Stage 2 Preliminary Assessment

California Department of Technology, SIMM 19B (Rev. 2.1), Revision 5/21/2018

2.1 General Information

Agency or State Entity Name:	
Transportation, Department of (Caltrans)	
Organization Code:	
2660	
Proposal Name:	
Transportation Asset Management System (TAMS)	
Department of Technology Project Number:	2660-544

2.2 Preliminary Submittal Information

Contact Information:	
Contact First Name:	**Contact Last Name:**
William	Boyd
Contact Email:	**Contact Phone:**
William.Boyd@dot.ca.gov	(916) 651-6533
Preliminary Submission Date:	**Preliminary Assessment Transmittal**:
7/7/2017	(Include transmittal as an attachment to your email submission.)

2.3 Stage 2 Preliminary Assessment

2.3.1 Impact Assessment

	Yes	No
1. Has the Agency/state entity identified and committed subject matter experts from all business sponsors and key stakeholders?	☒	☐
2. Are all current baseline systems that will be impacted by this proposal documented and current (e.g., data classification and data exchange agreements, privacy impact assessments, design documents, data flow diagram, data dictionary, application code, architecture descriptions)?	☐	☒
3. Does the Agency/state entity anticipate needing support from the California Department of Technology (CDT) Statewide Technology Procurement (STP) to conduct market research for this proposal (Market Survey, Request for Information)?	☒	☐
4. Does the Agency/state entity anticipate submitting a budget request to support the procurement activities of this proposal?	☐	☒
5. Could this proposal involve the development and/or purchase of systems to support activities included in Financial Information System for California (FI$Cal) (e.g., financial accounting, asset management, human resources, procurement/ordering, inventory management, facilities management)?	☐	☒
6. Does the Agency/state entity have a designated Chief Architect or Enterprise Architect to lead the development of baseline and alternative solutions architecture descriptions?	☒	☐
7. Will the Agency/state entity's Information Security Officer be involved in the development and review of any security related requirements?	☒	☐
8. Does the Agency/state entity anticipate performing a business-based procurement to have vendors propose a solution?	☒	☐

2.3.2 Business Complexity Assessment

Business Complexity:	1.6	Business Complexity Zone:	☐	High	☐	Medium	☒ Low

Stage 2 Alternatives Analysis

2.4 Submittal Information

Contact Information:

Contact First Name:	Contact Last Name:
William	Boyd
Contact Email:	**Contact Phone:**
William.Boyd@dot.ca.gov	(916) 651-6533
Submission Date:	**Project Approval Executive Transmittal:**
8/24/2018	(Include transmittal as an attachment to your email submission.)

Submission Type:

☒ New Submission
☐ Updated Submission (Pre-Approval)
☐ Updated Submission (Post-Approval)
☐ Withdraw Submission
Reason: Select...
If "Other," specify:

Sections Updated (For Updated Submissions Only) – (check all that apply)

- ☐ 2.1 General Information
- ☐ 2.2 Preliminary Submittal Information
- ☐ 2.3 Stage 2 Preliminary Assessment
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  - ☐ 2.5.1 Description
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  - ☐ 2.5.5 Security Categorization Impact Table
- ☐ 2.6 Mid-Level Solution Requirements
- ☐ 2.7 Assumptions and Constraints
- ☐ 2.8 Dependencies
- ☐ 2.9 Market Research
  - ☐ 2.9.1 Market Research Methodologies/Timeframes
  - ☐ 2.9.2 Results of Market Research
- ☐ 2.10 Alternative Solutions
  - ☐ 2.10.1 Solution Type)
    - ☐ Recommended
    - ☐ Alternative
  - ☐ 2.10.2 Name
  - ☐ 2.10.3 Description
  - ☐ 2.10.4 Benefit Analysis
  - ☐ 2.10.5 Assumptions and Constraints
  - ☐ 2.10.6 Implementation Approach
  - ☐ 2.10.7 Architecture Information
- ☐ 2.11 Recommended Solution
  - ☐ 2.11.1 Rationale for Selection
  - ☐ 2.11.2 Technical/Initial IT Project Oversight Framework Complexit Assessment
  - ☐ 2.11.3 Procurement and Staffing Strategy
  - ☐ 2.11.4 Enterprise Architecture Alignment
  - ☐ 2.11.5 Project Phases
  - ☐ 2.11.6 High Level Proposed Project Schedule
  - ☐ 2.11.7 Cost Summary
- ☐ 2.12 Staffing Plan
  - ☐ 2.12.1 Administrative
  - ☐ 2.12.2 Business Program
  - ☐ 2.12.3 Information Technology (IT)
  - ☐ 2.12.4 Testing
  - ☐ 2.12.5 Data Conversion/Migration
  - ☐ 2.12.6 Training and Organizational Change Management
  - ☐ 2.12.7 Resource Capacity/Skills/Knowledge for Stage 3 Solution Development
  - ☐ 2.12.8 Project Management
    - ☐ 2.12.8.1 Project Management Maturity Assessment
    - ☐ 2.12.8.2 Project Management Planning
  - ☐ 2.12.9 Organization Charts
- ☐ 2.13 Data Conversion/Migration
- ☐ 2.14 Financial Analysis Worksheets

Summary of Changes:

Condition(s) from Previous Stage(s):	
Condition #	….
Condition Category	Select...
Other, specify	….
Condition Sub-category	Select...
Other, specify	….
Condition	
Assessment	Select...
Other, specify	….
Agency/state Entity Response	
Status	Select...
Other, specify	….
Select + to add conditions.	

2.5 Baseline Processes and Systems

2.5.1 Description

Background

Caltrans and its transportation partner agencies are responsible for supporting safe and efficient travel on California's transportation network. Maintenance and preservation of transportation infrastructure are critical aspects of this responsibility. Pavements, bridges, and other infrastructure assets require ongoing investment to sustain a state of good repair. The California State Highway System (SHS) includes all assets within the boundaries of the highway system including: 49,644 lane miles of pavements, 13,160 bridges, 205,000 culverts and drainage facilities, and 18,837 transportation management system (TMS) assets with a replacement value for these four core assets totaling of $229 billion not including other supplementary assets.

Caltrans is the state agency responsible for planning, developing, maintaining and operating the legislatively designated SHS. California's state highway and local roadway network serves as the transportation backbone that supports a $2.6 trillion economy, greater than any other state, and places California as having the world's sixth largest economy. This transportation infrastructure connects communities serving approximately 40 million residents and over 35 million registered vehicles, providing vital links that move goods through some of the busiest ports in the United States. The demands on the transportation system lead to ongoing deterioration of our roadways and bridges that must be repaired, rehabilitated or replaced to preserve the integrity and reliability of the transportation system. Transportation managers must continually evaluate system safety, performance, condition, and vulnerabilities in the context of available funding to make good transportation investment decisions.

Total State and local projected asset management 10-year funding from FY 2018 to FY 2027 is $93.8 billion, based on information from the 2018 STIP Fund Estimate. Caltrans 6-year State funding commitments include: $5.6 billion for operations, $9.9 billion for maintenance, $9.1 billion for local assistance, $6.4 billion for the SHOPP, and $1.3 billion for the STIP. Two programs most closely related to asset management are the Highway Maintenance Program (HM) and the State Highway Operation and Protection Program (SHOPP). The HM program and the SHOPP fund maintenance, preservation, rehabilitation, and replacement projects; all are intended to maintain or improve asset condition.

To maximize the benefit of available federal funding, US congress set regulations (23 U.S.C. 119(e), MAP-21 § 1106) that require each state, in coordination with local transportation agencies, to develop a Transportation Asset Management Plan (TAMP) for all state highways and local roadways managed by regions, counties, and cities on the National Highway System (NHS). Senate Bill (SB) 486 (Statutes of 2014) amended Government Code 14526.4 to require a "robust" asset management plan that resulted in adopting federal requirements on the SHS for core assets such as pavement, bridges, drainage and transportation management systems as well as a number of supplementary

assets. These federal and state mandates guide investments made on the California's NHS and SHS networks by managing asset inventory, conditions, lifecycle planning, risk, objectives, performance measures, targets, gaps, financial plan and investment strategies. This TAMS project is a critical component of implementing these mandates.

TAMP is a focal point for asset information, strategies to manage them, long-term expenditure forecasts, and business management processes. Caltrans must use quality information to identify a structured sequence of maintenance, preservation, repair, rehabilitation and replacement actions to achieve a sustainable desired state of good repair over the lifecycle of the assets at a practicable cost. TAMP documents current system conditions, establishes condition targets, quantifies gaps in condition, and evaluates risks that could impact the system condition or reliability, documents life cycle planning strategies, defines available transportation funding, evaluates funding scenarios relative to established targets, and identifies areas of potential improvement in management of transportation assets.

The State Highway System Management Plan (SHSMP) implements requirements of Moving Ahead for Progress in the 21st Century (MAP-21) and Fixing America's Surface Transportation (FAST Act) for asset performance management as required by Assembly Bill (AB) 515 (Statutes of 2017). Caltrans is required to adopt national asset management performance measures to ensure consistent condition reporting nationwide of major highway assets classes: pavements and bridges, plus the state adds culverts and transportation management systems (TMS). These four asset classes represent a significant portion of NHS and SHS maintenance and rehabilitation investments in California. The California Transportation Commission designated them as California's core focus asset classes.

The SHSMP fundamentally changes the way Caltrans manages available funding by focusing on measured condition and performance objectives. The historic asset-based funding approach has been replaced by a performance driven approach that provides greater local flexibility to achieve multiple objectives within a single project. The new management methodology allows Caltrans to better integrate multimodal transportation options into traditional rehabilitation work to provide a cost-effective way to expand mode choice and reduce transportation related emissions. The SHSMP includes a Needs Assessment to achieve the established performance targets and an Investment Plan that will guide the management of the SHS and related infrastructure.

Projects are nominated to be funded by different programs regulated by statutes. These include the State Transportation Improvement Program (STIP) established by SB 45 in 1997. SB 45 placed 75% of the STIP funds under the control of California's regional agencies with projects nominated by cities and counties. Another funding program is the State Highway Operation and Protection Program (SHOPP). Streets and Highways (SHC 164.6 Statutes of 2017) requires a SHOPP 10-year Plan and 5-year Maintenance Plan which requires 34 specific focus areas to be included in the SHSMP. Other project funding programs that impact asset performance include: Highway Maintenance, competitive programs, local funding, etc.

Caltrans Systems

The following systems are used by Caltrans to track assets' conditions and locations, system information and performance information:

- **Pavement Management System (PaveM)**, managed by the Division of Pavement, stores information about the prioritization, preservation, rehabilitation, and maintenance of highway pavement.
- **Structures Maintenance Automated Report Transmittal System (SMART)**, managed by Office of Structures Maintenance and Investigations**,** stores each bridge's structure characteristics, condition, engineering evaluations, work history, and inspection results.
- **Culvert Inspection Program (CIP),** managed by the Office of Maintenance and Stormwater Environmental Compliance, captures and manages the statewide drainage inventory. It is built upon a collection of individual District and Headquarters Microsoft Access 2007 databases.

- **Traffic Management System (TMS) Inventory Database**, managed by the Division of Traffic Operations, stores inventory data for field elements (e.g., traffic signals, ramp meters), communications (e.g., fiber optic networks), central applications (e.g., Road Weather Information System), and information delivery systems (e.g., Freeway Performance Measurement System).
- **Statewide ITS Architecture (SWITSA)**, managed by the Division of Traffic Operations with support from the Division of Transportation Planning, is a repository of current and planned Intelligent Transportation Systems (ITS) elements within Caltrans' responsibility, as well as federally required Regional ITS Architectures. It identifies integration and information flows between ITS elements, as well as required communication standards.
- **Performance Measurement Systems (PeMS),** managed by the Division of Traffic Operations, is used for processing and analyzing traffic data to assess transportation systems' performance using data such as volume/occupancy/speed data from automated detectors, traffic census counts, vehicle classification data, and California Highway Patrol's real-time incident data.
- **Transportation System Network (TSN),** managed by the Division of Traffic Operations Traffic Accident Surveillance and Analysis Unit, stores highway inventory, traffic, and collisions for all State highway facilities, including highway miles, lanes, ramps, and intersections.
- **Integrated Maintenance Management System (IMMS),** managed by the Division of Maintenance, is used for inventory and work order tracking for items requiring maintenance on the SHS.
- **Project Resource and Schedule Management (PRSM)**, managed by the Division of Project Management, is an enterprise project management tool used for managing schedules and capital outlay support resources for all major projects on the SHS.
- **Enterprise Resource Planning Financial Infrastructure (EFIS)**, managed by the Division of Accounting, is the financial system of record for budget and expenditure data for all projects in PRSM.
- **District System Management Plan (DSMP),** developed by each distict and managed by the Division of Transportation Planning, includes the district's system plan which is a 20-year vision document for the region and a non-automated list of all projects identified as a State Highway System need. The project list is updated and used to facilitate the development of the Project Initiation Document (PID) list every two years.
- **State Highway Operation and Protection Program (SHOPP)**, managed by the Director's Office of Asset Management, directs the expenditure of transportation funds for major capital improvements on the SHS, including capital improvements relative to maintenance, safety, and rehabilitation of State highways and bridges.
- **Project Delivery Assets (PDA)** contains data on assets to be added to the SHS. PDA helps to explain project delivery projections and communicates the value of transportation investments to the public. PDA data reported does not represent all additions and modifications to the SHS, and does not include the local system.

TAMS Integration

Caltrans requires a solution which facilitates the implementation of the TAMP and will integrate inventory, location, events, needs, project scope and schedule, and financial data from the independent manual and automated Caltrans systems noted above. The new solution would facilitate consistency in PID planning and development, and replace two enterprise tools: SHOPP Tool and PDA, as well as add functionality.

Currently, Programs identify their "needs" on the State Highway System and are responsible for tracking asset health. Needs are prioritized within that Program only and do not consider the needs and priorities of other Programs to maximize the cost effectiveness and construction within similar project limits. Information about the needs, system information, asset condition and location, schedule, and financial information are stored in individual Program specific systems.

