

Draft Digital Delivery Implementation Plan

ODOT CI-2407
Multidimensional Design Support Services



OKLAHOMA
Transportation



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Acronyms

Acronym	Definition
AAR	After Action Review
ACCO	Association of County Commissioners of Oklahoma
ADCMS	Advanced Digital Construction Management Systems
AEGIS	Applications of Enterprise GIS in Transportation
AOGC	Association of Oklahoma General Contractors
ACOG	Association of Central Oklahoma Governments
AWP	AASHTOWare Project
BIM	Building Information Modelling
BEP	BIM Execution Plan
CDE	Common Data Environment
DBE	Disadvantaged Business Enterprise
DDP	Digital Delivery Program
DDT	Digital Delivery Team
EDC	Every Day Counts
FIO	For Information Only
GNSS	Global Navigation Satellite System
IFC	Industry Foundational Classes
IHEEP	International Highway Engineering Exchange Program
INCOG	Indian Nation Council of Governments
JSTAN	Joint Subcommittee on Data Standards
JTCEES	Joint Technical Committee on Electronic Engineering Standards
LOD	Level of Development
LOIN	Level of Information Need
MALD	Model as the Legal Document
MEBS	Model Element Breakdown Structure
ODOT	Oklahoma Department of Transportation
OSU	Oklahoma State University
OU	University of Oklahoma
RACI	Responsible, Accountable, Consulted, Informed
SG	Strategic Goal
STEM	Science, Technology, Engineering, Mathematics
TAMP	Transportation Asset Management Plan
TG	Tactical Goal
TRSA	Tulsa Regional STEM Alliance



Introduction

Oklahoma Department of Transportation (ODOT) has established a Digital Delivery Program (DDP) through a strategic plan and funded through an Advanced Digital Construction Management Systems (ADCMS) Grant. The strategic plan outlined three tactical and five strategic goals to guide the implementation of a program focused on adapting current processes for digital delivery and lifecycle data exchanges. The tactical goals can be achieved within one to three years, depending on the level of resources available. These are activities with low barriers to entry that can be done in conjunction with current project development and are listed first in this document. Following the tactical goals, are the strategic goals that can be achieved within three to seven years. These are high value activities that have prerequisites established in the tactical goals. The strategic goals are the core of the digital delivery program.

This implementation plan defines the phased approach to these goals through the steps necessary to meet the targeted digital maturity levels outlined in the ODOT gap assessment. This plan identifies the organizational changes recently made by the Department, along with an overall implementation approach and alignment with industry standards, such as openBIM and model use cases.

Overview

ODOT is positioning itself for the industry shift to open data standards and digital delivery. Executive management is focused on data driven decision making and implementing processes that will streamline this effort. Over the next four years, the DDP will help create a long-term, sustainable program centered on the project lifecycle assets.

The program was developed through a three-step process:

- Assess the organization's needs, desires, and current state of maturity.
- Align the needs to defined solutions and redesigned processes.
- Advance by defining a detailed roadmap to develop necessary technology and information requirements.

This plan includes tasks the Digital Delivery Team (DDT) will conduct through a phased and agile approach. The incremental development of tasks will manage the pace of change and allow the team to implement a series of specific and prioritized use cases. This plan will be updated with yearly amendments based on ongoing performance monitoring. Implementation of the program is defined through the overall purpose, digital delivery roles, and advancement of the program.



Purpose

The purpose of the ODOT DDP is to establish BIM workflows and processes throughout the project lifecycle and define digital delivery guidelines that will be implemented on future projects. Additional drivers of the program include:

1. Standardization throughout the agency in regard to data and information management.
2. Short-term development of today's workforce.
3. Education development for ODOT's future workforce.

Digital Delivery Roles

ODOT has appointed an internal Digital Delivery manager and associated teams committed to the execution of the program. The table below identifies the key stakeholders and groups necessary for the implementation of the program.

