Best Practices for Structuring and Managing Statewide Resource-Tracking Databases

SPR-795
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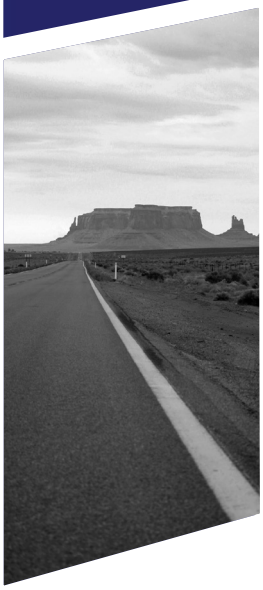

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ARIZONA DEPARTMENT OF TRANSPORTATION
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16. Abstract

The Arizona Department of Transportation (ADOT) is working to modernize its financial tracking systems to improve transparency, compliance, and efficiency in managing federally funded transportation projects. Existing tools, including the Resource Administration database and related systems, operate independently, and require extensive manual data entry, limiting real-time financial coordination.

This study evaluated federal requirements, reviewed ADOT's current financial management processes, and examined practices from peer state departments of transportation. The research identified best practices in system integration, governance, and automation, and also developed a three-phase framework, covering preparation, procurement, and implementation to guide modernization. The recommendations provide ADOT with a practical roadmap for developing a unified, data-driven resource-tracking system that supports efficient decision-making and regulatory compliance.

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Acronyms and Abbreviations

AC	Advanced Construction
ADOT	Arizona Department of Transportation
AFIS	Arizona Financial Information System
CFR	Code of Federal Regulations
COG	Council of Governments
COTS	Commercial Off-the-Shelf
DOT	Department of Transportation
eSTIP	Electronic Statewide Transportation Improvement Program
FFMIA	Federal Financial Management Improvement Act
FHWA	Federal Highway Administration
FMIS	Fiscal Management Information System
FTE	Full-Time Employee
IT	Information Technology
MPO	Metropolitan Planning Organization
OMB	Office of Management and Budget
PRB	Project Review Board
RA	Resource Administration
RFP	Request for Proposal
SaaS	Software as a Service
STIP	Statewide Transportation Improvement Program
TIP	Transportation Improvement Program

Introduction

Background

Financial tracking systems are the backbone of transportation program management, linking planning, programming, and delivery activities with the fiscal responsibility required by federal and state oversight agencies. ADOT's Resource Administration (RA) database plays a central role in this process, tracking project obligations, allocations, and the financial lifecycle of projects funded through state and federal sources.

However, ADOT's current system environment operates largely as a collection of semi-integrated tools. Manual data entry, inconsistent workflows, and limited automation have led to inefficiencies, duplicated effort, and challenges in maintaining real-time operational consistency. These issues mirror broader national trends among state departments of transportation (DOTs), many of which are modernizing their systems to reduce manual processes by automating integration with FMIS while also enhancing internal and external reporting capabilities.

Federal and state regulations establish strict expectations for financial accountability. Collectively, these mandates require standardized accounting, fiscal constraint in transportation programming, and certified financial management systems capable of providing auditable data.

Within this context, ADOT's modernization effort aims to strengthen financial integrity and compliance while improving workflow efficiency and user experience. The study provides a foundation for designing a system that aligns with best practices observed nationwide, including integrated data architectures, rule-based funding assignments, and automated financial reporting tools.

Objectives

The overarching objectives of this study are to identify best practices and provide a practical framework for enhancing ADOT's statewide financial tracking and reporting capabilities. Specifically, the study seeks to:

- Review relevant federal and state regulations that govern financial tracking, reporting, and compliance.
- Assess current financial management processes within ADOT's RA Database and related platforms.
- Review peer state systems to identify innovative tools, technologies, and operational models.
- Develop detailed case studies on innovative practices and programs used by other state DOTs.
- Formulate actionable recommendations and an implementation framework to guide ADOT in developing an integrated, efficient, and compliant statewide resource-tracking system.

These objectives ensure that ADOT's future financial management framework not only meets current regulatory requirements but also provides a flexible, scalable foundation for the evolving landscape of transportation funding and project management.

Recommendations

Based on the review of ADOT's current financial management systems, federal requirements, and peer state practices, the study presents a structured framework to guide ADOT in modernizing its statewide resource-tracking systems. The study's recommendations are organized into three sequential phases: Preparation, Procurement, and Implementation, each with specific goals, actions, and outcomes that collectively form a roadmap for ADOT's modernization effort (Figure 1).

