



Program and Project Financial Management Needs Assessment

FINAL REPORT 515

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16. Abstract <p>This report presents the findings and recommendations of Dye Management, Inc. to improve project budgeting, accounting, and reporting for the Arizona Department of Transportation. The project was conducted in five tasks:</p> <ul style="list-style-type: none"> • Initiate Project • Document Requirements • Survey Project Financial Management Best Practices • Analyze Alternatives and Recommend Options • Develop Preferred Option Implementation Plan <p>Reports were provided to ADOT for each of these tasks. These separate reports are consolidated into this report. The report presents requirements for improving the financial controls and reporting for ADOT projects. Four financial improvement projects were recommended to address the needs of ADOT. For projects that had technical alternatives, the alternatives are presented with a recommended approach.</p> <p>Dye Management Group conducted a literature search and a survey of practices employed by other transportation organizations to support project budgeting and accounting. The best practices information obtained from this effort contributed the recommended solutions to improve ADOT's financial information.</p> <p>The final chapter is an implementation plan for the preferred alternatives. The four projects are: Budget Processes and Architecture, Budget and Financial Reporting, Financial Policies and Procedures, and Financial Training. The implementation plan identifies tasks and subtasks required to complete each project.</p>			
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METRIC (SI*) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
In	inches	2.54	centimeters	cm
ft	feet	0.3048	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
AREA				
in ²	square inches	6.452	centimeters squared	cm ²
ft ²	square feet	0.0929	meters squared	m ²
yd ²	square yards	0.836	meters squared	m ²
mi ²	square miles	2.59	kilometers squared	km ²
ac	acres	0.395	hectares	ha
MASS (weight)				
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams	Mg
VOLUME				
fl oz	fluid ounces	29.57	millimeters	mL
gal	gallons	3.785	liters	L
ft ³	cubic feet	0.0328	meters cubed	m ³
yd ³	cubic yards	0.765	meters cubed	m ³

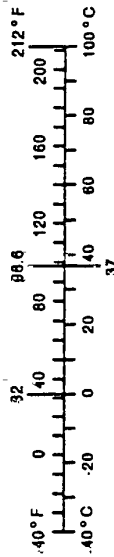
Note: Volumes greater than 1000 L shall be shown in m³.

TEMPERATURE (exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C
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APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
yd	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
AREA				
mm ²	millimeters squared	0.0016	square inches	in ²
m ²	meters squared	10.764	square feet	ft ²
yd ²	kilometers squared	0.39	square miles	mi ²
ha	hectares (10,000 m ²)	2.53	acres	ac
MASS (weight)				
g	grams	0.0353	ounces	oz
kg	kilograms	2.205	pounds	lb
Mg	megagrams (1000 kg)	1.103	short tons	T
VOLUME				
mL	millimeters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m ³	meters cubed	35.315	cubic feet	ft ³
m ³	meters cubed	1.308	cubic yards	yd ³
TEMPERATURE (exact)				
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



These factors conform to the requirement of FHWA Order 5190.1A

*SI is the symbol for the International System of Measurements

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EXECUTIVE SUMMARY

This document presents the Program and Project Financial Management Needs Assessment for the Arizona Department of Transportation (ADOT). The report focuses on improving project budgeting, accounting, and tracking information through improved integration of systems and improved business practices. Dye Management Group, Inc. conducted the study, during which we gathered requirements for project budgeting, researched best practices, designed four financial improvement projects, and developed an implementation plan.

The implementation plan presented could be completed in 18 months with adequate resources and funding, but provides flexibility to accommodate resource and funding constraints. The projects contain phases that can be completed incrementally as funds and resources are available. Key benefits identified for the projects include:

- **Improved programming decisions** – The linkage of projects to program line items will provide better visibility to how program moneys are spent on projects and the amount of a program item number that is obligated. It will also provide better visibility to the status of the program commitments and expenditures. This information will support management decisions when committing to new projects.
- **Improved accountability** – The revised policies and procedures will clarify responsibility and authority for the processing and approval of financial transactions. This will allow ADOT to have a more timely and accurate financial picture. The rigorous tracking of changes to the project budget provides a picture of who in the organization should be accountable for the changes.
- **Improved user productivity and satisfaction** – The data warehouse will provide access to data which allows users to create reports that meet their specific reporting requirements rather than relying on standard reports that may not contain all of the needed information. This will increase employee productivity and satisfaction with the reporting process by allowing employees to produce meaningful reports using tools commensurate with their technical abilities.
- **Reduced effort** – Currently the effort to monitor subprogram item numbers requires a significant effort to maintain manual entries in spreadsheets. The linkage approach will provide standard and user-defined reports to monitor the subprograms, reducing the current level of effort required.
- **Better management effectiveness** – Preparing exception reports will highlight potential problems for management and allow for quicker resolution of potential problems. Eliminating or reducing the manual effort required to produce management reports reduces the opportunity for error, thus creating more accurate management information.

- **Increased accuracy and timeliness of financial data** – A better understanding of how and where project information is used by ADOT systems and by the organization will prompt employees to appreciate the importance of the information, thus improving the accuracy and timeliness of the data. This will refine the information available for management decisions.
- **Improved financial control** – Better understanding by employees of budgeted versus actual amounts will improve the financial controls. Employees will understand how to monitor budget status and what actions are available when a project nears or exceeds its available budget.

PROJECT FINANCIAL REQUIREMENTS

The Project Financial Requirements section details ADOT’s project financial management business requirements, current project financial management practices, and opportunities for improvement. This report details requirements for improvements in:

- Reporting information and improvements.
- Business processes.
- Reporting practices.
- Written financial policies and procedures.

Critical Success Factors

The critical factors for successfully meeting ADOT’s public and fiscal responsibilities were identified through executive interviews. These factors varied depending on the executive interviewed. The critical success factors identified below have Department-wide application:

- Maintaining an adequate cash flow to fund the Department’s projects and operations.
- Assuring that books and records properly and accurately reflect budgeted and actual costs.
- Meeting the financial obligations of the Department.
- Developing and implementing a performance-based program plan.
- Delivering projects on time, on budget, and meeting the varying needs of constituents.

- Demonstrating the judicious use of the taxpayer’s money (good stewardship).

Requirements

A total of 78 requirements were identified and documented from focus group meetings, executive interviews, and the responses to the ADOT internal survey. All requirements that were identified were included in Chapter I: Project Financial Requirements. As we further analyzed the requirements for the financial improvements, those that have a direct impact on improving project budgeting and accounting processes and systems were identified. Financial improvement projects and phases were developed to address related groups of requirements.

BEST PRACTICES REVIEW

The Best Practices Review was conducted to document project budgeting and accounting policies, processes, and systems used by transportation and project-oriented organizations. The research had two phases: a literature search and a survey of transportation organizations. The literature search identified features that integrated project budgeting and accounting software should include and features of commercially available software packages that address specific needs of ADOT. The survey of transportation organizations was structured to focus on specific ADOT needs. The survey results identify business practices, system approaches, reporting capabilities, and training programs employed by other transportation organizations to be applicable to developing solutions for ADOT’s needs.

Literature Review

The literature review resulted in key findings that address ADOT’s project financial information system needs:

- Commercially available project information systems products contain features that would benefit ADOT.
- Specialized applications integrated with the project information system can supplement the capabilities of the core system; integration is key to implementing this approach.
- Business practices, policies, and procedures are important considerations in controlling project costs. The General Accounting Office (GAO) study [1] cited several methods to manage project costs that are being employed by transportation organizations across the country.

Survey of Transportation Organizations

The Survey of Transportation Organizations focused on organizations with similar characteristics to ADOT including three state departments of transportation, one municipal transportation authority, and one private sector engineering firm.

Of the survey participants, two use AMS applications for project accounting, two use Oracle financial software programs, and one uses custom developed software. Additional findings are:

- Both users of AMS were generally satisfied with the system and the reports.
- There was mixed satisfaction with the Oracle users.
- Montana Department of Transportation (MDT) is embarking on a project to better integrate its systems.
- ADOT's joint project agreements (JPAs) are more complex than those used by other states. The other states surveyed use either a percentage billing or a maximum amount. Their JPAs are not tied to specific elements of the project.
- The change control system and practices used by the Los Angeles Metropolitan Transit Authority demonstrated that effective management policy and direction supported by a robust system can provide measurable improvement in the quality of reported information while reducing administrative costs.
- The transportation organizations surveyed consistently use the project budget to plan and control costs. Both construction and consultant contracts are recorded as an encumbrance or obligation against the project budget giving a clear picture of future obligations and available budget. Work orders against "roster" contracts are used to assign the work to a specific project budget.

FINANCIAL REPORTING IMPROVEMENTS

The Financial Improvement section describes proposed financial system and process improvements to address ADOT requirements for project budgeting and accounting. The recommendations in this section are based on the requirements and needs developed by Dye Management Group, Inc. through interviews, focus groups and surveys with ADOT management and staff, and our best practices research.

During the process of identifying requirements, we determined that ADOT's financial system (ADVANTAGE) meets many of ADOT's financial reporting needs. Requirements identified for project budgeting, accounting, and reporting would not necessarily be fully met by implementing a replacement system. In addition, the idea of

implementing a new financial and project accounting system or even upgrading the current ADVANTAGE system is viewed as cost prohibitive. As a result, we agreed to focus on financial improvements that can be implemented by enhancing the current system.

Financial Improvement Projects

The financial improvement projects in this report were defined by combining related requirements into improvement projects that can be implemented incrementally. The projects represent four initiatives. They are:

- **Budget Processes and Architecture** – This project addresses those requirements related to project budget processes and system improvements to support those changes.
- **Budget and Financial Reporting** – This project addresses the requirements related to improving reports and reporting systems for project budget and accounting processes.
- **Financial Policies and Procedures** – This project addresses changes to financial policies and procedures to improve the overall financial controls and reporting of ADOT projects.
- **Financial Training** – This project focuses on developing and conducting a training program for users and providers of ADOT project financial information.

We also defined other recommendations. These recommendations identify projects to address requirements that are not integral to the project budgeting and accounting improvements but would provide significant improvements to ADOT processes. They are:

- **Third Party Agreement Process** – This project describes improvements to simplify the third party agreement process to reduce the effort and uncertainty in the billing process.
- **Track Change Orders** – This project describes a change order process that would formalize change order processing throughout the life of a project.
- **Data Management** – This project describes an approach for data management to further improve the organization's understanding of data and how to access it and use it.

Finally, there were six requirements that were identified as out of scope. They address ADOT's cost accounting and document management processes, and other budget issues.

Financial Improvement Results

Implementation of these financial process and system improvements will provide better project financial information by updating the project budgeting and accounting processes. This effort will provide:

- Financial policies and procedures to support improved project budgeting, accounting and reporting.
- A data warehouse to integrate project financial information to meet the reporting and analysis needs of management and staff.
- Improved project budgeting procedures to provide more inclusive and realistic project budgets with improved tracking of change orders for improved accountability.
- Linkage of projects to programs to provide an assessment of how program funds are spent and the level of commitment for each program line item.
- Improved management reports.
- A training program for project budgeting, accounting, and reporting policies, procedures and processes.

PREFERRED OPTION IMPLEMENTATION PLAN

Implementation Plan presents proposed schedules for improving project financial processes, systems, and reports for ADOT. Dye Management Group, Inc. developed this implementation plan as a guideline for implementing the projects defined in the *Financial Improvement Section*. The implementation plan presents the four related projects: Budget Processes and Architecture, Budget and Financial Reporting, Financial Policies and Procedures and Financial Training.

The tasks and subtasks required to implement the project are described for each project. In addition, the work products, the responsibilities of completing tasks and delivering the work product, and the duration are provided for each project. The Implementation Schedule presents the projects to implement the ADOT Preferred Option Implementation Plan. The project implementation plan schedules are presented in Figure–1 on the following page.

The four projects are presented as parallel tracks. Although the relative priority of the projects is considered in the schedule, the primary constraints to the sequence of projects are the dependencies and prerequisites between projects.

The Implementation Plan is meant to be a guide. It should be reevaluated and updated as projects progress and as more detailed information becomes available concerning priorities, resources, and schedules for each task.

Figure 1: Implementation Plan Schedule

Project/Phase	Quarter					
	1	2	3	4	5	6
Project 1: Budget Processes & Architecture						
Phase 1: Project/Budget Link	█					
Phase 2: Budget Categories	█	█				
Phase 3: Budget Commitments		█	█			
Phase 4: Budget Adjustments	█	█				
Project 2: Budget and Financial Reporting						
Phase 1: General Report Design	█	█	█			
Phase 2: ADVANTAGE Reports	█	█				
Phase 3: Data Elements			█			
Phase 4: Data Warehouse			█	█		
Phase 5: Reporting Tools			█	█	█	
Phase 6: New Reports					█	█
Phase 7: Reporting Support	█	█	█	█	█	█
Project 3: Financial Policy and Procedures	█	█	█	█	█	█
Project 4: Financial Training	█	█	█	█	█	█

Projects and Phases █ Ongoing Effort █ █ █ █ █ █

I. PROJECT FINANCIAL REQUIREMENTS

INTRODUCTION

The Project Financial Requirements Report details Arizona Department of Transportation's (ADOT) project financial management business requirements, current project financial management practices, and opportunities for improvement. This report details requirements for improvements in:

- Reporting information and improvements.
- Business processes.
- Reporting practices.
- Written financial policies and procedures.

These requirements were developed from focus group meetings, executive interviews, and the responses to the ADOT internal survey. Some of the requirements will require additional analysis to provide more detail and to justify the requirements. The requirements will be prioritized as the project moves forward.

Critical Success Factors

The critical success factors for meeting ADOT's public and fiscal responsibilities were identified through executive interviews. These factors varied depending on the executive interviewed. The critical success factors identified below have Department-wide application:

- Maintaining an adequate cash flow to fund the Department's projects and operations.
- Assuring that books and records properly and accurately reflect budgeted and actual costs.
- Meeting the financial obligations of the Department.
- Developing and implementing a performance-based program plan.
- Delivering projects on time, on budget, and meeting the varying needs of constituents.
- Demonstrating the judicious use of the taxpayer's money – good stewardship.

Business Processes

The business process map was developed in the focus group meetings to provide a background of how ADOT conducts its business related to transportation planning and construction. Transportation program/projects can be viewed to have a lifecycle with each phase having a deliverable that goes into the next phase. A summary of the business processes within each lifecycle phase is presented in Table 1.

The Project Lifecycle Activity row documents the major activities to complete each phase of the project lifecycle. The product of each phase is presented in bold as the first item, with the documentation that shows completion of the phase in parenthesis. The Financial Support Activities row presents the key financial activities that support the delivery of the programs and projects for each of the five major lifecycle stages.

Table 1: Project Budgeting and Accounting Business Processes

	Initiation	Scoping	Design Development	Construction	Maintenance
Project Lifecycle Activity	<p>Project Request (Programming)</p> <ul style="list-style-type: none"> • Definition. • Budget. • Solution. • Time. • Programming. 	<p>General Plan (Engineering Solution)</p> <ul style="list-style-type: none"> • Definition. • Project Master. • Budget. • Time. 	<p>Construction Plans (Contract Documents)</p> <ul style="list-style-type: none"> • Budget. • Planning, specifications, estimates. • Right-of-way acquisition. • Project Master. • Environmental clearance. • Utility clearance and relocation. • Joint project agreements. • Interagency/Intergovernmental. • Funding sources identification. • Programming. 	<p>Constructed Facility (Final Voucher)</p> <ul style="list-style-type: none"> • Project Master. • Proposal. • Advertisement. • Bid. • Agreement Estimates. • Change Orders. • Final Partnering. • Final Construction Progress Estimate (CPE). • Contract compliance. • Claims settled. 	<p>Identify Needs</p>
Financial Support Activities	<ul style="list-style-type: none"> • Programming. • Program level budget. • Preliminary budget. • Procurement. 	<ul style="list-style-type: none"> • Programming/Budgeting. • Payments to contractors and consultants. • Design budget. • Budget increases. • Staff expenditures (not project budget). • Supplemented service consultant expenditures. 	<ul style="list-style-type: none"> • Programming/Budgeting Obligation (State/Federal) • Contractor payments. • Property owner payments. • Federal agency approvals. • Budget increases. • Some federal reimbursement. • Other revenues. • JPAs, IGAs. • State agency funding. 	<ul style="list-style-type: none"> • ADOT furnished materials. • Payments to contractors. • Payments for incentives. • Budget increases. • Federal reimbursement. • Development fees. • Final vouchers and payments. • Final report. • Staff – also “rent-a-tech” supplemental – separate object. • Product price variance (asphalt & fuel) payments. 	<ul style="list-style-type: none"> • Budget

Financial System Success Factors

The financial system success factors were developed during focus group meetings. The discussion centered around key business objectives for project budgeting and accounting. The focus groups reached consensus on the following objective:

An integrated financial management and accounting system to support project programming, budgeting and accounting, which facilitates control of scope, schedule, and quality.

ADOT'S project budgeting and accounting systems should support this objective by facilitating:

- Management of funding sources including Federal, State, and others.
- Management of the timing of expenditures and revenues to control cash flow requirements.
- Coordination of budgets, expended amounts and schedule of obligation requirements.
- Management of statewide spending requirements based on regional allocations, including identification of funds for the Resource Allocation Advisory Committee (RAAC).
- Inclusion of all reasonably expected costs in the budget process to produce the most realistic budgets possible.
- Identification of the basis for a project budget to assess its accuracy for decision-making (some project budgets in the program are simply “space holders” and may not accurately reflect realistic project costs until much later in the development process).
- Management and accountability of project scope throughout its lifecycle.
- Identification of the amounts and reasons for changes in projected costs for a project throughout its lifecycle.
- Timely updates to project budgets as additional cost items are known.
- Access to project budget and accounting information by managers to enable them to be accountable for delivering projects, in accordance with budgets, scopes and schedules.

REPORTING INFORMATION AND FORMATS

The Reporting and Information Formats section identifies the requirements and opportunities to improve the reporting and information for ADOT's project budgeting and accounting. These requirements represent needs identified during the focus groups, executive interviews, and the ADOT internal survey.

Project Programming

These requirements address the need to match project budgets back to the program as the project progresses through its lifecycle (project phases).

Requirement 1: Connect Programming and Budgeting

ADOT needs the capability to measure project budgets against the program during the project life and to link budget updates to the program as projects evolve.

Requirement 2: Track Changes to Project Estimates

ADOT needs the ability to track the amounts and reasons for changes to the project estimates and budgets as projects evolve through their lifecycle. This includes accountability (reconciliation with explanation) for escalating (or de-escalating) costs for each stage of the project lifecycle including:

- The initial planning stage amount.
- The development estimates.
- The pre-construction amount.
- The bid amount.
- The actual amount.

During each stage of the project lifecycle, the qualities of project estimates improve, as more information is available. The project bid and construction contract amount represents the final and best budgets, but even that is modified by change orders. The reasons for these changes between phases and during phases need to be clearly documented and tracked, so an explanation of the differences between the original programmed amount and the final amount can be reported.

Project Budgeting

These requirements address needs specific to the budgeting process to provide reliable and consistent project budget information. Some of these needs are supported by

needs for new or updated business practices, or policy and procedures. They are included in their respective chapters.

Requirement 3: Original Budget

ADOT needs consistent use of the original budget amount in ADVANTAGE. The original budget amount is established when the project is created on the system. There are inconsistent practices for the amount to use when establishing the project, which can lead to inconsistent reporting. Some projects are created in the system for tracking purposes before the budget has been approved (e.g., right-of-way). When the budget amount is approved, the approved amount must be recorded as a revision. ADOT needs to determine the purpose and use of the original budget in ADVANTAGE (PRBL) and determine if it should be consistent with original budget in other ADOT systems.

Requirement 4: Control of “Subprogram” Projects

ADOT needs to provide a method to budget, control, and report the allocation of subprogram budgets. Currently, managers have difficulty identifying components of projects that are budgeted from subprograms. For example, traffic signal, pavement preservation, and district minor subprograms can all provide funding to a single project. In addition, a subprogram may have multiple subprojects and multiple subprograms may fund a subproject. These are currently tracked in Excel spreadsheets because ADVANTAGE does not provide the capability to establish multiple subprogram/subproject relationships.

Requirement 5: Source of Budget Items

ADOT needs budget information by various item numbers, such as traffic safety, pavement preservation, and district minor to provide budget monitoring information for the various users.

Project Accounting

These requirements address the need to include all costs attributable to a project to track these costs against the budget. This includes support costs and ADOT supplied materials. For example, internally supplied materials, time, and equipment are not budgeted as part of specific projects, but are later charged to projects. This creates a potential shortfall in the project budget.

Requirement 6: Adjustable Costs

ADOT needs to budget and account for cost variances from the bid amount (incentives, quantity changes, or unit price fluctuations) to measure their impact on overall project costs.

Requirement 7: Identify Contingency

ADOT needs to track the use of five percent construction contingency to provide a clear audit trail on project change orders that could result in a budget revision.

Requirement 8: Consultant Contracts

ADOT needs a process to relate task orders for consultant contracts to project budgets to ensure that appropriate budgets have been obligated for all committed work.

Requirement 9: Cost Accounting

ADOT needs to report the full costs of completing projects. ADOT needs to determine the extent that full costing of projects will improve ADOT's management information and assess if the benefits are cost justified.

Requirement 10: Link Construction Engineering Costs to Project Budget

ADOT needs the ability to budget and track construction engineering costs based on the type and size of the project. Currently, CE is budgeted as a standard 15 percent of the project cost for statewide projects and nine percent for Maricopa Regional Freeway System projects. The standard CE budget is not logically linked to the type and size of a project. Regional engineers estimate between six percent and 25 percent based on the type and size of project, and manage the total out of a pool. When these expenditures are paid, they are charged to the project.

Requirement 11: Financial Controls

ADOT needs to improve financial controls to prevent improper costs from being charged to a project. ADOT needs to evaluate whether automated front-end controls or manual review and correction procedures would be more effective.

Requirement 12: Budgetary Control for Temporary Technicians

ADOT needs the ability to budget and track expenditures for temporary technicians when they are working on activities not related to a construction project. Work is underway to resolve this process.

Project Billing

These requirements identify opportunities to improve the tracking and control of third party funds. In general, the billing process to FHWA is considered to be meeting ADOT's needs.

Requirement 13: Track Third-Party Commitments

ADOT needs a process to track expenditures billable to third parties (JPAs).

Requirement 14: Track Change Orders to Third Party Commitments

ADOT needs to link change orders to projects with third party funding to determine the impact on the third party's share of the costs. If these are not tracked back to original funding agreements, it can result in ADOT not billing the third parties for all recoverable charges.

Requirement 15: Billing of Third-Party Sources

ADOT needs to improve the billing process of third-parties sources (JPAs). The automatic billing invoices from ADVANTAGE are currently suppressed for these funding sources and the invoices are manually prepared.

Data Requirements

These requirements identify specific improvements to project budgeting and accounting data to meet ADOT's reporting and analytical needs and to support integration with other ADOT systems.

Requirement 16: Relate Contracts to Projects

ADOT needs contracts and projects to be cross-referenced (construction, consultants, JPAs, letter agreements).

Requirement 17: Asset Management

ADOT needs to define and store project information consistent with the requirements for the Asset Management and Data Warehouse projects that are currently in process.

Requirement 18: Project Characteristics

ADOT needs documentation of project characteristics to support production of the State Highway Log.

Requirement 19: Lane Miles

There are multiple definitions of lane miles. All of them are correct in the right context. ADOT needs to understand which definition to use from the project standpoint.

Requirement 20: RAAC Information

ADOT needs sort and selection capabilities to meet the RAAC reporting requirements including presenting project information by geographic area. ADOT needs to define budget (including subprograms), obligation, and expenditure categories for reporting to RAAC. RAAC information is presented in very broad categories making it difficult to determine the purpose of the expenditure.

Requirement 21: Type of Work Description

ADOT needs consistent rules and values for type of work descriptions to allow selection, summarization, and analysis.

Requirement 22: Project Establish Date

ADOT needs a date to indicate when the project record was created on the system.

Requirement 23: Authorization Dates

ADOT needs a separate date to indicate when the project budget was authorized at the state level. There currently is a single authorization date for all projects, which creates a conflict when the project has federal aid, because the federal authorization date may be different than the state authorization date.

Requirement 24: Budget Change Information

The ADVANTAGE PRBL table currently includes budget adjustments. Additional information defining who, when, why, and the amount is needed to provide a complete tracking and audit trail of the budget adjustments over time. (There could be multiple reasons in one transaction.)

Requirement 25: FHWA Reporting

ADOT needs to meet FHWA reporting requirements. Specific data requirements have not been defined.

Requirement 26: Cash Flow Forecasting

Project budget and expenditure data needs to be available to the cash forecasting systems. Payment information needs to be reported in the month that the payment is actually made. Presently all cash flow information is taken from the general ledger. Since ADVANTAGE does not provide general ledger control accounts for reconciliation to the project expenditures, the cash forecasting may not accurately reflect project status.

Requirement 27: Program and Budget Structure Needs

ADOT needs the ability to link a project to multiple program items (budget line items) and indicate the funding proportion for each line item. For example, if district minor money (a subprogram budget line item) is added to a project, that change cannot be reflected in ADVANTAGE because ADVANTAGE only has one line item field per subproject/phase.

Requirement 28: Route Identification

Some projects (particularly design and right-of-way) may be programmed containing multiple routes. ADOT needs to evaluate the cost/benefit for Development to have projects identified by a single route rather than possible multiple routes.

Requirement 29: Identify Projects in Five-Year Program

ADOT needs to investigate creating a unique identification for all projects in ADVANTAGE that are included in the five-year construction program.

BUSINESS PROCESSES

The Business Processes section identifies the requirements and opportunities to improve the business processes for ADOT's project budgeting and accounting. These requirements represent needs identified during the focus groups, executive interviews, and the ADOT internal survey.

Project Programming Processes

This section identifies opportunities to improve business processes related to programming and relating project budgets and costs to the program.

Requirement 30: Compare Project Budgets and Costs to the Program

ADOT needs the ability to determine the relationship between project budget and costs and the five-year construction program. The accounting system tracks project costs, but it does not relate them back to the program (currently using spreadsheets to do this). Project expenditures should be tracked by the program line item. The ability to analyze variances will allow staff to assess the impact on the overall program.

Project Budgeting Processes

This section identifies opportunities to improve business processes related to budget development, tracking, and the relationship of the project budget and cost data.

Requirement 31: Original Budget

ADOT needs to define a consistent use of the original budget amount in ADVANTAGE. The original budget amount is established when the project is created on the system. There are currently inconsistent practices for determining the amount to use when establishing the project, which can lead to inconsistent reporting. For example, some projects that are created as information only are established with a zero budget. When the project budget is approved, it must be entered as a revision. ADOT needs to identify the purpose and uses of the original budget amount in ADVANTAGE (PRBL) and its relationship to “original budget” in other ADOT systems.

Requirement 32: Annual Inflation Review

ADOT needs to develop policy and procedures for handling inflation at the program and project levels (including the adequacy of the inflation assumptions). This information currently supports cash projections but could also be used for evaluating the projected costs of the overall program.

Requirement 33: Updated Project Budgets

ADOT needs to update the estimates for major project components as the accuracy of estimates improves and the time of an event nears. This includes the ability to track the amounts and reasons for adjustments. For example, utility relocation costs are first estimated during programming. They should be adjusted during development as more information about the project is developed.

Requirement 34: Project-Based Budgeting

ADOT needs to consider project mix in developing support budgets and include support costs in the budget. Budgets for operations costs are established before the project mix is finalized. The budget for these support activities may be above or below ADOT’s needs to support the projects.

Project Accounting Processes

This section identifies opportunities to improve key business processes supporting project accounting information and controls.

Requirement 35: Contingency

ADOT needs clear definition as to what is part of a “contingency.” ADOT needs to develop guidelines for managing pre-construction and construction contingency and processes supported by system capabilities to monitor contingency budgets and the use of contingency funds.

Requirement 36: Consultant Contracts

ADOT needs to reevaluate the process for establishing open consultant contracts and relating specific work to a project, so that the commitment can be incorporated into the balance available for the project.

Requirement 37: Cost Accounting Process

ADOT needs to develop processes to report the full costs of completing a project. ADOT needs to determine the extent that cost accounting, including overhead allocation, would improve ADOT's management information and whether the benefits would justify the costs.

Requirement 38: Financial Controls and Review

ADOT needs to improve the financial controls for projects to ensure that only acceptable expenditures are charged to a project. In addition, clear procedures are needed at the appropriate levels to ensure fiscal responsibility for projects; for example, ensuring that needed budget adjustments are processed prior to the approval for payment of unbudgeted expenditures. ADOT also needs policies and procedures to proactively process change orders.

Requirement 39: Project Closeout

ADOT needs formal closeout procedures for all phases of the five-year construction program projects. Currently, the formal closeout procedures are in place only for the construction phase.

Requirement 40: Contract Closeout

ADOT needs formal closeout procedures for non-construction contracts in the system.

Third Party Agreements

This section identifies opportunities to improve the tracking and billing of third party agreements (JPAs).

Requirement 41: Third Party Agreement Process

ADOT needs to develop clear parameters and billing standards for creating and tracking third party agreements. The language contained in some JPAs makes it difficult to determine what is billable. A clear business process will clarify when exceptions are necessary for creative funding opportunities so they can be accommodated in the tracking and billing process. The procedure also needs to provide a review and approval process

with programming, finance, and resident engineers on terms of the third-party financing agreement.

Requirement 42: Third-Party Commitment Process

ADOT needs a process to track expenditures billable to third party agreements (JPA) consistent with the Billing Requirements presented previously. The process should provide for tracking change orders back to the original agreements for the project. The process should assure that billing records related to agreements are updated in a timely manner so that ADOT can bill the third parties for all recoverable charges.

Documentation and Training

This section identifies documentation and training opportunities to communicate the business process for project budgeting and accounting. These training topics were identified specific to business processes. There is a general need to identify who in ADOT needs which kinds of training and to develop a training program to support those needs.

Requirement 43: Program/Project Budgeting and Accounting

ADOT needs to provide documentation and training on how program budgets are created consistent with the Budgeting Processes identified above. ADOT needs to provide procedures, documentation, and training on project budgeting and accounting, including contingency (pre-construction, construction), consultant contracts, construction engineering costs, temporary technicians, and tracking third-party finds.

Requirement 44: Reporting

ADOT needs to provide documentation and training on data available for reporting and understanding of that data. Specific examples are:

- Processing cycles for payroll.
- Contractor payments, equipment, payroll additive (benefits), and other overhead (utilities).
- Impact of cutoff dates to determine the quality of information available.
- Differences between state and federal fiscal years.

Requirement 45: Information Training

Training is needed on where to access different types of information, how to analyze the information, and how to present it in the proper perspective.

Requirement 46: ADVANTAGE Training

ADVANTAGE is still referred to as TRACS, the old financial system, by many ADOT employees. Although some staff indicated that additional training is not needed, there were a significant number that indicated that the new system is not well understood and that more training would be beneficial.

Requirement 47: Financial Training

ADOT needs updated training on basic project financial processes including project coding, responsibilities, and impacts on other organizations. This training should not be limited to project managers.

Requirement 48: Specialized Training

ADOT needs training on specific processes related to project budgeting and accounting, including:

- Federal Aid processes and forms used (from ADOT's perspective).
- ADOT's project review board process and the forms used.
- ADOT's project master form used to establish the project setup in ADVANTAGE (TRACS #) and when the project number should be obtained.
- ADOT's obligation process and how it differs from the FHWA obligation process.

REPORTING PRACTICES

The Reporting Practices section identifies the requirements and opportunities to improve the capabilities supporting ADOT's project budgeting and accounting. Data integration needs and opportunities are included in this section because they are integral to supporting the reporting capabilities. These requirements represent needs identified during the focus groups, executive interviews and the ADOT internal survey. There is a general need to identify more specifically what reports are needed, by whom, and why, and to cost justify new reports before they are developed.

Reporting

The results of the focus group meetings and the ADOT internal survey gave a mixed message on the quality of ADOT's project budgeting and accounting reports. Many were satisfied with the reports or did not identify specific improvements or problems. Others deemed many of the reports inadequate. This section identifies some specific opportunities to improve ADOT'S project budgeting and accounting reports.

Requirement 49: Reports by Project-To-Date and by Fiscal Period

ADOT needs the ability to select and report project budget and accounting information both as project-to-date and for the current or a selected accounting period.

Requirement 50: Report CA100560-1: Project Detailed Transaction Report

ADOT needs the ability to see subtotals of contractor and consultant payments for payment voucher (PV) transactions on this report.

Requirement 51: Projects Underway Report

ADOT needs to develop an automated method to create the Project Underway Report, including direct access to ADVANTAGE data and the other databases that supply the information. Currently this report is very labor intensive to prepare.

Requirement 52: Exception Reports

ADOT needs management exception reports to monitor projects. For example, projects or contracts nearing budget, comparison reports of completed projects or contracts by funding category compared to bid amounts, projects or contracts that have exceeded their budgets by a certain percentage.

Requirement 53: Flexible Reporting

ADOT needs to provide project budget, obligations, and expenditure information with flexible selection, sorting, and summarization to report project financial information by county, resource code, route, Council of Governments/Metropolitan Planning Organization (COG/MPO), funding category, type of work, phase, etc. ADOT needs to provide the ability to monitor and report the status of each funding source as it relates to the project budget.

Standard Reports

This section presents opportunities to improve the usefulness of standard reports produced by ADVANTAGE.

Requirement 54: User-friendly Reports

ADOT needs to reduce paper produced with ADVANTAGE reports. Currently printed reports from ADVANTAGE have significant additional paper with Job Control Language (JCL), and other processing information. Users need to dig through this extra paper to find relevant information. The reports also need descriptive titles to be printed in addition to cryptic codes.

Requirement 55: Management Reports

ADOT needs to create reports to present information for management. For example, create budget-monitoring reports by program category in a management format. ADOT also needs reports that show multiple items numbers (budget item number from the five-year program) for a project and the proportion funded by each line item. ADOT needs to work with district engineers, resident engineers, and project managers to define specific reporting requirements.

Requirement 56: User Specific Reports

ADOT needs reports that reflect the specific information requirements of the users. Accounting needs project financial information presented in a way to support analysis of project budgets and expenditures. Project managers need the same data presented with different extracts, sorts, and summaries to support their analysis of project status.

Reporting Access

This section presents opportunities to improve the accessibility of standard reports produced by ADVANTAGE and of other project budgeting information.

Requirement 57: Access to Standard Reports

ADOT needs easy access to reports by all managers who desire it. The ADVANTAGE online report request capability is available to central, district, and field offices. Each field office should have an ADVANTAGE coordinator that is responsible for requesting and distributing reports. ADOT needs clarification and training on what reports are available and how to request them.

Requirement 58: Historical Information

ADOT needs access to historical information related to projects to perform analysis. This includes tools and access methods to allow searches, selections, and comparisons by various criteria (road segment, district, or other location criteria, project size, funding sources, etc.). Some of this information is currently available in INFACCS (ADOT's user reporting tool for the ADVANTAGE system), but is not easily accessed.

Requirement 59: Online Access to Information

ADOT needs online access to current and historical project information for reporting and analysis. This includes access to summary and detail information.

Requirement 60: Print Routing

ADOT needs the ability for users to print requested reports to their common printer, which may be a network printer or a local printer attached to their PC.

