to local real estate cycles, local contractor capacity, national and international cost and materials availability pressures and economic trends, recognize that project schedules and phasing – and on occasion, certain elements of project scopes – may need to be adjusted to maintain the financial viability of the total program.
- Implement industry Best Management Practices in process, methods and systems to track and report on program and project delivery.
- Change stakeholders' expectations with respect to many projects still in the early stages of development that have yet to complete preliminary planning and environmental assessments. For these projects, the aura of precise costs, on an exact schedule and with a detailed and defensible scope is not realistic. Move toward accountability for aggregate project delivery at the budgeted total program value with commitment to delivering each planned project.
- Implement methods to create program-level contingencies in cost and schedule timelines.
- Conclude the Strategic Plan phase promptly and move into implementation now. Delays in implementation of critical processes, procedures and Project Control and Reporting (PC&R) tools undermine program management in the out years through greater cost growth, schedule slippage and loss of stakeholder confidence than would be the case with an up-to-date, state-of-the-art integrated set of tools.

Figure 4 – The clock is ticking

"One delivery team recognizing that time is of the essence. One day of delay averages $1 million due to inflation".

Program Delivery Findings

<u>Assuring Accountability and Developing Incentivization</u>

A "clock is ticking – sprint-to-the-finish line" mentality requires that a strong message of the program's importance permeate the entire WSDOT organization. The absence of such a message will constitute a risk to program delivery. The

SPMG recommends that WSDOT develop clear, compelling incentives / disincentives to help drive internal and external performance.

Financial Plan, Flexibility and Cost Risks
The program needs to acquire the tools to deal with major changes – which are a given – beginning with the flexibility to move dollars around within biennium budgets and among projects. Lack of adequate budgets, on a project-by-project basis constrained to each legislative cycle, is a barrier and constraint to effective delivery. WSDOT should develop and annually update a Financial Plan and report program feasibility to the Governor. The program's Financial Plan should embody all the tools needed over the life of the program – even tools that are not immediately available to WSDOT and must be acquired incrementally.

"Finance plans impose discipline"
–*Management of Large Highway and Transit Projects, Kenneth M. Mead, Inspector General, US DOT, May 2, 2002*

Other Risks and Risk Management
WSDOT should identify macro-level risks and develop "Plan Bs" to manage them, including action strategies. These should be tied to the legislative timeline, with short-, medium- and long-term dimensions. This should include tactical evaluation of a worst case economic scenario similar to the construction cost escalation pressures encountered in the early to mid 1970's

Ancillary Delivery Models
The SPMG suggests that WSDOT examine the potential role and value of several different and innovative project delivery models. For example, greater application of design-build or incentivized project-level program management can shift most of the risk of staffing, schedule, and cost variability to the private sector. The larger the scale of projects or program elements employing such at-risk approaches, the more attractive they will be to national or international teams.

Ancillary Project Delivery Procedures
The SPMG also suggests that WSDOT undertake a pilot study of an Owner Controlled Insurance Program (OCIP), seek methods to expedite property acquisitions so as to hedge real estate cost increases, and employ techniques for facilitating utilities relocation work such as augmenting utility staff to assist in reviews and setting up low-cost loans to provide budgets for timely utility relocations.

Program Management Issues

Centralized Management Information Needs in a Distributed Delivery Structure
WSDOT's commitment to retaining lead responsibility for project delivery in the regions needs to be coupled with enhanced centralized and pro-active oversight currently hampered by its out-of-date reporting systems. WSDOT Headquarters (HQ) cannot provide effective program management and maintain accountability for program delivery without access to reliable, consistent and up-to-date data.

Baseline Assessment
At the beginning of Phase 2, WSDOT plans to undertake a targeted review of 80-plus projects that are somewhat less defined or in the early planning stage. These projects would be reviewed for their budgets, scopes and schedules to draw inferences and identify potential "red flags" for the program as a whole. From this, future legislative actions may be forthcoming. The review should also assess the extent to which BMPs have been used on each project.

Working with Multiple GECs
The SPMG suggests that WSDOT use lump-sum, incentive / disincentive contracting methods with GECs where and

if possible. WSDOT should adopt and implement common management / control systems across all GECs. This includes a prescriptive specification of GEC reporting and tools based on the findings and recommendations of this report.

Technology Opportunities
WSDOT should examine opportunities to enhance information technology to produce program benefits, such as electronic bidding, accelerated construction technologies, and traffic management technologies that enhance future revenue.

Workforce Analysis

WSDOT is charged with delivering $15 billion of capital projects under one program delivery team that is distributed across the state in regional and headquarter offices. These program delivery functions can be categorized into three separate services covering more than 400 new projects:

- Large Puget Sound projects ($4 billion)
- Other urban projects ($3.2 billion)
- Remaining statewide projects ($1.3 billion).

In response to the SPMG's recommended 18 strategies to sustain a high performance program delivery team, the WSDOT senior leadership group reviewed and grouped these strategies into five areas:

1. Workforce Alignment
2. Recruitment/Employer of Choice
3. Retention
4. Core Competencies
5. Partnering with Industry

The common elements across these recommendations are as follows:

1. Improving trust, respect, sense of value/competencies, development and recognition of staff by employing effective communication techniques such as performance evaluations, internal communication plans, integrated teams and mentoring.

2. Maximizing the use of existing resources by clarifying core competencies needed across the organization, distributing work and skilled staffing to support projects statewide, and using retirees and non-engineering career tracks when possible.

3. Optimizing recruitment and retention by becoming the "Employer of Choice" and being known for value to the public and the statewide economy, competitive compensation, unified/strong ownership and consistent project controls and reporting approach.

The challenge to implementing these recommendations will be regulatory approval required on HR matters, impacts on existing staff, and the time it takes for implementation. All recommendations will require executive support to be successful. These recommendations are presented in more detail in Section 2 of this report.

Workforce Capacity and Responsiveness Issues

The SPMG conducted an assessment of WSDOT's project delivery staffing requirements, in response to the addition of the 2005 Transportation Partnership Account (TPA) projects to previous and ongoing project delivery commitments.

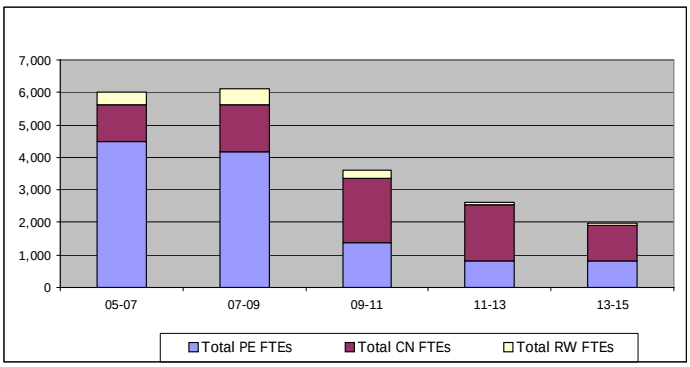
This assessment produced the following key findings:

- WSDOT clearly faces an immediate need to increase resources to undertake and complete its ambitious capital program. The combined workforce needed

(WSDOT plus consultants) to deliver the capital program during the current and next biennium is approximately 6,000 FTEs as compared with a present cohort of about 3,000+ that has developed to deliver the last biennium's $1.5 billion in spending.

- Because the Preliminary Engineering (PE) phase is relatively staff-intensive, the peak need for additional workforce precedes the time of peak dollar expenditure on new projects. This peak is upon WSDOT now.
- Figure 5 displays a current short-term "peaking" in workforce needs, followed by an immediate and significant decline in those needs beginning in the 2009-2011 biennium assuming current programmatic schedules. This indicates the need for immediate staff actions to meet program needs for a three-to-four year window and then argues for restraint in adding permanent long-term new positions to the WSDOT workforce. However, if the locally planned Regional Transportation Improvement District (RTID) programs are successful, these would dove-tail well with WSDOT's current staffing plans.

Figure 5 – Estimated Workforce Needs for Construction Program



WSDOT HQ and regional managers are currently implementing 18 recommended strategies in the draft *Workforce Analysis Report*[1] in an effort to address the staffing shortfall. However, the SPMG anticipates that this initiative will require time to mature and begin bearing fruit.

This concern leads SPMG to recommend developing a risk mitigation strategy to address a worst-case scenario in WSDOT workforce levels. This scenario should assume a continuation of the current workforce level. Of necessity, this strategy will revolve around a temporary shift away from reliance on in-house employees toward even greater reliance on the private sector during the peak delivery period at the Tier 3 level.

WSDOT Business Practices, Methods and Industry Best Practices

In an effort to improve the efficiency of WSDOT's delivery of projects, an analysis of industry standard project management BMPs has been performed. The analysis compares and contrasts these BMP elements with WSDOT practice and identifies gaps that exist between standards and practice. Considering the wide variation of projects, these Best Management Practices provide the framework for developing and maintaining project-control solutions providing appropriate management oversight while allowing the flexibility to be tailored to the specific needs of the project or program.

This Best Management Practices Analysis evaluation is oriented toward WSDOT projects. Sources for information regarding industry BMP descriptions include Parsons Brinckerhoff's Project Controls Standards of Practice, civil works consulting practices, Department of Defense standards, the Project Management Institute (PMI), various WSDOT manuals, and the national standard for Earned Value Management Systems (EVMS) (ANSI / EIA-748-A).

WSDOT practices are compilations taken from the current working knowledge of WSDOT, WSDOT manuals and guidance

(printed and on-line), and discussions with various WSDOT Project Engineers (PEs). WSDOT's actual practices have included results of the recent *SPMG Project Control and Reporting Survey*[2] and the January 2005 *JLARC Overview Report*[3].

Documented BMPs help Project Managers (PMs) and WSDOT successfully deliver projects. Success is achieved when the scope of work is completed on schedule, within budget and meets quality standards. For PMs to accomplish their project goals, they need knowledge, experience and tools.

The following list outlines the Best Management Practices categories that are discussed in the body of this report.

Best Management Practices Categories

- Project Management Plan
- Scope Management
- Work Breakdown Structure
- Risk Management
- Cost Estimating
- Schedule Management
- Cost Management
- Document Control
- Earned Value Management System (EVMS)
- Change Management
- Quarterly Project Review
- Safety and Health Program
- Contract Administration and Agreements.

Gaps exist between industry standard Best Management Practices and WSDOT's practices; these include low penetration of advanced cost management practices such as earned value management systems and time-phased budgeting. Other areas of improvement include right-of-way and milestone tracking systems and full utilization of WBS management tools. These gaps need to be closed for WSDOT to improve the efficiency of project delivery and to create a set of standard operating procedures that will facilitate the use of BMPs and effective project controls and reporting tools.

Gaps in Delivery Functions

Several gaps exist between the needs of effective project management techniques and the current operating environment of the delivery staff within WSDOT. In the past, focus has been on the accounting and reporting of legislatively mandated programs. The use of a purpose-built program management tool, Capital Program Management System (CPMS), has served the planning and program management efforts at the DOT for decades. However, in the last few years, WSDOT's management focus has shifted toward more conventional project management and reporting at the project level. While Project Control & Reporting (PC&R) has issued PM guidelines and tools, each WSDOT region has tackled the project and program management reporting elements according to their specific needs and management styles. This results in the need to reorganize data at HQ for consistency which leads to the fact that there is presently a lack of a more systematic and consistent approach in the accumulation, management and reporting of project-related data.

Recommendations for new applications and reporting styles are focused on providing a very consistent status-reporting environment throughout WSDOT's enterprise. Cultural change toward Best Management Practices facilitated by modern management tools are driving the organization toward the principle of running WSDOT as a business. The functionality of modern PC&R systems recommended herein would support this direction and make no distinction between management tools and the reporting functionality.

Gaps in Reporting and Tools

1. WSDOT has developed and implemented a number of policies, procedures and tools that are leading-edge and represent industry Best Management Practices. These include risk assessment and mitigation methods geared toward estimating probabilistic cost and schedule ranges for complex projects. In addition, WSDOT's On-Line Project Management Guide[4] reflects the Project Management Institute's (PMI) Best Practices for project management. However, there remain gaps in project management reports and tools that have continued to hinder effective PM practice. SPMG assessed these gaps against an array of 13 functional PC&R Best Management Practices and found that implementation of these BMPs varies with respect to size of the project and adoption by various regions throughout the state.

Recommended upgrades to reports and tools are contained within this document and prototypical examples are presented in the Appendix. Summary recommendations are as follows:

- Improved PM reports can be provided through use of modern PC&R tools as proposed herein.
- The Appendix lists a series of reports that should be used by PMs in the execution of their work assignments.
- WSDOT is urged to implement Earned Value Cost Management processes and tools immediately on its major and moderate-sized projects so the benefit of forecasting cost and schedule completion variances early in the PE stage can be captured to avoid potential unrecognized cost increases.
- Phase 2 of the SPMG effort should develop prescriptive reporting requirements that would be issued to GECs for uniformity of reporting on budget and schedule status.
- WSDOT has a good regime of PM training courses geared toward its current processes and practices. These should be supplemented and advanced to include training in the proper use of the advanced tools and reports as recommended herein.

Oversight and Accountability – Budgeting and Reporting

WSDOT cannot deliver this program on its own. Successful delivery will be the product of a collaborative effort among the Department, the Legislature, and various groups who have statutory roles in overseeing and administering the program. Recognizing this, the SPMG is recommending a number of actions that are both internal and external to WSDOT. As observed by the Peer Review and numerous instances in this SPMG Phase 1 delivery assessment, WSDOT needs the flexibility to manage change in a timely manner so as to not fail in its delivery mission. To that end, the following is a summary of SPMG's findings and recommendations:

1. The Legislature should empower WSDOT to develop efficient processes for managing changes in a project's scope, cost, or schedule that balance accountability and achievement of the public's trust while avoiding unnecessary delay or indecision. This should include the following:
   A. Provide greater flexibility to the Department to act on an opportunity or option at any time.
   B. Provide greater flexibility to the Department to reallocate funds between projects and programs.
   C. Provide greater flexibility to the Department to reallocate funds to or from projects with minor justified scope changes.

2. Establish reviews and decision-making authority at high enough levels to discourage unwarranted change and encourage innovative ways to keep projects on track while delegating authority to the lowest level appropriate for dealing with the consequences of the decision.
3. Place more accountability on the Regions and Project Managers for early identification of potential changes.
4. Re-establish the Screening Board or a similar committee with OFM participation to allow for a more thorough evaluation of proposed changes and to provide better information than the Quarterly Project Reviews (QPRs) that are general in content and do not appear to document specific action items.
5. Delegate authority to the Department – and establish thresholds similar to those for PEF Projects – for approval of modest changes. Document and report modest changes to the Screening Board monthly for consent approval.
6. Revise upward the "dollar" thresholds established for cost and scope changes to recognize the dynamics of the marketplace in terms of escalation of construction and delivery costs. Index the thresholds, or at least revisit them, annually.
7. Increase the use of contracting mechanisms that encourage control of scope, cost and schedule, such as lump sum, "design to cost," and schedule-based incentives and disincentives.
8. Add programmatic-level contingency funds independent of specific project budgets that allow WSDOT to manage within a range of cost, schedule and scope variables while committing to delivering every project in the program authorized by the Legislature. This should include refinement of Section 603 of ESSB 6241 to allow for transfers between programs and between biennia budgets.

This would provide a program of projects the size and complexity of those facing WSDOT, with its inevitable delays due to environmental processing, potential opposition or legal challenges, with the **"shock absorbers"** that enable a growing program to traverse the steep and uneven road ahead.

Coordination with Other Agencies and Studies

WSDOT has coordinated the SPMG strategic planning work activities with OFM, the Joint Legislative Audit and Review Committee (JLARC), the Government Management, Accountability and Performance (GMAP) Program, Department of Information Services, Roadmap for Washington, the Joint Transportation Committee (JTC) budget study, the Critical Applications Assessment study and with legislative staff. This coordination includes assessing ESSB 6241 Section 603 requirements and verifies WSDOT's compliance with the Priorities of Government (POG) process. WSDOT will continue to coordinate SPMG's activities with these on-going efforts during Phase 2. Following publication of this report, WSDOT will report to the house and senate transportation committees and OFM by July 31, 2006, on recommended capital budgeting and reporting options. Finally, as Phase 2 proceeds, WSDOT will continue to provide information to the Department of Information Systems (DIS) about the SPMG Project and coordinate closely on the systems work recommended in this SPMG Strategic Plan.

Changes to Business Practices and Methods

The gap analyses indicate a significant need for modernizing and integrating the PC&R systems. SPMG has developed recommendations that will provide WSDOT substantial improvements in project management as well as increased reliability, efficiencies and improved processes for project delivery by:

- Adopting forward-looking management tools and practices.
- Focusing on efficient operations and communications.
  - Top-to-bottom communications
  - Increased accountability
  - Modernized tools and techniques
  - Information sharing
- Providing greater value for operating and construction costs.

Changes in the processes and procedures will be "hand in glove" with changes in the information and project management tools or systems. This represents major hurdles that will be overcome through the Phase 2 Implementation Plan developed in detail for the project.

Reporting Systems and Process Improvements

The systems proposed herein will support much of the overall vision for developing WSDOT's capabilities to be able to meet the substantial increase in delivery expectations. The needs of the increased volume of work require world-class management techniques, processes and tools that:

- Eliminate conflicting data
- Are consistent and repeatable in process and results
- Are efficient in input and output
- Develop confidence in the integration of the data
- Report up-to-date cost accuracy
- Simplify processes and preparation of reports
- Are easy to access and intuitive to use
- Provide analytical methods based on best project management practices to reliably assess:
  - Risk
  - Forecast cost
  - Forecast time of completion.

The second phase of the SPMG project develops requests for proposal and implementation of two general functional applications that will focus on project management and content management. SPMG recommends that WSDOT acquire modern Commercial Off-the-Shelf (COTS) applications that will form the core of new integrated tools in support of the BMP business processes needed by WSDOT.

Proposed Systems Solution

SPMG evaluated three alternatives and recommends a systems solution that uses unmodified COTS products that are integrated and extended using Application Programming Interfaces (APIs) and database access. This concept provides for reporting project information from multiple systems through a single web-based portal. This solution will provide a management dashboard or web portal that allows users to access different levels of project information based on the reporting requirements of the individual.

The web-based dashboard system would be accessible from the WSDOT intranet network. Since the dashboard is web-based, there would be no software to be installed on the end-users' computers and all that would be needed is a web browser, such as Internet Explorer, to access the dashboard.

Systems Implementation

SPMG considered two implementation strategies. Implementation Option A is a one-step process with three phased releases of system functionality at months

17 for acceptance testing, with full deployment by the end of month 37. This is the recommended implementation strategy. Implementation Option B is a cash-flow constrained, two-stage implementation strategy that would provide partial roll out of earned value reporting on a stand-alone basis to the regions in 17 months and fully integrated functionality would be deployed at the end of a 38-month timeline. While Implementation Option B provides an early implementation of some Best Management Practices, this approach comes with elevated risks of failure compared to Implementation Option A.

Overview of Plan and Costs

The development cost of the single-stage plan, Option A is estimated at $14.1 million while Implementation Option B, the two-stage plan, is estimated at $16.3 million. On-going software licensing fees and maintenance costs are similar for each option at $2.5 million per biennium in present dollars. Table 1 summarizes the costs and trade-offs of the two implementation options.

Table 1 – Systems Implementation Options - Summary

Option A: ***Fully Implemented Commercial Off-The-Shelf Software One-Time Deployment*** **Total Development Cost Estimate: $14.1M** **Biennial Maintenance Cost Estimate: $2.5M**			
Pros: • Provides tools required to support improved project delivery best practices, including earned value and cost-to-complete • One-time deployment limits impact on project staff • Lower development costs than Option B • **Recommended by SPMG Consultant Team**		**Cons:** • Early deployment of earned value cost management component is not available with this option within 18 months	
FY '07	**07-09**	**09-11**	**11-13**
$3.6M	$8.5M	$4.5M (Maintenance + Dev.)	$3.3M (Maintenance)
Option B: ***Fully Implemented Commercial Off-The-Shelf Software Two-Stage Deployment*** **Total Development Cost Estimate: $16.3M** **Biennial Maintenance Cost Estimate: $2.5M**			
Pros: • Provides tools required to support improved project delivery best practices, including earned value and cost-to-complete • Provides early deployment of cost management component		**Cons:** • Staged deployment impacts productivity of project delivery staff and increases cost and level of consultant effort • Higher cost than Option A • Not recommended by SPMG Consultant Team	
FY '07	**07-09**	**09-11**	**11-13**
$5.3M	$8.9M	$4.6M (Maintenance + Dev.)	$3.3M (Maintenance)

Figure 6 – Option A – Single Stage Deployment

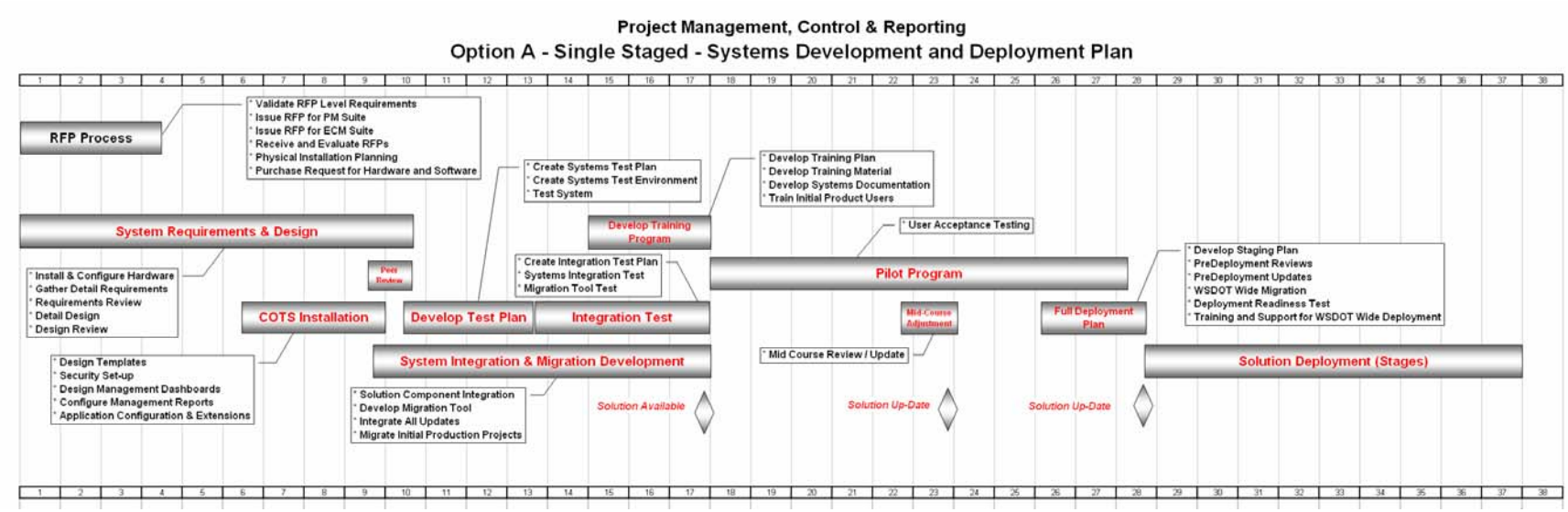
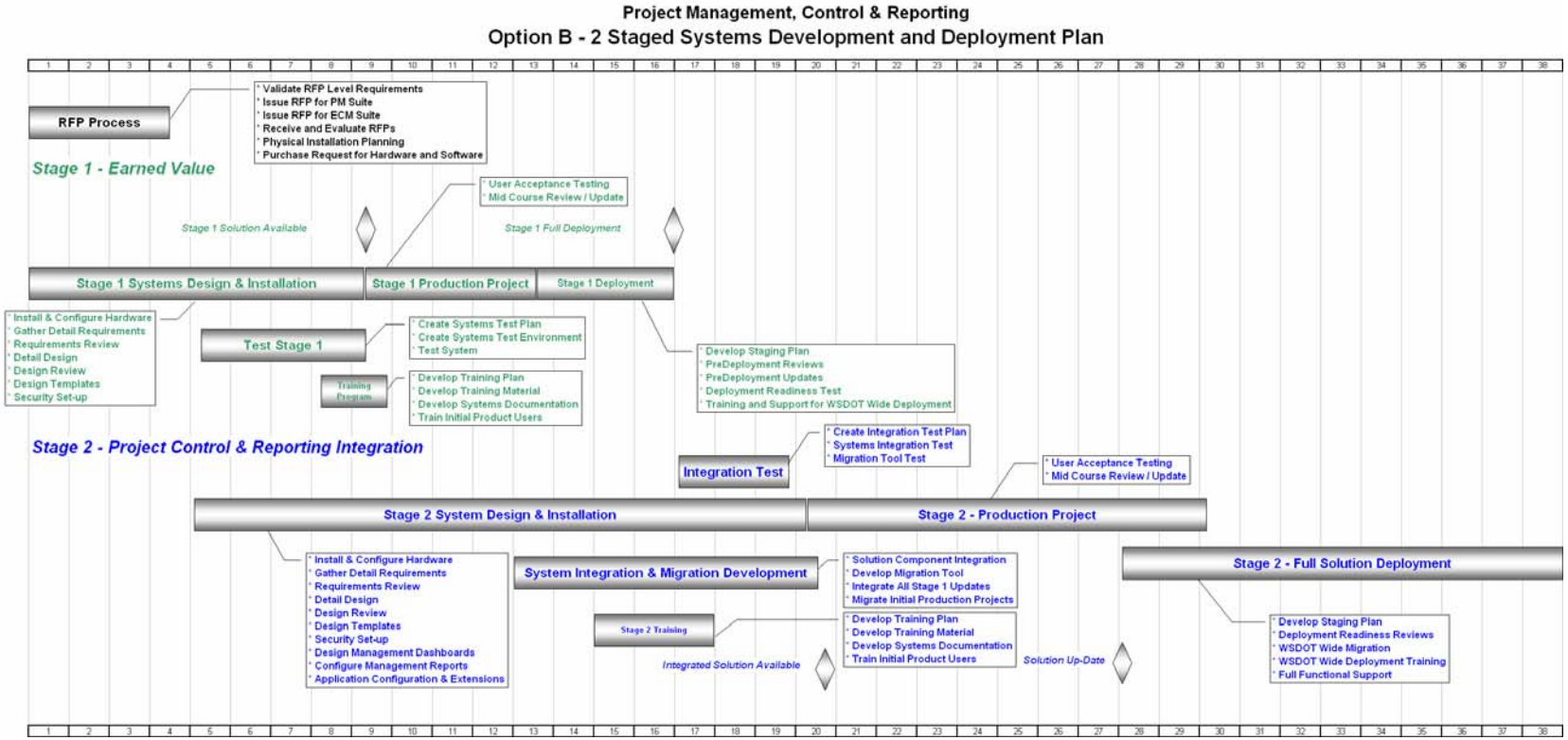


Figure 7 – Option B – Two-Stage Deployment



Business Justification

Implementation of an integrated project management process using industry-proven tools, methods, and BMPs supports WSDOT's goal of enhancing the day-to-day control of overall scope, cost and schedule of the capital construction delivery program. Incorporation of transportation industry Best Management Practices into project procedures and reports as well as deployment of web-based PC&R systems statewide is a critically essential solution to meet the rigorous demands of the program.

Recent experience within the engineering/construction industry, other state governments and federal agencies show that the benefits of implementing modern project control and reporting systems far outweigh their initial implementation costs, based on the overall program cost efficiencies realized by these organizations. Among these we mention: The Project Management Institute (PMI), Colorado State, North Dakota State Government, New York State Government, NASA and WSDOT's individual project experience.

Implementation of an integrated project management environment using the processes and tools recommended herein is estimated at $14-$16 million to support the envisaged WSDOT capital construction program of approximately $15 billion in value. SPMG estimates that WSDOT can expect to benefit in avoided cost increases ranging from $430 million to $540 million, an average B/C ratio of over 30 to 1.

Other benefits from implementation of such a program that are just as important include the following:

- Timely recognizing problems so as to resolve these before they reach the crisis stage of damage control
- Meeting needs for greater capacity
- Addressing workforce reality through increased efficiency to meet growing reporting demands with short staff resources
- Improved recording capabilities
- Improving Data
- Retaining productive processes and systems to the maximum extent possible.

SPMG's order of magnitude estimate of the benefit-cost ratio for avoided project cost increases stemming from unrecognized delay, poor management or contractor claims impacting overall program delivery is more than 30:1.

Section 2. Capital Construction Delivery Program

Overview

WSDOT is being challenged to deliver the largest program increase in the nation – a near tripling in program size. No DOT in the country could be expected to ramp up so dramatically in its program and project delivery capabilities without an investment in the resources and tools that are so vital to its success.

Within the family of DOTs in the U.S., WSDOT is considered to be among the leaders in its application of state-of-the art practices – in its environmental ethic, in its approach to environmental assessments and communicating with stakeholders, in its risk management approach to cost estimating, and in its application of performance measurements and reporting in an open and transparent way. These assets are useful and necessary but insufficient to handle the volume and complexity of an unprecedented program delivery challenge.

Delivering on WSDOT's capital program commitments will require the following:

- An expansion in available staff resources within the agency and even more so in outsourcing to its private-sector partners.
- Rapid and substantial improvements to its information technology focused on program management and project controls.
- The ability to respond quickly and decisively to the inevitable stream of changes that will arise as approximately 400 projects of varying size, complexity, functionality and location are advanced through the project-development process.

The actions required to enhance WSDOT's capabilities must be taken very soon if the fullest potential of resulting benefits is to be realized. Delays in implementing these actions will compromise WSDOT's ability to deliver the program.

Peer Review Synopsis

A Peer Review session held in mid-April 2006 after the March 2006 *SPMG Interim Report*[5] was published brought together senior SPMG members and WSDOT's EOC for an all-day work session. The goals of the Peer Review were to provide observations, insights and advice based upon the consultants' experiences with large, complex program management assignments. The EOC posed specific questions to the Peer Group as a means of articulating direction and advice from the assembled body. These questions were categorized into four topic areas as follows:

- Program Delivery Approach
- Program Management Issues
- Workforce Issues
- Organizational Issues of Immediate Import.

This section summarizes the Peer Review results while the remainder of Section 2 presents additional detail of various Peer Review and Strategic Plan findings and recommendations as related to these four topic areas.

WSDOT's Delivery Approach

WSDOT is facing a project and program management delivery challenge that stretches its capabilities in terms of current and near-term staff numbers and experience, as well as the limited capabilities of current financial, project and program management systems. At the same time, proclaiming an inability to deliver these projects is simply not an

option. The Peer Group acknowledged the groundwork laid by WSDOT in undertaking a strategic planning process by engaging the SPMG in a blended staff arrangement, further supported by additional GEC contracts to simultaneously manage an unprecedented number of mega-projects and other on-call procurements to assist with peak needs. They also acknowledged the implicit tradeoff between the degree of WSDOT control and degree of separate Program Manager accountability in comparing a blended staff arrangement to the more commonly applied delegated and incentivized Program Manager approach. The Peer Group also recognized the systematic and deliberative approach being implemented by WSDOT in the initial strategic planning process while noting the imminent need for a visible shift into a higher gear that would mark the conclusion of up-front planning, the adoption of a well thought out plan of action, and the widespread adherence to a "**mission critical sense of urgency**" that must resonate throughout the agency.