TAMS will interface with these systems and provide for integration of statewide project data. It will display assets geospatially, will aid in assessment of asset performance, and will provide a means for informed organization-wide asset decisions based on funding, planning, needs assessment, prioritization, and projections through asset & project monitoring, analytics, strategies, scenarios, and modelling. This risk based planning, based on actual data, provides for the ability to efficiently and effectively utilize constrained resources to achieve performance targets monitored and communicated to both department and local partners. These capabilities will provide for efficiency and transparency, and facilitate the prioritization and selection of SHOPP program projects. This will enable Caltrans to set performance targets in alignment with the department strategic goal of stewardship and legislation such as SB 1.

2.5.2 Business Process Workflow

Attachment: The Transportation Asset Management System is a new system to support the TAMP released in January 2018. Based on the fact that it is a new plan and it has not yet been implemented, and there is no current system in place, the TAM business does not have a documented business process.

2.5.3 Current Architecture Information

Business Function/Process(es)		**District System Management Plan (DSMP)** is a two-part plan that includes the system plan which is a 20-year vision document for the districts and a non-automated list of all projects identified by Districts as a need on the State Highway System. The project list is updated and used to facilitate the development of the PID list every two years.		
Select + to add a business process with the same application, system, or component; COTS, MOTS or custom solution; runtime environment; system interfaces, data center location; and, security.				
Application, System or Component		Non-automated process to develop the DSMP.		
		Select + to add an application, system, or component.		
COTS, MOTS or Custom		Select...		
	Name/Primary Technology:	N/A		
Runtime Environment	Cloud Computing Used?	☐ Yes ☐ No	If "Yes," specify:	Select...
	Server/Device Function	N/A		
	Hardware	N/A		
	Operating System	N/A		
	System Software	N/A		
		Select + to add system software.		
System Interfaces		N/A		
Data Center Location	Other, specify	Select...		
Security	Access (check all that apply)	☐ Public ☐ Internal State Staff ☐ External State Staff ☐ Other, specify:		
	Type of Information (check all that apply)	☐ Personal ☐ Health ☐ Tax ☐ Financial ☐ Legal ☐ Confidential ☐ Other, specify:		
	Protective Measures (check all that apply)	☐ Technical Security ☐ Identity Authorization and Authentication ☐ Physical Security ☐Backup and Recovery ☐ Other, specify:		
Data Management	Data Owner	Name: Scott Sauer		
		Title: Office Chief, Supervising Transportation Planner		
		Business Program: Transportation Planning Division, Office of System Planning		
	Data Custodian	Name: Gaylon Thornton		
		Title: Senior Transportation Planner		

		Business Program: Transportation Planning Division		
Business Function/Process(es)		**Structures Maintenance Automated Report Transmittal System (SMART)** stores bridge structure characteristics, conditions, engineering evaluations, work history, and inspection results.		
Select + to add a business process with the same application, system, or component; COTS, MOTS or custom solution; runtime environment; system interfaces, data center location; and, security.				
Application, System or Component		Application		
		Select + to add an application, system, or component.		
COTS, MOTS or Custom		Custom application		
Name/Primary Technology:		SMART / Oracle Forms developed by Caltrans IT		
Runtime Environment	Cloud Computing Used?	☐ Yes ☒ No	If "Yes," specify:	
	Server/Device Function	Web Service and Database		
	Hardware	Application Server HW (Oracle SPARC VM /Client workstations) Data Base Server HW (T7 LDOMs (logical domain), Pure Storage – Supported by IT)		
	Operating System	Database and Application Server Unix-Solaris 11/ Client Desktop Windows OS		
	System Software	Runs on Client Workstation on Java 1.6 Update 45		
Select + to add system software.				
System Interfaces		Bridge Maint (PONTIS); Bridge Inspection Records Information System (BIRIS). Note: Future implementation from SMART to AASHTOWare™ Bridge Management software (BrM) within the next 24 months.		
Data Center Location	Other, specify	State data center operated by CDT Application at the State data center operated by CDT at Gold Camp Data Center (Rancho Cordova), Database is at Caltrans Data Center.		
Security	Access (check all that apply)	☐ Public ☒ Internal State Staff ☐ External State Staff ☐ Other, specify:		
	Type of Information (check all that apply)	☐ Personal ☐ Health ☐ Tax ☐ Financial ☐ Legal ☐ Confidential ☒ Other, specify: Bridges characteristics, condition, engineering evaluations, work history, and inspection results		
	Protective Measures (check all that apply)	☒ Technical Security ☒ Identity Authorization and Authentication ☒ Physical Security ☒Backup and Recovery ☐ Other, specify:		
Data Management	Data Owner	Name: Dolores Valls		
		Title: Office Chief, Principal Bridge Engineer		
		Business Program: Division of Maintenance, Office of /Structure Maintenance & Investigations		
	Data Custodian	Name: Paul Cooley		
		Title: Senior Bridge Engineer (Supervisor)		
		Business Program: Division of Maintenance, Office of /Structure Maintenance & Investigations , Bridge Management		
Business Function/Process(es)		**Pavement Management System (PaveM)** stores segment, location, condition, treatments, modeling and other information about the prioritization, preservation, rehabilitation, and maintenance of highway pavement.		
Select + to add a business process with the same application, system, or component; COTS, MOTS or custom solution; runtime environment; system interfaces, data center location; and, security.				

Stage 2 Alternatives Analysis

Application, System or Component		Application		
		Select + to add an application, system, or component.		
COTS, MOTS or Custom		Commerical off-the-shelf (COTS)		
Name/Primary Technology:		Pavement Analyst Version 6.8 Build 1604271700 / Agile Assets Co.		
Runtime Environment	Cloud Computing Used?	☒ Yes ☐ No	If "Yes," specify:	Software as a Service (SaaS)
	Server/Device Function	Web application and database		
	Hardware	SaaS		
	Operating System	SaaS		
	System Software	SaaS		
		Select + to add system software.		
System Interfaces		Service-Oriented Architecture (SOA) to connect with existing and future Department systems. Data loads: Automated Pavement Condition Survey (APCS); Highway Performance Monitoring System (HPMS).		
Data Center Location	Other, specify	Commercial data center Click here to enter text.		
Security	Access (check all that apply)	☐ Public ☒ Internal State Staff ☐ External State Staff ☒ Other, specify: Access by invitation of State staff (Office of Pavement Management).		
	Type of Information (check all that apply)	☐ Personal ☐ Health ☐ Tax ☐ Financial ☐ Legal ☐ Confidential ☒ Other, specify: Pavement condition and project data.		
	Protective Measures (check all that apply)	☒ Technical Security ☒ Identity Authorization and Authentication ☒ Physical Security ☒Backup and Recovery ☐ Other, specify:		
Data Management	Data Owner	Name: Zhongren Wang		
		Title: Office Chief, Supervising Transportation Engineer		
		Business Program: Division of Maintenance, Office of Pavement Management		
	Data Custodian	Name: Nagendranath (Nagi) Pagadala		
		Title: Senior Transportation Engineer		
		Business Program: Division of Maintenance, Office of Pavement Management		
Business Function/Process(es)		**Traffic Management System (TMS) Inventory Database** stores inventory data for field elements (e.g., traffic signals, ramp meters), communications (e.g., fiber optic networks), central applications (e.g., Road Weather Information System), and information delivery systems (e.g., Freeway Performance Measurement System).		
Select + to add a business process with the same application, system, or component; COTS, MOTS or custom solution; runtime environment; system interfaces, data center location; and, security.				
Application, System or Component		Application		
		Select + to add an application, system, or component.		
COTS, MOTS or Custom		Custom application		
Name/Primary Technology:		FileMaker Server v12 / FileMaker Inc.		
Runtime Environment	Cloud Computing Used?	☐ Yes ☒ No	If "Yes," specify:	
	Server/Device Function	Database		

	Hardware	Blade at D3 TMC
	Operating System	VMware and Microsoft Windows Server 2008 R2
	System Software	SaaS
Select + to add system software.		
System Interfaces		None
Data Center Location		Agency/state data center operated by Agency/state entity
	Other, specify	Click here to enter text.
Security	Access (check all that apply)	☐ Public ☒ Internal State Staff ☐ External State Staff ☐ Other, specify:
	Type of Information (check all that apply)	☐ Personal ☐ Health ☐ Tax ☐ Financial ☐ Legal ☐ Confidential ☒ Other, specify: Inventory database for field elements (e.g. traffic signals, ramp meters), communications (e.g. fiber optic networks), central applications (e.g. Road Weather Information System), and information delivery systems (e.g. Freeway Performance Measurement System)
	Protective Measures (check all that apply)	☒ Technical Security ☒ Identity Authorization and Authentication ☒ Physical Security ☒Backup and Recovery ☐ Other, specify:
Data Management	Data Owner	Name: Heather Loebs
		Title: Transportation Engineer, Electrical
		Business Program: Maintenance and Operations/Traffic Operations Division
	Data Custodian	Name: Fredrick Gomez
		Title: IT Manager I
		Business Program: Caltrans Information Technology
Business Function/Process(es)		**Culvert Inspection Program (CIP)** captures and manages the statewide culvert/drainage inventory. It is built on a collection of individual District and Headquarters Microsoft Access 2007 databases.
Select + to add a business process with the same application, system, or component; COTS, MOTS or custom solution; runtime environment; system interfaces, data center location; and, security.		
Application, System or Component		Application
Select + to add an application, system, or component.		
COTS, MOTS or Custom		Custom application
Name/Primary Technology:		Culvert Inventory Database / Caltrans IT
Runtime Environment	Cloud Computing Used?	☐ Yes ☒ No If "Yes," specify:
	Server/Device Function	None. Desktop based system.
	Hardware	Desktop
	Operating System	Desktop. Windows 10
	System Software	Microsoft Access
Select + to add system software.		
System Interfaces		None
Data Center Location		Other
	Other, specify	Run on the user's desktop on the Caltrans' network and storage.
Security	Access (check all that apply)	☐ Public ☒ Internal State Staff ☐ External State Staff ☐ Other, specify:
	Type of Information (check all that apply)	☐ Personal ☐ Health ☐ Tax ☐ Financial ☐ Legal ☐ Confidential ☒ Other, specify: Drainage asset depiction.

	Protective Measures	☒ Technical Security ☐ Identity Authorization and Authentication ☐ Physical Security ☒Backup and Recovery ☒ Other, specify: Workstation-based protective measures.
Data Management	Data Owner	Name: Parviz Lashai
		Title: Office Chief, Supervising Transportation Engineer
		Business Program: Maintenance Division, Office of Stormwater & Environmental Compliance
	Data Custodian	Name: Manuel Morales
		Title: Transportation Engineer, Statewide CIP Program Manager
		Business Program: Maintenance Division
Business Function/Process(es)		**Integrated Maintenance Management System (IMMS)** is used for inventory and work order tracking for items requiring maintenance on the SHS.
Select + to add a business process with the same application, system, or component; COTS, MOTS or custom solution;		
Application, System or Component		Application
		Select + to add an application, system, or component.
COTS, MOTS or Custom		Commerical off-the-shelf (COTS)
Name/Primary Technology:		Hansen v8 upgrading currently to Infor v9
Runtime	Cloud Computing Used?	☐ Yes ☒ No If "Yes," specify:
	Server/Device Function	Web/App & Database Servers
	Hardware	HP Blade Servers
	Operating System	VMware, Solaris, and Windows Server 2012
	System Software	Infor Public Sector Transportation
		Select + to add system software.
System Interfaces		CGI Advantage, Fleet Anywhere, STAFF CENTRAL, SVS, Bridge Maintenance System
Data Center Location	Other, specify	State data center operated by CDT Click here to enter text.
Security	Access	☐ Public ☒ Internal State Staff ☐ External State Staff ☐ Other, specify:
	Type of Information	☐ Personal ☐ Health ☐ Tax ☐ Financial ☐ Legal ☐ Confidential ☒ Other, specify: Maintenance Inventory & Work Order Management
	Protective Measures	☒ Technical Security ☒ Identity Authorization and Authentication ☒ Physical Security ☒Backup and Recovery ☐ Other, specify:
Data Management	Data Owner	Name: Lilli Olvera
		Title: Assistant Division Chief, Staff Service Manager III
		Business Program: Division of Maintenance
	Data Custodian	Name: Kishore Kambhampati
		Title: IT Supervisor II
		Business Program: Application Development and Support Division
Business Function/Process(es)		**Transportation System Network (TSN)** data is used in numerous applications and includes highway network & inventory data, traffic volumes, collisions, investigations, and analytic reporting. The TSN application stores collision rates and highway inventory for all

			California (CA) State Highway facilities including highway miles, ramps, and intersections.	
Select + to add a business process with the same application, system, or component; COTS, MOTS or custom solution; runtime environment; system interfaces, data center location; and, security.				
Application, System or Component			System	
			Select + to add an application, system, or component.	
COTS, MOTS or Custom			Custom application	
	Name/Primary Technology:		Transportation System Network (TSN)	
Runtime Environment		Cloud Computing Used?	☐ Yes ☒ No	If "Yes," specify:
		Server/Device Function	Web Application and Database	
		Hardware	SUN Spark	
		Operating System	Solaris	
		System Software	Web Based - Oracle Forms/Reports 10g, Oracle SQL DB 12c	
			Select + to add system software.	
System Interfaces			TSN Application (includes TIRTS - Traffic Investigations & Reporting, TASAS - Traffic Accident Surveillance and Analysis System, and ACD – Accident Collision Diagrams modules; it interfaces with CHP CCRS & CHP SWITRS (CHP incident data), BMS - Bridge Management System, ACD Application - Accident Collision Diagrams, PeMS - Performance Measurement System, HPMS - Highway Performance Monitoring System.	
Data Center Location		Other, specify	State data center operated by CDT Gold Camp Data Center (Rancho Cordova) in Tenant Managed Services.	
Security		Access (check all that apply)	☐ Public ☒ Internal State Staff ☐ External State Staff ☐ Other, specify:	
		Type of Information (check all that apply)	☐ Personal ☐ Health ☐ Tax ☐ Financial ☒ Legal ☒ Confidential ☒ Other, specify: Highway Inventory; Accident, Traffic Volume, and Traffic Investigation data.	
		Protective Measures (check all that apply)	☒ Technical Security ☒ Identity Authorization and Authentication ☒ Physical Security ☒Backup and Recovery ☐ Other, specify:	
Data Management		Data Owner	Name: James Appleton	
			Title: Division Chief, CEA	
			Business Program: Division of Research Innovation and System Information	
		Data Custodian	Name: Vladamir Poroshin	
			Title: IT Specialist I	
			Business Program: Application Development and Support Division	
Business Function/Process(es)			**Statewide ITS Architecture (SWITSA)** is a repository of current and planned ITS elements within Caltrans' responsibility, as well as federally required regional ITS Architectures. It identifies integration and information flows between elements, and communication standards.	
Select + to add a business process with the same application, system, or component; COTS, MOTS or custom solution; runtime environment; system interfaces, data center location; and, security.				
Application, System or Component			Application	