Requirement 61: Reporting Support

ADOT needs central support on accessing ADVANTAGE and other data is needed to support managers and staff who may not routinely create reports or queries or who need information they have not accessed in the past.

Reporting Tools

This section presents opportunities to improve the project budgeting and accounting reporting and access tools.

Requirement 62: INFACCS

This database provides good project accounting and budgeting information reflecting the results of ADVANTAGE processes. The data is accessible for *ad hoc* reports for those that understand the INFACCS database and the available reporting tools (SQL, ACCESS). Potential improvements to this system include restructuring the database to make it easier to understand and access, creating additional access keys for selection and summarization, and tying it to other financial information such as the planning databases used by the Transportation Planning Division to develop the program.

Requirement 63: Analytical Tools and Access

ADOT maintains a great deal of data. Managers and staff need tools to provide them the ability to access, aggregate, merge, or otherwise analyze this data. Managers need analytical tools and access to current and historical data.

Requirement 64: Reporting Efficiency

ADOT needs reporting tools and access to data to more efficiently produce key reports. For example, the Projects Underway Report requires a significant amount of manual effort to prepare.

Requirement 65: Flexible Reporting

ADOT needs the capability and data to support analysis to answer questions as they are asked. For example, the ability to identify all the projects in a specific area over a specified dollar amount.

Requirement 66: Web-based Access

ADOT needs the ability for ADOT and State staff, the public and other stakeholders to easily access project information. Web-based access is a potential solution. It allows users to access information without special software (using a Web browser) while providing secure access levels to appropriate users.

Requirement 67: Document Management

ADOT needs a method to inventory or index where paper documents or disk files are located. This will provide the ability to access files as needed and provide a consistent place to locate information related to cost accounting records and documentation needed for lawsuits.

Data Integration

This section presents opportunities to improve the usefulness and accessibility of project budgeting and accounting information by integrating the data. Data integration can be accomplished in many ways. This section presents the ADOT requirements for integrated data.

Requirement 68: Consistent Data across Applications and Databases

ADOT needs consistent data across the financial systems to accurately report project budgets and costs. Even ADVANTAGE appears to provide different values from different tables. Cutoffs of information in different systems create timing differences, which are difficult to reconcile between the databases.

Requirement 69: Coordinated Data

ADOT needs to contain all of the data to manage the Highway Construction Program (HCP) budget in a single database or in connected databases. There are currently a number of databases with redundant project information, but none of them contain all of the information needed to manage the HCP budget.

Requirement 70: Data Ownership

ADOT needs to define who tracks each type of information in the systems. Clear definition of data ownership, authority and responsibility can reduce duplication, redundancy, and side-systems.

Requirement 71: Integrate Systems

ADOT needs to integrate system functions. Systems currently are functionally segregated. For example, both FAST (ADOT's construction tracking system) and ADVANTAGE contain information related to contractor payments. Information such as

contractor retainage and security deposits is available to one system but not the other. This information should be in a single system but be accessible by other systems that need it. Other systems or functions that need to be integrated with project information include the Planning database, cash flow forecasting, and project scheduling.

Requirement 72: Shared Access

ADOT needs to keep budget monitoring data in a shared database so it can be accessed as needed by staff. Currently, much of this data is stored in Excel, which limits multiple access to the same file except in read-only mode.

WRITTEN FINANCIAL POLICIES AND PROCEDURES

The Written Financial Policies and Procedures section identifies the requirements and opportunities to improve the policies and procedures supporting ADOT's project budgeting and accounting information. These requirements represent needs identified during the focus groups, executive interviews, and the ADOT internal survey.

Policies and Procedures

Requirement 73: Financial Policies

ADOT needs an update to financial policies is currently in process.

Requirement 74: Construction Budget and Project Accounting

ADOT needs a policy for construction budget and project accounting. The process varies. The policy should define the parameters and constraints for construction budget and project accounting while leaving flexibility for alternate financing methods. Procedures should also be included to define the specific budgeting and accounting processes for the known financing methods and to define processes to handle exceptions.

Requirement 75: Project Managers' Manual

The Project Manager's Manual used by ADOT needs specific procedures for processing project financial transactions.

Organizational Needs

This section addresses organizational needs that were identified through the focus group meetings. They are included in this chapter because they support the communication of ADOT policies and procedures.

Requirement 76: Agreement Estimate

ADOT needs to distribute agreement estimates and agreement recap sheets to all responsible parties.

Requirement 77: Organizational Communications

ADOT needs an updated organizational chart and phone directory to help define reporting structure and functional responsibilities. Staff in business units across ADOT need to know who does what in the organization so when they need help, they can get to the right person. A central help center to point questions to where they can be answered may be a solution.

Requirement 78: Financial Systems Support

ADOT needs a single point of contact for financial information. ADOT needs to recognize the information needs of all when processing data so the big picture value of the data is understood. ADOT needs to understand the process of setting up the project master so new projects can be set consistently.

II. LITERATURE REVIEW

INTRODUCTION

The purpose of the literature review was to identify “best practices” for project budgeting and accounting. The search focused on subject matter relevant to ADOT’s needs, both from a business practice and a systems capabilities perspective.

We reviewed the available literature on project financial capabilities. Based on the specialized nature of this area, we found that there is limited literature available on the subject. The U.S. General Accounting Office (GAO) has done a study on project costs and financing as well as methods of managing costs of large-dollar projects. [1] However, the GAO has not specifically examined the project accounting and budgeting aspect of these large projects. Many of the other articles we found described the features of commercially available project information systems. Each article selected contains one or more features that addresses an ADOT requirement. This is not meant to imply that any of those systems would meet all of ADOT’s requirements, but instead demonstrates how other systems address specific requirements.

The remainder of this document includes a description of the methodology that was used for the research, key capabilities that a project financial information system should include, and a summary of various project accounting software capabilities. This report reviews some of the important areas connected to project accounting: budgeting, tracking and control, and reporting and integration.

METHODOLOGY

The literature research was conducted primarily through the Internet. Specific sites likely to have information relevant to transportation and/or project information system and practices were identified and searched. General Web searches were also employed. The following terms were applied during the review of available literature. These combinations were seen as the most applicable to researching this subject:

- Transportation “cost accounting.”
- Transportation “project accounting.”
- “Cost accounting.”
- “Project accounting.”
- Budget development.
- Project budgeting.
- Project information systems.

The following are the literature databases and Internet Web sites examined for the preceding terms:

- Transportation Research Board.
- National Cooperative Highway Research Program.
- Federal Transit Administration: National Transit Library.
- Bureau of Transportation Statistics.
- Expanded Academic Index.
- Government Finance Officers Association.
- US Treasury Financial Management Services.
- Financial Management in Government (financenet).
- Association of Financial Professionals.
- Federal Highway Administration.
- National Transportation Library.
- American Association of State Highway and Transportation Officials.
- Institute of Transportation Engineers.
- Yahoo, MSN, Google.

PROJECT INFORMATION SYSTEMS

In order for project accounting software to deliver a best practice solution and a better return on investment, it should support most of the following features:

Project Budgeting and Accounting

- Multi-level structures to support complex projects using a Work Breakdown Structure (WBS) to track project costs, revenues, and budget values.
- Project budget checking allowing budgets to be associated with any level of a project WBS and, as an option, tracking during transaction entry so that users can be warned or alerted when project costs exceed predefined budget thresholds.
- Timesheet entry module for employees to record project related timesheet data.

- Billing capabilities, including revenue recognition and billing of project costs and time. The system should provide standard rates, allow user-defined revenue recognition rules, split costs or time between funding sources, and create billing document formats.
- Overhead allocation to automatically allocate indirect costs to a project via user-defined allocation rules and burden rates.
- Integration of accounting modules for accounts payable, accounts receivable/billing, fixed assets, payroll, and general ledger data.

Project Management

- WBS templates and copy functions to assist with the start-up of similar projects.
- Integration of planning data between the project costing module and project planning resource and management applications.
- Project visibility that gives project managers on-demand visibility into project life cycle numbers.
- Remote entry to support multi-location or remote location projects to provide more accurate entry of project costs and time data.
- Project work flows that show project events such as opening, suspending, terminating or completing a project subject to user defined work flows.

PROJECT BUDGETING AND ACCOUNTING PRACTICES

Project budgeting and accounting practices employed by other transportation organizations demonstrate methods to program and budget projects and control the project costs through accounting practices as the project progresses through its life cycle.

There has been concern about increases in the cost of ongoing large-dollar highway projects. The GAO study reviewed some of the techniques employed by various departments of transportation to control costs. [1] The cost containment methods observed include: improving the quality of initial cost estimates, establishing cost performance goals and strategies, and using external review boards to approve cost increases. For example, Maryland's goal is to ensure that initial estimates differ from final costs by no more than 10 percent. Their initial cost estimates include contingency factors to account for cost increases that usually occur as a project is designed. In California, the State's guidance provides a detailed methodology in order to control cost increases. The State will develop a project study report to avoid unforeseen items of work before a project proceeds into the final design phase. The guidance describes cost categories that should be included in an initial cost estimate, such as length of a project, inflation and overhead, and a 25 percent contingency as a proxy for future unknown costs.

Programming and Budgeting Practices

The budgeting system for project accounting is an important component for keeping track of the amount spent versus the amount budgeted. Having an integrated system that will not only reflect these differences, as well as allow for changes in the budget due to change orders and/or changes in scope of the project is necessary for project success. The FMS II Project Accounting System allows the user to record actual, commitment, and budget data for accurate tracking of project expenditures and available funds. [6] An important factor for Arizona is the ability to have budget adherence at the program level. In the USL Financials software system the budgets can be enforced or used as a warning for over-expenditures. [5]

Accounting and Budget Control Practices

The GAO determined that cost increases, above the initial cost, were not easy to track for large-dollar highway projects because the data is not readily available from the Federal Highway Administration (FHWA) or state highway departments. [1] The states do not track these increases because they are seen as normal management. Having software to follow project changes is an important feature of tracking project costs.

The Los Angeles Metropolitan Transportation Authority (MTA) has implemented the automated Change Control System (CCS) that allows for changes to be made in the field and for multi-level management reports that monitor field and design change activity. [2] This system helps with processing changes in an efficient time frame as well as providing quality change documentation. The system tracks contractor change notices and change orders and can link with other systems. The data is easily accessible for customized reports for analysis. The information is available in real-time and duplication of data is avoided.

Reporting and Integration Practices

The Port Authority of New York and New Jersey developed several *ad hoc* database systems to provide project control information and a project management integrated system. They had 12 database systems for developing and monitoring project schedules, budgets, costs and change approvals, and tracking drawings. They assessed their current systems in relation to standards recognized as the best in the industry. [3]

The Port Authority implemented two major systems, one for financial applications, the other for human resources. A key decision was whether to use all of the ERP modules offered by one system or use other software systems that are considered “best of breed” for some applications. This was resolved in two ways. They established integration certifications with the “best of breed” companies that allowed them to integrate certain software with their ERP system. They also developed their own functionality to provide comprehensive business applications in order to alleviate some of the need to deal with third-party software companies.

COMMERCIAL SYSTEMS' CAPABILITIES

Features in commercially available project information applications demonstrate approaches that could be used by ADOT to meet their project budgeting and accounting requirements. These features represent advertised capabilities of the application. No assessment was done as to how well these vendors meet their advertising claims or whether any of the applications would meet ADOT's various other requirements.

The following are examples of specific project information systems and their particular functions.

USL Project Accounting

The project accounting software can be part of a fully integrated system with other USL financial modules or function as a stand-alone program. The project accounting system was designed to track and manage project activities and has special features that were created for the non-profit or governmental market. In order to run the system, the SQL server from Microsoft or Sybase is required.

Table 2: USL Financials Project Accounting System [5]	
General Features	<ul style="list-style-type: none"> • No limit to the number of projects – can use sub-projects. • Add-on-the-fly feature controlled by module. • Projects can be associated with accounts. • Project and subproject entry can be associated and optionally required at an account level. • Notes may be associated with the definition of projects. • Projects have attributes to describe special features about each project – no limit. • Projects can have multiple funding sources. Can provide for funding or grant management.
Budgets	<ul style="list-style-type: none"> • Project budgets cross fiscal years and are associated with a given project. • Project budgets can be entered at the project or subproject level. • Budgets can be enforced or used as a warning.
Flexibility	<ul style="list-style-type: none"> • Usage of projects can be controlled at the module level. • Transactional interfaces provide association of projects to accounts. • Edit listings and detail journal reports include project activities.
Reports	<ul style="list-style-type: none"> • Each report has many user selections to assist with reporting on specific project activity. • Reports can provide for a range and “mask” selections: <ul style="list-style-type: none"> – Attribute reports. – Funding source reports. – Project and subproject definition reports. – Transaction reports organized by project or account.
System Integration	<ul style="list-style-type: none"> • Project accounting verifies that projects are associated with assigned accounts and enforced at all usage points.

FMS II Project Accounting System

The Mitchell Humphrey Accounting Software includes a full suite of modules that can be integrated or operate as a stand-alone program, and can be integrated with other software systems. For the database management system, FMS II supports either SQL server or TurboImage. The system can handle many types of projects, including construction, training, software development, and consulting.

Table 3: FMS II Project Accounting System [6]	
General Features	<ul style="list-style-type: none"> • User-defined project classifications such as sub-project, task, work component and activity. • Employee data and customer data. • Billing plans and special billing arrangements. • Other project data, such as name of manger, project type, etc. • Customized screens for data entry, project maintenance, and budgeting. • Access to project data while performing data entry functions. • Performs on-screen computations as you enter project budget and transactions.
Project Accounting	<ul style="list-style-type: none"> • Flexible account structure to track projects by employee, department, or customer. • Records actual, commitment, and budget data to allow accurate tracking of project expenditures and available funds. • Retains financial and statistical history for accounting period – year and life-to-date. • Stores detail transactions for each account by accounting period. • Performs allocations to projects and other accounts based on account balances, statistics, and percentages. • Provides comprehensive online edits and audit trails.
Project Planning	<ul style="list-style-type: none"> • Create budgets at multiple levels such as sub-project, task, account or employee. • Performs “what if” analyses for examining project variables. • Estimates final project costs using known occurrences and assumptions. • Compares actual costs to budgeted costs at any levels. • Retains up to 10 years of future budgets.
Interfaces with other systems	<ul style="list-style-type: none"> • Sends billing transactions to accounts receivable.
Project Management	<ul style="list-style-type: none"> • Review project information online at the summary, account, and detail transaction level. • Retrieve actual, budget, and commitment information from any time period. • Perform online projections. • Customize existing reports or create own reports.

ALCIE Project Accounting

The ALCIE project accounting system can integrate with other modules or work as a stand-alone system. The system includes an embedded billing sub-system and can gather data from other sources. It can also provide timesheet and expense entry and management for labor capture and tracking. The system uses the Oracle database.

Table 4: ALCIE Project Accounting [7]	
General Features	<ul style="list-style-type: none"> • Define fixed and variable burdens for labor. • Multi-company setup with option to share customers among selected companies.
Project Accounting	<ul style="list-style-type: none"> • Project costs can be assigned to specific division/department cost centers. • Project budgeting by labor, material and expenses for each task/activity.

Project Accounting Management System (PAMS)

PAMS is part of the GBA Systems and can operate as part of a suite, including a fixed asset management system, or as a stand-alone module. It can also receive defined systems that can be adapted to meet the needs of any project.

Table 5: Project Accounting Management System [8]	
General Features	<ul style="list-style-type: none"> • Threshold warning messages for critical events within the life of a project that will alert project managers and/or others. • Allocate asset information any number of ways.
Project Accounting	<ul style="list-style-type: none"> • Roll-up project costs and data at any level of a project. • Define project tracking and reporting requirements by utilizing up to 12 user-defined levels of a project posting structure. • Analyze projects in multiple ways: hours expended, revenues generated, multiple currencies.

CONCLUSIONS

While there is a lack of comprehensive literature on the subject of project accounting, there are some examples of how state departments of transportation and other public organizations use innovative techniques to control capital expenditures, and to deal with their unique programs. In addition, there are project accounting software systems that address the unique requirements of departments of transportation. These demonstrate features and practices that could be implemented at ADOT. However, the systems reviewed may or may not be suitable to meet ADOT's needs.

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III. SURVEY OF TRANSPORTATION ORGANIZATIONS

PURPOSE

The Arizona Department of Transportation’s (ADOT) Program and Project Financial Management Needs Assessment was conducted to identify opportunities to improve the reporting related to project accounting and budgeting. The survey assesses how other state transportation agencies and organizations satisfy the needs related to project accounting and budgeting, and identifies “best practices” that might be adopted by ADOT.

METHODOLOGY

This chapter summarizes and compares the responses from the organizations surveyed and includes some of the specific findings that maybe applicable to ADOT. The complete survey notes from each organization are included as Appendix B.

The criteria for selecting the five agency/organizations for the survey were based on current systems in relation to ADOT needs. The size of the organization (as compared to ADOT) and innovative practices in project accounting and budgeting by the organization were also important. At ADOT’s request, one non-public organization was included to identify techniques used by the private sector to manage project budgets and accounting. After a preliminary survey of potential survey candidates, these states were selected for the detailed survey because their project budgeting and accounting systems, and practices seemed most relevant to ADOT’s needs.

The state transportation agencies and organizations were contacted by phone in order to determine the best person capable of providing the required information. After setting an appointment to conduct the survey over the phone, the five-page survey was sent via e-mail in advance to that person. The phone interview took approximately one hour to conduct and follow-up for further details or literature was conducted as needed. A list of each agency or organization with the name and title of the person contacted is below in Table 6.

Table 6: Agency/Organization Surveyed

Agency/Organization	Contact	Title
Washington State Department of Transportation (WSDOT)	Marcy Yates	Accounting Chief
Utah Department of Transportation (UDOT)	Henry Johnston	Financial Manager
Montana Department of Transportation (MDT)	Darrel Zook	Chief of Accounting Services Bureau
Los Angeles Metropolitan Transit Authority (MTA)	Jeff Christiansen	Deputy Executive Officer, Program Management
Parsons Brinckerhoff (PB)	Gina Allick	Administrative Manager

SYSTEMS USED

Most of the organizations surveyed use commercial software with varying degrees of customization. MDT uses a suite of custom-developed applications for their project budgeting and accounting functionality and the statewide PeopleSoft application for general ledger and revenue accounting.

Table 7 summarizes the organizations surveyed and the system they currently use for project budgeting and accounting. The table illustrates the variety of system solutions and implementation strategies employed by the organizations.

Table 7. Project Accounting and Budgeting Systems

Agency/ Organization	WSDOT	UDOT	MDT	MTA	PB
System	TRAINS (AMS), CPMS	ADVANTAGE (AMS)	Various	Oracle Financials plus CCS*	Oracle Financials
Modified	Yes, heavily modified.	Yes, especially for federal billing system.	Yes	No, only minimal	Didn't know
Commercial or Custom	Commercial, custom	Commercial	Custom	Commercial, custom	Commercial
Statewide or Departmental	Departmental	Statewide	Departmental	Departmental	Corporate

* CCS is custom-developed, but is now available commercially.

SYSTEM FUNCTIONS

Most of the systems examined supported project budgeting and accounting functions in addition to general accounting, cost accounting, general ledger accounting, revenue accounting, federal billing, and contract tracking. In Utah and Washington, all of the project costs reside on the AMS database and the data is available almost immediately. Montana's statewide system (PeopleSoft) provides most of the general accounting functionality, while the various departmental systems provide for data collection, project budgeting and accounting, and federal billing. At MTA and PB, all project costs, as well as other accounting and operation data, reside on the Oracle database.

USER SATISFACTION

The level of satisfaction of the users of the programs varied. Most users at UDOT are satisfied with their system's project financial information and functionality. Some infrequent users of the AMS system at WSDOT find the system complicated to navigate, while the frequent users are comfortable, but still find the system cumbersome. The MTA

finds the financial accounting aspects of Oracle satisfactory, but the project accounting very unsatisfactory. On the other hand, PB is very satisfied with the Oracle project accounting capabilities and the information provided by their Oracle system.

PROJECT BUDGETING AND ACCOUNTING

Budgeting For Contingency

Not all of the agencies budget for a contingency, but those that do typically use a percentage of the total project budget. The MTA, for example, estimates the contingency amount by looking at line items, risks associated with the project, experience with similar projects, and historical data. WSDOT estimates a percentage for contingency. If change orders exceed this amount, a contract supplement requires approval by a screening board. In the private sector, the project manager has some flexibility on how to use contingency at PB. This contingency is a reserve against the project budget since most projects are based on a fixed price contract. Any work in excess of the contract amount requires a client approved change order.

Budgeting Engineering and Construction Administration Support

In order to budget for engineering and construction administration support, MDT estimates its resources to support construction based on the size and type of project. It uses a custom-developed application to project the costs by fiscal year. UDOT has historically budgeted 20 percent of its total project budget for all design and construction support, and continues to re-evaluate the percentage based on experience. UDOT's project budgets are managed by attempting to keep engineering costs below a specified percentage of contractor payments. It has developed special reports to track federal, state, administrative, and other costs that are reviewed monthly by budget officers. Washington allocates certain costs associated with construction to a special subprogram instead of to the project (e.g., furniture and utilities). They do allocate personnel costs to projects, but it was not clear how they budget these costs.

Including All Project Costs in the Project Budget

Most of the interview participants include all of the project costs in the project budget and use cost allocation formulas to allocate indirect costs. The exception is MDT, which includes only direct labor and associated benefits in the project budget and costs. They plan to implement a system strategy that will include full costing in the future.

Adjusting For Price Fluctuations

MTA and WSDOT require the contractor to include all costs in the bid process. Price fluctuations on materials become the responsibility of the contractor. WSDOT will use a change order if it is an extreme case of price fluctuation. UDOT allows price

fluctuation clauses in its construction contracts and treats them as a change order when the amount is known.

Recording and Tracking Multi-Year Projects

MTA uses a technique they call shadow budgeting for recording and tracking multi-year project budgets. Each project is rebudgeted each year, including any carryover. UDOT's division budgets are annual, but the project costs are tracked from inception to completion. Internal resources are budgeted as part of the operating budget, but are charged to projects as they are utilized.

WSDOT forecasts project costs beyond the biennium, but only budgets the amount that is funded. Ongoing projects are set up with the biennium appropriations, then modified as funding becomes available in subsequent biennia.

Montana also is constrained by biennial appropriation. Projects are budgeted for total cost. The budget is then broken down by fiscal year to project expenditures. The appropriation is flexible enough to allow specific projects to move earlier or later as long as the appropriation for state matching funds is not exceeded.

Relating Project Budgets to the Program, State Transportation Improvement Program (STIP) or Five-Year Plan

WSDOT holds a program management staff monthly summary review meeting to review expenditures, balance the program, and project the long-term status of projects for the biennium. UDOT associates the federal appropriate codes to projects to relate them back to the program at a high level.

Tracking Third Party Funds

The agencies we surveyed track their third party funds through different means. WSDOT uses the work order in its accounting system to identify each project. The work order provides a percent billing to each funding source. They are also able to associate agreements with each work order that defines reimbursement or payable commitments. If changes are needed to a specific Joint Party Agreement (JPA), then the setup of the work order is adjusted.

Managing Undesignated Funding

This question addressed the inclusion of a pool of money in the transportation program that is not designed to a particular project, but can be allocated to projects within certain guidelines. Most organizations we surveyed do not use the concept of undesignated funds in their transportation program. WSDOT has a discretionary budget that can be allocated to a project as needed. The regional administrator controls the allocation to projects. This is tracked through their project budgeting program by transferring budget from the discretionary pool to the specific project.

Relating Operating and Project Budgets

Most of the agencies surveyed create operating budgets separately from project budgets. PB budgets most administrative support directly to a project rather than including it in the operating budget. For administrative staff members who are normally overhead, but may charge directly to a project, a percentage of their salary is budgeted in the project budgets.

Tracking Changes

MTA has an innovative program for tracking project changes, called the Contract Control System (CCS). The system provides detailed historical tracking of change orders, online approvals, and online queries. The MTA developed this program in the early 1990s in response to the lack of any other software available to track changes. There are 12-13 modules available for items such as action items, sequence of steps, and aging process of a project.

The application is a FoxPro-based program that has integration points with their Oracle and Primavera systems. It is a windows-based, user-friendly system that can track the original budget, changes, and the current contract balance. This has allowed for less duplication of data entry and more accuracy in the data. It is available to all staff to input, approve, or track contract changes. The system has proven to be an efficient and effective process to track the detail related to their construction change orders.

A similar product on the market, called Expedition, is used by other transportation organizations, reportedly with less success.

Budgeting and Tracking Contractor Incentives

UDOT's budgeting and tracking of contractor incentives is tracked through the regular contractor management system. WSDOT builds a ceiling budget amount into the contract and budget. MTA has avoided this issue by not allowing for incentive payments.

Relating Consultant Contracts to Projects

The way in which consultant contracts are related to the projects and are controlled varies greatly by organization. WSDOT uses a roster process with umbrella contracts. These contracts are recorded and controlled in the TRAINS system by creating a task. The task allows them to allocate a specific amount of a general contract to a specific work order. The contract amounts are not allowed to exceed their limit. Task releases to the work order are not allowed to exceed the project budget.

UDOT also has general contracts that may be charged to multiple projects. The system records a contract for a dollar amount, but it is not applied to a particular project. The AMS system does not allow overpayments on contract amounts. UDOT uses work

orders (equivalent to WSDOT task) to identify a specific allocation of the contract to a project and to the commitment to each project.

MTA uses consultants for the life of a project and periodically use bench consultants (contractors) to help finish projects. The task and dollar amounts are associated with an activity in order to control maximum contract amounts.

Calculating the Balance of Underway Projects

WSDOT calculates the unexpended or unobligated balance of projects that are underway at the end of the fiscal period. WSDOT produces an “Operating Book” at the end of the biennium that identifies the amount to carry over at the appropriation level. This is supported by more detailed reports at the project level. These reports are prepared using costing information from TRAINS and program budget information from CPMS.

UDOT manages budgets on a fiscal year basis but not at the project level. Project budgets are a management tool. At year-end, multi-year budgets are carried over at the appropriation level.

REPORTING

Online Access to Project Information

Most organizations surveyed had some online access to information in addition to hard copy reports. MDT has very little online access, but is working toward improving online access by implementing a data warehouse.

PB provides differed levels of access to different users. Only the project administrator updates the information such as project data, timesheets, etc., but only for projects to which they are assigned. The project manager and the project administrator are able to view the information for information and reports.

WSDOT allows a limited number of employees in the Department to update information on the TRAINS work order system ledgers. Many employees have inquiry capability. Update authority to the Capital Program Management System (CPMS) is limited to program managers. These systems are available to both the central and regional offices.

Historical Information

All of the organizations surveyed store significant historical information. Access to the historical information varies. The WSDOT TRAINS system keeps historical information at the summary level for four to five biennia. The detail level of information is closed at the end of the biennium. MDT keeps some project detail information available in an Oracle database. Archived history is retained for seven years, but requires an information systems analyst to produce reports containing historical information.

UDOT has project history available for six years in their present system (since implementation). They also have access to historical information in the prior system.

Reporting and Analytical Tools

WSDOT uses its TRAINS system for monthly, weekly, and daily standard reports. For *ad hoc* reports, it uses AMS, ADVANTAGE DC, and Real Query products. It also uses a system called FIRS that provides summary level information from data extracted daily from TRAINS into an SQL database.

Use of Data Warehouse for Project Accounting and Budgeting

UDOT uses a data warehouse for all financial transactions, which are extracted into Microsoft ACCESS. ACCESS gives them flexible access for reports and queries with summary and detailed information. WSDOT has a reporting tool called FIRS that provides query and reporting access to TRAINS data that is extracted daily. MDT provides some access to Oracle copies of selected data, but is planning to use the data warehouse approach to integrate their project financial information.

Web-Based Access to Project Information

Web-based access to project information is increasing and PB offers this with special access features for those that require it. WSDOT participates in the Transportation Executive Information System (TEIS) that consolidates transportation information from their databases with that from other state transportation organizations for the legislature and other stakeholders. MTA is moving toward providing Web-based access to project information.

Presentation of Data by Program Activity and/or Geographic Area

WSDOT offers a number of budget reports that are divided by sub-program and organization. They also use TEIS, which is organized by legislative district and includes performance information by location. This is available to the legislature, stakeholders and constituents online, via the Internet. MTA provides reports and queries by activity, but not by geographic area. UDOT does not provide project information by program activity or geographic area.

TRAINING

Types of Training Provided

Training programs varied among the organizations surveyed. Most training was provided as classroom training. MTA has provided extensive training for their CCS product. They are currently providing Oracle training as they prepare to move to the new release.

WSDOT provides targeted training on their TRAINS system to introduce new features and for new employees. They also use newsletters, user groups, manuals, and a help desk to support the system's users.

PB offers in-house training on their Oracle system as well as a project manager and project administrator certification program with a set of modules that is presented in the classroom by the corporate human resources department.

IV. FINANCIAL IMPROVEMENTS

INTRODUCTION

The Financial Improvement Report describes proposed financial system and process improvements to address ADOT requirements for project budgeting and accounting. The recommendations in this report are based on the requirements and needs developed by Dye Management Group, Inc. through interviews, focus groups and surveys with ADOT management and staff, and our best practices research.

During the process of identifying requirements, we determined that ADVANTAGE meets many of ADOT's financial reporting needs. Requirements identified for project budgeting, accounting, and reporting would not necessarily be fully met by implementing a replacement system. In addition, the idea of implementing a new financial and project accounting system, or even upgrading the current ADVANTAGE system, is viewed as cost prohibitive. As a result, we agreed to focus on financial improvements that can be implemented by enhancing the current system.

The requirements were ranked by selected ADOT managers and by Dye Management Group, Inc. The ADOT managers prioritized the requirements by assigning a value of one to three (with three being the highest priority) to each requirement, then averaging the results. Dye Management Group, Inc. developed an independent ranking of the requirements based on our understanding of ADOT's business objectives, which were a result of information gathered during focus groups, interviews, and conversations with ADOT managers and staff; as well as our experience with similar project accounting requirements in similar organizations. These rankings are detailed in Appendix D: Ranking of ADOT Financial Improvement Requirements. These priorities had some impact on the packaging of requirements into projects and phases. The final project and phases were based on grouping the requirements for common functionality to address multiple related requirements, and impact on the systems and processes to provide ADOT the biggest benefits and the most efficient utilization of resources to implement the changes.

We were also requested to give an indication of which requirements may have an impact on internal controls. Although an internal controls review was not within the scope of this project, any change to accounting processes may have an impact on internal controls, and this impact should be evaluated and mitigated as part of the process and software design. In the chart in Appendix D, we indicated those requirements that will most likely have some impact on internal controls (such as those related to better documentation and training) and those for which internal controls should be considered during the design of the procedures or system changes.

The remainder of this report presents a description of each financial improvement project and the recommended approach to meeting the requirements. Each section includes the following topics:

- **Overview** – Describes the current process, the requirements related to that process, and the changes that are needed.
- **Recommended approach** – Describes the recommended approach for implementing the project. In larger projects, phases are identified to provide an incremental implementation approach for related requirements.
- **Benefits** – Identifies the benefits for completing each phase of the project.
- **Technical implementation alternatives** – Describes system alternatives to support the recommended approach with the recommendation for a preferred alternative. Technical alternatives may not be applicable for every financial improvement project or phase.
- **Work products** – Identifies the work products that will demonstrate that the project phase has been successfully completed.
- **Organizational impact** – Describes the organizational impact expected as a result of implementing the project.
- **Training requirements** – Describes training topics and audiences to be trained as result of the project.

Financial Reporting Improvement Projects

The financial reporting improvement projects in this report were defined by combining related requirements into improvement projects that can be implemented incrementally. The projects represent four initiatives. They are:

- **Budget Processes and Architecture** – This project addresses those requirements related to project budget process and architecture. This project includes the following implementation phases:
 - Link Projects to Program Item Number Budgets identified in the Five Year Transportation Facilities Construction Program.
 - Budget and track budget categories based on the Agreement Estimate Recap.
 - Track Budget Commitments.
 - Track Budget Adjustments.
- **Budget and Financial Reporting** – This project addresses the requirements related to budget and financial reporting. This project includes the following implementation phases:

- Report General Design.
- Change ADVANTAGE Reports.
- Add Data Elements.
- Develop Data Warehouse.
- Reporting Tools.
- Develop New Standard Reports.
- Reporting Support.
- **Financial Policies and Procedures** – This financial improvement project addresses changes to financial policies and procedures to improve the overall financial controls and reporting of ADOT projects.
- **Financial Training** – This project focuses on developing and conducting a training program for users and providers of ADOT project financial information.

We also defined other recommendations. These recommendations identify projects to address requirements that are not integral to the project budgeting and accounting improvements but would provide significant improvements to ADOT processes. Two of these recommended projects would provide additional capability to the core recommendations. They are:

- **Third Party Agreement Process** – This project describes improvements to simplify the third party agreement process to reduce the effort and uncertainty in the billing process.
- **Track Change Orders** – This project describes a change order process that would formalize change order processing throughout the life of a project.
- **Data Management** – This project describes an approach for data management that would create a data glossary to increase the understanding of data relationships throughout the ADOT financial systems.

Finally, there were five requirements that were identified as out of scope. They address ADOT’s cost accounting and document management processes, and other budget issues.

Table 8 lists the original requirements and indicates the project and phase addressing that requirement. Requirements related to other recommendations are indicated as “other” and out of scope requirements are indicated with “scope.” The table

also has a column indicating the anticipated impact on the current ADOT financial systems.