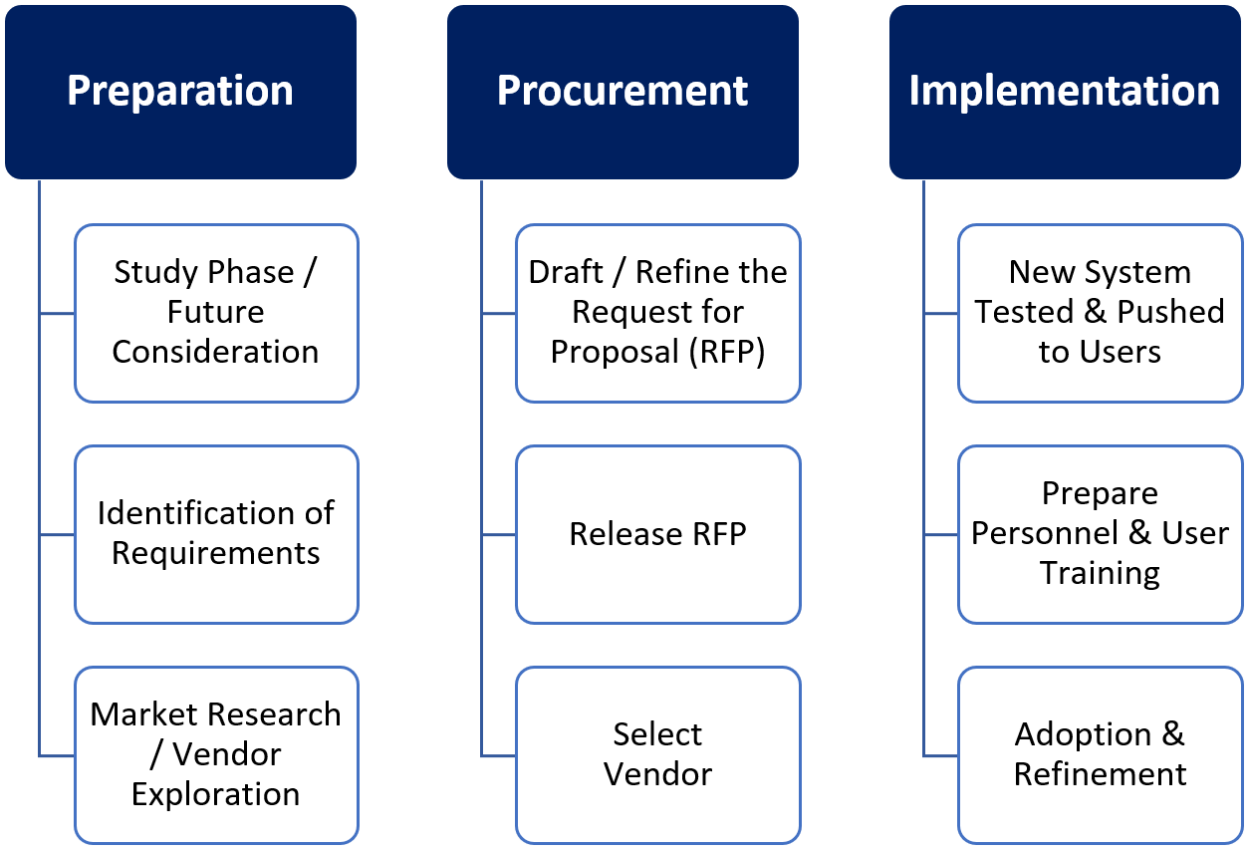

Figure 1. System Modernization Framework.

1. Preparation Phase

The preparation phase lays the foundation for successful procurement by defining system needs, mapping current processes, and aligning planning, programming, finance, and information technology (IT) units. During this stage, agencies assess existing challenges such as manual data entry, inconsistent reporting, or limited FMIS integration, and begin outlining desired system capabilities. Activities include reviewing peer practices, developing business use cases for automation, and coordinating with leadership on governance, funding, and data management needs to ensure readiness for later procurement stages.

Recommendations for ADOT

Goal: Build internal alignment, clearly define needs, and set the groundwork for a well-scoped procurement.

- **Identify the Key ADOT Drivers** that will direct decisions about any technologies/tools related to federal funds management. Some of these areas relate to ADOT's overall plan and strategy for the long-term vision of federal funds management. For example, what does ADOT want in the following areas:
    - **Map out anticipated future project volume:** Upcoming projects and overall project volume/program development can guide ADOT's decisions by identifying the amount of work compared to the current state, which impacts future tools, processes, and personnel. This will also form an important aspect of ADOT's "future state," which should be included in any procurement solicitation to potential vendors.
    - **Identify related initiatives:** Frequently, DOTs may take on multiple change initiatives, such as new software, tools, and processes. When these are done concurrently and in similar departments/related areas, this may cause confusion, disconnected systems/data flow, duplicated efforts, and magnify workload challenges for personnel. Changes to Federal funds management of projects should be carefully planned and timed accordingly.
    - **Create a budget:** Understanding ADOT's financial model and what that may look like in the future will dictate key decisions about Federal funds management options related to tools, processes, and systems/technologies. The budget should be comprehensive and realistic.
    - **Decide on whether to go with in-house development or third-party software:** If going with in-house, decide on software support and maintenance (e.g., availability of internal IT capacity, amount of dedicated IT resources, data quality, and leadership approval) to determine when ADOT should move to procurement. Reach out to various DOTs from the case studies developed (DOTs with similar software).

- Form **a Core Project Team** including Programming, Finance, Planning, and IT staff, with an executive sponsor and project manager. The Core Project Team will guide the change across the three main stages and key decision points.
- **Facilitate structured engagement sessions** with internal users (districts, finance, planning, and IT) to capture functional requirements, prioritize pain points, and define success criteria.
- **Ensure IT and cybersecurity alignment** by involving ADOT's technology division early in the request for proposals (RFP) review to vet hosting environments, data security, and access protocols.
- **Develop business use cases** for automation, data integration, and reporting enhancements, explicitly linking each proposed feature to an operational or compliance need.
- **Consider other DOTs' advanced practices** (e.g., Indiana's in-house CAPWise integration with FMIS, Massachusetts' centralized eSTIP®) to identify practical models of governance and system ownership.
- **Develop a data governance and integration roadmap** outlining how legacy systems, GIS data, and FMIS interfaces will be handled in later phases.

2. Procurement Phase

The procurement phase turns identified needs into clear, actionable steps for selecting a vendor. It involves developing RFPs, defining evaluation criteria, and coordinating closely among planning, finance, IT, and procurement teams. During this stage, agencies refine requirements, assess vendor proposals, and conduct demonstrations or pilot tests to ensure the chosen solution meets functional, technical, and compliance needs. Strong documentation, communication, and cross-unit collaboration are key to setting the foundation for a successful contract and smooth implementation.

Recommendations for ADOT

Goal: Translate business and functional needs into an actionable procurement that ensures flexibility, scalability, and accountability.

- **Draft the scope of work.**
  - **Overview and purpose**: Describe what the project is and the reason ADOT is pursuing it. This should include both a high-level summary and detailed information, such as the primary business drivers. Key questions to answer are:
    - Why is the organization interested in pursuing this project?
    - What will a successful outcome look like over the next several years?

    This information allows vendors to build their proposal and approach around the client's core objectives.

- **Future state**: Lay out the vision for how ADOT will use the FMIS. Key questions to answer are:
  - Which user groups will interact with the technology and in what ways?
  - How is this technology expected to integrate with other areas of the organization's technology environment?
  - What legacy data will be brought forward and used in relation to the new technology?
- **Identify the "Mandatory Requirements,"** which are pass/fail items that are the minimum expectations of the vendor and/or their technology. In other words, the vendor and their product(s) must meet every mandatory requirement. Failure to meet any individual mandatory requirement will result in automatic disqualification. The mandatory requirements should not be overly burdensome, or they will unnecessarily constrain competition.
- **Identify the "Desired Requirements,"** which are items that the organization would like to include because they may add value to the project. The proposals should try to achieve as many of these requirements as possible and will show the value proposition of each vendor, but vendors will not be automatically disqualified for missing a desired requirement. Typically, the vendors who can meet the most desired requirements will be front-runners in the evaluation process.
- **Schedule constraints should describe the anticipated duration of the implementation and/or deployment phase.**
- **Budget constraints are an important way to clarify the organization's needs and what they can reasonably afford.** The recommended best practice is to provide a clear and direct budget in the statement of work, which identifies the budget for one-time upfront costs and ongoing annual budgets for licensing, support, and long-term operation.