Key Peer Group Issues

Staffing: Despite authorization to add more than 400 new positions, WSDOT is losing rather than gaining ground in staffing. Retirements and resignations were occurring faster than recruitments at the time the staffing review was conducted. Furthermore, the SPMG team has also found it difficult to immediately fill WSDOT Tier 3 staffing requests. It was concluded that a much more creative, energized, and determined effort must be launched on a national (and potentially international) scale and that this should be a joint and integrated initiative between WSDOT Human Resources and the SPMG team. Furthermore, relaxation of potentially overly restrictive registration and professional certification requirements should be considered to achieve greater versatility and productivity from the current staff – without, of course, jeopardizing public safety or incurring unreasonable liabilities.

Incentives: WSDOT should seriously consider providing financial performance incentives for GECs and for other challenging project-specific outsourcing, as well as meaningful program and project management performance recognition for Department and SPMG blended staff.

Reporting and Managing Program and Project Changes: The Peer Group observed with absolute confidence that a program of approximately 400 new projects spanning a period of 16 years, many of which are in early, conceptual stages where the precise scope has yet to be confirmed, would of necessity undergo significant changes over time. And yet, legislated budgetary and programmatic constraints intended to "lock-in" early "guesstimates" of scope, schedule and cost were virtually guaranteeing an arduous, potentially contentious, and certainly belabored process of coping with such changes. ***The issue is not a question of reporting or of project delivery***. No state DOT in the country has done more than WSDOT to ensure transparency and accountability through frequent, candid and thorough project-level reporting – and this despite the fact that WSDOT project and program management systems are cumbersome and outdated. This commitment is also personified in the objective acceptance of responsibility for delivering every project contained in the total program. The issue is rather one of reasonable flexibility for WSDOT to anticipate and manage changes as they occur without suffering the massively disruptive process of stop / start change management characterized by a perennial need to seek prior, external

approvals for reasonable and defensible changes.

Flexibility for WSDOT to Manage Program and Project Changes: The Peer Group noted that WSDOT needs the flexibility to adjust project schedules and costs, and occasionally scope and funding category, by working with groups of projects on an aggregated program, or an aggregated corridor, or an aggregated geographic area basis. Such a process can and should be entirely transparent through detailed and high-level reporting and tightly managed by an upgraded system of program and project controls. The early and rapid development and implementation of program and project-level management systems is of the utmost importance if WSDOT is to have available at all management levels the tools needed for timely awareness and response to the inevitable array of issues and challenges that will arise. This can and should be done by building upon and integrating viable WSDOT systems components and state-of-the-art, widely supported commercially available software systems.

The "Rubber Band" or "One Degree of Freedom" Approach to Long-Term Program and Project Delivery: Knowing that changes over time were a certainty for a large collection of projects, some only "sketchily" defined, and yet mandated for delivery with a fixed scope, on a fixed schedule and within a fixed budget, the Peer Group suggested invoking an approach that would permit reasonable variations in at least one parameter or degree of freedom as a way of accommodating inevitable changes. Examples of such changes include schedule delays and cost and scope changes that could occur due to mitigation commitments, context sensitive design issues or if revenue collections deviated significantly from prior estimates. Key external stakeholders need to understand that factors beyond WSDOT's ability to control are likely to affect some projects so that the 16-year program might require 17 or 18 years to deliver or that pre-existing program funding may need to be used as a balancing funding source to ensure delivery of Nickel and TPA projects, and that some projects may need to be modified in concept and scope to pass a feasibility or cost-effectiveness test. If such possibilities were acknowledged to be likely during the course of project delivery and that flexibility for absorbing or coping with such program and project changes is essential to long-term WSDOT program delivery, then the probabilities for a successful prosecution of such a large program would be greatly enhanced.

Stakeholders' expectations need to change from: "Nickel and TPA projects will all be delivered exactly as described in the year shown and at the precise cost that was indicated up to 16 years earlier" to a different characterization that recognizes real-world exigencies, such as:

"Most Nickel and TPA projects will be delivered within a scope, schedule and cost that approximate estimates made when funding was first contemplated and commitments first made. Some will require a degree of modification to adapt and respond to changing circumstances that are inevitable with a large, long-term program."

This would provide a program of projects the size and complexity of those facing WSDOT, with its inevitable delays due to environmental processing, potential opposition or legal challenges, with the **"shock absorbers"** that enable a growing program to traverse the steep and uneven road ahead.

Program Delivery Approaches

Ensuring Accountability and Developing Incentive Behavior

WSDOT's approach to combining projects funded from new and previously existing funding sources, and managing that combined program with a blended staff of WSDOT employees and consultants, raises the issue of how to address accountability and foster a mission-driven sense of urgency for the TPA and Nickel programs. Some states have employed incentivized models for such programs, clearly separated from previous and ongoing "business as usual" capital program delivery responsibilities, with more of a "clock is ticking – finish line" mentality.

SPMG recommends that WSDOT investigate development of clear and compelling incentives / disincentives to help drive performance.

SPMG recommends that WSDOT stay the course on the program level (Tier 1), but consider giving the regions (Tier 2 and Tier 3) greater flexibility to delegate more responsibility to consultants as they deem necessary.

Financial Plan, Flexibility and Cost Risks

To accomplish program goals, WSDOT needs to acquire the tools to address major project changes, beginning with the flexibility to move dollars around within biennium budgets and among projects.

The cost of money itself over a 16-year period is a risk. WSDOT is already aware that some line-item program legislation contains unrealistic costs, particularly as related to real estate prices. This needs to be surfaced and addressed while WSDOT develops its contingency planning in parallel.

SPMG also recommends that the Legislature allow WSDOT to implement a non-project specific contingency account as a program-level management reserve. This recommendation will be refined in the July 31, 2006 Supplemental SPMG Report to the JTC and OFM.

The program's Financial Plan should embody all the tools needed over the life of the program, even if these tools are not immediately available to WSDOT and must be acquired incrementally.

Other Risks and Risk Management

Macro-level risk management is key to WSDOT's ability to deliver the capital program. WSDOT should identify macro-level risks and develop "Plan Bs" to manage them, including action strategies. These should be tied to the legislative timeline, with short-, medium- and long-term dimensions. The risk of project scope expansion caused by external requests (e.g., from communities) should be mitigated by a WSDOT "design-to-budget" mentality.

Ancillary Delivery Models

WSDOT has recently used a contracting procedure new to the agency on the Hood Canal Bridge replacement project employing incentives/disincentive cost sharing language with the contractor who operates under an open-book accounting system. The State has access to the contractor's cost records and shares with the contractor any saving or any overruns based on a negotiated formula. This is a follow-up to WSDOT's Office of Innovative Project Delivery. SPMG suggests that WSDOT examine the usefulness of similar but different, and some innovative, project delivery models, such as General Contractor/Construction Manager (GC/CM), the expanded use of Alliance Contracting, Design Build to Budget, bundling/packaging projects, contractors' Quality Control (QC), A+B bidding (I-405 Access Downtown Project), use of

consultants for construction administration, lump sum contracts for consultants, and user costs converted into liquidated damages.

WSDOT used A+B bidding on the I-405 Access Downtown project. This was a cost-plus-time bidding procedure. The low bidder was selected based on a combination of the traditional contract unit price items-based bid (A) and the time component proposed by the bidder to complete the project or a critical portion of the project (B). The time to complete the project (B) was assigned a monetary value and combined with the contract items-based bid (A) to select the contractor. The bidder with the lowest overall combined bid (A+B) was awarded the contract. In the actual contract, the contractor was only reimbursed for unit items (A). The time allowed to complete the project was set at the bidder's time component (B).

Ancillary Project Delivery Procedures
SPMG also suggests that WSDOT undertake a study of an Owner Controlled Insurance Program (OCIP) so as to determine the potential cost savings if feasible given the state's insurance position; seek methods to expedite real estate acquisitions through formation of a low-interest or interest free loan program to allow utilities access to the capital to implement timely utility relocations, and employ techniques for facilitating utilities or railroad coordination such as staff augmentation to assist in relocation or easement reviews.

Program Management Issues

The Peer Review found WSDOT's plans and procedures for work sharing through technology and approach to meeting the required Financial Plans and Management Plans for federally funded mega-projects to be appropriate. WSDOT's decentralized approach was also found to be good in reducing excessive workload on WSDOT senior management and reducing the risk of internal management bottlenecks.

Centralized Management Information Needs in a Distributed Delivery Structure
WSDOT's commitment to retaining lead responsibility for project delivery in the regions needs to be coupled with enhanced centralized and pro-active oversight. ***WSDOT HQ cannot provide effective program management and maintain accountability for program delivery without access to reliable, consistent data.***

The SPMG workforce assessment team met with capable, intelligent, thoughtful and willing regional and HQ human resources staff. They were uniformly committed to doing what it takes to deliver the program and generally forthcoming with the requested data (to the extent that data were available).

For instance, in completing the workforce assessment, SPMG encountered repeated examples of incomplete, inconsistent, and inadequate data, only partially attributable to outdated and incompatible systems. While preserving and enhancing each region's project delivery capabilities and encouraging regional innovation, centralized program management should provide to line management the situation in the regions at all times and be accountable for the accuracy of the data on which it reports.

On the other hand, the workforce assessment team encountered an inordinate need to explain what the data meant uniquely in particular regions, and even some reluctance to providing and/or being accountable for data and what those data represented. This is a particularly significant problem, given that a major strategy for managing peaks in resource needs is to redistribute and share work

among regions (see *Workforce Capacity and Responsiveness Issues*).

Common standards for collecting and reporting workforce (and other) data needs to be developed and insisted upon. WSDOT also needs to overcome data communications barriers among different offices, even at HQ.

Baseline Assessment

At the request of senior WSDOT management, SPMG has developed a list of targeted (not random) projects that are somewhat less defined in scope to be reviewed in Phase 2. These projects should be reviewed at the outset of Phase 2 to assess their budgets, scopes and schedules so as to draw inferences and identify potential "red flags" for the program as a whole and in particular for upcoming legislative action.

Early Cost Estimate Not Reliable: "...in 1994, the cost estimate for the Springfield Interchange project in Virginia was $241 million. However, it did not include such routine items as construction management, design, allowances for inflation, or contingency reserves. Today, (circa2002), the estimate is around $700 million.....Great care must be taken to assure that ...preliminary estimates are understood for what they are, and they do not serve as the predicate for project approval unless they are thoroughly examined and found to be accurate and complete."
Management of Large Highway and Transit Projects, Kenneth M. Mead, Inspector General, US DOT, May 2, 2002.

Working with Multiple GECs

SPMG suggests that WSDOT use lump-sum tasks with GECs where and if possible. WSDOT should also adopt and implement common management / control systems among all GECs.

The SPMG also suggests that WSDOT re-assess how it works with GECs. WSDOT should consider delegating more work to GECs if a project is lagging and lines of accountability are blurred, reviewing incentives in GEC contracts, and developing additional measures to incentivize the GECs.

Technology Opportunities

WSDOT should examine opportunities to enhance information technology efficiencies (e.g., electronic bidding, accelerated construction technologies, and traffic management technologies) that are innovative, improve efficiency, and/or provide other delivery benefits.

Workforce Capacity Issues

SPMG conducted an assessment of WSDOT's project delivery staffing requirements in response to the addition of the 2005 TPA projects to previous and ongoing project delivery commitments. This assessment was based on all projects funded under the PEF, Nickel and TPA programs funded from the current biennium to FY 2013-15, using the 2006 legislative capital program budget[1]. The Capital Projects System accounts for the primary phases of each project: PE, RW acquisition, and construction.

The need for more complete and consistent WSDOT data has been recognized and restricts the ability to reach definitive quantitative conclusions about workforce needs. However, the

[6] The Capital Projects System, Leg 06 Final, 5/30/06 lists all projects to be funded from the 2003 (Nickel) Funding Package, the 2005 Transportation Partnership Account (TPA) Funding Package, and Pre-Existing Funds (PEF) projects by phase. The Capital Projects System currently accounts for approximately $14 billion of the total WSDOT capital program.

following key findings (illustrated by Figures 8 and 9) apply:

- WSDOT clearly faces an immediate need to increase resources to undertake and complete its ambitious capital program from its current delivery capacity of 3,000+ FTEs to over 6,000 FTEs.

Figure 8 – Peak Staff Needs by Biennium

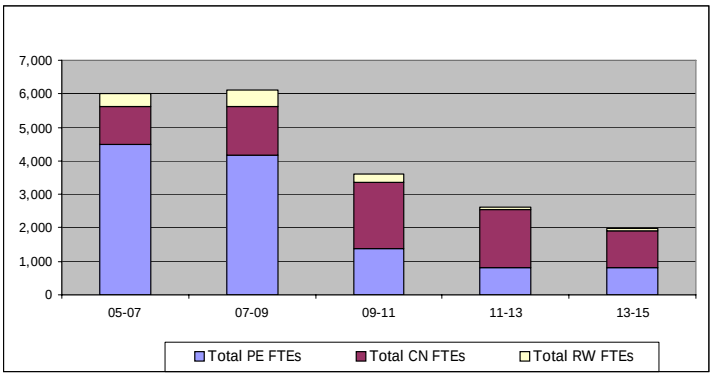
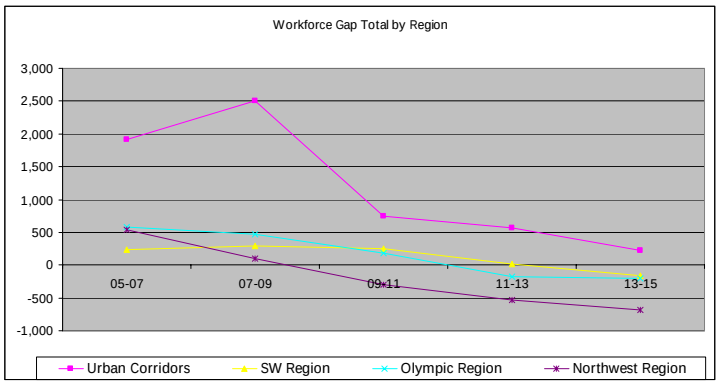


Figure 9 – Workforce Gaps for Selected WSDOT Regions



- Because the PE phase is relatively staff-intensive, the peak need for additional workforce precedes the time of peak dollar expenditure on new projects
- The figures a current temporary "peaking" in workforce needs, followed by an immediate and significant decline in those needs beginning in the 2009-2011 biennium, assuming current schedules are maintained. This argues for restraint in adding permanent new positions to the WSDOT workforce.

Another argument against making a major increase in WSDOT's in-house capital program delivery workforce is the limited availability of human resources available for recruitment to WSDOT under current circumstances. This is documented in the draft *Workforce Analysis Report*[1] and augmented in the Conclusions section of this Strategic Plan. WSDOT HQ and regional managers are currently implementing an action plan for the 18 recommended strategies in the draft *Workforce Analysis Report*[1] in an effort to address the staffing shortfall. However, the SPMG anticipates that this initiative will require time to mature and begin bearing fruit. (See next section.)

WSDOT's four regions in western Washington are together responsible for the major portion of the TPA-funded projects. These regions recognize the preceding patterns and constraints in determining their workforce targets, and have assumed that to perform anticipated projects, the workforce needed beyond these target levels will largely come from outsourcing to the private sector. Nevertheless, it appears that there is not enough local capacity immediately available to meet this current need.

The concerns noted previously lead the SPMG to recommend developing a risk mitigation strategy to address a worst-case scenario in WSDOT workforce levels. This scenario might assume a continuation of the current workforce level. Of necessity, this strategy will revolve around a temporary shift away from reliance on in-house employees toward even greater reliance on the private sector during the peak period at the Tier 3 level.

The other half of this recommendation deals with the consultant community's capacity to accommodate this increased reliance. Currently, there is remaining unused capacity within the local consultant market but SPMG estimates that the next wave of selections will more than absorb this capacity. (See Appendix 4 for Utilization of Consultants over the past ten years.) Accordingly, national recruitment campaigns will be necessary to address this requirement and this campaign is already underway. It will be greatly strengthened if WSDOT can clearly articulate and widely publicize the anticipated outsourced procurement schedule now for the next three years.

Workforce Analysis Recommendations

Following preparation of the February 2006 *Workforce Analysis Report*[1], which presented 18 strategies for enhancing WSDOT workforce depth and capabilities, senior management of the Department assigned to its Senior Leadership Group the task of refining the Action Plan presented by SPMG. The following summarizes this group's key findings and presents their recommendations.

Work Force Alignment

- Each region should have a clear, concise Strategic Delivery Plan that forms the basis of how individual project management plans can be deployed. Mission and goals need to be defined for each project and team to gain alignment and set expectations.
- Develop an internal communication strategy and marketing plan – Take strategies, materials, expectations to statewide meetings, to regional and division meetings, and to team meetings.
- Executive policy should be established to tie supervisory performance incentives to the timely preparation of performance evaluations. The performance evaluations would include the updated Performance Competencies information for each employee review.
- Structure a way to balance workforce between regions, acting as a consultant for other regions. Shifting work between regions to better utilize existing WSDOT workforce for the benefit of delivery.
- Develop an internal communications plan that is supported by resources necessary to maintain team alignment and successful delivery.
- Other areas to be discussed in further detail
  - Establish executive policy to formally incorporate a non-engineering tract for construction management and project management functions.
  - As a retention tool to remain competitive with the private sector,

"The Senior Leaders Group found the Strategic Program Delivery Plan – workforce assessment, to be informative and thought-provoking. With that said, numerous questions were raised regarding forecasted staffing requirements and retirement rates called for in the report. We encourage caution as we advance through delivery that the assumption of 450 new staff needed to deliver the program be continually reviewed and evaluated for accuracy.

As future leaders of WSDOT, we recognized the importance of our recommendations as we meet the challenge together in the successful delivery of the 15-year program. The size of the Statewide Program is like no other time and we appreciate the privilege to offer these work force recommendations to deliver this critical phase in Washington State's transportation future." *– Kevin Dayton and Keith Metcalf, Team Leads WSDOT Senior Leaders Group, June 2006*

provide for an automatic pay incentive for PE, EIT, and PMI certifications.
    - Office of Human Resources should aggressively recruit TE-1&2 candidates that will immediately placed by regions to fill staffing needs. This effort would improve the efficiency of recruiting/retention efforts.

Recruitment/Employer of Choice

- Brand WSDOT as an employer of choice:
    - Incorporate the brand into attractive 'leave-behind' write-ups of high-visibility and successful projects
    - Aggressively market WSDOT to potential candidates
    - Train existing staff in the WSDOT pitch
- Further develop and initiate activities that support WSDOT as an employer of choice:
    - Extended leave options (sabbaticals, maternity, education)
    - Employee development programs, in-training or apprenticeship strategies, locating design offices on college campuses
    - Educational scholarships tied to a commitment to WSDOT
- Develop a long-range staffing plan, 2008 – 2017.
- Leverage existing WSDOT talent through focused internal recruitment:
    - Formal program to move maintenance staff into engineering positions
    - Formal process to provide current staff training/education in different fields to enhance mobility options
- Use open recruitments at all levels for immediate hires:
    - Target lower-paying states and retiring military personnel
    - Advertise WSDOT in trade journals
- Create a more automated, agile management process for recruitments. Realize this increased recruitment effort requires additional staff support (increased HR resource).

WSDOT executives can authorize:

- Development of a comprehensive recruitment toolbox built around WSDOT as an employer of choice.
- Internal recruitment that identifies and targets employees with potential to fill higher-level skill positions.

Retention

- Eliminate the barrier that prohibits WSDOT from negotiating agreements with employees who are eligible for post-retirement employment.
- Fund and support the leadership enhancement and development program and expand advanced degree opportunities for employees in all fields.
- Work with DOP to increase WSDOT salaries to stay competitive with the market utilizing the most current salary survey.
- Use the In-Training Process to re-institute automatic promotions from E-1 to E-2 based on experience. Avoid the risk of promoting people who shouldn't be promoted by developing specific criteria for advancement.
- Reward and recognize significant career accomplishments (i.e., attaining PE license or PMI certification).
- Assign all new engineers a mentor at the mid-management level. Ensure that selected mentors represent the future of what WSDOT wants in a workforce.
- Interview employees who participated in the existing Mentor Program to

determine its effectiveness and how it should be improved.

- Recognize and reward exceptional job performance.
- Encourage the use of "pay for performance" when it becomes available to WSDOT.

Core Competencies

- Create a tool for the retention of knowledge by more formally defining critical experience that is required in the organization over the next 15 years:
  - Recognize Performance Competencies program developed by OHR
  - Utilize the Performance Evaluation process to update and monitor changes to critical skills needed for each position/individual
- Identify and evaluate what positions must carry a Professional Engineering requirement:
  - Evaluate existing positions and identify PE requirement based on definition of the "practice of engineering"
  - Identify impact for those working toward PE that they are able to serve under the "direction of an engineer"
  - Provide for an automatic pay incentive for PE certification/EIT certification
  - Maintain adequate PE candidates in the pipeline
- Incorporate Construction Project Management (CMP) occupational category and career path into WSDOT organization:
  - Utilize existing DOP occupational category that parallels TE classifications. CPM1 pay range starts 3% below TE1. However, CPM4 pay range is equivalent in pay and duties to a TE5
- Identify critical disciplines to target and develop enhanced certification programs such as Project Management and Construction Management
  - Develop Project Management Professional certification program using both external training (PMI), experience and evaluation
  - Provide a pay incentive for PMP certification.

Partnering with Industry

- Clearly communicate (both internally and externally) why WSDOT is pursuing the Partnering with Industry strategy.
- Perform thorough project analyses that examine work schedules and skill level requirements. The analyses need to be performed by regions, and need to factor in projections of true retirement numbers and FTE requirements. Undertake a detailed resource leveling exercise to determine where the project level work force needs are located. Document the problems and issues associated with impacts to program delivery to support future communication plans.
- Identify the potential for partnering with industry at the regional level. Re-run project schedules and budgets factoring in outsourcing costs and schedule impacts. Inform Governor. Brief Legislature.
- Encourage knowledge transfer between the industry and staff by modifying contract language to stipulate project knowledge transfers. Identify specific knowledge to be transferred and to whom. Develop employee policy and guidance to require staff to seek out knowledge transfers. Utilize retirees as consulting

staff to mentor junior staff in addition to providing contract administration.

Organizational Issues

Working with Resource and Review Agencies

Given the workforce constraints described previously, WSDOT needs to develop an approach to such agencies as the Federal Highway Administration (FHWA), federal and state environmental review agencies, such as the Army Corps of Engineers, the railroads, utilities, etc. that goes well beyond its traditional relationships with these agencies.

The SPMG recommends that beginning at the highest levels, including the Governor's office and proceeding on to the working level, WSDOT engage these agencies as partners in a cooperative effort to implement the needed and long delayed, capacity, safety, and operational transportation system improvements that constitute the WSDOT capital program.

Upcoming Audit

The State's $4 million audit of the TPA program is not scheduled to be completed until March 2007. WSDOT will not be able to await the audit's findings and recommendations to begin to make the kind of program improvements recommended in this report, but it can begin to anticipate the nature of the audit's areas of interest because of the common nature of such audits. At this time, WSDOT needs to concentrate on the big-picture, "macro"-level program issues, particularly the two major challenges of workforce retention and expansion (along with its related expansion of consultant support) and implementation of new and replacement systems required to support a program of this scale.

Audits tend to address more specific, less "macro" issues, and WSDOT can schedule and prepare to respond to and incorporate the audit's recommendations into the program when those recommendations become available next March. For example, any audit can be expected to be particularly concerned with how monies are tracked and accounted for. The essential systems improvements that have been recommended can go a long way toward meeting both shorter-term needs, including those of the audit itself, and any longer-term recommendations that come out of the audit.

Costs Escalation

As discussed earlier in the chapter, escalating project costs are worrisome because basic cost assumptions were fixed, along with year of delivery, when the funding packages were initially developed. Since this time, real estate prices and construction costs have escalated dramatically – in Washington and throughout the country. WSDOT is in the process of updating project costs, using recent bid information and the resulting changes in unit prices and inflation projections for future years of the program. As described in previous sections, the need forflexibility to adjust at least one of the variables of project scope, schedule or budget will be required – while retaining oversight and accountability. Recommended change management process modifications are described later in this chapter. In addition, the cost escalation issue must be surfaced for public and legislative understanding as soon as possible.

The SPMG urges development of action strategies on several levels. Among these is the need to begin to develop an adjustable, prioritized "Watch List" of projects – described later in this chapter – that can facilitate decision-making as project scopes change and/or costs escalate beyond available cash flow of the

biennium so as to be able to manage changes while still committed to delivering every project in the overall program. Among the difficult decisions that may need to be made under such circumstances is when to defer certain projects.

Local Control over Projects

Municipalities and other local jurisdictions have asserted a desire to control certain projects, particularly those with specific land use implications at a particular location, such as ferry terminals and even the Alaskan Way Viaduct. The number of such projects, in the context of the entire capital program, is not large though the order of magnitude costs of these is certainly significant. In some cases, the Nickel and TPA funding has been viewed as an opportunity to realize some long-desired local land use improvements, and the localities want to define and "own" the nature of the transportation project to maximize such local benefits.

However, a transfer of lead responsibility for any of the projects to local control would be contrary to WSDOT's commitment to its strong State ownership role. Moreover, there are potential specific dangers both to the WSDOT-promised delivery schedule and to project definition (and, hence, budget). SPMG recommends that WSDOT retain project control but engage localities in a partnering relationship, not unlike that recommended for WSDOT's relationship with federal and state resource and review agencies. Again, this would go beyond WSDOT's traditional channels of communication with local officials and agencies to engage them pro-actively in a mutual effort to expedite project delivery and control costs.

Critical Staffing

In addition to the findings and recommendations of the workforce assessment, there is a specific need to address certain specific regional staff needs at the PE and assistant PE levels that could impact a large number of small projects in the program. Currently, WSDOT does not possess the depth of staff resources, for example, to backfill immediately upon the loss of one key PE. This will affect smaller projects in particular.

SPMG recommends that WSDOT provide organizational support across the program that can respond to the lack of depth in staff resources in any one region and prevent schedule slippage in the delivery of the many small capital projects in the program.

SPMG Tier 2 and 3 Support

Additionally, as described earlier, there is a need to develop greater accountability and authorize the regions, as part of Tiers 2 and 3, to more directly delegate work to consultants. As part of the management aspects of the implementation plan for Tiers 2 and 3, it is recommended, among other things, that a single point of contact for WSDOT be designated, the process for staff selection be documented, and alternatives be provided to the regions on how Tiers 2 and 3 positions can be funded. An action plan for Tiers 2 and 3 resource deployment has been presented to WSDOT for Phase 2 implementation. In addition, enhancement of Tier 1 support by SPMG is to be developed.

Communications

The importance of WSDOT telling its story externally and internally has been recognized by WSDOT leadership. This needs to be sustained and strengthened at all levels of WSDOT.

Describing the exciting capital program being undertaken can help in recruiting the right talent to WSDOT's workforce, as well as in retaining existing staff. Describing the realities faced in delivering the program, and continually updating information on program progress and challenges, including cost escalation – while simultaneously developing and implementing contingency / risk management plans – will help in managing public and legislative expectations.

Oversight and Accountability – Change Control

Change Management Issues

Change is normal on any project. Changes occur during the planning, design or construction phases for a variety of reasons and should not be unexpected. Management of change is handled by a number of methods, including risk management, contract administration and change control. The process for change control includes the following common goals:

- Timely identification and evaluation of potential changes as soon as they become apparent
- Prompt evaluation of the change's justification and impact
- Expeditious approval or disapproval of the change.

Managers in charge are required to follow specific procedures when a material change in the ongoing work is proposed or precipitated by project circumstances. The procedures are designed to achieve the following:

- Formalize the assessment of proposed changes to measure benefits to the project element being changed as well as the effects on other project elements, cost or schedule
- Ensure that the cost and schedule impacts of making the change are accurately estimated and considered prior to initiating the change
- Advance the decision making to the level of authority where approval or denial rests
- Provide a timely process to rule on changes
- Minimize the time required to assess and act upon a proposed change
- Allow implementation of essential changes during construction with minimum delay
- Standardize the change process to provide an accurate record of changes to the project and the decisions that led thereto
- Reduce or mitigate future changes through assessment of past changes.

A change can affect project participants beyond the individual who proposes, causes or first becomes aware of the need for the change. Some apparently beneficial changes may have consequent adverse impacts on other facilities or components. These adverse impacts could be so negative as to preclude the adoption of the proposed change. Thus, when changes are anticipated, each must be processed through a control system that verifies that the change is beneficial and/or necessary, maintains integrity of the design and informs all key project participants that the change is occurring or is about to occur.

There are several ways to control changes. One way is to transfer the risk of a change to another party by using alternate project delivery methods such as design-build, CM-at-Risk or design-to-budget contracts.

Another way to control changes is to provide a different way to deal with the change. For example, the contract documents could require that no cost changes are allowed for quantity increases or decreases to the quantity shown on the bid list for changes

less than a specified amount, say 15 percent.

A third way to control changes is through procedures used to identify, track and approve the change.

The primary responsibility for identifying and tracking changes should be with the PE who serves as the PM. This person is the most familiar with the project and should be the first to recognize or act when an actual or potential change becomes apparent. If the PE is not functioning as the PM, the PE should notify the PM immediately of potential change issues. The PM should prepare a risk management plan during the early stages of a project when budgets and schedules are being established to identify the most likely risks and include appropriate contingencies in the schedule and budget. An analysis similar to the CRA or CEVP® process can be used for this exercise.

As soon as a change becomes apparent, the PM should prepare an estimate of the range of the cost or schedule implications of the change. The change should be evaluated to determine if it had previously been anticipated and accounted for in project contingencies or if this is an unanticipated change.

At this time a decision is made concerning the use of available contingency to account for the change. Caution should be used to not deplete the contingency too early in the evolution of the project. The change should be evaluated in light of the anticipated risks to determine if the contingency should be applied to all, some or none of the change and a corresponding reduction in the available contingency is made. The impacts are then incorporated into the cost and schedule to complete the project.

Approval Authority

Procedures for obtaining approval of a project change are presented in WSDOT's *Project Control and Reporting Manual*[7], Section 4 and Appendix C. The Department controls the approval of changes in a project's scope, schedule or budget using the Project Control Form (PCF). The PE should be responsible for completing the PCF and prepare any supporting documentation for a change in a project.

Prior to the advertisement of a construction contract, funding approval is needed to confirm the availability of funds. A PCF is prepared when any change impacting the scope, schedule or budget of a Nickel / TPA-funded project is identified in CPMS. After contract award, a PCF is prepared if approved change orders cannot be accommodated within established project contingencies and exceed project cost thresholds or if the "Operationally Complete" milestone is impacted. An exception to the PCF submittal requirement is allowed for cash-flow adjustments less than $100,000 that cross biennial lines that do not involve a cost, scope or schedule change. Other post-contract award changes are processed through the Construction Change Order process.

Changes to Nickel / TPA-funded projects require approval from the Legislature. Changes in the legislatively budgeted cash spending of Nickel and TPA projects require approval from the Legislature if it is in session. If the Legislature is not in session, changes can be made with OFM approval. Changes to all rail projects must be approved by the Legislature regardless of the magnitude. Table 2 identifies the thresholds for approval of PEF and Nickel / TPA projects.