Financial Reporting Improvement Results

Implementation of these financial process and system improvements will provide better project financial information by updating the project budgeting and accounting processes. This effort will provide:

- Financial policies and procedures to support improved project budgeting, accounting and reporting.
- A data warehouse to integrate project financial information to meet the reporting and analysis needs of management and staff.
- Improved project budgeting procedures to provide more inclusive and realistic project budgets with improved tracking of change orders for improved accountability.
- Linkage of projects to programs to provide an assessment of how program funds are being spent and the level of commitment for each program line item.
- Improved management reports including exception reports.
- A training program for project budgeting, accounting, and reporting policies, procedures and processes

Table 8: Requirements Matrix

REQ#	Title	Requirements Page Numbers	System Impact	Budget Processes and Architecture*	Budget and Financial Reporting*	Financial Policies and Procedures*	Financial Training*	Unscheduled Other Recommendations	Out of Scope Requirements
1	Connect Programming and Budgeting	54	New Table	1.1					
2	Track Changes to Project Estimates	59, 105	ADVANTAGE & New Table	1.4				X	
3	Original Budget	59	ADVANTAGE & New Table	1.4					
4	Control of “Subprogram” Projects	55	New Table	1.1					
5	Source of Budget Items	55	New Table	1.1					
6	Adjustable Costs	56, 106	New Table	1.2				X	
7	Identify Contingency	56, 106	New Table	1.2				X	
8	Consultant Contracts	57	New Table	1.3					
9	Cost Accounting	113							X
10	Link Construction Engineering Costs to Project Budget	56	New Table	1.2					
11	Financial Controls	94				3			
12	Budgetary Control for Temporary Technicians	114							X
13	Track Third-Party Commitments	102						X	

REQ#	Title	Requirements Page Numbers	System Impact	Budget Processes and Architecture*	Budget and Financial Reporting*	Financial Policies and Procedures*	Financial Training*	Unscheduled Other Recommendations	Out of Scope Requirements
14	Track Change Orders to Third Party Commitments	102						X	
15	Billing of Third-Party Sources	102						X	
16	Relate Contracts to Projects	57	New Table	1.3					
17	Asset Management	76	PRBL/SPDT		2.3				
18	Project Characteristics	76	PRBL/SPDT		2.3				
19	Lane Miles	76	PRBL/SPDT		2.3				
20	RAAC Information	72	New Reports		2.1, 2.3, 2.6				
21	Type of Work Description	76	PRBL/SPDT		2.3				
22	Project Establish Date	76	PRBL/SPDT		2.3				
23	Authorization Dates	76	PRBL/SPDT		2.3				
24	Budget Change Information	60, 106	ADVANTAGE & New Table	1.4				X	
25	FHWA Reporting	72	New Reports & PRBL/SPDT		2.1, 2.3, 2.6				
26	Cash Flow Forecasting	72	New Reports & PRBL/SPDT		2.1, 2.3, 2.6				
27	Program and Budget Structure Needs	55	New Table	1.1					

REQ#	Title	Requirements Page Numbers	System Impact	Budget Processes and Architecture*	Budget and Financial Reporting*	Financial Policies and Procedures*	Financial Training*	Unscheduled Other Recommendations	Out of Scope Requirements
28	Route Identification	76	PRBL/SPDT		2.3				
29	Identify Projects in Five-Year Program	55	New Table	1.1					
30	Compare Project Budgets and Costs to the Program	55	New Table	1.1					
31	Original Budget	94				3			
32	Annual Inflation Review	114							X
33	Updated Project Budgets	60, 106	ADVANTAGE & New Table	1.4				X	
34	Project-Based Budgeting	114							X
35	Contingency	56, 106	New Table	1.2					
36	Consultant Contracts	58	New Table	1.3					
37	Cost Accounting Process	113							X
38	Financial Controls and Review	94				3			
39	Project Closeout	94				3			
40	Contract Closeout	95				3			
41	Third Party Agreement Process	102						X	
42	Third-Party Commitment Process	102						X	

REQ#	Title	Requirements Page Numbers	System Impact	Budget Processes and Architecture*	Budget and Financial Reporting*	Financial Policies and Procedures*	Financial Training*	Unscheduled Other Recommendations	Out of Scope Requirements
43	Program/Project Budgeting and Accounting	98	New Table	1.2					
44	Reporting	98					4		
45	Information Training	99					4		
46	ADVANTAGE Training	99					4		
47	Financial Training	99					4		
48	Specialized Training	99					4		
49	Reports by Project-To-Date and by Fiscal Period	73	New Reports		2.1, 2.6				
50	Report CA100560-1: Project Detailed Transaction Report	70	ADVANTAGE		2.2				
51	Projects Underway Report	71	New Reports		2.1, 2.6				
52	Exception Reports	72	New Reports		2.1, 2.6				
53	Flexible Reporting	73	New Reports & Reporting Tools		2.1, 2.5, 2.6				
54	User-friendly Reports	70	ADVANTAGE		2.2				
55	Management Reports	73	New Reports		2.1, 2.6				
56	User Specific Reports	73, 109	New Reports & Reporting Tools		2.1, 2.5, 2.6			X	

REQ#	Title	Requirements Page Numbers	System Impact	Budget Processes and Architecture*	Budget and Financial Reporting*	Financial Policies and Procedures*	Financial Training*	Unscheduled Other Recommendations	Out of Scope Requirements
57	Access to Standard Reports	71	ADVANTAGE		2.2				
58	Historical Information	73	Data Warehouse & Reporting Tools		2.4, 2.5				
59	Online Access to Information	73	Data Warehouse & Reporting Tools		2.4, 2.5				
60	Print Routing	71	ADVANTAGE		2.2				
61	Reporting Support	72			2.7				
62	INFACCS	74	Data Warehouse & Reporting Tools		2.4, 2.5				
63	Analytical Tools and Access	74	Data Warehouse & Reporting Tools		2.4, 2.5				
64	Reporting Efficiency	74	Data Warehouse & Reporting Tools		2.4, 2.5				
65	Flexible Reporting	74	Data Warehouse & Reporting Tools		2.4, 2.5				
66	Web-based Access	74	Data Warehouse & Reporting Tools		2.4, 2.5				

REQ#	Title	Requirements Page Numbers	System Impact	Budget Processes and Architecture*	Budget and Financial Reporting*	Financial Policies and Procedures*	Financial Training*	Unscheduled Other Recommendations	Out of Scope Requirements
67	Document Management	113							X
68	Consistent Data Across Applications and Databases	75, 109	Data Warehouse		2.4			X	
69	Coordinated Data	75, 109	Data Warehouse		2.4			X	
70	Data Ownership	75, 109	Data Warehouse		2.4			X	
71	Integrate Systems	75, 110	Data Warehouse		2.4			X	
72	Shared Access	76	Data Warehouse		2.4				
73	Financial Policies	95				3			
74	Construction Budget and Project Accounting	95				3			
75	Project Managers' Manual	95				3			
76	Agreement Estimate	95				3			
77	Organizational Communications	95				3			
78	Financial Systems Support	95				3			

*Explicit project and phase numbers are shown.

PROJECT 1: BUDGET PROCESSES AND ARCHITECTURE

Overview

This project addresses those requirements related to project budget process and architecture. These requirements will require both system and procedure changes to implement. The requirements related to project budgeting and accounting fall into the following categories:

- Linking projects to Line Item Budgets.
- Budgeting and tracking budget categories based on the Estimate Agreement for construction project phases and on other key budget categories for other phases.
- Tracking commitment against the project budget.
- Tracking Budget Adjustments.

Linking projects to Line Item Budgets

A consistent theme during the requirements analysis was the need to link project information in ADVANTAGE to the program information prepared and maintained by the Transportation Planning Division (Priority Programming System). One key need is the ability to track a project to multiple program line items. ADVANTAGE currently is able to tie a project to a single line item in the program. However, projects funded by multiple line items in the program are common, especially when “subprogram” allocations are used.

The converse is also true. There is a need to track multiple projects or portions thereof funded by a single line item in the program. This information is important to assess the status of the program and to determine how much of the program is uncommitted.

Line items in the Transportation Planning Priority Programming System (PPS) identify the official budgets for the ADOT projects. The project table in ADVANTAGE provides the ability to identify a single line item. There is actually a many-to-many relationship between the PPS line items and ADVANTAGE projects since a project may be budgeted by multiple line items and a line item may provide budget authority to multiple projects. The requirements below identify a need to provide additional linkage capabilities between the ADVANTAGE project and the line item budgets.

- **Requirement 1: Connect Programming and Budgeting** – ADOT needs the capability to measure project budgets against the program during the project life. ADOT needs to link budget updates to the program as projects evolve.

- **Requirement 4: Control of “Subprogram” Projects** – ADOT needs to provide a method to budget, control, and report the allocation of subprogram budgets. Currently, managers have difficulty identifying components of projects that are budgeted from subprograms. For example, traffic signal, pavement preservation, and district minor subprograms can all provide funding to a single project. In addition, a subprogram may have multiple subprojects and multiple subprograms may fund a subproject. These are currently tracked in Excel spreadsheets because ADVANTAGE does not provide the capability to establish multiple subprogram/subproject relationships.
- **Requirement 5: Source of Budget Items** – ADOT needs budget information by various item numbers, such as traffic safety, pavement preservation, and district minor to provide budget monitoring information for the various users.
- **Requirement 27: Program and Budget Structure Needs** – ADOT needs the ability to link a project to multiple program items (budget line items) and indicate the funding proportion for each line item. For example, if district minor money (a subprogram budget line item) is added to a project, that change cannot be reflected in ADVANTAGE because ADVANTAGE only has one line item field per subproject/phase.
- **Requirement 29: Identify Projects in Five-Year Program** – ADOT needs to investigate creating a unique identification for all projects in ADVANTAGE that are included in the five-year construction program.
- **Requirement 30: Compare Project Budgets and Costs to the Program** – ADOT needs the ability to determine the relationship between project budget and costs and the five-year construction program. The accounting system tracks project costs, but it does not relate them back to the program (currently using spreadsheets to do this). Project expenditures should be tracked by the program line item. The ability to analyze variances will allow staff to assess the impact on the overall program.

Budgeting and Tracking Budget Categories

The budget development process needs to be reviewed and updated. The project budget resulting from the current budget process does not accurately reflect all of the costs of completing the project. Key components of the project budget are the construction contract, contingency (usually five percent), construction engineering (usually 15 percent), consultant contracts, and other costs including ADOT and in-kind resources.

Costs for incentives, quantity changes, or unit price fluctuations are included in many construction contracts. The project budget needs to account for the estimated

amount of cost variances from the budget categories identified in the Agreement Estimate Recap to measure the impact of incurred costs on overall project costs.

The budget development process needs to clearly define what costs can and should be included in contingency as well as include guidelines for managing pre-construction and construction contingency. Systematic processes are needed to monitor contingency budgets and the use of contingency.

Currently, Construction Engineering (CE) is budgeted as a standard 15 percent of the project cost for statewide projects and nine percent for Maricopa Regional Freeway System projects (MAG). Regional engineers estimate a CE cost of six percent to 25 percent based on the type and size of project. They manage the total CE budget out of a pool instead of including the estimated CE amount in the project budget. When these expenditures are paid, they are charged to the project to which they apply. As a result, some projects show as over-expended while others are under-expended.

The estimate agreement provides a budget breakdown below the phase and subproject level now recorded in ADVANTAGE. These budget components provide a necessary level of tracking and information for budget control and for reporting. The requirements below demonstrate the need to provide this additional level of information for the project budget.

- **Requirement 6: Adjustable Costs** – ADOT needs to budget and account for cost variances from the bid amount (incentives, quantity changes, or unit price fluctuations) to measure their impact on overall project costs.
- **Requirement 7: Identify Contingency** – ADOT needs to track the use of five percent construction contingency to provide a clear audit trail on project change orders that could result in a budget revision.
- **Requirement 10: Link Construction Engineering Costs to Project Budget** – ADOT needs the ability to budget and track construction engineering costs based on the type and size of the project. Currently, CE is budgeted as a standard 15 percent of the project cost for statewide projects and nine percent for Maricopa Regional Freeway System projects (MAG). The standard CE budget is not logically linked to the type and size of a project. Regional engineers estimate between six percent and 25 percent based on the type and size of project, and manage the total out of a pool. When these expenditures are paid, they are charged to the project.
- **Requirement 35: Contingency** – ADOT needs clear definition as to what is part of a “contingency.” ADOT needs to develop guidelines for managing pre-construction and construction contingency and processes supported by system capabilities to monitor contingency budgets and the use of contingency.

Tracking Commitment against the Project Budget

As projects progress, it is important to understand what commitments or obligations have been made against the project budget. Commitments can be in the form of consultant contracts, construction contracts, purchase orders, and employee labor. In the traditional governmental accounting system, these commitments would be identified by encumbrances. In ADOT project accounting, the encumbrances represent only a portion of the total commitment because by State guidelines, the construction and consultant contracts are not encumbered.

Consultant contracts are an open agreement with a firm to provide certain specific skills at an agreed upon price. Consultant contracts are recorded in the Engineering Contract System (ECS). Services such as surveying, engineering, archeological advice, and environmental consulting are documented through a task order as they are needed for a project. These task orders represent a commitment to the project but are not recorded in either the project ledgers or the ECS ledgers. There is currently no process to relate the task orders for consultant contracts to project budgets to ensure that appropriate budgets have been obligated for all committed work.

Temporary technicians are similar to consultant contracts except they are used to supplement ADOT staff. Contracts for temporary technicians are recorded in the engineering contract system (ECS). Task orders are not presently used to document the commitment of temporary technicians to projects. Payments for temporary technicians are charged to the projects on which they worked.

Construction contracts relate directly to a project in the ADVANTAGE contract system. These obligations are recorded in the Construction Contract System (CCS) but are not reported as a commitment to the project. In addition, the consultant contract amount represents the bid amount. Change orders to the contract are not posted into CCS until the end of the project.

Projects may have other commitments such as a JPA or letter agreement. This category also includes work done for the benefit of a project by other Arizona departments such as Highway Patrol. These would represent the commitment to pay for work done for ADOT by another jurisdiction. It is the opposite of the JPAs for which ADOT does work for and bills the third party.

The requirements below demonstrate the need for additional methods to track and control project commitments.

- **Requirement 8: Consultant Contracts** – ADOT needs a process to relate task orders for consultant contracts to project budgets to ensure that appropriate budgets have been obligated for all committed work.
- **Requirement 16: Relate Contracts to Projects** – ADOT needs contracts and projects to be cross-referenced (construction, consultants, JPAs, letter agreements).

- **Requirement 36: Consultant Contracts** – ADOT needs to reevaluate the process for establishing open consultant contracts and relating specific work to a project, so that the commitment can be incorporated into the balance available for the project.

Tracking Budget Adjustments

Changes to the project and program occur over time as projects evolve through their lifecycle. Some of these changes are currently tracked but many are not tracked in the system. Changes occur at different levels but need to be tracked regardless of the level. The kinds of changes that occur include:

The design of ADVANTAGE records an original budget amount when the project is created. Because projects may be created in the system for tracking purposes before the budget amount is available, some projects are created with a zero amount. When the budget amount is approved, the approved amount must be recorded as a revision.

Changes to the program occur as the program progresses and additional information becomes available for the scope and estimated costs of projects are included in the program. These changes are approved by the Transportation Board (TB) and tracked by the Transportation Planning PPS database. Key steps of the budget are:

- **Planned** – The amounts used to determine the size of the project in the planning stages.
- **Committed** – Updated project amount based on engineering estimates. This forms the budget going into the bidding process.
- **Obligated** – This is the amount of the construction contract binding ADOT to a contractual obligation.

When looking at a project's budget for reporting and analysis, the user needs to know which of these steps the current budgeting represents.

Changes to the project budget can be a result of a scope change supported by a JPA, additional unforeseen work, or changes in design. These changes may require a change to the program but are often funded by allocating available subprogram dollars or by acquiring additional JPA dollars. The project budget is not updated if there is a sufficient contingency balance available. The revised budget amount is entered into ADVANTAGE to post these changes. ADVANTAGE creates a change transaction with minimal information. Additional information is required to track the amounts and reasons for adjustments.

The contract and the original project budgets for construction are based on the bid amount. The actual amount can vary as the construction progresses for a variety of reasons. Some of these include changes as a result of a JPA, features intended in the original scope but not included in the design, quantity and price changes, and design

changes. (Quantity changes are made to the contract only if the revise quantity is a 25 percent increase.) These changes are not entered into the contract tracking system (CCS) until the end of the project and are not recorded in the project budget until the expenditures exceed the contingency budget. When the contingency amount is exhausted, a budget change is required to accommodate the next contract payment. All change orders need to be tracked systematically to provide a complete history of the project and to provide accountability for escalating costs.

A second issue related to change orders is timely processing of the resulting budget changes. Too often, the payment reports (invoices) resulting from a change order arrive in Cost Accounting before the budget change is posted, requiring additional research and possibly a budget override to allow the invoice to be paid.

The requirements below demonstrate the need to provide additional tracking for budget revisions throughout the project's life.

- **Requirement 2: Track Changes to Project Estimates** – ADOT needs the ability to track the amounts and reasons for changes to the project estimates and budgets as projects evolve through their lifecycle. This includes accountability (reconciliation with explanation) for escalating (or de-escalating) costs for each stage of the project lifecycle including:
 - The initial planning stage amount.
 - The development estimates.
 - The pre-construction amount.
 - The bid amount.
 - The actual amount.

During each stage of the project lifecycle, the qualities of project estimates improve as more information becomes available. The project bid and construction contract amount represent the final and best budgets, but even that is modified by change orders. The reasons for these changes between phases and during phases need to be clearly documented and tracked, so an explanation of the differences between the original programmed amount and the final amount can be reported.

- **Requirement 3: Original Budget** – ADOT needs consistent use of the original budget amount in ADVANTAGE. The original budget amount is established when the project is created on the system. There are inconsistent practices for the amount to use when establishing the project, which can lead to inconsistent reporting. Some projects are created in the system for tracking purposes before the budget has been approved (e.g., right-of-way). When the budget amount is approved, the approved amount must be recorded as a revision. ADOT needs to determine the purpose and use of the

original budget in ADVANTAGE (PRBL) and determine if it should be consistent with original budget in other ADOT systems.

- **Requirement 24: Budget Change Information** – The ADVANTAGE PRBL table currently includes budget adjustments. Additional information defining who, when, why, and the amount is needed to provide a complete tracking and audit trail of the budget adjustments over time. (There could be multiple reasons in one transaction.)
- **Requirement 33: Updated Project Budgets** – ADOT needs to update the estimates for major project components as the accuracy of estimates improves and the time of an event nears. This includes the ability to track the amounts and reasons for adjustments. For example, utility relocation costs are first estimated during programming. They should be adjusted during development as more information about the project is developed.

Recommended Approach

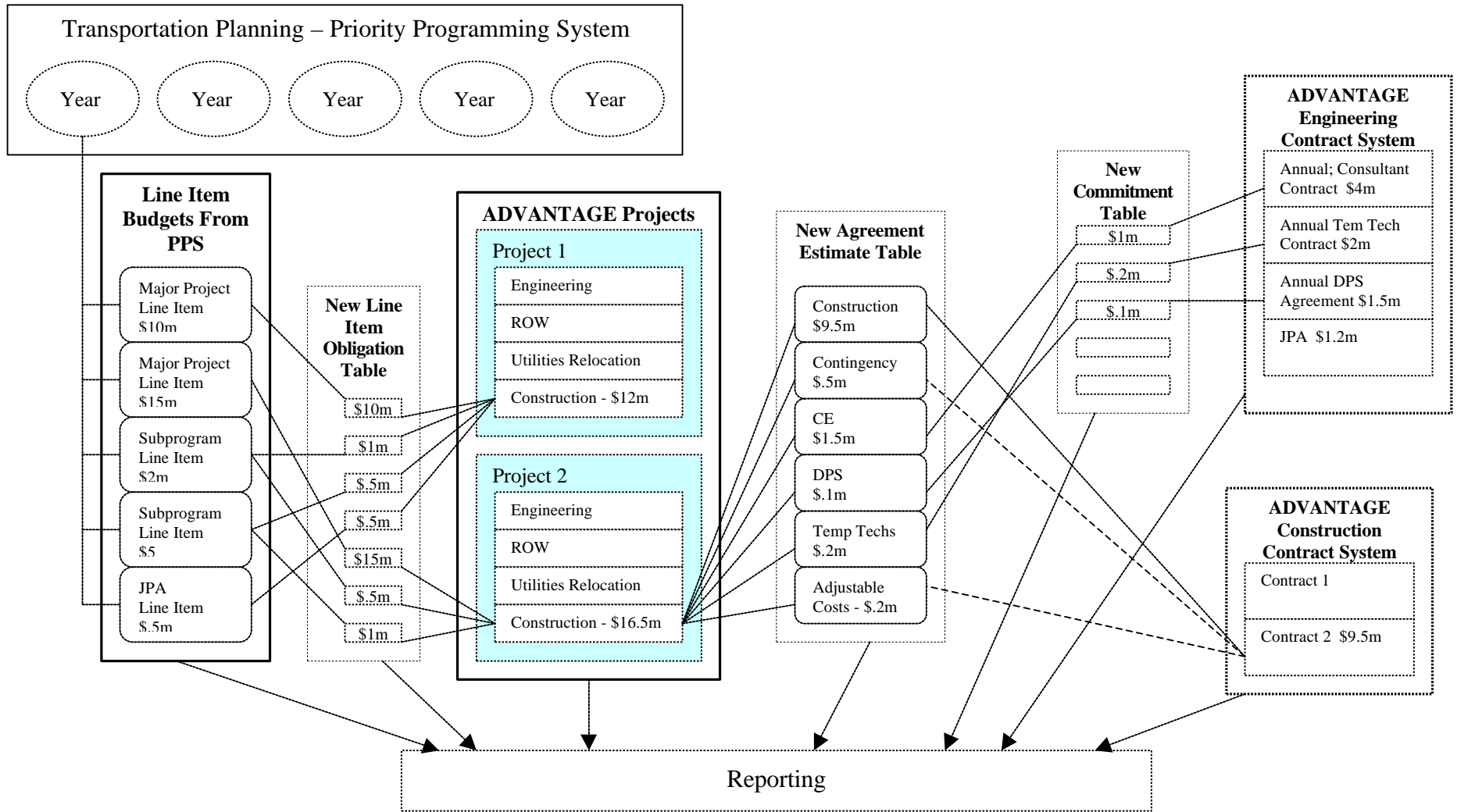
We recommend modifying ADVANTAGE to provide the additional detail to support these requirements. The changes to ADVANTAGE are detailed below in phases that relate to the requirement groups. Each phase could be implemented independent of the others to gain the benefits of some capabilities sooner. However, there could be overall economies by making all of the ADVANTAGE changes at once.

The approach would create new tables to build relationships between projects and line item budgets, identify the budget components, and to record the commitments of consultant contracts to projects. Updates to these tables will be tracked for audit trail purposes and to provide analysis of the reasons and authorization for changes.

The tables will support the analysis of budgets and commitments. ADVANTAGE transactions will need to include or infer additional information so the expenditures can be tracked by these new categories (line item, budget category, and commitment or task order). Figure 2 illustrates the system structure that would be created by adding the new tables.

Each phase is described in detail on the following pages.

Figure 2: Project Budget and Accounting Overview



Phase 1: Link Projects to Line Item Budgets

The recommended approach is to link projects to the Five-Year Transportation Facilities Construction Program (“Program”). This can be done by recording the amount for each program (or subprogram) item number that funds a project. This approach is used in the ADVANTAGE billing process. In the billing process the billing sources for the project and the amount authorized for each are identified. The total authorized amount for all billing sources must balance to the project budget. When the billing process is run, the billable expenditures are prorated to each billing source based on the percentage of the authorized amount to the project budget.

Using this approach the program item number obligation amount for each project would be established in a table. As with the billing table, the total amount of the program table would equal the project budget. Expenditures must be related to the program item number through direct coding on the expenditure transaction or through inference from other fields on the expenditure transactions. Commitments will also need to be related to the program item number to support reporting and analysis.

Access to the PPS database is needed for validation of item numbers and to monitor obligated amounts. We recommend creating a copy of the key PPS data elements in ADVANTAGE to provide for editing and validation.

Benefits

The benefits associated with linking the project to the program are:

- **Improved programming decisions** – This linkage will provide better visibility to how program moneys are spent on projects and the amount of a program item number that is committed. This information will support management decisions on committing to new projects.
- **Better program management** – The linkage of projects to the Program will also give better visibility to the status of the Program since project commitments and expenditures will be available by program item numbers.
- **Reduced effort** – Currently the effort to monitor subprogram item numbers requires a significant effort to maintain manual entry in spreadsheets. The linkage approach will provide standard and user-defined reports to monitor the subprograms, reducing the current level of effort required.

Technical Implementation Alternatives

Three alternatives have been identified for establishing the link between the Program item numbers and projects.

Create a new ADVANTAGE table – This alternative would create a new ADVANTAGE table to track the amount of a program or subprogram item number contribution to a project. The table would contain the project number (including subproject and phase), the program (or subprogram) item number and the obligation amount.

The advantage to this approach is that it uses ADVANTAGE compatible processes without directly affecting any of the standard ADVANTAGE programs. It can be tied directly to the project creation and update process.

Add program (or subprogram) item number to the ADVANTAGE billing table – This alternative would add the program item number to the current billing table. This would increase the size of the billing table for each project and cause the billing process to create additional billing transactions during each billing cycle. The billing records could be sorted and summarized to provide a total by program.

This approach directly impacts the billing process. Since this is an integral part of ADOT's revenue stream, this alternative should be carefully reviewed to ensure that there are no negative impacts on the billing process. In addition, the billing process prorates expenditure amounts for each record based on the percentage of the project budget. This approach does not provide the ability to monitor actual expenditures against the program item numbers.

Create an external table – Since the percentage calculation for connecting projects to programs will be used in external reporting processes, an external table to ADVANTAGE could be used. This table would contain the same information as the internal table and would need the same edits.

The advantage of this approach is that there is no impact on the ADVANTAGE system. The disadvantage of this approach from a user's perspective is that the user would need to switch to this maintenance table when a new project is created or there are changes to an existing project (such as a budget change).

We recommend the new ADVANTAGE table approach. This approach would meet the needs while providing minimal risk. It is also most consistent with the current project maintenance procedures and requires minimal training of staff. The current billing table supports the billing process. The new table will support the budgeting and accounting process. These are distinct views of a project's financial status and should be kept separate.

In addition, we recommend copying the PPS database to ADVANTAGE so that it is available for validation and reporting. Updates to this table would be entered into PPS and copied to the ADVANTAGE table.

Work Products

Work products that will demonstrate the completion of this phase include:

- Budget/project link table.
- PPS Table in ADVANTAGE.
- Updated training on project creation and maintenance.

Phase 2: Budgeting and tracking budget categories

We recommend identifying separate budget amounts in the system for each of the major components (construction, consultants, construction engineering, adjustable costs, contingency, and other) based on the Agreement Estimate Recap. Expenditures and commitments can then be compared to these budget dollars to monitor budget status and to identify potential problems.

Benefits

The benefits associated with updating the budget categories are:

- **Better visibility of budget status** – Better project estimating techniques and improved tracking will provide management with realistic projections of the status of a project or group of projects.
- **Improved budget estimates** – Historical tracking of the reasons for budget changes can provide a basis for better estimating.

Technical Implementation Alternatives

Budget categories will allow users to record the budget amounts in each of the budget categories identified on the Agreement Estimate Recap for construction projects. Additional categories would be defined for each phase of a project. Base processing concepts would require the categories (construction, consultants, construction engineering, adjustable costs, contingency, and other) to balance to the project budget or be the basis for computing it. The budget revision process must update the appropriate category. Technical alternatives are:

Add the categories to the ADVANTAGE project table (PRBL or SPDT) – This alternative would add the budget categories to the PRBL or SPDT screen and to the underlying project record. The advantage of this approach is that it would be an integral part of the project creation and update process. This change would require expanding the ADVANTAGE project record to accommodate the additional fields. Depending on the resolution of the original budget amount, an original and modified amount may be required for each category.

A disadvantage to this approach is that once the budget categories are established, it will be difficult to add more categories as requirements change in the future. This restriction occurs because this approach creates new fields in an existing record. New

categories would require additional fields to be created at the same programming cost as the original project.

Another restriction to this approach is limited space on the PRBL screen. A second screen may be required to accommodate the additional fields.

Create a new ADVANTAGE table for budget categories – A new ADVANTAGE table would add long-term flexibility to the budget category assignments because the budget categories would not be constrained by screen space or record size. With this approach, the users could create new budget categories without programming involvement from technical staff (unless there is a need for specific edits for the new budget category). As an ADVANTAGE table, this approach can also be an integral part of the budget creation and maintenance process.

Create an external table for budget categories – An external table would be similar to the ADVANTAGE table except that no modifications to ADVANTAGE would be required. The table would require development of a maintenance capability using non-mainframe technology such as Visual BASIC or ACCESS. The table would be easily accessed using the proposed data warehouse and reporting tools.

This approach would not provide an integrated process for project creation and maintenance. The user would need to switch from mainframe screen to the table maintenance program. As a database external to ADVANTAGE, verifications of the balance to the budget on the PRBL table may not be possible on a real-time basis.

We recommend creating a new ADVANTAGE table for budget categories. This approach has the least impact on current ADVANTAGE processes while providing an integrated approach and the capability of future expansion.

Work Products

Work products that will demonstrate the completion of this project include:

- Updated project budget creation and processes, including identifying and estimating the budget categories.
- System features to support tracking of budget and expenditures by category.

Phase 3: Track Budget Commitments

We recommend establishing a systematic process to report the commitments to a project. This project will define processes and reports to improve the project commitment information available to project managers using the construction contract and consultant contract task orders. It will explore ways to record commitments for temporary technicians and other contracts so that a project manager can see a complete picture of the project commitments.

The project will assess the impact of including or excluding ADOT staff in the commitment calculations. A portion of the project's budget includes ADOT staff participation. Staff time is charged to a particular project as they work; therefore there is accurate tracking of the staff expenditures. The project will determine whether there is an effective way to record the estimated staff costs as an obligation and reduce the committed amount as time is charged.

Benefits

The benefits associated with tracking budget obligations are:

- **Better budgetary control** – Reporting commitment information for a project along with the amount expended to date will provide better control of budgets. It will identify potential budget issues with a project early on, so that management can take proactive steps to resolve them.
- **Better management information** – Understanding project commitments will show how the project budget has been allocated and whether that is consistent with the planned expenditures. Balance for each type of commitment will also provide information on how contractor and consultant resources are paid for their work on the project.

Technical Implementation Alternatives

These alternatives address improvements to the commitment tracking capabilities including tracking obligations for JPAs, temporary technicians, other Arizona organizations and ADOT staff.

In ADVANTAGE – Commitments for consultant and construction contracts are already tracked in ADVANTAGE. This approach would enhance the ADVANTAGE capabilities to include the additional commitment categories. The task order capability in the consultant contract subsystem could provide commitment information for temporary technicians, JPAs, and other Arizona departments. Tracking of ADOT staff commitments to a project would be done in ADVANTAGE but needs further study to determine the benefit/cost and approach for this information.

New Commitment Table – This approach would create a new commitment table in ADVANTAGE to link the consultant contracts to the budget category table. The new table and associated processes would include the needed data to track changes to the commitment.

External to ADVANTAGE – This approach would use systems outside of ADVANTAGE to track commitment information that is not already available. This approach would allow ADOT to develop specific processes for each commitment type instead of being constrained by current processes. Implementation of this approach would require development of a database, screens and reports to support the processes. The database would need to be tied to ADVANTAGE data to be certain of data consistency.

We recommend using the existing ADVANTAGE capabilities to the greatest extent possible to meet the commitment tracking needs. However, it is unclear whether the task order table can be modified to meet the processing and reporting requirements. We recommend that a new commitment table be created to document the relationships between the consultant contracts and the budget categories.

Work Products

Work products that will demonstrate the completion of this phase include:

- Resolution of whether to include ADOT staff in the commitment process and a method of implementing this if it is determined to be cost effective.
- Implementation of commitment tracking in ADVANTAGE for engineering consultant contracts, temporary technicians, JPAs, and other organizations.

Phase 4: Track Budget Adjustments

Change orders to projects and contracts are not systematically tracked in the ADOT systems. Currently there is a Supplemental Agreement Task Force reviewing the requirements and system alternatives for tracking supplemental agreements to contracts. Their scope does not appear to address all of the requirements stated above for tracking budget adjustments.

This phase focuses on improvements to ADVANTAGE enhance the information related to budget changes. We recommend that ADOT look at procedural and system alternatives beyond those addressed by the task force to create an integrated system for tracking changes to contracts and projects. The approach to this integrated approach is documented in the Other Recommendations section.

The approach for tracking and reporting changes to the program and project include:

- Use the budget change information currently tracked in PPS to report changes to the program and subprogram item number budgets. This currently represents changes authorized by the Transportation Board.
- Add a log and update processes to track changes to the Program Item Number Obligation, Budget Category, and Commitment tables. This information should document at a minimum the amount of the change, the reason, the date, who authorized it, and who entered it.
- Include original amount and changes in the design of the Program Item Number Obligation, Budget Category, and Commitment tables.
- Clearly define the basis for original budget amount and the system source for this amount (PPS, ADVANTAGE PRBL, Budget Category table).

Benefits

The benefits associated with updating the budgeting process are:

- **Better visibility of budget status** – Better project estimating techniques and improved tracking will provide management with realistic projections of the status of a project or group of projects.
- **Improved budget estimates** – Historical tracking of the reasons for budget changes can provide a basis for better estimating.
- **Accountability for budget changes** – The rigorous tracking of changes to the project budget provides a picture of who in the organization should be accountable for the changes. This management information can be used to identify improvements in project planning, estimating, and management.

Technical Implementation Alternatives

The following technical alternatives were identified for tracking budget adjustments:

Develop Change Tracking with New Tables – This approach would include information to track changes in the Program Item Number Obligation, Budget Category, and Commitment table update processes. This information at a minimum would include the amount of the change, the reason, the date, who authorized it, and who entered it.

Modify ADVANTAGE PRBL Screen – In early discussions, we envisioned changing the ADVANTAGE PRBL screen to record additional information related to changes.

We recommend implementing the change information as the new tables are developed. By linking the changes to the new tables, the modifications to the ADVANTAGE table can be avoided and additional information related to the impact of the change can be tracked.

Work Products

Work products that will demonstrate the completion of this phase include:

- Updated project budget creation and processes, including identifying and estimating the budget categories.
- System features to support tracking of budget categories.
- Procedures and system processes to track changes to program item numbers and to project budgets.

Organizational Impact

Implementing the link of projects to program item number budgets, budget categories, and commitment tracking will require additional forms to be completed by project managers. This additional data will need to be entered into the system by Finance staff. Tracking changes to these tables as they occur throughout the project will also have an impact on workload.

Reporting against the program item number budgets and budget categories requires that the commitments be coded to include the budget item number and that expenditures be coded to include reference to the budget item number or the commitment that is already linked. This will change the way these documents are processed and will increase the volume of transactions and the related workload.

Training Requirements

These changes will impact the way that ADOT does business. Training will be needed for project managers, district personnel, and Finance staff to introduce the new forms and procedures. Training will be needed for the following topics:

- **Linking the projects and programs** – The training should include how to set up and modify the project/program relationships and how to use this information in reporting.
- **Tracking of changes to the program and project budgets** – This training should include participants in the budget process but may include other management and staff impacted by the change tracking processes.
- **Processing Commitments** – This training should introduce the revisions for the temporary technicians, JPAs, and the participation of other departments on ADOT projects.

These training materials should be incorporated into the training program developed in the *Financial Training* project.

PROJECT 2: BUDGET AND FINANCIAL REPORTING

Overview

This project addresses the requirements related to budget and financial reporting. The requirements fall into the following categories:

- Changes to ADVANTAGE reports.
- Budget reports.
- Reporting support.

- Reporting capabilities.
- Data structures.
- Data elements.

Changes to ADVANTAGE reports

ADVANTAGE produces a number of standard reports. The results of our user survey and interviews indicated that most users that actually used the standard reports were satisfied. Few had specific suggestions for improving them. This section addresses opportunities to improve ADVANTAGE reports.

The Project Detailed Transaction Report (CA100560-1) provides a detail of transactions for a project. Various kinds of transactions are included on the report including payment voucher (PV) transactions. A subtotal of contractor and consultant payments for payment voucher transactions would make the transactions charged to the project easier to review.

When users request a report from ADVANTAGE, they receive additional paper with job statistics and control information. This additional paper is wasteful and a frustration to users as they look for the report information they requested. This project includes a method to eliminate this unwanted paper unless it is needed to resolve a system problem.

Some users found it difficult to access standard reports. Not all users have access to ADVANTAGE to request reports but each district office has a report coordinator.

A related issue is where and how to print reports when they are requested. Mainframe reports currently print on selected printers including those at district offices. Users would prefer to print reports on local printers attached to the PC or to the network.

In addition, many standard ADVANTAGE reports contain cryptic codes with no titles or descriptions. Titles are needed on these reports to improve their usability. The specific reports have not been identified.

The following requirements illustrate the need for these improvements to ADVANTAGE reporting.