		Select + to add an application, system, or component.		
COTS, MOTS or Custom		Custom application		
Name/Primary Technology:		SWITSA		
Runtime Environment	Cloud Computing Used?	☐ Yes ☒ No	If "Yes," specify:	
	Server/Device Function	Database and Web Services		
	Hardware	Blade		
	Operating System	VMware and Windows Server		
	System Software	Java, MySQL (application, data managed by contractor)		
		Select + to add system software.		
System Interfaces		None		
Data Center Location	Other, specify	Agency/state data center operated by Agency/state entity Click here to enter text.		
Security	Access (check all that apply)	☐ Public ☒ Internal State Staff ☒ External State Staff ☐ Other, specify:		
	Type of Information (check all that apply)	☐ Personal ☐ Health ☐ Tax ☐Financial ☐ Legal ☐ Confidential ☒ Other, specify: ITS equipment location and services		
	Protective Measures (check all that apply)	☒ Technical Security ☒ Identity Authorization and Authentication ☒ Physical Security ☒Backup and Recovery ☐ Other, specify:		
Data Management	Data Owner	Name: Joseph Rouse		
		Title: Office Chief, Supervising Transportation Engineer		
		Business Program: Division of Traffic Operations		
	Data Custodian	Name: Mike Jenkinson		
		Title: Senior Transportation Electrical Engineer		
		Business Program: Traffic Operations Division		
Business Function/Process(es)		**Performance Measurement Systems (PeMS)** is used for processing and analyzing traffic data to assess the transportation systems performance using data such as volume/occupancy/speed data from automated detectors, traffic census counts, vehicle classification data, and the California Highway Patrol's real-time incident data.		
Select + to add a business process with the same application, system, or component; COTS, MOTS or custom solution; runtime environment; system interfaces, data center location; and, security.				
Application, System or Component		Application		
		Select + to add an application, system, or component.		
COTS, MOTS or Custom		Custom application		
Name/Primary Technology:		PeMS		
Runtime Environment	Cloud Computing Used?	☐ Yes ☒ No	If "Yes," specify:	
	Server/Device Function	Web server, data collection servers, database servers		
	Hardware	Sun Fire (various), SVGCDB96		
	Operating System	Red Hat Enterprise Linux, Oracle Solaris 10		
	System Software	Perl, Oracle Data Warehouse, PHP, JavaScript, Apache		
		Select + to add system software.		
System Interfaces		None		
Data Center Location	Other, specify	State data center operated by CDT (Rancho Cordova)		

Stage 2 Alternatives Analysis

Security	Access (check all that apply)	☒ Public ☒ Internal State Staff ☒ External State Staff ☐ Other, specify:
	Type of Information (check all that apply)	☐ Personal ☐ Health ☐ Tax ☐ Financial ☐ Legal ☐ Confidential ☒ Other, specify: Public transportation data
	Protective Measures (check all that apply)	☒ Technical Security ☒ Identity Authorization and Authentication ☒ Physical Security ☒Backup and Recovery ☐ Other, specify:
Data Management	Data Owner	Name: Timothy Hart
		Title: Senior Transportation Planner
		Business Program: Division of Traffic Operations
	Data Custodian	Name: Carole Ludlum
		Title: IT Specialist I
		Business Program: Application Development & Support Division
Business Function/Process(es)		**Project Resourcing and Schedule Management System (PRSM)** is an enterprise project management tool used for managing schedules and capital outlay support resources for all major projects on the SHS and is managed by the Division of Project Management.
Select + to add a business process with the same application, system, or component; COTS, MOTS or custom solution; runtime environment; system interfaces, data center location; and, security.		
Application, System or Component		Application
		Select + to add an application, system, or component.
COTS, MOTS or Custom		Commerical off-the-shelf (COTS)
Name/Primary Technology:		Computer Associates Clarity PPM v15.3 SP3
Runtime Environment	Cloud Computing Used?	☐ Yes ☒ No If "Yes," specify:
	Server/Device Function	Web Application and Database Servers
	Hardware	Red Hat Linux 7.3, PRSM12p1 - svgcdb86
	Operating System	Solaris 10 & Red Hat Enterprise Linux Server release 7.3
	System Software	Computer Associates - PPM v15.3 SP3, Jasper Reports 6.4.2
		Select + to add system software.
System Interfaces		CGI Advantage, PeopleSoft 9.1 HRMS/T&L, QMRS, FIDO
Data Center Location	Other, specify	State data center operated by CDT Tenant Managed Services
Security	Access (check all that apply)	☐ Public ☒ Internal State Staff ☐ External State Staff ☐ Other, specify:
	Type of Information (check all that apply)	☐ Personal ☐ Health ☐ Tax ☐ Financial ☐ Legal ☐ Confidential ☒ Other, specify: Capital outlay support resources & schedule for all major projects.
	Protective Measures (check all that apply)	☒ Technical Security ☒ Identity Authorization and Authentication ☒ Physical Security ☒Backup and Recovery ☐ Other, specify:
Data Management	Data Owner	Name: James Monroe
		Title: Office Chief, Supervising Transportation Engineer
		Business Program: Division of Project Management
	Data Custodian	Name: Keri Elsberry-Vidad
		Title: Transportation Engineer
		Business Program: Division of Project Management

Business Function/Process(es)			**Enterprise Resource Planning Financial Infrastructure (EFIS)** is the financial system of record for budget and expenditure data for all projects in PRSM.	
Select + to add a business process with the same application, system, or component; COTS, MOTS or custom solution; runtime environment; system interfaces, data center location; and, security.				
Application, System or Component			Application	
			Select + to add an application, system, or component.	
COTS, MOTS or Custom			Commerical off-the-shelf (COTS)	
Name/Primary Technology:			CGI Advantage Financials 3.7.02	
Runtime Environment	Cloud Computing Used?		☐ Yes ☒ No	If "Yes," specify:
	Server/Device Function		Web, Application and Database Servers	
	Hardware		Blades	
	Operating System		VMware and Windows Server 2008 R2	
	System Software		CGI Advantage Financials & Reporting, version 3.7.02	
			Select + to add system software.	
System Interfaces			ARRA, CAS, FIDO, FIP, FI$Cal, GASB34, IMMS, LP2000, PETS, PRSM, STAFF CENTRAL, SMUD, FMIS	
Data Center Location		Other, specify	State data center operated by CDT Tennant Managed Services	
Security		Access (check all that apply)	☐ Public ☒ Internal State Staff ☐ External State Staff ☐ Other, specify:	
		Type of Information (check all that apply)	☐ Personal ☐ Health ☒ Tax ☒ Financial ☐ Legal ☒ Confidential ☐ Other, specify:	
		Protective Measures (check all that apply)	☒ Technical Security ☒ Identity Authorization and Authentication ☒ Physical Security ☒Backup and Recovery ☐ Other, specify:	
Data Management		Data Owner	Name: Clark Paulsen	
			Title: Division Chief, CEA	
			Business Program: Division of Accounting	
		Data Custodian	Name: Terry Zanchi	
			Title: Accounting Administrator II	
			Business Program: Division of Accounting	
Select + to add business functions/processes.				

2.5.4 Current Architecture Diagram

Attachment: 2660-544_Caltrans_TAMS_S2AA_2.5.4_Current-Architecture.vsdx

2.5.5 Security Categorization Impact Table

Attachment: 2660-544_Caltrans_TAMS_S2AA_2.5.5 Security Categorization Impact Table.xlsx

SECURITY CATEGORIZATION IMPACT TABLE SUMMARY

SECURITY OBJECTIVE	LOW	MODERATE	HIGH
Confidentiality	☐	☒	☐
Integrity	☐	☒	☐
Availability	☒	☐	☐

2.6 Mid-Level Solution Requirements

Attachment: 2660-544_Caltrans_TAMS_S2AA_2.6_Midlevel_Solution_Requirements.xlsm

2.7 Assumptions and Constraints

Assumptions/Constraints	Description/Potential Impact
Funding is available for this project.	Yes, funding is available for this project and is not dependent on SB 1. The project will continue to receive department executive, CalSTA, and California Transportation Commission support.
The project executive steering committee is comprised of representatives from the highest executive level management, including Caltrans' chief deputy director, Headquarters program chiefs, and district directors or their deputies.	Full participation of the project executive steering committee with its ability to support the project through its successful completion is imperative to meeting project goals and objectives, including meeting federal and State mandates and Caltrans goals.
A dedicated project team is assigned to activities in the project schedule.	The lack of a project team's continuous dedication and commitment through successful project completion may delay project goals, objectives, deliverables, and the date of project completion.
Availability of all key stakeholders (program chiefs and subject matter experts) and users in all phases of the project.	The lack of availability of key stakeholders may impact the new system's functionality and ability to meet needs and requirements. This may affect the availability, integrity, and quality of the data fed into TAMS from the other system interfaces, ultimately causing erroneous or incomplete project plans and target attainment.
The business process changes and improvements in Caltrans' programs and Districts should be implemented and completed before starting TAMS implementation.	If business process changes and improvements in Caltrans' programs and districts are not implemented before starting the TAMS implementation, the smooth transition and deployment of TAMS will be negatively impacted. System implementation should support business processes through automation. Introducing completely new business processes with new technology may introduce too much change for user proficiency.
Control agencies' approval process will indicate overall planning timeline.	Early involvement of control agency (e.g., CDT, CalSTA) representatives, and their responsiveness and timely acceptance of project deliverables.
Inability to develop or correct asset inventory, location and condition data.	Ensure that asset data is available as required to ascertain current asset inventory, location and condition.
Select + to add assumptions/constraints.	

2.8 Dependencies

Element	Description
State Highway Operation and Protection Program (SHOPP) Tool Replacement by TAMS	Replacement of SHOPP Tool functionality for the 10-Year State Highway System Plan of SHA-funded projects requires extracting PDA data, and data from additional sources for inventory and condition, use of Linear Reference System (LRS) for project location geospatial data, and provision of data driven projections instead of direct input and enhancements in the planning processes. **Project Status:** Enhancements in process.
Project Delivery Assets (PDA) Tool Replacement by TAMS	Replacement of PDA tool functionality requires extracting data from additional sources for inventory and condition, use of LRS for project location geospatial data, and provision of data

	driven projections in lieu of direct input and enhancements within operational processes. **Project Status:** Operational
Pavement Management System (PaveM) Data Import to TAMS	TAMS will be incorporating inventory, condition, location, treatments/needs, and other data for pavement from PaveM SaaS system provided by Agile Assets. It will use existing systems and functionality, and extract data from additional sources for inventory and condition, then will use functionality of LRS for location. **Project Status:** Upgrade in Procurement
Bridge Management System (consisting of SMART-Structure Maintenance Automated Report Transmittal, BIRIS- Bridge Inspection Records Information System and PONTIS AASHTOWare (COTS) now known as Bridge Management or BrM) Data Import to TAMS	TAMS will use these systems for Bridge inventory, location, condition, needs and other data. It will use existing systems functionality and extract data from additional sources for inventory and condition, then will use LRS functionality for location. **Project Status:** Operational
Culvert Inventory (CIP) Data Import to TAMS	TAMS will extract inventory information from this database. Currently, not all culverts are included. TAMS depends on the Culvert Inventory Database Improvement Project to obtain improved information in this database to assure improved information in TAMS. **Project Status:** Migration to AgileAssets post PaveM upgrade.
TSN (Transportation System Network) Import Data to TAMS	The TSN Replacement project will add geospatial and MAP-21 capabilities. TAMS will rely on the asset inventory and traffic data (census and safety) provided by TSN. **Project Status:** In PAL process for replacement
Linear Reference System (LRS) Functionality Used by TAMS for Asset Location	Agreement on asset location nomenclature is critical to TAMS development. TAMS will use existing systems and functionality and extract data from additional sources for inventory and condition, then use for location. **Project Status:** Replacement in process
SHOPP Project Nomination Application Prototype	TAMS will absorb the SHOPP Tool. Any changes to the SHOPP process will have to be incorporated into TAMS Needs, nomination, and funding connections' functionality should be added, which will then provide required BI functionality and reporting. **Project Status:** Prototype in process
IMMS (Integrated Maintenance Management System) Data Sweeping to TAMS	TAMS will be sweeping information from IMMS to look at maintenance crew work and heat map of maintenance work to inform rehabilitation projects. It's an opportunity to ensure data format is consistent and improve data accuracy. **Project Status:** Upgrade scheduled go-live in November 2018
Level of Service (LOS) Data Import to TAMS	TAMS will incorporate asset condition information. Level of service will be a source of asset condition for a discrete set of assets in maintenance. We need to identify a way to translate LOS impacts on performance. TAMS will add needs, nomination, and funding connections, then provide BI functionality and reporting.