Table 2 – Change Control

Change		Threshold	Approval Level	
			PEF	Nickel / TPA
Cost	Minor	Changes up to $200K for projects < $2M Changes up to 10% for projects > $2M and < $10M Changes up to $1M for projects > $10M		Legislature or OFM*
		Changes up to $400K for projects < $2M Changes up to 20% for projects > $2M and < $10M Changes up to $2M for projects > $10M	Improvement & Preservation Program Mgrs.	Legislature or OFM*
		Changes above HQPM Level, up to $3M		
		Changes above HQ PM Level, up to $3M	Asst. Dir. PC&R	Legislature or OFM*
	Major	Changes above $3M	Secretary Eng. & Regional Operations	Legislature or OFM*
Schedule	Minor	Advances or delays that can be accommodated by current biennial cash flows	Asst. Dir. PC&R	OFM
	Major	Advances or delays that CANNOT be accommodated by current biennial cash flows	Director, PC&R Sec. Eng. & Reg. Operations	Legislature
Scope	Minor	Changes to original planned improvements that do NOT alter the functional intent of the project as funded by the Legislature	Asst. Dir. PC&R	OFM
	Major	Changes to original planned improvements that SIGNIFICANTLY alter the functional intent of the project as funded by the Legislature	Director, PC&R Sec. Eng. & Reg. Operations	Legislature
Program		Unprogrammed projects	Secretary Eng. & Regional Operations	Legislature
		Deleted projects		

* ESSB 6241 permits OFM to approve spending changes when the Legislature is not in session.

On the I-90/EB Off Ramp to SR 18 Project, the low bid came in at approximately 3% over the final engineer's estimate, but at over 30% above the original engineer's estimate, which was the amount budgeted for the project. Even if the project comes in on budget, relative to the awarded low-bid, it will significantly exceed the budget and show up as a large cost overrun.

When a project has a PE cost overrun, this increase will sometimes be paid for by drawing funds from the CN phase into the PE phase. But the money is still needed for CN and this results in a project cost overrun. The overrun can happen without any notification to Headquarters. *Source: WSDOT*

The thresholds for highway and ferry projects requiring legislative approval are defined as those changes that would result in the following:

- Change costs that cannot be accommodated within the current biennium cash flow
- Delete a programmed project
- Add a project not already programmed
- Permit a schedule advance or delay that cannot be accommodated within the current biennial cash flow
- Entail major scope changes that significantly alter a project's functional intent.

Changes to Nickel / TPA funded projects below these thresholds are approved by the either OFM or the Legislature based on ESSB 6241.

Section 603 Budget Transfers

Recognizing that some changes will be needed in the program, the Legislature has provided for the reallocation of funds between projects when it is not in session. The transfers must meet the requirements of ESSB 6241, Section 603, which provides conditions for the transfer of funds into or out of these projects. Briefly these conditions are as follows:

- Transfers between projects can only be made within each specific fund source (i.e., funds from a TPA project can only be transferred to another project on the TPA list)
- Transfers from a project may be made if the project is experiencing an unavoidable expenditure delay. The funds must be restored to the project when the delay has ended
- Transfers FROM a project cannot be the result of a reduction in the scope of the project
- Transfers TO a project cannot be made to accommodate an increase in the scope of the project
- The transfer of funds between projects cannot occur until the Director of OFM determines the resulting change will not adversely impact the completion of the projects approved by the Legislature
- Transfers may not occur to projects not on the applicable project list
- Transfers may not occur when the Legislature is in session.

Reporting Changes

The Department uses the "Beige Pages" in the *Gray Notebook*[8] to provide advance information about potential or proposed changes. The Beige Pages have three subsections for providing information on changes:

1. The "***Watch List***" identifies projects that have a specific risk that could trigger a change requiring either OFM or Legislature approval. As soon as a specific risk is identified for a project, it should be added to the Watch List. A description of the risk and its cost and/or schedule impact are provided. The project remains on the Watch List until the risk is removed or a change actually occurs.

   Risks that are identified through the CRA or CEVP® process should not be placed on the Watch List unless the risk actually manifests itself on the project. These processes are excellent tools for identifying potential risks and proposing mitigation to prevent the risk from occurring or limiting its impact if it does.

If a change does occur, the project is added to either the "***Adjustments to Delivery Planning***" or the "***Opportunities and Options for Legislative Consideration***" lists, depending on the level of approval required.

2. If the change only requires approval by OFM, it is added to the ***Adjustments to Delivery Planning*** list. Once approved by OFM, the changes are incorporated into the program; the change is reported to the Legislature; and the project is removed from the list.

3. If the change meets the threshold requiring legislative approval it is added to the ***Opportunities and Options for Legislative Consideration*** list. Once the Legislature approves the change, it is incorporated into the program and the project is removed from the list. No action on the opportunity or option is permitted until the Legislature approves the course of action.

Change Control Recommendations

Objectives

1. ***Develop efficient processes for managing changes in a project's scope, cost, or schedule that balance accountability and achievement of the public's trust while avoiding unnecessary delay or indecision.*** Such delay or indecision could actually increase cost and schedule of the project as a result of inefficient processing of warranted project changes. Ironically, the unwieldy and time-consuming nature of the current process requiring external approvals of relatively modest changes in schedule, cost and scope are virtual guarantees that significant schedule slippage will occur in delivering many, if not most, projects since changes in some aspect of a project's characteristics are the rule and not the exception. If WSDOT is to have a fair chance of delivering the program on time, within budget and within a scope that is tailored to the purpose and need of the project then significant simplification and delegation of approval authority in the change process is essential. Reporting and accountability for such changes can remain detailed and undiminished. But slowing or stopping the project development process to accommodate such a cumbersome process will have the unintended consequence of necessitating additional budget and schedule changes that account for the lost time and wasted effort.
2. ***Provide greater flexibility to the Department to act on an opportunity or option regardless of when the Legislature is in session.*** Since the Legislature is in session for only part of the year, this could cause the Department to miss opportunities for some beneficial changes or limit the options available to control a change. There should be no difference in the Department's ability to react to events due to the time of year.
3. ***Provide greater flexibility to the Department to reallocate funds to or from projects with minor justified scope changes.*** Encourage minor scope changes that keep projects on schedule and allow Departmental processing of minor scope changes with only a review by the Legislature rather than approval.

To achieve these objectives, we recommend the following:

- Establish reviews and decision-making authority at high enough levels to discourage unwarranted change and

encourage innovative ways to keep projects on track while delegating authority to the lowest level appropriate for dealing with the consequences of the decision.

- Place more accountability on the regions and Project Managers for early identification, mitigation and to the extent feasible, relatively "painless" accommodation of potential changes.
- Re-establish the Screening Board or a similar committee with OFM participation to allow for a more thorough evaluation of proposed changes and to provide more detailed substantiation than the Quarterly Project Reviews that are general and lack detail.
- Delegate authority to the Department – and establish thresholds similar to those for PEF Projects – for approval of routine changes. Document and report routine changes to the Screening Board monthly for consent approval.
- Revise upward the "dollar" thresholds established for cost and scope changes to recognize the dynamics of the marketplace in terms of escalation of capital costs. Index the thresholds, or at least revisit them annually.
- Increase the use of contracting mechanisms that encourage control of scope, cost and schedule, such as lump sum, "design to cost," and schedule-based incentives and disincentives.
- Institute an annual Program Financial Feasibility Plan Update that accounts for all known changes that have noticeable impact on scope, schedule and cost of all known projects (including minor project changes, statewide revenue estimates and projections, changes in interest rates, national cost trends) in a report to the Legislature that assesses the cumulative impact on the financial and schedule feasibility of the program and identifies project, program and financing alternatives for accommodating significant adverse changes.

Coordination with JTC Budget Study

As per Section 219 of ESSB 6241, SPMG has been coordinating its work with a number of on-going legislative activities, including the JTC budget study. This JTC study addresses the following three areas of the WSDOT budget process:

1. Program Structure
2. Budget Process
3. Budget Communication.

With respect to change management, a key issue raised in the Budget Process section of the study correlates with balancing accountability and effective program delivery. While the identification and commitment to delivering specific projects as scoped is viewed as key to winning the Legislature's confidence, the study notes that few peer states fund projects on a line-item appropriation basis. Many states do list specific projects and associate these with a program-level appropriation. Table 3 is extracted from the *JTC Budget Methodologies Study*[9] presentation of April 20, 2006, made to the JTC.

Table 3 – Project vs. Program Appropriations

Level of Appropriation	Resulting Ability to:				
	Gain Public Support for Revenue Increase	Manage Change	Fund Use and Transfers	Monitor Delivery	Monitor Outcomes
Program	Low	High	High	Low	High
Groups of Projects	Med	Med	Med	Med	Med
Projects	High	Low	Low	High	Med

Source: CSI

"The evolution of project definitions, scope, budget, and schedule, and its impact on reporting (for accountability), is the single biggest cause of frustration with the budget process."

JTC Budget Methodologies Study, April 2006

SPMG comments on selected study recommendations are provided in Table 4 as follows:

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Table 4 – SPMG Discussion of Key JTC Budget Methodologies Recommendations

JTC Budget Study Recommendation	SPMG Comments and Expansion
1. Clarify process for approving transfers between Nickel and TPA projects	Ongoing meetings with OFM and Leg staff are underway for this item.
2. Increase flexibility to transfer funds between (programs) building on existing guidelines for (PEF) projects	Concur.
3. Increase flexibility to manage multiple dedicated funding streams (e.g., fed funds on Nickel/TPA projects)	Provide legislative authority to allow WSDOT to act but review each project as to appropriateness based on overlaying added federal processes that could increase costs or add delay.
4. Develop guidelines for removing a project from a program if its merit, relative to cost, changes significantly	Concur.
5. For new revenue packages, appropriate funds at the program level (w/lists) or by group of projects	Concur.
6. Clarify the role of Legislature, OFM and WSDOT in project prioritization	WSDOT should provide guidance to the Legislature as to initial project prioritization and modifications of those priorities, including scope changes, recognizing the need to balance approval authorities and the time necessary for those approvals with the need to effectively manage the timely delivery of the program. Consideration should be given by the Legislature to the establishment of programmatic priorities with day-to day management of project actions delegated to WSDOT with review by OFM and/or the Legislature.
7. Over time, establish a threshold for reporting project status	Management and measurement of project status is needed for all projects but differing levels of detail are necessary for reporting dependent on the significance of the issue and the particular needs of the report recipient. Thresholds should be established for differing levels of report detail consistent with the thresholds of approval of various actions. The 'Beige pages' tend to provide this approach currently. If approval processes are modified, the reporting should be consistent with those modifications and recognize the need to use resources efficiently.
8. Representatives from WSDOT, OFM and Legislature should meet to review existing reports and determine: a. If basic reporting needs are met and, if not, what is missing b. Are any existing reports unnecessary/duplicative c. The appropriate frequency of issuance for each report	A January 2006 workshop was held to accomplish this as part of the SPMG effort. On-going discussions with key participants are taking place. The SPMG Final Report Appendix 2 presents recommended prototypical report layouts. These would be issued quarterly and available on a website for ease of access if the proposed systems are funded and implemented.
9. Coordinate this review with Critical Applications Replacement Design, SPMG efforts and GMAP requirements	On-going coordination with OIT's CARD efforts and GMAP is taking place.
10. In conjunction with the introduction of a higher-level program structure, WSDOT should consider implementation of an overall (web-based) program dashboard	The SPMG hybrid systems solution contains these features.

Section 3. WSDOT Business Practices and Systems

PM Best Management Practices

WSDOT's business is to deliver the capital construction program with quality results, be accountable for this delivery on time and within budget and report the delivery status accurately and in a current time frame. To do this, use of efficient business practices and processes are important contributors to success. This section identifies gaps between industry Best Management Practices (BMP) and current IT supported tools and WSDOT business processes. This gap analysis assists in formatting the recommendations for the enhancement of WSDOT's current project management processes and software applications.

Industry Best Practices

This section identifies the major elements that comprise industry standard project management best practices for delivery of capital projects, compares and contrasts these elements with WSDOT practice, and identifies gaps that exist between standards and current practice. Considering the wide variation of projects, these Best Management Practices provide the frame work for developing and maintaining project control functions allowing the flexibility to be tailored to the specific needs of the project or program.

This gap analysis evaluation is oriented toward WSDOT projects that operate within the funding context relative to the Nickel and TPA transportation funding packages. Sources for information regarding BMP descriptions include civil works consulting practices, Department of Defense, PMI, various WSDOT manuals, and national standards such as ANSI / EIA-748-A.

WSDOT practices are compilations taken from the current working knowledge of WSDOT, WSDOT manuals and guidance-printed and on-line), and interviews with various WSDOT PEs. WSDOT's actual practices have included results of the recent SPMG *Project Control and Reporting Survey*[2] and the January 2005 JLARC *Overview Report*[3].

Documented BMPs help PMs and WSDOT successfully deliver projects. Success is achieved when the scope of work is completed on schedule, within budget, and meets quality standards. In order for PMs to accomplish their project goals, they need knowledge, experience, and tools. The following provides the details from which the analysis is derived.

Project Management Plan

WSDOT requires the team that delivers the Plans, Specifications and Estimates (PS&E) phase of a project to develop a Project Management Plan (PMP) (e.g., a Work Plan) that is scalable based on the project size. The goal of the PMP is to be comprehensive, realistic, endorsed by all team members, and implemented. The PMP is submitted to Headquarters and reviewed by executives during regional Quarterly Project Review Meetings.

Currently, PMPs vary from Project Manager to Project Manager, and project to project. WSDOT recently issued a standard format for all PMPs. However, major projects that have federal funding and exceed $500 million are required to follow the FHWA PMP Guidelines. Those projects that follow the FHWA Guidelines will meet the intent of the WSDOT PMP format. WSDOT needs to emphasize the production of PMPs for small-to-moderate-sized projects.

Scope Management

WSDOT Scope Management practices vary depending on the experience and management expertise of the Project Engineer (PE) responsible for managing the project. Most PEs will have greater and more specific details in the project scopes when they are applying other BMP project-control functions, such as schedule and cost-control practices.

Work Breakdown Structure

A standard project control method is to employ a Work Breakdown Structure (WBS) to code and track activities, resources, functions and progress of work. This hierarchical method is used to integrate budgets, costs incurred and work accomplished into a single record for tracking and reporting purposes. WSDOT has a number of stand-alone WBS templates (e.g WSF Vessel procurement and the CCIS construction WBS) but does not currently have a refined standard WBS for all types of projects that reaches across all phases of the work. WSDOT does have an established standard list of deliverables called the Master Deliverable List (MDL). Attempts to use the MDL as a WBS has led to difficulties in controlling and reporting work. However, the MDL contains deliverables and milestones that should be included in the project schedule. The MDL is broken down by project phase and project elements. Although it appears to be a comprehensive list, a focused effort should be undertaken to clean it up so it will become usable with a standard WBS. WSDOT could benefit by establishing standard WBS templates for small, moderate, large, and major projects. Project teams could start with one of these standard templates and the MDL to flesh out a project-specific WBS and schedule with standard deliverables and milestones identified. Compliance with a standard WBS will occur only after a workable WBS, incorporating MDL items, is established.

Risk Management

WSDOT has very specific risk management policies and procedures. All major WSDOT projects are following the CEVP® process. However, there appears to be a need to implement a more universal approach to risk management on small-to-moderate-sized projects which need more emphasis on the CRA process. Although most WSDOT PEs are aware of project risks, they do not necessarily follow standard risk assessment procedures. The results of the survey undertaken by the SPMG indicated that WSDOT staff believes that gaining more skill in this area is critical to enhancing future performance.

Cost Estimating

Estimating is an integral part of the project management process within WSDOT. When applied as a linear process, the Estimates and Bid Analysis System (EBASE), WSDOT's Design Manual, and CEVP® work together to ensure that total project costs are accurate at a specific point in the development cycle.

Nevertheless, there are some gaps. The design estimate is defined as the effort that it takes to produce an Advertisement-Ready set of documents. The cost estimate for this effort is generally a factored estimate based on the total cost of the project. WSDOT currently uses a factor of 10% to calculate the effort required.

The construction estimate is developed as the project moves through the various stages of design. Standard estimating techniques are used to estimate the initial construction cost that is developed through the use of cost per square foot or cost per lineal foot. As design progresses, detailed estimates are generated using EBASE.

WSDOT's current cost estimating process is adequate for the majority of WSDOT's standard projects. On occasion, WSDOT will receive external direction to include a poorly defined project which lacks adequate detail in the cost of the proposed solution concept. The need for parametric estimating to quickly assess the future cost of this type of proposal is lacking.

WSDOT has developed a sophisticated risk-based assessment process that it employs to estimate the probable construction cost of large-scale projects. This process has proven reliable for a number of jobs in the past. Due to recent cost escalation issues being experienced in the market place, WSDOT has issued guidance to PEs to update cost estimates for projects going to construction this biennium and to include more recent historical bid prices in the calculation of construction costs. To facilitate these updates, WSDOT has also added to EBASE's functionality the capability of applying current contractor unit bid prices to their cost estimates. Nevertheless, there remains the need to comprehensively assess the overall program's estimated costs against an economist-based scenario of rising costs escalation and rising interest rate environment.

Cost Management

The current WSDOT process includes estimating project costs based on the WBS, project resources, schedule, and historical bid items. This includes budgeting to the specialty group (Bridge, Environmental, Landscape Architecture, Real Estate, and others) level. Budgets are aged by month. Estimates include an appropriate contingency allowance if they are based on the results of CEVP® or CRA, to account for identified risk areas and inaccuracies in the cost estimating process. WSDOT's cost control requirements are not clearly identified since risk premium cost estimating is not a common practice outside of the CEVP® or CRA process. WSDOT selectively uses the CEVP® and CRA processes to provide a range of costs, including risks. Refer to the Risk Management sections for more details on CRA and CEVP®.

WSDOT actual processes for cost estimating, cost budgeting, and cost control varies greatly. Most WSDOT projects have reasonable cost estimates, but the method varies depending on size of project, region, and other factors. The cost budgeting based on to a WBS only occurs about 60% of the time, according to the recent SPMG Project Controls survey. Utilization of cost-control measures, such as Earned Value monitoring, usually does not occur. Predictions of cost and schedule at completion are even less common. The majority of cost management BMP practices within current projects consists of reporting the actual dollars spent against the budget without the benefit of projecting a cost at completion or estimating an independent cost to complete. A revised WBS, tools, and training are required to implement cost-control procedures.

"To avoid costly delays, the work schedules of the various contractors must be coordinated, and progress measured to judge whether the contractors will be able to complete the project on schedule and within budget....Given the complexity typical of large projects, delays by one contractor can have a domino effect, and use of an integrated (master) schedule is a prudent business practice." - *Management of Large Highway and Transit Projects, Kenneth M. Mead, Inspector General, US DOT, May 2, 2002.*

Schedule Management

All projects within WSDOT have access to the Project Delivery Information System (PDIS), which is a tool for project planning, scheduling, resource balancing, and cost management. The Project Delivery Information System (PDIS) incorporates PS8 as a scheduling tool. However, scheduling is currently being done with the use of several commercial off-the-shelf software packages. These packages include PS8, Microsoft Project, Primavera, P3 e/c and SureTrak. A consistent scheduling tool and a set of scheduling protocols need to be established within WSDOT if the desired enterprise (roll-up) reporting is to take place.

Document Control

On the design side, WSDOT does not have a formalized document control system. Part of the SMPG effort is targeted at developing and implementing a modern document control system. There are requirements for project documentation such as the Project File and the Design Documentation Package (DDP). The DDP is a specific list of project files that is archived for 75+ years. There are also some specific processes and policies for certain WSDOT sub-functions such as Work Order Authorizations, invoice processing, etc. These sub-functions have well-documented processes and procedures, which is the first step in establishing a complete document-control system.

Without a formal Document Control System within WSDOT, a significant amount of effort would be required to set up standards for projects, and even more effort if an enterprise level system is desired. Two of the major projects within the WSDOT Urban Corridors Office (UCO), SR 520 and the Alaskan Way Viaduct/ Seawall Replacement Project, are in the process of setting up document-control processes. These projects are phasing in the system in the following stages:

1. Invoice process within the project and between the project and UCO
2. Development and execution of Task Orders within the project
3. Tracking all incoming correspondence into the project and distributing it within the project
4. Tracking all project related deliverables between the consultant and the agency.

Some construction projects use a more formal document-control process for tracking deliverables. Programs such as Primavera Expedition are currently being used on the Hood Canal Floating Bridge, Tacoma Narrows Bridge, and the I-405 Kirkland Stage 1 projects. Northwest Region is using Expedition to track correspondence, change order values, submittals, and Requests for Information (RFIs). The Columbia River Bridge project is using ConstructWare to track documents. Design offices could benefit from the use of electronic document-control procedures and tools that are currently used by a number of construction offices.

Earned Value Management System

WSDOT does not specifically require application of Earned Value (EV) methods or strict adherence to an Earned Value Management System (EVMS). However, WSDOT expects their PMs to:

- Measure project performance
- Identify variances and their sources
- Forecast project performance
- Manage project variances and indices.

Certain regions and organizations have specific methods and programs for measuring performance, including EVMS. However, without a standardized system and tools compliant with an EVMS, WSDOT PMs have to build and maintain

offline tools that may or may not be suitable, easily updated, or accurate given the current systems and tools in place. It is very difficult for WSDOT PMs to forecast project performance with readily available WSDOT tools. A consistent EV process, tools, and training are required for a successful EV management approach to project management.

Change Management

WSDOT has three primary mechanisms in place to monitor and control project scopes, schedules, and expenditures. The first is the PCF, the second is the Work Order Form and the third is the Quarterly Project Review (QPR) meetings.

WSDOT's PCF process is legislatively oriented at the TPA and Nickel program levels and is very similar to the CALTRANS process. WSDOT has replaced its practice of regularly scheduled Project Screening Board reviews and has implemented QPR meetings in each region. Along with these, executive level Ad Hoc reviews are conducted on major projects. When a change to project scope, schedule, or budget is needed on a project, a request for approval of the change is submitted to the appropriate level via a Project Control Form. The Project Control Form provides the reviewer and approver with a detailed description of the project's current status for the cost, scope, and schedule; the need for the change; the change itself; and a proposal as to how the change will be accomplished within the budget.

The Work Order Authorization process is the second level of control. All WSDOT expenditures must be approved through the Work Order Authorization process using the same approval levels as the Project Control Form.

The use of the Project Control Form and Work Order Form will continue to be the primary tools for communicating project scope, schedule, and budget changes to the region and HQ. In addition, the need for greater visibility of changes and the control of those changes at the project level has revealed the need for a project change management process. Some regions are developing a project change management process that includes a Change Management Board on each project greater than $100 million for its GEC led projects.

More control of project level changes is required. Having more detail of deliverables in contracts and task orders will help with identifying and tracking changes. Change Boards for projects over $100 million are being established for GEC-led projects. Identifying the important parts of change management and providing training to WSDOT PMs is recommended.

Quarterly Project Review

The "Regional Project Principal" or "Regional Project Executive" position does not exist in WSDOT terms though WSDOT senior management does regularly review project status weekly, monthly and quarterly. Selected projects are reviewed weekly at Headquarters and the regions. Monthly reports that list key project statistics are generated at a project level and reviewed at a regional level. Quarterly reports are generated at the project level and reviewed regionally and at the HQ level every three months. Adding a Regional Project Executive position, on a consistent basis, to oversee a portfolio of projects is recommended as an important step in attaining accountability at the project level. Also, instituting a formal quarterly financial closing of all project status information is a Best Management Practice that should be implemented.

Safety and Health Program

Health and safety practices are woven throughout the WSDOT culture. WSDOT addresses health and safety issues in many areas such as:

- Hazardous Materials Program - Health and Safety Plan
- Protecting the health and safety of state citizens has been stated as one of WSDOT's vital interests
- Recent changes to the Growth Management Act (GMA) require projects and programs that support healthy communities to be part of comprehensive plans
- Policy and planning efforts that increase access to inexpensive or free opportunities for regular exercise in all communities around the state and create communities where people find it easy and safe to be physically active
- Hiring and employing state workforce
- The WSDOT's *Construction Manual* addresses safety and health issues for state workers, as well as construction site issues.

WSDOT does well with the health and safety aspects associated with field work, construction work, and public facilities. Producing and following health and safety plans for design and regional offices is adequate-to-good but could be improved upon. Generally, this could be another chapter in an office procedures manual. Standards should be established and applied to all offices. Additional training should be considered.

Contracts Administration

WSDOT would benefit from establishing more standards for consultant contracts and task orders. Deliverables with predetermined progressing methods should be included. Deliverables should match the MDL. A schedule and budget to the deliverable level should also be included. WSDOT should also establish an inter-regional / division agreement process. Adhering to inter-regional / divisional agreements demonstrates accountability.

Gaps between Best Practices and WSDOT's Current Processes and Methods

This section identifies the industry standard best management practices in project management, delivery and control. In an effort to improve the efficiency of WSDOT's delivery of projects, this analysis compares and contrasts these Best Management Practices with WSDOT practice, and identifies gaps that exist between standard and practice.

Table 5 starting on page 43 identifies 13 Best Management Practices and the gap between them and WSDOT's current practices. Also identified is the level of adoption required for the practices to be successfully integrated into the WSDOT environment.

Recommended PM Functionality Improvements

Any evaluation of potential PC&R system solutions must meet WSDOT's high-level requirements, support industry Best Management Practices and fit within WSDOT's operating environment. The process of selecting a new project management system forces organizations to look at existing processes in light of the Best Practices or new business functions as part of the embedded functionality within the commercially available systems. The operating environment requires functional changes in the following:

- Data Structure
- Task Management Data vs. Funding Data
- Work Breakdown Structure

- Control Data
- Cost and the Cost-to-Date Accuracy
- Scope Management
- Earned Value Indices
- Level and Retention of Documents
- Change Management
- Construction Cost Estimating and the Relationship of Risk on Contingencies
- Contract Administration.

Additionally, the environment in which data are going to be reported or used requires some structure and understanding. The display of internal or working information and files should be accessible to line management and those directly involved in day-to-day operations within the delivery process. Periodic information that is used to convey project status and performance can be used by both internal and external stakeholders and team members as static reports.

Gaps between industry Best Management Practices and overall current practices within WSDOT will close as new software solutions are integrated into the process of the project delivery team. Newer, more efficient systems that reflect industry BMPs will be accepted by staff as more efficient PM tools leading the agency to continue to improve the credibility and confidence in the new standards. The current state of the gaps among Best Management Practices, the current condition and the functional requirements of the proposed new solution are summarized in Table 6 beginning on page 46.

Table 5 – Gap Analysis of Best Management Practices

Best Management Practice	Project Size	Level of Adoption [1] (Low / Moderate / High)	GAP [2]	Recommended Improvements to Business Practices, Processes and Tools
Project Management Plan * Project Definition * Scope Management * Cost Management * Schedule Management	Major		Small, moderate, and large projects do not consistently produce, update, or implement PMPs that meet BMP, defined as meeting the FHWA SAFETEA-LU requirements for major projects or meeting WSDOT Online PM Guide.	Develop and issue PMP guidance consistent with BMPs by project size, follow up with training, QA, and performance measurement. Continue to work with FHWA to refine WSDOT PMP requirements for appropriate-sized projects.
	Moderate			
	Small			
Scope Management * Definition of Baseline * Determination of Progress * Validity and Definition of Change	Major		Scopes of work are often not developed adequately and scope changes from baseline are often not documented properly.	Develop and issue guidance for development of scopes that are consistent with BMP, follow up with training, QA, and performance measurement. Develop and issue guidance for proper documentation of scope changes from baseline. Review WSDOT Online Guide with regions for training and implementation of scope creep mitigation techniques.
	Moderate			
	Small			
Work Breakdown Structure * Planning Basic Elements * Establishment of Base - * Scope * Cost * Schedule	Major		WBS for projects are often not organized consistent with the MDL. The current MDL is not inclusive of all types of work performed by WSDOT.	Revise the MDL to include all types of work performed by WSDOT, develop and issue guidance on BMPs for development of proper WBS for projects by size, follow up with training and QA,
	Moderate			
	Small			
Risk Management * Assessment of Base Condition * Mitigation Measures * Impact Evaluation of - * Scope * Cost * Schedule	Major		WSDOT is implementing RPM on moderate size jobs throughout the regions. Identification of risk needs improvement, especially for small and moderate size projects. Management of risk needs to be improved to include quantification of the reduction in risk compared to investment.	Develop guidance articulating expectations for identification, management, and tracking/reporting of risk reduction, follow up with training, QA, and performance measurement.
	Moderate			
	Small			
Cost Estimating * Development of Total Project Cost * All "Phases" of a Project * Reviews for each "phase" or level	Major		WSDOT has recognized recent external market trends affecting bids and cost estimates by giving direction to regions to update cost estimates. The CEVP® process has greatly improved WSDOT's cost estimating performance and represents BMP. The CRA process needs improvement to effectively embrace CEVP® principles. CEVPs® ability to respond to rapid changes in market conditions needs improvement. WSDOT's normal cost estimating process is being improved to reflect recent market trends.	Periodically update statewide guidance on CEVP®/CRA processes, task regions with developing and periodically region-specific guidance by project size, measure the effectiveness of CEVP®/CRA by region and project size, provide training for CEVP® participants, evaluate the effectiveness of CEVP® facilitators. Periodically update cost estimates to reflect recent market trends.
	Moderate			
	Small			

Best Management Practice	Project Size	Level of Adoption [1] (Low / Moderate / High)	GAP [2]	Recommended Improvements to Business Practices, Processes and Tools
Schedule Management * Sequence of work * Task interdependencies * Meets key objectives * Provides a timeline	Major Moderate Small		The quality of project schedules varies greatly both geographically and by project size. Scheduling tools vary, ability/experience levels vary, and the use of schedules as a management tool varies greatly.	Establish requirements for adequacy of project schedules by project size, consider the use of enterprise scheduling systems, or a mix of small project (easy to use) and large (higher capability, harder to use) scheduling systems. Provide training in the scheduling discipline, the use of the tool, and reporting expectations. Consider implementing integrated master schedules on complex construction projects.
Cost Management * Cost Budgeting * Cost Control - * Measures Performance * Predicts Performance	Major Moderate Small		The establishment of proper Control Account Plans (CAPs) at a level appropriate to track and control the work is a BMP and is not routinely practiced within WSDOT. Small projects may be asked for detailed information that is either not used or not necessary for tracking accountability or rollup.	Establish expectations for proper setup and management of CAPs tied to WBS based on the WSDOT MDL. Provide cost management systems linked to cost and schedule data marts with common and easy access and transport of data. Require standard rollup levels and reports. Provide training in the cost management discipline and the use of the tools to manage costs.
Document Control * Physical Documents * Electronic Files * Business Process * Technical Tools * Operational Support	Major Moderate Small		Construction offices generally have adequate systems for document control, but more recent developments in electronic document control systems have not been implemented statewide. Construction and design offices could both benefit from the standardization of document control file organization, tools, and process.	Establish statewide requirements for document control processes, organization, and QA/QC. Provide document control tools and training that match BMP and user needs. Provide supplementary support during implementation.
Earned Value Management System * Objective Measurement of Progress * Planned Detailed Scope of Work * Actual Cost of Work All at the same frequency	Major Moderate Small		The use of EVMS in WSDOT is recent, limited and not yet consistent with BMP. Where used, more sophisticated capabilities such as schedule and cost performance/trends and ETC/EAC are generally below BMP. EVMS tools are not readily available outside of UCO or WSF except on major projects. Reporting is often not consistent with BMP.	Provide the tools, guidance, and training to implement EVMS consistently on all WSDOT projects. Consider standards that vary by project size. Provide for the ability to roll up and across deliverables for each project.
Change Management * Uniform and Consistent Approach * Identify * Define * Evaluate * Account	Major Moderate Small		The time taken to implement changes within pre-construction projects is generally longer than BMP (i.e., scope, budget, and schedule changes are generally implemented slower than BMP). Execution of pre-construction contract changes is generally slower than BMP. The level of documentation of the reasons for change and negotiation process varies. Change management boards are not universally employed.	Train the developers of pre-construction agreements to anticipate and embody tolls within agreements that either obviate the need for change or facilitate change management. Train change managers to develop and negotiate scope, schedule, and budget more quickly. Initiate a change management documentation system statewide. Streamline current process to remove constraints on BMP of change management.