- **Requirement 50: Report CA100560-1: Project Detailed Transaction Report** – ADOT needs the ability to see subtotals of contractor and consultant payments for payment voucher (PV) transactions on this report.
- **Requirement 54: User-friendly Reports** – ADOT needs to reduce paper produced with ADVANTAGE reports. Currently printed reports from ADVANTAGE have significant additional paper with Job Control Language (JCL), and other processing information. Users need to dig through this extra

paper to find relevant information. The reports also need descriptive titles to be printed in addition to cryptic codes.

- **Requirement 57: Access to Standard Reports** – ADOT needs easy access to reports by all managers who desire it. The ADVANTAGE online report request capability is available to central, district, and field offices. Each field office should have an ADVANTAGE coordinator that is responsible for requesting and distributing reports. ADOT needs clarification and training on what reports are available and how to request them.
- **Requirement 60: Print Routing** – The users need the ability to print requested reports to their common printer, which may be a network printer or a local printer attached to their PC.

Requirements Related to Budget Reports

The project underway report and exception reports represent specific budget reporting needs identified in the requirements.

The Project Underway Report is currently very labor intensive to prepare. The purpose of the report is to document the progress of projects at year-end and to identify the available budget balance to be carried forward into the new fiscal year. Most of the needed data is available in ADVANTAGE but is not available in the form needed to prepare the report. Some of the information requires access to other ADOT financial systems. As a result, the information is manually assembled in various spreadsheets and then formatted to create the report. This project will define a new process for creating this report by accessing and combining the electronic data that is available.

ADVANTAGE contains significant financial information for ADOT's projects. Many standard reports provide detail on the status of these projects. What managers need are exception reports to monitor projects quickly and to identify potential problems. Examples of the kinds of exception reports needed are:

- Projects or contracts with expenditures nearing the budget amount.
- Projects or contracts that have exceeded their budgets by a certain percentage.
- Completed projects or contracts compared to the bid amounts by funding category.

The requirements below demonstrate the need for these new reports.

- **Requirement 51: Projects Underway Report** – Develop an automated method to create the Project Underway Report, including direct access to ADVANTAGE data and the other databases that supply the information. Currently this report is very labor intensive to prepare.

- **Requirement 52: Exception Reports** – ADOT needs management exception reports to monitor projects. For example, projects or contracts nearing budget, comparison reports of completed projects or contracts by funding category compared to bid amounts, projects or contracts that have exceeded their budgets by a certain percentage.

Reporting Support

We discovered in the ADOT internal survey that many users were not aware of which standard reports were available. There is also inadequate support for INFAACS standard reports and custom reports. The requirement below illustrates the need to provide additional support for ADVANTAGE, INFAACS, and other reporting sources and tools available to ADOT users.

- **Requirement 61: Reporting Support** – Central support on accessing ADVANTAGE and other data is needed to support managers and staff who may not routinely create reports or queries or who need information they have not accessed in the past.

Requirements Related to Reporting Capabilities

This section focuses on ADOT's many unfulfilled reporting needs. The requirements identified categories that require new ways to extract, sort, summarize, and analyze project budgeting and accounting information. In some cases, additional data will be needed to support the reporting requirements. In most cases, they can be met by providing new ways to access current data in ADVANTAGE or related financial systems. The requirements below illustrate the need for additional reporting capabilities for budget and financial information.

- **Requirement 20: RAAC Information** – ADOT needs sort and selection capabilities to meet the RAAC reporting requirements including presenting project information by geographic area. ADOT needs to define budget (including subprograms), obligation, and expenditure categories for reporting to RAAC. RAAC information is presented in very broad categories making it difficult to determine the purpose of the expenditure.
- **Requirement 25: FHWA Reporting** – ADOT needs to meet FHWA reporting requirements. Specific data requirements have not been defined.
- **Requirement 26: Cash Flow Forecasting** – Project budget and expenditure data needs to be available to the cash forecasting systems. Payment information needs to be reported in the month that the payment is actually made. Presently all cash flow information is taken from the general ledger. Since ADVANTAGE does not provide general ledger control accounts for reconciliation to the project expenditures, the cash forecasting may not accurately reflect project status.

- **Requirement 49: Reports by Project-To-Date and by Fiscal Period** – ADOT needs the ability to select and report project budget and accounting information both as project-to-date and for the current or a selected accounting period.
- **Requirement 53: Flexible Reporting** – Provide project budget, obligations, and expenditure information with flexible selection, sorting, and summarization to report project financial information by county, resource code, route, Council of Governments/Metropolitan Planning Organization (COG/MPO), funding category, type of work, phase, etc. Provide the ability to monitor and report the status of each funding source as it relates to the project budget.
- **Requirement 55: Management Reports** – ADOT needs to create reports to present information for management. For example, create budget-monitoring reports by program category in a management format. Also need reports that show multiple item numbers (budget item number from the five-year program) for a project and the proportion funded by each line item. ADOT needs to work with district engineers, resident engineers, and project managers to define specific reporting requirements.
- **Requirement 56: User Specific Reports** – ADOT needs reports that reflect the specific information requirements of the users. Accounting needs project financial information presented in a way to support analysis of project budgets and expenditures. Project managers need the same data presented with different extracts, sorts, and summaries to support their analysis of project status.

Requirements Related to Reporting Tools

Reporting tools provide user-friendly capabilities to access data and flexibility in the presentation of budget and financial information. ADOT has a significant need for the ability to provide flexible, accurate, and timely standard and user-defined reports. The specific requirements below illustrate ADOT’s need for reporting tools and databases to support to access project budget and accounting information in a variety of ways.

- **Requirement 58: Historical Information** – ADOT needs access to historical information related to projects to perform analysis. This includes tools and access methods to allow searches, selections, and comparisons by various criteria (road segment, district, or other location criteria, project size, funding sources, etc.). Some of this information is currently available in INFACCS, but is not easily accessed.
- **Requirement 59: Online Access to Information** – ADOT needs online access to current and historical project information for reporting and analysis. This includes access to summary and detail information.

- **Requirement 62: INFACCS** – This database provides good project accounting and budgeting information reflecting the results of ADVANTAGE processes. The data is accessible for *ad hoc* reports for those that understand the INFACCS database and the available reporting tools (SQL, ACCESS). Potential improvements to this system include restructuring the database to make it easier to understand and access, creating additional access keys for selection and summarization, and tying it to other financial information such as the planning databases used by Transportation Planning to develop the program.
- **Requirement 63: Analytical Tools and Access** – ADOT maintains a great deal of data. Managers and staff need tools to provide them the ability to access, aggregate, merge, or otherwise analyze this data. Managers need analytical tools and access to current and historical data.
- **Requirement 64: Reporting Efficiency** – ADOT needs reporting tools and access to data to more efficiently produce key reports. For example, the Projects Underway Report requires a significant amount of manual effort to prepare.
- **Requirement 65: Flexible Reporting** – ADOT needs the capability and data to support analysis to answer questions as they are asked. For example, the ability to identify all the projects in a specific area over a specified dollar amount.
- **Requirement 66: Web-based Access** – ADOT needs the ability for ADOT and State staff, the public and other stakeholders to easily access project information. Web-based access is a potential solution. It allows users to access information without special software (using a Web browser) while providing secure access levels to appropriate users.

Requirements Related to Data Management

Data management involves identifying ways to collect and store information so that it is reliable, consistent, and easily accessed.

ADOT has a number of mission critical systems that provide specific functionality for the organization. The data in a particular system may be correct for that system, but be inconsistent with similar figures in another system. The timing differences of cutoffs in systems also create difficulty in reconciling between the databases. Consistent data across the financial systems is needed to improve the accuracy and consistency of reporting project budgets and costs.

There are currently a number of databases with redundant project information. None of them contain all of the information needed to manage the Highway Construction Program budget. Creating a single database or connected databases will simplify reporting and research as well as provide a better basis to manage the program.

Various ADOT systems contain a wealth of project financial information. There are many “personal” systems and databases because the needed data either is not available or is not trusted. Clear definitions of data ownership, authority, and responsibility can reduce duplication, redundancy, and side-systems.

The many ADOT systems are currently functionally segregated. For example, both FAST and ADVANTAGE contain information related to contractor payments. Information such as contractor retainage and security deposits is available to one system but not the other. Other systems or functions that need to be integrated with project information include the Transportation Planning database, cash flow forecasting, and project scheduling.

With personal databases and spreadsheets, the data is not always accessible by those who need it. A common database for budget monitoring data will allow access as needed by managers and staff.

The specific requirements below illustrate the need for a data management strategy and documentation.

- **Requirement 68: Consistent Data Across Applications and Databases** – ADOT needs consistent data across the financial systems to accurately report project budgets and costs. Even ADVANTAGE appears to provide different values from different tables. Cutoffs of information in different systems create timing differences, which are difficult to reconcile between the databases.
- **Requirement 69: Coordinated Data** – ADOT needs to contain all of the data to manage the Highway Construction Program budget in a single database or in connected databases. There are currently a number of databases with redundant project information, but none of them contain all of the information needed to manage the HCP budget.
- **Requirement 70: Data Ownership** – ADOT needs to define who tracks each type of information in the systems. Clear definition data ownership, authority and responsibility can reduce duplication, redundancy, and side-systems.
- **Requirement 71: Integrate Systems** – ADOT needs to integrate system functions. Systems are currently functionally segregated. For example, both FAST and ADVANTAGE contain information related to contractor payments. Information such as contractor retainage and security deposits is available to one system but not the other. This information should be in a single system but be accessible by other systems that need it. Other systems or functions that need to be integrated with project information include the Transportation Planning database, cash flow forecasting, and project scheduling.

- **Requirement 72: Shared Access** – ADOT needs to keep budget monitoring data in a shared database so it can be accessed as needed by staff. Currently, much of this data is stored in Excel, which limits multiple access to the same file except in read-only mode.

Requirements Related to Data Elements

This section addresses new types of data or specific data items that are needed to support selection, summarization, and analysis of project financial information and to support other reporting needs. The requirements below identify types of data and specific data elements that are needed to enhance ADOT’s reporting project capabilities and information.

- **Requirement 17: Asset Management** – ADOT needs to define and store project information consistent with the requirements for the Asset Management and Data Warehouse projects that are currently in process.
- **Requirement 18: Project Characteristics** – ADOT needs documentation of project characteristics to support production of the State Highway Log.
- **Requirement 19: Lane Miles** – There are multiple definitions of lane miles. All of them are correct in the right context. ADOT needs to understand which definition to use from the project standpoint.
- **Requirement 21: Type of Work Description** – ADOT needs consistent rules and values for type of work descriptions to allow selection, summarization, and analysis.
- **Requirement 22: Project Establish Date** – ADOT needs a date to indicate when the project record was created on the system.
- **Requirement 23: Authorization Dates** – ADOT needs a separate date to indicate when the project budget was authorized at the state level. There currently is a single authorization date for all projects, which creates a conflict when the project has federal aid, because the federal authorization date may be different than the state authorization date.
- **Requirement 28: Route Identification** – Some projects (particularly design and right-of-way) may be programmed containing multiple routes. ADOT needs to evaluate the cost/benefit for Development to have projects identified by a single route rather than possible multiple routes.

Recommended Approach

We recommend a multi-phased approach to meeting the ADOT reporting requirements. The approach is based on using ADVANTAGE capabilities to the extent possible. New data items should be entered and stored consistent with where and how the

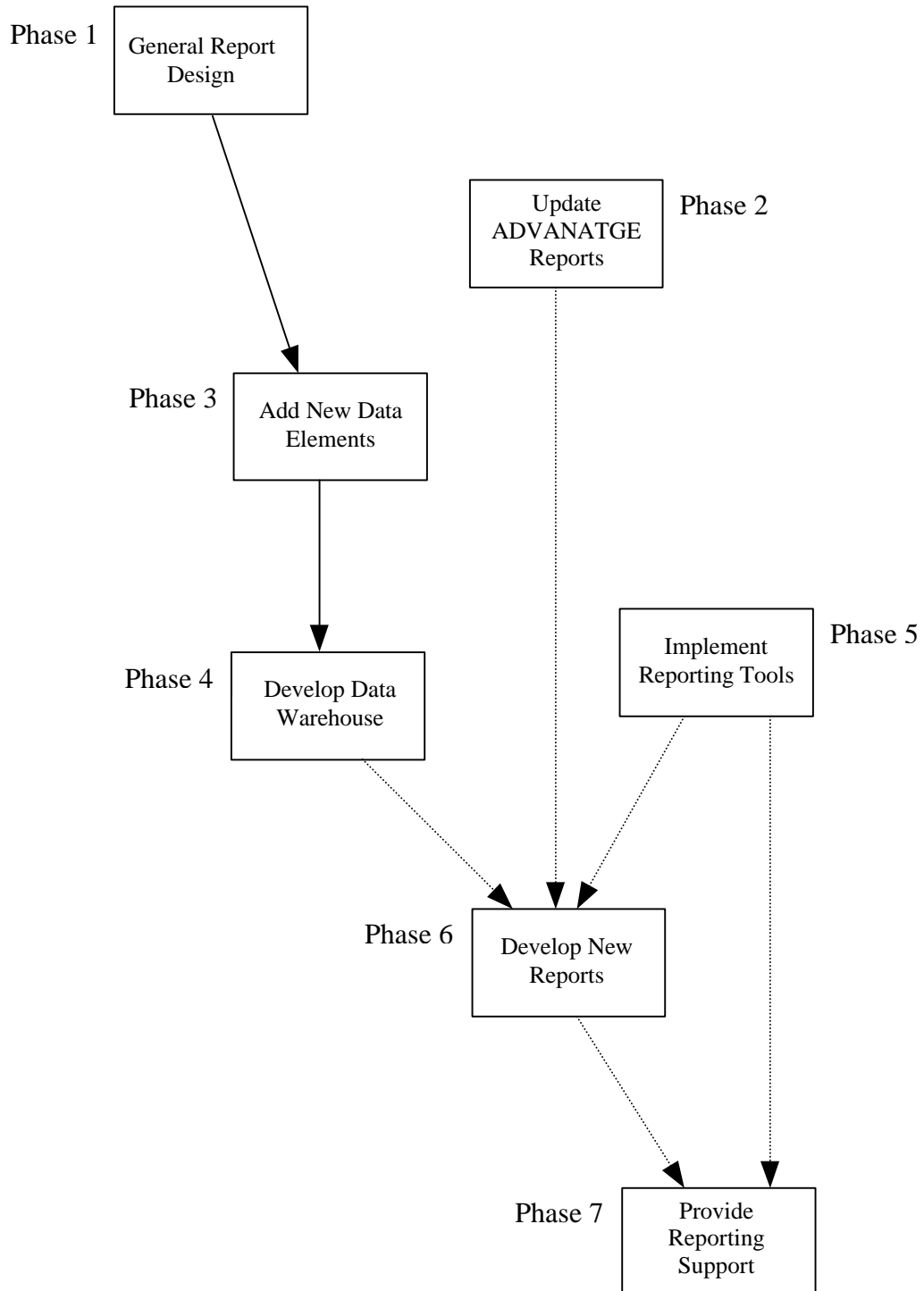
data is collected, such on the project initialization or update process. We also recommend the use of a data warehouse to store data from ADVANTAGE and other ADOT systems so the data can be integrated for reporting. The key recommendations for reporting are summarized below:

- **Develop detail reporting specifications** – Specifications for reports would focus on the kinds of sorts and selections that are needed and anticipated for both standard and user-specific reports and the sources of data to support those reports. This analysis will support the design of the data warehouse and the requirements for reporting tools.
- **Update ADVANTAGE reports** – We recommend developing detailed specifications for the ADVANTAGE reports and processes to be modified. The detail specifications will prioritize the reports to which titles and descriptions will be added. We recommend implementing changes to the high priority reports first. The changes to ADVANTAGE reports should also address the report access and printing needs of ADOT users.
- **Add new data elements to ADVANTAGE** – Detailed specifications should be developed for the new data element to be added to ADVANTAGE to support the reporting needs. The detail specifications will identify field sizes, screen specifications, edit and validation rules, and the source of the data. The changes to ADVANTAGE can then be implemented.
- **Develop a data warehouse** – We recommend a data warehouse to provide flexible and integrated data for the ADOT reports. The design of the data warehouse should be based on the reporting specifications and the data element definitions from above. The actual data warehouse can be implemented in stages to support high priority reporting needs first.
- **Implement reporting tools** – We recommend implementing new reporting tools to facilitate the creation of standard and user-defined reports.
- **Develop new standard reports** – We recommend developing new standard reports, including the projects underway report and the budget exception reports using the data warehouse and the reporting tools. Detailed specification including report layouts, data elements, and calculations should be defined in the detail specifications. The standard reports should be designed with selection parameters to allow users to select the information relevant to their inquiry. Reports should be prioritized and implemented according to priority.
- **Provide support for report users** – In order for ADOT to experience the maximum realization of the reporting investment, we recommend user-oriented documentation of the data warehouse, standard reports, report templates, and reporting tools. We also recommend a user support

organization to provide individualized help to less experienced report users and to address more complex reporting requirements.

Figure 3 illustrates the recommended approach for meeting the ADOT reporting requirements.

Figure 3: Recommended Approach for ADOT Reporting



Phase 1: Reports General Design

We recommend first identifying the types and sources of data needed to support the reporting requirements. The reporting analysis will not design specific reports. It will define the kinds of data, selection criteria, summarization, and analysis that are needed to support the reporting requirements for a particular kind of report (i.e., RAAC, FHWA, projects underway, management, exception). From this analysis, the team will identify where the data can be obtained and what new kinds of data are needed to support the reporting requirements. Implementing a data glossary as recommended in Other Recommendations: Data Management would provide a key resource for this effort. For new data elements, the team will need to determine where to get the data, coding rules, responsibility, and where to store it.

Based on the data analysis, the team will design structures to store the needed data so that it is accessible for reporting and analysis. This process includes creating a data model for the reporting databases and documenting the data elements in the data glossary.

Along with this detailed analysis there should be a cost justification for new reporting capabilities. Reporting requirements should be prioritized so that those with the highest payback can be addressed first.

This analysis will support the design of the data warehouse and the requirements for reporting tools.

Benefits

The benefit associated with the report general design and data analysis is:

- **Efficient Implementation of System Changes** – Understanding the data elements needed to support the various reports will allow them to be added to the appropriate system as a single effort. This will provide a more efficient implementation process and reduce the effort for changing forms and educating users.

Technical Implementation Alternatives

No technical alternatives were identified for this phase.

Work Products

Work products that will demonstrate that this project has been implemented successfully include:

- Identification of specific budget and financial reports needed.
- General design of reports by category.

- Cost justification for reports.
- Prioritization of reports based on cost justification.
- Data model supporting the report general design.

Phase 2: Change ADVANTAGE Reports

The recommended approach for each of the reporting categories varies. Detail specifications are needed for modified reports. Technical staff should develop the detail specifications with input, review and approval from the users of the reports. The specific approach for each category is presented below.

Report CA100560-1 – This requirement can be met by changing the standard report to generate the additional total. This change will require adding an indicator to the report's sort key to identify consultant and contractor voucher payments. An additional total will be printed when the value of the new indicator changes. This report also needs titles added to describe the codes on the report.

Add descriptions of codes to reports – The first step is to identify the specific reports to which titles or descriptions of codes should be added. The list should be prioritized based on usage of the reports and the risk that the report data will be misunderstood or misinterpreted without the titles. An assessment should be made for each report to determine if it should continue to be produced from ADVANTAGE or whether it would be more cost effective to create a new report from the data warehouse. ADVANTAGE reports should then be updated in groups based on the priority and available resources.

Reduction of Paper on Standard Reports – This requirement addresses the way ADVANTAGE reports are produced on the mainframe. The solution to this is to not print the extraneous information related to job processing statistics and control information for the run. This information may be needed to diagnose a problem running the report, but is not needed when the report runs successfully.

Many IT organizations identify a specific printer class for the processing statistics and control information. This information is typically held in the mainframe computer for a specified period (usually one to three days) and is not printed unless the analyst needs it to diagnose a problem. The user only sees the requested report saving significant paper and printer time and eliminating the need to dig through the run statistics to find the requested report.

Access to ADVANTAGE reports – Additional users that need access to the ADVANTAGE report request capability should be granted access and trained to access the standard reports. We recommend that additional training be given to the report coordinators to assure that they have the skills and knowledge to support the users in the field.

Printing Options – A technical issue related to ADVANTAGE reporting is how and where to print standard reports. Currently ADVANTAGE reports are routed to mainframe printers or printers at district offices. Users would prefer to print requested reports to their common printer, which may be a network printer or a local printer attached to their PC. We recommend conducting research to determine if there are hardware or software options supported by the State that will allow mainframe reports to print on the user’s local printer.

Benefits

The benefits associated with these modified reports and processes are:

- **Greater usability of report information** – Addition of the new totals to the Project Detailed Transaction Report will improve the report information for users and eliminate the need to manually calculate totals.
- **Improved understanding of report information** – The descriptions of cryptic codes and other descriptive information on standard reports will improve the user’s understanding of the data and reduce the need to research cryptic codes.
- **Less paper produced** – A simple change to the production of standard reports will produce significant savings in paper usage and printer time.
- **Efficient printing of requested reports** – The ability to print standard reports at the user’s selected printer will reduce the time needed to retrieve reports and encourage users to request reports from the ADVANTAGE data to meet their information needs.
- **Better access to project budget and financial information** – Improving the access for requesting reports will make the ADVANTAGE information available to a greater population and reduce the need to obtain the reports through a secondary source.

Technical Implementation Alternatives

No technical alternatives were identified for this phase.

Work Products

Work products that will demonstrate that this project has been implemented successfully include:

- A revised project detail transaction report.
- Titles and descriptions added to key ADVANTAGE reports.

- Reduced paper output for ADVANTAGE standard reports.
- New print routing capabilities for ADVANTAGE reports.
- New users with ADVANTAGE report request capability.

Phase 3: Add Data Elements

We recommend that new data elements related to reporting project financial information be stored in the system or database close to and consistent with the source of data. For example, new data elements that relate to projects should be stored on the ADVANTAGE PRBL or SPDT table and be maintained by the same forms and screens used to maintain the PRBL or SPDT data. We also recommend a data warehouse and user-oriented reporting tools to access the data.

This phase will assess the best method to collect, store, and maintain new information and implementing the new data elements in ADVANTAGE (or other systems or databases).

Benefits

The benefits associated with creation of the new data elements are:

- **Flexible Reporting** – The new data elements in the system will provide flexible selection, sorting, and summarization of budget and financial information.
- **Consistent Data** – Capturing reporting data elements centrally in the ADOT financial systems will provide a consistent source for financial information.
- **Improved Reporting Quality** – Clear definition of new data elements, rules, and validations will improve the understanding of the data by users, resulting in higher quality reports.

Technical Implementation Alternatives

These technical alternatives relate to the specific new data elements identified in the requirements including project characteristics, lane miles, route identification, established date, and authorization dates. These data elements provide additional ways to select and sort project information. In addition, there may be additional data elements required to support other reporting requirements defined elsewhere in this report (for example RAAC reports in the Reporting Tools project). Alternatives for storing these data elements are:

Update ADVANTAGE with new data elements – This alternative would incorporate these data elements into the ADVANTAGE PRBL or SPDT table as an

integral part of the project maintenance process. It would require modifying the ADVANTAGE PRBL or SPDT screen and the project record layout to accommodate the additional fields. The data elements would be downloaded to the INFAACS database and to the data warehouse for reporting.

Note that the PRBL screen has limited available space, so a companion screen may be needed to accommodate the new fields.

Incorporate new data elements into another system – This approach would identify another ADOT system suitable for storing these fields and populating the data warehouse. Most systems use the ADVANTAGE project information as their source (most systems copy it from the INFAACS project table). This alternative would be inconsistent with the current practice.

Create new data elements in a database external to ADVANTAGE – This approach would create a database separate from the ADVANTAGE system to store and maintain data elements that are new to ADVANTAGE. The upside to this approach is that no changes would be needed in ADVANTAGE. The table could be easily accessed using the proposed data warehouse and reporting tools.

This approach could not provide an integrated process for project creation and maintenance. The user would need to switch from mainframe screen to the table maintenance program. This approach would also create a risk that the separate database could become inconsistent with the ADVANTAGE data.

We recommend creating all new data elements related to projects in ADVANTAGE. This approach is consistent with the current project maintenance procedures and requires minimal training of staff.

Work Products

Work products that will demonstrate the completion of this project include:

- Data definition for new data elements.
- New data elements to support selection, sorting, summarization, and analysis of project financial information.
- Processes for adding and maintaining new data elements.

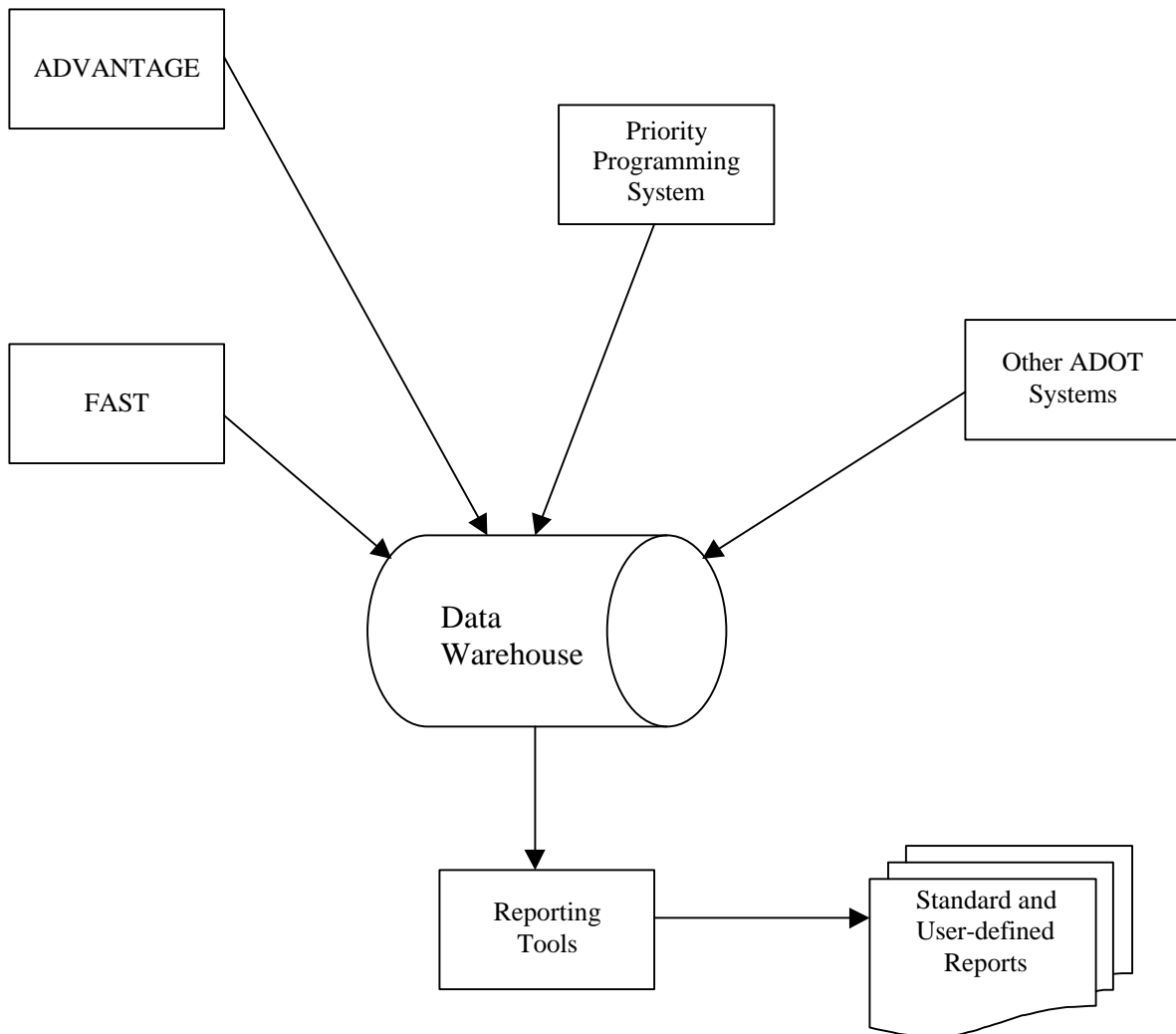
Phase 4: Develop Data Warehouse

We recommend a data warehouse to provide flexible and integrated data for the ADOT reports. The design of the data warehouse should be based on the reporting specifications and the data element definitions from above. The actual data warehouse can be implemented in stages to support high priority reporting needs first.

A data warehouse is a collection of data from various systems. The data in the data warehouse is restructured from the source system to provide flexible selection, sorting, and summarization of the data and to target specific reporting requirements. The data warehouse is typically made up of data marts, which are specialized views of the data meeting a particular reporting need. In this example, data marts might be established for ADVANTAGE budget data, expenditure data, commitment data, fixed asset data and PPS data. A common key would link the data marts so that the information from the different data marts can be combined as needed for reports.

Figure 4: Data Warehouse illustrates how the data warehouse relates to current ADOT systems.

Figure 4: Data Warehouse



Benefits

The benefits associated with the data warehouse are:

- **Efficient user reporting** – The data warehouse presents the opportunity to store and connect data from the different systems so that users can identify and select needed information for reports. This will enhance the efficiency of users generating reports and provide better reports and analysis for management decisions.
- **Improved productivity** – Storing all financial information in the data warehouse will allow multiple users to access the data as they need it. This capability will improve productivity and reduce frustration.
- **Effective data integration** – The data warehouse will provide the opportunity to associate project budgeting and accounting data from ADVANTAGE with data from other systems and databases such as PPS and FAST.
- **Improved user productivity and satisfaction** – The data warehouse will provide access to data to allow users to create reports that meet their specific reporting requirements rather than relying on standard reports that do not have the right totals or do not contain all of the needed information. This will increase employee productivity and satisfaction with the reporting process. The reporting information will not require technical sophistication to produce meaningful reports.

Technical Implementation Alternatives

Alternatives for building the reporting data structure include:

INFAACS – The INFAACS database provides good project accounting and budgeting information reflecting the results of ADVANTAGE processes. The data is accessible for *ad hoc* reports for those that understand the INFACCS database and the available reporting tools (SQL, ACCESS). The data is a copy of the ADVANTAGE files. It does not have all of the keys needed for selection, summarization and analysis of available financial information. In addition, it does not have the information to tie it to other financial information such as the planning databases used by Transportation Planning to develop the program.

This database requires internal knowledge of ADVANTAGE files to be used effectively by reporting users.

Data warehouse – The data warehouse provides a copy of key reporting and analytical data in a compatible form. The data is a copy of production data from the ADVANTAGE system and other financial applications. ADOT currently has a data warehouse project underway focused on asset management. This approach would add financial data to the data warehouse. The result would be a common structure that allows

users to include related data from different sources on reports. It would provide clear definition of the data contents and structures through the data glossary if the *Data Management* project is completed.

We recommend the data warehouse approach for building the reporting data structures. Building on the current data warehouse experience will allow ADOT to provide the needed financial information by leveraging the experience from the current project.

Work Products

Work products that will demonstrate that this phase has been implemented successfully include:

- Data warehouse for project budget and financial reporting data.
- Documentation of data structures and access methods to use and relate data from multiple financial sources within ADOT.

Phase 5: Reporting Tools

Once the data is structured, the users need to be able to access it. We recommend that existing reporting tools and user reporting capabilities and needs be assessed and that new reporting tools be identified and implemented to meet the users reporting needs and technical capabilities. The reporting tools selected should recognize that users have differing levels of need and technical expertise.

Benefits

The benefits associated with reporting tools are:

- **Efficient reporting** – The reporting tools will provide for flexible selection, sorting, summarization and analysis to improve the quality and timeliness of financial information for management decisions.
- **Improved user productivity and satisfaction** – The reporting tools will provide the capability for users to create reports that meet their specific reporting requirements rather than relying on standard reports that do not have the right totals or do not contain all of the needed information. This will increase employee productivity and satisfaction with the reporting process. The reporting information will not require technical sophistication to produce meaningful reports.

Technical Implementation Alternatives

The technical implementation alternatives for reporting tools include:

Standard MS SQL, MS ACCESS, and MS Excel – Currently ADOT's databases are accessed using standard Microsoft technology including MS SQL, MS ACCESS, and MS Excel. While these tools are adequate and useful, they require a certain degree of technical knowledge and an understanding of the structures to be effective. Most users have Excel but few have the technical knowledge to link it to a database. SQL and ACCESS require the user to have the product installed on his or her PC. As a result, the use of INFAACS and other ADOT databases is somewhat limited.

Reporting packages – Reporting packages such as Crystal and COGNOS claim to provide user oriented reporting capabilities. Some reporting packages require more technical expertise than others. Power users will be able to develop reports using these packages while other less technical users will require sample reports and templates to help them. These packages provide some flexibility in formatting so users can prepare graphs and other pictorial representations of the data.

Pricing for these products is typically based on the number of users having the software installed on their computers or having concurrent access to the database. They typically require each user to have software installed on his or her PC.

Web-based access – Web-based report writers provide similar functionality to the reporting packages but can be used via a Web browser such as Microsoft Explorer or Netscape. These do not require special software to be loaded on the individual's PC. This technology can also be used to allow public access to selected ADOT data. The Web-based approach may require a larger initial investment to provide the servers, security, and implementation support, but this approach would make the reporting capabilities available to the widest population of ADOT employees.

We recommend selecting a commercial reporting tool that also has a Web capability. The specific capabilities of the tool should match the reporting needs and capabilities of the reporting community. It is possible that more than one tool will be needed. Some users with complex analytical needs and a more sophisticated technical ability may prefer a different tool than a manager who needs to quickly access summary information. The implementation plan should include templates and sample reports to help users to develop reports and queries.

Work Products

Work products that will demonstrate the completion of this project include:

- Reporting tools that support different levels of user technical expertise, and flexible reporting formats.
- Training program for data access and reporting tools.

Phase 6: Develop New Standard Reports

We recommend using the data warehouse and the reporting tools to support new reporting requirements. This phase implements the reports identified in the Reports General Design phase. Each report will require a detail design to specify the report format, page size, columns, titles, sorts, selection options, total breaks and the source of the data. Any special calculations or charts would also be specified in the detail design.

In addition, report templates that allow the users to build their own reports will be designed and implemented. The specific list of reports and templates to be included in this phase will depend on the priorities established in the general design phase. Two specific reporting requirements to be implemented are the project underway and the exception reports.

Projects Underway Report – This is a new report. The specific requirements of this report need to be documented in a detailed design. Most of the data required for the report is available in ADVANTAGE system. Resolution of the source of specific data items and totals will be resolved during the detail specifications.

Exception Reports – The exception reports identified in the requirements represent a sample of the kinds of exception reports that are needed. We recommend developing specific criteria for exception reports in a detail requirements definition task. Based on the detail requirements, the source of data for each report can be developed and a detail specification can be documented and reviewed with key managers. The reports will be programmed using the approved detail specifications.

Benefits

The benefits associated with new reports are:

- **Management effectiveness** – Preparing exception reports will highlight potential problems for management and allow for quicker resolution of potential problems.
- **Increased accuracy** – Eliminating or reducing the manual effort required to produce management reports reduces the opportunity for error, thus creating more accurate management information.
- **Reduction in effort** – Automating report production for complex reports will reduce the staff effort, allowing them to focus on the information analysis instead of report preparation.
- **Reporting efficiency** – The report templates will allow users to efficiently develop reports that meet their specific requirements. By providing report templates as an example of types of reports, the learning curve is reduced for developing individual reports.