	Project Status: S1BA Approved, delegated to Department as M&O
Project Resource and Schedule Management (PRSM) Data Import to TAMS	TAMS will incorporate project data from PRSM (modified version of CA Technologies Clarity implemented in 2013). TAMS will add performance, needs, nomination, and funding connections, then provide BI functionality and reporting. **Project Status:** Operational
BI Roadmap Impact on Information Organization at TAMS	TAMS will be using BI as part of its organization of information. The BI Roadmap will greatly influence the development of TAMS. **Project Status:** Roadmap is complete.
Asset Location Information in TAMS is impacted by the Local Development-Intergovernmental Review of Geo-Based Tracking System (LDIGR-GTS)	TAMS' asset management system will be based on asset location and will use Information in the Geo-Based Tracking System. **Project Status:** Operational
CTC Intake Tool Project Information Data Import to TAMS	SB 1 required enhanced coordination with local transportation entities including county, city, Metropolitan Planning Organization (MPO) and Regional Transportation Agency (RTPA). To facilitate this coordination, a portal for transportation project intake was created in 2017. TAMS will eventually utilize the project information and, perhaps, expand data intake to include local condition. **Project Status:** Enhancements in process

Select + to add dependencies.

2.9 Market Research

2.9.1 Market Research Methodologies/Timeframes

Methodologies Used to Perform Market Research (check all that apply)**:**

☒	Request for Information (RFI)	☒	Trade shows
☒	Internet Research	☒	Published Literature
☒	Vendor Forums/Presentation	☐	Leveraged Agreements
☒	Collaboration with other Agencies/state entities or governmental entities	☐	Other, specify:

Time spent conducting market research:	6 months
Date market research was started:	3/26/2018
Date all market research was completed:	7/17/2018

2.9.2 Results of Market Research

See attached Market Research report: 2660-054_Caltrans_TAMS_S2AA_Market Research Summary.docx

2.10 Alternative Solutions

2.10.1 Solution Type

☒ **Recommended**

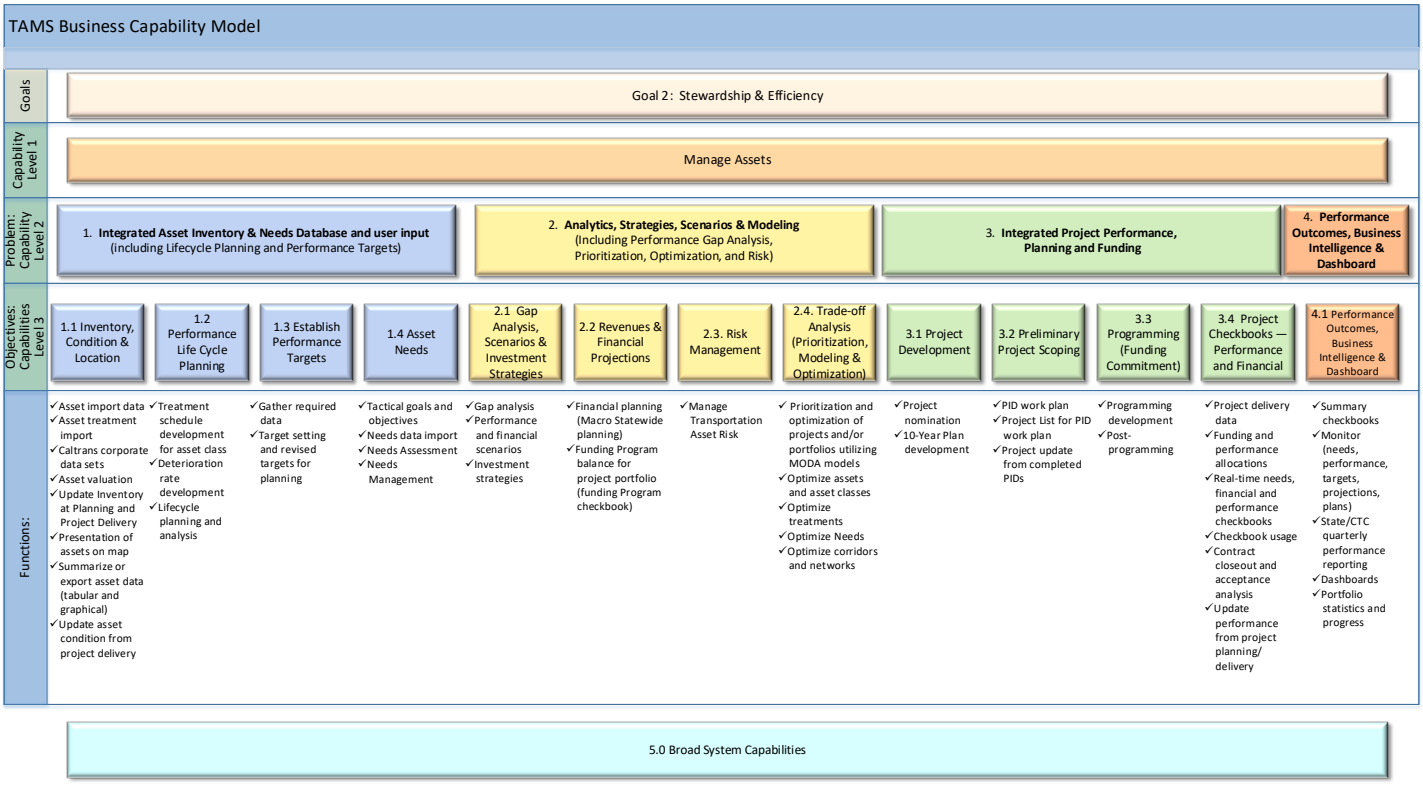
2.10.2 Name

Systems Integrator (SI) – Vendor SI with prescribed extension(s) of existing systems

2.10.3 Description

This proposed alternative seeks to enlist the services of a systems integrator to both implement new business capabilities and potentially extend existing Caltrans' capabilities.

Caltrans performed extensive mid-level requirements developed around the following business capability model:



This business capability model is based on legislative requirements contained within the following federal and state legislation and is modeled in alignment with the Caltrans Transportation Asset Management Plan.

1. MAP-21 (23 U.S.C. 119(e)(1))
2. SB 486 (GC 14524)
3. Road Repair and Accountability Act of 2017 (SB 1)
4. State Highway System Management Plan (AB 515)

In conducting the market research for TAMS, we ascertained that several proposed solutions include using existing technology for the asset repository (capability 1.1, Inventory, Condition & Location). This recommended alternative seeks to investigate further extending existing Caltrans asset systems as the TAMS multi-asset repository. These existing system capabilities will be compared to our TAMS-detailed requirements to determine the appropriateness of using an existing asset system to meet TAMS needs. Based on the results, the TAMS request for proposal (RFP) may include specific requirements to use an existing Caltrans' asset system to provide the TAMS asset inventory, condition and location capability. PAL Stage Gate 3 provides the opportunity to perform this analysis prior to inclusion in the RFP. Should none of the existing Caltrans systems meet TAMS requirements, then the vendor will be asked to provide the multi-asset system. RFI responses, including timeframe and cost estimates already included this system, and these parameters were used for this recommended alternative staffing and costing.

The recommended alternative meets all primary TAMS objectives:

1. **Inventory**: Integrate, map and use Caltrans' core asset class (bridge, pavement, TMS and drainage) inventory and condition required information in one repository
2. **Life Cycle Treatment Options**: Establish Caltrans' needs-based treatment options based on each core asset class, corridor, life cycle and optimization; for minimum of three treatments for condition/performance
3. **Targets**: Set performance targets (as determined in analysis) for the four core asset classes to be used to evaluate project contributions towards programmatic accomplishments

4. **Project Trade-Off Analysis**: Establish trade-off analysis and prioritization of project for Caltrans projects in TAMS
5. **Project Nomination**: Establish development of project based on selection needs in a selected corridor and evaluated with trade-off scores, scenarios, strategies and risk to inform the selection of need in TAMS
6. **Portfolio Commitment**: Establish portfolio commitment based on project trade-off scores, portfolio scenarios, investment strategies and risk mitigation to inform the selection and commitment of portfolios in TAMS
7. **Monitor**: Establish reports and dashboards for both historical and current asset, project and portfolio performance and funds monitoring throughout the TAMS lifecycle

This approach includes multiple efforts timed to increase the business and technical success and reduce associated risk. These procurements include:

1. Data Quality, Cleansing and Enterprise Architecture
2. Organizational Change Management (OCM)
3. Visualization Requirements
4. Implementation
5. Independent Verification and Validation (IV&V)

This alternative assumes cloud (Software-as-a-Service or SaaS) for architecture and costing purposes. In accordance with the Technology Letter, Update to Cloud Computing Policy – Infrastructure and Platform (TL 17-06), deviation from the cloud computing policy will require an exemption request per SIMM Section 18B.

Approach (Check all that apply)**:**	
☐	Increase staff – new or existing capabilities
☒	Modify the existing business process or create a new business process
☐	Reduce the services or level of services provided
☒	Utilize new or increased contracted services
☒	Enhance the existing IT system
☒	Create a new IT system
☐	Perform a business-based procurement to have vendors propose a solution
☐	Other, specify:

2.10.4 Benefit Analysis

Benefits/Advantages
Use a Systems Integrator to reduce the risk of a complex, multi-product implementation.
Bring industry knowledge, product implementation, data warehouse, dashboard and analytics skills to the project with aligned goals to meet the entire end-to-end scope.
Procures and implements an overall solution with both products and services.
Investigates use of existing Caltrans' systems (e.g., asset repository) to best use existing licenses, knowledge, skills and abilities.
Reduces implementation risk through data, enterprise architecture and organizational change management preparation prior to engaging Systems Integrator.
Ability to select the best hosting model based on functionality of the solution, data integration requirements and cost (the market supports making the decision as part of the RFP).
The nature of the solution, asset planning without replacement of critical existing systems, provides a lower operational risk profile for the proposed system. Transportation Asset Management Planning would continue as is currently performed.
Implementation will provide benefits along the way. Realization of broad capabilities provides value prior to the completion of all capabilities. For example, having a multi-asset inventory, location and condition on a single map provides early and significant business value.

Select + to add benefits/advantages.

Disadvantages

Once SI is engaged, it does not allow easy pivoting should specific products and/or integration services prove insufficient (monolithic procurement).

Highly complex system requiring data from many parts of Caltrans' organization.

Proposed SI Solutions may not meet the complete breadth and/or depth of requirements as requested by the Program.

Assumes perfect knowledge of the desired solution at the time of procurement. All capability requirements defined up front to contract with the Systems Integrator. This includes determining up front if Caltrans will use existing systems to provide some capabilities (e.g., asset repository).

Program is evolving business processes and requirements which may change during this procurement and implementation.

Select + to add disadvantages.

Anticipated Time to Achieve Objectives After Project Go-Live

	Objective Timeframe				
Objective Number	**Within 1 Year**	**2 Years**	**3 Years**	**4 Years**	**Over 4 Years**
1.1.1	☒	☐	☐	☐	☐
1.2.1	☒	☐	☐	☐	☐
1.3.1	☒	☐	☐	☐	☐
2.4.1	☐	☒	☐	☐	☐
3.1.1	☐	☒	☐	☐	☐
4.1.1	☒	☐	☐	☐	☐

Select + to add objectives.

Anticipated Time to Achieve Financial Benefits After Project Go-Live

Financial Benefit	Within 1 Year	2 Years	3 Years	4 Years	Over 4 Years
Increased Revenues	☐	☐	☐	☐	☐
Cost Savings	☐	☐	☐	☐	☐
Cost Avoidance	☐	☒	☐	☐	☐
Cost Recovery	☐	☐	☐	☐	☐

2.10.5 Assumptions and Constraints

Financial benefits (e.g., cost avoidance), if any, are reinvested into prioritized projects. AB 515 (Statutes of 2017) amended Streets and Highways code 164.6. to read: "(c) The State Highway System Management Plan for rehabilitation and maintenance shall attempt to balance resources between State Highway Operation and Protection Program activities and maintenance activities in order to achieve identified goals at the lowest possible long-term total cost. If the maintenance plan recommends increases in maintenance spending, it shall identify projected future State Highway Operation and Protection Program costs that would be avoided by increasing maintenance spending. The department's maintenance division shall identify highway maintenance projects and associated costs that allow it to achieve the requirements of this subdivision."

The constituents of California should experience better service through the addressing of multi-modal needs across the State and across all funding programs.

The TAMS vision is quite broad and deep and will be further developed over time following the initial implementation (see scope discussion). Additional assets classes, deficiencies, needs, lifecycle plans, risks, entities (MPO, RTPA, county, and city) and funding programs will be added over time as business processes and data availability mature to both provide the needed information and take advantage of the planning capability. This long-term vision must be kept in mind when procuring and implementing TAMS, even if these requirements are not immediately addressed.

The identified Department staffing levels are met given the approved schedule.

Vendor resources are skilled in transportation industry terminology, asset management, performance and planning given the selected solutions.

Integration with existing Caltrans systems may require modification to these systems to facilitate data extraction and automation. These costs, if any, to modify existing systems are the responsibilities of the source system owners. The TAMS project is coordinating now with these systems to identify requirements early as these systems are replaced, upgraded and maintained.

Select + to add assumptions/constraints

2.10.6 Implementation Approach

Identify the type of existing IT system enhancement or new system proposed (check all that apply)**:**

- ☒ Enhance the current system
- ☐ Develop a new custom solution
- ☒ Purchase a Commercial off-the-Shelf (COTS) system
- ☐ Purchase or obtain a system from another government agency (Transfer)
- ☒ Subscribe to a Software as a Service (SaaS) system
- ☐ Other, specify:

Identify cloud services to be leveraged (check all that apply)**:**

- ☐ Software as a Service (SaaS) provided by OTech
- ☒ Software as a Service (SaaS) provided by commercial vendor
- ☐ Platform as a Service (PaaS) provided by OTech
- ☐ Platform as a Service (PaaS) provided by commercial vendor
- ☐ Infrastructure as a Service (IaaS) provided by OTech
- ☐ Infrastructure as a Service (IaaS) provided by commercial vendor
- ☐ No cloud services will be leveraged by this alternative. Provide a description of why cloud services are not being leveraged:

Identify who will modify the existing system or create the new system (check all that apply)**:**

- ☒ Agency/state entity IT staff
- ☒ A vendor will be contracted
- ☐ Inter-agency agreement will be established with another governmental agency. Specify Agency name(s):

- ☐ Other, specify:

Identify the implementation strategy:

- ☐ All requirements will be addressed in this proposed project in a single implementation.
- ☒ Requirements will be addressed in incremental implementations in this proposed project.
- ☒ Some requirements will be addressed in this proposed project. The remaining requirements will be addressed at a later date.