Best Management Practice	Project Size	Level of Adoption [1] (Low / Moderate / High)	GAP [2]	Recommended Improvements to Business Practices, Processes and Tools
Quarterly Project Review * Establish a "Project Executive" * Project Manager's Performance * Overall Direction of Project * Scope * Schedule * Cost	Major		Quarterly Projects Reviews are a BMP, but the lack of principal or project executive review and feedback of the report prior to the QPR is below BMP. Reporting content requirements are below BMP for larger projects because of a lack of trend analysis, sensitivity analysis of EAC and schedule at completion. Moderate and small size project reporting standards need to be adjusted to fit WSDOT accountability needs, but not overly burden the PM.	Provide executive/principal review of project reports prior to the QPR. Develop a standardized reporting format for each project size category. Establish consistent reporting periods and due dates for completion of reports. Provide staff review of reports prior to review meetings and prepare questions for the review panel. Review panel to hold PM accountable for reports and the integrity of the data and analysis presented in the reports. Institute a quarterly project financial close process.
	Moderate			
	Small			
Safety and Health Program * Written Policies * Written Procedures * Cover the Health and Safety of the workforce	All projects		WSDOT's Health and Safety for construction and some field tasks is consistent with BMP. Health and Safety planning and training for some design offices could be improved.	Continue to update and improve health and safety standards, provide consistent guidance and enforcement of standards, and train staff to meet WSDOT expectations.
Contract Administration * Establishing the Contract form * Governance * Information * Invoicing * Submittals * Changes * Disputes * Insurance	All projects		WSDOT construction contract administration is consistent with BMP. Administration of consultant agreements remains below BMP. WSDOT staff are often not experienced enough to prepare and negotiate agreements consistent with BMP. Deficiencies include scope development, anticipation of change management requirements, consistency with the MDL, inappropriate CAPs, no predetermined or inappropriate progressing methods, schedules that don't match scopes and budgets, improper activity durations, inconsistencies between task orders and master agreements, slow execution of task orders, amendments, and construct supplements, substandard review of invoices, lack of timely evaluations, inability to accurately estimate costs, lack of documentation for negotiations, lack of WSDOT verification of progress, and no use of contingency methods..	Revise the WSDOT Managing Project Delivery process and the Project Management On-Line Guide to reflect standard reporting requirements by project size, establish executive review of reports prior to the QPR, revise the Consultant Services Procedures Manual to include requirements for reporting and reporting review, continue to train WSDOT staff in administrative procedures, expand the use of contingency planning within OFM, train WSDOT staff in consultant agreement negotiations procedures, streamline change management procedures, train staff in documentation requirements and cost estimating, establish a database of scopes, schedules, and cost estimates for staff use, provide QA of consultant agreements.

NOTES:
1) Level of Adoption is the extent to which WSDOT utilizes BMPs by project size.
2) GAP = The difference between WSDOT's current level of adoption and BMP.

Table 6 – Correspondence Between BMP and PM Functionality Requirements

Best Management Practice	Corresponding Management Tool Functionality Requirements[1]	Corresponding Tool Functionality Requirements for Meeting Reporting Needs[2]
Project Management Plan	Practice can use work flows to develop plans in all areas of PMP as part of initiating active management practice. Uniformity and checklist management techniques.	Notification of requirements and issues arising from daily operations and working the plan can be displayed at higher levels within the WSDOT structure through "Dashboards" and notifications.
Scope Management	See *Change Management* and *Contracts and Agreements.*	See *System Tool Requirements*.
Work Breakdown Structure	See *Schedule Management* and *Cost Management*.	See *System Tool Requirements*.
Risk Management	WSDOT Risk Management Practice can use standard tools such as MS Excel and MS Word. Additional training may be required for high-end use of MS Excel for full CEVP® analysis.	Computerized risk management databases that facilitate reporting, tracking and documentation of actions taken and reductions in risk received in scope, schedule, and cost at complete at the project, program, region, and statewide enterprise levels.
Cost Estimating	• WSDOT is in need of a standardized tool for developing cost estimates at various phases within a project's life cycle and the ability to move that information forward as new projects are developed. The estimating solution will have features that: o Can accommodate variable escalation rates based on trade, year, region, complexity of the work, etc. o Differing levels of detail within a project life cycle for developing cost estimates (i.e., Lane Miles / Roadway – Planning / Programming Stage, Linear Feet of Lane / Roadway fill – Preliminary Engineering, Cubic Yards / Square Yards of PCC – PS&E Stage, etc.) o Multi-level of detail o Associate risk with contingency	See *System Tool Requirements*.

Best Management Practice	Corresponding Management Tool Functionality Requirements[1]	Corresponding Tool Functionality Requirements for Meeting Reporting Needs[2]
Schedule Management	• Scheduling capabilities of the solution will include the ability to: o Develop a WBS and apply activities based on codes and/or WBS structure o Support CPM scheduling techniques o Link with Cost Management / Earned Value applications o Link with Pay Item system o Multi "Baseline" comparisons o Record specific historical information o Capable of Template Projects o Resource management of several levels based on an Organizational Breakdown Structure (OBS) o Develop multiple views within a project and filter or summarize the schedule data o Multi-project / subproject relationships with links (or hand-offs) to other projects o Constraints with dates or activity attributes o Capable of "Hammocking" a series of activities o ODBC links with other database applications o Exporting / importing through standard Microsoft applications o Global calendar, coding, resource	Scheduling software that reasonably provides high functionality at the project, program, region, and statewide enterprise levels without excessive learning curve and support / maintenance requirements. Scheduling software that is functionally integrated with financial / cost management software at the project, program, region, and statewide enterprise levels. Scheduling and financial management software that utilize common tag or database indicators, thereby facilitating consistent programmable sorting and selection of data and reports to pre-established requirements (all projects, very difficult). Scheduling and financial / cost management (and reporting) software that use a shared, maintainable database, and facilitate consistent and accurate reporting and information display formats. Also see *Cost Management*.
Cost Management	• Cost Control and Earned Value Analysis requires that the solution is able to efficiently handle: o Multiple funding sources for each account o Time Phased distribution of Budgets, Accrued, Invoiced Cost, and Progress (earnings) o Distributed among WBS, OBS or other Financial Breakdown Structures o Modeling – Forecasting for budgets and remaining values beyond the actual cost and progress o Graphics-based in addition to standard tabular comparisons o Single Screen Comparison (budget, actual, forecasting, etc.) without having to toggle among multiple screens to facilitate modeling / forecasting o Multiple Elements (i.e., hours, dollars, etc.) for each period within an account o Multiple coding capabilities for each account based on a portion of the account designation and according to a coding structure that can be changed outside of the account number o Change management that allows for reductions in scope o Develop period estimates or Estimates at Completion Also see *Earned Value Management System.*	Financial / cost management software that provides high functionality at the project, program, region, and statewide enterprise levels without excessive learning curve and support or maintenance requirements. Also see *Schedule Management.*

Best Management Practice	Corresponding Management Tool Functionality Requirements[1]	Corresponding Tool Functionality Requirements for Meeting Reporting Needs[2]
Document Control	• Business Process Management (Workflow) • Records Retention Management o Management of records stored within Enterprise Content Management (ECM) library o Management of physical records not stored electronically o Management of records stored in network folders • Open Records Management • Document (content) Management Capabilities o Scanned images o Common files (i.e. Word, PDF, e-mails, TIF, JPEG, etc.) o Compound documents (i.e. drawings, Excel, etc.) o Multiple views of library structure o User-configurable rapid document access functions o User-defined saved searches o Document open with browser-based viewers o Document open with native application o Intelligent electronic forms o Collaboration support o Versioning § Major versions (regular, normal, access) § Minor versions (restricted, DRAFT, access)	See *System Tool Requirements*.
Earned Value Management System	See *Cost Management.*	See *System Tool Requirements*.

Best Management Practice	Corresponding Management Tool Functionality Requirements[1]	Corresponding Tool Functionality Requirements for Meeting Reporting Needs[2]
Change Management	• Contract / Scope Management is the cornerstone of the engineering and construction industry and the solution should be able to control and be capable of: o Variance reporting for project, contract, work order, and/or task order summaries or filters within the program o Funding source management is fundamental to WSDOT's multiple programs and sub-programs. As such, the solution should be able to: § Fund budgets for overall enterprise accounts • At a program level • At a sub-program level • At a project level • For each biennium § Multi-funding adjustments based on program / sub-program during a biennium. Disconnect or add to a series of projects to a funding source. o Change management based on scope or funding needs o Basic work flow capabilities needed for approving administrative processes o Work Order Authorizations outside of contracts subdivisions • Task Order management within a WO and associated with a contract Also see *Scope Management* and *Contracts Administration and Agreements* for additional gap descriptions.	Computerized change management databases that facilitate tracking and documentation of scope, schedule, and cost at complete changes at the project, program, region, and statewide enterprise levels
Quarterly Project Review	Open discussion and validation of project status, issues and trends. Standard reports and movement towards the report mock-up information will help facilitate understanding by external stakeholders and internal management and executives.	See *System Tool Requirements.*
Safety and Health Program	Practice can use standard tools, such as MS Excel and MS Word.	See *System Tool Requirements.*
Contracts Administration and Agreements	• Invoice development capabilities from material lists and schedule integration • Submittal tracking and status • Request for information / change tracking • Limited records management • Insurance tracking • Daily inspection reporting • Punch list development • Contracts management Also see Change Management and Scope Management.	See *System Tool Requirements.*
Time and Task-Specific Cost Collection	Open discussion and validation of project status, issues and trends. Standard reports and movement toward the report mock-up information will help facilitate understanding by external stakeholders and internal management and executives.	See *System Tool Requirements.*

NOTES:

1) Refer to the *Systems* section of this report for more details.
2) Refer to the *PM Needs and Reports* section of this report for more details.

Gaps in Tools and Systems by Project Development Processes

Basic Requirements

As shown in Tables 5 and 6, any proposed systems solution must be able to support project management activities related to scope, change management, cost, schedule, estimating, and certain Earned Value techniques, in addition to document control and risk management. In addition, any solution must be implementable in the short to mid term to provide benefits to the expanding construction program. Finally, many of the newer COTS applications overlap with several of the legacy information systems. For instance, Earned Value is a combination of progress measurement, cost and schedule control. Any solution needs to be applicable to all phases of project development and not abandon useful processes or tools of viable legacy systems.

Scoping and Project Planning Processes

The proposed systems solution must be able to support a varied approach in the scoping phase which tends to be driven by a very fluid method WSDOT uses for defining the scopes of proposed projects. Prioritizing needs and considering value for the cost of specific programs make the scoping process one of the most creative climates within WSDOT.

Commercially available off the shelf software systems, herewith COTS, are available that would fulfill the DOT's unique approach in the earliest phases of development of project planning and scoping. However, they require substantial set up time and a level of integration that would detract from the greatest benefit of the project management focus. They would function similar to CPMS, TRIPS, PATS and Project Summary, but as an integrated system with other PC&R applications. Any proposed CPMS system must have a natural hand-off with other COTS System proposed for PC&R project management. This represents the greatest challenge to the replacement suite of systems, but is proposed after the shift in culture and systems for this immediate phase.

On the $4 billion Louisiana TIMED Program, multiple cost savings/reduction efforts have resulted in significant savings to the program due to Best Management Practices. These cost-saving efforts result from a unified team approach to project management and are above and beyond those typically encountered by the LADOTD. The unified team approach, which integrates project controls with project management, right-of-way, utilities and construction management, enables the Louisiana TIMED Managers (LTM) to better forecast estimates at completion and expected finish dates. As a result of improved forecasting and integration with the different disciplines, LTM has made modifications to the program that have resulted in cost savings and reduced the likelihood of cost overruns. Some of those changes are presented in this section:

Repackaging of Project Segments – Savings $13.8 million.

Working with design and construction managers, Project Controls was able to establish forecasted estimates at completion and scheduled completion dates prior to accepting responsibility for the project segments. LTM considered alternative ways to deliver the projects and completed cost and schedule forecasts for combined project segments, which showed savings in design cost and in contractor mobilization and efficiency costs.
Source: SPMG

Project Delivery Processes

Project Management Plan

In many ways, the project management plans developed by each project team or team lead are reflective of some of the Best Management Practices currently available for this category of project planning work. Although project management plans are the norm within WSDOT, most of these plans exist offline or are part of desktop applications. Bringing these documents to PMs and project teams through the use of online collaborative tools would improve the consistency, accuracy and efficiency needed to accommodate WSDOT's expanding requirements. WSDOT's recently introduced online guides for pre-construction and construction phases provide the framework for preparation of suitable PM plans. Other systems were evaluated for their ability to provide collaborative tools for the dissemination of PM plans.

Pre-Construction Phases

WSDOT's largest efforts are preparing preliminary engineering and design development of PS&E and engineering packages. Although pre-construction work is not necessarily the largest portion of a project's cost (typically that is construction), it presents the greatest exposure to unknown risk. As such, this phase deserves some of the greatest attention to business practices and the systems that support that effort.

Design Phase

A typical roadway design effort should have several discipline-based control accounts established by a work plan. It should include a deliverable list of drawings and the major products of the scope. The effort to produce those drawings (estimated number of hours per drawing type) is predictable. This workflow is consistent with the PMPs that are current practice within WSDOT. Proposed systems should be able to add those plans to a database for the department to use and allow for uniformity in planning and reporting.

As the list of deliverables (drawings, specifications, estimates and reports) develops in the planning stage through these applications, the estimated associated hours to produce those items can be rolled up into the Control Account. Progress can then be time-scaled to show the expected development of the individual account in support of deliverables.

A roll-up of the planned time-scaled progress will produce a time-scaled budget curve for the control accounts. This can be developed through some workflow applications outside of the COTS but loaded into the COTS when developing or refining the plans. When placed into the appropriate application, the time-phased budgets become the basis for Earned Value measurement in the engineering phase.

LTM Cost Trend Analysis Caused Change in Typical Sections – Savings approximately $12 million on six project segments to date.

Detailed cost-estimate tracking of unit prices and forecasting of industry trends revealed that the cost of stone was increasing faster than inflation. As a result, value engineering efforts were undertaken to revise the typical sections to utilize more soil cement stabilization rather than stone aggregate base course.
Source: SPMG

Each reporting period (monthly or bi-weekly), the cost associated with the control account should be measured and compared to the actual progress of the drawings contained in the discipline-based accounts. The comparison of the three elements:

- Budgeted cost
- Actual cost
- Actual progress

can be charted to develop trends in the cost Earned Value manager program.

A variety of Earned Value metrics such as the Cost Performance Index (CPI), Schedule Performance Index (SPI), Schedule or Cost Variances can be calculated and displayed through developed standard reports. Furthermore, a simple cost and schedule variance is a typical reporting metric within the proposed systems and can be displayed through some customized on-screen reporting of the COTS. Earned Value metrics contained in the proposed COTS allow the PE to make a calculated and objective forecast of Estimates at Completion (EAC) for both schedule and cost of the tasks. It will also give an indication of the expected task development and progress at a certain period.

In-House Work

Each discipline-based control account should have a drawing list (or checklist of items for very preliminary efforts) that forms the basis for measuring accomplishments. In addition to the drawings, the major elements should highlight the earning needs in order to accomplish milestones or deliverables within the schedule. For instance, if the requirement for earning 60% design status requires that the alignment and cross sections be developed, then the drawing status should require that these items be complete in order to achieve the milestone and deliverable within the MDL and schedule.

This level of management should be the basis for developing any task order. The task order should outline the control account at a discipline-task level. These control accounts should not be constrained by upset limits. To do so would require reconciliation of budgets against the actual cost against the account at a frequency that would overwhelm management task. Allow the leads and managers to report against the accounts, but track the work by the task order and control costs at an upset limit in the contract.

Standard drop-down lists at the task order level, in addition to the task and drawing level, will provide consistency and help determine what is necessary versus excessive.

Control accounts should also have limited time periods for performance. A control account should be used to develop trends over a period when work can be reflective of historical information used to make calculations on future performance. These periods are usually 10 to 18 months. Control accounts shorter than this will be too short to be effective. A control account that is too long may be considered too general and large in scope.

Any proposed system should be able to accommodate any information that is set-up; however, the standardization will need to come from a level of adjunct applications that allow for this input. Unfortunately, too many of the powerful project control systems are designed to meet a range of needs and allow users to overly customize. WSDOT doctrine must therefore steer these applications.

Consultants

The same standard of measurement and monitoring holds true for a GEC. In fact, in an effort to add consistency from one design effort or project to another, GECs should adhere to the systems put in place. These systems are expected to induce

industry Best Practices and an enterprise application should follow that mindset.

Right-of-Way

The process for securing the right-of-way for projects can take many varied paths to completion. Since the path for each parcel within a project is largely determined by external factors, it is not amenable to conventional project planning. The details of parcel management are decision-based ("if" statements). Certification of the right-of-way is an essential precursor to the Advertise Date and may become the determining factor in achieving that milestone. As such, a process supported within the integrated system must be established in support of project delivery.

Right-of-way modules previously created to support this task for other organizations provide a checklist for essential steps and contact information related to each parcel on a project. Users are able to quickly and easily record the information relative to a parcel and view or generate reports on the current state of each parcel or project. The existing module groups parcel information by roadway (project) and construction project. It may also be extended to provide percent-complete reporting on summary tasks within the WBS.

The relationship among the right-of-way elements in a project has a significant impact on the ability to advertise and ultimately award construction contracts within the project. This relationship needs to be established within the overall project schedule and updated within the new system to elevate the effects of right-of-way on the delivery schedule. Fundamental logic networks within the project schedule are to be established as part of project templates that will cover a project's life cycle.

Utilities

The process for identifying and relocating existing utilities is difficult to identify in the earliest stages of the project because of missing records, incomplete information on as-built drawings, etc. However, many of these situations can be solved by a variety of work-arounds so that a template for achieving the utility relocation needs can spread throughout a project's life.

One way of minimizing the impact of existing utilities relocation is through utilities tracker modules. Utilities tracker modules previously created to support utilities tasks for other organizations provide an organized catalog of utilities along the right-of-way by highway (project) and capture all of the required information related to utility owners, contractors involved in relocation, relocation schedules, exceptional conditions, and relocation payments. A reporting component provides utilities reports in multiple formats. This module can be modified to conform to WSDOT processes, procedures and unique requirements.

Environmental

A module for managing and reporting the environmental process can be created by adapting existing modules for right-of-way and/or the utilities tracker to address WSDOT, State of Washington, and federal environmental requirements, processes and procedures. The MDL can relate anticipated documents within the network logic of the project schedule. Adding specific sequences to the project schedule will help reduce the surprising affects of environmental issues as they are discovered, as well as enhance the ability to work "what if?" scenarios.

Construction Phase

The construction phase of WSDOT's delivery process, while relatively straight-

forward, can be greatly enhanced by integration and implementation of some industry Best Management Practices. Admittedly, the majority of the project's cost is for construction, although most of the risk has been managed during the pre-construction phase. The approach to this is to implement easily achievable steps of BMP along with the tools to support the methods. These include implementation of document management systems, revisions to current WSDOT construction specifications and, eventually, implementation of consolidated scheduling capabilities for construction planning, monitoring of progress and claims avoidance and analysis.

Reduction in Contractor Claims Resulting from Detailed Schedule Requirements, Review & Contractor Coordination – Zero LTM claims resulting in litigation or pending litigation.

LTM has avoided litigation on ALL contractor claims to date. There is currently no pending litigation on any LTM- managed contract. LTM specifies the use of more detailed schedule requirements than the LADOTD typically does. These include additional coding and cash flow requirements, liquidated damages, which were not enforced before, and submittal of electronic schedules for comparison to the approved baseline. LTM construction management works closely with project controls to coordinate with the contractors on a regular basis, which improves communication and reduces claims.
Source: SPMG

Initially SPMG would review WSDOT's current general specifications to recommend any refinements to bring to bear contractor compliance with submitting integrated master schedule provisions where appropriate. This allows for assessment of possible delay due to seemingly separate and unrelated construction activities.

Typical construction administration/ management staff rely on the contractor developing and submitting a schedule for review by the project engineering team. On small projects, the schedule can be a simple bar chart or Gantt chart with activities describing the sequences of work. As projects become more complicated, the bar chart is usually generated by a CPM network.

Improved Construction Scheduling and Coordination Results in Increased Productivity.

LTM has increased contractor productivity on LTM-managed projects. LTM-managed contractors spend an average of $56,000/day compared to the LADOTD-managed contractor's average of $19,100/day. This translates into LTM completing the projects sooner than LADOTD does thanks to more effective management techniques.
Source: SPMG

One element that should be added by WSDOT staff is cost loading the schedule to measure progress as a means of payment for smaller jobs. For larger jobs, WSDOT could require contractors to submit cost loaded schedules. Construction activities should follow the format of pay items during the construction phase. The earning rules are very clear-cut with a properly cost-loaded CPM and the added benefits of combining CPM scheduling with Earned Value will give the greatest understanding of a project's status and direction to the WSDOT staff.

Some consideration should be given to WSDOT's current practice of "Groups" within the construction pay items. This practice relates specific facilities with joint payment agreements among agencies, local, state and federal funding sources. These payment agreements would be better served as allocations when

establishing the pay items and resolved at the conclusion of a construction contract rather than an intricate ongoing process. Each activity within the schedule should have a pay item assigned to it (quantity and related cost commensurate with the description of the activity). The total activities within the CPM should then be equal with what is expected to be placed within the contract. This has several benefits. First it requires the contractor to correlate the construction activities with the quantities within the schedule of values or pay items of the contract. Secondly, increases in construction activities will generate a revision to the estimate at completion and a time at completion for construction contracts. This starts to synchronize the issues of scope, cost and schedule at the detailed level within the construction phase.
The proposed COTS systems support reporting during the construction phase in the following manner: Once the pay items are summarized into relatively manageable tasks for the size of a project, the information can be entered into a WSDOT system that will look for hammock activities with start, end dates, total float value and a cost element. Adding all the hammocks of a project and the cost of the pay items within the system will allow for Earned Value analyses to see if the contractor is within the early / late envelope of work.

WSDOT generates pay requests for the contractors based on the quantities recorded by the field inspectors. This process can be added to systems that link individual inspector's daily reports with the pay items. The proposed COTS systems will establish a listing of all the pay items associated with a contract. As quantities are logged in, reports are gathered on a regular basis and used to generate pay requests. It also calculates revised quantities due to changes generated within the system. The result is a cost system that accurately reflects changes in pay items in addition to an associated change order. This system would be a viable replacement for some of the functionality of CCIS and/or CAPS with the added ability to reflect cost and progress reporting against the schedule – verifying the contractor's ability to meet the contract obligations or make alterations when the work could be most effective. Although the systems are very capable of this type of interaction, they require the support of comprehensive and standardized WBSs that are carried within the contractor's schedule as well as the pay items.

WSDOT PM Needs and Reports

Basic Requirements

Project Managers are required by WSDOT policy and procedures to develop and maintain Project Management Plans (PMPs) throughout the life of the project. The PMP must present a plan for delivery of the project, including the establishment of a master schedule and progress (cost) curve, which become the baseline against which the project is measured. A key component of the PMP is the tracking and reporting of project status, especially for schedule and cost performance.

Reporting requirements for projects can be divided into three basic categories:

- Project-centric reports
- Internal DOT reports
- External stakeholders' reporting

Appendix 2 lists a series of PM reports along with summary content that a PM typically needs to effectively complete the project.

Project management needs to generate a range of reports that meet WSDOT requirements, now and in the future, such as:

- Consistent, practical WBS used statewide (MDL)
- Easy access to accurate and timely cost data
- Project cost and schedule systems that facilitate management and reporting
- Easy import of cost data into cost and schedule reporting systems
- Ease of integration of cost and progress data with schedule and financial reporting systems
- Ability to roll up cost, progress, and performance reporting from low (MDL sublevel) to high (project, program, region)
- Ability to report progress and performance across funding types
- Financial and schedule performance software that facilitates documentation of historical changes to the project baseline.

To accomplish these reporting needs, WSDOT staff need the requisite mix of knowledge, skills, and motivation in the following areas:

- Alignment of project plan with project, region, and statewide goals and objectives
- Critical Path Method (CPM) scheduling
- Financial and cost management
- Earned Value management systems (EVMS)
- Scoping to the WSDOT MDL and beyond
- Project planning, staffing, and organizing
- Project resource loading and costing
- Trend calculation, prediction, and interpretation
- Change management
- Document and issue management
- Risk identification and management
- Contingency planning
- Performance and accountability reporting to multiple levels
- Consistently accurate prediction of cost and schedule at complete.

Tables 6, 7 and 8 reflect a summary of the PM reporting needs by a project's functional phase of:

- **Project Planning**
- **On-going Management and**
- **Reports to meet External Needs**.

PM Reports to Others

One of the greatest challenges for a PM is to efficiently and accurately report project status to others in responsible oversight. The systems solution should support this goal of efficiency and accuracy. The range of reporting needs can come from the general public, to interested government representatives, to the Secretary of Transportation or at the Project Engineer level.

Canned or Standard Reports

By structuring the data to respond to business needs of WSDOT and stakeholders, several reports can be developed that meet the majority of those needs. Some of those needs are the legacy reports that were developed by managers and staff personnel who expected to work within the framework of the original systems and tools available to WSDOT. Now that the systems, data and capabilities are changing, transitions to more relevant and concise reports are expected.

Table 7 – Project Planning Tools

Project Planning Tools

Topic	Attributes	Importance/Ease of Use by Project		
		Small	Moderate	Major
Master Deliverables List				
	• Structure for the project WBS	●	●	●
	• Applied across multiple projects effectively	●	●	●
Scheduling				
	• Develop a CPM Master Schedule	●	●	●
	• Rollup to program and higher levels	♦	♦	♦
	• Rollup to deliverables, support enterprise planning and management	♦	♦	♦
Cost Management				
	• Generate baseline cost and progress curves for projects	●	●	●
	• Control accounting for all accounts	♦	♦♦	♦♦
	• Easily customized rollups based on the WBS and other factors	♦	♦♦	♦♦
Document Control				
	• Facilitates establishment of document-control requirements	♦	♦	♦
Reporting				
	• Facilitates timely generation of standard, accurate project-control reports	●	♦	♦♦
Policy				
	• Provides clear expectations for risk management, control and reporting	●	●	●

Primary Secondary ● Easy ♦ More Difficult ♦♦ Very Difficult

Table 8 – Ongoing Project Management Tools

Ongoing Management Tools

Topics	Attributes	Importance/Ease of Use by Project Size		
		Small	Moderate	Major
Scheduling Software				
	• Facilitates resource loading and documents changes	●	●	●
	• Documents physical progress entry, recognizes progressing methods, limits progress inputs	♦♦	♦♦	♦♦
	• Identifies exceptions and negative trends	♦	♦	♦♦
	• Uses multiple algorithms for schedule prediction	♦	♦	♦♦
Cost Management Software				
	• Facilitates accounting cost and labor hour data entry and reconciles project cost and labor hour data to WSDOT cost database	●	♦♦	♦♦
	• Generates resource requirements and compares staffing plans to schedule and budget baselines	♦	♦♦	♦♦
	• Generates sophisticated exception reports, trend analysis, and estimates cost and schedule at completion	♦	♦♦	♦♦
Reporting Software				
	• Generates standard, detailed, accurate, integrated, and timely project-control reports	●	♦	♦♦
Document Control				
	• Facilitates receipt, logging, distribution, tracking, and resolution of issues generated by documents.	♦	♦♦	♦♦
Risk Management				
	• Guidance/reporting requirements to support project-level risk management • Software to facilitate project risk management reporting, allowing easy coding to support manipulation above the project level	♦	♦♦	♦♦

Primary Secondary ● Easy ♦ More Difficult ♦♦ Very Difficult

Table 9 – Tools for Reporting to Meet External Requirements

Tools for Reporting to Meet External Requirements

Topic	Attribute	Importance/Ease of Use by Project Size		
		Small	Moderate	Major
Scheduling Software				
	• Provides high functionality at the project, program, region, and statewide enterprise levels	♦	♦♦	♦♦
	• Integrates with financial/cost management software, offers high functionality at project, program, region and statewide enterprise levels without excessive learning curve and supports/maintenance requirements	♦♦	♦♦	♦♦
Cost Management Software				
	• Provides high functionality at the project, program, region, and statewide enterprise levels	♦♦	♦♦	♦♦
Relational Data Management Tools				
	• Utilizes common tag or database indicators to facilitate consistent programmable sorting and selection of data and reports to pre-established requirements	♦♦	♦♦	♦♦
	• Utilizes shared, maintainable database	♦♦	♦♦	♦♦
	• Facilitates consistent and accurate reporting and information display formats	♦♦	♦♦	♦♦
	• Change management databases facilitate tracking and documentation of scope schedule, and cost at complete at the project, program, region, and statewide enterprise levels	♦♦	♦♦	♦♦
	• Risk management facilitates reporting, tracking, and documentation of actions taken and reductions in risk received in scope, schedule, and cost at complete	♦♦	♦♦	♦♦
Web Based Portal				
	• Reporting tool	♦	♦	♦

Primary Secondary ● Easy ♦ More Difficult ♦♦ Very Difficult

Line Managers Needs
The effort involved in compiling periodic reports predominates the PC&R staff's time. Relatively straightforward reports used to display project health are effective but almost always require a considerable and focused effort. In addition, once published, these reports require further consolidation and groupings for different report levels and publications. The proposed systems support the generation of reports that will reflect a role-based need. Much of the reporting data will be in easy-to-read dashboard formats that allow for drilling down into the issues driving alerts. Much of the daily action reporting can be accomplished through operational dash-boards supported by the recommended COTS, which summarize the issues and actions required from an operational standpoint.

Stakeholders' Needs
Periodic reports are expected to dominate the stakeholders' reporting requirements. Immediate access to the project's operational detail must be conducted through knowledgeable managers and staff to ensure that the information is not misinterpreted.

Most of these reports will mimic the current structure; however, as the enhanced capabilities and awareness of the proposed system's capabilities develop, a shift in format is also expected. The underlying format will be the Gray Notebook which is the public face of most of WSDOT's delivery effort. Ever-increasing levels of detail will be available through the system as each of the project, sub-corridors and corridors report information. In addition, the financial health of the programs, subprograms and many other levels of reporting will be published or available in the standardized reports.

Ad Hoc Reports

Line Managers' Needs
The capabilities and working level for many of the project operational and supervisory levels within WSDOT will be through the proposed system's dash-boards. Everyday issues can be addressed by selecting items that warrant attention. Specific selections or queries can be written to get at the root of the issues or items of interest.

Stakeholders' Needs
The stakeholder query capabilities should be limited to the published or periodic reports. Making the sum of all WSDOT capital construction programs available at the lowest level of detail will allow for any mixture of grouping, exclusions, summarization or detail desired. This information relies on the integrity of the smallest element within the system, which provides useful information to any user.

Sample Report Formats

Working with external stakeholders and internal management over the Phase 1 Strategic Plan period, SPMG has developed pro-forma sample reports that illustrate the type of external information that would be part of the systems solution. Appendix 3 presents these sample report formats.