- **Draft an RFP that reflects real user workflows**, drawing on input from finance, programming, and IT units to ensure that system design supports both fiscal compliance and planning coordination.
- **Use a multi-criteria evaluation framework** that balances functionality, cost, implementation support, and vendor experience with other DOTs or government agencies.
- **Incorporate demonstrations from current DOT clients** as part of vendor evaluation to validate usability and integration potential before final selection.
- **Plan for data migration and change management costs** within the procurement budget—a common underestimation in peer states.
- **Define clear contract deliverables and milestones**, including system configuration, testing, training, and post-go-live support requirements.
- **Leverage lessons from peer DOT procurements**, such as Texas' structured RFP development vendor selection model for Masterworks®, to inform procurement sequencing.

The outcome of the procurement phase should result in the selection of a vendor and contract award based on transparent, performance-based criteria aligned with ADOT's modernization goals.

3. Implementation Phase

The implementation phase focuses on configuring, testing, and deploying the new system once a vendor is selected. Activities include setup, customization, data migration, and user testing, supported by strong leadership and clear governance. Deployment is typically phased in to reduce disruption, with training, communication, and technical support ensuring smooth adoption. Ongoing monitoring and user feedback help refine performance and maintain system effectiveness after launch.

Recommendations for ADOT

Goal: Achieve a smooth transition from legacy systems to a fully functional, user-adopted platform.

- **Establish a cross-functional implementation team** including technical, financial, and program management representatives to supervise configuration, testing, and go-live readiness. This may include members of the core project team.
- **Adopt a phased implementation strategy** (can refer to Massachusetts DOT) (e.g., piloting with one program or district first) to test workflows, validate data migration, and refine training before full rollout.
- **Create ongoing feedback and support channels**, such as user advisory groups or quarterly check-ins, to monitor adoption and identify post-launch enhancements.
- **Track and evaluate success metrics** (e.g., reduced manual entries, faster federal code assignment, improved fiscal constraint tracking) to assess the system's value and report these back to the Core Project Team to ensure accountability and value.
- **Monitor, Support, and Continuously Improve** the system post-launch, using performance metrics and user feedback to guide enhancements.
- **Develop comprehensive training materials and user guides**.

Unique Approaches from Peer State DOTs

Peer DOTs have adopted distinctive strategies to modernize their financial management and programming systems. Each example offers valuable lessons in governance, automation, and phased implementation. Collectively, these approaches illustrate multiple pathways to improving efficiency, compliance, and user accessibility, providing practical insights for shaping ADOT's own modernization roadmap.

Indiana: Long-term Expertise and Automation

INDOT's CAPWise system evolved through continuous collaboration with an embedded consultant who bridges business and technical domains. Its business rules engine automates funding code assignment based on eligibility, ensuring accuracy and compliance while reducing staff workload.

New Mexico: Inclusive Procurement and Testing

NMDOT's second-generation procurement process emphasized early stakeholder involvement across divisions and metropolitan planning organizations (MPOs), clear FMIS integration requirements, and a four-month testing period before going live, reducing risks, and improving adoption.

Oregon: Rule-based Simplicity

Oregon DOT streamlined federal funding code assignment using structured rules that prioritize restrictive funds first, leaving flexible funds for redistribution. This process demonstrates that clarity and consistency in business logic are as valuable as automation.

Massachusetts: Phased Implementation and Self-Service

Massachusetts DOT's eSTIP rollout focused on core functionality first, launching early, and expanding in phases. The system's automated eligibility rules and user-managed updates promote accountability and real-time decision-making while reducing IT dependency.

These examples reinforce that successful modernization is not just about technology, but about governance, user engagement, and incremental system maturity. ADOT's roadmap should combine the technical rigor of automation (Indiana), the inclusive process of stakeholder design (New Mexico), the operational discipline of rule-based workflows (Oregon), and the phased, self-service orientation (Massachusetts).

Peer State Procurement and Implementation Timeline

The timeline in Figure 2 illustrates the different stages of DOT modernization, from early exploration to full implementation. It may guide ADOT in prioritizing peer outreach, engaging states in the study or RFP phases for scoping and procurement insights, and those in implementation for lessons on deployment and change management. This targeted approach helps ADOT gather practical, stage-specific lessons throughout the procurement lifecycle.

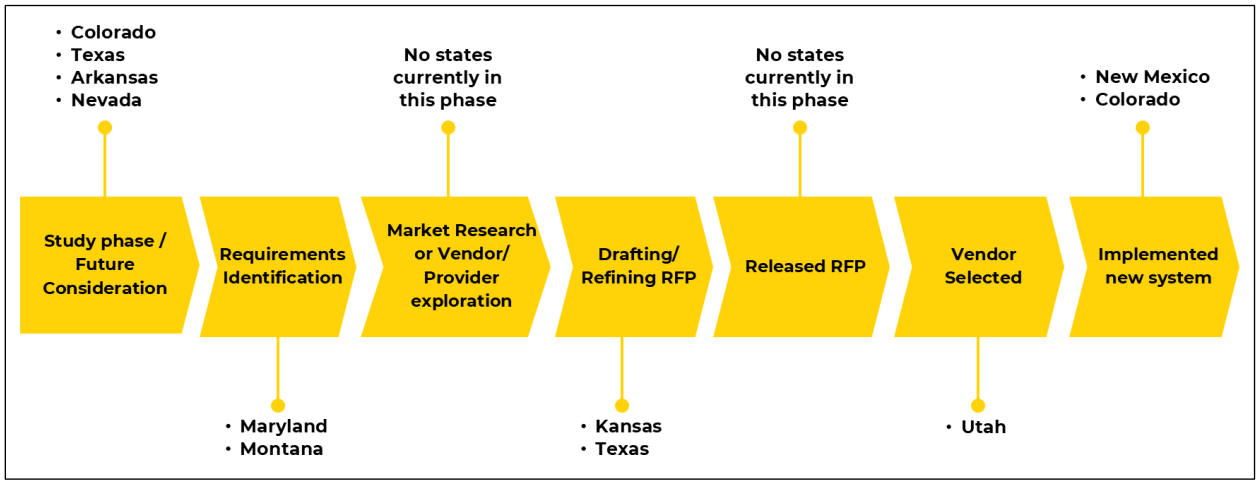

Figure 2. Timeline for Changing Software.

Findings

Regulatory and Compliance Framework

Effective financial management of federally funded transportation programs depends on adherence to a set of core federal regulations that promote transparency, accountability, and fiscal discipline. While ADOT's RA Database is one of several tools used in the broader financial management process, understanding the overarching regulatory framework is essential to guide system modernization and ensure continued compliance. These regulations establish how states must structure, track, and report project funds, setting consistent expectations for data integrity, audit readiness, and financial control. The following synthesis focuses on the regulations most relevant to project funds management and explains how they inform ADOT's modernization efforts.