  Specify the year when the remaining requirements will be addressed: The core assets and capabilities are addressed within this project. Additional assets (supplementary) will be added based on the maturity of the asset management and availability of data. MPO/RTPA/county/city partnership will also be added at a later time based on the willingness of these entities to participate in statewide transportation asset management planning and performance reporting.

Identify if the technology for the proposed project will be mission critical and public facing:

- ☐ The technology implemented for this proposed project will be considered mission critical and public facing.

2.10.7 Architecture Information

Business Function/Process(es)	Manage Assets
Select + to add a business process with the same application, system, or component; COTS, MOTS or custom solution; runtime environment; system interfaces, data center location; and, security.	
Application, System or Component	1.0 Integrated Asset Inventory & Needs Database and User Input

		Select + to add an application, system, or component.		
COTS, MOTS or Custom		Commerical off-the-shelf (COTS)		
	Name/Primary Technology:	Asset Repository (Enterprise Asset Management)		
Runtime	Cloud Computing Used?	☒ Yes ☐ No	If "Yes," specify:	Software as a Service (SaaS)
	Server/Device Function	Asset Repository (system)		
	Hardware	N/A		
	Operating System	N/A		
	System Software	N/A		
		Select + to add system software.		
System Interfaces		Periodic loading of asset inventory/location/condition, deficiency, lifecycle and need data. Updates will be based on availability of additional asset information based on project completion or inspection. Each asset class has a different schedule with pavement surveys completed on a yearly basis and bridge inspections every other year (continually). Anchor assets included are pavement, bridge, drainage and TMS elements. Asset Management System and Needs source systems include: 1. PaveM (pavement) 2. Bridge Management consisting of Pontis, SMART, BIRIS (bridge) 3. Culvert DB (Drainage) 4. Traffic Management System (TMS elements) 5. One additional supplementary asset selected from the following list: a. Asset Management Database (AMI) (facilities) b. IMMS (street lights, signs, etc.) c. ADAPT American's with Disability Act (ADA) Geospatial Information System to locate Assets and Needs on the national and state highway systems: 1. Esri Roads and Highways LRS 2. PeMS (traffic census)		
Data Center Location		Commercial data center		
	Other, specify	Click or tap here to enter text.		
Security	Access (check all that apply)	☐ Public ☒ Internal State Staff ☐ External State Staff ☐ Other, specify: Click or tap here to enter text.		
	Type of Information (check all that apply)	☐ Personal ☐ Health ☐ Tax ☐ Financial ☐ Legal ☐ Confidential ☒ Other, specify: Asset Inventory/Location/Condition, Deficiencies, Performance Targets and Needs.		
	Protective Measures (check all that apply)	☒ Technical Security ☒ Identity Authorization and Authentication ☒ Physical Security ☒Backup and Recovery ☐ Other, specify: Click or tap here to enter text.		
Data Management	Data Owner	Name: Loren Turner		
		Title: Office Chief, Supervising Transportation Engineer		
		Business Program: Director's Office of Asset Management		
	Data Custodian	Name: Michelle Lopez-Hardie		
		Title: Staff Services Manager I		
		Business Program: Director's Office of Asset Management		

Business Function/Process(es)		Manage Assets		
Select + to add a business process with the same application, system, or component; COTS, MOTS or custom solution;				
Application, System or Component		2.0 Analytics, Strategies, Scenarios & Modeling		
		Select + to add an application, system, or component.		
COTS, MOTS or Custom		Commerical off-the-shelf (COTS)		
	Name/Primary Technology:	Analytics		
Runtime	Cloud Computing Used?	☒ Yes ☐ No	If "Yes," specify:	Software as a Service (SaaS)
	Server/Device Function	N/A		
	Hardware	N/A		
	Operating System	N/A		
	System Software	N/A		
Select + to add system software.				
System Interfaces		Periodic loading of data utilized for analytics including revenue, financial projections, vulnerability assessments, demographics, and safety incidents. Financial data: 1. CGI Advantage (revenue) 2. Spreadsheets (financial projections) 3. PRSM (existing commitments) and/or quality management reporting system (QMRS) Demographics: 1. United State Census Bureau a. American Community Survey b. American Housing Survey c. Current Population Survey (includes labor force statistics) d. Current Population Survey Food Security Supplement e. Current Population Survey School Enrollment Supplement f. National Crime Victimization Survey g. National Crime Victimization Survey School Crime Supplement h. National Crime Victimization Survey Public Contact Survey i. National Longitudinal Mortality Study j. National Survey of College Graduates k. Rental Housing Finance Survey l. Survey of Income and Program Participation Panels 2. California Department of Finance a. Opportunity Zones b. Population Estimates c. Projections of Population, Births and Public School Enrollment Safety incidents:		

			1. TSN (traffic system network) Risks and Vulnerability Assessments: 1. USGS (GIS Shapefiles) a. Landslide b. Geologic Map c. Earthquake Fault Zones d. Seismic Hazard Zones e. Watershed Maps f. Topographic Maps 3. District Vulnerability Assessments (spreadsheets)		
Data Center Location		Other, specify	Commercial data center Click or tap here to enter text.		
Security		Access (check all that apply)	☐ Public ☒ Internal State Staff ☐ External State Staff ☐ Other, specify: Click or tap here to enter text.		
		Type of Information (check all that apply)	☐ Personal ☐ Health ☐ Tax ☐ Financial ☐ Legal ☐ Confidential ☒ Other, specify: Vulnerability assessments and safety incidents.		
		Protective Measures (check all that apply)	☒ Technical Security ☒ Identity Authorization and Authentication ☒ Physical Security ☒Backup and Recovery ☐ Other, specify: Click or tap here to enter text.		
Data Management		Data Owner	Name: Loren Turner		
			Title: Office Chief, Supervising Transportation Engineer		
			Business Program: Director's Office of Asset Management		
		Data Custodian	Name: Michelle Lopez-Hardie		
			Title: Staff Services Manager I		
			Business Program: Director's Office of Asset Management		
Business Function/Process(es)			Manage Assets		
Select + to add a business process with the same application, system, or component; COTS, MOTS or custom solution; runtime environment; system interfaces, data center location; and, security.					
Application, System or Component			3.0 Integrated Project Performance and Funding		
			Select + to add an application, system, or component.		
COTS, MOTS or Custom			Commerical off-the-shelf (COTS)		
		Name/Primary Technology:	Project Nomination and Commitment		
Runtime Environment		Cloud Computing Used?	☒ Yes ☐ No	If "Yes," specify:	Software as a Service (SaaS)
		Server/Device Function	N/A		
		Hardware	N/A		
		Operating System	N/A		
		System Software	N/A		
Select + to add system software.					
System Interfaces			Periodic (during planning period) sending of committed projects to PRSM for planning and/or QMRS.		
Data Center Location		Other, specify	Commercial data center Click or tap here to enter text.		
Security		Access (check all that apply)	☐ Public ☒ Internal State Staff ☐ External State Staff ☐ Other, specify: Click or tap here to enter text.		
		Type of Information	☐ Personal ☐ Health ☐ Tax ☐ Financial ☐ Legal		

	(check all that apply)	☐ Confidential ☒ Other, specify: Unfunded projects.			
	Protective Measures (check all that apply)	☒ Technical Security ☒ Identity Authorization and Authentication ☒ Physical Security ☒Backup and Recovery ☐ Other, specify: Click or tap here to enter text.			
Data Management	Data Owner	Name: Loren Turner			
		Title: Office Chief, Supervising Transportation Engineer			
		Business Program: Director's Office of Asset Management			
	Data Custodian	Name: Michelle Lopez-Hardie			
		Title: Staff Services Manager I			
		Business Program: Director's Office of Asset Management			
Business Function/Process(es)		Manage Assets			
Select + to add a business process with the same application, system, or component; COTS, MOTS or custom solution; runtime environment; system interfaces, data center location; and, security.					
Application, System or Component		4.0 Performance Outcomes, Business Intelligence & Dashboard			
		Select + to add an application, system, or component.			
COTS, MOTS or Custom		Modified off-the-shelf (MOTS)			
	Name/Primary Technology:	Dashboard			
Runtime Environment	Cloud Computing Used?	☒ Yes ☐ No	If "Yes," specify:	Software as a Service (SaaS)	
	Server/Device Function	N/A			
	Hardware	N/A			
	Operating System	N/A			
	System Software	N/A			
Select + to add system software.					
System Interfaces		Not Applicable. Required data will be available within TAMS through earlier interfaces and user interaction.			
Data Center Location		Commercial data center			
	Other, specify	Click or tap here to enter text.			
Security	Access (check all that apply)	☐ Public ☒ Internal State Staff ☒ External State Staff ☐ Other, specify: Click or tap here to enter text.			
	Type of Information (check all that apply)	☐ Personal ☐ Health ☐ Tax ☐ Financial ☐ Legal ☐ Confidential ☐ Other, specify: Click or tap here to enter text.			
	Protective Measures (check all that apply)	☒ Technical Security ☒ Identity Authorization and Authentication ☒ Physical Security ☒Backup and Recovery ☐ Other, specify: Click or tap here to enter text.			
Data Management	Data Owner	Name: Loren Turner			
		Title: Office Chief, Supervising Transportation Engineer			
		Business Program: Director's Office of Asset Management			
	Data Custodian	Name: Michelle Lopez-Hardie			
		Title: Staff Services Manager I			
		Business Program: Director's Office of Asset Management			
Business Function/Process(es)		Manage Assets			
Select + to add a business process with the same application, system, or component; COTS, MOTS or custom solution; runtime environment; system interfaces, data center location; and, security.					
Application, System or Component		5.0 Broad System Capabilities			
		Select + to add an application, system, or component.			
COTS, MOTS or Custom		Commerical off-the-shelf (COTS)			
	Name/Primary Technology:	Visualization, Document Management, and Data Science			

Runtime Environment	Cloud Computing Used?	☒ Yes ☐ No	If "Yes," specify:	Software as a Service (SaaS)
	Server/Device Function	N/A		
	Hardware	N/A		
	Operating System	N/A		
	System Software	N/A		
Select + to add system software.				
System Interfaces		Not Applicable. Required data will be available within TAMS through earlier interfaces and user interaction.		
Data Center Location		Commercial data center		
	Other, specify	Click or tap here to enter text.		
Security	Access (check all that apply)	☐ Public ☒ Internal State Staff ☐ External State Staff ☐ Other, specify: Click or tap here to enter text.		
	Type of Information (check all that apply)	☐ Personal ☐ Health ☐ Tax ☐ Financial ☐ Legal ☐ Confidential ☐ Other, specify: Click or tap here to enter text.		
	Protective Measures (check all that apply)	☒ Technical Security ☒ Identity Authorization and Authentication ☒ Physical Security ☒Backup and Recovery ☐ Other, specify: Click or tap here to enter text.		
Data Management	Data Owner	Name: Loren Turner		
		Title: Office Chief, Supervising Transportation Engineer		
		Business Program: Director's Office of Transportation Asset Management		
	Data Custodian	Name: Michelle Lopez-Hardie		
		Title: Staff Services Manager I		
		Business Program: Director's Office of Transportation Asset Management		
Select + to add business functions/processes.				

2.10.1 Solution Type

☒ **Alternative**

2.10.2 Name

Caltrans as Prime

2.10.3 Description

This proposed alternative seeks to enlist the services of multiple contractors to implement specific capabilities within the TAMS Business Capability Model. Caltrans will act as the prime contractor to select and procure products and implementation services as the business capability model is progressively implemented. This implementation alternative places the responsibility of ensuring the overall solution operation and interoperability on Caltrans.

The implementation scope is the same as previously identified in the selected alternative; however, the responsibility of providing the end-to-end solution would be the sole responsibility of Caltrans. While this solution might seem easy to rule out given the success probability associated with State of California IT implementation projects, the intent of this system is for planning purposes and will not impact the Department's operational capabilities should the solution require additional effort or rework to fully implement.

This alternative also meets all the primary TAMS objectives:

1. **Inventory**: Integrate, map and use Caltrans' core asset class (bridge, pavement, TMS and drainage) inventory and condition required information in one repository
2. **Life Cycle Treatment Options**: Establish Caltrans' needs-based treatment options based on each core asset class, corridor, life cycle and optimization, for a minimum of three treatments for condition/performance

3. **Targets**: Set performance targets (as determined in analysis) for the four core asset classes to be used to evaluate project contributions towards programmatic accomplishments
4. **Project Trade-Off Analysis**: Establish trade-off analysis and prioritization of project for Caltrans projects in TAMS
5. **Project Nomination**: Establish development of project based on selection needs in a selected corridor and evaluated with trade-off scores, scenarios, strategies and risk to inform the selection of need in TAMS
6. **Portfolio Commitment**: Establish portfolio commitment based on project trade-off scores, portfolio scenarios, investment strategies and risk mitigation to inform the selection and commitment of portfolios in TAMS
7. **Monitor**: Establish reports and dashboards for both historical and current asset, project and portfolio performance and funds monitoring throughout the TAMS lifecycle

This approach, however, includes multiple efforts timed to increase the business and technical success and deliver early value. This specific sequencing also allows Caltrans to select downstream projects on a progressive timeline rather than all upfront. These procurements include:

1. Data Quality, Cleansing and Enterprise Architecture
2. Organizational Change Management (OCM)
3. Product Selection and Implementation: Asset Repository (inventory, lifecycle planning and needs) – Primarily Capability 1
4. Product Selection and Implementation: Targets, Analytics, Strategies, Scenarios, Modeling, performance, planning and funding – Capabilities 2 and 3 and Data Science from Capability 5
5. Product Selection and Implementation: Dashboard, Content Management and Visualization – Capability 4 and the remainder of Capability 5
6. Independent Verification and Validation (IV&V)

This alternative was not costed. Cloud (Software-as-a-Service or SaaS) is prescribed for architecture. In accordance with the Technology Letter, Update to Cloud Computing Policy – Infrastructure and Platform (TL 17-06), deviation from the cloud computing policy will require an exemption request per SIMM Section 18B.