Section 4. Evaluation of System Option

Systems Functionality Requirements

Summary of Concept

Project scheduling, project management, document management, business process automation and records management are challenges that are common to many types and sizes of businesses. Proven, enterprise-quality, industry leading, COTS applications for these functional areas have been developed, tested, refined and enhanced by software application development companies over decades. COTS applications are proposed to address these basic building blocks of the WSDOT solution. The selection of the recommended COTS elements of this solution are to be confirmed and finalized by the end of August 2006.

Even though COTS solutions are excellent at performing their functions, by their very nature, they are not targeted to a specific business or industry. Much of the adaptation to the WSDOT business model, processes and specific objectives will be accomplished by selecting and setting the proper combination of each application's configuration options. The balance of adaptation and integration will be accomplished through the use of the COTS supplied application interfaces and database accessibility.

Because it is unlikely that software vendors would fully support modified products, COTS applications would be implemented without alteration. Modifying COTS products may also preclude WSDOT from applying future releases and maintenance without incurring the time and cost of additional modification efforts. Remaining isolated from new releases would prevent WSDOT from receiving the benefits of application maintenance and enhancements as they became available.

Systems Vision Statement

PC&R systems should provide for portfolio management of projects and programs from a single set of base data which is transparent, rolls up effectively from task level to work package to project to program, can be filtered or sorted by geographic and organizational areas and tracked and reported by functional responsibility.

Major Options Considered

The review of WSDOT's business environment, user needs and data structure led to the development and evaluation of three general options to meet the above stated Vision Statement:

- Commercial Off-the-Shelf (COTS)
- Hybrid (Data Integration)
- Custom-Built.

Upon further discussion and analysis, Option 2 was split into the following sub-options.

- 2A: Hybrid (Data Integration)
- 2B: Hybrid (Data Integration plus Web Portal).

Option 2B builds upon the functionality of Option 2A by adding a "dashboard" reporting feature. This split within the Hybrid option offers two functionality levels. The first is the accomplishment of data integration, which currently is lacking within the legacy WSDOT systems due to the systems silos that have been created

over time. An enhancement to that is provided under Option 2B through the introduction of "work-flows" that integrate the systems into forms and dashboards that minimize the user's awareness of separate applications when searching for data, reports or processes.

Updating and maintaining legacy systems can create significant challenges for software developers. In addition, any attempts or efforts to modify legacy applications can be exhaustive and a time-consuming process, with hours spent merely working through a labyrinth of architectural and code changes. In many instances, because the same developers have applied their knowledge, the same processes have been used to improve these systems over an extended period of time. However, any new processes and practices pose challenges and problems, on both the human and the technological level. A discussion of the various options follows, listing both advantages and disadvantages.

Table 10 – Systems Options Evaluation Matrix

Comparison of PC&R System Enhancement Options				
Factors	Option 1 COTS	Option 2a Hybrid COTS (Data Integration)	Option 2b Hybrid COTS (Data Integration + Dashboards)	Option 3 Custom Built System
Support Enterprise Architecture	Poor	Very Good	Excellent	Excellent
Prevalence in Market	Excellent	Excellent	Excellent	Poor
Meet Functionality Needs	Poor	Moderate	Excellent	Excellent
System Adaptability - Future Needs	Very Good	Excellent	Excellent	Poor
System Adaptability - Advancements in Market	Excellent	Excellent	Excellent	Poor
Data Integration for Reporting	Poor	Very Good	Excellent	Very Good
Systems Supporting Optimum Processes	Poor	Moderate	Excellent	Moderate
Time to Implement	Excellent	Very Good	Very Good	Poor
Maintenance Costs	Very Good	Very Good	Very Good	Poor
Implementation Cost	Excellent	Very Good	Very Good	Poor
Technical Risk	Low	Moderate	Moderate	High
			Recommended	

Evaluation of Options

Option 1 – Commercial Off-the-Shelf (COTS)

COTS are applications used as purchased, without software integration or extensions.

- Advantages
  Selecting a COTS application lends itself to an easy and simplified installation, with no modifications planned or wait-time for development. Another advantage to the concept of an unmodified application is the leveraging of new COTS capabilities and functionality.

  Traditionally, COTS applications address typical and commonly experienced classes of problems throughout multiple industries and yet, provide easy and relatively inexpensive solutions. For example, Enterprise Content Management (ECM) systems provide document management capabilities that can be utilized by any organization regardless of industry. A broad customer base in the market lends to price advantages and economies of scale. The usual costs of advancements are spread across all customers instead of having to be borne by one organization.

As with most COTS, changes to capabilities and functionality occur. Disruption to everyday processes and business activities must be kept to a bare minimum. This way, new capabilities and functionalities can be easily adopted and users quickly take advantage of new functionalities.

Another advantage of a pure COTS solution is familiarization. Since most COTS are widely-used applications, exposure and experience residing internally may reduce the time needed to familiarize staff with the application.

- Disadvantages
  Option 1 contains a single major flaw: the lack of integration of WSDOT's data. This flaw affects many of the current issues.

  Although Option 1 allows the users the benefit of the more appropriate Best Management Practices and industry-leading tools, it perpetuates the current state of stand-alone applications, which require considerable effort for integration and reporting.

  Selecting a COTS application, without integration, does carry additional disadvantages. Current WSDOT systems were designed and adapted to meet WSDOT's reporting requirements. Adding COTS components enables additional business, management and reporting processes to be developed that can utilize COTS software functionalities and supplement current WSDOT processes. Without integration, however, there is a continued need to maintain silos of data and thus, from time to time, it is necessary to enter the same data in multiple locations. Duplicate data can lead to potential data errors or inconsistencies. This practice will require manual reconciliation of both systems in the preparation of report data. Technical maintenance and costs are increased due to the added requirement of assuming additional responsibilities of maintaining both COTS and existing systems that remain running and functioning. Storage costs increase due to storing duplicate data in multiple locations.

Option 2a – Hybrid (Data Integration):

This option is comprised of COTS products that are integrated and extended using Applications Programming Interfaces (APIs) and database access.

Today's COTS products are focused on solving industry-wide classes of similar needs and problems. Just as many projects require the efforts of several different specialty tasks, the tools are also specialized. Data integration relies on the establishment of comparative levels and consistent views of the work at the delivery stage of any of these projects. For example, an organization may use COTS applications to maintain its document storage, record retention, and project management without any one of the applications talking to another. With the absence of integration, the customer is faced with manually extracting data from each source to create a consolidated report. Integration puts the puzzle together. Therefore, integration allows COTS systems, WSDOT's financial systems and other existing systems to work in concert with each other. Focusing on industry Best Management Practices leverages both vendor and product capability. For example, a number of industry Best Management Practices are embedded in software produced by

Primavera, Timberline, ARES and other applications.

- Advantages
  The Hybrid option adds to all of the advantages described for Option 1. It also takes advantage of being able to provide solutions for a class of typical industry issues or problems and integrating their capabilities to meet WSDOT's needs. Each COTS solution is integrated with each other. This creates a coherent reporting tool and eliminates the need to manually reconcile reporting data and to gather reporting data from multiple locations.

  The addition of a data warehouse facilitates the integration of COTS components and WSDOT legacy systems. The data warehouse serves as a repository of integrated information, available for queries and analysis. Data and information are extracted from various sources as they are generated, which allows for a much easier and more efficient method of running queries of data that originally came from different sources. Ultimately, the data warehouse fosters less redundant data, fewer interface programs, fewer problems with timing discrepancies, and more timely data. It also helps control the inadvertent release of unvetted working data.

  The Hybrid option also leverages the ease of quickly integrating new COTS enhancements and capabilities as soon as they become available.

- Disadvantages
  Implementation Cost – Additional cost for integration effort.

  Implementation schedule – Additional time required for integration effort.

Option 2b – Hybrid (Data Integration + Web Portal)

This option utilizes unmodified COTS products that are integrated and extended using APIs and database access, and provides a solution for reporting project information from multiple systems through a single web-based portal. This option will provide a management dashboard or portal for users that will allow the users to have different views of the project information based on their status, such as Project, Regional, and HQ levels.

The web-based dashboard system would be accessible anywhere on the intranet within the WSDOT network. Since the dashboard is web-based, there is no software to be installed on the end-users' computers and all that is needed is a web browser such as Internet Explorer to access the dashboard.

The dashboard will have a public area that is accessible to any user that goes to the web address. The publicly-available information that is displayed on the portal screen represents a graphical view of the entire WSDOT service area, and has the ability to drill down through the map to different regions, and then to individual projects and segments within those regions. This drill-down map design will allow the users to start at the highest level and drill down to the lowest level of detail that is available within the portal.

At each level of the publicly-accessible portal, there are graphical indicators of cost, schedule and Earned Value performance measures at all levels. For example, at a regional level, a user would be able to view a list of projects within that region that are considered to be high, medium or low risk, based on a stoplight-like image that shows the number of

projects in each category next to the colors of the stoplight.

Users with different roles will also be permitted to log into the dashboard system to get a more detailed view of the status of such indicators as cost and schedule on their projects. Once logged in, the dashboard is customized to the role of the user within the organization, and they are given an integrated view of their project information that is updated much more frequently than the publicly-accessible dashboard. These types of users will also be able to print project-specific reports and generate ad hoc queries of the data where permitted.

Data in the reporting portal would be refreshed at different levels of frequency for individual needs. For example, Project Engineers may have access to a weekly or daily update of their project data, but the publicly-accessible dashboard system will only contain data that is refreshed from the individual COTS and legacy systems on a monthly or quarterly basis.

- Advantages
  The advantages of the Hybrid plus business objects option are identical to those mentioned in Option 2a; but it provides a catered pictorial summary view (i.e., project health, Earned Value, etc.) for stakeholders. The summary view also provides the user the ability to "drill-down" to summary data. For example, a user could view the project health and continue to drill down to view project tasks.

  By extracting data from the integrated COTS applications, they are used as working tools for project controls. This is instead of just using data-entry screens for communicating project data to the central reporting group, while maintaining current project information in non-centralized and disorganized ways.

  Utilizing data integration with business objects will allow project information to be reported through a single portal. This would reduce the need for training and licensing of software on individual software applications when the user needs to seek project-related information

- Disadvantages
  Implementation Cost – There is a moderate increase in cost for integration and the creation of business objects.

  Implementation Schedule – The implementation time will be slightly longer. It is expected that up to 37 months may be needed for the full functionality with a pilot program.

Option 3 – Custom-Built

This option would involve complete customization and fully-integrated implementation with consolidated and accessible data.

Although a custom-built system would allow for the integration of all the data, industry Best Management Practices and technology continue to advance, and this requires WSDOT to be constantly trying to update portions of the system in parallel with industry software providers. The cost/benefit of a custom system is a fatal flaw for this option, due to the large scale of effort required to provide the basic functions in addition to long development periods.

- Advantages
  A custom-built solution would address the needs as they are known and understood today. As discussed previously, it would eliminate redundant data and data inconsistencies. One

advantage of this option would be an exact and specific fit for all current issues or problems. WSDOT would have total control over what, when, and how the option is implemented.

- Disadvantages
  Creating a custom-built solution carries an extremely high cost and would have a long implementation duration. Of all currently listed options, this approach is the most time consuming and expensive to design, document, implement and test. When implemented, the duration would far exceed the other options. Creating an application from the "ground up" would lose the advantages offered by many COTS development companies. Over many years, COTS development companies have leveraged their specialized expertise in the latest technologies, used their large resource pools for continued enhancements, and spread their cost across their broad customer base.
  - Another disadvantage is that a custom-built application would require skill sets that are external to the organization and expensive, due to specialization in the latest IT technology. This increase in costs would stems from the need for the large technical team required to provide maintenance and support. This specialized group would have a full grasp and understanding of the customized solution.
  - Other disadvantages: the knowledge of the application is limited to the original development team, enhancements would all have to be made with limited resources.
  - Customized web-based interface would carry a lengthy duration relative to development
  - A need for a custom-designed database
  - Technology and requirements may change at or prior to implementation
  - Unforeseen or unanticipated requirements may emerge in the future.

Table 11 – Comparative Assessment of User Requirements

Table 11 summarizes the assessment of each option by user requirement criteria. It

Qualitative Comparison of Service Enhancement Options				
Factors	Option 1 COTS	Option 2a Hybrid COTS (Data Integration)	Option 2b Hybrid COTS (Data Integration + Dashboards)	Option 3 Custom Built System
Eliminates Conflicting Data Sources	No	Possible with Data Warehouse	Possible with Data Warehouse	Yes
Consistency of Process and Results	Yes	Yes	Yes	Yes
Efficient in Inputs and Outputs	Moderate	Better	Better	Best
Integration of Data	No	Yes	Yes	Yes
Real-Time Cost Accuracy	Fragmented	Able to provide	Able to provide	Yes
Simplifies Workflow and Preparation of Reports	Somewhat	Better	Better	Best
Provides Analytical Methods Based on Best PM Practices to Assess Risk and Forecast Cost and Time of Completion Reliably	Yes	Yes	Yes	Yes
Are easy to access and intuitive in use	No	Somewhat	Somewhat	Best
Can Be implemented in a relatively short time frame so as to benefit the startup of the major capital construction spending	Yes	Yes	Yes	**No (Fatal Flaw)**
Recommendation	Drop	Second Choice	Select	Drop

is recommended that Option 2B be taken forward into implementation planning.

Business Justification — Benefits of Systems Improvements

Upgrading to Industry Best Management Practices

WSDOT recognizes the need to evaluate, develop and implement organizational structures, effective business practices, and consistent reporting systems that will enhance the day-to-day control of the capital construction delivery program's overall scope, cost and schedule. This goal will be achieved by implementing an integrated project management environment capable of summarizing the status of a multitude of individual projects across the State. This project environment will need to generate consistent management information that can be easily summarized for use by higher tiers in the organization.

The proposed systems solution incorporates industry Best Management Practices into project procedures and reports, and deploys web-based computer systems throughout statewide offices. Although this will require the expenditure of effort, time and money, this solution is a pragmatic business step that will be absolutely essential to meet the program's demands. Recent experience within the engineering / construction industry and other state governments and federal agencies show that the benefits of implementing modern project control and reporting systems far outweigh their initial implementation costs. Overall program cost efficiencies have been realized by these organizations as a result of the following:

- Continuous business process improvement through centrally managed standards
- Improved access to real-time project data in a timely manner that facilitates more informed decisions
- More timely and organized accessibility to actual and planned cost information that enables project, program and line managers to monitor individual project performance within an overall program budget
- Individual project status that is reported in a consistent and timely manner, which enhances communication at all levels of the organization and to external audiences
- Early identification of potential project risks that are more readily mitigated in a timely manner
- Training of project personnel that is consolidated and standardized to align with statewide procedures, computer systems and reporting requirements
- Systematically capturing historical data on completed projects that is used to program and execute future work
- Improvement in workforce efficiencies to meet the expanding needs of a growing program without significant long-term staff increases.

Recent Engineering / Construction Industry Examples

Project Management Institute (PMI)

PMI is a recognized leader in the development and dissemination of state-of-the-art project management techniques and processes. PMI recently published its *Guide to the Project Management Body of Knowledge*[10] (PMBOK) as well as its *Standard for Program Management*.[11] These PMI documents highlight, as essential ingredients to successful program management, many of the industry Best Management Practices discussed in the WSDOT Process / Best Management Practices Analysis such as the

Project Management Plan; scope, schedule, cost, and document controls; work breakdown structure; risk monitoring and control; earned value / performance measurement and reporting; risk monitoring the control; contract administration and change control. A number of State and Federal agencies have implemented these program management standards in recognition of the overall cost / schedule savings that are realized. Several examples are highlighted below.

New York State Government

The state of New York is an $80-billion-per-year industry with 80 independent agencies. Within these agencies, hundreds of individual projects are being executed simultaneously. In 1999, the state began making changes to improve its project management capabilities.

> ***"It was clear to me from the start that a stronger project management capability would increase the success rate of our projects across the state. With so many large-scale business and technology projects underway, we had to adopt the principles of project management in order to most effectively maximize the state's resources."***
>
> *William Pelgrin, Director for the New York State Office of Technology*

North Dakota State Government

The State of North Dakota recently completed its *Project Management Guidebook*.[12] This Guidebook embraces Project Management Best Practices and the Enterprise Project Management concepts as outlined in PMI's PMBOK, yet conforms to the business of North Dakota state government. Included in the Guidebook are industry standards such as Earned Value management, work breakdown structure and scope / cost / schedule controls.

NASA

In 2000, NASA embarked on a process to identify and implement enterprise-level project management techniques, including work breakdown structure, risk management, cost and schedule controls, and Earned Value management. NASA's own assessment of the success of this effort is highlighted in a report dated August 26, 2002, titled, *Enterprise Project Management Tool Analysis – White Paper*[13] where it states the following:

> ***"Enterprise Project Management Tools were found to provide a wide range of functions. Among these functions are scheduling, resource allocation, cost estimating, budgeting, and collaborating. They also allow enterprise-wide views of all the projects in an organization as well as access to anyone involved in setting up, maintaining, updating or browsing to come in contact with the project information needed to make informed decisions. These tools greatly assist in disseminating and sharing project knowledge... These users need to create detailed project budgets, have access to actual cost data, track and distribute performance data, and create earned-value reports."***

Cost Benefits of Implementing Best Management Practices for the WSDOT Program

The current order-of-magnitude cost estimate to implement and maintain a statewide program management infrastructure for the 15-year WSDOT program is $20 million over the next three biennia. Although it is challenging to assign a dollar value to the many benefits of implementing a Best Management Practices program, reasonable dollar ranges can be supported based on this statewide capital construction transportation improvement program's

magnitude and complexity and on recent engineering / construction industry experience.

Given that the current WSDOT program cost estimate is in the range of $15 billion, a reasonable breakdown of this total value into major categories of work would be as shown in Table 12 below. The overall benefit cost ratio approximates 30:1 in terms of estimated avoided cost increases divided by the implementation costs.

Table 12 – Benefit Cost Analysis of Systems Upgrades

Cost Benefits Analysis		
Construction		$ Billions
Initial Contractor Bid Value		9.5
Changes during Construction		0.9
Design		
Preliminary		0.4
Final Design		1
Program Management		1.2
Overall Program		
Design Mgmt		
Procurement/Contract Mgmt		
Field Construction Mgmt		
Right-of-Way		2
Total Capital Program Estimate		$15.0 billion
Estimate of Avoided Costs Saved by Implementation:		
Initial Contractor Bid Value	Percent Saved	Amount Saved in $ millions
Risk Management	1.5-2%	$140-190
Scope Mgmt/Value Eng'g	1.5-2%	$140-190
(Incl: Cost Estimating/Reconciling)		
Changes during Construction	10%	$90
Schedule Management		
(incl: Earned Value Management)		
Change Management		
Claims Avoidance Reviews		
Comprehensive Safety Program		
Program Management		
Quarterly Project Reviews	5%	$70
Order of Magnitude Range of Overall Program Benefits	2.6-3.6%	$440-540 million
Development Cost Range		$16.3 - 14.1 million
Potential Range of Estimated Benefit/Cost Ratio:		27:1 up to 38:1

"WSDOT recently settled a construction claim on a freeway interchange project. The claim resulted from a document retrieval system failure wherein as-built records of an emergency slide repair to an unstable cut slope were not provided when the design engineer requested all related construction as-builts. Had the as-builts been made available, the design team would have easily identified an ancient slide condition and could have provided appropriate protection for it as opposed to it being discovered during construction. This single claim was settled for an amount approaching the cost of the proposed systems solution." *Source: SPMG*

Intangible Benefits

Other important benefits include the following:

1. Running WSDOT like a business:
    - Standardized business processes throughout WSDOT
    - True forecasting / forward-looking tools to facilitate the goal of "No Surprises"
    - Accountability / ownership through visibility of project health by all line managers
    - Analysis-based tools rather than reporting focus – "The right tools for the right job"
    - Better data for better decision making (first hand / current / forward looking)
    - Program money spent wisely (greatest "bang for the buck").
2. Meeting the need for greater capacity (three-fold increase in program):
    - Current effort required to produce the reporting needs is highly labor intensive and at capacity.
3. Seasoned workers who are producing and delivering projects and programs are expected to leave the agency at the peak of the additional programs based on workforce analysis. The need for efficient tools and processes to replace these skills is met by the proposed solution as follows:
    - Current delivery success is due to tenured staff's skills and experience, not by the supporting systems (systems are more of a burden and just used for reporting) while knowledge transfer to replacement staff can be addressed through a solution that institutionalizes processes and Best Management Practices
    - Skills to backfill out-of-date (legacy) technology support needs are not readily available.
4. Increased efficiency:
    - Workflow automation and streamlining processes improve efficiency
    - Tools are used to analyze and report project health
    - Paper documents are replaced by electronic files
    - Communications and business processes are improved by adding document and records management systems
    - A centralized information repository increases accessibility and manageability
    - Provision of appropriate tools encourages use by management staff at the project level
    - Current database technology is more efficient and flexible for data integration.
5. Improved reporting capabilities:
    - Reduce the time to produce periodic reports
    - Provide broader access to more detailed information
    - Code information to ease compilation of report data
    - Provide access to details underlying summary information
    - Standardize report formats
    - Provide executive visibility to detailed project information
    - Facilitate ad hoc reporting
    - Preserve accessible project history
    - Provide integrated data source and remove independent silos.
6. Improving Data:
    - Higher or inherent data quality due to verification by managers that information is correct and reflects accurate conditions if they rely on the tools for decision making:
        - First-hand entry will eliminate human error when the information is entered once for use by Project Engineers.

7. Number of systems replaced not numerous:
   - "Journey of a thousand miles (or $15 billion) starts with a single step"
   - This is an essential first step in updating WSDOT systems.

Figure 10 – First Step to Success

Section 5. Proposed Systems Implementation Plan

Description

Hardware and Software Procurement

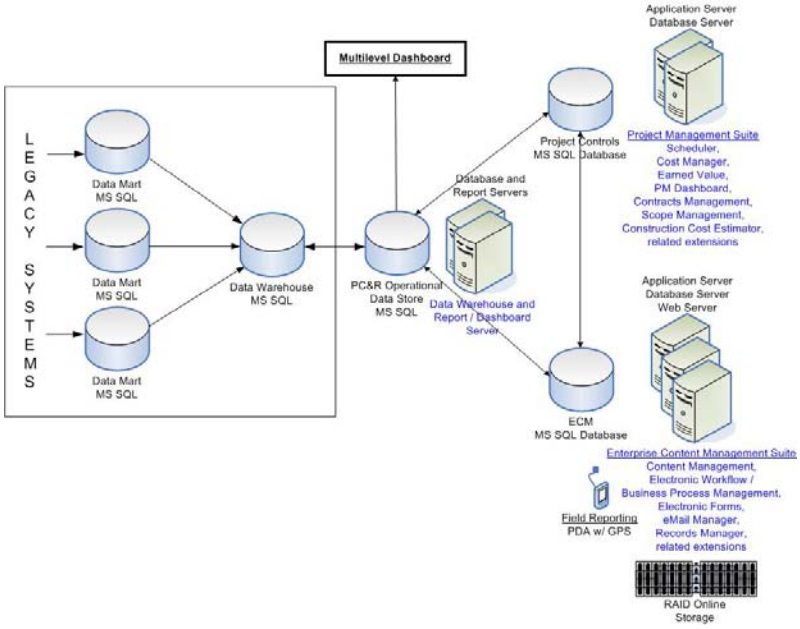
The approach to software selection has refined since completion of the *Systems Functionality and Feasibility Memorandum*. The WSDOT RFP process will be used to procure software and hardware for the Project Management suite and separately for the Enterprise Content Management suite.

Software component selection criteria were developed as part of the *Systems Functionality and Feasibility Memorandum*. They are based on collaboration between SPMG subject matter experts, WSDOT steering committees, the WSDOT Office of Information Technology (OIT), and a limited set of current system users from HQ and regional offices. The Feasibility Memorandum criteria can be converted into an RFP format and reviewed with WSDOT steering committees, WSDOT OIT, and a broader selection of WSDOT users across all regions. The RFPs will be issued following these reviews. All RFPs, software selection and procurement processes are expected to be completed within the first three months of Phase 2 and are detailed in the Project Plan.

The selected software components will ultimately determine the hardware specifications and configuration required to implement and deploy the solution. The anticipated production configuration of hardware and software components is depicted in Figure 11.

Sets of servers will be required for a *development* environment, a *staging / testing* environment and a *production* environment. The Enterprise Content Management suite is anticipated to be web-browser based. Each of the three environments will require an application server, a database server and a web server. As an Internet-based solution, the production environment will support all users. End-user desktop systems will only require intranet or Internet access and a reasonably current web browser. Application software will not have to be installed on end-user systems. A storage area network with at least one terabyte of storage will be required for the storage of documents, workflow definitions, report definitions and meta data.

Figure 11 - Major System Elements



The Project Management suite is anticipated to be client-server based. A central site will be established at WSDOT HQ with an application server and a database server for each of the three environments. Additional production server sets are likely to be required for some or all regional offices, if network capacity issues or security / firewall issues prohibit WSDOT-wide use of the HQ'

production environment servers. End-user desktop systems will require the installation of client software. Depending on the release levels and capability of end-user system hardware and software, some systems may need to be upgraded to meet Project Management suite requirements. This will be determined after software has been selected and required upgrades addressed during Phase 2 of the project.

Table 13 summarizes hardware needs. Two additional servers for each environment will be required to handle integration through the Operational Data Store, the report web portal (dashboard) and general report processing. The user interface to these functions will be web-browser based.

Table 13 – Hardware Requirements Summary

Hardware Requirements Summary		
	Headquarters	Individual Regions
Enterprise Content Management Suite	9	0
Project Management Suite	6	0 to 18 (TBD)
Operational Data Store / Dashboard / Reporting	6	0

Deployment

Implementation will typically be performed in two stages. The deployment process for each stage consists of multiple steps:

- Initial production deployment:
  - Initial end-user training
  - Initial end-user client installation (where needed)
  - User acceptance testing
  - Ongoing user support
  - Mid-course review and resulting updates and testing
  - Pre-full deployment review and resulting updates and testing
  - Full deployment readiness review
- Full production deployment:
  - End-user training
  - End-user client installation (where needed)
  - Ongoing user support.

Initial production deployment will include two projects from each region and span a variety of project types. The initial deployment will verify that the functionality delivered by an implementation stage will function well across all project types and regions. End-user training is performed using production-level functionality and current data from the selected projects. Limiting initial deployment provides an opportunity for close communication with a relatively small set of initial users and the ability to refine the solution with a minimum of cost and user impact before it is deployed throughout WSDOT.

It is anticipated that some or all of the project management software components that are selected by WSDOT will be client-server based. All required end-user client desktop software will be installed prior to completion of training for each user. At the completion of training, users will be able to continue to use the new software functions for their project duties. User acceptance testing will immediately follow training and will include early systems usage and feedback from end users and user support personnel.

An initial deployment mid-course review will be conducted to address evaluation feedback and issues discovered in user acceptance testing and all systems use and support experience gained up to that point.

Systems will receive a mid-course update to correct issues, and the initial users will continue to use the updated systems.

A Full Deployment Readiness Review and any needed additional updates required will be performed at the end of the initial deployment period. A Full Deployment Readiness Review of final updates, as well as training and client software installation plans and resources, will be conducted prior to WSDOT-wide full production deployment.

During full production deployment, all WSDOT software users will be trained and will have any required software installed on their desktop systems. User support will be provided throughout all deployment tasks and continue after deployment is complete.

Training

Training will be conducted during the Pilot Project. Training will build the skill base within WSDOT, fill the specific needs of the SPMG project, and develop individuals' skills. Upon the completion of pilot user training, the project team and regional trainers will evaluate the effectiveness of the training program and take action to ensure that this program meets the project's and WSDOT's objectives. All approved curriculum changes will be applied accordingly prior to beginning the WSDOT-wide deployment.

The SPMG PC&R project training will focus on system users, business processes and tools. The SPMG PC&R project team will work jointly with WSDOT trainers to develop curriculum. The project team will train WSDOT end users and WSDOT trainers, and will transition training responsibility to WSDOT trainers during the course of deployment.

Initial projects will be selected from each region and moved into or created in the production environment for use during training. Regional representatives will assist in the selection process to ensure a broad variety of project types and projects that address individual regional needs. Users will be trained on the tools, processes and procedures in the context of their projects. They will be able to continue to use the new systems for their current projects immediately after training.

A detailed list of the people who must be trained and their training requirements will be developed to create training plans and schedules. The project team will work with regional representatives to identify and finalize the end users to be trained.

Financial Plan for Implementation

Costs

SPMG has developed two options for systems implementation. Option A is a single stage development cycle that includes three incremental releases of functionality during a pilot program. Upon successful completion of the pilot, the system would be deployed to all regions. Option B deploys specific EVMS and RW tracking functionalities early in the project in response to potential fiscal constraints. Option B divides the implementation into two separate stages while focusing cost on specific benefits for each of these stages and the fiscal year and biennia. Each stage covers the installation of software, hardware and support from OIT in addition to SPMG's efforts for the integration, management, training and design of the new system. The detailed work plans are attached in the Appendix 5 and summarized in this section. Both options have continuing costs of ongoing maintenance and support. Tables 14 and 15 present the Implementation Costs for each option. The development costs for each option are: Option A - $14.1 million and Option B - $16.3 million.

Table 14 – Option A – Costs by Fiscal Year

Option A - Single Stage Deployment Cost Summary					
Benefit	Risk		SPMG	OIT	Grand Total
Low	High	FY07	$ 1,728,000	$ 1,868,000	$ 3,596,000
High	Moderate	FB 07-09	$ 4,062,000	$ 4,408,000	$ 8,470,000
High	Moderate	FB 09-11	$ 2,002,000	$ 2,500,000	$ 4,502,000
High	Moderate	FB 11-13	$ 750,000	$ 2,500,000	$ 3,250,000
			$ 8,542,000	$11,276,000	$19,818,000

The difference between the total costs shown in Tables 14 and 15 are biennia maintenance costs of $2.5 million per biennium. OIT and SPMG have continuing costs for the remainder of biennia 2009-2011 and 2011-2013 in current day dollars.

Each option and the stages and associated benefits are summarized in Figures 12 and 13.

Full realization of the systems solution does not occur until the end of the deployment under both options in the first months of biennium 2009-2011.

Implementation Option A (IO-A) - Single Stage Systems Approach

Introduction
The following describes a single stage process and systems implementation for project control and reporting at WSDOT.

Fiscal Year '07
Business Objective: Procure necessary software and hardware, moving forward with detail planning, design and implementation of new business processes and systems that:

- Eliminate conflicting data
- Are consistent and repeatable in process and results
- Are efficient in inputs and out-puts
- Develop confidence in the integrity of the data
- Report up-to-date cost accuracy
- Simplify processes and preparation of reports
- Are easy to access and intuitive to use
- Provide analytical methods based on best project management practices to reliably assess:
  - Risk
  - Forecast cost
  - Forecast time of completion.

Benefits
Detailed design and planning for cultural change within WSDOT. Start the implementation of the recommendations of best practices and systems in the strategic report.

Risks
Systems and processes will be in detailed development without user benefit of testing or indoctrination of the new integration of processes or systems.

Within the first year, the approach does not reduce or minimize:

- The lack of integration in the data and business processes
- The workload of the project delivery staff
- Discrepancies across the regions on most of project control and reporting information

- Will not be noticed to most of the delivery staff and will have to wait for evidence of tangible results.