Overview of Key Regulations

A review of federal guidance and statutes requiring agencies handling federally funded transportation projects to demonstrate compliance with a few key requirements. These include:

- **Title 23 Code of Federal Regulations (CFR) 450.104**: Provides regulations on fiscal constraint in transportation programs, ensuring that projects listed especially in the Statewide Transportation Improvement Program (STIP) and metropolitan transportation improvement programs (TIPs) can be completed with committed or reasonably available funds.
- **Title 23 U.S.C. 115**: Governs project authorizations and the use of Advance Construction, which allows states to begin projects with state funds and later seek federal reimbursement, provided that accurate financial records are maintained.
- **Title 2 CFR Part 2900**: Establishes uniform administrative and financial requirements for federal financial assistance programs, including rules on allowable costs, internal controls, and financial reporting.
- **Office of Management and Budget (OMB) Circular A-130**: Requires agencies to use standardized and government-approved financial tracking software that reduces operational costs while ensuring compliance with federal information management policies.

Together, these regulations form a baseline for financial accountability. However, two frameworks, the Federal Financial Management Improvement Act (FFMIA) and the Federal Highway Administration's (FHWA's) Project Funds Management Guidance, are most directly tied to ADOT's modernization goals.

Federal Financial Management Improvement Act

The FFMIA establishes the national expectation that government agencies use auditable financial management systems. This means ADOT's financial data, from initial project setup to final reimbursement, must be accurate, traceable, and consistent across all systems.

For ADOT, the FFMIA underscores the importance of a single, unified system that connects project planning, budgeting, authorization, and reporting. Under the current framework, manual data entry between systems such as AFIS, FMIS, and the RA Database introduces inefficiencies and potential inconsistencies. A modernized, FFMIA-aligned system would allow ADOT to automate financial reconciliation, improve data accuracy, and demonstrate fiscal accountability to federal partners.

FHWA Project Funds Management Guidance

The FHWA's Project Funds Management Guide for State Grants translates those federal requirements into specific operational expectations. It outlines how state DOTs should manage funds throughout the life of a project, from authorization to closeout and what documentation is required to demonstrate compliance.

For ADOT, these expectations highlight the need for better automation and monitoring. A modernized system should flag inactive projects, prompt updates to obligations, and automatically track whether projects are progressing within their approved timelines. By embedding these functions into system design, ADOT can move from reactive oversight to proactive financial management.

Core Elements of Federal Funds Monitoring

Across these federal standards, four recurring elements define effective oversight of federally funded projects. These elements represent practical checkpoints that ADOT may integrate into future system workflows and are described in Table 1.

Table 1. Funds Monitoring.

Core Monitoring Element	Description
Planning	Planning highlights the importance and completeness of the STIP and project agreements to ensure smooth authorization occurs and remains active.
Schedule	Schedule highlights the importance of the project's end date as a critical milestone and monitoring to ensure a project's schedule is progressing appropriately.
Financial	Financial ensures that the records of all obligations and advance construction authorizations are maintained and properly authorized. Obligations should be expended through regular billing. Project agreements must be updated to reflect current costs.
Closeout	Closeout stipulates that projects should be closed out in a timely manner, final costs should be verified, and both the final voucher and final report submitted to FHWA.

Collectively, the regulatory framework points toward a single operational goal: a modern, integrated financial management system that can enforce compliance through automation rather than manual oversight. For ADOT, aligning with FFMIA and FHWA guidance means designing a system that not only meets audit standards but also simplifies daily workflows, reduces human error, and supports real-time fiscal monitoring.

Current ADOT Systems and Practices

Currently, ADOT manages the financial lifecycle of federally funded transportation projects through several interconnected applications. Each plays an important role in tracking funding, authorizations, and expenditures, but they function more as separate components than as a single, integrated system.

- The **Arizona Financial Information System (AFIS)** serves as the state's primary accounting platform.
- **Project Master** is used internally to assign project codes.
- The **Fiscal Management Information System (FMIS)**, owned by the FHWA, is the Federal accounting system through which ADOT must enter and manage federally funded projects.
- **eSTIP** provides a searchable online listing of all projects approved in the STIP.
- The **RA Database** supports daily management of project obligations, allocations, and suballocations.

Together, these systems provide the foundation for financial accountability and compliance with federal requirements. However, the absence of full system integration means that information must often be manually entered or updated in multiple places. This lack of connectivity limits the department's ability to view the full financial picture of each project in real time. Several key challenges identified with the current RA Database are:

- **Extensive manual data entry:** Staff must manually enter and verify most project and funding data, increasing the risk of human error and consuming a significant amount of time.
- **Limited workflow alignment:** The interface does not support clear tracking of project progress, requiring users to maintain manual records that can lead to inconsistency.
- **Inflexible system structure:** Adding new funding codes or categories requires backend changes, which can restrict adaptability to new programs or policy updates.
- **System instability:** Unpredictable crashes can occasionally result in data loss and workflow disruptions, undermining user confidence.
- **Limited technical support:** Delays in troubleshooting and system maintenance may prolong inefficiencies and reduce overall reliability.

These challenges collectively emphasize the need for a modern, integrated, and user-friendly financial tracking platform that improves efficiency, stability, and adaptability.

To better understand how other transportation agencies manage federally funded projects, the research team interviewed 18 state DOTs across the country (Table 2). These interviews focused on the systems, staffing structures, and financial funds management processes each state uses to track project funding, assign federal codes, and maintain fiscal compliance. The responses were summarized into a data matrix, which organizes information by key categories as shown in Table 3. This matrix provided a consistent framework for comparing approaches, identifying innovative practices, and pinpointing elements that form the basis for the recommendations. The complete data matrix, containing detailed state-by-state information, is provided in the Appendix for reference.

Key Facts and Figures from Data Matrix

The peer state interviews revealed significant variation in how state DOTs manage federal funds, yet several consistent patterns emerged across the 18 agencies studied. These findings highlight trends in technology, staffing, and operational practices that can inform ADOT's modernization approach.

Note that all percentages and figures in this section are based on the 18 state DOTs that were interviewed for this study (for example, 44 percent represents eight out of 18 states) and are not reflective of all U.S. states.

1. System Types and Technology

Most state DOTs have developed unique approaches to managing financial data, ranging from simple spreadsheets to complex enterprise systems. The review found that:

- 44 percent (eight states) use in-house developed systems tailored to agency needs.
- 17 percent (three states) use customized third-party platforms.
- 17 percent (three states) rely on data warehouses combined with spreadsheets.
- 11 percent (two states) depend primarily on standalone spreadsheets.
- 11 percent (two states) use commercial off-the-shelf software.