Technical Implementation Alternatives

The Projects Underway Report and the exception reports are new reports. The following alternatives have been identified for creating these reports.

Create new reports in ADVANTAGE – Reports created in ADVANTAGE will be run on the mainframe and use ADVANTAGE data directly. These reports will be limited to data in the ADVANTAGE file and to mainframe programming and operations methods. This provides a stable environment but limits the users access to the reports since they must be run in batch mode.

Use the INFAACS data for new reports – INFAACS is a client server copy of the ADVANTAGE data that is updated nightly. The advantage to using this data for these new reports is accessibility. The exception reports can be run as an interactive inquiry and printed if needed.

Use a data warehouse for new reports – A data warehouse is a copy of production data that has been refined to efficiently support reporting and analytical needs. The data warehouse, combined with reporting tools provides a powerful reporting source. See the Reporting Tools section for more information.

ADOT has an initial data warehouse project underway focused on asset management. Building on this effort by including financial data will provide a unified approach for accessing financial data with the ability to combine it with other ADOT data. Using the data warehouse approach as the data source for these new reports creates the opportunity to efficiently use data from systems other than ADVANTAGE if the reports require additional data.

We recommend using a data warehouse to provide new budget management reports. This approach not only provides the ability to provide standard project financial status and exception reports but also provides the ability for managers to do their own research using the reporting tools.

Work Products

Work products that will demonstrate the completion of this project include:

- New projects underway report.
- New exception reports for managers.
- New financial status reports providing budget status incorporating budgets, commitments (including encumbrances), and expenditures.

Phase 7: Reporting Support

We recommend developing a catalogue of standard reports with documentation describing the source, purpose, timing, how to request each report, and how to use the information. This catalogue should include ADVANTAGE reports, INFAACS reports, and standard reports produced by other ADOT financial systems as well as new standard reports developed in this project.

We also recommend creating a reporting support group to facilitate production of standard and user-defined reports. The roles of the support group will be to provide expertise to ADOT managers and staff requesting standard reports or developing user reports. They will help the users identify the standard reports or data sources to meet their reporting requirements. However, we also recognize that ADOT's ability to create such a support group will likely be constrained by budget considerations. An alternative approach is to designate report experts throughout the organization to provide this knowledge. This support staff would require advanced training on the reporting tools and data warehouse data structures. Ongoing training of new support staff is essential to provide a continuous core report group as members advance or leave ADOT.

Benefits

The benefits associated with reporting support are:

- **Better understanding of the data** – The reporting support group will improve the understanding of the data allowing management and staff to create better reports and conduct more accurate analysis.
- **Reliable and consistent financial information** – By identifying standard reports and making them accessible to the users, ADOT management will have more reliable and consistent financial information.

Technical Implementation Alternatives

Technical alternatives identified for this project are related to methods of publishing the report catalog to make it available and useable for the reporting users.

Hard copy manuals – The hard copy manual approach provides a portable media that can be accessed away from the desk. These may be necessary for some ADOT offices where access to electronic media may be unavailable or slow, for example, for a construction site office.

Hard copy manuals are expensive to create and maintain. The update process for hard copy manuals is usually unreliable because updated pages or sections must be distributed to the holders of the manual, which can change over time. The holders of the manual must be relied upon to update the manuals in a timely manner. There is no assurance that manuals have been kept current.

Electronic media – Electronic media in this context includes distribution of manuals on disks, CD, diskette or e-mail, where each recipient of the manual has a complete electronic copy. This media has the advantage of being searchable by key word or phrase. It can be published in a format that is readable on any standard PC using readily available software (such as Acrobat Reader).

Updates to this media would require the manual to be completely reissued. This addresses the printing and replication costs of hard copy manuals but knowing who needs updates would still be a problem as jobs change.

An option for this media would be to publish the manual on a server that is available to all financial system users. It may not be possible for ADOT employees to access a central server from remote locations requiring electronic or hard copy distributions to those users.

Intranet – Publication of the policies and procedures on the ADOT Intranet would make a current copy of the manual available to any ADOT employee that has access to the Web. Effective use of Web technology would make the manual very user-friendly as well as easily kept up to date.

This approach is currently used for ADOT's policies and procedures. Whenever there are updates to a policy or procedure, all ADOT employees with e-mail access are notified.

We recommend publishing the report catalog on the ADOT Intranet supplemented by hard copy for those who need it. Most staff requesting reports will have access to the Intranet and will be able to access this information.

Work Products

Work products that will demonstrate the completion of this project include:

- Report documentation.
- A data/reports training program.
- A reporting support group.

Organizational Impact

The principal organizational impact of this project will be the creation of the reporting support group or the identification and training of designated report experts.

Technical resources also need to be designated to support and maintain the data warehouse and the reporting tools.

Training Requirements

Project managers will need training on the access to and interpretation of the new exception reports. These training materials should be incorporated into the training program developed in the Financial Training project.

Resource Administration will need training on the new projects underway report. Formal training for this report is anticipated to be minimal since the key users will be involved in the development of the report.

Initial and ongoing training will be needed on the data warehouse and the use of the reporting tools.

A training program to introduce the report catalog and the reporting potential of the system should be presented to all project managers and others who use project financial information. These training materials should be incorporated into the training program developed in the Financial Training project.

PROJECT 3: FINANCIAL POLICIES AND PROCEDURES

Overview

This financial improvement project addresses changes to financial policies and procedures to improve the overall financial controls and reporting of ADOT projects.

Currently there are inconsistent practices for construction budgeting and project accounting across the ADOT organization. Specific policies and procedures are needed to define the parameters and constraints for construction budget and project accounting. Procedures should also be included to define the specific budgeting and accounting processes for the known financing methods and to define processes to handle exceptions. These policies and procedures must leave flexibility for alternative financing methods. Specific processes related to funding of projects with third party funding are addressed in the Other Recommendations: Third Party Agreement Process.

Clear policies and procedures for processing and approving financial transactions can help ensure fiscal responsibility for projects. This project will review and update policies and procedures for ensuring that only acceptable expenditures are charged to a project, and ensuring that needed budget adjustments are processed prior to the approval for payment of unbudgeted expenditures. It will also evaluate whether automated front end controls or manual review and correction procedures will be more effective for supporting the transaction review process.

The ADOT financial systems contain significant financial information. ADVANTAGE provides the central project budgeting and accounting functionality, but a number of other ADOT systems contain important financial information. Policies and procedures will define how this information should flow (both manually and in the system), but there are always numerous detailed questions about the data and the process.

Currently, there is a formal closeout procedure in place for the construction phase of projects but there are no formal procedures for closing out other phases when they are complete. This formal closeout procedure will be updated to extend to all phases of projects in the five-year construction program.

ADVANTAGE uses two subsystems to track contracts. The CCS subsystem tracks construction contracts and the ECS system tracks nonconstruction contracts (such as engineering services, consultant contracts, and temporary technicians). There is a formal closeout procedure for construction contracts but one is needed for nonconstruction contracts.

ADOT currently maintains a Project Manager's Manual. This manual contains significant information related to managing ADOT projects but needs to include the financial policies and procedures related to projects.

Policies and procedures are also needed to support the system and process changes identified in the Budget Processes and Architecture and the Budget and Financial Reporting projects. The requirements below illustrate the need to improve financial policies and procedures:

- **Requirement 11: Financial Controls** – ADOT needs to improve financial controls to prevent incorrect costs from being charged to a project. ADOT needs to evaluate whether automated front-end controls or manual review and correction procedures would be more effective.
- **Requirement 31: Original Budget** – ADOT needs to define a consistent use of the original budget amount in ADVANTAGE. The original budget amount is established when the project is created on the system. There are currently inconsistent practices for determining the amount to use when establishing the project, which can lead to inconsistent reporting. For example, some projects that are created as information only are established with a zero budget. When the project budget is approved, it must be entered as a revision. ADOT needs to identify the purpose and uses of the original budget amount in ADVANTAGE (PRBL) and its relationship to “original budget” in other ADOT systems.
- **Requirement 38: Financial Controls and Review** – ADOT needs to improve the financial controls for projects to ensure that only acceptable expenditures are charged to a project. In addition, clear procedures are needed at the appropriate levels to ensure fiscal responsibility for projects; for example, ensuring that needed budget adjustments are processed prior to the approval for payment of unbudgeted expenditures. Also need policies and procedures to proactively process change orders.
- **Requirement 39: Project Closeout** – ADOT needs formal closeout procedures for all phases of the five-year construction program projects.

Currently, the formal closeout procedures are in place only for the construction phase.

- **Requirement 40: Contract Closeout** – ADOT needs formal closeout procedures for non-construction contracts in the system.
- **Requirement 73: Financial Policies** – An update to financial policies is currently in process. However, there is still significant work needed on project budgeting and accounting policies and procedures.
- **Requirement 74: Construction Budget and Project Accounting** – ADOT needs a policy for construction budget and project accounting, which will vary. The policy should define the parameters and constraints for construction budget and project accounting while leaving flexibility for alternate financing methods. Procedures should also be included to define the specific budgeting and accounting processes for the known financing methods and to define processes to handle exceptions.
- **Requirement 75: Project Manager’s Manual** – The Project Manager’s Manual used by ADOT needs specific procedures for processing project financial transactions.
- **Requirement 76: Agreement Estimate** – ADOT needs to distribute agreement estimates and agreement recap sheets to all responsible parties.
- **Requirement 77: Organizational Communications** – ADOT needs an updated organizational chart and phone directory to help define reporting structure and functional responsibilities. Staff in business units across ADOT need to know who does what in the organization so when they need help, they can get to the right person. A central help center to point questions to where they can be answered may be a solution.
- **Requirement 78: Financial Systems Support** – ADOT needs a single point of contact for financial information. ADOT needs to recognize all information needs when processing data so the big picture value of the data is understood. ADOT needs to understand the process of setting up the project master so new projects can be set consistently.

Recommended Approach

We recommend forming a team of ADOT managers and staff representing the organizations impacted by the budget process to review and update the budget development policies and procedures. In addition to addressing how budgets are developed, as well as other key components of the budget, the team should address the tracking and reporting needs to monitor the budget status and provide accountability for budget changes.

Updating ADOT's policies and procedures is a continuous process. There are about 30 financial policies on the ADOT Intranet. Of these, nine have been updated during the last year and another nine are being reviewed. This process should continue to identify any additional policies and procedures related to financial controls and any reporting that may be needed as well as current policies that may need to be updated.

We recommend forming a task force with representation from financial management, plus a cross-section of the organization to review the proposed policies and procedures and obtain consensus from the affected disciplines including planners, engineers, and project managers. The policies and procedures should provide rigorous accountability to the financial budgeting and accounting processes while allowing the flexibility needed to assure that project managers can deploy the resources they need to complete projects.

Training should initially be provided as an introduction to the updated and new project financial policies. This same training should be provided on an ongoing basis to introduce new or promoted managers and staff to the financial policies.

We recommend a formal process for users to get answers to project policy and procedure questions. The ideal approach would be a formation of a centralized financial systems help desk to answer users' questions on project financial policies and procedures as well as to provide guidance on how to process and research financial information. This group would logically be the team needed to update the policies and procedures mentioned above. This approach will provide a single point of contact to implement new and revised policies and procedures, and to provide ongoing financial systems support.

There are two challenges to this approach. One is financial. Budget constraints within the department limit that ability to form a discrete team for this purpose. The second is knowledge. The different units within ADOT Finance perform very specialized tasks and processes. Forming a team that encompasses all of these specialties would require a significant investment in training and experience.

Therefore, we recommend that subject matter experts be designated in each unit and that a formal help directory be published to identify the subject matter experts along with the topics they are prepared to address.

Benefits

Clear policies and procedures will provide the following benefits to ADOT:

- **Improved accountability** – The revised policies and procedures will clarify responsibility and authority for the processing and approval of financial transactions. This will allow ADOT to have a more timely and accurate financial picture.
- **Improved financial information** – The revised policies and procedures will improve transaction accuracy and timeliness in reducing effort to research

and resolve errors. They will also provide more reliable and consistent information for managers.

- **Employee efficiency** – The financial help directory will improve employee efficiency by providing quick and correct answers on policies, procedures and practices related to processing project financial transactions.

Technical Implementation Alternatives

No technical alternatives were identified for this project.

Work Products

Work products that will demonstrate that this project has been completed successfully include:

- An updated policy and procedures manual (online).
- Training materials to introduce the policies and procedures to the organization.
- Inclusion of policies and procedures affecting construction in the Project Manager's Manual.
- An organizational plan for the Financial Systems Help Directory.
- Creation of the Financial Systems Help Directory and subject matter experts.

Organizational Impact

The key organizational impact will achieve Department-wide consensus on the policies and procedures. This will require clear communications on the intent and impacts of the policy and procedure changes.

A second organizational impact will be organization of the Financial Systems subject matter experts within Finance. This new function assigned to key people will have some impact on their workload.

Training Requirements

Training requirements for this project include initial training of management and staff on the updated policies and procedures. These training materials should be incorporated into the training program developed in the Financial Training project.

PROJECT 4: FINANCIAL TRAINING

Overview

This project focuses on developing and conducting a training program for users and providers of ADOT project financial information. The training program will address the overall financial system capabilities and the interrelationships between the key components including programming, budgeting, contracting, and expenditures. The purpose of the training program is to provide an overall understanding of the financial system emphasizing basic project financial processes including project coding, responsibilities, and impacts on other organizations. The training program should address:

- Project planning processes and procedures.
- Project budgeting processes and procedures.
- Project financial accounting processes and procedures.
- The training program should also include the following special topics:
 - Federal Aid processes and forms used (from ADOT’s perspective).
 - ADOT’s Project Review Board process and forms used.
 - ADOT’s project master form used to establish the project setup in ADVANTAGE (TRACS #) and when the project number should be obtained.
 - ADOT’s obligation process and how it differs from the FHWA obligation process.

The following requirements demonstrate the need for an updated financial training program and the specific topics that should be incorporated into the training.

- **Requirement 43: Program/Project Budgeting and Accounting** – Provide documentation and training on how program budgets are created consistent with the budgeting processes identified above. Provide procedures, documentation, and training on project budgeting and accounting, including contingency (pre-construction, construction), consultant contracts, construction engineering costs, temporary technicians, and tracking third-party finds.
- **Requirement 44: Reporting** – Provide documentation and training on data available for reporting and understanding of that data. Specific examples are:

- Processing cycles for payroll.
- Contractor payments, equipment, payroll additive (benefits), and other overhead (utilities).
- Impact of cutoff dates to determine the quality of information available.
- Differences between state and federal fiscal years.
- **Requirement 45: Information Training** – Training is needed on where to access different types of information, how to analyze the information, and how to present it in the proper perspective.
- **Requirement 46: ADVANTAGE Training** – ADVANTAGE is still referred to as TRACS, the old financial system, by many ADOT employees. Although some staff indicated that additional training is not needed, there were a significant number that indicated that the new system is not well understood and that more training would be beneficial.
- **Requirement 47: Financial Training** – ADOT needs updated training on basic project financial processes including project coding, responsibilities, and impacts on other organizations. This training should not be limited to project managers.
- **Requirement 48: Specialized Training** – ADOT needs training on specific processes related to project budgeting and accounting, including:
 - Federal Aid processes and forms used (from ADOT’s perspective).
 - ADOT’s project review board process and the forms used.
 - ADOT’s project master form used to establish the project setup in ADVANTAGE (TRACS #) and when the project number should be obtained.
 - ADOT’s obligation process and how it differs from the FHWA obligation process.

Recommended Approach

The recommended approach is to first review current training programs and curriculum and to identify additional financial training needs. ADOT has training programs for ADVANTAGE now that focus on the technical aspects of using the system. Additional training curriculum is needed to address the financial impacts of project budgeting and accounting. Many of these needs were identified in the requirements but the training program should not be limited to these needs. Once the training needs are

confirmed, a training program should be developed to address these needs. This training program should address the specific topics identified and put them into perspective with the financial policies and procedures.

Benefits

The benefits associated with training for project financial information are:

- **Increased accuracy and timeliness of financial data** – A better understanding how and where project information is used by ADOT systems and by the organization will cause employees to appreciate the importance of the information, thereby improving the accuracy and timeliness of the data. This will improve the information available for management decisions.
- **Improved productivity** – A better understanding of project financial processes and systems will allow employees to obtain and understand financial information more quickly.
- **Financial control** – Better understanding by employees of budgeted versus actual amounts will improve the financial controls. Employees will understand how to monitor budget status and what actions are available when a project nears or exceeds its available budget.
- **Employee satisfaction** – With better training and understanding of the project financial processes and systems the employee will experience less frustration in creating and using financial information.

Technical Implementation Alternatives

No technical alternatives were identified for this project.

Work Products

Work products that will demonstrate the completion of this project include:

- A financial training program.
- Financial training materials.

Organizational Impact

No organizational impact is anticipated for this project.

Training Requirements

This training program should be presented to all project managers and others responsible for financial transactions or those who use project financial information.

OTHER RECOMMENDATIONS

This section present three other recommendations that were identified through the requirements but are not included in the core projects described above. Completion of these projects would further improve the ADOT project budgeting, accounting and reporting capabilities and information. These projects are not addressed in the implementation plan. They are:

- **Third Party Agreement Process** – This project describes improvements to simplify the third party agreement process to reduce the effort and uncertainty in the billing process.
- **Track Change Orders** – This project describes a change order process that would formalize change order processing throughout the life of a project.
- **Data Management** – This project describes an approach for data management that would create a data glossary to increase the understanding of data relationships throughout the ADOT financial systems.

Third Party Agreement Process

Overview

ADOT uses third party agreements or joint project agreements (JPA) extensively to fund portions of projects or special features of projects. Local governments (city or county) or private sources such as developers may fund the JPA.

Tracking JPAs has become an accounting challenge because of their complexity. Most of the current JPAs contain restrictions as to how the money can be spent and should be tied to specific line items of the contract. For example, a city might agree to fund additional lighting or an additional turn lane for a specific amount. The third party can be billed only for labor and materials related to that specific work. However, the language of many JPAs is vague as to what should or should not be billed as indicated below by Requirement 41.

ADVANTAGE includes a capability for billing third parties but its billing is based on a percentage of the project expenditures and is not tied to specific work products. As a result, ADVANTAGE computes the percentage attributable to the JPAs to support the billing of federal, state, and bond sources but does not produce the third party bills. Cost Accounting has to interpret the conditions of the JPA and research each contractor invoice for the project to identify which line items can be billed to the third

party. They must track these billed items project-to-date so they do not exceed the total of the agreement.

Another factor that complicates the Cost Accounting group's billing of JPAs is change orders. The third party may request a change to the lighting or a turn lane during the construction and agree to fund the change. These changes are not always communicated to the Cost Accounting group in a timely manner, further complicating the billing process. The third party billing process is currently a manual process supported by spreadsheets.

Finally, there is no formal tracking of the billed amount in ADVANATGE. Tracking of the accounts receivable balances of third parties is needed to determine if all obligations have been paid and to provide better financial information.

The goal of this project is to add structure to the third party agreement process and systems to reduce the billing effort and increase accuracy. The following requirements demonstrate the need for improvements to the third party agreement process.

- **Requirement 13: Track Third-Party Commitments** – ADOT needs a process to track expenditures billable to third parties (JPAs).
- **Requirement 14: Track Change Orders to Third Party Commitments** – ADOT needs to link change orders to projects with third party funding to determine the impact on the third party's share of the costs. If these are not tracked back to original funding agreements, it can result in the non-billing of third parties for all recoverable charges.
- **Requirement 15: Billing of Third-Party Sources** – ADOT needs to improve the billing process of third-parties' sources (JPAs). The automatic billing invoices from ADVANTAGE are currently suppressed for these funding sources and the invoices are manually prepared.
- **Requirement 41: Third-Party Agreement Process** – ADOT needs to develop clear parameters and billing standards for creating and tracking third party agreements. The language contained in some JPAs makes it difficult to determine what is billable. A clear business process will clarify when exceptions are necessary for creative funding opportunities so they can be accommodated in the tracking and billing process. The procedure also needs to provide a review and approval process with programming, finance, and resident engineers on terms of the third-party financing agreement.
- **Requirement 42: Third-Party Commitment Process** – ADOT needs a process to track expenditures billable to third party agreements (JPA) consistent with the Billing Requirements presented previously. The process should provide for tracking change orders back to the original agreements for the project. The process should assure that billing records related to

agreements are updated in a timely manner so that ADOT can bill the third parties for all recoverable charges.

Recommended Approach

We recommend reviewing and updating the third party agreement process to establish guidelines for developing the JPAs. We also recommend defining processes for reviewing and approving the JPAs before they are signed to provide assurance that the terms are understandable and meet the best interest of ADOT, and that the work can be billed in a systematic process.

In addition, this project includes definition of possible system improvements to reduce the effort and increase the accuracy of the billing process.

Benefits

The benefits associated with an improved third party billing process are:

- **More accurate third party billing** – The implementation of structured JPA billing parameters will increase the accuracy of the bills and help to ensure that ADOT collects all the money that is owed.
- **Less effort to bill third parties** – Streamlining the JPA billing process will reduce the staff effort currently required to prepare and track the billing process. This will allow the staff to work on other tasks benefiting ADOT.
- **Better tracking of changes to JPAs** – Improved procedures to track changes to JPAs will also contribute to more accurate, timely billing of the work related to those changes.

Technical Implementation Alternatives

The current manual billing process involves reviewing each contractor's invoice for projects that have a JPA. When items are included on the invoice that meet the terms of the JPA, they are recorded in the JPA tracking spreadsheets. This is a time-consuming process since each JPA has specific terms and limitations that must be considered during the review. Alternatives to improve this process are identified below.

Automate the identification of line items to be billed – A well-defined process for creating third party agreements provides the potential to create a system to automatically identify and extract billing line items for payment from contractor invoices. This process would require a subsystem to feed the ADVANTAGE billing process as well as changes to ADVANTAGE.

Using this capability would require entering the details of the contractor invoices into the system, at least for projects that have JPAs. This detail is not entered into the system now. It would require a significant increase in accounting staff to enter this

additional detail into the system (ADOT staff estimated six additional positions). The projected cost of the data entry resources eliminate this option as a viable alternative.

Use percentage billing during the project and reconcile to line items at the end – ADVANTAGE contains a process to automatically bill third parties for a percentage of the contractor's invoice. The percentage is computed by the system as the funded amount divided by the total project budget. This process is executed by the system but the bills are not produced because they do not meet the terms of the JPAs. This alternative would use the standard billing process throughout the project, and then reconcile any differences when the project is complete. Impacts of this alternative are:

- Contractor invoices would still need to be reviewed for line items applicable to the project. The timing of this review will change from the current practice because it will not need to be done for each billing cycle.
- Billing would be more current since review of contractor invoices would not be required for each JPA billing.
- Either current JPAs would need to be renegotiated or the process would be implemented over time as new JPAs are created.
- This alternative could have some impact on cash flow since current JPA billings may occur early or late in the project depending on the specific work covered. Although the cash flow for ADOT would likely average out and become more predictable, it would certainly affect the cash flow of the third parties.

The other states we surveyed do all of their third party billing using the percentage method.

Continue with current practice, but with more rigorous JPA standards – The current practice is complex and cumbersome. New standards for the JPA negotiation process and clearer documentation of the agreement terms will provide the opportunity for significant improvement in the current process.

The most significant improvement related to JPA billing is the standardization of JPA terms and an approval process to assure that the JPAs meet all ADOT policies and procedures. Improving this process will significantly reduce the complexity, time, and billing errors created by the current process.

Implementing the percentage billing with the reconciliation at the end of the project could save additional processing time in Cost Accounting. The viability of this option depends on the willingness of the third parties to agree to these conditions.

We recommend that ADOT focus its primary effort on improving the JPA process. We also suggest that the percentage billing method be explored with the third party funding sources to determine if this is an acceptable billing method.

Work Products

The primary work products from this project would be:

- A written procedure for developing JPAs and for updating the JPAs throughout the project as scope changes.
- A formal review and approval process for JPA documents.
- Updated procedures for processing third party invoices.

Organizational Impact

The primary organizational impact will be to change the organizational culture to adopt and follow the revised JPA process. JPAs have been developed using an informal process in the past. This process has provided significant flexibility in how projects were funded but created billing ambiguities. The revised process will add structure and rigor to this process while still providing some flexibility. The project managers and others who negotiate these agreements will need to understand the accounting implications of the agreements that they negotiate.

There will also be procedural changes in Cost Accounting to process the revised JPAs.

Training Requirements

Formal training of project managers and others involved in developing, negotiating, and approving the JPAs should be conducted and included in the ongoing Financial Management training program.

Track Change Orders

Overview

Change orders to projects are not systematically tracked in the ADOT systems. We recommend that ADOT look at procedural and system alternatives for tracking changes to projects. The end result will be a method supported by system capabilities to track and report changes. There is currently a Supplemental Agreement Task Force reviewing the requirements for change orders and force accounts.

Requirements that demonstrate the need for this capability are addressed in other projects but are repeated here.

- **Requirement 2: Track Changes to Project Estimates** – ADOT needs the ability to track the amounts and reasons for changes to the project estimates and budgets as projects evolve through their lifecycle. This includes

accountability (reconciliation with explanation) for escalating (or de-escalating) costs for each stage of the project lifecycle including:

- The initial planning stage amount.
- The development estimates.
- The pre-construction amount.
- The bid amount.
- The actual amount.

During each stage of the project lifecycle, the qualities of project estimates improve, as more information becomes available. The project bid and construction contract amount represent the final and best budget, but even that is modified by change orders. The reasons for these changes between phases and during phases need to be clearly documented and tracked, so an explanation of the differences between the original programmed amount and the final amount can be reported.

- **Requirement 6: Adjustable Costs** – ADOT needs to budget and account for cost variances from the bid amount (incentives, quantity changes, or unit price fluctuations) to measure their impact on overall project costs.
- **Requirement 7: Identify Contingency** – ADOT needs to track the use of five percent construction contingency to provide a clear audit trail on project change orders that could result in a budget revision.
- **Requirement 24: Budget Change Information** – The ADVANTAGE PRBL table currently includes budget adjustments. Additional information defining who, when, why, and the amount is needed to provide a complete tracking and audit trail of the budget adjustments over time. (There could be multiple reasons in one transaction.)
- **Requirement 33: Updated Project Budgets** – ADOT needs to update the estimates for major project components as the accuracy of estimates improves and the time of an event nears. This includes the ability to track the amounts and reasons for adjustments. For example, utility relocation costs are first estimated during programming. They should be adjusted during development as more information about the project is developed.
- **Requirement 35: Contingency** – ADOT needs clear definition as to what is part of a “contingency.” ADOT needs to develop guidelines for managing pre-construction and construction contingency and processes supported by system capabilities to monitor contingency budgets and the use of contingency.

Recommended Approach

Our recommendation is consistent with the mission of the Supplement Agreement Task Force, which is to develop a single system which is to develop a single system to track change orders. Our vision goes beyond theirs and would use that system to track all changes to the project from inception to completion including changes as a result of engineering design changes, right-of-way costs, and utility relocation costs in addition to changes to the construction contract. The system would provide electronic approval routing of the changes and integrate with the financial systems to update the contract and budget records once the approval is complete. The change order system developed by the Los Angeles Metropolitan Transit Authority (MTA) is an example of how this approach can provide a detailed audit trail of changes for a project.

Benefits

The benefits associated with creating a change order tracking system are:

- **Better visibility of budget status** – Better project estimating techniques and improved tracking will provide management with realistic projections of the status of a project or group of projects.
- **Improved budget estimates** – Historical tracking of the reasons for budget changes can provide a basis for better estimating.
- **Accountability for budget changes** – The rigorous tracking of changes to the project budget provides a picture of who in the organization should be accountable for the changes. This management information can be used to identify improvements in project planning, estimating, and management.

Technical Implementation Alternatives

As indicated above, change orders can impact one or more systems or subsystems depending on the nature of the change order and the budget status. Changes to the program may be a result of program development and not technically be considered a change order. These changes provide insight to the financial evolution of the project to support analysis on improving the estimating process.

Track changes in the individual systems – This approach would track the changes in the system or systems impacted by the change. The Transportation Planning database does this now for changes approved by the Transportation Board. Changes to the project budget are tracked in ADVANTAGE but they do not provide sufficient detail for analysis. Many changes do not affect the budget because of contingency but would require a change to the contract. Changes to the engineering contract system (ECS) represent changes to the contract, not to the project. Project impact would need to be tracked via the task orders (see the Track Budget Obligations phase). In addition, changes to construction contract would need to be recorded as they occur rather than as a total at the end of the project.

This approach will require a very specific procedure on what databases are impacted by each kind of change to the program, project budget, or contract. A particular change may impact more than one of the systems.

This approach also requires that the reporting process be able to identify a change once if it has impacted more than one of the systems and report the change as a single event. This requires some consistency in recording the changes when they are recorded in multiple locations.

Implement a change order tracking system – A change order tracking system would provide a single place to track all changes. The system would be external to the other systems and databases, but would need to integrate with them to assure consistency and accuracy. Such a system would add rigor to the change order process by recording all information related to the change order when it is initiated. It will allow the user to follow the change order through a predefined electronic approval process. Once the change order is fully approved, the financial impact would be electronically posted to all of the appropriate systems.

In our survey of other transportation organizations, we discovered that the MTA developed such a system with policies and procedures to implement it. MTA has fewer projects; they are very large (building light rail lines and stations), and a project may have hundreds of change orders. Their process provides a rigorous method to track the history of the project as it evolves.

ADOT may not need all of the sophistication included in the MTA application, but the concepts could be employed to improve the information available to ADOT managers. The software MTA developed is available commercially.

Note: ADOT had a change order system at one time but it is not currently being used.

Changing the current systems would improve the tracking of project changes for ADOT. We are concerned with consistency between the systems and the ability of reports to identify change orders posted to multiple systems. More research is needed to determine if there are change orders that would not impact one of the systems identified.

We recommend that ADOT consider the change order system approach before committing to the first approach. Key ADOT staff should visit with MTA to understand their process and their system to determine if that or another system would improve the tracking process enough to justify the investment.

Work Products

Work products that will demonstrate the completion of this project include:

- Requirements for tracking change orders.

- A system for tracking change orders.
- Procedure for change orders.
- A training program to support the system and the processes.

Organizational Impact

No organizational impact is anticipated from this project.

Training Requirements

Training would be required throughout the organization on the procedures for creating and approving change orders in the system.

Data Management

Overview

These projects describe an approach for data management that would create a data glossary to increase the understanding of data relationships throughout the ADOT financial systems.

- **Requirement 56: User Specific Reports** – ADOT needs reports that reflect the specific information requirements of the users. Accounting needs project financial information presented in a way to support analysis of project budgets and expenditures. Project managers need the same data presented with different extracts, sorts, and summaries to support their analysis of project status.
- **Requirement 68: Consistent Data Across Applications and Databases** – ADOT needs consistent data across the financial systems to accurately report project budgets and costs. Even ADVANTAGE appears to provide different values from different tables. Cutoffs of information in different systems create timing differences, which are difficult to reconcile between the databases.
- **Requirement 69: Coordinated Data** – ADOT needs to contain all of the data to manage the Highway Construction Program budget in a single database or in connected databases. There are currently a number of databases with redundant project information, but none of them contain all of the information needed to manage the HCP budget.
- **Requirement 70: Data Ownership** – ADOT needs to define who tracks each type of information in the systems. Clear definition of data ownership,

authority and responsibility can reduce duplication, redundancy, and side-systems.

- **Requirement 71: Integrate Systems** – ADOT needs to integrate system functions. Systems are currently functionally segregated. For example, both FAST and ADVANTAGE contain information related to contractor payments. Information such as contractor retainage and security deposits is available to one system but not the other. This information should be in a single system but be accessible by other systems that need it. Other systems or functions that need to be integrated with project information include the Transportation Planning database, cash flow forecasting, and project scheduling.

Recommended Approach

The recommended approach for implementing report support and training improvements is to first define and document the data elements and their uses in ADVANTAGE and related financial databases. Reports are made of data. To understand the current reports and the ability to create new reports, one must first understand what data is available, its quality, its currency, and its source.

We recommend creating a data glossary that is initially based on documentation for ADVANTAGE and INFAACS. Although some technical information will be required to describe the data elements, the descriptions should emphasize the user's perspective. The documentation should be presented so that prospective users of the reports have easy access and are able to easily identify the most appropriate data elements to be included in a report.

The data glossary should describe data from various sources including mainframe files, databases, and manual records. Key information included in the data glossary include:

- What does the data include?
- Who is responsible for the data?
- Why was the data prepared?
- What similar data is available?
- How is the data created and maintained?
- How reliable is the data?
- How can you access the data?

This phase focuses on improving the ability of the organization to understand and use the financial data that is available within ADOT. This information includes financial data available in ADVANTAGE and in other financial databases. This project provides a process for identifying and documenting the available data and develops a training program for users of financial information.

The documentation and training resulting from this project will define how and where to access financial information, what standard reports are available and how to request them, and posting schedules for data from interfaces or scheduled processes such as payroll and equipment.

Benefits

The benefits associated with creating data glossary are:

- **Reliable management information** – The data glossary will help users understand the currency of different types of data and how to select the correct data for their reporting needs from the data warehouse. This will also enhance the ability to provide reliable management information in reports.
- **Fewer copies of data** – By defining the data and where it can be found, users will be able to access the data for a particular reporting need. Access to the data warehouse will reduce the need for users to keep copies.
- **Data accountability** – The data glossary will identify the sources and ownership of data. This will allow users to research data to verify that it meets their reporting needs, further contributing to reliable management reports.

Technical Implementation Alternatives

These technical alternatives identify methods to publish the data glossary so that it will be available and useable for the reporting users. They include:

Hard copy manuals – The hard copy data glossary approach provides a portable media that can be accessed away from the desk. These may necessary for some ADOT offices where access to electronic media may be unavailable or too slow, such as a construction site office.

Hard copy manuals are expensive to create and maintain. The update process for hard copy manuals is usually unreliable because updated pages or sections must be distributed to the holders of the manual, which can change over time. The holders of the data glossary must be relied upon to update the manuals in a timely manner. There is no assurance that the data glossary has been kept current.

Electronic media – Electronic media in this context includes distribution of the data glossary on disks, CD, diskette or e-mail, where each recipient of the manual has a

complete electronic copy. This media has the advantage of being searchable by key word or phrase. It can be published in a format that is readable on any standard PC using readily available software (such as Acrobat reader).

Updates to this media would require the data glossary to be completely reissued. This addresses the printing and replication costs of hard copy manuals but knowing who needs updates would still be a problem as jobs change.

An option for this media would be to publish the data glossary on a server that is available to all financial system users. However, it may not be possible for ADOT employees to access a central server from remote locations requiring electronic or hard copy distributions to those users.

Intranet – Publication of the policies and procedures on the ADOT Intranet would make a current copy of the data glossary available to any ADOT employee that has access to the Web. Effective use of Web technology would make the manual very user-friendly as well as up to date.

This approach is currently used for ADOT's policies and procedures. Whenever there are updates to a policy or procedure, all ADOT employees with e-mail access are notified.

We recommend publishing the data glossary on the ADOT Intranet supplemented by hard copy for those who need it. Most staff requesting reports will have access to the Intranet and will be able to access this information.

Work Products

Work products that will demonstrate the completion of this project include:

- Data glossary.

Organizational Impact

No organizational impact is anticipated from this project.

Training

Training for the data glossary and the standards for creating new data elements should be included in training programs for report developers and for technical staff supporting ADOT financial systems.