Approach (Check all that apply)**:**

☐	Increase staff – new or existing capabilities
☐	Modify the existing business process or create a new business process
☐	Reduce the services or level of services provided
☒	Utilize new or increased contracted services
☒	Enhance the existing IT system
☒	Create a new IT system
☐	Perform a business-based procurement to have vendors propose a solution
☐	Other, specify:

2.10.4 Benefit Analysis

Benefits/Advantages

Provides the ability to more easily use existing systems as the whole solution is not procured up front.
The nature of the solution, asset planning without replacement of critical existing systems, provides a lower operational risk profile for the proposed system. Transportation Asset Management Planning would continue as is currently performed. This alternative provides for a relatively low operational risk profile.
Allows Caltrans to more fully understand data, business processes and capabilities as additional products are specified, procured and implemented. A more iterative approach to procurement and implementation allowing for evolving business needs to be more readily addressed.
Implementation will provide benefits along the way. Realization of broad capabilities provides value prior to the completion of all capabilities. For example, having a multi-asset inventory, location and condition on a single map
Select + to add benefits/advantages

Disadvantages

Caltrans currently does not have the resources capable of providing and following the overall business and information technology vision to bring the overall solution to fruition. For example, understanding dashboard needs is critical when determining what asset data must be available in TAMS.

Responsibility of resolving product integration and operability problems becomes the responsibility of Caltrans. Much higher state implementation risk profile.

Overall time and costs may be longer/higher as each implementation ramps up and includes similar resources (e.g., project management/team leads, testing and training). Becomes more acute if phases overlap and strains corresponding state resources.

Select + to add disadvantages

Anticipated Time to Achieve Objectives After Project Go-Live

	Objective Timeframe				
Objective	**Within 1 Year**	**2 Years**	**3 Years**	**4 Years**	**Over 4 Years**
1.1.1	☒	☐	☐	☐	☐
1.2.1	☒	☐	☐	☐	☐
1.3.1	☒	☐	☐	☐	☐
2.4.1	☐	☒	☐	☐	☐
3.1.1	☐	☒	☐	☐	☐
4.1.1	☒	☐	☐	☐	☐

Select + to add objectives

Anticipated Time to Achieve Financial Benefits After Project Go-Live

Financial Benefit	**Within 1 Year**	**2 Years**	**3 Years**	**4 Years**	**Over 4 Years**
Increased Revenues	☐	☐	☐	☐	☐
Cost Savings	☐	☐	☒	☐	☐
Cost Avoidance	☐	☐	☐	☐	☐
Cost Recovery	☐	☐	☐	☐	☐

2.10.5 Assumptions and Constraints

Existing Caltrans' staff is trained or augmented to provide additional knowledge, skills and abilities to provide the needed roles for overall solution architecture and implementation.

Additional procurements will likely require additional time and effort to conduct. Additional Caltrans staff will be required to address procurement as existing staff focuses on implementation activities.

A higher contingency is required to address issues incurred between products and vendors. Multiple contracts for multiple products and implementation resources could prove challenging to manage.

Multiple, smaller contracts provide Caltrans with the ability to adapt more readily to changing business requirements and to take advantage of new technology opportunities.

Select + to add assumptions/constraints

2.10.6 Implementation Approach

Identify the type of existing IT system enhancement or new system proposed (check all that apply)**:**

- ☒ Enhance the current system
- ☐ Develop a new custom solution
- ☒ Purchase a Commercial off-the-Shelf (COTS) system
- ☐ Purchase or obtain a system from another government agency (Transfer)
- ☒ Subscribe to a Software as a Service (SaaS) system
- ☐ Other, specify:

Identify cloud services to be leveraged (check all that apply)**:**

- ☐ Software as a Service (SaaS) provided by OTech
- ☒ Software as a Service (SaaS) provided by commercial vendor
- ☐ Platform as a Service (PaaS) provided by OTech
- ☐ Platform as a Service (PaaS) provided by commercial vendor
- ☐ Infrastructure as a Service (IaaS) provided by OTech
- ☐ Infrastructure as a Service (IaaS) provided by commercial vendor
- ☐ No cloud services will be leveraged by this alternative. Provide a description of why cloud services are not being leveraged:

Identify who will modify the existing system or create the new system (check all that apply)**:**

- ☒ Agency/state entity IT staff
- ☒ A vendor will be contracted
- ☐ Inter-agency agreement will be established with another governmental agency. Specify Agency name(s):

- ☐ Other, specify:

Identify the implementation strategy:

- ☐ All requirements will be addressed in this proposed project in a single implementation.
- ☒ Requirements will be addressed in incremental implementations in this proposed project.
- ☒ Some requirements will be addressed in this proposed project. The remaining requirements will be addressed at a later date.

Specify the year when the remaining requirements will be addressed: The core assets and capabilities are addressed within this project. Additional assets (supplementary) will be added based on the maturity of the asset management and availability of data. MPO/RTPA/county/city partnership will also be added at a later time based on the willingness of these entities to participate in statewide transportation asset management planning and performance reporting.

Identify if the technology for the proposed project will be mission critical and public facing:

- ☐ The technology implemented for this proposed project will be considered mission critical and public facing.

2.10.7 Architecture Information

Business Function/Process(es)		Manage Assets		
Select + to add a business process with the same application, system, or component; COTS, MOTS or custom solution; runtime environment; system interfaces, data center location; and, security.				
Application, System or Component		1.0 Integrated Asset Inventory & Needs Database and User Input		
		Select + to add an application, system, or component.		
COTS, MOTS or Custom		Commercial off-the-shelf (COTS)		
	Name/Primary Technology:	Asset Repository (Enterprise Asset Management)		
Runtime Environment	Cloud Computing Used?	☒ Yes ☐ No	If "Yes," specify:	Software as a Service (SaaS)
	Server/Device Function	Asset Repository (system)		
	Hardware	N/A		
	Operating System	N/A		
	System Software	N/A		
Select + to add system software				

System Interfaces			Periodic loading of asset inventory/location/condition, deficiency, lifecycle and need data. Updates will be based on availability of additional asset information based on project completion or inspection. Each asset class has a different schedule with pavement surveys completed on a yearly basis and bridge inspections every other year (continually). Anchor assets included are pavement, bridge, drainage and TMS elements. Asset Management System and Needs source systems include: 6. PaveM (pavement) 7. Bridge Management consisting of Pontis, SMART, BIRIS (bridge) 8. Culvert DB (Drainage) 9. Traffic Management System (TMS elements) 10. One additional supplementary asset selected from the following list: a. Asset Management Database (AMI) (facilities) b. IMMS (street lights, signs, etc.) c. ADAPT American's with Disability Act (ADA) Geospatial Information System to locate Assets and Needs on the national and state highway systems: 4. Esri Roads and Highways LRS 5. PeMS (traffic census)		
Data Center Location		Other, specify	Commercial data center		
Security		Access (check all that apply)	☐ Public ☒ Internal State Staff ☐ External State Staff ☐ Other, specify:		
		Type of Information (check all that apply)	☐ Personal ☐ Health ☐ Tax ☐ Financial ☐ Legal ☐ Confidential ☒ Other, specify: Asset Inventory/Location/Condition, Deficiencies, Performance Targets and Needs.		
		Protective Measures (check all that apply)	☒ Technical Security ☒ Identity Authorization and Authentication ☒ Physical Security ☒Backup and Recovery ☐ Other, specify:		
Data Management		Data Owner	Name: Loren Turner		
			Title: Office Chief, Supervising Transportation Engineer		
			Business Program: Director's Office of Asset Management		
		Data Custodian	Name: Michelle Lopez-Hardie		
			Title: Staff Services Manager I		
			Business Function: Director's Office of Asset Management		
Business Function/Process(es)			Manage Assets		
Select + to add a business process with the same application, system, or component; COTS, MOTS or custom solution; runtime environment; system interfaces, data center location; and, security.					
Application, System or Component			2.0 Analytics, Strategies, Scenarios & Modeling		
			Select + to add an application, system, or component.		
COTS, MOTS or Custom			Commercial off-the-shelf (COTS)		
	Name/Primary Technology:		Analytics		
Runtime Environment	Cloud Computing Used?		☒ Yes ☐ No	If "Yes," specify:	Software as a Service (SaaS)
	Server/Device Function		N/A		

	Hardware	N/A
	Operating System	N/A
	System Software	N/A
Select + to add system software		
System Interfaces		Periodic loading of data utilized for analytics including revenue, financial projections, vulnerability assessments, demographics, and safety incidents. Financial data: 4. CGI Advantage (revenue) 5. Spreadsheets (financial projections) 6. PRSM (existing commitments) and/or quality management reporting system (QMRS) Demographics: 3. United State Census Bureau a. American Community Survey b. American Housing Survey c. Current Population Survey (includes labor force statistics) d. Current Population Survey Food Security Supplement e. Current Population Survey School Enrollment Supplement f. National Crime Victimization Survey g. National Crime Victimization Survey School Crime Supplement h. National Crime Victimization Survey Public Contact Survey i. National Longitudinal Mortality Study j. National Survey of College Graduates k. Rental Housing Finance Survey l. Survey of Income and Program Participation Panels 4. California Department of Finance a. Opportunity Zones b. Population Estimates c. Projections of Population, Births and Public School Enrollment Safety incidents: 2. TSN (traffic system network) Risks and Vulnerability Assessments: 2. USGS (GIS Shapefiles) a. Landslide b. Geologic Map c. Earthquake Fault Zones d. Seismic Hazard Zones e. Watershed Maps f. Topographic Maps

			6. District Vulnerability Assessments (spreadsheets)		
Data Center Location		Other, specify	Commercial data center		
Security		Access (check all that apply)	☐ Public ☒ Internal State Staff ☐ External State Staff ☐ Other, specify:		
		Type of Information (check all that apply)	☐ Personal ☐ Health ☐ Tax ☐ Financial ☐ Legal ☐ Confidential ☒ Other, specify: vulnerability assessments and safety incidents.		
		Protective Measures (check all that apply)	☒ Technical Security ☒ Identity Authorization and Authentication ☒ Physical Security ☒Backup and Recovery ☐ Other, specify:		
Data Management		Data Owner	Name: Loren Turner		
			Title: Office Chief, Supervising Transportation Engineer		
			Business Program: Director's Office of Asset Management		
		Data Custodian	Name: Michelle Lopez-Hardie		
			Title: Staff Services Manager I		
			Business Program: Director's Office of Asset Management		
Business Function/Process(es)			Manage Assets		
Select + to add a business process with the same application, system, or component; COTS, MOTS or custom solution; runtime environment; system interfaces, data center location; and, security.					
Application, System or Component			3.0 Integrated Project Performance and Funding		
			Select + to add an application, system, or component.		
COTS, MOTS or Custom			Commercial off-the-shelf (COTS)		
		Name/Primary Technology:	Project Nomination and Commitment		
Runtime Environment		Cloud Computing Used?	☒ Yes ☐ No	If "Yes," specify:	Software as a Service (SaaS)
		Server/Device Function	N/A		
		Hardware	N/A		
		Operating System	N/A		
		System Software	N/A		
Select + to add system software					
System Interfaces			Periodic (during planning period) sending of committed projects to PRSM for planning and/or QMRS.		
Data Center Location		Other, specify	Commercial data center		
Security		Access (check all that apply)	☐ Public ☒ Internal State Staff ☐ External State Staff ☐ Other, specify:		
		Type of Information (check all that apply)	☐ Personal ☐ Health ☐ Tax ☐ Financial ☐ Legal ☐ Confidential ☒ Other, specify: Unfunded projects.		
		Protective Measures (check all that apply)	☒ Technical Security ☒ Identity Authorization and Authentication ☒ Physical Security ☒Backup and Recovery ☐ Other, specify:		
Data Management		Data Owner	Name: Loren Turner		
			Title: Office Chief, Supervising Transportation Engineer		
			Business Program: Director's Office of Asset Management		
		Data Custodian	Name: Michelle Lopez-Hardie		
			Title: Staff Services Manager I		
			Business Program: Director's Office of Asset Management		

Business Function/Process(es)			Manage Assets		
Select + to add a business process with the same application, system, or component; COTS, MOTS or custom solution; runtime environment; system interfaces, data center location; and, security.					
Application, System or Component			4.0 Performance Outcomes, Business Intelligence & Dashboard		
			Select + to add an application, system, or component.		
COTS, MOTS or Custom			Commerical off-the-shelf (COTS)		
	Name/Primary Technology:		Project Nomination and Commitment		
Runtime Environment		Cloud Computing Used?	☒ Yes ☐ No	If "Yes," specify:	Software as a Service (SaaS)
		Server/Device Function	N/A		
		Hardware	N/A		
		Operating System	N/A		
		System Software	N/A		
Select + to add system software					
System Interfaces			Not Applicable. Required data will be available within TAMS through earlier interfaces and user interaction.		
Data Center Location		Other, specify	Commercial data center		
Security		Access (check all that apply)	☐ Public ☒ Internal State Staff ☒ External State Staff ☐ Other, specify:		
		Type of Information (check all that apply)	☐ Personal ☐ Health ☐ Tax ☐ Financial ☐ Legal ☐ Confidential ☐ Other, specify:		
		Protective Measures (check all that apply)	☒ Technical Security ☒ Identity Authorization and Authentication ☒ Physical Security ☒Backup and Recovery ☐ Other, specify:		
Data Management		Data Owner	Name: Loren Turner		
			Title: Office Chief, Supervising Transportation Engineer		
			Business Program: Director's Office of Asset Management		
		Data Custodian	Name: Michelle Lopez-Hardie		
			Title: Staff Services Manager I		
			Business Program: Director's Office of Asset Management		
Business Function/Process(es)			Manage Assets		
Select + to add a business process with the same application, system, or component; COTS, MOTS or custom solution; runtime environment; system interfaces, data center location; and, security.					
Application, System or Component			5.0 Broad System Capabilities		
			Select + to add an application, system, or component.		
COTS, MOTS or Custom			Commerical off-the-shelf (COTS)		
	Name/Primary Technology:		Visualization, Document Management and Data Science		
Runtime Environment		Cloud Computing Used?	☒ Yes ☐ No	If "Yes," specify:	Software as a Service (SaaS)
		Server/Device Function	N/A		
		Hardware	N/A		
		Operating System	N/A		
		System Software	N/A		
Select + to add system software					
System Interfaces			Not Applicable. Required data will be available within TAMS through earlier interfaces and user interaction.		
Data Center Location			Commercial data center		

	Other, specify	
Security	Access (check all that apply)	☐ Public ☐ Internal State Staff ☐ External State Staff ☐ Other, specify:
	Type of Information (check all that apply)	☐ Personal ☐ Health ☐ Tax ☐ Financial ☐ Legal ☐ Confidential ☐ Other, specify:
	Protective Measures (check all that apply)	☒ Technical Security ☒ Identity Authorization and Authentication ☒ Physical Security ☒Backup and Recovery ☐ Other, specify:
Data Management	Data Owner	Name: Loren Turner
		Title: Office Chief, Supervising Transportation Engineer
		Business Program: Director's Office of Asset Management
	Data Custodian	Name: Michelle Lopez-Hardie
		Title: Staff Services Manager I
		Business Program: Director's Office of Asset Management
Select + to add business functions/processes		

2.11 Recommended Solution

2.11.1 Rationale for Selection

Caltrans analyzed the previous alternatives using the following evaluation criteria to select the preferred alternative. Please note that TAMS sponsors and project management strongly feel multiple vendors can meet the provided mid-level requirements and the procurement will allow us to more fully define both business processes and requirements to evaluate fully the solutions proposed during the RFP. This solution does not include selection of specific products or an overall solution. It is fully expected that solutions offered by the market will shift in composition from those demonstrated during the RFI to meet more detailed TAMS requirements.