Stakeholder	Program Role
Executive Sponsor	Supports the DDP both externally and internally to the agency. The Executive Sponsor is currently the Executive Director but can be another member of ODOT should role transition.
Digital Delivery Manager	Leads the overall program and coordinates with other state DOTs/agencies through collaboration and peer exchanges. ODOT position filled by application.
Digital Delivery Team	Core leadership group composed of Digital Delivery Manager, a mix of ODOT Digital Delivery specialists and design engineers, and contracted consultants. Members perform multiple functions and classified under below roles for tasks.
ODOT Digital Delivery Design Team	The design team will assist pilot project workflows and identify needs for technology. Made up of current members of ODOT pilot squad.
ODOT Quality Management Team	Assists with quality management processes and workflows for digital deliverables.
ODOT Digital Delivery Technology Team	Assists with the implementation of the common data environment, software standards and controls, and monitoring software usage. Composed of ODOT ProjectWise and Standards and Controls personnel as well as Bentley software engineer.
ODOT Digital Delivery Engagement Team	Assists with training, education, and industry outreach. ODOT assigned positions to coordinate training and lead outreach.



Stakeholder	Program Role
Digital Delivery Consultants	Assists the Digital Delivery Manager to implement and deliver the program. Consists of current on-call consultants and sub-consultants.
Technical Committee	Assists with industry input through quarterly meetings and specified reviews. The technical committee is composed of representatives from ODOT divisions including construction, consultants, and contractors.
ODOT Agency Leads	Assists with specific input based on their roles and responsibilities. Examples of agency leads includes executive leadership, District leads, inspectors, and data stewards.
Industry Stakeholders	Assists with specific input based on their roles and responsibilities. Examples of industry stakeholders include ACEC, AOGC, AGOC, and Oklahoma Turnpike Authority.
Education Stakeholders	Assists with specific input based on their roles and responsibilities. Examples of education stakeholders include college programs, career tech, and K-12 schools.

Program Advancement

The DDP is centered around an overall vision and mission statement, program objectives and goals, and defined metrics. The following sections will be crucial when revisiting the implementation plan to monitor progress and refine future tasks.

Vision

The vision of the DDP is to create digital delivery standards and optimized workflows that are adopted and implemented agency wide, increasing value throughout the transportation infrastructure lifecycle.

Mission

The mission of the DDP is to lead efforts to advance and connect digital resources that facilitate data-driven decision making and maximize the value of the transportation infrastructure lifecycle.

Program Goals

The program goals, or desired outcomes, for achieving the vision and mission include:

1. Develop standardized and accessible digital delivery processes, guidance documents, training, and tools to support project development functions by all stakeholders.



2. Implement digital technologies throughout the project lifecycle to create high-quality, data-rich models and capture historical, present, and future data through our project deliverables.
3. Establish and implement new information management processes that capture construction inspection data and use asset information from all projects to improve existing asset management systems.
4. Establish practices to manage the pace of change with the current and future workforce through technology training and workforce development.

Program Objectives

The core program objectives, or steps for achieving the larger program goals, focus on advancing data-driven decision making through digital delivery standards. The objectives include:

1. Develop standardized processes and utilize technology that supports the digital delivery project lifecycle.
2. Develop foundational plans such as strategic, implementation, communication, engagement, and change management plans that clearly articulate future objectives and are available for stakeholder reference.
3. Reduce paper throughout project lifecycles by conducting pilot projects to evaluate digital workflows.
4. Leverage new and current technologies that align with ODOT's overall IT stack and lead to proficiency with data rich models and asset information stored and managed throughout the asset lifecycle.

Project Delivery Implementation Goals

Tactical and strategic goals that align with the program's overall goals and objectives, require varied levels of effort and resource needs. Built upon the program objectives and program components from the ADCMS grant, the following three tactical goals (achieved in 1-3 years) and five strategic goals (achieved in 3-7 years) were defined:



Tactical Goals



TG-1: Establish Change Management, Communication, and Engagement Plans



TG-2: Establish Process Standardization aligning to industry standards for data exchanges



TG-3: Establish workforce development education and training programs

Strategic Goals



SG-1: Implementation of Outreach and Training Programs



SG-2: Strategy and Risk Calibration



SG-3: Championing Change through leadership empowerment



SG-4: Lifecycle Data Exchanges



SG-5: Lifecycle data processes for operations and maintenance



Progress Monitoring

The following key metrics have been identified to monitor progress throughout the program. These metrics are associated with each applicable tactical or strategic goal task and can be found in Appendix A.

Funding:

Funding investment: The amount of funding needed to complete a task or activity.