OUT OF SCOPE REQUIREMENTS

The requirements in this section were identified during the focus group meetings, interviews or the ADOT internal survey. They are requirements that need more analysis, but are not within the scope of this report.

Cost Accounting

Cost accounting provides a rational way of recording costs to projects to measure the full cost of performing the activity. It also breaks down costs of activities to provide the ability to measure performance over time. ADOT currently records direct costs to projects but does not do activity costing. ADOT does not allocate overhead and other indirect costs to projects. These options have been studied by ADOT in the past but have not been adopted.

- **Requirement 9: Cost Accounting** – ADOT needs to report the full costs of completing projects. ADOT needs to determine the extent that full costing of projects will improve ADOT’s management information and assess if the benefits are cost justified.
- **Requirement 37: Cost Accounting Process** – ADOT needs to develop processes to report the full costs of completing a project. ADOT needs to determine the extent that cost accounting, including overhead allocation, would improve ADOT’s management information and whether the benefits would justify the costs.

Document Management

There is a need to develop a consistent way to file and index documents related to project costs so the documents can be efficiently accessed for public inquiries, audits, court cases or other research.

- **Requirement 67: Document Management** – ADOT needs a method to inventory or index where paper documents or disk files are located. This will provide the ability to access files as needed and provide a consistent place to locate information related to cost accounting records and documentation needed for lawsuits.

Other Budget Issues

Three other budget issues were identified during the requirements analysis. They are:

- **Temporary Technicians** – An issue was defined in the requirements relating to temporary technicians who work on projects that are not capital improvement. Currently these expenditures are charged to an administrative

project. There is a concern that these projects may not have the same level of budget control as the capital improvement projects.

- **Annual Inflation Review** – The program is developed using today’s dollars. As projects are bid, inflation is a factor in the cost. Policies and procedures are needed to define how to handle inflation at the program and project levels (including the adequacy of the inflation assumptions). This information currently supports cash projections but could also be used for evaluating the projected costs of the overall program.
- **Operations Budgeting** – Budgets for operations costs are established before the project mix is finalized. The budget for these activities may be above or below ADOT’s needs to support the projects. The project mix needs to be considered in developing support budgets.

The requirements below support the need for additional research for these budget issues.

- **Requirement 12: Budgetary Control for Temporary Technicians** – ADOT needs the ability to budget and track expenditures for temporary technicians when they are working on activities not related to a construction project.
- **Requirement 32: Annual Inflation Review** – ADOT needs to develop policy and procedures for handling inflation at the program and project levels (including the adequacy of the inflation assumptions). This information currently supports cash projections but could also be used for evaluating the projected costs of the overall program.
- **Requirement 34: Project-Based Budgeting** – ADOT needs to consider project mix in developing support budgets and include support costs in the budget. Budgets for operations costs are established before the project mix is finalized. The budget for these support activities may be above or below ADOT’s needs to support the projects.

V. PREFERRED OPTION IMPLEMENTATION PLAN

INTRODUCTION

This Arizona Department of Transportation (ADOT) Preferred Option Implementation Plan presents proposed schedules for improving project financial processes, systems, and reports for ADOT. Dye Management Group, Inc. developed this implementation plan as a guideline for implementing the projects defined in the *Financial Improvement Report*.

The implementation plan presents the four related projects:

- **Budget Processes and Architecture** – This project implements business processes and system enhancements to improve budget development, control, and accountability. This project includes system enhancements for linking projects to line item budgets, tracking budget categories, reporting budget adjustments, and identifying budget commitments.
- **Budget and Financial Reporting**– The reporting project includes seven phases related to improving financial reporting. These phases implement a data warehouse for financial reporting, and install reporting tools to enhance the ability of users to create custom reports and queries. This group also includes creation of new reports such as the underway report and financial exception reports for project managers, and updates current ADVANTAGE reports and improves report access and printing.
- **Financial Policies and Procedures** – The financial policies and procedures project addresses updates to financial policy and procedures related to project budgeting, accounting, and reporting, and provides a support network for creators and users of financial information.
- **Financial Training** – The financial training project identifies training needs and creates updated curriculum and training materials to address those needs.

The tasks and subtasks required to implement the project are described for each project. In addition, the work products, the responsibilities of completing tasks and delivering the work product, and the duration are provided for each project. Additional details on the requirements and approach for each project are provided in the Project *Financial Requirements Report* and the *Financial Improvement Report*.

IMPLEMENTATION SCHEDULE

The Implementation Schedule presents the projects to implement the ADOT Preferred Option Implementation Plan. The projects are presented in Figure 5 on the following page.

The four projects are presented as parallel tracks. Although the relative priority of the projects is considered in the schedule, the primary constraints to the sequence of projects are the dependencies and prerequisites between projects. For example, tasks to create new reports follow the implementation of the data warehouse and reporting tools.

The Implementation Plan is meant to be a guide. It should be reevaluated and updated as projects progress and as more detailed information becomes available concerning priorities, resources, and schedules for each task.

Figure 5: Implementation Plan Schedule

Project/Phase	2002		2003			
	3	4	1	2	3	4
Project 1: Budget Processes and Architecture						
Phase 1: Project/Budget Link	■					
Phase 2: Budget Categories		■				
Phase 3: Budget Commitments			■			
Phase 4: Budget Adjustments	■	■				
Project 2: Budget and Financial Reporting						
Phase 1: General Report Design	■	■				
Phase 2: ADVANTAGE Reports	■	■				
Phase 3: Data Elements			■			
Phase 4: Data Warehouse				■	■	
Phase 5: Reporting Tools			■	■	■	
Phase 6: New Reports					■	■
Phase 7: Reporting Support	■	■	■	■	■	■
Project 3: Financial Policy and Procedures	■	■	■	■	■	■
Project 4: Financial Training	■	■	■	■	■	■














Projects and Phases ■ Ongoing Effort ■ ■ ■ ■ ■

PROJECT 1: BUDGET PROCESSES AND ARCHITECTURE

This project describes the approach for implementing improvements to ADOT’s budget processes and the system enhancements to support the improvements. This project includes four phases for improving budget development, control, and accountability. The tasks and subtasks needed to implement the solution are described for each phase. Policies and procedures related to the budget development process improvements are included in *Project 3: Financial Policies and Procedures*.

The Budget Processes and Architecture Implementation Plan (Figure 6) presents the schedule of projects and tasks to complete this group of projects.

Figure 6: Budget Processes and Architecture Implementation Plan

Phase/Task	2002		2003			
	3	4	1	2	3	4
Phase 1: Project/Budget Link						
Develop Project/Budget Link						
Develop Maintenance Procedures						
Phase 2: Budget Categories						
Develop Budget Categories						
Develop Maintenance Procedures						
Phase 3: Budget Commitments						
Develop Budget Commitment Procedures						
Implement Supporting System Changes						
Develop Maintenance Procedures						
Phase 4: Budget Adjustments						
Update Budget Development Process						
Document Reporting Requirements						

Phases  Tasks 

Phase 1: Link Projects to Line Item Budgets

This phase will create a new ADVANTAGE table to link projects to the budget item number and to identify the amount of the budget obligated for each link. The table will provide the ability to identify multiple budget item numbers from the Transportation Planning Division’s Priority Planning Systems (PPS) database to a project and to identify multiple projects funded by a budget item number. The table will identify the amount of each link for reporting purposes.

The approach to this table is to create a new ADVANTAGE table and maintenance screens to record and maintain the linkage, the original amount and change amounts. Item numbers will be validated against a copy of the PPS database that will be loaded into ADVANTAGE. In addition, a transaction file will be created to record each transaction

updating the table including the amount, reason, authorization, and user. This transaction file is a key element for tracking budget changes throughout the life of a project.

Tasks and Subtasks

The tasks for implementing the Programming/Budget Link project are described below.

Develop Project/Budget Link

This task will create a new ADVANTAGE table and update screens to record the one or more links from a project to the program item numbers. This table will identify the program and the dollar amount of the program item number committed to the project. It will include edits to assure that the total of the program item numbers equal the current project budget amount. Subtasks to be performed during this task are:

- Define reporting requirements for projects related to program item numbers.
- Define data structures and sources to support the reporting requirements.
- Develop detail specifications for the table, screen, and edits.
- Program and test the updates to ADVANTAGE.
- Implement the changes.

Develop Maintenance Procedures

This task updates the project maintenance procedures to incorporate the forms and processes to post the project/budget link information to the project whenever a project is created, the budget is updated, or additional item links are added. Subtasks to be performed during this task are:

- Define user roles and responsibilities for completing forms and updating the project records.
- Document the procedures for completing project forms and for updating the project records.
- Update financial documentation and training materials to reflect the project/budget link.

Work Products

Work products that will demonstrate the completion of this phase include:

- Project/budget item number link table.
- Reporting requirements.
- Updated training on project creation and maintenance.

Responsibilities for Task and Work Product Delivery

The responsibilities for completing the tasks and delivering the work products for this phase should be as follows:

- The Financial Systems Administration should take the lead in developing the project/budget link. Resource Administration should have significant involvement in the detail design and testing of the ADVANTAGE changes and the new reports.
- The Resource Administration should develop the maintenance procedures, update the forms, and revise the financial documentation and training materials for the new processes.

Duration

The Project/Budget Line Item Link phase is projected to last two to three months.

Phase 2: Budget Categories

This phase will create a new ADVANTAGE table to track budget categories. The budget categories will record budget estimates for the key components of the project budget based on the agreement estimate recap for construction projects (construction, consultants, construction engineering, adjustable costs, contingency, and other), and other budget documents for nonconstruction projects. The phase also addresses the tracking and reporting needs to monitor the budget status and provide accountability for budget changes.

The approach to this table is to create a new ADVANTAGE table and maintenance screens to record and maintain the budget category, the original amount and change amounts. In addition, a transaction file will be created to record each transaction updating the table including the amount, reason, authorization, and user. This transaction file is a key element for tracking budget changes throughout the life of a project.

Tasks and Subtasks

The tasks for implementing the Budget Process project are described below.

Develop Budget Categories

This task will define the budget categories and the reporting needs for developing and tracking budget categories, and then design and implement the tables, screens, and other system changes to support those requirements. Subtasks to be performed during this task are:

- Identify budget category requirements for the major budget components (consultants, construction engineering, construction, adjustable costs, contingency, and other).
- Define how expenditures and commitments will be compared to these budget dollars to monitor budget status and to identify potential problems.
- Define reporting requirements for projects related to program line items.
- Define data structures and sources to support the reporting requirements.
- Create detail specifications for the budget component table, maintenance screen, and budget status reports (new or modified).
- Program and test the screens and tables.
- Implement the system changes.

Develop Maintenance Procedures

This task updates the project maintenance procedures to incorporate the forms and processes to create and maintain the budget category information for the project whenever a project is created or the budget is updated. Subtasks to be performed during this task are:

- Define user roles and responsibilities for completing forms and updating the project records.
- Document the procedures for completing project forms and for updating the project records.
- Update financial documentation and training materials to reflect the budget categories.

Work Products

Work products that will demonstrate the completion of this phase include:

- System features to support tracking of budget categories.
- Reporting requirements for budget categories.

- Updated project budget creation and update processes including processes for identifying and estimating the budget categories.

Responsibilities for Task and Work Product Delivery

The responsibilities for completing the tasks and delivering the work products for this phase should be as follows:

- The Financial Systems Administration should take the lead in developing the changes to ADVANTAGE and the reports for the budget components tracking. Resource Administration, the budget office and project managers should have significant involvement in the detailed design and testing of the ADVANTAGE changes and the new reports.

Duration

The budget categories phase is projected to last three to four months.

Phase 3: Budget Commitments

This phase establishes a systematic process to report project commitments. This phase will also define processes and reports to improve the project obligations information available to project managers using the construction contract and consultant contract task orders or a new table. It also will review and recommend ways to record commitments for temporary technicians and other contracts so that a project manager can see a complete picture of the project commitments.

The phase will assess the impact of including or excluding ADOT staff in the commitment calculations. The phase will determine whether there is an effective way to record the estimated staff costs as an obligation and reduce the obligated amount as time is charged. The estimated duration below includes the time to evaluate this option but does not include design or implementation effort.

Tasks and Subtasks

The tasks for implementing the Budget Commitment phase are described below.

Develop Budget Commitment Procedures

This task develops the procedures to use the Construction Contract System, the Engineering Contract System, and task orders to record commitments for all types of contracts so that a project manager can see a complete picture of the project commitments. This task also evaluates the value of recording commitments of ADOT employee time to the project. Subtasks to be performed during this task are:

- Evaluate using task orders or another method to connect Engineering Contract System commitments to the project.
- Determine how or if planned ADOT employee time can be shown as a commitment to a project with the commitment amount being reduced as the time is charged.
- Define reporting requirements for projects related to budget commitments.

Implement Supporting System Changes

This task implements changes to ADVANTAGE to meet the commitment tracking needs. These changes will provide a structure for recording commitment amounts and reducing the commitment balance as payments are made. The approach is to create a commitment table to record the relationship between the contract and the project category for each task order. (Further analysis is needed to determine if the existing task order process can fulfill this function.) In addition, a transaction file will be created to record each transaction updating the table including the amount, reason, authorization, and user. This transaction file is a key element for tracking budget changes throughout the life of a project. Subtasks to be performed during this task are:

- Define data structures and sources to support the reporting requirements.
- Develop detailed specifications for system changes, new processes, tables, and screens to support the budget commitment procedures.
- Program and test the changes.
- Implement the changes.

Develop Maintenance Procedures

This task updates procedures to incorporate the forms and processes to record and maintain project commitments. Subtasks to be performed during this task are:

- Define user roles and responsibilities for completing forms and updating the commitment records.
- Document the procedures for completing commitment forms and for updating the commitment records.
- Update financial documentation and training materials to reflect the project commitments.

Work Products

Work products that will demonstrate the completion of this phase include:

- Resolution of whether to include ADOT staff in the commitment process and a method of implementing this if it is determined to be cost-effective.
- Implementation of commitment tracking in ADVANTAGE for temporary technicians, JPA, and other organizations.
- New project financial status and exception reports providing budget status incorporating budgets, commitments (including encumbrances), and expenditures.

Responsibilities for Task and Work Product Delivery

The responsibilities for completing the tasks and delivering the work products for this phase should be as follows:

- Resource Administration and Cost Accounting should be responsible for developing the budget commitment process. The budget office and project managers should have significant involvement in this effort.
- Resource Administration should update the budget policies and procedures to reflect the budget commitment procedures and facilitate training for the new processes.
- The Financial Systems Administration should take the lead in the implementing the changes to ADVANTAGE, creating the data warehouse, and developing the reports for the budget obligation process. Cost Accounting and Resource Administration will have a major role in the detail design and testing of the ADVANTAGE changes and the new reports.

Duration

The budget commitments phase is projected to last three months.

Phase 4: Track Budget Adjustments

The system changes for this phase are included in Phases One, Two, and Three. This phase focuses on the detailed reporting requirements for tracking the budget adjustments, and the budget procedures to support those system changes. This phase will be done in conjunction with the other phases to assure that the data structures captured in the tables and in the transaction file support the required reports.

Tasks and Subtasks

Update Budget Development Process

This task will review and update the budget development processes to support the project line item links, the budget categories, and the commitment process. It will address how budgets are developed and the key components of the budget. Subtasks to be performed during this task are:

- Define how the original budget will be used in project financial reporting and from where it will be derived (ADVANTAGE or another database).
- Update budget procedures to reflect the revised budgeting process.
- Identify training and communications requirements for updating ADOT staff on the budget processes.

Define Reporting Requirements for Tracking Budget Adjustments

This task will define the specific reporting requirements for tracking budget adjustments. This task will be performed in conjunction with the design of the budget architecture enhancements so that the design of the project line item links, the budget categories, and the commitment process contain all of the necessary reporting data elements. Actual programming of these reports will be completed in project/phase 2.6. Subtasks to be performed during this task are:

- Define reporting requirements for budget changes of projects related to program line items, budget categories, and commitments.
- Define data structures and sources to support the reporting requirements.

Work Products

- Updated budget development process.
- Definition of budget adjustment reports.
- Data element definitions to support reporting requirements.

Responsibilities for Task and Work Product Delivery

- Resource Administration should take the lead in updating the budget development process and identifying the reporting needs. The Budget Office and project managers should have significant involvement in this process.

Duration

The track budget adjustments phase is projected to last five months.

PROJECT 2: BUDGET AND FINANCIAL REPORTING

This section describes the projects that will improve ADOT’s project financial reports. In turn, these projects will implement a data warehouse for financial reporting, and install reporting tools to enhance the ability of users to create custom reports and queries. This group also includes creation of new reports such as the underway report and financial exception reports for project managers.

The Budget and Financial Reporting Implementation Plan (Figure 7) presents the schedule projects and tasks to complete this group of projects.

Figure 7: Budget and Financial Implementation Plan

Phase/Task	2002		2003			
	3	4	1	2	3	4
Phase 1: General Report Design						
Define Project Underway Report						
Define Exception Reports						
Define RAAC Reports						
Define FHWA Reports						
Define Management Reports						
Define User Specific Reports						
Prioritize Reports						
Phase 2: ADVANTAGE Reports						
Update Project Detailed Transaction Report						
Reduce Paper on Standard Reports						
Update Reporting Access						
Update Report Printing						
Add titles to ADVANTAGE Report						
Phase 3: Data Elements						
Implement New Data Elements						
Develop maintenance procedures						
Phase 4: Data Warehouse						
Develop Reporting Tables						
Phase 4: Reporting Tools						
Select and Implement Reporting Tools						

Phase/Task	2002		2003			
	3	4	1	2	3	4
Develop training program				█		
Phase 6: New Reports				█	█	█
Develop standard budget reports				█	█	
Develop budget reporting templates					█	█
Develop standard financial reports					█	█
Develop financial reporting templates					█	█
Include reports in Report Catalog						█
Phase 7: Reporting Support	█	█	█	█	█	█
Organize report support group	█	█				
Develop report catalog			█	█	█	█

Phases █ Ongoing Phase █ █ █ █ █ Tasks █

Phase 1: General Report Design

The objective of the general report design is to identify the kinds of budget reports needed by ADOT users, managers, and stakeholders including selections, sorts, summarizations, statistical data, and financial totals (budgeted, expended, committed). The detail design of specific reports occurs in Phase 6 of this project. This phase identifies specific reports and categories of reports so that the source of necessary data elements can be identified if they currently exist and new data elements can be included in the system (Phase 4 of this project).

Tasks and Subtasks

Define Project Underway Report

This task defines selection, sort, and summarization requirements for the Projects Underway report. Subtasks to be performed during this task are:

- Document selections, sorts, and summarizations.
- Identify financial data elements.
- Identify the source of data elements.
- Define new data elements.
- Define data warehouse requirements.
- Develop costs and benefits.

Define Project Exception Reports

This task defines selection, sort, and summarization requirements for the Project Exception reports. Subtasks to be performed during this task are:

- Document selections, sorts, and summarizations.
- Identify financial data elements.
- Identify the source of data elements.
- Define new data elements.
- Define data warehouse requirements
- Develop costs and benefits.

Define RAAC Reports

This task defines selection, sort, and summarization requirements for the RAAC reports. Subtasks to be performed during this task are:

- Document selections, sorts, and summarizations.
- Identify financial data elements.
- Identify the source of data elements.
- Define new data elements.
- Define data warehouse requirements.
- Develop costs and benefits.

Define FHWA Reports

This task defines selection, sort, and summarization requirements for the FHWA reports. Subtasks to be performed during this task are:

- Document selections, sorts, and summarizations.
- Identify financial data elements.
- Identify the source of data elements.
- Define new data elements.

- Define data warehouse requirements
- Develop costs and benefits.

Define Management Reports

This task defines selection, sort, and summarization requirements for new management reports and reporting templates. Subtasks to be performed during this task are:

- Identify users of management reports.
- Interview key managers to define specific reporting needs
- Document selections, sorts, and summarizations.
- Identify financial data elements.
- Identify the source of data elements.
- Define new data elements.
- Define data warehouse requirements
- Develop costs and benefits.

Define User Specific Reports

This task defines selection, sort, and summarization requirements for reporting templates. To support user specific reports, subtasks to be performed during this task are:

- Identify key reporting users.
- Interview key users to define specific reporting needs
- Document selections, sorts, and summarizations.
- Identify financial data elements.
- Identify the source of data elements.
- Define new data elements.
- Define data warehouse requirements
- Develop costs and benefits.

Prioritize Reports

This task prioritizes the reports defined in this task in preparation for planning the report development effort (Phase 6). The reports priorities should include reports defined in the Budget Processes and Architecture project. Subtasks to be performed during this task are:

- Define prioritization criteria.
- Assign priority to reports and report templates.
- Obtain consensus on priority assignments.

Work Products

Work products that will demonstrate that this phase has been implemented successfully include:

- Reporting requirements and data elements for Project Underway Report.
- Reporting requirements and data elements for Project Exception Reports.
- Reporting requirements and data elements for RAAC Reports.
- Reporting requirements and data elements for FHWA Reports.
- Reporting requirements and data elements for Management Reports.
- Reporting requirements and data elements for User Specific Reports.
- Priority assignments for developing new reports.

Responsibilities for Task and Work Product Delivery

A project team should be formed to create the general design for reports. The team will require significant involvement for Resource Administration, the Budget Office, project managers, and key report users and analysts.

Duration

The general reports design phase is projected to last seven months.

Phase 2: ADVANTAGE Reports

This project updates current ADVANTAGE standard reports and processes.

Tasks and Subtasks

The tasks for implementing updates to the ADVANTAGE standard reports are described below.

Change Report CA100560-1: Project Detailed Transaction Report

This task will modify the report to generate the additional total and to add descriptions for coding elements. An indicator will be added to the report's sort key to identify consultant and contractor voucher payments. An additional total will be printed when the value of the new indicator changes. Subtasks to be performed during this task are:

- Develop specifications for the report changes identifying the impacted programs and record formats.
- Program and test the report changes.
- Implement the changes to the specified programs and record layouts.

Reduce Paper on Standard Reports

This task will change the way ADVANTAGE prints standard reports to reduce the paper that users receive. The tasks will identify a specific printer class for the processing statistics and control information. This information will be held in the mainframe computer for a specified period (one to three days) and will not be printed unless the analyst needs it to diagnose a problem. The user will only see the requested report, saving significant paper and printer time and eliminating the need to dig through the run statistics to find the requested report. Subtasks to be performed during this task are:

- Identify the standard reporting jobs to change.
- Specify the print classes for job control and run statistics output.
- Develop the operational procedures for reviewing and purging job control and run statistics.
- Update and test the job control language (JCL) for reporting jobs identified above.
- Implement the job control changes and operational procedures.

Update Reporting Access

This task reviews the current reporting support capabilities in the district offices, provides access to new users for requesting reports. Subtasks to be performed during this task are:

- Evaluate district report support capabilities and effectiveness.
- Identify who needs access to report request capabilities and whether it can be logistically provided (considering online access capabilities to the mainframe computer).
- Identify training requirements for standard reports (and include them in the financial training program).
- Implement improved access.

Update Report Printing

This task implements improvements in printing mainframe reports to local printers. Subtasks to be performed during this task are:

- Identify the needs of users to print on additional printers or printer locations.
- Determine if the State computer center does or will support software to allow printing on user's personal printers in remote locations.
- Develop an implementation plan to update printing capabilities and new access.
- Implement improved printing capabilities.

Add titles to ADVANTAGE Reports

This task adds titles to selected ADVANTAGE reports that currently display cryptic information. Subtasks to be performed during this task are:

- Identify reports needing improved titles.
- Prioritize reports to be modified.
- Identify reports to be redeveloped via the data warehouse where this approach would be more cost-effective or user friendly, or where other modifications to the report are needed.
- Develop detail design for High Priority reports.
- Program and test changes to reports.
- Implement reporting changes.

Work Products

Work products that will demonstrate that this phase has been implemented successfully include:

- A revised Project Detail Transaction report.
- Reduced paper output for ADVANTAGE standard reports.
- Additional access for users to request standard ADVANTAGE reports.
- ADVANTAGE reports with updated titles and descriptive information.
- Additional options for printing ADVANTAGE reports to local printers.

Responsibilities for Task and Work Product Delivery

The responsibilities for completing the tasks and delivering the work products for this phase should be as follows:

- The reporting project team should identify and prioritize the reports to be modified with input and support from Resource Administration, the Budget Office and project managers. The Financial Systems Administration will have primary responsibility for implementing changes to ADVANTAGE reports and for changes to ADVANTAGE print processes to reduce paper.
- The Financial Systems Administration will be responsible for determining the feasibility of printing mainframe reports on local printers and implementing this capability.

Duration

The ADVANTAGE reports phase is projected to last five to six months.

Phase 3: Create New Data Elements

This phase implements the new data elements to the ADOT financial databases to support selection, summarization, and analysis of project financial information and to support other reporting requirements. The analysis will identify the systems and files in which to store the new data elements based on logical association with financial and statistical data and collection points and timing for maintaining the data values.

Tasks and Subtasks

The tasks for implementing the new data elements are described below.

Implement New Data Elements

This task adds the new data elements to the system that were identified in the *Project Financial Requirements*. It also creates new data elements to support reporting needs defined in the *Phase 1: General Report Design*. Subtasks to be performed during this task are:

- Identify the format and validation requirements for new data elements.
- Identify files for new data elements following the data standards.
- Develop detailed specifications for table and screen changes to maintain and store the new data elements, including the data warehouse.
- Update and test screens, programs, files, and data warehouse tables for new data elements.
- Implement the changes.

Develop Maintenance Procedures

This task updates the project maintenance procedures to incorporate the forms and processes to create and maintain the new data elements for the project. Subtasks to be performed during this task are:

- Define user roles and responsibilities for completing forms and updating the project records.
- Document the procedures for completing project forms and for updating the project records.
- Update financial documentation and training materials to reflect the budget categories.
- Train users on the impact of the new data elements.

Work Products

Work products that will demonstrate the completion of this phase include:

- New data elements to support selection, sorting, summarization, and analysis of project financial information.
- Training for the collecting and maintaining the new data elements.

Responsibilities for Task and Work Product Delivery

The responsibilities for completing the tasks and delivering the work products for this phase should be as follows:

- Resource Administration will develop the maintenance procedures and conduct the training on the new data elements.

Duration

The creation of data elements phase is projected to last two months.

Phase 4: Develop Data Warehouse

This phase develops a data warehouse to support flexible ADOT reporting and to provide links to other financial databases. The data warehouse will be used to collect information for project budget and financial reporting. There is currently a data warehouse project underway at ADOT. This phase will add project financial data to that data warehouse using consistent techniques and access methods so the data can be shared across ADOT. This phase will not replace the current INFAACS database but will provide additional data stores organized to enhance the users' ability to select, sort, and summarize financial information in the various ways identified in the *Phase 1: General Report Design*.

Tasks and Subtasks

The tasks for implementing the data warehouse are described below.

Develop Reporting Tables

This task creates new tables in the data warehouse to support specific reporting requirements. The team will design data structures to store the needed data so that it is accessible for reporting and analysis. The subtasks will be conducted for each type of report. This task may be repeated over time to implement tables supporting high-priority reports first, and then adding tables to support lower priority reports as funds and resources permit. Subtasks to be performed during this task are:

- Define data structures and sources to support reporting requirements.
- Document the data model for the data warehouse.
- Design extraction and preparation routines for loading the data warehouse.
- Develop detail specifications for the extracts and preparation routines.
- Build and test the data extracts and processes.

- Implement reporting tables in the data warehouse.

Work Products

Work products that will demonstrate the completion of this phase include:

- Instructions on how to use the table in reports.
- A database containing project financial information by program.

Responsibilities for Task and Work Product Delivery

The Data Warehouse team should have primary responsibility for implementing the data warehouse tables.

Duration

The creation of data warehouse phase is projected to last four to five months.

Phase 5: Reporting Tools

This phase includes the selection and implementation of new reporting tools to improve the access and presentation of ADOT financial information. Currently, standard reporting tools such as ACCESS, Excel and SQL are used to create reports from the data warehouse. The data warehouse team has considered other reporting tools such as Crystal Reports but have not invested the time and resources to acquire additional reporting tools.

Tasks and Subtasks

The tasks for implementing the reporting tools are described below.

Select and Implement Reporting Tools

This task will identify and implement reporting tools to meet the users' reporting needs and technical capabilities. Subtasks to be performed during this task are:

- Define the potential report developers (managers, staff, technicians, statisticians).
- Define formatting and access needs for standard and user requested reports (online queries, hard copy reports, graphics and charts).
- Assess technical skills and interests of potential report developers.
- Develop a requirements statement for reporting tools.

- Select one or more reporting tools to meet the requirements.
- Identify and train expert users for the tools.
- Install and test the reporting tools.
- Implement the tools.

Develop Training Program

This task will develop training programs and materials on how to use the reporting tools and how to access the data. Subtasks to be performed during this task are:

- Develop a training curriculum addressing the varying technical capabilities of the users. Incorporate it into the financial training program.
- Develop sample reports and templates for illustration and as a starting point for users to develop their own reports.
- Develop the training materials.
- Conduct the training program.

Work Products

Work products that will demonstrate the completion of this phase include:

- Reporting tools.
- A training program for data access and reporting tools.

Responsibilities for Task and Work Product Delivery

The Data Warehouse team should write the requirements for the reporting tools, acquire and implement the reporting tools and develop the training program for the data warehouse and the reporting tools.

Duration

The reporting tools phase is estimated to last 10 to 12 months. This phase includes time to select and acquire reporting tools, which may vary depending on the procurement processes required for ADOT.

Phase 6: Implement New Reports

This phase implements reports defined in previous projects and phases. The tasks presented below represent categories of reports that are anticipated to be needed. The actual sequence of development and the size of each task will depend on how many reports are included in each group, the complexity of the reports, the reporting tools selected, and the priorities assigned to each report.

Tasks and Subtasks

The tasks for implementing the new reporting are described below.

Develop Projects Underway Report

This task will develop a new Projects Underway report. The specific requirements of this report will be documented in a detail design including resolution of the source of specific data items and totals. Subtasks to be performed during this task are:

- Develop detailed specifications for the project underway report.
- Program and test the project underway report.
- Document training needs for selecting and using the project underway report.

Develop Exception Reports

This task will implement standard management exception reports. The types of exception reports were identified in the *Phase 1: General Report Design*. The high-priority reports will be further defined to include specific criteria, and the source of data for each report. A detail specification for the reports will be documented and reviewed with key managers. The reports will be programmed using the approved detail specifications. Subtasks to be performed during this task are:

- Define the specific exception reports to be included in the scope of this task based on priority.
- Develop detailed specifications for the exception reports.
- Program and test the exception reports.
- Document training needs for selecting and using exception reports.

Develop reports to support new budget processes

These reports support the *Budget Processes and Architecture* project including project/budget links, budget categories, budget commitments, and budget adjustments. The standard reports defined in the phases of project 1 will be implemented in this task. The size and duration of this task will vary depending on the number of reports, their complexity and their priority.

- Develop detailed specifications for budget reports.
- Program and test the budget reports.
- Document training needs for selecting and using budget reports.

Develop budget reporting templates

These report templates support the *Budget Processes and Architecture* project. The reports templates defined in the phases of project 1 will allow users to create custom budget reports using the templates as a starting point. The size and duration of this task will vary depending on the number of report templates, their complexity and their priority.

- Define specific report templates.
- Develop detailed specifications for the templates.
- Program and test the budget report templates.
- Document training needs for selecting and using budget report templates.

Develop standard financial reports

This task will implement standard financial reports. The types of financial reports were identified in the *Phase 1: General Report Design*. The high-priority reports will be further defined to include specific criteria, and the source of data for each report. A detail specification for the reports will be documented and reviewed with key managers. The reports will be programmed using the approved detail specifications. Subtasks to be performed during this task are:

- Define the specific financial reports to be included in the scope of this task based on priority.
- Develop detailed specifications for the financial reports.
- Program and test the financial reports.
- Document training needs for selecting and using financial reports.

Develop financial reporting templates

These report templates support flexible financial reporting. The reports templates defined in the phases of project 1 will allow users to create custom financial reports using the templates as a starting point. The size and duration of this task will vary depending on the number of report templates, their complexity and their priority.

- Define specific report templates.
- Develop detailed specifications for the templates.
- Program and test the financial report templates.
- Document training needs for selecting and using financial report templates.

Include the reports in the Report Catalog

The report catalog will be developed in *Phase 7: Reporting Support*. This task incorporated new reports and templates into the Report Catalog.

Work Products

Work products that will demonstrate the completion of this phase include:

- New project underway report.
- New project exception reports and templates.
- New reports for monitoring budget status.
- New budget reporting templates.
- New standard financial reports.
- New financial reporting templates.

Responsibilities for Task and Work Product Delivery

Duration

The implementation of new reports phase is estimated to last five to six months. The duration of this phase depends on the number of new reports. This estimate assumes that as many high priority reports will be included as will fit the schedule and available resources and that the remaining reports will be completed as ongoing development.

Phase 7: Reporting Support

This phase focuses on improving the ability of the organizational units to understand and use the financial data that is available within ADOT. The report catalog developed during this project will define how and where to access financial information, what standard reports are available and how to request them, and posting schedules for data from interfaces or scheduled processes such as payroll and equipment. This project will establish a support organization to provide help to users requesting standard reports or developing user specific reports.

Tasks and Subtasks

The tasks for implementing the Reporting Support phase are described below.

Organize Report Support Group

This task confirms the roles and responsibilities of the Report Support Group by assessing the kind of help needed by the reporting community. We recommend that the support group provide expertise, coaching, and assistance to ADOT managers and staff requesting standard reports or developing user reports. Since it is unlikely that separate funding can be obtained to create a separate support unit, this task focuses on creating a network of report experts that can be called upon to support reporting questions and issues as part of their regular assignment. Subtasks to be performed during this task are:

- Confirm roles and responsibilities of the Report Support Group.
- Determine staffing levels needed to support the anticipated report support queries.
- Develop organizational structure for the Report Support Group network. This includes determining to whom in the organization will have primary responsibility for coordinating support group activities such as training and workshops.
- Recruit staff to become the Report Support Group experts through additional training and experience.
- Begin operations by the training of the Report Support Group and publishing the report support procedures.

Develop Report Catalog

This task will develop a catalogue of standard reports and reporting templates with documentation describing the source, purpose, timing, how to request each report, and how to use the information. This catalogue will include ADVANTAGE reports, INFAACS reports, and standard reports produced by other ADOT financial systems. It

will also include data warehouse reports created through these projects. Subtasks to be performed during this task are:

- Identify reports to include in the catalog.
- Gather reports samples and documentation.
- Document the Report Catalog.
- Publish the Report Catalog

Work Products

Work products that will demonstrate the completion of this phase include:

- A reporting support group.
- Reports documentation.

Responsibilities for Task and Work Product Delivery

The responsibilities for completing the tasks and delivering the work products for this phase should be as follows:

- ADOT's Finance Management Services should be responsible for forming the Report Support Group.
- The Report Support Group will then be responsible for compiling the report catalog with the help of the Financial Systems Administration.
- The Report Support Group will be responsible for identifying and training users that need access to request reports.

Duration

The Reporting Support phase is estimated to last 18 months. This time includes organization of the support group and continued involvement supporting the development and cataloging of new reports.