Overall, more than half of the states interviewed are planning or actively implementing system upgrades, showing a national shift toward modernization and integration.

2. Core System Functions

DOT systems vary in their level of sophistication, but most focus on ensuring fiscal constraint and compliance with federal funding rules. Among the states interviewed:

- 78 percent of states use their systems to support both programming and planning functions.
- 67 percent use them to balance against federal funding accounts.
- Only 22 percent of systems are used for procurement or purchase order functions.
- Most of the state DOTs separate project management from financial transaction systems.
- About half the states still rely on manual entry into FHWA's FMIS, while others have achieved partial or full automation.

3. Federal Funding Code Assignment

Assigning and tracking federal fund codes remains largely a manual process. The peer review showed that:

- 12 states assign funding codes during the programming phase, while four states do so earlier in planning.
- 15 of 18 states handle code assignments manually, with only a few having automated or rule-based systems.
- Many DOTs reported prioritizing use of the most restrictive federal funds first (e.g., PROTECT, Carbon Reduction) to preserve flexibility later in the fiscal year.

4. Staffing and Resources

Most DOTs rely on small, specialized teams to manage federal fund programming and oversight. The review found that:

- Most DOTs manage federal fund programming with small teams of 3–15 full-time employees (FTEs).
- The average staffing level across states was approximately six FTEs, often split between programming, finance, and IT functions.
- States with in-house systems tend to operate with leaner teams, relying on dedicated IT support rather than additional administrative staff.

5. STIP Planning Practices

States differ in how often they update and manage their STIPs. The interviews indicated that:

- The STIP update cycle varies:
  - Annual updates in seven states.
  - Biennial updates in seven states.
  - Triennial or longer cycles in four states.
- Most states (15) operate on four- or five-year STIP horizons, though some extend to six or seven years for long-term planning.

Emerging Trends

Across all peer states, modernization is driven by a shared need for efficiency, flexibility, and transparency. Several trends are shaping the direction of state DOTs' financial systems:

- **Integrated systems:** States are moving away from disconnected systems toward unified systems that combine planning, programming, and funding management. This enables real-time data sharing, improved security, and faster system updates.
- **Automation and business rules:** New systems increasingly use built-in logic to assign fund codes, flag errors, and validate eligibility before submission to FHWA. For example, Indiana's CAPWise system applies business rules that ensure compliance and reduce manual checks.
- **Collaboration between IT and program staff:** States with successful systems maintain strong collaboration between finance, programming, and IT divisions. This ensures that system functionality supports both operational workflows and compliance requirements.
- **Institutional continuity and knowledge management:** Retaining experienced staff or long-term consultants who understand both federal policy and system architecture has proven essential. States that maintained this continuity through multiple system upgrades reported fewer disruptions.
- **Phased implementation strategies:** Most states are moving toward gradual, step-by-step modernization rather than full system replacement. Phased rollouts allow time for user testing, staff training, and refinement of business rules before statewide deployment.

The peer state interviews confirm that ADOT's challenges, like manual data entry, fragmented systems, and heavy reliance on spreadsheets, are common across the country. However, the states that are advancing most rapidly share several characteristics: integrated platforms, automation of repetitive processes, and sustained investment in staff expertise. These lessons provide a clear direction for shaping ADOT's future modernization and system design strategy.

Peer Case Studies

To gain deeper insight into how other states manage federally funded transportation programs, the study identified three states for creating detailed case studies: Indiana, Kentucky, and Massachusetts. These states were chosen because they represent distinct modernization approaches:

- Indiana demonstrates the success of a custom, in-house developed financial management system.
- Kentucky showcases internally managed modernization supported by strong IT capacity and cash management discipline.
- Massachusetts illustrates the benefits of a vendor-supported, cloud-based system that enables statewide collaboration and transparency.

Together, these case studies capture a range of strategies that highlight how different system designs and implementation approaches can achieve improved integration, efficiency, and compliance.

Indiana Department of Transportation (INDOT)

Indiana has developed a fully integrated, in-house financial management system called CAPWise, designed specifically for managing federal funds. The system connects directly with the FHWA's FMIS and the state's accounting platform, allowing real-time tracking of obligations and expenditures.

Key features include automated funding code assignment, electronic project authorization, and comprehensive reporting capabilities. Nearly all Indiana projects are authorized under advance construction (AC), giving the state flexibility to manage cash flow and maximize federal reimbursements.

Indiana's success demonstrates the value of customized in-house systems that can be updated over time, using automation and integration to reduce manual work and strengthen compliance.

Kentucky Transportation Cabinet (KYTC)

Kentucky has modernized its programming and federal fund management through internally developed tools built by its IT team. The state's system integrates directly with FMIS and the state's financial systems, eliminating duplicate entries and providing real-time obligation authority balances. It also uses GIS-based fund recommendations, which help staff quickly identify eligible funding sources.

Kentucky supports a large portion of projects under AC, drawing on state funds while awaiting federal reimbursement.

Kentucky shows how an agency can achieve high efficiency and flexibility through internal system development, supported by strong IT capability and careful fiscal planning.

Massachusetts Department of Transportation (MassDOT)

Massachusetts implemented a centralized, cloud-based eSTIP system developed by PMG™, providing a single source of truth for programming and project management across the state. The system integrates with other internal tools (such as the Massachusetts Project Intake Tool [MaPIT]® and Project Info) and includes automated eligibility checks to prevent funding errors.

The platform is accessible to MPOs, regional transit agencies, and federal partners, enabling real-time collaboration and transparency. The system was launched in phases, starting with essential STIP and funding functions before expanding to other modules.

Massachusetts illustrates how a configurable, web-based platform can improve coordination among partners, enhance transparency, and support compliance through built-in validation and reporting tools.

Intersecting Insights

Across the three case studies, several shared practices emerged that can guide ADOT's modernization strategy:

- **Integration is key:** All three systems, whether in-house or vendor-based, prioritize seamless data exchange between programming, accounting, and federal systems (e.g., FMIS).
- **Automation improves accuracy:** Built-in validation rules, automated reporting, and electronic approvals reduce manual work and improve compliance.
- **Phased implementation works best:** Each agency adopted an incremental rollout to test functions, train users, and refine workflows before full deployment.
- **Sustained IT support is essential:** Whether through internal staff (Indiana, Kentucky) or vendor partnership (Massachusetts), continuous technical support ensures reliability and adaptability.