Funding Utilization: Incurred and future costs measured against percent of program complete.

Cost of procurement: Cost of licenses, software, or hardware for specific activities.

Change Management:

Total Stakeholder communications: Number of emails, newsletters, videos, or documents created, distributed, or updated.

Risk Tracking: Number of risks created, mitigated, or decommissioned following the risk registry and yearly assessment.

Stakeholder Satisfaction: Number and quality of collated responses or feedback from survey respondents.

After-Action Review Feedback: Number of AARs conducted for specific activities and quality of feedback.

Total educational sessions: Number of education sessions, meetings, workshops, or peer exchanges conducted.

Total workforce development programs: Number of stem kits provided, curriculum updates, or programs implemented.

Guidance Documents and Training:

Website Engagement: Monthly, quarterly, or in perpetuity counts of document downloads, clicked links, or website visits monitored over time.

Total Staff trained: Individual count of staff or participants trained or attending workshops or sessions.

Volume of Educational Materials: Number of resources created for stakeholders including schools, workforce development, and industry partners.

Pilot Project Program:

Model use case volume: Number of model use cases piloted on specific pilots or ancillary assets collected for digital as-built use case.

Total pilot projects: Number of pilots identified using the criteria matrix.



Stakeholder Volume: Number of districts, stakeholders, contractors, consultants, or agencies participating in specific activities.

Digital Delivery Implementation Approach

Implementing the program will take numerous stakeholders and a phased and holistic approach to meet the maturity goals by the end of 2027. The phased approach to deliver model-based design deliverables will need to incorporate low barrier to entry tasks, prerequisite model use cases, and industry standards for faster adoption. Initial guidance documents will need to be in place prior to the initial phase of the pilot program and construction phase programs. As part of this approach, special consideration should be given to the following:

- Identification of roles and responsibilities of key stakeholders to provide clarity and accountability from the start.
- Establish and prioritize BIM Model Use Cases.
- Monitor the advancement of industry standards that will be implemented throughout the program, such as open data standards and openBIM.
- Conduct additional organizational activities that are foundational for the ODOT DDP.

Roles and Responsibilities

A RACI chart, or matrix, is a responsibility assignment matrix in project management used to clarify roles and responsibilities on project tasks. A RACI chart has been created for the tasks with the four key responsibilities (responsible, accountable, consulted, informed) assigned using the ODOT digital delivery organization structure. The definitions of RACI are:

- **Responsible:** Assigned directly to do the work or create the deliverable.
- **Accountable:** Delegates and reviews the work. Only one accountable person per task.
- **Consulted:** Provides input and feedback. Has a stake in the outcome of the task and is consulted prior to the task if needed. Not every task needs a consulted party.
- **Informed:** Needs to be educated on progress but not consulted. Usually outside of the project team.

In addition to the organizational chart, additional stakeholders have been identified for the roles associated with the chart. The following table outlines the roles and potential responsibilities for the program. Additional roles can be added as the program progresses.



RACI Roles	Responsible	Accountable	Consulted	Informed
Executive Sponsor				X
ODOT Digital Delivery Manager	X	X		
ODOT Digital Delivery Design Team	X		X	
ODOT Quality Management Team	X		X	
ODOT Digital Delivery Technology Team	X		X	
ODOT Digital Delivery Engagement Team	X		X	
Digital Delivery Consultants	X		X	
Technical Committee			X	X
ODOT Agency Leads			X	X
Industry Stakeholders			X	X
Education Stakeholders			X	X

The full program task RACI chart and associated progress monitoring metrics can be found in Appendix A: RACI Chart and Metrics

BIM Model Use Cases

Establishing BIM Model Use Cases (or BIM Use Cases) is one of the first steps in the implementation of the DDP. Model use cases describe the purposes of BIM models and how they will be used on a project or for operations for design, construction, and asset management activities. A BIM Use Case may be fulfilled through multiple workflows, leveraging different tools to engage the digital data that makes up a BIM model. For projects, model use cases are documented in a BIM Execution Plan (BEP), which establishes how digital data and BIM models will be created, managed, reviewed, and exchanged to achieve required project outcomes.