If funding is limited or unavailable after FY '07, Option A will deliver no integration of process or systems according to the recommendations of the Strategic Plan/Report:

- Loss of labor and software investments in FY '07 that do not result in any increased functionality
- Not meeting the overall vision and goals of the fully implemented project control and reporting solution
- No implementation of BMP or new business processes supported by modern tools/systems
- All the design and testing will go unnoticed nor used by the delivery staff
- Continued conflicting views of projects and information.

Any delays in the RFP/IT contracting processes will delay the start of implementation of the strategic recommendations.

07-09 Biennium

Business Objective: Complete testing and mid-deployment of improved business and management processes, systems and reporting.

Complete the pilot program and final half of deployment to the regions of a:

- Consistent and standardized approach to managing and reporting work and progress
- Cost Management/Earned Value process for all phases
- Integrated project control and reporting system:
  - Schedule integration
  - Parametric estimating
  - Scope management
  - Risk management and integration
  - Increased consistency, efficiencies and reliability

Benefits

Earliest stages of Better Project Management practices:

- Training WSDOT delivery staff in industry best practices
- Running WSDOT more like a business:
  - Forward-looking management tools and techniques
  - Efficient operations and communications:
    - Top-to-bottom communications
    - increased accountability
    - modernized tools and techniques
    - information sharing
- Greater value for operating and construction cost.

Risks

Cultural and functional issues within WSDOT represent the largest risk to the new processes and systems. They include:

- Possible resistance of staff to the cultural transition
- Belief that systems will correct process and cultural issues
- Efficiencies may be overshadowed by substantial increases in workload due to increased program size
- Final deployment throughout WSDOT of the new processes and system may not be complete if the project is shortened
- Lack of experience with the new tools and techniques will create some short-term inefficiencies.

09-11 Biennium

Business Objective: Run WSDOT like a business with world-class management techniques and tools.

Complete the overall deployment of business processes and systems that:

- Eliminate conflicting data
- Are consistent and repeatable in process and results
- Are efficient in inputs and outputs
- Develop confidence in the integrity of the data
- Report up-to-date cost accuracy
- Simplify processes and preparation of reports
- Are easy to access and intuitive to use
- Provide analytical methods based on best project management practices to reliably assess:
  - Risk
  - Forecast cost
  - Forecast time of completion.

Risks

Cultural functional issues within WSDOT represent the largest risk to the new processes and systems. They include:

- Belief that systems will correct process and cultural issues
- The possibility that efficiencies will be overshadowed by substantial increases in program work loads.

Implementation Option B (IO-B) - Incremental Systems Approach

Table 15 – Option B – Costs by Fiscal Year

Fiscal Year '07

Business Objective: Improve cost management to facilitate greater project management control and reporting.

Stage 1: Roll out Earned Value applications and selected BMP processes to the regions. This will include:

- Cost Management/Earned Value using Commercial Off-the-Shelf software
- Deployment of an available RW phase tracking system to report on RW progress and Milestones
- Development of a standardized Work Breakdown Structure (WBS) that works with the Master Deliverables List (MDL) to facilitate consistent management techniques
- Work flows to integrate much of the needed specialized process.

Stage 2: In parallel with Stage 1 deployment:

- Develop the design of the integrated project control and reporting system
- Test system integration and develop new processes:
  - Schedule integration
  - Parametric estimating
  - Scope management
  - Efficiencies in additional electronic work flows.

Option B - Two Stage Deployment Cost Summary							
Benefit	Risk		Stage 1	Stage 2	SPMG Total	OIT Total	Grand Total
High	High	FY07	$ 2,300,000	$ 1,116,000	$ 3,416,000	$ 1,868,000	$ 5,284,000
High	Moderate	FB 07-09	$ 517,000	$ 3,944,000	$ 4,461,000	$ 4,423,000	$ 8,884,000
High	Moderate	FB 09-11		$ 1,000,000	$ 1,000,000	$ 3,605,000	$ 4,605,000
High	Moderate	FB 11-13			$ 750,000	$ 2,500,000	$ 3,250,000
			$ 2,817,000	$ 6,060,000	$ 9,627,000	$ 12,396,000	$ 22,023,000

Introduction

The following describes a two stage process and systems implementation for project control and reporting at WSDOT. While funding may dictate the need for this type of approach it carries a relatively high risk and is not optimal (see specific risks associated with each increment).

Benefits

Better project management brings better delivery:

- Earned Value by Project Engineers will facilitate:
  - Estimates at Completion, and
  - Forecast Time Of Completion

- Helping to identify the "Surprises" in time mitigates corrections for:
  - Preliminary Engineering (PE)
  - Right-of-Way
- Start to develop a single view business environment.

Risks

Within the first year, Stage 1 of Option B does not reduce or minimize:

- The lack of integration in the data and business processes
- The workload of the project delivery staff
- The risk of rejection based on its deployment into an overloaded work environment with users who are unfamiliar with the techniques
- Discrepancies across the regions on most of project control and reporting information

Aggressive rollout schedules for new project management methodologies and software usages for Stage 1 requires abbreviated pilot program:

  - Short test schedules
  - Very short training programs.

If funding is limited or unavailable after FY '07, it will heighten the issues raised above and will result in:

- Moderate losses based on labor and software investments in FY '07 that do not result in fully implemented functionality
- The final development of more efficient processes worked around in Stage 1 (i.e., Cost-To-Date lag)
- Not meeting the overall vision and goals of the fully implemented project control and reporting solution
- Implementation of Best Practices that are not supported by modern tools/systems.

Any delays in the RFP/IT contracting process will delay the start of implementation of the strategic recommendations.

<u>07-09 Biennium</u>

Business Objective: Leverage improved cost management with greater project control and information integration and reporting.

Stage 1: Complete the pilot and deployment to the regions of a:

- Cost Management/Earned Value process
- Right-of-Way phase Tracking System to report on RW progress and milestones
- Consistent and standardized approach to managing and reporting work and progress.

Stage 2: Complete the overall deployment and pilot program including:

- Integrated project control and reporting system
  - Schedule integration
  - Parametric estimating
  - Scope management
  - Increased consistency, efficiencies and reliability.

Risks

Cultural and functional issues within WSDOT represent the largest risk to the new processes and systems. They include:

- Possible resistance of staff to the cultural transition
- Belief that systems will correct process and cultural issues
- Efficiencies may be overshadowed by substantial increases in workload due to increased program size
- Expectation that WSDOT will have to make due with what they have now
- Failure to lay the groundwork for cultural change in Stage 1 will result in heightened obstacles to overcome in Stage 2.

09-11 Biennium

Business Objective: Run WSDOT like a business with world-class management techniques and tools.

Complete the overall deployment of the integrated business processes and systems that:

- Eliminate conflicting data
- Are consistent and repeatable in process and results
- Are efficient in inputs and outputs
- Develop confidence in the integrity of the data
- Report up-to-date cost accuracy
- Simplify processes and preparation of reports
- Are easy to access and intuitive to use
- Provide analytical methods based on best project management practices to reliably assess:
  - Risk
  - Forecast cost
  - Forecast time of completion.

Benefits

Better project management brings better delivery:

- Implementing industry Best Practices
- Running WSDOT like a business
  - Forward-looking management tools
  - Efficient operations and communications
    - Top-to-bottom communications
    - Increased accountability
    - Modernized tools and techniques
    - Information sharing
- Greater value for operating and construction cost.

Risks

Cultural functional issues within WSDOT represent the largest risk to the new processes and systems. They include:

- Resistance of the staff in the cultural transition
- Belief that systems will correct process and cultural issues
- The possibility that efficiencies will be overshadowed by substantial increases in program work loads.

Spending and Cash Flow

The Systems Implementation Plan is expected to begin with efforts concentrating and supporting the RFP process. Concurrently, detail requirements and systems design will also begin in order to mitigate any postponements in the procurement process. However, there are limitations to the amount of work that can be accomplished before the delivery of hardware and software. SPMG and OIT anticipate the project's cost curve to be as shown in Figure 11 for IO-A and similar in Figure 12 for IO-B.

In Figure 12, within the cost curve spending for Stage 1 of IO-B is highlighted in dark red and Stage 2 is highlighted in yellow. OIT's costs are predominantly in Stage 2 and are displayed as such throughout this report for the Option B scenario. Cumulative costs are developed for the 38 months of the project, but Figure 12 does not include the additional 22 months of work that OIT and SPMG will expect to expend by the end of the 2009-2011 biennium. The cost in the histogram (scaled on the left side of the figure) and the cumulative cost curve (scaled on the right) are superimposed against major task elements of the project plans.

Funding Sources

This issue has not been fully developed as of the writing of this report.

Figure 12 – Cost By Fiscal Year and Biennium – Option A

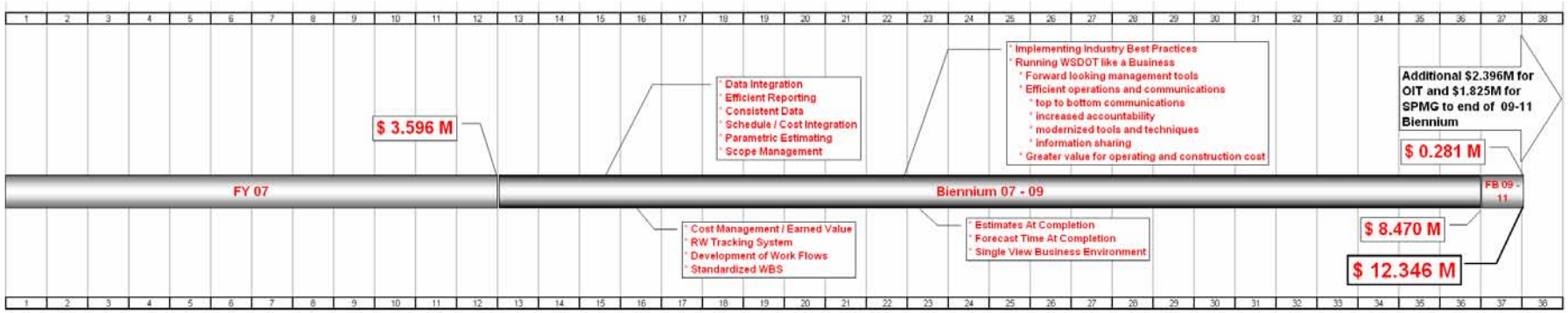


Figure 13 – Cost By Fiscal Year and Biennium – Option B

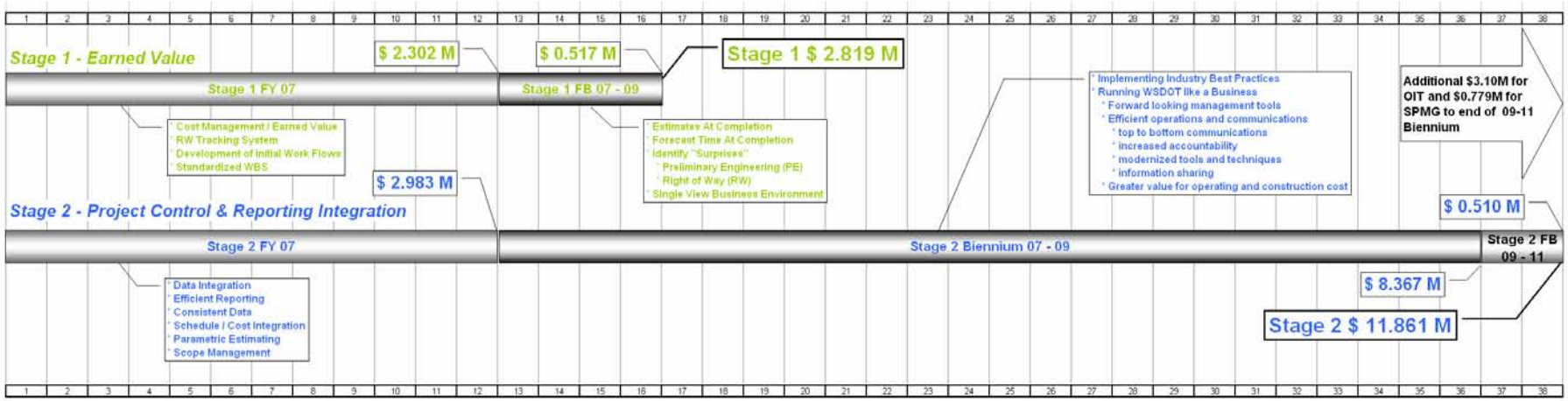


Figure 14 – Time Phased Cost of Option A

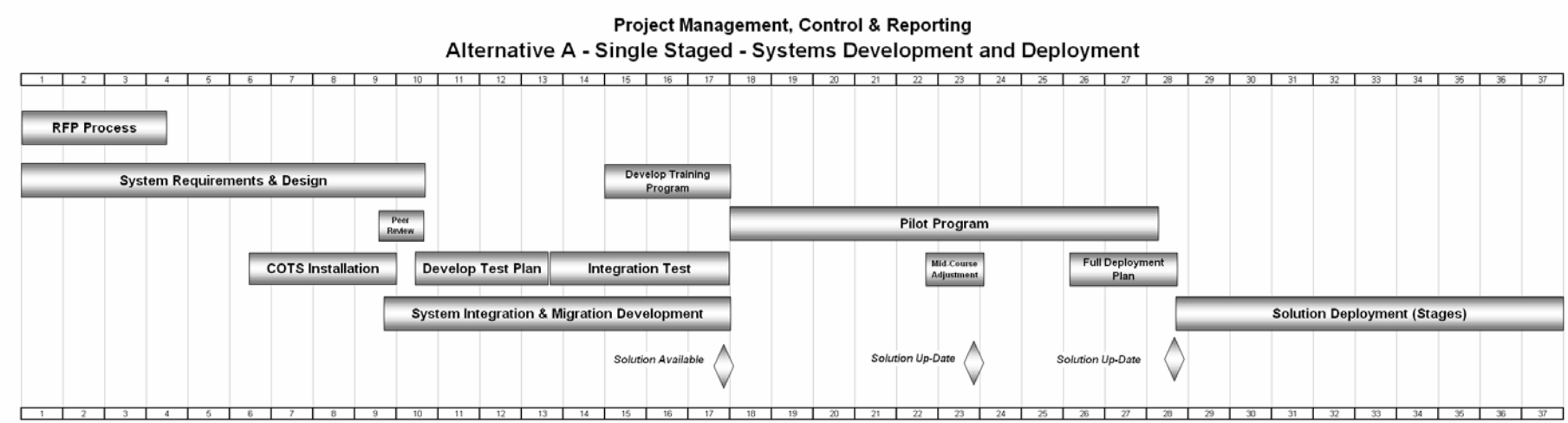
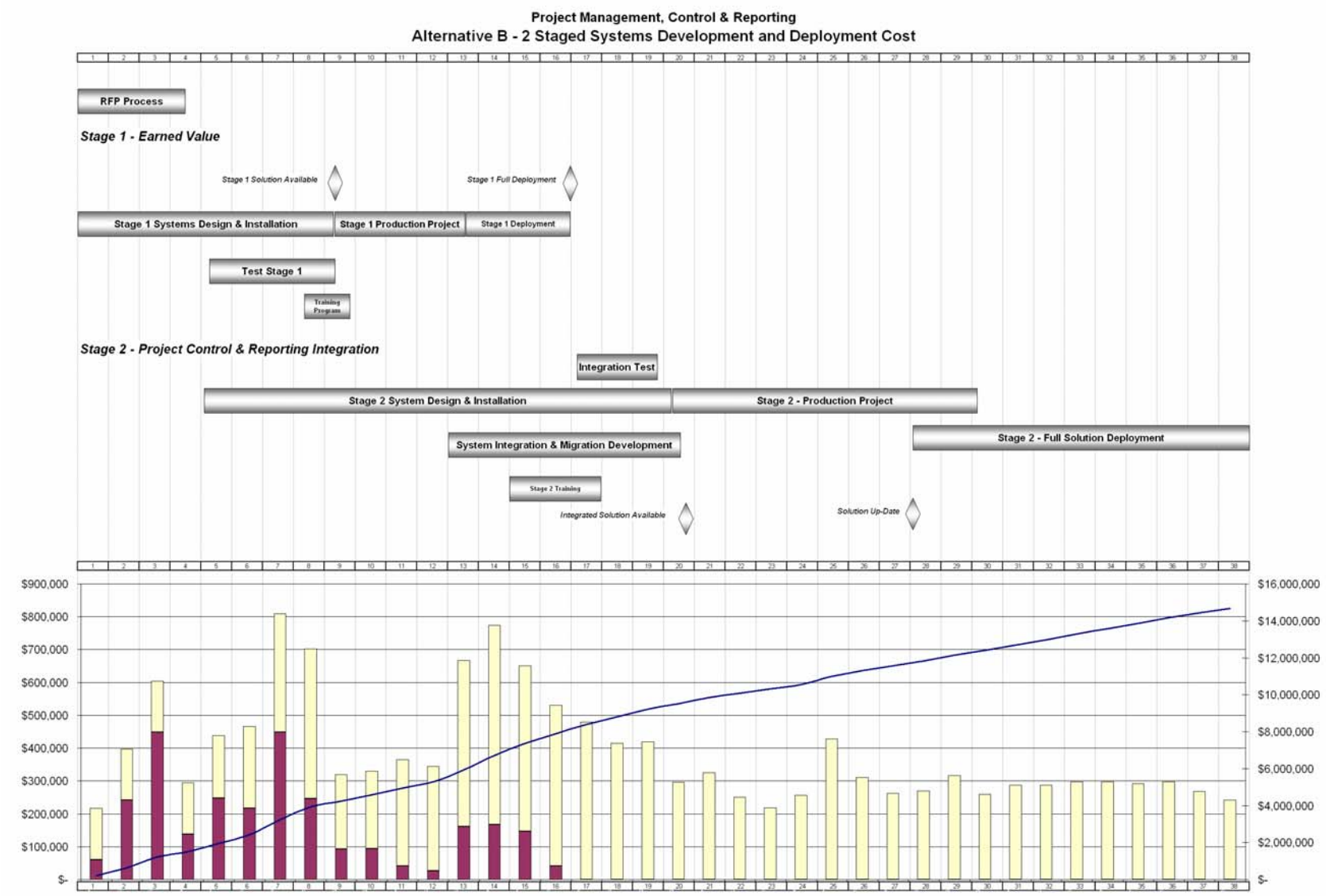


Figure 15 – Time Phased Cost of Option B



Estimated Work Plan Schedule

The work schedule for each option is detailed in the work plan and is summarized in Figures 14 and 15. Option A is expected to take 37 months for full deployment while Option B is expected to take a minimum of 38 months for deployment. Appendix 5 presents detailed work schedules for each option.

Timeframe for Implementation

Implementation is expected to start in the next fiscal year. Development tasks, including the RFP process, need to start in sync with the fiscal year and bienniums for estimated costs to proceed according to plan. Any postponement will skew costs and timeframes for full development and deployments of either stage by a commensurate period.

Option A and Stage 1 of Option B is expected to be deployed within WSDOT within 17 months for the test or pilot project and the stage solution respectively. Both options look at a statewide deployment in the first few months of the second biennium (2009-2011 biennium).

Phasing Options

Phasing options were developed into the two-stage approach presented here, although limited releases within a pilot or production program are scheduled for either scenario. In these phases, "user acceptance testing" and corrections to the initial releases will refine the eventual release throughout WSDOT. These releases throughout WSDOT will be incremental and are expected to be based on regions.

Transition from Legacy Systems

Legacy systems contain both mainline functions and adjunct functions. Some functions are believed to be no longer used or required. Legacy system instrumentation is required to determine function usage. CPMS, CAPS, CCIS, EBASE, WOA and PDIS are the primary legacy systems that will be evaluated to determine if all essential functions are superseded and they can be fully retired. Systems that cannot be retired will become candidates for reorganization or replacement by additional modern applications.

Acceptance of new systems, processes and procedures requires cultural change within the organization and its people. To minimize resistance to cultural change, a dialogue will be maintained with end users and steering groups, to keep them involved and informed throughout the project. In addition, a small representative group of projects will initially use each stage so that functions may be refined before they are deployed throughout WSDOT. To minimize the number of cultural change barriers, Stage 1 functions will not change when Stage 2 is delivered.

Risk Assessment

A detailed risk assessment is available for reference in the Appendix 6. The purpose of the risk assessment is to identify possible impacts to the success of the project and plan for their possible occurrence. The risk assessment outlines the risks most likely to be encountered during the course of the development and implementation of the Best Management Practices, processes and program control systems. The assessment ranks the potential impact to the projects' resources and schedule, as well as the probability of occurrence. Also identified are the mitigation efforts that can be taken in the event of occurrence, the possible triggers, and the associated trigger dates.

A list follows that shows the potential impacts identified to date. These risks are also included in Appendix 6.

Figure 16 shows the concept of a production dip which typically occurs when systems and tools are upgraded. This is a

key risk that must be managed during implementation. WSDOT has formed a Steering Team, described in the following section on Project Management and Organization. The role of the Steering Team is to serve as sponsors, champions and effective communicators to the community of users so as to create positive cultural support for the deployment and implementation of the methods and tools agencywide.

Figure 16 - The Production Dip

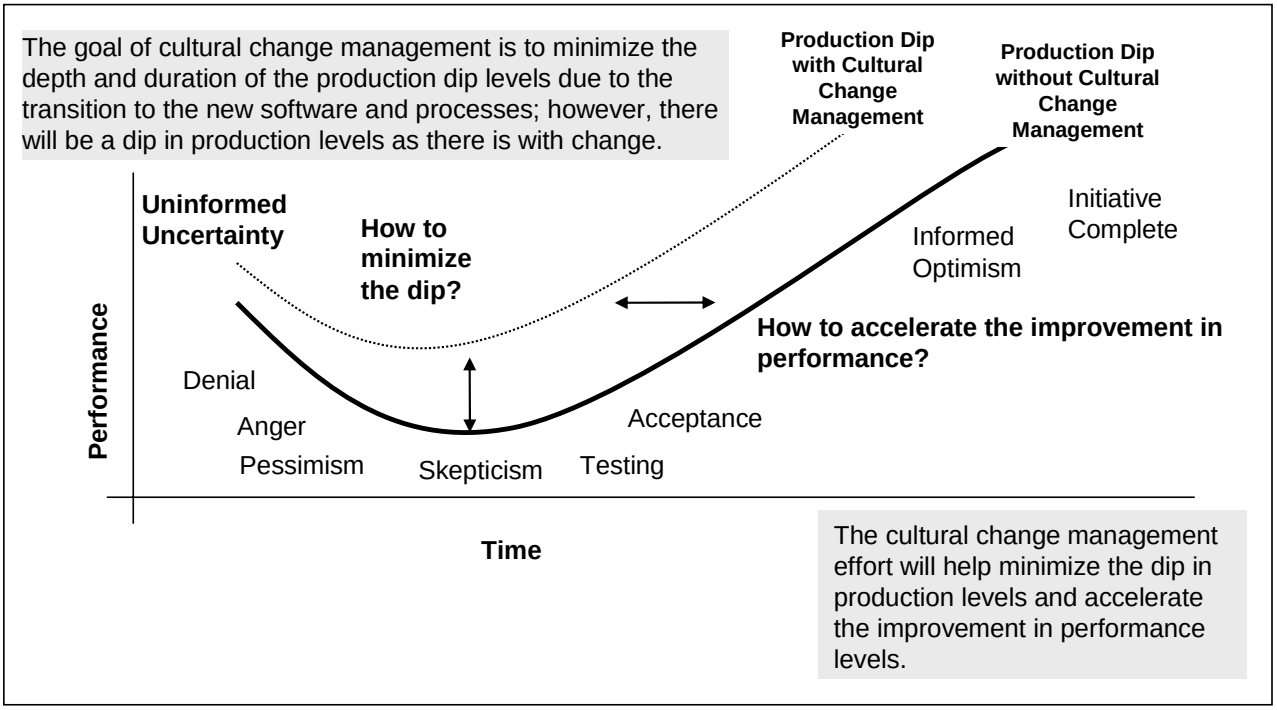


Table 16 – List of Risks in System Development and Implementation

No.	Risk / Threat
1.	Funding from WSDOT not in accordance with development: funding could be denied
2.	Funding from WSDOT not in accordance with development: funding may not be available for FY '07
3.	Funding from WSDOT not in accordance with development: remaining funding, post FY '07, may not be available
4.	Budget from WSDOT not in accordance with development
5.	Hardware procurement problems / timeliness
6.	Software procurement problems / timeliness
7.	Partial or total rejection of recommended Best Practices
8.	Resource availability for development in timeframe indicated
9.	Completion within the timeframe identified
10.	Integration with legacy system data
11.	Selection of representative pilot projects
12.	Lack of participation by stakeholders due to "not invented here" syndrome
13.	Resistance by line managers due to "it ain't broke" attitude; Staff reluctance to do things a new way; Belief that projects don't fit into the template(s)
14.	Staff not receiving the same deliverable from the new system as from the old system
15.	Staff not wanting to be held accountable; Staff's increased workload perception
16.	Lack of consistent definitions for processes
17.	Lack of a consistent definition for a project; Lack of consistent terminology
18.	Changing vision of what is needed from DOT
19.	Over-reliance on technology to solve non-technical issues
20.	Lack of adherence to protocol or process
21.	Acceptance by IT groups of "outsider consultant"
22.	Security issues unknown to integration team
23.	Interface issues unknown to integration team
24.	Staged System Implementation
25.	Phase 1 cost and schedule estimates based on preferred candidates

Project Management and Organization

Sponsors and Lead Development Responsibility

Figure 17 illustrates the SPMG's governance structure.

Figure 17 – Statewide Program Management Governance

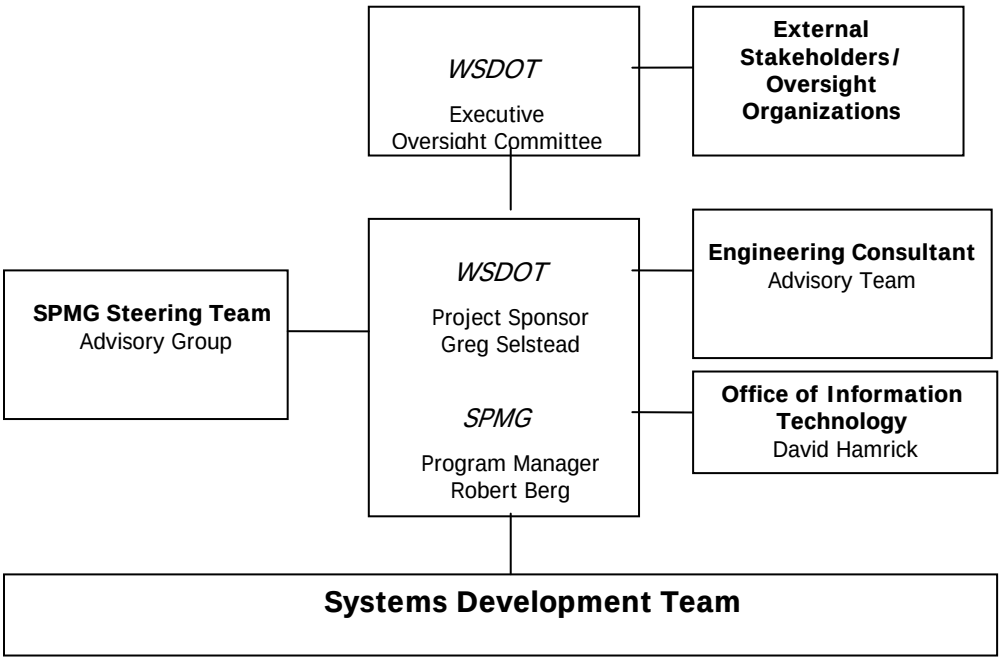


Table 17 lists the project team members and their roles and responsibilities

Table 17 – Team, Roles and Responsibilities

ROLE / MEMBER(S)	RESPONSIBILITIES
EXECUTIVE SPONSOR: John Conrad	• Provides oversight of critical project decisions on cost, scope and schedule • Reviews project status with Project Managers
WSDOT PROJECT MANAGER: Greg Selstead	• Provides daily guidance and makes critical project decisions on cost, scope, schedule and deliverables • Reviews project status reports.
CONSULTANT TEAM PROGRAM MANAGER: Bob Berg	• Provides daily guidance and makes critical project decisions on scope, schedule and deliverables. • Provides project status reports.
EXECUTIVE STEERING COMMITTEE: Paula Hammond John Conrad Don Nelson Mike Anderson Bill Ford Doug Vaughn Lorena Eng Randy Hain Dave Dye Don Wagner Don Whitehouse Don Senn Jerry Lenzi Kermit Wooden Doug MacDonald David Hamrick Daniel Bremmer	• Provides executive-level guidance and approves major project deliverables. • Attends steering committee meetings and presentations on the project. • Reviews project status reports.
WSDOT COORDINATOR Rose This	• Coordinates project activities on behalf of WSDOT
CONSULTANT PROJECT TEAM LEAD Greg Jones	• Directs the project in regard to business requirements
SPMG STEERING TEAM Rick Singer, OR Business Services / TNB Roy Grinnell, UCO Bill Elliott, OL Region Project Management Eng Glenn Schneider, SW Region Construction Joel Voth, NC Region Development Branch Project Engineer Sharif Shaklawun, NW Region Project Engineer Mike Frucci – ER Construction	• Reviews SPMG project deliverables and provides input to the SPMG project team, with the goal of improving the project outcome and ensuring alignment with WSDOT's business needs. • Effectively communicates about the SPMG project to other WSDOT staff. • Advocates with other WSDOT staff for positive cultural changes in support of SPMG project goals. • Reviews each applicable project deliverable and communicates suggestions to the consultant project team • Has ongoing oversight role in the implementation phase of the June 30th Strategic Plan

ROLE / MEMBER(S)	RESPONSIBILITIES
David Hamrick – Office of Information Tech. Aaron Butters – HQ SAPD Ken Smith – HQ Design Jennifer Brown – HQ IPD / EE Russ East – NW Region Todd Trepanier – SC Asst RA John Jeffreys – HQ PCRO Marilyn Bowman – Admin Services Susan Everett – UCO PM Mike Palazzo – Real Estate Services Nicole MacIntosh – WSF Kevin Jeffers – Rail Todd Lamphere – Human Resources Brantly Bain – NC Region	• Guide implementation and training efforts

Critical Resource Skills

The following critical resource skills are needed and required for configuration and administration of new processes, tools and reports:

- Project Manager
- Solution Architect / Designer
- Process Engineers
- Workflow Developers
- Enterprise Application Integration Developers
- Software Application Developers
- Database Developers
- Dashboard Developers
- Report Developers
- Technical Writers
- Quality Assurance / Quality Control
- Trainers
- IT Infrastructure Support
- RFP / Procurement Process Support
- Regional Change Agents
- Subject Matter Experts (SMEs)
    - Construction Project Management
    - Project Management Applications
    - Legacy Systems
    - PC&R Best Practices
    - Enterprise Content Management
    - Project Cost Controls
    - Project Estimating.