Common Off-the-Shelf Software Solutions Identified

While several state DOTs have developed their own custom systems, many others have adopted commercial off-the-shelf (COTS) solutions to manage programming, project tracking, and federal funds. These platforms are designed to meet broad government needs but can be configured to fit each state's processes.

The study reviewed several of the most widely used COTS products across peer agencies, focusing on their capabilities, implementation trends, and relevance to ADOT's modernization goals.

EcoInteractive

EcoInteractive™ is one of the most widely used third-party systems for managing Statewide and Metropolitan Transportation Improvement Programs (STIPs and TIPs). It provides a centralized, web-based platform where DOTs, MPOs, and local partners can enter, review, and approve project data.

EcoInteractive solutions support:

- Electronic STIP/TIP management.
- Federal compliance automation with built-in rules that help agencies meet FHWA and Federal Transit Administration requirements.
- Workflow and collaboration with role-based access that allows DOTs, MPOs, and local partners to manage projects in a shared environment.
- Public transparency by allowing web portals for public access to project data and funding details.
- Data Integration for accurate reporting.

Nevada, Utah, and (previously) New Mexico have implemented EcoInteractive for statewide programming and MPO collaboration. Colorado has also selected it for upcoming system replacement.

EcoInteractive demonstrates how a shared cloud platform can streamline coordination with MPOs and improve visibility of project data across agencies; an important consideration for future eSTIP and RA Database integration.

PMG

PMG provides tailored web-based systems that support programming, project delivery, and funding management. Its eSTIP product allows agencies to manage project development, budgets, and federal fund assignments within one environment.

Key features include:

- STIP and TIP management
- Federal aid management
- Project programming system

Massachusetts uses PMG's eSTIP as its primary programming platform, while New Mexico is currently transitioning from EcoInteractive to PMG to improve integration and reporting capabilities.

PMG's model shows how configurable vendor systems can balance flexibility with structure, allowing agencies to maintain unique workflows while still meeting federal reporting requirements.

Masterworks (Aurigo)

Aurigo's™ Masterworks platform is designed for large infrastructure programs, offering tools for planning, budgeting, design, construction, and closeout. It integrates funding management with document control and contract management.

Key features include:

- Capital program and project lifecycle management
- Contract, procurement, and document management modules
- Funding and resource allocation tracking
- Real-time dashboards and performance analytics
- Built on Microsoft Azure for scalability and security

Utah and Nevada have adopted Masterworks to replace older, fragmented systems and to centralize project oversight and funding management.

Masterworks illustrates how a single enterprise platform can connect planning, design, and construction functions, supporting long-term scalability if ADOT seeks to integrate broader project management capabilities into its financial system modernization.

SAP

SAP™ is a globally recognized enterprise software suite used by several DOTs for budgeting, accounting, and federal fund management. Its strength lies in its financial control, data integration, and audit capabilities.

Key features include:

- Comprehensive budgeting and forecasting tools
- Federal fund allocation and reimbursement management
- Automated accounts payable and receivable processing
- Integrated analytics and reporting dashboards
- Compatibility with project management tools and state enterprise resource planning systems

Colorado uses SAP as its enterprise financial backbone, integrating project and program management modules with its accounting system.

SAP demonstrates the value of enterprise-level integration between finance and project systems. While it may be more complex than ADOT's current needs, its structure provides a reference point for how large DOTs achieve unified financial oversight.

Summary Insight

The review of commercial software shows that no single off-the-shelf product fits all agencies, but several consistent advantages emerge:

- Cloud-based systems allow for easier collaboration and remote access.
- Built-in compliance rules and fiscal checks reduce human error.
- Integration with federal and state systems (like FMIS and AFIS) is increasingly standard.
- Configurable workflows help agencies tailor systems to their internal processes without custom-building software from scratch.

For ADOT, these findings suggest that a configurable, cloud-based system that is either developed in-house or through a vendor would best balance flexibility, automation, and long-term sustainability.

Methods

The study used a structured, step-by-step approach to evaluate ADOT's financial tracking system and identify opportunities for improvement. The research combined regulatory review, internal system assessment, and peer benchmarking to ensure findings were comprehensive and practical.

Each task built on the previous one, beginning with understanding the regulatory framework, followed by analyzing ADOT's current processes, and then reviewing practices from other state DOTs that use innovative tracking systems. This approach ensured that the final recommendations are grounded in both compliance requirements and proven strategies from across the country.

Regulatory and Literature Review

This task focused on understanding the federal and state regulations that guide how transportation funds are tracked and managed. The research team reviewed key laws, policies, and guidance from FHWA, FFMIA, and the OMB to define the standards that shape ADOT's financial tracking practices.

The review examined how these regulations influence system structure, reporting, and accountability requirements for federally funded projects. Findings from this analysis established the baseline for evaluating ADOT's RA Database in later tasks and ensured that all recommendations were built on a clear understanding of compliance expectations.

ADOT supported this task by providing access to current documentation, compliance materials, and internal guidance, which helped confirm how federal requirements are currently applied within the agency.

ADOT System Assessment

The research team worked closely with the RA team to document existing workflows, reports, and processes managed through the RA Database.

Interviews and discussions with key staff helped identify how the system is used on a daily basis, where manual work or duplication occurs, and what challenges staff face in maintaining accuracy and efficiency. These insights provided a clear picture of the system's strengths, limitations, and user needs.

Findings from this assessment established the foundation for identifying modernization priorities and informed later tasks that compared ADOT's practices with peer state systems.

Data Sources and Outreach

To support the peer comparison and case study analysis, the research team compiled an extensive list of contacts and conducted structured interviews across multiple transportation agencies.

A comprehensive contact list was developed containing 127 state DOT representatives and 19 FHWA division staff across all states. The list includes program managers, STIP coordinators, funding staff, and IT/system leads, representing the full range of personnel involved in federal funds management.

This contact list provided a foundation for peer outreach and follow-up exchanges, enabling the researchers to directly connect with state DOT representatives and identify transferable practices for modernization.

From this broader list, 34 individuals across 18 state DOTs participated in structured interviews conducted between April and June 2025, as shown in Table 2. Interviewees represented key organizational units, including program management, finance, planning, and IT.

Each interview captured the participant's role, years of experience, and system responsibilities, with particular focus on:

- Federal funds tracking processes
- STIP development and project authorization
- Software tools and system integration
- Staffing structure and reporting workflows

This targeted outreach ensured that both policy and operational perspectives were incorporated into the study's findings, with interviews listed in Table 2.

Table 2. List of States Interviewed and Date of Interview.