As part of the digital delivery gap assessment that was conducted in 2023, the Digital Delivery Use Cases strategy element was rated as non-existent. The short-term 2027 maturity target for Project Use Cases is to achieve extensive digital delivery use cases with limited sharing between parties. The 2027 maturity target for Operational Use Cases is to have digital as-built information manually maintained during operations and maintenance activities. The following use cases will be utilized throughout the program and are explained in detail in Appendix B:



- Existing Condition Modeling
- Design Authoring
- Visualization
- Design Model Review
- Design Cost Estimation
- Contract Model (Letting Model)
- 4D Construction Phasing
- Construction Authoring (Build Model)
- Model-Based Construction Management
- Digital As-Built (Record Model)

Open Data Standards

It is important to monitor the advancement and development of open data standards as the infrastructure industry shifts to openBIM. OpenBIM is a collaborative approach to using BIM workflows that is vendor neutral. Open data standards include many benefits such as data ownership (data stewards being able to open their data in any software, providing durability and longevity), interoperability and collaboration (transparent and consistent), and futureproofing (international standards development within a community of subject matter experts). In 2019 AASHTO passed a resolution to adopt Industry Foundation Classes (IFC) as the national data schema as the exchange of construction information. Since then, the use of IFC is becoming more mature through research and pooled funds. It will be important to adopt openBIM workflows and industry advancements within ODOT to allow for greater collaboration with other state agencies and future adoption for all stakeholders.

Other standards, such as ISO 19650 for BIM information management, ISO 55000 for asset and project management, ISO 16739 for IFC for data sharing in the construction and facility management industries, and ISO 7850 for level of information need, will be useful with the development and execution of the DDP. To monitor the integration of all of these standards and technology advancements, ODOT should coordinate with the AASHTO pooled funds (BIM for Bridges and Structures, BIM for Infrastructure, and future survey pooled funds), Every Day Count initiatives such as e-ticketing and Digital As-Built, ADCMS grant agency coordination, industry groups (e.g. JTCEES and JSTAN), and national conferences (e.g. IHEEP, vendor conferences, and user groups).

Organizational Activities

The following activities have been identified for ODOT to investigate to help align internal processes with the DDP. Due to the nature of these tasks, ODOT leads will need to coordinate the activities with internal stakeholders. The activities include:



- Procurement Language Input
- Signing and Sealing of Digital Deliverables
- Vendor Strategic Collaboration
- Workspace/Configuration Development

Procurement Language Input: Reviewing current procurement language and work breakdown structure codes to provide technical input and changes to developing scope of work for digital delivery projects can be done in parallel with the development of digital delivery guidance. This language can be incorporated into task orders or project contracts for the pilot project program first. Reviewing procurement language can be a task for the Technical Committee to advise on industry insights.

Signing and Sealing Standards: Establishing a standard for signing and sealing digital deliverables may take a significant amount of time if legislation needs to be changed through the Oklahoma State Board of Licensure for Professional Engineers and Land Surveyors. ODOT leads can coordinate with other states that have changed legislation to include digital signatures for model deliverables. These states include Utah DOT, PennDOT, Florida DOT, TxDOT, and NCDOT. ODOT leads can establish a roadmap for digital signatures.

Vendor Strategic Collaboration: Technology vendors can provide strategic collaboration during the development of the DDP. Vendors such as Bentley, Autodesk, Infotech, ESRI, and Trimble can provide strategic collaboration discussions to help identify the right technologies to pilot and implement. ODOT leads can begin discussion with key vendors to review current software, hardware, and workflows, and have the vendors provide advice on interoperability for ODOT's technology stack.

Workspace/Configuration Development: ODOT's Bentley OpenRoads and OpenBridge Designer workspaces, and Autodesk State-kit will need to be continually expanded to meet the needs of digital delivery. Working with the software vendors and training vendors, ODOT should create a phased development schedule to evolve the workspaces in parallel. A single ODOT lead should be designated to monitor the development and be able to coordinate with the ProjectWise administrator for managed workspaces in the common data environment. The ODOT lead should coordinate with other state DOT workspace managers to help identify best practices that should be implemented for 3D cell creation, drainage and utility data collection, item types, and bridge items. Coordination with the state DOT CADD leads can be done through the Highway Engineering Exchange Program. Critical items to be defined include:



- Workspace distribution to external stakeholders.
- Common data environment management for external stakeholders, such as consultants and contractors.
- Workspace development and locking the workspaces to control how data exchanges will be conducted. This item will be crucial when implementing open data standard processes in the future.
- Quality control of digital files being delivered as per the workspace requirements.