The alternative evaluation criteria include:

Addressing TAMS Capabilities:
1.1 To what degree is the alternative able to meet the breadth and depth of TAMS capabilities, functions and requirements?
1.2 How effectively does the alternative optimize Caltrans' ability to meet legislative requirements?

Risk and Complexity:
2.1 What implementation risk is inherent in the proposed alternative?
2.2 What is the operational risk indicated by the proposed alternative?
2.3 Can the Department use existing systems to reduce the risk and complexity?
2.4 Does the Department have the skills necessarry for a successful implementation?

Alignment with Agency, Department and IT Strategies:
3.1 Cloud solution available?
3.2 Supports the vision for funding agnostic performance management of all asset classes across the State of California?
3.3 Time required to reach vision?
3.4 Supports long term maintenance and support of the solution (use products which can be upgraded to use both current technology and increased functionality)?
3.5 Does the alternative support delivery of a minimum viable product?

Market Research Results:
4.1 Do the market research results support the proposed alternative (viable solutions)?
4.2 Does the market research support competition to provide the proposed alternative?

4.3 Were the demonstrated solutions acceptable to executive management?

The criteria above were evaluated below relative to each other. The ratings are high (3), medium (2) and low (1) with a high rating being good and low rating being relatively worse. This may be counterintuitive for some criteria. For example, implementation risk rated as high is a good rating.

Evaluation Criteria	#	Recommended (Systems Integrator)	Alternative (Caltrans as Prime)
Addressing TAMS Capabilities	1.1	High	Medium
	1.2	High	High
Risk and Complexity	2.1	High	Low
	2.2	High	High
	2.3	Medium	High
	2.4	High	Low
Alignment with Agency, Department and Caltrans' IT Strategies	3.1	High	High
	3.2	High	High
	3.3	High	Medium
	3.4	High	Low
	3.5	Medium	High
Market Research Results	4.1	High	Low
	4.2	High	Medium
	4.3	High	Low
Overall Ranking (average)		**2.85 (Recommended)**	2.07

Additionally, the recommended solution meets the following criteria based on the financial analysis:

1. Funding is available and approved (see FAW for specifics).
2. Caltrans and vendors have the required resource skills and availability.
3. COTS software is available to integrate and configure to meet Caltrans' requirements as identified herein.

Attachment: No attachment.

2.11.2 Technical/Initial CA-PMM Complexity Assessment

Complexity		Complexity Zone	
Technical Complexity Score:	2.1	☐ Zone I	Low Criticality/Risk
		☒ Zone II/III	Medium Criticality/Risk
		☐ Zone IV	High Criticality/Risk

2.11.3 Procurement and Staffing Strategy

Activity

Procurement 0/4 Project Management (See detail in Staffing Plan Tab S2AA-2.11.3)

Responsible (check all that apply)	When Needed (check all that apply)	Cost Estimate Verification (check all that apply)

☒ Agency/state entity staff ☒ STP staff ☒ CDT Project Approvals and Oversight staff ☐ CA-PMO staff ☐ DGS staff ☐ Contractor ☐ Other, specify:	☒ Stage 3 Solution Development ☒ Stage 4 Project Readiness and Approval ☒ After project is approved (after Stage 4 Project Readiness and Approval)	☐ Market research conducted (MR) ☐ Cost estimate provided (CE) ☐ CDT CE ☐ DGS CE ☐ Request for Information (RFI) conducted ☐ Comparable vendor services have been used on previous contracts (CV) ☐ Leveraged Procurement Agreement (LPA)

Complete Only if Contractor Responsible for Activity			
Procurement Vehicle	Request for Offer/Information Technology Consulting Services (ITMSA)	**Contract Type**	Time and Materials (T&M)
If "Other," specify:	Service Request	If "Other," specify:	CDT Hourly

Procurement 1a Data Validation (See detail in Staffing Plan Tab S2AA-2.11.3)

Responsible (check all that apply)	**When Needed** (check all that apply)	**Cost Estimate Verification** (check all that apply)
☒ Agency/state entity staff ☒ STP staff ☒ CDT Project Approvals and Oversight staff ☐ CA-PMO staff ☐ DGS staff ☒ Contractor ☐ Other, specify:	☒ Stage 3 Solution Development ☒ Stage 4 Project Readiness and Approval ☐ After project is approved (after Stage 4 Project Readiness and Approval)	☒ Market research conducted (MR) ☐ Cost estimate provided (CE) ☐ CDT CE ☐ DGS CE ☒ Request for Information (RFI) conducted ☐ Comparable vendor services have been used on previous contracts (CV) ☐ Leveraged Procurement Agreement (LPA)

Complete Only if Contractor Responsible for Activity			
Procurement Vehicle	Request for Offer/Information Technology Consulting Services (ITMSA)	**Contract Type**	Fixed Price (FP)
If "Other," specify:	Click here to enter text.	If "Other," specify:	Click here to enter text.

Procurement 1b Enterprise Architecture (See detail in Staffing Plan Tab S2AA-2.11.3)

Responsible (check all that apply)	**When Needed** (check all that apply)	**Cost Estimate Verification** (check all that apply)
☒ Agency/state entity staff ☒ STP staff ☒ CDT Project Approvals and Oversight staff ☐ CA-PMO staff ☐ DGS staff ☒ Contractor ☐ Other, specify:	☒ Stage 3 Solution Development ☒ Stage 4 Project Readiness and Approval ☐ After project is approved (after Stage 4 Project Readiness and Approval)	☒ Market research conducted (MR) ☐ Cost estimate provided (CE) ☐ CDT CE ☐ DGS CE ☒ Request for Information (RFI) conducted ☐ Comparable vendor services have been used on previous contracts (CV) ☐ Leveraged Procurement Agreement (LPA)

Complete Only if Contractor Responsible for Activity			
Procurement Vehicle	Request for Offer/Information Technology Consulting Services (ITMSA)	**Contract Type**	Fixed Price (FP)
If "Other," specify:	Click here to enter text.	If "Other," specify:	Click here to enter text.

Procurement 2 Requirements Elicitation (Visualization) (See detail in Staffing Plan Tab S2AA-2.11.3)

Responsible (check all that apply)	**When Needed** (check all that apply)	**Cost Estimate Verification** (check all that apply)
☒ Agency/state entity staff ☒ STP staff ☒ CDT Project Approvals and Oversight staff ☐ CA-PMO staff ☐ DGS staff ☒ Contractor ☐ Other, specify:	☒ Stage 3 Solution Development ☐ Stage 4 Project Readiness and Approval ☐ After project is approved (after Stage 4 Project Readiness and Approval)	☒ Market research conducted (MR) ☐ Cost estimate provided (CE) ☐ CDT CE ☐ DGS CE ☒ Request for Information (RFI) conducted ☐ Comparable vendor services have been used on previous contracts (CV) ☐ Leveraged Procurement Agreement (LPA)

Complete Only if Contractor Responsible for Activity			
Procurement Vehicle	Request for Offer/California Multiple Award Schedules (RFO/CMAS)	**Contract Type**	Fixed Price (FP)
If "Other," specify:	Click here to enter text.	If "Other," specify:	Click here to enter text.

Procurement 3 Business-Organizational Change Management (See detail in Staffing Plan Tab S2AA-2.11.3)

Responsible (check all that apply)	**When Needed** (check all that apply)	**Cost Estimate Verification** (check all that apply)
☒ Agency/state entity staff ☒ STP staff ☒ CDT Project Approvals and Oversight staff ☐ CA-PMO staff ☐ DGS staff ☒ Contractor ☐ Other, specify:	☒ Stage 3 Solution Development ☒ Stage 4 Project Readiness and Approval ☒ After project is approved (after Stage 4 Project Readiness and Approval)	☒ Market research conducted (MR) ☐ Cost estimate provided (CE) ☐ CDT CE ☐ DGS CE ☒ Request for Information (RFI) conducted ☐ Comparable vendor services have been used on previous contracts (CV) ☐ Leveraged Procurement Agreement (LPA)

Complete Only if Contractor Responsible for Activity			
Procurement Vehicle	Formal Solicitation (IFB/ RFP)	**Contract Type**	Fixed Price (FP)
If "Other," specify:	Click here to enter text.	If "Other," specify:	Click here to enter text.

Procurement 4 Integration/Configuration (See detail activities in Staffing Plan Tab S2AA-2.11.3)

Responsible (check all that apply)	**When Needed** (check all that apply)	**Cost Estimate Verification** (check all that apply)

☒ Agency/state entity staff ☒ STP staff ☒ CDT Project Approvals and Oversight staff ☐ CA-PMO staff ☐ DGS staff ☒ Contractor ☐ Other, specify:	☐ Stage 3 Solution Development ☐ Stage 4 Project Readiness and Approval ☒ After project is approved (after Stage 4 Project Readiness and Approval)	☒ Market research conducted (MR) ☐ Cost estimate provided (CE) ☐ CDT CE ☐ DGS CE ☒ Request for Information (RFI) conducted ☐ Comparable vendor services have been used on previous contracts (CV) ☐ Leveraged Procurement Agreement (LPA)

Complete Only if Contractor Responsible for Activity

Procurement Vehicle	Formal Solicitation (IFB/ RFP)	**Contract Type**	Fixed Price (FP)
If "Other," specify:	Click here to enter text.	If "Other," specify:	Click here to enter text.

Procurement 5 Independent Verification and Validation (IV&V) (See detail in Staffing Plan Tab S2AA-2.11.3)

Responsible (check all that apply)	**When Needed** (check all that apply)	**Cost Estimate Verification** (check all that apply)
☒ Agency/state entity staff ☒ STP staff ☐ CDT Project Approvals and Oversight staff ☐ CA-PMO staff ☐ DGS staff ☒ Contractor ☐ Other, specify:	☐ Stage 3 Solution Development ☐ Stage 4 Project Readiness and Approval ☒ After project is approved (after Stage 4 Project Readiness and Approval)	☐ Market research conducted (MR) ☐ Cost estimate provided (CE) ☐ CDT CE ☐ DGS CE ☐ Request for Information (RFI) conducted ☒ Comparable vendor services have been used on previous contracts (CV) ☐ Leveraged Procurement Agreement (LPA)

Complete Only if Contractor Responsible for Activity

Procurement Vehicle	Request for Offer/Information Technology Consulting Services (ITMSA)	**Contract Type**	Fixed Price (FP)
If "Other," specify:	Click here to enter text.	If "Other," specify:	Click here to enter text.

Select + to add activities.

	Yes	**No**
Will any of the activities identified above result in a competitive or non-competitive solicitation that will be over the Agency/state entity's DGS delegated purchasing authority?	☒	☐

2.11.4 Enterprise Architecture Alignment

Caltrans provided both hardware and software standards and security practices related to cloud computing with the RFI. No vendors indicated any concerns or issues in both aligning to our hardware/software standards and complying with our security practices.

The following capabilities are currently within Caltrans' enterprise architecture and will be leveraged through direct inclusion in the RFP as enterprise standards with evaluation criteria:

1. Public or Internal Portal/Website
2. Identity and Access Management
3. Business Intelligence and Data Warehousing (standards defined and partially implemented)

4. Big Data Analytics (standard defined, but not yet implemented)
5. Master Data Management (planned implementation under Data Governance)

The following capabilities require development as Department of Transporation capabilities and will likely extend the existing Caltrans' enterprise architecture:
1. Enterprise Service Bus
2. Enterprise Content Management (NOT including document scanning and eForms capabilities as they are not required of the TAMS solution)

Inclusion of these items in the TAMS RFP is under evaluation. TAMS may not be the driver for the selection of these enteprise capabilities, but would be able to leverage them if available.