No	State	Date of interview
1	Arkansas	06/05/2025
2	Colorado	06/18/2025
3	Indiana	04/23/2025
4	Iowa	05/07/2025
5	Kansas	06/10/2025
6	Kentucky	06/25/2025
7	Maryland	06/10/2025
8	Massachusetts	06/09/2025
9	Mississippi	04/24/2025
10	Montana	05/06/2025
11	Nevada	06/25/2025
12	New Mexico	04/30/2025
13	Ohio	06/02/2025
14	Oregon	05/06/2025
15	Texas	04/18/2025, 05/05/2025
16	Utah	04/23/2025
17	Washington	05/01/2025
18	Wyoming	06/03/2025

Peer State Analysis

Peer state analysis was conducted based on the data gathered from the interviews to understand how other state DOTs manage federally funded programs and associated financial tracking systems. The researchers conducted interviews with representatives from 18 state DOTs as shown in Table 1, representing a range of organizational sizes, system types, and program structures. The analysis examined each state's software solutions, functional capabilities, system usage patterns, federal funding management approaches, available resources, and STIP planning processes.

To support comparison, a summary matrix was developed to organize key characteristics across states and provide a reference for identifying trends and transferable practices, the details for which are presented in Table 3.

Table 3. List of Major Categories and their Descriptions.

Category Designation	Category Name	Category Description
A	Type of Software	Identifies the technical tools currently used for managing transportation programming/funding.
B	Functionality	Describes what the system is used for.
C	System Use	Timeline for implementation of current software and future changes information.
D	If changing product for federal funding, current stage for change	Tracks which stage of the process they are in for changing their software.
E	Federal Funding Code Assignment	Details of when and how federal funding codes are assigned.
F	Resources	Staffing and responsibility details for managing federal funds.
G	Stats	State-level organizational and financial statistics.
H	STIP Planning	Provides insight into how the STIP Program is managed.

Findings revealed wide variation in technological maturity, staffing levels, and operational strategies across the states. Some agencies operate advanced, integrated systems with automated funding logic and two-way data exchange with FMIS, while others continue to rely on legacy databases and manual data entry. The comparative assessment identified specific practices and models that can be adapted to guide ADOT's modernization efforts.

Case Study Development

Based on interviews and analysis, three detailed case studies were developed to illustrate how other state DOTs have successfully modernized their financial tracking systems. Each case study documents the agency's implementation approach, system functionality, and key lessons learned that are relevant to ADOT's modernization goals.

The selected states, i.e., Indiana, Kentucky, and Massachusetts, represent diverse approaches to innovation. Together, these case studies provide practical insights into system design, governance, and user adoption strategies.

Synthesis and Framework Development

The research team synthesized results from the regulatory review, system assessment, and peer case studies to identify strategies most relevant to ADOT's modernization goals. Findings from all data sources were analyzed to develop the three-phase modernization framework provided in the *Recommendations* section with the following three phases:

1. Preparation
2. Procurement
3. Implementation

The framework was designed to be scalable, allowing ADOT to apply it whether pursuing a COTS solution or an in-house system. Recommendations were developed to address system usability, integration with existing platforms, and improved tracking of multiple funding sources. The research emphasized approaches that balance compliance, efficiency, and user-friendliness.

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Appendix

The following tables present the complete data matrix, summarizing responses from 18 state DOTs. The matrix provides detailed information on each state's systems, staffing, and financial management practices, organized by key analytical categories used throughout this study.

		A. Type of software					
No.	State	1. Developed In-House	2. Customized Third-Party Solution	3. Data Warehouse and Spreadsheets	4. Spreadsheets	5. Off-the-Shelf Product	6. Name of the software
1	Arkansas			X			N/A
2	Colorado		X				SAP
3	Indiana	X					CAPWISE
4	Iowa				X		N/A
5	Kansas		X				WinCPMS
6	Kentucky	X					N/A
7	Maryland			X			N/A
8	Massachusetts		X				GeoDOT (Developed by PMG)
9	Mississippi	X					PDPM
10	Montana	X					PPMS(Program and Project Management System), STAR system
11	Nevada					X	EcoInteractive
12	New Mexico					X	EcoInteractive
13	Ohio	X					Ellis, Federal Program Management System (FPM)
14	Oregon			X			STIP FP (Financial Plan)
15	Texas	X					FAFOS, TxDOT Connect
16	Utah	X					EPM (Enterprise Project Management)
17	Washington	X					Federal Aid Tracking Systems(FATS)
18	Wyoming				X		N/A
Total	18	8	3	3	2	2	

Figure 3. Types of Software Solutions Used by State DOTs for Programming and Federal Fund Management.

		B. Functionality				
No.	State	1. Used to Execute Programming/Planning	2. Used to Balance Against Federal Funding Account	3. Used to Issue Purchase Orders	4. Project Entry in FMIS	5. Have Separate Systems for Federal Funding and Project Management?
1	Arkansas	X	X		Manual	Yes
2	Colorado	X	X	X	Automated	Yes
3	Indiana	X	X	X	Automated	Yes
4	Iowa				Manual	Yes
5	Kansas	X	X	X	Semi-Automated	Yes
6	Kentucky				Automated	
7	Maryland	X	X	X	Manual	Yes
8	Massachusetts		X		Manual	Yes
9	Mississippi	X			Manual	Yes
10	Montana	X			Manual	Yes
11	Nevada	X	X		Manual	Yes
12	New Mexico	X	X + some manual/spreadsheets		Automated	Yes
13	Ohio	X	X			Yes
14	Oregon	X	X			Yes
15	Texas	X	X		Manual	Yes
16	Utah	X				
17	Washington	X	X		Automated	Yes
18	Wyoming				Manual	Yes
Total	**18**	**14**	**12**	**4**		

Figure 4. Functional Uses of DOT Systems, Including Planning, Programming, Balancing Funds, and Federal Project Entry.

		C. System Use		
No.	State	1. Implementation Timeline	2. About to Change Product for Federal Funding	3. About to Change eSTIP?
1	Arkansas		Yes	
2	Colorado	2006	Yes	X
3	Indiana	~2014	No	
4	Iowa		No	
5	Kansas	2010	Yes	
6	Kentucky	~1996		
7	Maryland		Yes	
8	Massachusetts	~2020		
9	Mississippi	5 years, started building pieces of this 10 years ago		
10	Montana		Yes	
11	Nevada	2016	Yes	X
12	New Mexico	~2017	Yes	X
13	Ohio	Ellis: 2003, FPM: ~2015		
14	Oregon	~2015		
15	Texas	~2015, TxDOT Connect: ~2019	Yes	
16	Utah	implemented nearly 2 decades ago	Yes	X
17	Washington	prior to 2010		
18	Wyoming		No	
Total	**18**			

Figure 5. Implementation Timelines and Anticipated Updates to DOT Systems.