Project Delivery Implementation Task Descriptions

The following sections contain the implementation task guidance for the tactical and strategic goals defined in the ODOT Strategic Plan. One of the key success factors of the plan is empowering the workforce through workforce development. As such, each task has a breakdown of education and training activities as well as potential procurement needs. Additional workforce development options can be added or adjusted as the program progresses. Each task also has prerequisite and corequisite tasks, along with an approximate starting schedule based on a quarterly calendar. A detailed Gantt chart of the program with activity dependencies is being created by the ODOT program manager and monitored through bi-weekly calls with entire DDT.

Each task will have a summary table providing the following information:

Prerequisite Tasks	Corequisite Tasks	Timing Start
Any tasks that serve as dependencies	Tasks developed in tandem due to overlapping material and potential efficiencies. (Tasks developed simultaneously are not necessarily corequisite)	Approximate Quarter & Year task begins

Deliverables	Workforce Development		
	Education	Training	Procurement
Files such as documents, memos, reports, educational materials, and PowerPoint slides	Sessions that provide information and background to better inform stakeholders	Sessions held that provide instruction on using workflows, software/hardware, etc.	Software and hardware required for task



Tactical Goal 1

Establishing Change Management, Communication and Engagement Plans

This goal focuses on the development of multiple foundational plans necessary for the implementation of digital delivery throughout the agency. The tasks included in this goal include:



- TG-1.1 Implementation Plan
- TG-1.2 Change Management Plan
- TG-1.3 Communication Plan
- TG-1.4 Engagement Plan
- TG-1.5 Risk Registry

TG 1.1 Implementation Plan & Updates

The Implementation Plan outlines the process of achieving the tactical and strategic goals that were established in the Strategic Plan. This document defines the high-level scope of each task and associated activities that need to be completed. The roadmap schedule defined in the strategic plan is used as an initial timeline, but the overall schedule of tasks is fluid to accommodate the pace of change. A baseline schedule of activities should be defined through the program management and DDT after concurrence on the implementation plan tasks.

The implementation plan should be reviewed and updated annually to redefine tasks and expand the development of others. Additional funding needs should be highlighted in a status update.

Prerequisite Tasks	Corequisite Tasks	Timing Start
None	None	Q2 - 2024

Deliverables	Workforce Development		
	Education	Training	Procurement
Document	None	None	None

TG 1.2 Change Management Plan

The change management plan lays out specific actions focused on managing the change process within ODOT and with industry partners. Transitioning to a digital delivery system, and capturing digital information throughout planning, design, construction, and asset management is a major change for the organization. This plan outlines the methodology used to make strategic, operational, and tactical changes.



Some aspects of the plan may include business cases for stakeholders, engagement within the broader digital delivery teams, and strategies to generate momentum and acceptance of the program. Future steps include energizing all areas of the industry as well as updating the plan annually.

Prerequisite Tasks	Corequisite Tasks	Timing Start
Implementation Plan	Foundational Plans	Q3-2024

Deliverables	Workforce Development		
	Education	Training	Procurement
Document	None	None	None

TG 1.3 Communication Plan

The communication plan establishes the communication methods utilized for the program. It serves as a guide to internal and external team communication by defining the scope, timing, and target audience of various recurring communications. The communication plan should include program challenges and the effective communication methods to address the challenges, stakeholder analysis, key messaging, and progress metrics and schedule.

An appendix listing stakeholders will be developed as part of Strategic Goal 3.1 in correlation to the communication plan. This list should be referenced accordingly.

The communication plan will contain several metrics to track progress such as website traffic, downloads or clicked links, and/or views. Metrics should be captured within a quarterly communications report to measure the effectiveness of the communication plan. Existing and new platforms should be evaluated for the program use. The communication plan is a living document and should be reviewed periodically for updates.