The following capability is not envisioned within the initial scope of TAMS and is not under consideration for usage or extension:
1. Public or Internal Mobile Application

Information Technology Capability Table

Information Technology Capability	Existing Enterprise Capability to be Leveraged	New Enterprise Capability Needed
Public or Internal Portal/Website	☒	☐
Public or Internal Mobile Application	☐	☐
Enterprise Service Bus	☐	☒
Identity and Access Management	☒	☐
Enterprise Content Management (including document scanning and eForms capabilities)	☐	☒
Business Intelligence and Data Warehousing	☒	☐
Master Data Management	☐	☒
Big Data Analytics	☐	☒

2.11.5 Project Phases

Phase	Project Preparation (SI onboarding)

Description	Phase Deliverable
This phase provides initial planning and preparation for the project. Each project has its own unique objectives, scope, and priorities. The deliverables described in this phase assist in completing the initiation and planning steps in an efficient and effective manner. 1. Finalize project management plans with SI 2. Finalize project work breakdown structure (WBS), tasks, and schedule 3. Confirm and obtain project resources 4. Configure project collaboration space and project library 5. Create Project Library training material (may be utilzied during project kick-off)	1. Project Management Plans (Project Charter, Project Governance Plan, Issue Management, Risk Management, etc.) 2. Project Library Available 3. Project Library Training Material 4. Project Kick-off Material 5. MS Project Schedule 6. MS Word and PowerPoint Deliverable Templates 7. Bill of Material for initial environment build-out (on-prem) provisioning (SaaS)

6. Create deliverable templates (e.g., MS Word, PowerPoint) 7. Obtain base solution environment components (sandbox environment at a minimum) 8. Initiate project governance 9. Initiate project oversight Conduct kick-off (generally one for executive level and one for the project team)	

Phase	**Scope Validation**
Description	**Phase Deliverable**
The purpose of this phase is to achieve a common understanding of how Caltrans intends to use the selected solution to support their business. It focuses on the rapid setup of the environment available for validation workshops with business users to confirm scope and determine delta requirements. These will be realized in the next phase to enhance the baseline provided by COTS software. 1. Rapid provisioning of sandbox environment 2. Education of software functionality 3. Education of business processes and requirements (including legislative requirements) 4. Document business processes 5. Refinement of requirements given the software capabilities and business processes 6. Conduct workshops demonstrating software functionality quickly configured to meet requirements 7. Identify gaps between configured software functionaly and business/functional requirements 8. Conduct technical analysis to determine the solution architecture, technical requirements (based on DOT standards) and data requirements (includes evaluation of existing Department systems and data)	1. Solution Blueprint 2. Solution Architecture 3. Data Integration and Migration Plan 4. Updated MS Project Schedule to indicate detailed activities required for the next phase

Phase	**Realization**
Description	**Phase Deliverable**
The purpose of this phase is to implement any of the business process delta requirements defined during the Scope Validation phase. The team configures, develops, tests and documents the solution in a series of time-boxed iterations. Before the solution is released to the next phase it is fully end-to-end integration tested and accepted by end users.	1. Solution Design 2. Data Integration and Migration Design 3. Test Plan 4. Test Scripts 5. Test Reports a. Unit Test b. Integration Test

1. Design the solution 2. Configure the solution 3. Iterations will likely be defined by capabilities (e.g., asset repository handled as an individual sprint) 4. Test the solution 5. Prepare for training 6. Prepare for cutover (conduct dry-runs)	c. System Test d. User Acceptance Test e. Load Test 6. Training Plan 7. Training Material 8. Transition Plan (including cutover activities) 9. Go/No-Go Criteria

Phase	**Final Preparation**
Description	**Phase Deliverable**
The purpose of this phase is to complete the cutover activities (including technical and load testing, end user training, system management and cutover rehearsal activities) to finalize your readiness to go live. The Final Preparation phase also serves to resolve all remaining critical issues. On successful completion of this phase, users are using TAMS end-to-end for all business capabilities. 1. Execute transition plan 2. Execute training 3. Conduct cutover activities (including data integration for assets and migration of pipeline projects)	1. Go/No-Go Decision 2. Training Report (summarizes training participation and effecacy) 3. Outstanding Defect List – Categorized by severity (becomes punch list for go-live support) 4. Operations, Maintenance and Support Guide 5. Production Certification

Phase	**Go-Live Support**
Description	**Phase Deliverable**
The purpose of this phase is to move from a project-oriented, pre-production environment to live production operation and provide sustained support to business users to aid their transition into the new environment. 1. Conduct knowledge transfer sessions 2. Shadow Department IT while they conduct operations and maintenance activities 3. Resolve outstanding high-severity defects 4. Brief Caltrans service desk and Enteprise Architecture on TAMS 5. Review TAMS component procedures for receiving product or Systems Integrator support	1. Updated Operations, Maintenance and Support Guide 2. Service Desk Presentation 3. Enterprise Architecture Presentation

Select + to add project phases.

2.11.6 High Level Proposed Project Schedule

Proposed Project Planning Start Date:	7/26/2017	**Proposed Project Planning End Date:**	2/28/2020
Proposed Project Start Date:	4/1/2020	**Proposed Project End Date:**	3/31/2023

Activity Name	**Start Date**	**End Date**
Stage 3 Solution Development	9/28/2018	7/31/2019
Solicitation Development	9/28/2018	4/30/2019

Solicitation Package Review	5/1/2019	7/31/2019
Stage 4 Project Readiness and Approval	8/1/2019	2/28/2020
Solicitation Release	10/7/2019	1/27/2020
Solicitation Negotiations	2/24/2020	2/28/2020
Solicitation Award	3/2/2020	3/16/2020
Solicitation Protest Period	3/17/2020	3/24/2020
Requirements	4/1/2020	9/30/2020
Data Conversion	6/1/2020	11/30/2020
Design	10/1/2020	2/26/2021
Development	3/1/2021	7/30/2021
Data Migration	1/4/2021	4/30/2021
Testing	5/3/2021	10/29/2021
Training	6/1/2021	7/29/2022
Deployment	11/1/2021	11/30/2021
Go Live	12/1/2021	12/31/2021
Maintenance and Operations	1/3/2022	3/31/2023

Select + to add activities

2.11.7 Cost Summary

Total Proposed Planning Cost:	$5,854,025
Total Proposed Project Cost:	$20,734,248
Total Proposed Future Operations IT Staff & OE&E Costs (Continuing):	$1,329,765
Total Proposed Annual Future Operations IT Costs (M&O):	$1,237,183

2.12 Staffing Plan

2.12.1 Administrative

To ensure the success of this project Caltrans is committing staff with extensive, high-level administrative experience (budgets, procurement, personnel, and contract and project management). The staffing is shown in the attached staffing plan spreadsheet; administrative staffing are identified through all phases of the project. This mandated, critical project will revise and greatly improve Caltrans' core transportation project planning, management, and delivery processes. It also meets state and national mandates, supports Caltrans' strategic goals, and will provide the information managers needed to make the best decisions, and as such, has earned management's strong support in staffing and funding.

2.12.2 Business Program

Caltrans is dedicating staff to this project posessing extensive business process knowledge (project delivery, planning, management, and funding). It is guided by the Statewide Asset Management Engineer, who has years of high-level experience in all facets of the core processes being addressed by the TAMS system, as well as experience improving transportation business processes with IT solutions. More importantly, the IT and business project managers, who are dedicated to this project , have much knowledge and experience respectively, guaranteeing smooth project implementation. These resources are included in the numbers under Administrative above. Caltrans' districts and headquarters program managers will be used to lead the change to the business processes and assist with the implementation of the new system. The staffing for Business Program is shown in the attached staffing plan spreadsheet and are identified in the project through all phases of the project.

2.12.3 Information Technology (IT)

Caltrans is staffing this project with experienced IT staff and will be adding to the team as the project moves forward. In addition to havesting data from as many of Caltrans current systems, this project replaces two additional small data systems. These small systems are within the purview of the business process team. A team of data experts from each of the current systems meets regularly to identify issues of needed data and format modification which will to help prepare for the establishment of the TAMS. The staffing for IT for Caltrans and the various vendor contracts are shown in the attached staffing plan spreadsheet and are identified in the project through all phases of the project.

2.12.4 Testing

Caltrans is dedicating both TAM business and IT staff, as well as users and vendor staff to testing. Testing is critical to ensure the State gets the product it expected for its expenditure of resources, and to ensure the best transition because TAMs affects Caltrans core operations statewide. The staffing for testing is shown in the attached staffing plan spreadsheet and are identified in the project in the testing phases of the project.

2.12.5 Data Conversion/Migration

Caltrans is dedicating staff to handle the data conversion and migration effort in this project. To ensure this is a smooth transition, Caltrans is establishing a contract in the planning phase to work on data cleansing and quality. This data cleansing and quality contract will include documentation of further information for data governance. The staffing for data conversion/migration is shown in the attached staffing plan spreadsheet and are identified in the project in the data cleansing and data quality phase and in the data conversion/migration of the project.

2.12.6 Training and Organizational Change Management

Training and OCM for system and business process changes are critical to TAMS' success. Caltrans is adding resources to procure support for business OCM early in project planning for ongoing process changes and project preparation. Additional OCM and training will be included in the SI contract for Caltrans staff in districts and headquarters during the implementation of TAMS. The staffing for training and OCM are shown in the attached staffing plan spreadsheet and are identified in the SI project in the training and OCM activities as well as the business OCM in project planning.

2.12.7 Resource Capacity/Skills/Knowledge for Stage 3 Solution Development

TAMS staff have extensive experience with Caltrans' contract procurement, management, the business programs and processes. IT has extensive technical knowledge to support the project and systems. The team has already conducted a written industry survey, a literature survey, surveyed other states' agencies facing similar operations and data mandates, and hosted a two day vendor demonstration conference to collect information on industry offerings. The team has worked closely with CDT staff to ensure these activities have been appropriate and comprehensive. Caltrans will be working with the CDT State Technology Procurement (STP) division on this project. CDT sets the standard for precision, experience, skill, and accuracy for IT procurement in state government. The staffing for Stage 3 is shown in the attached staffing plan spreadsheet and are identified in the project in the planning phase of the project.

2.12.8 Project Management

2.12.8.1 Project Management Risk Assessment

Project Management Risk Score:	0.6
Attachment: 2660-544_Caltrans_TAMS_S2AA_2.12.8.1_Project Mgmt Risk Assessment.xlsx	

2.12.8.2 Project Management Planning

Are the following project management plans or project artifacts complete, approved by the designated Agency/state entity authority, and available for Department of Technology review?

Project Charter	Yes	2660-544_Caltrans_TAMS_S2AA_2.12.8.2_Project CharterDRAFT.pdf
Scope Management Plan	No	To be completed during stages 3 and 4
Risk Management Plan	Yes	2660-544_Caltrans_TAMS_S2AA_2.12.8.2_RiskManagementPlanDRAFT.pdf
Issue and Action Item Management Plan	Yes	2660-544_Caltrans_TAMS_S2AA_2.12.8.2_IssueManagementPlanDRAFT.pdf
Communication Management Plan	No	To be completed during stages 3 and 4
Schedule Management Plan	No	To be completed during stages 3 and 4
Human Resource Management Plan	No	To be completed during stages 3 and 4
Staff Management Plan	No	To be completed during stages 3 and 4
Stakeholder Management Plan	No	To be completed during stages 3 and 4
Governance Plan	Yes	2660-544_Caltrans_TAMS_S2AA_2.12.8.2_GovernancePlanDRAFT.pdf

2.12.9 Organization Charts

Attachment: 2660-544_Caltrans_TAMS_S2AA_2.12.9 Project Organization Chart.pdf

2.13 Data Conversion/Migration

Identify the status of each of the following data conversion/migration activities:

Data Conversion/Migration Planning	In Progress	Data Quality Assessment	Not Started
Data Conversion/Migration	In Progress	Data Quality Business Rules	Not Started
Current Environment Analysis	In Progress	Data Dictionaries	Not Started
Data Profiling	In Progress	Data Cleansing and Correction	Not Started

Data conversion and migration are a small part of TAMS. As the project is replacing two smaller reporting systems, we anticipate the conversion of historical pipeline project data into TAMS. TAMS will not be the system of record for these projects, but will provide the opportunity to associate assets, needs and performance with these converted projects. For the projects originating from the SHOPP Tool, project performance will also be migrated.

The bulk of data integration will come from asset inventory, location and condition. Again, TAMS will not be the system of record for the majority of these assets and will need to periodically receive asset data from the existing asset management systems. For the anchor assets; pavement, bridge, drainage and TMS, TAMS will be conducting the data assessment, quality, definition and cleansing effort beginning in January 2019. TAMS will work with the data owners and stewards of these asset management systems to ascertain data quality and resolve data issues prior to TAMS go-live. For data items not resolvable (e.g., incomplete inventory and/or condition), TAMS will determine the appropriate remediation plan and adjust scope as necessarry for the TAMS RFP.

In coordination with the Caltrans Geospatial Data Officer, the TAMS project is preparing to pilot enterprise data assessment, quality, definition and cleansing processes, procedures and tools. This effort is slated to begin in January of 2019 and has received funding approval by the TAMS Steering Committee and the Finance Board.

Explanation of "Not Started" data conversion/migration items:

1. Data Quality Assessment
   Included in the TAMS data assessment, quality, definition and cleansing effort to being January 2019.
2. Data Quality Business Rules
   Included in the TAMS data assessment, quality, definition and cleansing effort to being January 2019.
3. Data Dictionaries
   Included in the TAMS data assessment, quality, definition and cleansing effort to being January 2019.
4. Data Cleansing and Correction
   Included in the TAMS data assessment, quality, definition and cleansing effort to being January 2019.

Attachment: 2660-544_Caltrans_TAMS_S2AA_2.13_PDA_Tool Architecture.vsdx; 2660-544_Caltrans_TAMS_S2AA_2.13_SHOPP_Tool Data and Architecture.vsdx

2.14 Financial Analysis Worksheets

Attachment: 2660-544_Caltrans_TAMS_S2AA_2.14_FAW_psw123 v5.xlsx

Preliminary Assessment – Department of Technology Use Only	
Original "New Submission" Date	9/24/2018
Form Received Date	9/24/2018
Form Accepted Date	9/24/2018
Form Status	Completed
Form Status Date	11/02/2018

Main Form – Department of Technology Use Only	
Original "New Submission" Date	9/24/2018
Form Received Date	9/24/2018
Form Accepted Date	9/24/2018
Form Status	Completed
Form Status Date	11/02/2018
Form Disposition	Approved
Form Disposition Date	11/02/2018