		D. If changing product for federal funding, current stage for change			
No.	State	1. Requirements mapping and scoping	2. RFP stage	3. Vendor Selected	4. About to start
1	Arkansas	X			
2	Colorado				Might start about 2-3 years in the future
3	Indiana				
4	Iowa				
5	Kansas		X		
6	Kentucky				
7	Maryland	X			
8	Massachusetts				
9	Mississippi				
10	Montana		Did one a few years ago but failed		
11	Nevada			X	
12	New Mexico			X(PMG)	
13	Ohio				
14	Oregon				
15	Texas		X		
16	Utah			X	
17	Washington				
18	Wyoming				
Total	18				

Figure 6. Current Stage of Software Change for Federal Funding Management (Requirements, RFP, Vendor Selection, Implementation).

		E. Federal funding code assignment	
No.	State	1. When Federal funding code assigned	2. Manual or Automated?
1	Arkansas	Planning	Manual
2	Colorado	Programming	Manual
3	Indiana	Programming	Automated
4	Iowa	Programming	Manual
5	Kansas	Planning	Manual
6	Kentucky	Programming	Automated
7	Maryland	Planning	Manual
8	Massachusetts	Programming	Automated
9	Mississippi	Programming	Manual
10	Montana	Programming	Manual
11	Nevada	Programming	Manual
12	New Mexico	Programming	Manual
13	Ohio	Planning	Manual
14	Oregon	Programming	Manual
15	Texas		Manual
16	Utah	Programming	Manual
17	Washington	Planning	Manual
18	Wyoming	Programming	Manual
Total	**18**		

Figure 7. Timing and Process of Federal Funding Code Assignment Across DOTs.

		F. Resources	
No.	State	1. Which Team/Unit Responsible?	2. No. of People to Manage Federal Funds (FTE)
1	Arkansas	Program Funding	6
2	Colorado		5
3	Indiana	Project Funding & Budgets	4
4	Iowa	Bureau of Program Management	3(But really 1 person)
5	Kansas	Federal Aid Group	7
6	Kentucky		
7	Maryland	Federal Aid Prgramming Team	8
8	Massachusetts		
9	Mississippi	Programming Division	4
10	Montana	Admin Team	4-5
11	Nevada		
12	New Mexico	rogramming) + Project Oversight	4 + ~15
13	Ohio		4-5
14	Oregon	Obligation team	7-9
15	Texas	Federal funding Team	~5 core staff, 20+ cross-trained in obligations, and 4–5 in federal billings
16	Utah	Program Finance Team	6
17	Washington	Implementation Team	5(Anissa handles all the planning)
18	Wyoming	Budget Team	4
Total	**18**		

Figure 8. Staffing Levels and Organizational Units Responsible for Federal Fund Management.

		* Information is drawn from a combination of official state DOT websites and interviews conduct		
		G. Stats		
No.	State	1. Percentage of Funds That Are Federal (vs. State)	2. Number of MPOs *	3. Number of Districts/Regions *
1	Arkansas	80%	8	10
2	Colorado	80-100%	5	5
3	Indiana	No Data	14	6
4	Iowa	60%	9	6
5	Kansas	a big state funded program and some Federally funded projects	5	6
6	Kentucky	No Data	10	12
7	Maryland	~90%	7	7
8	Massachusetts	Not sure, Likely 50%	10	6
9	Mississippi	50%	4	6
10	Montana	85-90%	5	5
11	Nevada	don't have a lot of state funds lately	4	3
12	New Mexico	50%	5	6
13	Ohio	~50%	9	12
14	Oregon	75%	8	5
15	Texas	No Data	24	25
16	Utah	33%	4	4
17	Washington	30%	12	6
18	Wyoming	~75%	2	5
Total	18			

Figure 9. State-Level Statistics on Federal Funding Share, MPOs, and DOT Districts/Regions.

		^ Source: Federal Highway Administration (FHWA), U.S. Department of Transportation, "FY 2025 Computational Tables – Table 1, Part 1: Initial State Apportionments					
		H. STIP Planning					
No.	State	1. AC Stategy	2. Federal Funds Received (FY 2025 TOTAL INITIAL STATE APPORTIONMENTS) ^	3. STIP Update Frequency (years) *	4. STIP Cycle (years) *	5. If Required to Go Through Legislature (for STIP)	6. Leadership Previously in STIP-Related Role
1	Arkansas	Used to do a lot, but trying to reduce	$727,936,896	2	4		Yes
2	Colorado	Almost every project starts as AC then converted	$760,415,888	Annually	4		
3	Indiana	100% in AC first, then change as required	$1,339,691,083	2	5		
4	Iowa	~50%	$690,982,116	Annually	4		
5	Kansas	mostly on larger projects except ones with speciality codes, som smaller projects & projects with unknown timelines	$531,315,639	Annually	4		
6	Kentucky	~80%	$934,174,695	2	4	Yes	
7	Maryland	Most federal funds are AC	$844,906,008	3	4		
8	Massachusetts	AC if $25M or more or 50% of year's apportionment at the regional level	$853,916,416	Annually	5		Yes
9	Mississippi	Used to spread federal obligations across multiple years on large, multi-year projects to manage funds efficiently.	$679,996,144	2	4		Yes
10	Montana	use it a lot especially due to uncertainty in obligation authority, knowing that expenditures are going to come later.	$576,867,366	Annually	5		
11	Nevada	~30% (do this a lot, but looking to do less in the future)	$510,538,927	Annually	4		
12	New Mexico	~10%	$516,314,856	2	6		
13	Ohio	almost 100% in AC, except for discretionary or earmarked cases	$1,884,607,016	2	4		
14	Oregon	AC whatever they have to, Big bill "house bill 2017" – large revenue, AC all of them to be able to switch them out, also use in conjunction with August redistribution	$702,750,653	3	4		
15	Texas	They don't do that, MPOs do AC	$5,484,545,637	2	4		
16	Utah	Only for DOT, not MPOs or local	$488,214,003	Daily	6		
17	Washington	In terms of project count, AC is used for a small number of projects, but dollar-wise, it represents a significant portion of the budget.	$953,133,572	Annually	4	Yes	
18	Wyoming	100% AC first, then when bids are let and update costs in FMIS, if they have full OA they go, otherwise only get a little bit	$360,189,716	4	7		
Total	18						3

Figure 10. STIP Management Practices, Update Cycles, and Legislative Requirements Across DOTs.