Other Statutory Coordination Results

Roadmap for Washington

Coordination with Washington State's Roadmap for Financial and Administrative Policies, Processes, and Systems

Background

In August 2002, Washington State initiated a "Priorities of Government" budget approach that identified ten results that citizens can expect from state government as the basis for budget decision-making. In 2004, a new result was added to address the critical issue of administrative efficiency:

> ***"Strengthen government's ability to achieve its results efficiently and effectively"***

Recognizing the opportunity to build on the promise of Civil Service Reform to continue improving state financial and administrative policies, processes, and systems, the Priorities of Government team provided the following direction:

> ***"The Office of Financial Management, in partnership with Financial and Administrative Systems Roadmap agencies, should develop a proposal to address both short-term and long-term implementation plans and funding needs for a new statewide financial system that, along with the new Human Resources Management System, improves statewide core financial and administrative processes. The proposal should include the ability for agencies, OFM, and the Legislature to receive both accounting and financial data necessary to meet their business requirements."***

The project was launched under the premise that many of Washington State's existing core financial and administrative business processes do not meet the modern and progressive business needs of state agencies. The *Roadmap for Washington State Financial and Administrative Policies, Processes, and Systems*[14] is intended to create a comprehensive plan to meet demands for better information, improved management systems and streamlined business processes and policies.

Phase I of the Roadmap Project (the evaluation and planning process) will focus on identifying common business problems, opportunities and benefits; identifing and validating a solutions framework; validating strategic direction; assessing technical architecture; developing funding options; and developing implementation plans. Phase I is due to be completed in June 2007. Phase II is the implementation of the *Roadmap* and is scheduled to begin in July 2007, depending on availability of funding.

Linkage between the SPMG Project and the Roadmap Project

Because of the specialized nature of transportation project management / delivery (the focus of the SPMG Project), the Roadmap Project has tentatively deemed this functional area "out of scope," with the understanding that integration with any statewide financial and administrative systems must be open-architected and approved by OFM. Any significant changes to WSDOT systems that are currently within the scope of the Roadmap Project will also require approval from OFM. This includes TRAINS, CAPS and all other financial or administrative systems internal or external to WSDOT.

SPMG / Roadmap Coordination Activities Undertaken To Date

- WSDOT is actively involved in the Roadmap Project Advisory Group.
- WSDOT has performed an in-house assessment of its critical computer systems in coordination with OFM. Note: Dennis Jones and Tom Saelid from OFM were members of the Critical Applications Assessment Steering Committee. The WSDOT project was staffed by Eclipse Solutions, the consulting firm that is also engaged on the Roadmap Project.
- SPMG consultants, who are charged with the systems assessment portion of Phase I, have met with Eclipse Solutions and WSDOT project staff to review WSDOT's in-house assessment and to identify and discuss linkages to the Roadmap Project.
- SPMG consultants have reviewed the Roadmap Project documentation and OFM rules for approval of financial and administrative system changes and replacements.
- WSDOT SPMG staff and OFM Roadmap staff have maintained contact from the inception of the project, to facilitate open communication and collaboration between the two teams.

Next Steps

WSDOT staff will continue to partner with the Roadmap team to maintain open communication, identify opportunities for enterprise solutions, and ensure all Washington State policies, standards, and guidelines are followed.

Critical Application Assessment and Enterprise

A 2005-2007 budget proviso from the Legislature directed WSDOT to develop a "financial and capital project system needs assessment for future automation development and enhancements." The assessment was completed in December 2005 and identified options that were presented to the transportation committees of the Senate and the House of Representatives. The assessment addressed both business and technical needs. It also identified risks associated with the proposed alternative for addressing the prioritized needs. More specifically, the assessment provided the following:

1. A comprehensive analysis and review of the current state of 11 critical applications and processes that support capital project management, capital program management, financial accounting and budgeting from a business and technical perspective.
2. An analysis of the gaps between the functionality of the 11 critical applications and WSDOT's prioritized current business needs for systems to support capital project management, capital program management, financial accounting and budgeting.
3. An analysis of approaches to addressing the agency's unmet needs and a description of the migration / implementation strategy and risks associated with the recommended alternative.

The study focused on the major applications that support project / program management and financial processes at WSDOT. Descriptions of these applications follow. Figure 15 provides an overview of the linkages among these applications.

- **Transportation Reporting and Accounting Information System (TRAINS – Mainframe, 1991):** Accounts for all WSDOT revenues, expenditures, receipts, disbursements, resources and obligations. It is a highly customized version of an American Management Systems (AMS) software package (includes the budget system – TRACS).

- **Labor Collection and Distribution System / Payroll (Mainframe, 1981):** Processes employee hours worked, leave taken, and financial (cost accounting) details associated with labor hours. Interfaces payroll data to the State's central payroll system.
- **Contract Administration and Payment System (CAPS – Mainframe, 1983):** Maintains administrative and payment information on highway and ferry construction contracts. Creates payment vouchers to pay contractors.
- **Capital Program Management System (CPMS – Mainframe, 1987):** Supports development, monitoring, managing and delivering WSDOT's capital construction program.
- **Priority Array Tracking System (PATS – Mainframe, 1997):** Collects, maintains and tracks WSDOT's capital highway program deficiencies to support development of the capital highway construction program.
- **Project Delivery Information System (PDIS – Client Server, 2002):** Project scheduling system for the capital highway construction projects.
- **Project Summary (Client Server, 1998):** Collects capital project information during initial project scoping. Documents the department's commitment for scope of work and design, programming and environmental decisions.
- **Transportation Information Planning and Support System (TRIPS – Mainframe, 1986):** Maintains and processes current and historical data on the WSDOT roadway network, traffic volumes and classifications, collisions and collision severity.
- **Construction Contracts Information System (CCIS – Mainframe / Client Server, 1990):** Tracks construction contract details (e.g., start dates, end dates, percent complete, fair hiring practices, fair wage rates, percent of work sublet).
- **Work Order Authorization System (WOA – Client Server, 2002):** Provides for funding approval of preliminary engineering, right-of-way and construction expenditures for all projects in the highway construction program.
- **Estimate and Bid Analysis System (EBASE – Client Server, 1998):** Contains engineers' estimates and contract bid history for highway construction projects. Estimates and bid information are uploaded into CAPS.

The assessment found these systems to be inadaptable and inflexible, lacking integration, lacking critical functionality, and incapable of supporting critical information delivery. The assessment also found that the systems do not effectively adapt to law, policy, management priority, and union changes and that workarounds requiring extra staff time are common. The assessment also found that project cost and financial management is difficult and that managers cannot tightly manage expenses and risk having late or over-budget projects.

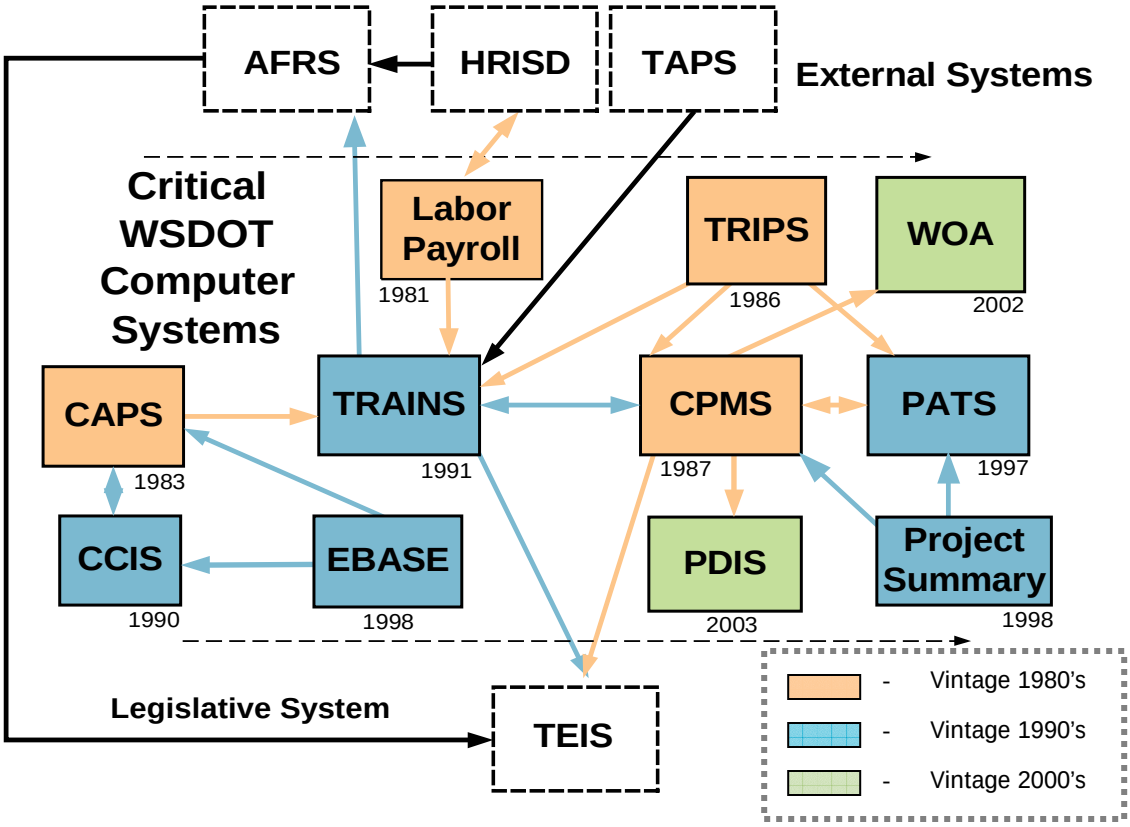
A gap analysis was performed, comparing WSDOT's business and technical needs to the current system's capabilities. Based on this analysis, five alternatives were identified. The recommended alternative, "Retool Everything," was based on the following:

> ***"There is not much WSDOT can save, reuse, or extend within the existing set of eleven critical applications and the supporting business processes. Partial replacement of systems delivers some benefits, but unless WSDOT replaces all of the core systems, the Agency will be saddled with steeply increasing maintenance costs and decreasing value over time....The recommended solution provides WSDOT and its external stakeholders with information about projects, their schedules, resources, costs and results, as well as the project and work order levels."*** *Source: Project Control & Reporting Manual PC&R, WSDOT, January 2006*

Figure 18 - PC&R Financial and Budgeting Systems

The agency has taken the following steps to maintain synchronization between the Critical Applications Assessment findings, WSDOT's ongoing enterprise application planning, and the SPMG Systems Implementation Plan:

- SPMG consultants reviewed all Critical Applications Assessment documentation prior to starting their work.
- SPMG consultants met with the Eclipse consulting team and WSDOT staff who performed the Critical Applications Assessment, to become more familiar with the assessment. They followed up with phone conversations to ensure their understanding of the findings and recommendations.
- OIT has begun development of an Enterprise Architecture, based on overall agency needs and the findings of the Critical Applications Assessment.
- OIT staff and consultants involved in



developing WSDOT's Enterprise Architecture have participated in SPMG systems-related interviews and team meetings and provided direct input to the process.

- Consultants working on OIT's Enterprise Architecture are developing a description of the intersection / overlaps between the SPMG systems proposal and the Critical Applications. This should provide a basis for funding replacement of systems inside and outside the scope of the SPMG project.
- The SPMG team partnered with OIT to prepare funding proposals, to ensure that enterprise infrastructure and support needs are accounted for.

The SPMG team will continue to collaborate with OIT, DIS and others to ensure consistency between implementation of the Critical Applications Assessment and SPMG systems development activities.

Priorities of Government

The State's Priorities of Government (POG) approach creates a strategic framework for investment decisions. The approach starts with several basic questions:

- What are the results citizens expect from government?
- What strategies are most effective in achieving those results?
- How should we prioritize spending to buy the activities that are most critical to implementing these strategies?
- How will we measure progress?

This prioritization of activities is used to guide the Governor's budget proposal to the Legislature and to communicate that budget to the public. The current priorities of government include improving the mobility of people, goods and services. The WSDOT Strategic Delivery Plan directly supports these priorities as follows:

- The approximately 400 TPA and Nickel projects, along with the underlying PEF list projects, all contribute to "***management of the transportation system operations and demand effectively"*** by maximizing the use of existing facilities, increasing travel safety and making modal investments that support local land use and transportation planning. In addition, these projects "***improve system quality and service"*** and "***preserve and maintain state, regional and local transportation systems"*** by:
  - providing added capacity in deficient corridors
  - increasing non-motorized trips in urban areas
  - providing added connectivity between modes
  - improving access to major airports and marine ports
  - preserving essential components of the current transportation system
  - improving all-weather roads on strategic freight routes
  - eliminating seismically and operationally deficient bridges.
- Implementation of the SPMG strategic recommendations with the associated business process changes and PC&R systems and tools helps WSDOT meet the following key strategies for "***effective management"***:
  - Budget highway capital program by project type of corridor / subcorridor / mega / project group
  - Communicate project results in transparent and timely manner
  - Clarify executive-department roles and responsibilities.
- The SPMG Plan is coordinated with the following POG: ***"Mobility- focused budget areas"***
  - Change traditional transportation capital budgeting processes to a corridor-based approach, to

maximize resources while still ensuring transparency and accountability
- Identify project transfer criteria, processes and procedures.

This clearly shows that the SPMG Plan aligns well with many of the government's current priorities.

References

1. *Workforce Analysis Task, Draft Report*. Statewide Program Management Group, February 24, 2006.

2. *SPMG Survey of WSDOT Project Delivery Staff.* January 2006.

3. *Overview of Washington State Department of Transportation Capital Project Management.* Report 05-3, Joint Legislative Audit and Review Committee (JLARC), January 21, 2005.

4. *WSDOT Online Project Management Guide.* http://www.wsdot.wa.gov

5. *SPMG Interim Report.* Statewide Program Management Group. March 2006.

6. *Capital Projects Systems.* Leg '06 Final. May 2006.

7. *WSDOT Project Control and Reporting Manual - Managing Program Delivery at the Project Level*. M3026.00, Project Control and Reporting Office, January 2006. http://www.wsdot.wa.gov/fasc/EngineeringPublications/Manuals/ProjectControlManual.pdf

8. *Beige Pages, Gray Notebook,* WSDOT, published quarterly.

9. *JTC Budget Methodologies Study Presentation.* April 20, 2006.

10. *Guide to the Project Management Body of Knowledge* (PMBOK). Project Management Institute.

11. *Standard for Program Management.* Project Management Institute.

12. *Project Management Guidebook.* State of North Dakota.

13. *Enterprise Project Management Tool Analysis – White Paper.* National Aeronautics and Space Administration. August 2002.

14. *Roadmap for Washington State Financial and Administrative Policies, Processes and Systems.* Washington State Office of Financial Management, OFM Budget Division, Fiscal Research & Forecasting. http://www.ofm.wa.gov/roadmap

Appendix

Appendix 1. Glossary

API – Application Programming Interfaces
AFRS – Agency Financial Reporting System
API – Applications Programming Interface
BASS – Budget and Allotment Support System
CAP – Control Account Plan
CAPS – Contract Administration and Payment System
CCIS – Construction Contracts Information System
CEVP® – Cost Estimate Validation Process
CIPP – Capital Improvement and Preservation Program
COTS – Commercial Off-the-Shelf
CPI – Cost Performance Index (Ratio)
CPMS – Capital Program Management System
CRA – Cost Risk Assessment
DIS – Department of Information Systems
DPS – Direct Project Support
EAC – Estimate at Completion
EBASE – Estimate and Bid Analysis System
EV – Earned Value
FAPA – Federal Aid Project Agreement
FATS – Federal Aid tracking System
FIRS – Financial Information Retrieval System
GEC – General Engineering Consultant
JTC – Joint Transportation Committee
MDL – Master Deliverables List
OCIP – Owner Controlled Insurance Program
OFM – Office of Financial Management
OIT – Office of Information Technology
PATS – Priority Array Tracking System
PC&R – Project Control and Reporting
PDIS – Project Development Information System (used with MS Project)
PE – Preliminary Engineering (also Project Engineer)
PINs – Program Item Numbers
PM – Project Manager (also Project Management)
Project Summary – Project Summary information
RMP – Risk Management Plan
SGDB – Specialty Group Database
SP&P – Strategic Planning & Programming
SPI – Schedule Performance Index (Ratio)
SPMG – Statewide Program Management Group
SRMP – State Route Milepost descriptor
STAR – Local Agency Project Tracking System
TEIS – Transportation Executive Information System
TRAINS – Transportation Accounting and Reporting System
TRIPS – Transportation Information Planning and Support System
WBS – Work Breakdown Structure
WINs – Work Item Numbers
WOA - Work Order Authorization
WSF – Washington State Ferries

Appendix 2. List of PM Reports

Project-Centric Reports

- Cost incurred by project, phase, deliverable, and CAP to date and per period. Transaction detailed and summarized to WBS
- Breakdown of costs incurred to date and per period by project, phase, deliverable, and CAP by cost category (labor, consultants, direct expenses, overhead, G&A, State forces by organization code, etc.). Transaction detailed and summarized to WBS
- Claims or change orders pending
- Estimated schedule and cost at completion
- Schedule status including planned versus actual progress to date and critical indicators for the project, hammock tasks, and activities including total float, free float, and estimated completion
- Schedule trend analysis showing time variance of free float, total float, and schedule variance and schedule performance for project, phase, deliverable, and CAP
- Standard and user-defined exception reports for project, phase, deliverable and CAP for schedule and cost performance variances and indices
- Invoice and payments status by period and to date
- Funding and remaining funding status for project and tasks dedicated to funding sources
- Biennium funding and remaining funding status
- Cash flow projections and actuals comparisons
- Cost and schedule at complete trends
- Contract data by project and phase
- Committed versus uncommitted costs and funding
- Funding needs to complete the project versus authorized funds
- Budget map with documentation of budget map changes
- Current and projected DPS or State G&A charges to project
- Document management reports, contract logs, correspondence logs, issue tracking, construction submittal / RFI / change order logs, claims status.

Region, Statewide, and Stakeholder Reports

- Funding aging by program and phase, overall and by biennium
- Funding / expenditure status by project, program, and phase, overall and by biennium
- Schedule variance and schedule performance rollup for project and program by phase
- Cost variance and cost performance rollup for project and program by phase
- Funding / expenditure plan and actual by program, project, and period, per funding source
- Exception reports for project and program variance / performance by phase
- Exception reports for project and program variance / performance across deliverables

- Major milestones by program and project / budget and biennium
- Resource needs by department by time period and project
- Planned and actual schedule and cost at completion for project / program by funding source.

Appendix 3. Sample Report Formats

Performance Status Prototype

Performance								
	Budget Status		Cost Status		Work Status		Schedule Status	
	Current	Est @ Completion	To Date	%Spent	Earned	% Complete	Total Duration (days)	Elapsed %
PE	167.4M	174.4M	25M	15%	24M	14%	400d	20%
ROW	17M	17M	0	0%	0	0%	250d	0%
CN	390M	390m	0	0%	0	0%	1,250d	0%
Total	574.4M	581.4M	25M	4.4%	24M	4.2%	1,650d	4.8%
		$CPI_{TOT} = 0.96$				$SPI_{TOT} = 0.72$		

$$CPI = \frac{\text{Work Earned to Date (\$)}}{\text{Cost to Date}} = \frac{14\% \text{ X } \$167.4 \text{ mi}}{\$25 \text{ mi}} = \frac{24}{\$25\text{mi}} \quad 0.96$$

$$SPI = \frac{\text{Work Earned to Date (\$)}}{\text{Work Schedule to be Earned To Date*}} = \frac{14\% \text{ X } \$167.4 \text{ mi}}{20\% \text{ X } 167.4 \text{ mi}} = \frac{24}{33.5} = 0.72$$

*Assume that with 20% of PE duration is expended, should have completed 20% of the PE Budget or 20% x $167.4mi = $33.5mi

Legislative Summary Report Prototype (four to a page)

LEGISLATIVE SUMMARY REPORT

Corridor: **SR 999**
Project: **Bridge Replacement and HOV Project**
Project Executive: C. Jones
Status Date: March 2006
Report Date: March 2006
Start Date:

Budgets

Phase	Amount
PE	167.4M
ROW	17M
CN	390M
Total	574M

Delivery Notes: • Amended Draft EIS to include jurisdictional/community sponsored design options • Enhancing corridor Catastrophic Failure Planning • Received interchange concepts from the Local Impact Committee. • Planning for the development of a site for the Construction of the floating bridge pontoons. • Met with the Signatory Agency Committee (SAC) • Purchases of two selected R/W parcels in the Medina area are now being pursued

Performance

Budget Status		Cost Status		Work Status		Schedule Status	
Current	Est @ Completion	To Date	%Spent	Earned	% Complete	Total Duration	Elapsed %
574M	581M	25M	4.4%	24M	4.2%	200d	4.8%

Original LEAP$ Budget $52M

Legislative Milestone Status

	Proj Def Complete		Engineering Start		Environmental Complete		ROW Complete		Advertise		Open to Use	
Plan | *forecast*	**3Q03**	✓	**4Q03**	**early**	4Q07	-	-	-	2Q09	-	-	-

Met Construction Season: ☐Yes ☐No

Quarter Page Report Prototype (four to a page)

¼ PAGE REPORT

SR 999: Bridge Replacement and HOV Project

Project Description

The overall project will replace the SR 520 floating bridge and associated approaches. This project is currently funding to complete the environmental review, including as EIS through the Record of Decision.

Project Benefits

Safety: Rebuilds Portage Bay and Evergreen Point bridges, reducing seismic and storm damage risks. Improves safety and reliability by providing full shoulders for disabled vehicles and emergency aid.

Congestion Relief: Provides a dedicated HOV lane to move transit and carpool (in the 6-lane Alternative) and provides full shoulders for disabled vehicles and emergency aid. Pontoons will be built to carry future high-capacity transit.

Open Risk Issues:

Budgets

Phase	Amount
PE	167.4M
ROW	17M
CN	390M
Total	574M

PE: J. Smith

Project Executive: C. Jones

Performance

Budget Status		Cost Status		Work Status		Schedule Status	
Current	Est @ Completion	To Date	%Spent	Earned	% Complete	Total Duration	Elapsed %
574M	581M	25M	4.4%	24M	4.2%	200d	4.8%

Original LEAP$ Budget $52M

Legislative Milestone Status

Proj Def Complete		Engineering Start		Environmental Complete		ROW Complete		Advertise		Open to Use	
3Q03	✓	**4Q03**	**early**	4Q07	-	-	-	2Q09	-	-	-

Plan | *forecast*

Met Construction Season: ☐Yes ☐No

Half-Page Report Prototype

½ PAGE REPORT

SR 270: Pullman to Idaho State Line – Additional Lanes

Project Description:
Constructs one additional lane in each direction with a two way turn lane between Pullman and the Idaho State line. The project will increase capacity and reduce travel times. Safety will be enhanced with the addition of a two way turn lane to provide separation between opposing directions of traffic. There are currently two lanes. There will be four through lanes when this project is completed.

Contractor/Consultant:
Project not yet advertised or awarded

Project Benefits:
This project will substantially improve safety by creating additional lanes. The project will increase capacity and reduce travel times.

Risks:
Design

Right-of-Way

Construction

Legislative Milestone Status

Proj Def Complete		Engineering Start		Environmental Complete		ROW Complete		Advertise		Open to Use	
3Q03	✓	**4Q03**	✓	**1Q06**	*2Q06*	4Q06	*2Q07*	4Q06	*2Q07*	4Q08	*4Q09*

Plan | *forecast*

Met Construction Season: ☐Yes ☐No

Other Financial Data:

This project is funded through the following sources:

- 2003 Gas Tax (Nickel Funding) - $28,470,266
- Existing Funds - $2,133,196
- Total Funding Available From All Sources - $30,603,46
- Original LEAP$ Budget - ???

Budgets

Phase	Amount
PE	4.2M
ROW	6.3M
CN	19.4M
Total	29.9M

Performance

Budget Status		Cost Status		Work Status		Schedule Status	
Current	Est @ Completion	To Date	%Spent	Earned	% Complete	Total Duration	Elapsed %
$$$	$$$	7.5M	%	$$$	%	days	%

Full-Page Report Prototype

FULL PAGE REPORT

SR 00: New Suspension Bridge Replacement

Project Description:

A new suspension bridge is being built parallel to and south of the existing bridge, providing two general purpose and an HOB lane for eastbound traffic. The new bridge will include a separated path for bicycles and pedestrians. The new bridge is also designed to accommodate a second deck in the future. The existing bridge will be reconfigured to provide two general purpose and an HOB lane for westbound traffic only. The existing bridge work includes seismic improvements. The project also includes 3.4 miles of SR 16 from the Jackson Avenue interchange in Tacoma to a new interchange at 24th/36th streets.

Contractor/Consultants:

Tacoma Narrows Constructors, A Joint Venture (Design/Build); TransCore, L. P. (Toll System Supply and Installation).

Project Benefits:

Safety: Separating oncoming traffic will significantly improve safety across the Tacoma Narrows. Additional safety improvements include wider lanes and new safety shoulders.

Congestion: The operational improvements along the SR 16 corridor between the Nalley Valley viaduct in Tacoma and the Olympic Drive interchange in Gig Harbor will help reduce delays across the Tacoma Narrows.

Risks:
Design
Right-of-Way
Construction

Other Financial Data:

This project started construction in 2003. Its current overall cost estimate is $849 million.

About $800 million of tax-exempt bond financing is required to support the proposed Tacoma Narrows Bridge project. The state has funded $50 million and provided certain tax exemptions and tax deferrals that help to reduce the project costs. The Washington State Transportation Commission will determine the actual toll amounts and schedule in fall 2006. The bridge financial plan assumes an initial $3 toll for the first year, but the Commission will consider this assumed toll amount along with a possible reduced toll for Good to Go! ™ (electronic toll) users. All toll setting and adjustments will be made according to a schedule to be determined by the Commission.

Expenditure Plan:

This project is funded through the following sources:

Existing Funds - $771,408,998*

Total Funding Available From All Sources - $771,408,998

(* - Includes $11 million expended for right of way acquisition and existing bridge inspections prior to the 2002 legislative authorization changing the project from private financing to public funding.)

Monthly Project Report Update for October 2005

Bridge Progress

1. Tacoma Narrows Constructors (TNC) installed the tram support frames, spliced and installed the tram cable and pulled both towers almost two feet toward shore in preparation for cable spinning.
2. First strand of the south cable completed.
3. Completed spinning and profile adjustment on the first strand for the north cable
4. Installed two toggle anchors for the ocean vessels delivering the new bridge deck sections.

Roadway/Roadside Progress

1. Work at Living War Memorial Park, landscaping at the Jackson St. on ramp and along east bound main line on the Gig Harbor side.
2. Seismic retrofit at the existing bridge east anchorage and on the Tacoma tower.

Environmental Performance

1. Prepared for the winter season by installing soil stabilization and erosion control measures throughout the project site
2. Updated the Stormwater Pollution Prevention Plan (SWPPP).
3. WSDOT Headquarter Environmental Office Performed an independent fall assessment of the project's Temporary Erosion and Sedimentation Control Measure.

Public Outreach

1. Provided tours to visiting Japanese delegation and Washington Transportation Commission
2. Provided information for broadcast groups for ½ hours shows and for feature stories about cable spinning for newspapers.
3. Toll workshop given in Gig Harbor, approved Factory Acceptance Test (FAT), toll staff reviewed TransCore's Open Road Tolling lane testing site in NM., Installation Readiness milestone met, October 30.

Legislative Milestone Status

Proj Def Complete		Engineering Start		Environmental Complete		ROW Complete		Advertise		Open to Use	
3Q03	✓	4Q03	✓	4Q05	late	4Q05	✓	2Q06	2Q06	2Q07	2Q07

Plan | *forecast*

Met Construction Season: ☒ Yes ☐ No

PE: J. Smith, Project Executive: C. Jones

Budgets

Phase	Amount
PE	$$$
ROW	$$$
CN	$$$
Total	$$$

Performance

Budget Status		Cost Status		Work Status		Schedule Status	
Current	Est @ Completion	To Date	%Spent	Earned	% Complete	Total Duration	Elapsed %
$$$	$$$	180M	%	$$$	%	days	%

Contract Summary	Date or Value	Issues & Outlook
Contract Award:		
Notice to Proceed:		
Original Contract Time:		
Original Substantial Completion:		
Original Contract Amount:		
Revised Contract w/App. CO's:		

Contract Type	
Design-bid Build	
Design Build	

Progress Status	
% Time:	
% Financial:	
% Physical:	

Earned Value Forecast	
Projected Schedule Completion Date:	
Projected Cost at Completion:	
Variance from Baseline	

Two-Page Report Prototype

TWO PAGE REPORT - Page 2

SR 520: Bridge Replacement and HOV Project

Construction Activities & Impacts:

The anticipated start of major construction is mid-2009. The 2005 Cost Estimate Validation Process for the SR 520 project estimates the duration of construction to be seven to eight years and the total project cost to be in the range of $2.0 to $3.1 billion depending on the final alternative and options selected. Options are being evaluated for replacement of the Evergreen Point Bridge as a first phase project. The project has received $52 million from the 2003 Nickel Package and $500 million from the 2005 Transportation Partnership Account. This money will be used for the completion of the Environmental Impact Statement, project design, right of way purchases and to begin construction. Project construction depends on additional funding from tolling, a regional transportation investment, and other sources.

Comments:

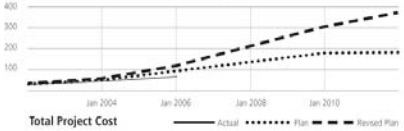
Environmental Impacts / Compliance

A Draft Environmental Impact Statement with complete analysis of the project alternatives and design options is scheduled to be issued in May 2006 followed by a public comment period during the summer. The goal for the project will be to select a preferred alternative by the end of the summer once all public comments have been evaluated.

Impacts to Traffic

Traffic impacts in the corridor have not yet been fully determined. Pontoons for the new floating bridge will be constructed offsite and brought in through the Ballard Locks. The new floating bridge will be built to the north of the existing bridge allowing traffic to continue to use the existing bridge during construction.

Planned vs. Actual Expenditures



Gray Notebook Text:

Fast-growing numbers of citizens depend on the SR 520 link across Lake Washington. SR 520 links densely populated cities and some of the largest employers in the state.

A one-and-a-half-mile long liability, the 42 year-old SR 520 Evergreen Point Bridge is very vulnerable to windstorms and earthquakes and needs to be replaced.

The currently sub-standard bridge could be replaced with a 4-Lane or 6-Lane facility. Both alternatives will create a seismically sound and safe new Portage Bay Bridge and Evergreen Point Floating Bridge with full shoulders, and a bike and pedestrian path through the entire project corridor.

Both alternatives include pontoons large enough to support future high capacity transit (HCT).

Expansion and improvements to the approach structures on the Evergreen Point Bridge, the Portage Bay Bridge, on- and off-ramps and segments of SR 520 on either end of the lake are also included in both alternatives.

The project is currently in the environmental analysis phase with the Draft Environmental Impact Statement scheduled to be released in May 2006.

Changes Since Inception:

Local Coordination (Grants etc.)