PROJECT 3: FINANCIAL POLICIES AND PROCEDURES

This project will update financial policies and procedures to improve the overall financial controls and reporting of ADOT projects. It includes formation of a Financial System support network to assist financial managers in interpreting and understanding the policies and procedures and to resolve technical accounting questions not covered by the policies and procedures. This project will provide:

- Prioritize the updates and develop the plan for implementation.
- Update current policies and procedures and create new ones.
- Publish the policies and procedures on the ADOT Intranet.
- Update the Project Manager's Manual.

Form Financial System Support Network

This task will facilitate the formation of a centralized Financial Systems Help Desk to answer users' questions on financial policies and procedures as well as to provide guidance in how to process and research financial information. This group will provide a single point of contact to implement new and revised policies and procedures, and to provide ongoing financial systems support. Subtasks to be performed during this task are:

- Identify roles and responsibilities for the financial support group participants.
- Determine staffing levels needed to support the anticipated financial support queries.
- Develop the organizational structure for the support network. This includes determining who will be the coordinator and facilitator for the support group.
- Recruit staff to become the financial support group experts through additional training and experience.
- Begin operations by conducting orientation sessions for the financial support group.

Work Products

Work products that will demonstrate that this improvement has been completed successfully include:

- An updated policy and procedures manual.
- Inclusion of policies and procedures affecting construction in the Project Manager's Manual.
- An organizational plan for the financial systems support.
- Creation of the financial systems support network.

Responsibilities for Task and Work Product Delivery

The responsibilities for completing the tasks and delivering the work products for this project should be as follows:

- The Policy and Procedures task force will be responsible for completing the review and updating the documentation for the financial policies and procedures. The Financial Systems Help Desk should inherit this responsibility once it has been formed.
- The ADOT Policy and Procedures organization has responsibility for publishing the updated documents.
- ADOT’s Finance Management Services should be responsible for forming the Financial Systems Help Desk.

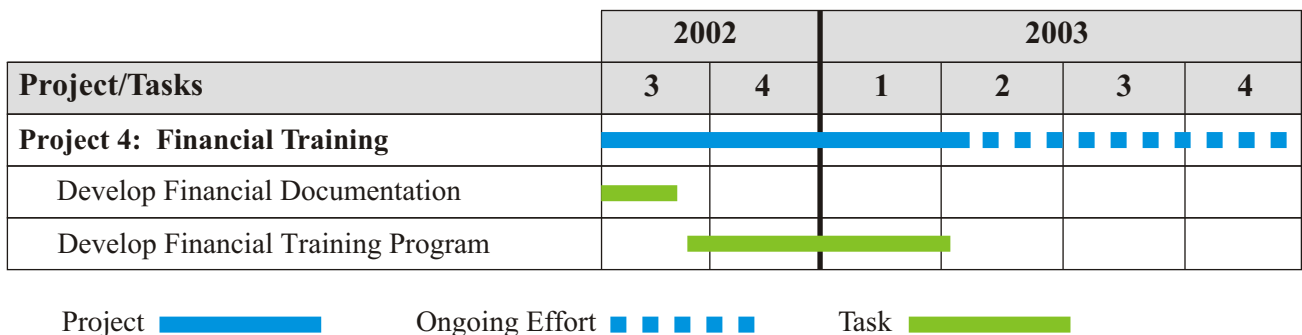
Duration

The policies and procedures phase is estimated to last eight months with continuing ongoing support.

PROJECT 4: FINANCIAL TRAINING

This project develops financial system documentation and a training program for users and providers of ADOT project financial information. The training program (see Figure 9 schedule) will address the overall financial system capabilities and the interrelationships between the key components including programming, budgeting, contracting, and expenditures. The purpose of the training program is to provide an overall understanding of the financial system, emphasizing basic project financial processes including project coding, responsibilities, and impacts on other organizations. The training program will address project financial accounting procedures, ADOT financial systems, and project financial systems.

Figure 9: Financial Training Implementation Plan



The documentation and training developed in this project will incorporate documentation and training programs to support other financial improvement projects. The specific training requirements are identified in those projects.

Tasks and Subtasks

The tasks for implementing the Financial Documentation and Training project are described below.

Develop Financial Documentation

This task will review the current documentation for project financial accounting procedures, ADOT financial systems, and project financial systems as well as identify needed updates. The current topics in the documentation will be updated and new topics will be added to address the overall ADOT financial system and issues specific to project budgeting, accounting, and reporting. Subtasks to be performed during this task are:

- Take inventory of current financial documentation and training materials.
- Develop/update documentation for project budgeting, accounting and reporting.

Develop Financial Training Program

This task will update current financial training programs and curriculum to identify additional financial training needs. The task will update the training programs to address the specific topics related to:

- Project financial accounting procedures.
- ADOT financial systems.
- Project financial systems.

The training program will present those topics in perspective with the financial policies and procedures. Subtasks to be performed during this task are:

- Identify audiences for financial training programs.
- Develop financial training curriculum covering the needed topics at a summary and detailed level.
- Develop training materials to support the curriculum.
- Conduct training classes including initial classes to introduce the changes to the training program.

- Conduct ongoing training for new or promoted employees.

Work Products

Work products that will demonstrate the completion of this project include:

- Updated financial systems documentation.
- A financial training program.
- Financial training materials.

Responsibilities for Task and Work Product Delivery

The responsibilities for completing the tasks and delivering the work products for this project should be as follows:

- The Financial Systems Support Network will be responsible for completing the review, updating the financial documentation and for developing and presenting the training program.

Duration

The Financial Documentation and Training project is estimated to last five months.

APPENDIX A: GLOSSARY

ACCESS	A Microsoft database application.
ADVANTAGE	The financial system used by ADOT as the primary system for financial and project accounting information. It is a product of American Management Systems.
ADVANTAGE DS	Decision support system from AMS used by Washington Department of Transportation to extract data for reporting and analysis
Agreement Estimate Recap	A form completed for each project describing the specific amounts allocated for construction, construction engineering, and other related costs.
ALCIE	Asset, Liabilities, Capital, Income, Expense ERP solution from Computertime Network Corporation, St-Laurent, Quebec Canada
AMS	American Management Systems
CCS	Change Control System implemented by the Los Angeles Metropolitan Transportation Authority (MTA)
CCS	Construction Contract System - a module added to ADVANTAGE.
CE	Construction Engineering – Engineering resources supporting a construction project
COG	Council of Governments.
COGNOS	A report writing tool.
CPMS	Capital Program Management System implemented by the Washington Department of Transportation
Crystal	A report writing tool.
ECS	Engineering Contract System – a module added to ADVANTAGE.
ERP	Enterprise Resource Planning System
Excel	Microsoft spreadsheet application.
FAST	A system supporting Construction Administration in managing, tracking, and paying for Construction Contractor work.
FHWA	Federal Highway Administration

FIRS	Financial Information Retrieval System implemented by Washington State Department of Transportation
FMS II	Financial Management System accounting software from Mitchell Humphrey
GAO	U.S. General Accounting Office
GBA	GBA Systems, Colfax, NC
INFAACS	A database developed by ADOT to provide a user reporting tool for ADVANTAGE and other financial data.
item number	Includes both program item number and subprogram item number.
JCL	Job Control Language used on mainframe computers to control the sequencing of processes, allocate files, and direct reports to specific print classes.
JPA	Joint Project Agreement
JPA	Joint Project Agreement – an agreement between ADOT and another entity (public or private) to share in the funding of a project. ADOT may receive or pay money as a result of the terms of the agreement and who is managing the construction project.
MAG	Maricopa Regional Freeway System projects.
MDT	Montana Department of Transportation
MPO	Metropolitan Planning Organization.
MTA	Los Angeles Metropolitan Transportation Authority
MTA	The Los Angeles Municipal Transportation Authority.
PAMS	Project Accounting Management Software for GBA Systems
PB	Parsons Brinckerhoff, Tempe, AZ
PPS	Transportation Planning Priority Programming System.
PRBL	The table within ADVANTAGE that records budget information for a project.
Program item number	A number used in the Transportation Planning Priority Programming System to identify a specific budgeted project.
PV	An indicator in ADVANTAGE to identify payment vouchers.
RAAC	Resource Allocation Advisory Committee.
SQL	Microsoft SQL Server database

SQL	A method/language for accessing data in a database.
STIP	State Transportation Improvement Program
Subprogram item number	A number used in the Transportation Planning Priority Programming System to identify the budget for a subprogram. The subprogram is a budget for work to be done (such as safety improvements) that is not targeted to a specific project or section of highway.
TB	Transportation Board.
TEIS	Transportation Executive Information System implemented by Washington State DOT
TRACS #	The original name for the ADOT project number. It is still commonly used to identify the project number and the ADVANTAGE system.
TRAINS	Washington Department of Transportation project accounting system based on the AMS product
UDOT	Utah Department of Transportation
USL	USL Financial System by Public-Sector Solutions, Falls Church VA
Visual BASIC	A programming language used to develop screens and processes on personal and network computers.
WBS	Work Breakdown Structure – a way of creating a hierarchical project reporting structure.
WSDOT	Washington State Department of Transportation

APPENDIX B: SURVEYS

Program and Project Financial Management Needs Assessment: Best Practices Survey

SURVEY QUESTIONS

The Arizona Department of Transportation (ADOT) is conducting a Program and Project Financial Management Needs Assessment to identify opportunities to improve the reporting related to project accounting and budgeting. In support of this endeavor, Dye Management Group, Inc. is conducting this survey for ADOT to assess how other state transportation and similar organizations satisfy the needs related to project accounting and budgeting, and to identify “best practices” that might be adopted by ADOT.

We appreciate your assistance in this effort.

Name of Interviewee: Marcy Yates

Position/Title: Accounting Chief

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E-mail: yatesm@wsdot.wa.gov

SYSTEM

1. How are project budgeting and accounting supported?

- Core budget and accounting system? *CPMS – planning discussion document; TRAINS- (financial system) after approved for control and monitoring – with exchange of data between the two systems.*
- Stand-alone project accounting system?
- Manual or spreadsheets? *Yes, Access.*

2. What system(s) is/are used for project budget and accounting?

- Name of system? *TRAINS AMS/GFS.*
- Technical platform? *Mainframe MVS/OS 390, ADATABASE files, custom built for DOT.*
- Is system statewide or departmental? *Departmental.*
- Custom developed or commercial? *CPMS custom built – July 1991, TRAINS – commercial.*
- If commercial, name of package and vendor? *AMS/GFS.*
- Was it modified to meet your requirements? *TRAINS was heavily modified.*

- Was implementation vendor supported? If so, by whom? *TRAINS implementation was supported by AMS (onsite 4-5 years).*
- Strengths? *CPMS – many features; TRAINS – meets business needs.*
- Weaknesses? *CPMS – cumbersome, hard to modify, can't change rapidly; TRAINS can't upgrade, hard to get COBOL programmers to support the system.*
- Are users of the system satisfied with system(s)? *Infrequent TRAINS users are not satisfied because it is too complex and it is difficult to get information. Heavy users are comfortable, but it is still cumbersome. CPMS has growing management discontent (20 years old, inflexible, programming processes are changing and the system hasn't kept up).*
- Are there any improvements or innovations you are planning or would like to make to your system? *Changing the way systems are implemented or upgraded. Increase use of EFT; other enhancements; want to redevelop CPMS. TRAINS needs enhanced budgeting ties to/from the statewide financial system and other tools provided by the Office of Financial Management.*

3. What functions are supported by the system?

- Programming – *CPMS.*
- Project Budgeting – *CPMS.*
- Project Accounting – *TRAINS.*
- Cost Accounting – *TRAINS.*
- General Ledger Accounting – *TRAINS.*
- Revenue Accounting – *TRAINS.*
- Federal Billing – *TRAINS.*
- Contract Tracking – *TRAINS/Contract Administration (CAPS) in 1980. Custom, retainage, material, and line item cost to compute payment amount.*
- Other – *TRACS (Transportation Allotment and Allocation Control System) – customized version of AMS budget prep, subsystem of TRAINS. Used for expenditure control at the organization and object code level.*
 - Control appropriation and determine allocation.

PROJECT BUDGETING AND ACCOUNTING

1. How do you track changes in the project budget and the reasons for changes between phases and during phases? (E.g., preliminary engineering, right-of-way, design, construction.)

- How do you relate project changes back to the program? *Change orders are managed through CAPS to increase authorized amount. CPMS performs*

program balancing. Agreement sheet is used to adjust work order authorized amount.

- *Budget is at a high level; total project level rather than phase for most projects.*

2. Do project budgets relate back to the program, STIP, or five-year plan?

- *How does your system support this? Program Management staff holds a monthly allocation summary review meeting. They watch expenditures, balance the program, and project long-term project expenditure over the biennium.*

3. Do you budget a contingency amount for projects? Yes, May vary between local and state projects 20-25 percent.

- *For our standard form agreements with Utilities and Local Governments, the contracts contain an extra work clause where overruns of up to 25 percent may be allowed. Work of 25 percent or more of the contract total would require a contract supplement.*
- *If yes, how do you determine and track the contingency amount? (E.g., fixed percent, vary by type and size of project.) If above the limit, it needs to go to screening board. Otherwise they track in CAPS.*

4. How do you budget engineering and other construction administration support? (Percentage of total costs, vary by type or size of project, other.) Some direct product support (utilities, furniture) charged to a subprogram, not to projects. Personnel costs are allocated to the project.

5. How do you budget and track third party funding sources?

- *Do you have multiple joint project agreements (JPAs) for a project? (E.g., agreements with local governments for prior contributions to projects.) Yes. Can be a developer, local, state and federal participation. Use agreements tied to the work order functionality in TRAINS to do percent billing.*
- *Do you track changes to a specific JPA? Adjust set-up of work order if the participation changes.*
- *How do you track and bill project activities and progress to third party funds (JPAs)? Past due and reports.*

6. Do you have pools of undesignated funding in the program that can be allocated to projects on an as-needed basis? Regional Administrations has discretionary budget. If yes:

- *How do you balance these back to the program? Through CPMS by program managers in each region.*
- *How do you track available budget and expenditures?*

7. How do the operating budget and the project budget relate? Are they entirely separate? Split by subprogram in TRAINS (capital projects through CPMS).

- What controls are in place to ensure that project expenditures are not charged to an operations budget and vice versa? *Program managers ensure that what is going through is correct.*
- 8. How are multi-year project budgets recorded and tracked? Most are budgeted through a biennium cycle. They can be projected, planned and programmed beyond two years, but are not necessarily funded. Perpetual work orders are set up for two years initially then modify as funds become available. TRAINS contracts show the maximum amount.**
- 9. Are all project costs included in the project budget?**
- Indirect cost. *Yes – some through direct project support pool.*
 - Operational cost (e.g., agency or department staff time). *Yes.*
 - State provided materials or equipment. *Yes.*
 - Are major cost components separately identified in the project budget structure? (E.g., utility relocation and right-of-way acquisition.)
- 10. How do you relate consultant contracts to projects?**
- Do you have consultant contracts that can be charged to multiple projects? *Yes*
 - If so, how do you budget for multiple projects? *TRAINS contracts work order and payment process – contract allotted to work order as assignments are identified.*
 - How do you forecast project budget commitments? *Roster process identifies available and authorized consultants. Task assignment is on a rotating basis through the consultant liaison office.*
 - How do you control maximum contract amounts? *Through the work order system, project payment process. The contract number is attached to a work order. Can't exceed the contract/work order amount.*
- 11. How do you budget and track contractor incentives? A ceiling budget amount is built into full budget price.**
- 12. Do your contracts include adjustments for price fluctuations (e.g., oil prices affecting asphalt costs)? How do you budget and account for this? All costs must be included in the contractor's bid. A change order may be negotiated if the cost variances are extreme.**
- 13. Do you carry over unexpended project balances from one fiscal year/biennium to the next? Yes, at end of biennium. The construction programs are summarized at the appropriation level.**
- Do you prepare a report identifying projects that are underway and their unexpended budgets? *Yes. The "Operating Book."*
 - How do you prepare the report? *The Operating Book is prepared in CPMS using CPMS budget projections and cost information from TRAINS. Some adjustments are required to resolve reconciling items.*

- Is this report prepared directly from your project accounting system?
Indirectly, cost information is extracted to CPMS from TRAINS.

REPORTING

1. Do you provide online access to project information?

- Update? *TRAINS – work order system, work order ledgers. CPMS – program managers online, more limited.*
- Read only? *Yes, through TRAINS (several hundred users).*
- Available to central office? *FIRS (about 1500 users) – Provides summary level information, it is written in Visual Basic and Excel with an SQL database. Daily extracts from TRAINS keep the data current.*
- Available to district or regional offices? *CPMS (less than 300 users) – program managers only access it in region. One representative for access. TRAINS (about 300 users) query ability and entry into CAPS then to TRAINS.*

2. How much historical information is available? *With TRAINS perpetual projects, each work order stays on the system at summary level for about how long? Summary closed in about 4-5 biennia. Detail closed at end of biennium but can be run in reports.*

- Online? *Detail level not online.*
- Reports?

3. What reporting and analytical tools do you use?

- For standard reports? *100's of reports monthly, some daily and weekly.*
- For *ad hoc* reports? *AMS, Advantage DS (10 licenses) Real query – SQL, ADABAS (new).*
- Are they available to project managers and staff? *No, except for FIRS.*

4. Do you use a data warehouse for project accounting and budgeting? If so, what functions are available via the data warehouse? *Visual Basic, Excel, SQL database behind nightly extract. FIRS provides summary level of information in work order and group.*

5. Do you provide Web-based access to project information? *Not yet, looking at other PM tools.*

6. Do your reports present data by program activity and/or geographic area? *Yes, number of budget reports are subprogram, and organization, TEIS (Transportation Executive Information System) – for legislative transportation committee is organized by legislative district shows performance information by location.*

7. May we have a sample copy of a project budgeting or cost accounting report or screen prints of your system? *Yes, work-order ledger and report for tracking budget and expenditures.*

TRAINING

1. What type of training do you provide on project budgeting and accounting?

- Classroom training on systems? *TRAINS – new features.*
- Classroom training on the fundamentals of project budgeting and accounting?
No.
- Online training? *No.*
- Other? *TRAINS - Targeted training with new features/lab. Also new employees.*

Newsletters, User groups, help desk, manuals (rewritten). CPMS user group.

2. Can we get a copy of training materials?

Program and Project Financial Management Needs Assessment: Best Practices Survey

SURVEY QUESTIONS

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We appreciate your assistance in this effort.

Name of Interviewee: Henry Johnston

Position/Title: Financial Manager

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SYSTEM

1. How are project budgeting and accounting supported?

- Core budget and accounting system? *Yes, American Management System.*
- Stand-alone project accounting system? *Yes, Scheduling and Managing PPMS (Preconstruction Project Management System) Integrated in-house.*
- Manual or spreadsheets? *Spreadsheets – Access for presentation.*

2. What system(s) is/are used for project budget and accounting?

- Name of system? *American Management System.*
- Technical platform? *Mainframe, Table driven system.*
- Is system statewide or departmental? *Statewide.*
- Custom developed or commercial? *Commercial.*
- If commercial, name of package and vendor? *American Management System.*
- Was it modified to meet your requirements? *Yes, particularly for our federal billing system. Major modifications were made for federal billing. Other modifications were minor. Upgraded six months ago.*
- Was implementation vendor supported? If so, by whom? *Yes, AMS.*
- Strengths? *All project costs reside on one database. Data is available almost immediately. Not pleased with canned reports.*

- Weaknesses? *Data warehouse (ACCESS) is necessary to gather data, rather than canned reports.*
- Are users of the system satisfied with system(s)? *Overall yes. Sometimes cumbersome, especially with federal billing.*
- Are there any improvements or innovations you are planning or would like to make to your system? *No.*

3. What functions are supported by the system?

- Programming – *No.*
- Project Budgeting – *Yes.*
- Project Accounting – *Yes.*
- Cost Accounting – *Yes.*
- General Ledger Accounting – *Yes.*
- Revenue Accounting – *Yes.*
- Federal Billing – *Yes.*
- Contract Tracking – *Yes.*
- Other – *Receivables, fixed assets, inventory.*

PROJECT BUDGETING AND ACCOUNTING

1. How do you track changes in the project budget and the reasons for changes between phases and during phases? (E.g., preliminary engineering, right-of-way, design, construction.) *Track actual costs against budgets. On federal projects budget changes are only made when authorized by federal authorization form 709. Changes are tracked in a spreadsheet. Project budgets are tracked at higher level.*

- How do you relate project changes back to the program? *Changes are made based on overall project costs rather than individual project costs.*

2. Do project budgets relate back to the program, STIP, or five-year plan? *Yes.*

- How does your system support this? *Federal appropriate codes for federal projects and on a total project cost basis rather than individual.*

Maintains separate data at broad picture level. The five-year plan is not in AMS. It is tracked back by federal codes.

3. Do you budget a contingency amount for projects? *No.*

If yes, how do you determine and track and contingency amount? (E.g., fixed percent, vary by type and size of project.) *Weak on changes. Do have slush that is not allocated to a particular project.*

4. How do you budget engineering and other construction administration support? (Percentage of total costs, vary by type or size of project, other.)

Administrative costs are indirect and allocated to payments. The overhead pool is applied to contractor payments as a percent. Construction engineering costs are charged to a project, but their budgets are managed by individual division.

5. How do you budget and track third party funding sources?

- Do you have multiple joint project agreements (JPAs) for a project? (E.g., agreements with local governments for prior contributions to projects.) *Yes.*
- Do you track changes to a specific JPA? *Yes*
- How do you track and bill project activities and progress to third party funds (JPAs)? *Manually track project costs and bill third parties quarterly.*

6. Do you have pools of undesignated funding in the program that can be allocated to projects on an as-needed basis? *No*

If yes:

- How do you balance these back to the program?
- How do you track available budget and expenditures?

7. How do the operating budget and the project budget relate? Are they entirely separate? *Project budgets are managed by attempting to keep engineering costs below a specified percentage of contractor payments.*

- What controls are in place to ensure that project expenditures are not charged to an operations budget and vice versa? *We have developed a special report to track federal, state, admin, and other costs and these are reviewed by budget officers monthly.*

8. How are multi-year project budgets recorded and tracked? *Division budgets are annual, but project costs are tracked from inception to completion. Resources are budgeted as part of the operating budget by division. Operating resources are charged to a project as applicable.*

9. Are all project costs included in the project budget?

- Indirect cost. *Yes.*
- Operational cost (e.g., agency or department staff time). *Yes.*
- State provided materials or equipment. *Yes.*
- Are major cost components separately identified in the project budget structure? (E.g., utility relocation and right-of-way acquisition.) *Yes.*

10. How do you relate consultant contracts to projects?

- **Do you have consultant contracts that can be charged to multiple projects?** *Yes. Have on contract for a dollar amount that is not applied to a particular project.*
- If so, how do you budget for multiple projects? *By contract.*

- How do you forecast project budget commitments? *Through our STIP.*
 - How do you control maximum contract amounts? *Our contract system doesn't allow us to overpay on contract amount.*
 - *Use work orders to identify commitment to each project.*
 - *Separate contract tracking system ARCMS*
11. **How do you budget and track contractor incentives?** *Tracked through our regular contractor management system.*
 12. **Do your contracts include adjustments for price fluctuations (e.g., oil prices affecting asphalt costs)? How do you budget and account for this?** *No. Treated as a change order.*
 13. **Do you carry over unexpended project balances from one fiscal year/biennium to the next?** *Yes, budgets are managed on a fiscal year basis.*
 - Do you prepare a report identifying projects that are underway and their unexpended budgets? *No. Project budgets are a management tool. The budget carryover is computed at the appropriation level.*
 - How do you prepare the report?
 - Is this report prepared directly from your project accounting system?

REPORTING

1. **Do you provide online access to project information?**
 - Update? *Yes.*
 - Read only? *Yes.*
 - Available to central office? *Yes.*
 - Available to district or regional offices? *Yes.*
2. **How much historical information is available?**
 - Online? *Back six years in present system, but further back to old system if project is still on books.*
 - Reports? *Same as above.*
3. **What reporting and analytical tools do you use?**
 - For standard reports? *American Management System.*
 - For *ad hoc* reports? *Microsoft Access.*
 - Are they available to project managers and staff? *Yes.*
4. **Do you use a data warehouse for project accounting and budgeting? Yes. If so, what functions are available via the data warehouse?** *All financial transactions are in the data warehouse and can be extracted using Microsoft Access. With the*

table driven system didn't like reports. Access gives better results with summary and detail.

- 5. Do you provide Web-based access to project information?** *Very limited.*
- 6. Do your reports present data by program activity and/or geographic area?** *No.*
- 7. May we have a sample copy of a project budgeting or cost accounting report or screen prints of your system?** *Yes. Project cost tracking and cost detail. Project status and control project cost tracking and detail.*

TRAINING

- 1. What type of training do you provide on project budgeting and accounting?**
 - Classroom training on systems? *Yes*
 - Classroom training on the fundamentals of project budgeting and accounting? *Yes.*
 - Online training? *No, all classroom.*
 - Other?
- 2. Can we get a copy of training materials?** *Nothing currently available.*

Program and Project Financial Management Needs Assessment: Best Practices Survey

SURVEY QUESTIONS

The Arizona Department of Transportation (ADOT) is conducting a Program and Project Financial Management Needs Assessment to identify opportunities to improve the reporting related to project accounting and budgeting. In support of this endeavor, Dye Management Group, Inc. is conducting this survey for ADOT to assess how other state transportation and similar organizations satisfy the needs related to project accounting and budgeting, and to identify “best practices” that might be adopted by ADOT.

We appreciate your assistance in this effort.

Name of Interviewee: Darrel Zook

Position/Title: Chief Accountant, Services Bureau

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SYSTEM

1. **How are project budgeting and accounting supported?** *Through a number of budgeting, accounting, and management information systems that each support a specific function.*
 - Core budget and accounting system?
 - Stand-alone project accounting system?
 - Manual or spreadsheets? *Yes, Spreadsheets are used to combine information from multiple systems.*

2. **What system(s) is/are used for project budget and accounting?**
 - Name of system? *SABHRS (PeopleSoft), Cost Accounting Record Entry System (CARES), Budget Development System (BDS), Project Cost Scheduling (PCS), Tentative Construction Program, Fund Obligation System, Management Systems e.g. Construction Management System (CMS)*
 - Technical platform? *Mainframe and Oracle client server with some PC applications.*
 - Is system statewide or departmental? *Departmental although some accounting functions are provided via the statewide accounting system (PeopleSoft).*
 - Custom developed or commercial? *Custom.*
 - If commercial, name of package and vendor?
 - Was it modified to meet your requirements?

- Was implementation vendor supported? If so, by whom?
- Strengths? *Supports many specific business practices of MDT.*
- Weaknesses? *Poor reporting access and usability. Systems are not integrated.*
 - *Custom systems are poorly documented and difficult to maintain.*
 - *Systems do not fully meet current requirements.*
 - *Systems are interfaced but redundant data entry is still required.*
 - *Technical expertise to maintain legacy mainframe systems is becoming difficult to attract.*
- Are users of the system satisfied with system(s)? *Depends.*
- Are there any improvements or innovations you are planning or would like to make to your system? *Move to data warehouse is in the planning stages.*
 - *Will redevelop or replace legacy systems to use current technology, to add functionality, and to improve integration of data.*
 - *Implementing PPMS to improve project budgeting and scheduling. Will initially be implemented for Engineering pre-construction but plan to deploy it to replace PCS and CMS and to support maintenance planning.*

3. What functions are supported by the system?

- Programming? *Tentative Construction Program (TCP), Fund Obligation System (FOB).*
- Project Budgeting? *Project Cost Scheduling Systems (PCS), Construction Management System (CMS), Budget Development System (BDS).*
- Project Accounting? *Cost Accounting Record Entry System (CARES), Project Ledgers, Payroll Timekeeping, SABHRS (PeopleSoft).*
- Cost Accounting? *Cost Accounting Record Entry System (CARES), Project ledgers, Payroll Timekeeping, SABHRS (PeopleSoft).*
- General Ledger Accounting? *SABHRS (PeopleSoft).*
- Revenue Accounting? *SABHRS (PeopleSoft), Lockheed MOTRS.*
- Federal Billing? *Billing Voucher System (BV).*
- Contract Tracking? *Spreadsheets, Contract Management System, Contract Tracking System*
- Other?

PROJECT BUDGETING AND ACCOUNTING

1. **How do you track changes in the project budget and the reasons for changes between phases and during phases? (E.g., preliminary engineering, right-of-way, design, construction.)**
 - How do you relate project changes back to the program? *Through the federal program modification process. Amounts and justification are contained in the programming documents. This has been a problem that will be addressed through the proposed system updates.*
2. **Do project budgets relate back to the program, STIP, or five-year plan?**
 - How does your system support this? *An analysis can be performed which identifies budgeted vs. actual but it is not a fully automated process. The Project Cost Scheduling System takes planned and active projects and forecasts future costs. Spreadsheets are also used.*
3. **Do you budget a contingency amount for projects?**
 - If yes, how do you determine and track contingency amounts? (E.g., fixed percent, vary by type and size of project.) *The project engineer(s) estimate an amount of contingency depending on the type and size of the proposed construction project. The closer the project is to being advertised for bid letting, the smaller the project contingency should be.*
4. **How do you budget engineering and other construction administration support? (Percentage of total costs, vary by type or size of project, other.)** *For budgeting purposes, CMS estimates MDT resources to support construction based on the size and type of project. Estimates are projected by fiscal year. The estimated cost for preliminary engineering is determined through consultation with the various pre-construction area units (i.e. those units estimate the number of hours required to accomplish the work. Based on those hours, a total estimated cost for MDT personnel is derived). If a consultant is utilized on the project, their contract cost is used to determine part of the total budgeted amount. For federal aid programming purposes, construction engineering is derived using a percentage of the construction contract (i.e. 8 percent, 10 percent, 12 percent...).*
5. **How do you budget and track third party funding sources?**
 - Do you have multiple joint project agreements (JPAs) for a project? (E.g., agreements with local governments for prior contributions to projects.) *Yes, the programming documents calculate the estimated or total committed amounts on a specific project. These documents are then used to create records in the accounting and billing systems.*
 - Do you track changes to a specific JPA?
 - How do you track and bill project activities and progress to third party funds (JPAs)?

6. Do you have pools of undesignated funding in the program that can be allocated to projects on an as-needed basis? *No.*

If yes:

- How do you balance these back to the program?
- How do you track available budget and expenditures?

7. How do the operating budget and the project budget relate? Are they entirely separate?

- What controls are in place to ensure that project expenditures are not charged to an operations budget and vice versa?

8. How are multi-year project budgets recorded and tracked? *PCS and CMS project costs by fiscal year.*

9. Are all project costs included in the project budget?

- Indirect cost. *No.*
- Operational cost (e.g., agency or department staff time). *Yes.*
- State provided materials or equipment. *Yes*
- Are major cost components separately identified in the project budget structure? (E.g., utility relocation and right-of-way acquisition.) *Yes.*

10. How do you relate consultant contracts to projects?

- Do you have consultant contracts that can be charged to multiple projects? *Yes.*
- If so, how do you budget for multiple projects? *Consultant invoices must document how much is to be charged to each project.*
- How do you forecast project budget commitments? *Five year average by type and size of project.*
- How do you control maximum contract amounts? *Fixed Assets*

11. How do you budget and track contractor incentives? *The construction bureau has not tried to budget for and track contractor incentive on projects. We do modifications to put more money in and take more money out of projects. To my knowledge in the last five years we have not had to do a modification because a contractor had a big incentive payment. The one exception to this are projects where contractors have early contract incentive completion clauses like 10th Avenue South in Great Falls and the contractor does complete early which cost the Department a large sum of money. We have not done a lot of big urban projects and paid big incentives in the last five years.*

12. Do your contracts include adjustments for price fluctuations (e.g., oil prices affecting asphalt costs)? How do you budget and account for this? *The Department has a contract special provision for fuel use on a project and for burner fuel to make plant mix. The current special provision allows the price to go up or down by 25 percent before the Department or the contractor needs to make an*

adjustment. We do not try to budget for this item but we do put contingency factors in our estimates. Again, we have not done a lot of contract modifications in the last five years because of the fuel use special provision and until recently the contractors have been paying more back to the Department than we have been paying to them.

REPORTING

1. Do you provide online access to project information?

- Update? - *For those authorized, system by system.*
- Read only? *Yes. Limited in some cases.*
- Available to central office? *Yes.*
- Available to district or regional offices? *Yes.*

2. How much historical information is available?

- Online?
- Reports? *Seven years of project information is kept in archives. It requires ISB set up for access.*

3. What reporting and analytical tools do you use?

- For standard reports? *PL1, Culprit, SABHRS, Oracle, and spreadsheets*
- For *ad hoc* reports? *Oracle Tools*
- Are they available to project managers and staff? *Generally require ISB involvement.*

4. Do you use a data warehouse for project accounting and budgeting? If so, what functions are available via the data warehouse? *Some data is copied to Oracle tables for reporting. Moving to implement data warehouse concepts for key data.*

5. Do you provide Web-based access to project information? *No, but would like to include those capabilities in future development. PPMS will be web enabled.*

6. Do your reports present data by program activity and/or geographic area? *Some geographical data is available. MDT has a Transportation Information System (TIS) that provides a standard geographical link to data. Project accounting data is not linked yet.*

7. May we have a sample copy of a project budgeting or cost accounting report or screen prints of your system?

TRAINING

1. What type of training do you provide on project budgeting and accounting?

- Classroom training on systems?
- Classroom training on the fundamentals of project budgeting and accounting?

- Online training?
- Other?

2. Can we get a copy of training materials?

Program and Project Financial Management Needs Assessment: Best Practices Survey

SURVEY QUESTIONS

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We appreciate your assistance in this effort.