Prerequisite Tasks	Corequisite Tasks	Timing Start
Implementation Plan	Foundational plans Identify stakeholders	Q3-2024

Deliverables	Workforce Development		
	Education	Training	Procurement
Document	None	None	None



TG 1.4 Engagement Plan

The engagement plan defines the approach and strategies that will maximize engagement opportunities. This plan should include a list or matrix of engagement tools and tactics that will be utilized in conjunction with the communication plan. A matrix of each engagement strategy should include tools or tactics, a detailed description with examples, and deployment time frame during the program. The plan should also include a framework for developing future engagements. Future engagement activities will include workshops and peer exchanges that may be virtual or in person.

The engagement plan can be kept as a separate document or combined with the communication plan and references the stakeholder and champion appendix. It is important to note that additional engagement development will continue to be established throughout the program.

Specific tools or activities that should be developed include:

- A feedback tool process and sample feedback survey and forms that can be used during various tasks. The ODOT team should identify what types of feedback are needed for each task and create a plan to administer and monitor when feedback should be collected.
- Feedback summaries should be collected and provided quarterly to monitor progress and address changes.
- An after-action review memo template that will be used in SG 4.3 After Action Reviews.

Prerequisite Tasks	Corequisite Tasks	Timing Start
Implementation Plan	Foundational plans Identify stakeholders	Q3-2024

Deliverables	Workforce Development		
	Education	Training	Procurement
Document	None	None	None

TG 1.5 Risk Registry

There are many types of risks that may impact the DDP and pilot projects. Developing a risk registry is imperative for successful risk management of the program. The ODOT DDT will follow a five-step analysis process, which includes:

1. Defining the project base;
2. Risk identification;
3. Risk assessment and analysis;



4. Risk planning and response;
5. Implementation and control.

A risk workshop will focus on defining potential risks involved with the implementation of digital delivery by key stakeholders within ODOT. Participants will have pre-workshop tasks and meet in person to work through potential risks to the DOT or its partners. During the workshop participants will outline potential mitigation actions for each risk. Following the development of the risk registry matrix, the ODOT DDT will monitor the risks for the duration of the program. Risks should be monitored frequently throughout the program through regularly scheduled coordination meetings.

Prerequisite Tasks	Corequisite Tasks	Timing Start
Implementation Plan	None	Q3-2024

Deliverables	Workforce Development		
	Education	Training	Procurement
Risk registry and executive summary document	Workshop	None	None

Tactical Goal 2

Establish Process Standardization Aligning to Industry Standards for Data Exchanges

This goal focuses on the development of processes and guidance to implement digital delivery following industry standards including ISO 19650 and digital delivery workflows. The tasks included in this goal include:

- TG-2.1 Information Management Improvement Plan
- TG-2.2 Develop and Implement Common Data Environment (CDE)
- TG-2.3 Guidance for CDE
- TG-2.4 ISO 19650 Training and Education Development
- TG-2.5 Digital Delivery Guidelines
- TG-2.6 Modeling Standards Manual
- TG-2.7 Quality Management for Digital Delivery Guidelines
- TG-2.8 Pilot Project Criteria



TG 2.1 Information Management Improvement Plan

The purpose of an information management improvement plan is to identify business functions and data elements for the agency centered around data governance. Through a high-level business capability model, the plan will highlight the opportunities to collect, retain, archive, and utilize data elements of key assets. The plan, in conjunction with the Asset Management Assessment, will identify an improvement roadmap that can be implemented through a list of projects defined by project charters. The charters will provide a high level scope to achieve improvements and desired future state.

The steps of this task include:

- Preparing a high-level business capability model that shows the primary business functions.
- Identify key business sub-functions and key information elements associated with those functions for the identified business functions (e.g., asset management).
- Identify roles and responsibilities for the information elements.
- Compile all elements to prepare an information management improvement plan that identifies the business function, sub-functions, data elements for each sub-function, and associated roles and responsibilities.

Prerequisite Tasks	Corequisite Tasks	Timing Start
None	ODOT Data Governance Initiative Asset Management Assessment	Q4-2024

Deliverables	Workforce Development		
	Education	Training	Procurement
Document	None	None	None

TG 2.2 and 2.3 Common Data Environment Development and Guidance

Building a common data environment (CDE) that connects the lifecycle data exchanges is critical for the implementation of digital delivery. Based on a recently completed ProjectWise discovery and assessment, a records and data management plan will be developed. Following this, a complete build out of the recommended platform integration for a new connected environment along with training will be conducted. Additional guidance documents will need to be produced for the administration of the CDE, including specific decisions made during development and recommendations for future development.