Performance

	Budget Status		Cost Status		Work Status		Schedule Status	
	Current	Est @ Completion	To Date	%Spent	Earned	% Complete	Total Duration (days)	Elapsed %
PE	167.4M	174.4M	25M	15%	24M	14%	400d	20%
ROW	17M	17M	0	0%	0	0%	250d	0%
CN	390M	390m	0	0%	0	0%	1,250d	0%
Total	$74.4M	581.4M	25M	4.4%	24M	4.2%	1,650d	4.8%

$CPI_{tot} = 0.99$ $SPI_{tot} = 0.73$

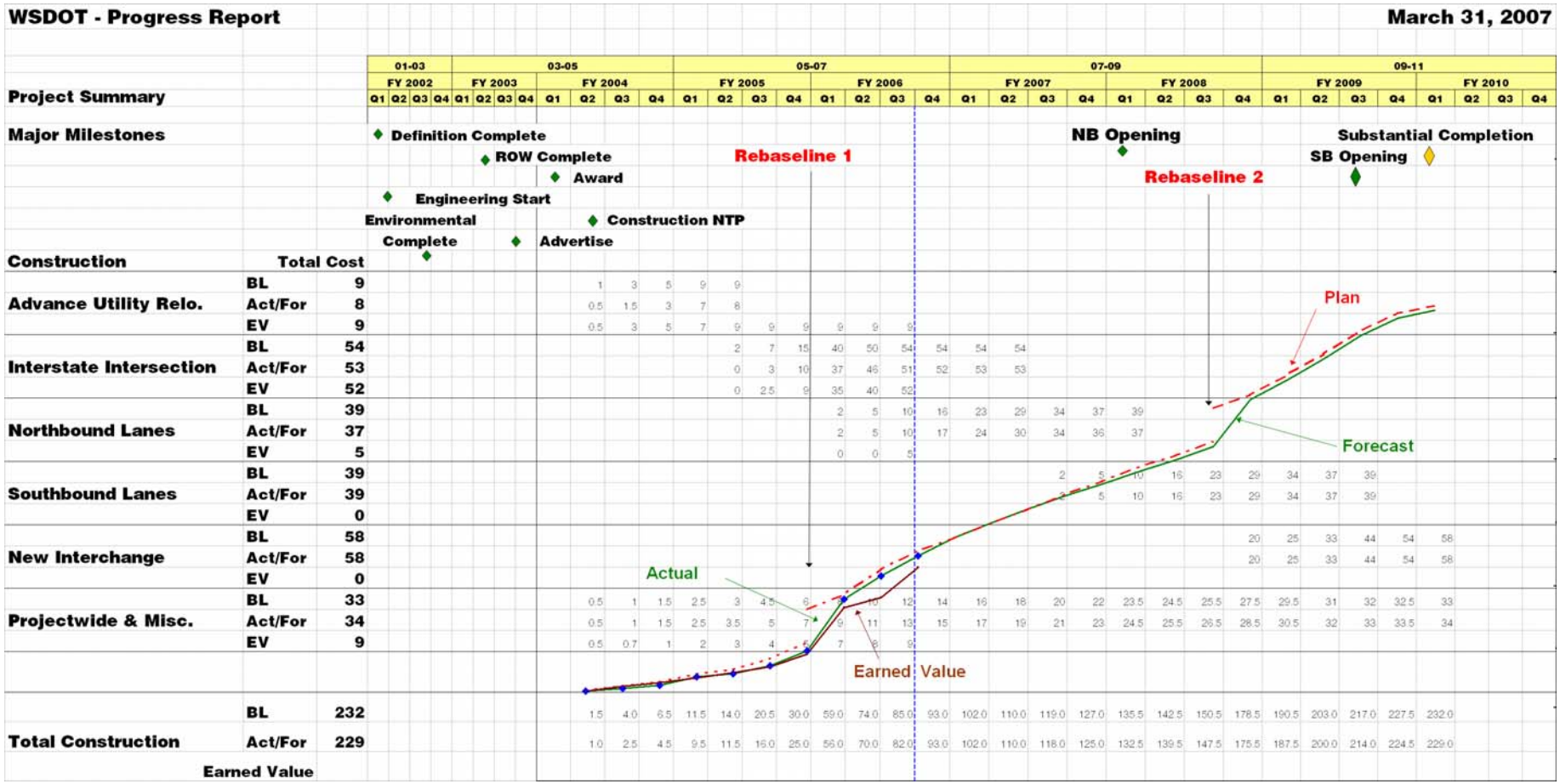
Contract Type	Progress Status	Earned Value Forecast
Design-bid Build	% Time:	Projected Schedule Completion Date:
Design Build	% Financial:	Projected Cost at Completion:
	% Physical:	Variance from Baseline

PE: J. Smith

Project Executive: C. Jones

Independent Cost at Completion		Contract Summary	Date or Value	Issues & Outlook
Cost ITD:	25M	Contract Award:		
Open Commitments:	$$$	Notice to Proceed:		
Provisions for Claims Pending:	0	Original Contract Time:		
Estimate to Complete:	$$$	Original Substantial Completion:		
Contingency:	$$$	Original Contract Amount:		
Total at Completion:	$$$	Revised Contract w/App. CO's:		

Planned vs. Actual Cost Summary Prototype



Summary Project Cost Report

			Program										
Phase		Work Order Authorization	Nickel	TPA	PEF	Other	Original Budget	Present Budget	Estimate or Contract Amount	Auth or Projected Contingency	Total Estimate w/ Contingency	Cost to Date	Variance - Present Budget VS Total Est.
Preliminary Engineering													
	EIS												
	PS&E												
	Procurement												
	Subtotal												
Right of Way													
	Subtotal												
Construction													
	Utility Coordination												
	Construction Contracts												
	Subtotal												
Program Management													
	Subtotal												
Program Oversight													
	Subtotal												

Appendix 4. Historical Consultant Utilization by WSDOT

Washington State Department of Transportation
Historical Consultant Utilization
Highway Improvement and Preservation Programs
July 1996 through April 2006
30-May-06
(dollars in thousands)

Fiscal Year 1997
July 1996 - June 1997

	Total Expenditures	Consultant Payments	Consultant Percent of Expenditures
Design/Environmental	1,116,961	22,635	19.4%
Right-of-Way	27,291	306	101.0%
Construction	513,947	2,480	0.5%
Total	658,119	25,421	3.9%

Fiscal Year 1998
July 1997 - June 1998

	Total Expenditures	Consultant Payments	Consultant Percent of Expenditures
Design/Environmental	103,815	15,620	15.0%
Right-of-Way	24,290	384	1.6%
Construction	432,703	1,708	0.4%
Total	560,807	17,712	3.2%

Fiscal Year 1999
July 1998 - June 1999

	Total Expenditures	Consultant Payments	Consultant Percent of Expenditures
Design/Environmental	143,993	30,632	21.3%
Right-of-Way	49,937	669	1.3%
Construction	406,356	1,412	0.3%
Total	600,287	32,713	5.4%

Fiscal Year 2000
July 1999 - June 2000

	Total Expenditures	Consultant Payments	Consultant Percent of Expenditures
Design/Environmental	116,952	18,023	15.4%
Right-of-Way	33,891	322	1.0%
Construction	410,950	1,153	0.3%
Total	561,793	19,498	3.5%

Fiscal Year 2001
July 2000 - June 2001

	Total Expenditures	Consultant Payments	Consultant Percent of Expenditures
Design/Environmental	157,341	32,640	20.7%
Right-of-Way	64,214	571	9.0%
Construction	442,420	1,492	3.0%
Total	663,975	34,703	5.2%

Fiscal Year 2002
July 2001 - June 2002

	Total Expenditures	Consultant Payments	Consultant Percent of Expenditures
Design/Environmental	163,486	44,287	27.1%
Right-of-Way	61,496	502	0.8%
Construction	485,040	1,083	0.2%
Total	710,021	45,872	6.5%

Fiscal Year 2003
July 2002 - June 2003

	Total Expenditures	Consultant Payments	Consultant Percent of Expenditures
Design/Environmental	163,028	49,982	30.7%
Right-of-Way	43,575	521	1.2%
Construction	615,576	1,097	0.2%
Total	822,179	51,600	6.3%

Fiscal Year 2004
July 2003 - June 2004

	Total Expenditures	Consultant Payments	Consultant Percent of Expenditures
Design/Environmental	144,743	42,797	29.6%
Right-of-Way	65,940	1,729	2.6%
Construction	608,783	1,508	0.2%
Total	819,466	46,033	5.6%

Fiscal Year 2005
July 2004 - June 2005

	Total Expenditures	Consultant Payments	Consultant Percent of Expenditures
Design/Environmental	194,089	80,930	41.7%
Right-of-Way	89,954	3,557	4.0%
Construction	698,747	2,627	0.4%
Total	982,790	87,115	8.9%

Fiscal Year 2006
July 2005 - June 2006*

	Total Expenditures	Consultant Payments	Consultant Percent of Expenditures
Design/Environmental	162,714	62,844	38.6%
Right-of-Way	50,395	3,181	6.3%
Construction	546,727	3,587	70.0%
Total	759,836	69,611	9.2%

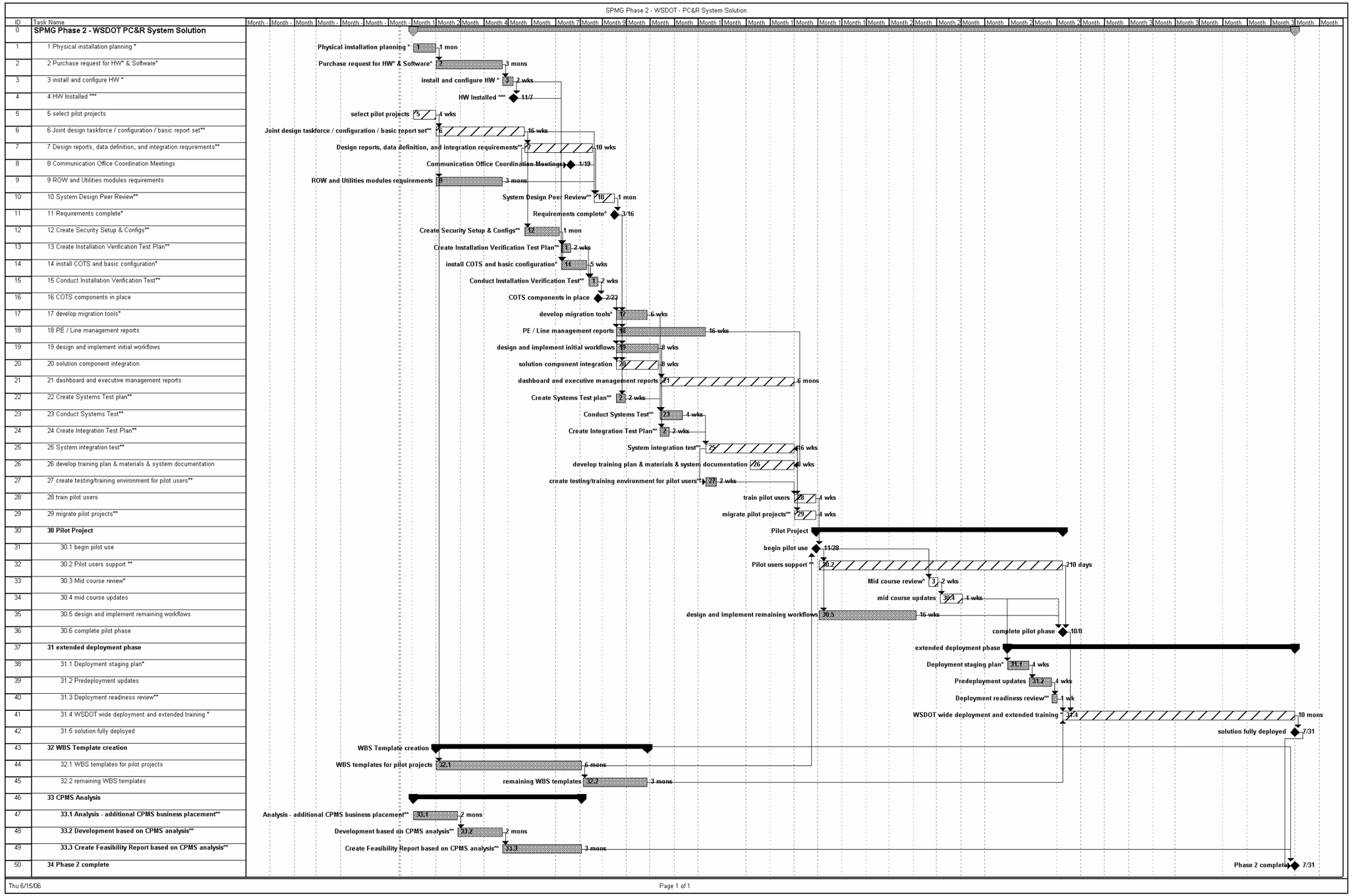
Notes:

Excludes Sound Transit projects

*** Fiscal Year 2006 is not complete**

Appendix 5. Detailed Systems Development Schedule

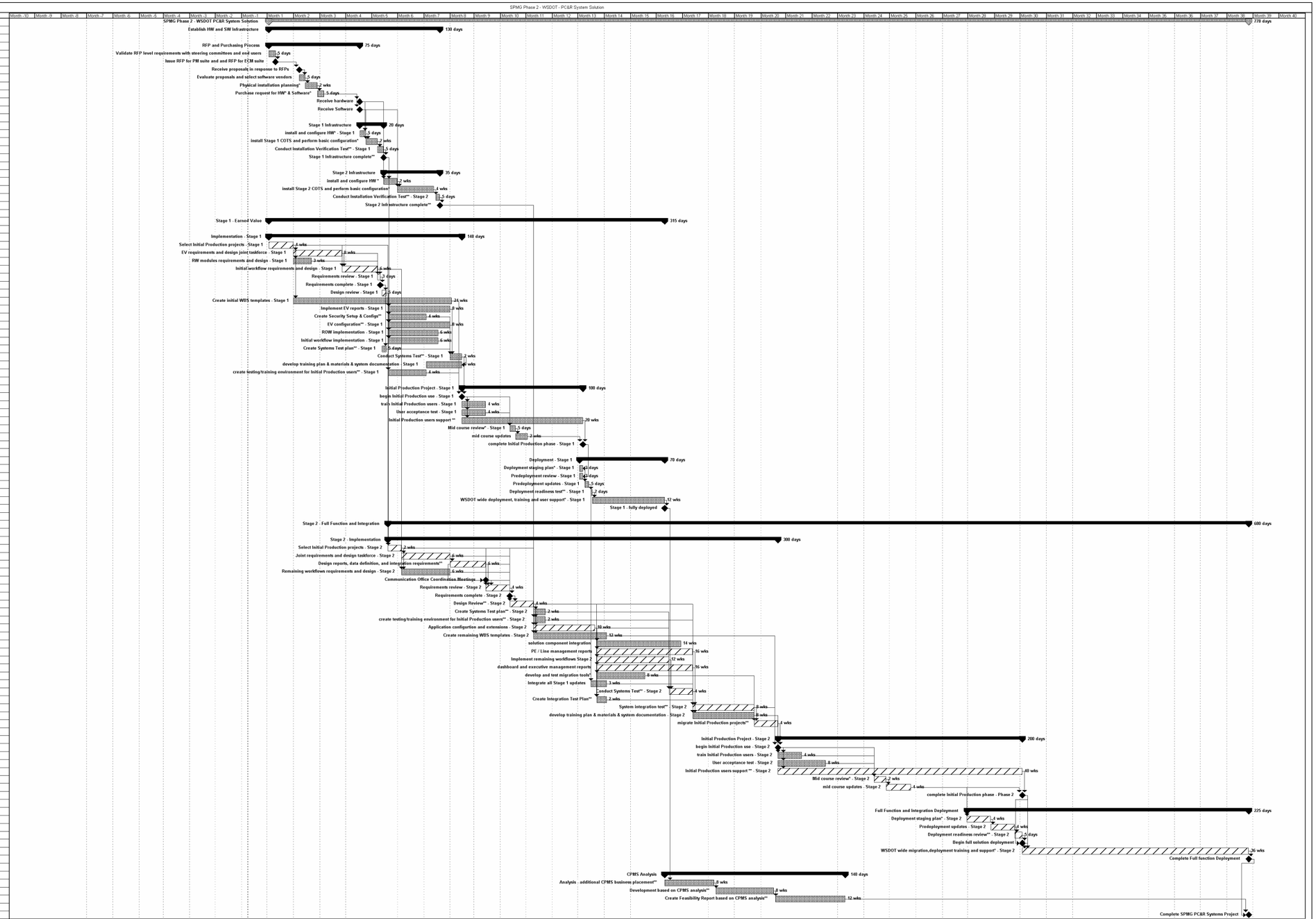
Option A – Single Staged Detailed Implementation Schedule



Option B – Two Staged Detailed Implementation Schedule

SPMG Phase 2 - WSDOT - PC&R System Solution

ID	Task Name
0	**SPMG Phase 2 - WSDOT PC&R System Solution**
1	**1 Establish HW and SW Infrastructure**
2	
3	**1.1 RFP and Purchasing Process**
4	1.1.1 Validate RFP level requirements with steering committees and end users
5	1.1.2 Issue RFP for PM suite and and RFP for ECM suite
6	1.1.3 Receiwe proposals in response to RFPs
7	1.1.4 Evaluate proposals and select software vendors
8	1.1.5 Physical installation planning*
9	1.1.6 Purchase request for HW* & Software*
10	1.1.7 Receiwe hardware
11	1.1.8 Receiwe Software
12	
13	**1.2 Stage 1 Infrastructure**
14	1.2.1 install and configure HW* - Stage 1
15	1.2.2 install Stage 1 COTS and perform basic configuration*
16	1.2.3 Conduct Installation Verification Test** - Stage 1
17	1.2.4 Stage 1 Infrastructure complete**
18	
19	**1.3 Stage 2 Infrastructure**
20	1.3.1 install and configure HW *
21	1.3.2 install Stage 2 COTS and perform basic configuration*
22	1.3.3 Conduct Installation Verification Test** - Stage 2
23	1.3.4 Stage 2 Infrastructure complete**
24	
25	**2 Stage 1 - Earned Value**
26	
27	**2.1 Implementation - Stage 1**
28	2.1.1 Select Initial Production projects - Stage 1
29	2.1.2 EV requirements and design joint taskforce - Stage 1
30	2.1.3 RW modules requirements and design - Stage 1
31	2.1.4 Initial workflow requirements and design - Stage 1
32	2.1.5 Requirements review - Stage 1
33	2.1.6 Requirements complete - Stage 1
34	2.1.7 Design review - Stage 1
35	2.1.8 Create initial WBS templates - Stage 1
36	2.1.9 Implement EV reports - Stage 1
37	2.1.10 Create Security Setup & Config**
38	2.1.11 EV configuration** - Stage 1
39	2.1.12 ROW implementation - Stage 1
40	2.1.13 Initial workflow implementation - Stage 1
41	2.1.14 Create Systems Test plan** - Stage 1
42	2.1.15 Conduct Systems Test** - Stage 1
43	2.1.16 develop training plan & materials & system documentation - Stage 1
44	2.1.17 create testing/training environment for Initial Production users** - Stage 1
45	
46	**2.2 Initial Production Project - Stage 1**
47	2.2.1 begin Initial Production use - Stage 1
48	2.2.2 train Initial Production users - Stage 1
49	2.2.3 User acceptance test - Stage 1
50	2.2.4 Initial Production users support **
51	2.2.5 Mid course review* - Stage 1
52	2.2.6 mid course updates
53	2.2.7 complete Initial Production phase - Stage 1
54	
55	**2.3 Deployment - Stage 1**
56	2.3.1 Deployment staging plan* - Stage 1
57	2.3.2 Predeployment review - Stage 1
58	2.3.3 Predeployment updates - Stage 1
59	2.3.4 Deployment readiness test** - Stage 1
60	2.3.5 WSDOT wide deployment, training and user support* - Stage 1
61	2.3.6 Stage 1 - fully deployed
62	
63	**3 Stage 2 - Full Function and Integration**
64	
65	**3.1 Stage 2 - Implementation**
66	3.1.1 Select Initial Production projects - Stage 2
67	3.1.2 Joint requirements and design taskforce - Stage 2
68	3.1.3 Design reports, data definition, and integration requirements**
69	3.1.4 Remaining workflows requirements and design - Stage 2
70	***3.1.5 Communication Office Coordination Meetings***
71	3.1.6 Requirements review - Stage 2
72	3.1.7 Requirements complete - Stage 2
73	3.1.8 Design Review** - Stage 2
74	3.1.9 Create Systems Test plan** - Stage 2
75	3.1.10 create testing/training environment for Initial Production users** - Stage 2
76	3.1.11 Application configurtion and extensions - Stage 2
77	3.1.12 Create remaining WBS templates - Stage 2
78	3.1.13 solution component integration
79	3.1.14 PE / Line management reports
80	3.1.15 Implement remaining workflows Stage 2
81	3.1.16 dashboard and executive management reports
82	3.1.17 develop and test migration tools*
83	3.1.18 Integrate all Stage 1 updates
84	3.1.19 Conduct Systems Test** - Stage 2
85	3.1.20 Create Integration Test Plan**
86	3.1.21 System integration test** - Stage 2
87	3.1.22 develop training plan & materials & system documentation - Stage 2
88	3.1.23 migrate Initial Production projects**
89	
90	**3.2 Initial Production Project - Stage 2**
91	3.2.1 begin Initial Production use - Stage 2
92	3.2.2 train Initial Production users - Stage 2
93	3.2.3 User acceptance test - Stage 2
94	3.2.4 Initial Production users support ** - Stage 2
95	3.2.5 Mid course review* - Stage 2
96	3.2.6 mid course updates - Stage 2
97	3.2.7 complete Initial Production phase - Phase 2
98	
99	**3.3 Full Function and Integration Deployment**
100	3.3.1 Deployment staging plan* - Stage 2
101	3.3.2 Predeployment updates - Stage 2
102	3.3.3 Deployment readiness review** - Stage 2
103	3.3.4 Begin full solution deployment
104	3.3.5 WSDOT wide migration,deployment training and support* - Stage 2
105	3.3.6 Complete Full function Deployment
106	
107	**4 CPMS Analysis**
108	**4.1 Analysis - additional CPMS business placement****
109	**4.2 Development based on CPMS analysis****
110	**4.3 Create Feasibility Report based on CPMS analysis****
111	
112	5 Complete SPMG PC&R Systems Project



Thu 6/8/06

Page 1 of 1

State
Phas

Appendix 6. SPMG PC&R Systems Integration Risk Management Matrix Plan

Legend

Risk Category Descriptions			***Impact***	***Occurrence Probability***	***Exposure (Rank)***
Category	***Level***	***Value***			
Resources	*High*	*3*	*Greater than three-month delay of schedule*	*Very likely: greater than 70%*	*Impact x Occurrence Probability =Rank*
	Med	*2*	*One to three-month delay in implementation*	*Probable: 30-70% probability*	
	Low	*1*	*One-week to one-month delay in implementation*	*Unlikely: Less than 30% probability*	
Schedule	*High*	*3*	*Greater than three-month delay of schedule*	*Very likely: greater than 70%*	
	Med	*2*	*One to three-month delay in implementation*	*Probable: 30-70% probability*	
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No.	**Risk / Threat**	*Business Priority*				**Risk Management Strategy**					**Status**
							Contingency				
						Mitigation Activities	*Trigger*			**Activities**	
		Risk Category	**Impact**	**Occurrence Probability**	**Exposure (Rank)**		**Condition**	**Date**			
1.	**Funding from WSDOT not in accordance with development:**	R/S									
	Funding for the project could be denied based on budget estimates					Seek alternate funding sources	Legislative acceptance	6/30/06		Finalize SPMG's effort for Phase 1	
	1a) Totally unfunded		3	1	3	• Consider alternative solutions in Systems Memorandum	Legislative acceptance	6/30/06			
	1b) Reduced funding		2	3	6	• Postpone project activities pending next	WSDOT Director-Level guidance	6/30/06		Finalize SPMG's effort for Phase 1	

Appendix 6. SPMG PC&R Systems Integration Risk Management Matrix Plan

Legend

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						Mitigation Activities	*Contingency*				
							Trigger			**Activities**	
		Risk Category	**Impact**	**Occurrence Probability**	**Exposure (Rank)**		**Condition**	**Date**			
						legislative session					

Appendix 6. SPMG PC&R Systems Integration Risk Management Matrix Plan

Legend					
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No.	Risk / Threat	*Business Priority*				**Risk Management Strategy**					**Status**
						Mitigation Activities	*Contingency*				
							Trigger			**Activities**	
		Risk Category	**Impact**	**Occurrence Probability**	**Exposure (Rank)**		**Condition**	**Date**			
2.	**Funding from WSDOT not in accordance with development** Funding may not be available for FY07	R/S	3	1	3	• Consider alternative solutions mentioned in Systems Memorandum • Adjust schedule and/or postpone project activities	WSDOT Director-Level guidance	6/30/06		Finalize SPMG's effort for Phase 1	

Appendix 6. SPMG PC&R Systems Integration Risk Management Matrix Plan

Legend

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						Mitigation Activities	*Contingency*				
							Trigger			**Activities**	
		Risk Category	**Impact**	**Occurrence Probability**	**Exposure (Rank)**		**Condition**	**Date**			
3.	**Funding from WSDOT not in accordance with development:** Remaining funding, post FY07 may not be available.										
	3a) Totally unfunded	R/S	3	1	3	WSDOT will seek alternate funding	WSDOT Director-Level guidance	6/30/06			
	3b) Reduced funding	R/S	2	2	4	Adjust schedule and/or postpone project activities					

Appendix 6. SPMG PC&R Systems Integration Risk Management Matrix Plan

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No.	Risk / Threat	*Business Priority*				**Risk Management Strategy**					**Status**
						Mitigation Activities	*Contingency*				
							Trigger			**Activities**	
		Risk Category	**Impact**	**Occurrence Probability**	**Exposure (Rank)**		**Condition**	**Date**			
4.	**Budget from WSDOT not in accordance with development:** Funding may not match budget estimates and normal work duties	R/ S	2	2	4	WSDOT will seek alternate funding Adjust schedule and/or postpone project activities	WSDOT Director-Level guidance	6/30/06		.	
5.	**Hardware procurement problems / timeliness**	S	1	1	1	Temporary use of existing OIT hardware would be available for development	Server overloaded	10/06			.

Appendix 6. SPMG PC&R Systems Integration Risk Management Matrix Plan

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No.	Risk / Threat	*Business Priority*				**Risk Management Strategy**					**Status**
							Contingency				
						Mitigation Activities	*Trigger*			**Activities**	
		Risk Category	**Impact**	**Occurrence Probability**	**Exposure (Rank)**		**Condition**	**Date**			
6.	**Software procurement problems / timeliness**	S	1	1	1	Work with IT Systems Manager to obtain a replacement	Software unavailable	10/06			
7.	**Partial or total rejection of recommended Best Practices:** Best Practices may be "cherry-picked" or partially accepted without regard to functionality and effectiveness.	R/S	2	2	4	Communicate desirability of integrated application functionality	Outside agency dictating systems definition	07/06			

Appendix 6. SPMG PC&R Systems Integration Risk Management Matrix Plan

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No.	Risk / Threat	*Business Priority*				**Risk Management Strategy**					**Status**
						Mitigation Activities	*Contingency*				
							Trigger			**Activities**	
		Risk Category	**Impact**	**Occurrence Probability**	**Exposure (Rank)**		**Condition**	**Date**			
8.	**Resource availability for development in timeframe indicated**	R/S	2	1	2	Recognition / awareness of project schedule, and requirements	Falling behind schedule	ongoing			
9.	**Completion within the timeframe identified**	S	2	2	4	Adequate funding	Falling behind schedule	ongoing			

Appendix 6. SPMG PC&R Systems Integration Risk Management Matrix Plan

Legend

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No.	Risk / Threat	*Business Priority*				**Risk Management Strategy**					**Status**
							Contingency				
						Mitigation Activities	*Trigger*			**Activities**	
		Risk Category	**Impact**	**Occurrence Probability**	**Exposure (Rank)**		**Condition**	**Date**			
10.	**Integration with legacy system data**	S									
	10a) Data needed for some reporting purposes may not currently be automatically populated in existing data marts		1	3	3	Request assistance from OIT to add the automatic population of the additional data to the existing data mart	Incomplete reporting information available for PC&R integrated solution reports	12/06		Design PC&R integrated solution reports	
	10b) Pushing data to legacy system native data stores may be required for existing processes and/or reports		2	2	4	Require the continuation of parallel manual entry of required data in legacy system	Incomplete legacy system data for users and reports	10/07		Review legacy system screens and reports to determine that pilot system projects are properly represented	

Appendix 6. SPMG PC&R Systems Integration Risk Management Matrix Plan

Legend				
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Category / ***Level*** / ***Value***				
Resources / *High* / *3*	*Greater than three-month delay of schedule*	*Very likely: greater than 70%*	*Impact x Occurrence Probability =Rank*	
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Low / *1*	*One-week to one-month delay in implementation*	*Unlikely: Less than 30% probability*		
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No.	Risk / Threat	*Business Priority*				**Risk Management Strategy**					**Status**
						Mitigation Activities	*Contingency*				
							Trigger			**Activities**	
		Risk Category	**Impact**	**Occurrence Probability**	**Exposure (Rank)**		**Condition**	**Date**			
11.	**Selection of representative pilot projects**	S	1	1	1	Coordinate with WSDOT field staff	Pilot projects not identified	09/06			
12.	**Lack of participation by stakeholders due to "not invented here" syndrome**	R	1	1	1	Executive mandate to adopt new processes and controls	Lack of response	08/06		Maintain high visibility/communication of development	

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		Risk Category	**Impact**	**Occurrence Probability**	**Exposure (Rank)**	*Mitigation Activities*	**Condition**	**Date**			
13.	**Resistance by line managers due to "it ain't broke" attitude; Staff reluctance to do things a new way; Belief that projects don't fit into the template(s)**	R	1	2	2	Executive mandate to adopt new processes and controls	Lack of participation	07/09			
14.	**Staff not receiving the same deliverable from the new system as old**	S	2	1	2	Perceived gaps in new functionalities will be addressed through education, training, and communication	Feedback from pilot users	11/07			
15.	**Staff not wanting to be held accountable;**	R	2	2	4	New tools will foster clearer responsibilities	Feedback from pilot users	11/07			

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		Risk Category	**Impact**	**Occurrence Probability**	**Exposure (Rank)**		**Condition**	**Date**			
	Staff's perception of increased workload										
16.	**Lack of consistent definitions for processes**	R	2	2	4	New system will be predicated on specific processes to be followed	Questions as to process	11/07			
17.	**Lack of a consistent definition for a project; Lack of consistent terminology**	S	3	2	6	Require consistent application of definition and terminology	Questions as to process	11/07			
18.	**Changing vision of what is needed from WSDOT**	R/ S	2	2	4	Close coordination / communication with Legislature	White Paper review	06/06			
19.	**Over-reliance on**	S	3	2	6	Management of	Feedback from pilot	11/07			

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		Risk Category	**Impact**	**Occurrence Probability**	**Exposure (Rank)**		**Condition**	**Date**			
	technology to solve non-technical issues					expectations	users				
20.	**Lack of adherence to protocol or process**	R	3	2	6	New system will be predicated on specific processes to be followed; education, communication, and training is key	Feedback from pilot users	11/07			
	COORDINATION ISSUES										
21.	**Acceptance by IT groups of "outsider consultant"**	R	2	1	2	Communication / coordination with OIT	Resistance to participate with development	07/06			
22.	**Security issues unknown to integration team**	S	1	1	1	Coordination with OIT	Discovery	09/06			
23.	**Interface issues**	S	2	1	2	Coordination with IT,		09/06			

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Legend

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							Contingency				
						Mitigation Activities	*Trigger*			**Activities**	
		Risk Category	**Impact**	**Occurrence Probability**	**Exposure (Rank)**		**Condition**	**Date**			
	unknown to integration team					recognition of uniqueness of legacy systems					

Washington State Department of Transportation

PMG
Statewide Program Management Group

A Strategic Delivery Plan for the Washington State Department of Transportation's Capital Construction Program

Phase 1 Final Report

June 14, 2006
Draft for Agency Review
Comments Due: COB June 23, 2006