Name of Interviewee: Jeff Christiansen

Position/Title: Deputy Executive Officer, Program Management

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SYSTEM

1. How are project budgeting and accounting supported?

- Core budget and accounting system? *Oracle.*
- Stand-alone project accounting system? *No.*
- Manual or spreadsheets? *No.*

2. What system(s) is/are used for project budget and accounting?

- Name of system? *Oracle.*
- Technical platform? *Client server.*
- Is system statewide or departmental? *Used agency wide (9,000 employees)
Departments: Operating, Construction, Planning, Administration.*
- Custom developed or commercial? *Commercial.*
- If commercial, name of package and vendor? *Oracle, installing 11i in 12/2001.*
- Was it modified to meet your requirements? *Minimal modifications.*
- Was implementation vendor supported? If so, by whom? *Yes, Oracle.*
- Strengths? *Not happy with it – not capital friendly, not set up for 6-8 year capital projects.*
- Weaknesses? *Can't enter negative adjustments; this adds work.*

- Are users of the system satisfied with system(s)? *Varies, not liked by the capital users, accounting finds it meets their needs.*
- Are there any improvements or innovations you are planning or would like to make to your system? *Yes, upgrading to 11i in December 2001.*

3. What functions are supported by the system?

- Programming - *No*
- Project Budgeting - *Yes*
- Project Accounting - *Yes*
- Cost Accounting - *Yes*
- General Ledger Accounting - *Yes*
- Revenue Accounting - *Yes*
- Federal Billing - *Yes*
- Contract Tracking - *Yes*
- Other - *Budget input and analysis system (BIAS) and financial information system (FIS.)*

PROJECT BUDGETING AND ACCOUNTING

- 1. How do you track changes in the project budget and the reasons for changes between phases and during phases? (E.g., preliminary engineering, right-of-way, design, construction.)** *By using the Contract Control System (CCS) – any changes go through this program.*
 - How do you relate project changes back to the program? *Using CCS.*
- 2. Do project budgets relate back to the program, STIP, or five-year plan?** *Yes.*
 - How does your system support this? *Appropriation is basis for budget. Projects relate back to appropriation of state, FTA, and propositions in city.*
- 3. Do you budget a contingency amount for projects?** *Yes.*
 - If yes, how do you determine and track contingency amounts? (E.g., fixed percent, vary by type and size of project.) *Line item, look at risk associated with the project, use experience and historical data. Use database for estimating local region, usually at least 10 percent.*
- 4. How do you budget engineering and other construction administration support? (Percentage of total costs, vary by type or size of project, other.)** *Used 20 percent of total project budget for all design and construction support (modifications based on experience). Looking at design/build for future projects.*
- 5. How do you budget and track third party funding sources?** *Memoranda of agreement with city agencies.*

- Do you have multiple joint project agreements (JPAs) for a project? (E.g., agreements with local governments for prior contributions to projects.) *Yes.*
 - Do you track changes to a specific JPA? *Yes.*
 - How do you track and bill project activities and progress to third party funds (JPAs)? *Treat like any other vendor, most JPA's are paid by MTA rather than a funding source.*
- 6. Do you have pools of undesignated funding in the program that can be allocated to projects on an as-needed basis? *No.***
- If yes:
- How do you balance these back to the program?
 - How do you track available budget and expenditures?
- 7. How do the operating budget and the project budget relate? Are they entirely separate? *Entirely separate.***
- What controls are in place to ensure that project expenditures are not charged to an operations budget and vice versa? *Sorted by accounting code. Just implemented resource checking. Too much control.*
- 8. How are multi-year project budgets recorded and tracked? *Included based on cash flow. Shadow budgeting like a memo, re-budget each year, also re-budget carryover.***
- 9. Are all project costs included in the project budget? *Yes.***
- Indirect cost. *Yes.*
 - Operational cost (e.g., agency or department staff time). *Yes.*
 - State provided materials or equipment. *Yes.*
 - Are major cost components separately identified in the project budget structure? (E.g., utility relocation and right-of-way acquisition.) *Yes.*
- 10. How do you relate consultant contracts to projects? *Have consultants for life of project.***
- Do you have consultant contracts that can be charged to multiple projects? *Bench consultants (contractors) help finish out project periodically.*
 - If so, how do you budget for multiple projects?
 - How do you forecast project budget commitments?
 - How do you control maximum contract amounts? *Task and dollar amount are associated with activity.*
- 11. How do you budget and track contractor incentives? *Don't track that.***
- 12. Do your contracts include adjustments for price fluctuations (e.g., oil prices affecting asphalt costs)? How do you budget and account for this? *No, factored***

in each year, get percent multiplier from federal government. Responsibility of contractor to bid appropriate amount.

REPORTING

- 1. Do you provide online access to project information? Yes, CCS.**
 - Update? *Yes.*
 - Read only? *Mostly read only.*
 - Available to central office? *Yes. Everyone has access to Oracle via Internet. Controlled update permission.*
 - Available to district or regional offices? *Yes. Internal to MTA.*
- 2. How much historical information is available? CCS – everything. Oracle – prior to 1993 in summary, since is available at the detail level.**
 - Online?
 - Reports?
- 3. What reporting and analytical tools do you use?**
 - For standard reports? *Trending system. CIP (250) – reports monthly, hard copy in the past, moving to Web based. Use ACCESS, MS FrontPage.*
 - For *ad hoc* reports? *CCS has many reports.*
 - Are they available to project managers and staff? *Yes, also records management center retains a historical copy of all reports.*
- 4. Do you use a data warehouse for project accounting and budgeting? If so, what functions are available via the data warehouse? Yes, for CCS and Oracle.**
- 5. Do you provide Web-based access to project information? CCS – web based upgrade. Going to web project management (shared documents and updates). Project quest, operational in beginning of 2002.**
- 6. Do your reports present data by program activity and/or geographic area? Yes, to program activity.**
- 7. May we have a sample copy of a project budgeting or cost accounting report or screen prints of your system? Yes.**

TRAINING

- 1. What type of training do you provide on project budgeting and accounting?**
 - Classroom training on systems? *Oracle currently on 11i. Ongoing with CCS.*
 - Classroom training on the fundamentals of project budgeting and accounting? *No.*
 - Online training? *No.*
 - Other?

2. Can we get a copy of training materials? *Yes.*

Program and Project Financial Management Needs Assessment: Best Practices Survey

SURVEY QUESTIONS

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We appreciate your assistance in this effort.

Name of Interviewee: Gina Allick

Position/Title: Administrative Manager

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SYSTEM

1. How are project budgeting and accounting supported?

- Core budget and accounting system? *Oracle ERP.*
- Stand-alone project accounting system?
- Manual or spreadsheets? *Excel, Access, Primavera.*

2. What system(s) is/are used for project budget and accounting?

- Name of system? *Oracle.*
- Technical platform?
- Is system statewide or departmental? *Corporate-wide.*
- Custom developed or commercial? *Commercial.*
- If commercial, name of package and vendor? *Oracle.*
- Was it modified to meet your requirements? *Probably modified some.*
- Was implementation vendor supported? If so, by whom? *Oracle in 93/94*
- Strengths? *Makes invoicing easy, good cost tracking, helpful reports for tracking costs and profit, also good at flagging problems on projects eg. Cost overrun.*
- Weaknesses? *Adjusting or recalculating costs on an old project later – because of change in overhead rates.*

- Are users of the system satisfied with system(s)? *Yes.*
- Are there any improvements or innovations you are planning or would like to make to your system? *Currently have version 10.7*

3. What functions are supported by the system?

- Programming – *Yes.*
- Project Budgeting – *Yes.*
- Project Accounting – *Yes.*
- Cost Accounting – *Yes.*
- General Ledger Accounting – *Yes.*
- Revenue Accounting – *Yes.*
- Federal Billing – *Yes.*
- Contract Tracking – *Yes.*
- Other - *Human resources, Accounts payable/receivable, separates operating from project costs.*

PROJECT BUDGETING AND ACCOUNTING

1. How do you track changes in the project budget and the reasons for changes between phases and during phases? (E.g., preliminary engineering, right-of-way, design, construction.) *Change orders and (client) modifications update budgets in Oracle and tracks history.*

- How do you relate project changes back to the program? *Can track changes with report.*

2. Do project budgets relate back to the program, STIP, or five-year plan? *N/A*

How does your system support this?

3. Do you budget a contingency amount for projects? *Varies.*

If yes, how do you determine and track and contingency amount? (E.g., fixed percent, vary by type and size of project.) *Some project managers budget reserve in contingency. Some clients do not allow this; it depends on the client, the contract and the project manager.*

4. How do you budget engineering and other construction administration support? (Percentage of total costs, vary by type or size of project, other.) *Project administrator charges directly to project. Resources are estimated during proposal process. Proposal costs are usually based on average salaries.*

5. How do you budget and track third party funding sources? *N/A*

- Do you have multiple joint project agreements (JPAs) for a project? (E.g., agreements with local governments for prior contributions to projects.)

- Do you track changes to a specific JPA?
- How do you track and bill project activities and progress to third party funds (JPAs)?

6. Do you have pools of undesignated funding in the program that can be allocated to projects on an as-needed basis? N/A.

If yes:

- How do you balance these back to the program?
- How do you track available budget and expenditures?

7. How do the operating budget and the project budget relate? Are they entirely separate? *Operating plan assumes certain percent to project. Oracle handles both and keeps separate.*

- What controls are in place to ensure that project expenditures are not charged to an operations budget and vice versa? *Timesheets- relationship between task and project provides edit, Time is tracked daily and tasks are charged to projects as worked.*

8. How are multi-year project budgets recorded and tracked? *Set up with notice to proceed. Looks at revenue recognition 3-4 times a year. Project managers use Primavera for scheduling, project status, percent complete, expenditures, etc.*

9. Are all project costs included in the project budget? *Yes.*

- Indirect cost.
- Operational cost (e.g., agency or department staff time).
- State provided materials or equipment.
- Are major cost components separately identified in the project budget structure? (E.g., utility relocation and right-of-way acquisition.).

10. How do you relate consultant contracts to projects? *One to one.*

- Do you have consultant contracts that can be charged to multiple projects?
- If so, how do you budget for multiple projects?
- How do you forecast project budget commitments?
- How do you control maximum contract amounts?

11. How do you budget and track contractor incentives? *N/A.*

12. Do your contracts include adjustments for price fluctuations (e.g., oil prices affecting asphalt costs)? How do you budget and account for this? *N/A.*

REPORTING

1. Do you provide online access to project information? *Yes.*

- Update? *Limited access to only Project Administrator, they handle all updating for project data, timesheets, etc.*
 - Read only? *Available to Project Manager and the Project Administrator.*
 - Available to central office? *Yes.*
 - Available to district or regional offices? *Project office/Project Administrator/Manager.*
- 2. How much historical information is available?**
- Online? *Yes, it has not been purged.*
 - Reports? *Yes.*
- 3. What reporting and analytical tools do you use? *Excel, Access, Primavera. Data is downloaded from Oracle to Excel, etc.***
- For standard reports?
 - For *ad hoc* reports?
 - Are they available to project managers and staff?
- 4. Do you use a data warehouse for project accounting and budgeting? If so, what functions are available via the data warehouse? *Don't think so***
- 5. Do you provide Web-based access to project information? *Yes, requires special access.***
- 6. Do your reports present data by program activity and/or geographic area? *Yes, geographic/Cost center/Profit center – project managers can only access their own projects.***
- 7. May we have a sample copy of a project budgeting or cost accounting report or screen prints of your system? *No.***

TRAINING

- 1. What type of training do you provide on project budgeting and accounting?**
- Classroom training on systems? *PBIS training, on Oracle in house.*
 - Classroom training on the fundamentals of project budgeting and accounting? *Project manager and Project administrator certification program – set of modules (classroom) presented by corporate human resources.*
 - Online training? *No.*
 - Other?
- 2. Can we get a copy of training materials? *No.***

APPENDIX C: SURVEY QUESTIONNAIRE MATRIX

Survey Question	WSDOT	UDOT	MDT	MTA	PB
System					
1. How are project budgeting and accounting supported?			Through a number of budgeting, accounting, and management information systems that each support a specific function.		
Core budget and accounting system?	CPMS – planning discussion document; TRAINS- (financial system) after approved for control and monitoring – with exchange of data between the two systems.	Yes, American Management System		Oracle.	Oracle ERP
Stand-alone project accounting system?		Yes, Scheduling and Managing PPMS (Preconstruction Project Management System) Integrated in-house.		No	
Manual or spreadsheets?	Yes, Access	Spreadsheets – Access for presentation.	Yes, Spreadsheets are used to combine information from multiple systems.	No	Excel, Access, Primavera
2. What system(s) is/are used for project budget and accounting?					

Survey Question	WSDOT	UDOT	MDT	MTA	PB
Name of system?	TRAINS AMS/GFS	American Management System.	SABHRS (PeopleSoft), Cost Accounting Record Entry System (CARES), Budget Development System (BDS), Project Cost Scheduling (PCS), Tentative Construction Program, Fund Obligation System, Management Systems e.g. Construction Management System (CMS)	Oracle	Oracle
Technical platform?	Mainframe MVS/OS 390, ADABAS files, custom built for DOT.	Mainframe, table-driven system.	Mainframe and Oracle client server with some PC applications.	Client server.	
Is system statewide or departmental?	Departmental	Statewide	Departmental, although some accounting functions are provided via the statewide accounting system (PeopleSoft).	Used agency wide (9,000 employees) Departments: Operating, Construction, Planning, Administration.	Corporate-wide
Custom developed or commercial?	CPMS custom built – July 1991, TRAINS – commercial.	Commercial	Custom	Commercial	Commercial
If commercial, name of package and vendor?	AMS/GFS	American Management System		Oracle, installing 11i in 12/2001	Oracle
Was it modified to meet your requirements?	TRAINS was heavily modified	Yes, particularly for our federal billing system. Major modifications were made for federal billing. Other modifications were minor. Upgraded 6mo. ago.		Minimal modifications	Probably modified some
Was implementation vendor supported? If so, by whom?	TRAINS implementation was supported by AMS (onsite 4-5 years).	Yes, AMS		Yes, Oracle.	Oracle in 93/94

Survey Question	WSDOT	UDOT	MDT	MTA	PB
Strengths?	CPMS – many features; TRAINS – meets business needs.	All project costs reside on one database. Data is available almost immediately. Not pleased with canned reports.	Supports many specific business practices of MDT.	Not happy with it – not capital friendly, not set up for 6-8 year capital projects.	Makes invoicing easy, good cost tracking, helpful reports for tracking costs and profit, also good at flagging problems on projects e.g. Cost overrun.
Weaknesses?	CPMS – cumbersome, hard to modify, can't change rapidly; TRAINS can't upgrade, hard to get COBOL programmers to support the system.	Data warehouse (ACCESS) is necessary to gather data, rather than canned reports.	Poor reporting access and usability. Systems are not integrated. Custom systems are poorly documented and difficult to maintain. Systems do not fully meet current requirements. Systems are interfaced but redundant data entry is still required. Technical expertise to maintain legacy mainframe systems is difficult to attract.	Can't enter negative adjustments, this adds work.	Adjusting or recalculating costs on an old project later – because of change in overhead rates
Are users of the system satisfied with system(s)?	Infrequent TRAINS users are not satisfied because it is too complex and it is difficult to get information. Heavy users are comfortable, but it is still cumbersome. CPMS has growing management discontent (20 years old, inflexible, programming processes are changing and the system hasn't kept up).	Overall yes. Sometimes cumbersome, especially with federal billing.	Depends	Varies, not liked by the capital users, accounting finds it meets their needs.	Yes

Survey Question	WSDOT	UDOT	MDT	MTA	PB
Are there any improvements or innovations you are planning or would like to make to your system?	Changing the way systems are implemented or upgraded. Increase use of EFT, other enhancements, want to redevelop CPMS. TRAINS needs enhanced budgeting ties to/from the Statewide financial system and other tools provided by the Office of Financial Management.	No	Will redevelop or replace legacy systems to use current technology, to add functionality, and to improve integration of data. Implementing PPMS to improve project budgeting and scheduling. Will initially be implemented for Engineering pre-construction but plan to deploy it to replace PCS and CMS and to support maintenance planning.	Yes, upgrading to 11i in December 2001	Currently have version 10.7
3. What functions are supported by the system?					
Programming	CPMS	No	Tentative Construction Program (TCP), Fund Obligation System (FOB).	No	Yes
Project Budgeting	CPMS	Yes	Project Cost Scheduling Systems (PCS), Construction Management System (CMS), Budget Development System (BDS)	Yes	Yes
Project Accounting	TRAINS	Yes	Cost Accounting Record Entry System (CARES), Project Ledgers, Payroll Timekeeping, SABHRS (PeopleSoft).	Yes	Yes
Cost Accounting	TRAINS	Yes	Cost Accounting Record Entry System (CARES), Project ledgers, Payroll Timekeeping, SABHRS (PeopleSoft).	Yes	Yes
General Ledger Accounting	TRAINS	Yes	SABHRS (PeopleSoft).	Yes	Yes

Survey Question	WSDOT	UDOT	MDT	MTA	PB
Revenue Accounting	TRAINS	Yes	SABHRS (PeopleSoft), Lockheed MOTRS.	Yes	Yes
Federal Billing	TRAINS	Yes	Billing Voucher System (BV).	Yes	Yes
Contract Tracking	TRAINS/Contact Administration (CAPS) in 1980. Custom, retainage, material, and line item cost to compute payment amount.	Yes	Spreadsheets, Contract Management System, Contract Tracking System	Yes	Yes
Other	Rewritten for specific needs TRACS (Transportation Allotment and Allocation Control System) – customized version of AMS budget prep, subsystem of TRAINS. Used for expenditure control at the organization and object code level. Control appropriation and determine allocation.	Receivables, fixed assets, inventory		Budget input and analysis system (BIAS) and financial information system (FIS.)	Human resources, Accounts payable/receivable, separates operating from project costs.
Project Budgeting and Accounting					
1. How do you track changes in the project budget and the reasons for changes between phases and during phases? (E.g., preliminary engineering, right-of-way, design, construction.)		Track actual costs against budgets. On federal projects budget changes are only made when authorized by federal authorization form 709. Changes are tracked in a spreadsheet. Project budgets are tracked at higher level.		By using the Contract Control System (CCS) – any changes go through this program	Change orders and (client) modifications update budgets in Oracle and tracks history

Survey Question	WSDOT	UDOT	MDT	MTA	PB
How do you relate project changes back to the program?	Change orders are managed through CAPS to increase authorized amount. CPMS performs program balancing. Agreement sheet is used to adjust work order authorized amount. Budget is at a high level; total project level rather than phase for most projects.	Changes are made based on overall project costs rather than individual project costs.	Through the federal program modification process. Amounts and justification is contained in the programming documents. This has been a problem that will be addressed through the proposed system updates.	Using CCS	Can track changes with report.
2. Do project budgets relate back to the program, STIP, or five-year plan?		Yes		Yes	N/A
How does your system support this?	Program Management staff holds a monthly allocation summary review meeting. They watch expenditures, balance the program, and project long-term project expenditure over the biennium.	Federal appropriate codes for federal projects and on a total project cost basis rather than individual. Maintains separate data at broad picture level. The 5-year plan is not in AMS. It is tracked back by federal codes.	An analysis can be performed which identifies budgeted vs. actual but it is not a fully automated process. The Project Cost Scheduling System takes planned and active projects and forecasts future costs. Spreadsheets are also used.	Appropriation is basis for budget. Projects relate back to appropriation of state, FTA, and propositions in city.	

Survey Question	WSDOT	UDOT	MDT	MTA	PB
<p>3. Do you budget a contingency amount for projects?</p>	<p>Yes, May vary between local and state projects 20-25 percent.</p> <p>For our standard form agreements with Utilities and Local Governments, the contracts contain an extra work clause where overruns of up to 25 percent may be allowed. Work of 25 percent or more of the contract total would require a contract supplement.</p>	<p>No</p>		<p>Yes</p>	<p>Varies</p>

Survey Question	WSDOT	UDOT	MDT	MTA	PB
<p>If yes, how do you determine and track and contingency amount? (E.g., fixed percent, vary by type and size of project.)</p>	<p>If above the limit, it needs to go to screening board. Otherwise they track in CAPS.</p>	<p>Weak on changes. Do have slush that is not allocated to a particular project.</p>	<p>The project engineer(s) estimate an amount of contingency depending on the type and size of the proposed construction project. The closer the project is to being advertised for bid letting, the smaller the project contingency should be.</p>	<p>Line item; look at risk associated with the project, use experience and historical data. Use database for estimating local region, usually at least 10 percent.</p>	<p>Some project managers budget reserve in contingency. Some clients do not allow this; it depends on the client, the contract and the project manager.</p>

Survey Question	WSDOT	UDOT	MDT	MTA	PB
<p>4. How do you budget engineering and other construction administration support? (Percentage of total costs, vary by type or size of project, other.)</p>	<p>Some direct product support (utilities, furniture) charged to a subprogram, not to projects. Personnel costs are allocated to the project.</p>	<p>Administrative costs are indirect and allocated to payments. The overhead pool is applied to contractor payments as a percent. Construction engineering costs are charged to a project, but their budgets are managed by individual division.</p>	<p>For budgeting purposes, CMS estimates MDT resources to support construction based on the size and type of project. Estimates are projected by fiscal year. The estimated cost for preliminary engineering is determined through consultation with the various pre-construction area units (i.e. those units estimate the number of hours required to accomplish the work. Based on those hours, a total estimated cost for MDT personnel is derived). If a consultant is utilized on the project, their contract cost is used to determine part of the total budgeted amount. For federal aid programming purposes, construction engineering is derived using a percentage of the construction contract (i.e. 8 percent, 10 percent, 12 percent...).</p>	<p>Used 20 percent of total project budget for all design and construction support (modifications based on experience). Looking at design/build for future projects.</p>	<p>Project administrator charges directly to project. Resources are estimated during proposal process. Proposal costs are usually based on average salaries.</p>

Survey Question	WSDOT	UDOT	MDT	MTA	PB
5. How do you budget and track third party funding sources?				Memoranda of agreement with city agencies	N/A
Do you have multiple joint project agreements (JPAs) for a project? (E.g., agreements with local governments for prior contributions to projects.)	Yes. Can be a developer, local, state and federal participation. Use agreements tied to the work order functionality in TRAINS to do percent billing.	Yes	Yes, the programming documents calculate the estimated or total committed amounts on a specific project. These documents are then used to create records in the accounting and billing systems.	Yes	
Do you track changes to a specific JPA?	Adjust set-up of work order if the participation changes.	Yes		Yes	
How do you track and bill project activities and progress to third party funds (JPAs)	Past due and reports.	Manually track project costs and bill third parties quarterly.		Treat like any other vendor, most JPA's are paid by MTA rather than a funding source	
6. Do you have pools of undesignated funding in the program that can be allocated to projects on an as-needed basis?	Regional Administrations has discretionary budget.	No	No	No	N/A
How do you balance these back to the program?	Through CPMS by program mangers in each region.				
How do you track available budget and expenditures?					

Survey Question	WSDOT	UDOT	MDT	MTA	PB
7. How do the operating budget and the project budget relate? Are they entirely separate?	Split by subprogram in TRAINS (capital projects through CPMS).	Project budgets are managed by attempting to keep engineering costs below a specified percentage of contractor payments.		Entirely separate.	Operating plan assumes certain percent to project. Oracle handles both and keeps separate.
What controls are in place to ensure that project expenditures are not charged to an operations budget and vice versa?	Program managers ensure that what is going through is correct.	We have developed a special report to track federal, state, admin, and other costs and these are reviewed by budget officers monthly.		Sorted by accounting code. Just implemented resource checking. Too much control.	Timesheets- relationship between task and project provides edit, Time is tracked daily and tasks are charged to projects as worked.
How are multi-year project budgets recorded and tracked?	They can be projected, planned and programmed beyond two years, but are not necessarily funded. Perpetual work orders are set up for two years initially then modify as funds become available. TRAINS contracts show the maximum amount.	Division budgets are annual, but project costs are tracked from inception to completion. Resources are budgeted as part of the operating budget by division. Operating resources are charged to a project as applicable.	PCS and CMS project costs by fiscal year.	Included based on cash flow. Shadow budgeting like a memo, re-budget each year, also re-budget carryover.	Looks at revenue recognition 3-4 times a year. Project managers use Primavera for scheduling, project status, percent complete, expenditures, etc.
8. Are all project costs included in the project budget?				Yes	Yes
Indirect cost.	Yes – some through direct project support pool.	Yes	No	Yes	
Operational cost (e.g., agency or department staff time).	Yes	Yes	Yes	Yes	
State provided materials or equipment.	Yes	Yes	Yes	Yes	
Are major cost components separately identified in the project budget structure? (E.g., utility relocation and right-of-way acquisition.)		Yes	Yes	Yes	

Survey Question	WSDOT	UDOT	MDT	MTA	PB
9. How do you relate consultant contracts to projects?	Yes			Have consultants for life of project	One to one
Do you have consultant contracts that can be charged to multiple projects?	TRAINS contracts work order and payment process – contract allotted to work order as assignments are identified.	Yes. Have on contract for a dollar amount that is not applied to a particular project.	Yes	Bench consultants (contractors) help finish out project periodically.	
If so, how do you budget for multiple projects?	Task assignment is on a rotating basis through the consultant liaison office.	By contract	Consultant invoices must document how much is to be charged to each project.		
How do you forecast project budget commitments?	Roster process identifies available and authorized consultants.	Through our STIP	Five year average by type and size of project.		
How do you control maximum contract amounts?	The contract number is attached to a work order. Can't exceed the contract/work order amount.	Our contract system doesn't allow us to overpay on contract amount. Use work orders to identify commitment to each project. Separate contract tracking system ARCMS	Fixed Assets	Task and dollar amount are associated with activity.	

Survey Question	WSDOT	UDOT	MDT	MTA	PB
<p>10. How do you budget and track contractor incentives?</p>	<p>A ceiling budget amount is built into full budget price.</p>	<p>Tracked through our regular contractor management system.</p>	<p>The construction bureau has not tried to budget for and track contractor incentive on projects. We do modifications to put more money and take more money out of projects. To my knowledge, in the last five years we have not had to do a modification because a contractor had a big incentive payment. The one exception to this are projects where contractors have early contract incentive completion clauses like 10th Avenue South in Great Falls and the contractor does complete early which cost the Department a large sum of money. We have not done a lot of big urban projects and paid big incentives in the last five years.</p>	<p>Don't track that</p>	<p>N/A</p>

Survey Question	WSDOT	UDOT	MDT	MTA	PB
1. Do your contracts include adjustments for price fluctuations (e.g., oil prices affecting asphalt costs)? How do you budget and account for this?	All costs must be included in the contractor's bid. A change order may be negotiated if the cost variances are extreme.	No. Treated as a change order.	The Department has a contract special provision for fuel use on a project and for burner fuel to make plant mix. The current special provision allows the price to go up or down by 25 percent before the Department or the contractor needs to make an adjustment. We do not try to budget for this item but we do put contingency factors in our estimates. Again we have not done a lot of contract modifications in the last five years because of the fuel use special provision and until recently the contractors have been paying more back to the Department then we have been paying to them.	No, factored in each year, get percent multiplier from federal government. Responsibility of contractor to bid appropriate amount.	N/A.
2. Do you carry over unexpended project balances from one fiscal year/biennium to the next?	Yes, at end of biennium. The construction programs are summarized at the appropriation level.	Yes. Budgets are managed on a fiscal year basis.			
Do you prepare a report identifying projects that are underway and their unexpended budgets?	Yes. The "Operating Book."	No. Project budgets are a management tool. The budget carryover is computed at the appropriation level.			

Survey Question	WSDOT	UDOT	MDT	MTA	PB
How do you prepare the report?	The "Operating Book" is prepared in CPMS using CPMS budget projections and cost information from TRAINS. Some adjustments are required to resolve reconciling items.				
Is this report prepared directly from your project accounting system?	Indirectly; cost information is extracted to CPMS from TRAINS.				
Reporting					
1. Do you provide online access to project information?				Yes, CCS	Yes
Update?	TRAINS – work order system, work order ledgers. CPMS – program managers online, more limited.	Yes	For those authorized, system by system	Yes	Limited access to only Project Administrator, they handle all updating for project data, timesheets, etc.
Read only?	Yes, through TRAINS (several hundred users).	Yes	Yes. Limited in some cases	Mostly read only	Available to Project Manager and the Project Administrator.
Available to central office?	FIRS (about 1500 users) – Provides summary level information, it is written in Visual Basic and Excel with an SQL database. Daily extracts from TRAINS keeps the data current.	Yes	Yes	Yes. Everyone has access to Oracle via Internet. Controlled update permission	Yes

Survey Question	WSDOT	UDOT	MDT	MTA	PB
Available to district or regional offices?	CPMS (less than 300 users) – program managers only access it in region. One representative for access. TRAINS (about 300 users) query ability and entry into CAPS then to TRAINS.	Yes	Yes	Yes. Internal to WSDOT	Project office/Project Administrator/Manager.
2. How much historical information is available?	With TRAINS perpetual projects, each work order stays on the system at summary level for in about. Summary closed in about 4-5 biennia. Detail closed at end of biennium but can be run in reports.			CCS – everything. Oracle – prior to 1993 in summary, since is available at the detail level.	
Online?	Detail level not online.	Back six years in present system, but further back to old system if project is still on books.			Yes, it has not been purged
Reports?		Same as above.	Seven Years of project information is kept in archives. It requires ISB set up for access.		Yes
3. What reporting and analytical tools do you use?					Excel, Access, Primavera. Data is downloaded from Oracle to Excel, etc.
For standard reports?	100's of reports monthly, some daily and weekly.	American Management System.	PL1, Culprit, SABHRS, Oracle, and spreadsheets	Trending system. CIP (250) – reports monthly, hard copy in the past, moving to Web based. Use ACCESS, MS FrontPage.	
For <i>ad hoc</i> reports?	AMS, Advantage DC (10 licenses) Real query – SQL, ADABAS (new).	Microsoft Access.	Oracle Tools	CCS has many reports.	

Survey Question	WSDOT	UDOT	MDT	MTA	PB
Are they available to project managers and staff?	No, except for FIRS	Yes	Generally require ISB involvement	Yes, also records management center retains a historical copy of all reports.	
4. Do you use a data warehouse for project accounting and budgeting? If so, what functions are available via the data warehouse?	Visual Basic, Excel, SQL database behind nightly extract. FIRS provides summary level of information in work order and group.	Yes. All financial transactions are in the data warehouse and can be extracted using Microsoft Access. With the table driven system didn't like reports. Access gives better results with summary and detail.	Some data is copied to Oracle tables for reporting. Moving to implement data warehouse concepts for key data.	Yes, for CCS and Oracle.	Don't think so
5. Do you provide Web-based access to project information?	Not yet, looking at other PM tools.	Very limited.	No, but would like to include those capabilities in future development. PPMS will be web enabled.	CCS – web based upgrade. Going to web project management (shared documents and updates). Project quest, operational in beginning of 2002.	Yes, requires special access.
6. Do your reports present data by program activity and/or geographic area?	Yes, a number of budget reports are by subprogram, and organization, TEIS (Transportation Executive Information System) – for legislative transportation committee is organized by legislative district shows performance information by location.	No	Some geographical data is available. MDT has a Transpiration Information System (TIS) that provides a standard geographical link to data. Project accounting data is not linked yet	Yes, to program activity	Yes, geographic/Cost center/Profit center – project managers can only access their own projects.
7. May we have a sample copy of a project budgeting or cost accounting report or screen prints of your system? .	Yes, work-order ledger and report for tracking budget and expenditures.	Yes. Project cost tracking and cost detail. Project status and control project cost tracking and detail.		Yes	No

Survey Question	WSDOT	UDOT	MDT	MTA	PB
Training					
1. What type of training do you provide on project budgeting and accounting?					
Classroom training on systems?	TRAINS – new features	Yes		Oracle currently on 11i. Ongoing with CCS.	PBIS training, on Oracle in house
Classroom training on the fundamentals of project budgeting and accounting?	No	Yes		No	Project manager and Project administrator certification program – set of modules (classroom) presented by corporate human resources.
Online training?	No	No, all classroom.		No	No
Other?	Targeted training with new features/lab. Also new employees. Newsletters, User groups, help desk, manuals (rewritten). CPMS user group.				
2. Can we get a copy of training materials?		Nothing currently available.		Yes	No

APPENDIX D: RANKING OF ADOT REQUIREMENTS

This appendix shows the ranking of ADOT financial improvement requirements by selected ADOT managers and by Dye Management Group, Inc. Selected ADOT managers prioritized the requirements by assigning a value of one to three (with three being the highest priority) to each requirement, then averaging the results. Dye Management Group, Inc. developed an independent ranking of the requirements based on their understanding of ADOT's business objectives; information gathered during focus groups, interviews, and conversations with ADOT managers and staff; and our experience with similar project accounting requirements in similar organizations.

We were also requested to give an indication of which requirements may have an impact on internal controls. Although an internal controls review was not within the scope of this project, any change to accounting processes may have an impact on internal controls and this impact should be evaluated and mitigated as part of the process and software design. In the chart below, we have indicated those requirements that will most likely have some impact on internal controls (such as those related to better documentation and training) and those for which internal controls should be considered during the design of the procedures or system changes.

REQ#	Title	ADOT Rank	Dye Rank	Impact on Internal Controls?
1	Connect Programming and Budgeting	2.7	3	
2	Track Changes to Project Estimates	2.5	3	yes
3	Original Budget	3.0	2.5	yes
4	Control of "Subprogram" Projects	2.7	3	
5	Source of Budget Items	2.3	3	
6	Adjustable Costs	2.8	2.5	
7	Identify Contingency	2.5	2.5	
8	Consultant Contracts	2.7	2	yes
9	Cost Accounting	2.2	1	
10	Link Construction Engineering Costs to Project Budget	2.3	3	
11	Financial Controls	2.7	2.5	yes
12	Budgetary Control for Temporary Technicians	2.2	1	
13	Track Third-Party Commitments	2.8	3	yes
14	Track Change Orders to Third Party Commitments	2.8	2.5	yes
15	Billing of Third-Party Sources	2.7	2.5	yes
16	Relate Contracts to Projects	3.0	2.5	yes

REQ#	Title	ADOT Rank	Dye Rank	Impact on Internal Controls?
17	Asset Management	2.8	2	
18	Project Characteristics	1.8	2	
19	Lane Miles	1.8	2	
20	RAAC Information	2.5	2	
21	Type of Work Description	2.7	2	
22	Project Establish Date	2.5	2.2	
23	Authorization Dates	2.8	2.2	
24	Budget Change Information	2.8	2.7	yes
25	FHWA Reporting	2.8	2	
26	Cash Flow Forecasting	2.7	1	
27	Program and Budget Structure Needs	2.8	2.5	
28	Route Identification	1.8	2	
29	Identify Projects in Five-Year Program	2.5	3	yes
30	Compare Project Budgets and Costs to the Program	3.0	3	yes
31	Original Budget	3.0	3	
32	Annual Inflation Review	1.7	1	
33	Updated Project Budgets	2.7	2.5	yes
34	Project-Based Budgeting	2.0	1	
35	Contingency	2.5	2.5	
36	Consultant Contracts	2.0	2.5	
37	Cost Accounting	1.8	1	
38	Financial Controls and Review	2.8	2.5	yes
39	Project Closeout	2.8	2.7	yes
40	Contract Closeout	2.8	2.7	yes
41	Third Party Agreement Process	2.7	3	
42	Track Third-Party Commitments	2.7	2.5	
43	Program/Project Budgeting and Accounting	2.8	3	
44	Reporting	2.8	2.5	
45	Information Training	2.5	2.5	
46	ADVANTAGE Training	2.5	2	
47	Financial Training	2.7	2	yes
48	Specialized Training	2.8	2	
49	Reports by Project-To-Date and by Fiscal Period	2.8	1.5	
50	Report CA100560-1: Project Detailed	2.4	1.5	

REQ#	Title	ADOT Rank	Dye Rank	Impact on Internal Controls?
	Transaction Report			
51	Projects Underway Report	3.0	3	
52	Exception Reports	3.0	2.5	yes
53	Flexible Reporting	2.8	2.3	
54	User-friendly Reports	2.8	2.3	
55	Management Reports	2.8	2.3	
56	User Specific Reports	2.7	2.3	
57	Access to Standard Reports	3.0	2.5	
58	Historical Information	2.5	2.5	
59	Online Access to Information	2.5	2.5	yes
60	Print Routing	2.5	2	
61	Reporting Support	2.6	2	
62	INFACCS	2.7	2	
63	Analytical Tools and Access	2.5	2	
64	Reporting Efficiency	2.7	2	
65	Flexible Reporting	2.7	2	
66	Web-based Access	2.2	2.5	
67	Document Management	1.7	1	
68	Consistent Data Across Applications and Databases	3.0	2.7	
69	Coordinated Data	2.8	2.7	
70	Data Ownership	2.8	2.7	
71	Integrate Systems	2.7	2.5	
72	Shared Access	2.8	2	
73	Financial Policies	2.8	3	yes
74	Construction Budget and Project Accounting	2.8	3	yes
75	Project Managers' Manual	3.0	3	
76	Agreement Estimate	3.0	2.5	
77	Organizational Communications	2.8	1.5	
78	Financial Systems Support	3.0	2.5	yes