Key aspects that should be taken into consideration include:



- ISO 19650 data management processes including folder and file naming structures and archival processes.
- Determine if ProjectWise data sources will be on premises or Bentley Cloud hosted. If on premise, determine backup intervals and systems.
- Determine the Department version of ProjectWise and any interaction with ODOT IT with Windows updates or versioning (e.g. moving to Windows 11).
- Determine the goals of using ProjectWise for the CDE including document storage and coordination, managed workspace application, coordinated design development document distribution, and connections to external platforms such as Infrastructure Cloud, Synchro, or Quadri.
- Determine which features will be utilized (e.g. workflows, document management, quality control, document codes)
- Define functionality and access to ProjectWise for agency, consultants, contractors, and other parties.
- Develop security/user groups and process for adding/removing parties and individuals.
- Define security parameters such as password resets and duration, and inactive unenrollment.

Prerequisite Tasks	Corequisite Tasks	Timing Start
None	ISO 19650 Training	Q3-2024

Deliverables	Workforce Development		
	Education	Training	Procurement
Implemented CDE, CDE admin guidance document	Webinars, workshops, or presentations	User and admin training for ProjectWise	None

TG 2.4 ISO 19650 Certification and Education Development

As part of the industry shift to open data standards, ODOT is committing resources to educate staff about the ISO 19650 - Building Information Modelling standard. Operam Academy provides instruction and certification to become Information Management Practitioners. Participants of this course will understand personas and roles in the information management process and will learn how to apply BIM to projects and processes according to ISO 19650. Internal presentations and educational materials will be developed by and for ODOT staff to share knowledge of this content. Coordination with the College and Career Tech Program should be prioritized to include a session or workshop about the importance of open data standards within the industry.



Prerequisite Tasks	Corequisite Tasks	Timing Start
None	None	Q3-2024

Deliverables	Workforce Development		
	Education	Training	Procurement
Educational documents, video, and assessment	Internal webinar and/or videos		Operam Academy licenses

TG 2.5 Digital Delivery Guidelines

A Digital Delivery Guidance manual will provide detailed guidance and specifications for the implementation of digital delivery processes throughout the lifecycle of a project. It will include best practices related to Level of Development (LOD) and Level of Information Need (LOIN) that are appropriate with the model uses cases identified for the pilot project program. The guidance manual will include templates outlined on the National BIM Strategic Roadmap such as a BIM Execution Plan (BEP) template and Model Element Breakdown Structure (MEBS).

For a phased approach, the guidelines can be developed in segments and based on industry examples. The initial phase would be tailored to For Information Only (FIO) digital deliverables (non-contractual model data) followed by content for the pilot project teams. Prioritizing this content will allow for the initial set of pilots to start before the standards are complete. This document will be critical for delivering all elements of a project in a digital format and should be continually updated throughout the program. At the conclusion of the program, the guidelines should be compiled as an official ODOT design manual. Below is a summary of key concepts that will be expanded in the guidelines.

BIM Execution Plan Template

A BIM execution plan template will be created based on industry examples and other state DOTs. Protocols will be defined for the use, review, and submission of the template for the design team and contractors. This living document will be created by the design team during project initiation and used during the construction phase by all stakeholders. It is meant to be refreshed throughout the project duration to stay relevant and current as project needs, processes, and technology evolve.



Model Element Breakdown Structure

An MEBS defines the element breakdown of a 3D model and identifies the level of detail and information the element must meet at any point in time. MEBS workbooks classify the elements and are structured to categorize modeled data and the requirements for each information exchange.

Level of Development

LOD is a scale that communicates the level of detail and accuracy of model elements. Using LOD during the project lifecycle depicts an evolutionary process with elements increasing in value and can be expressed through the MEBS framework. An LOD framework should be defined based on industry guidelines and examples. The required elements are documented in the BIM execution plan and are the basis of project scoping and fee development.

Level of Information Need

LOIN refers to a framework that defines the amount of information attributed to model elements. Having a standardized framework allows for consistency across all projects and allows the downstream data users to trust the quality of information provided. Through the development of the guidelines, LOIN will be established through a data dictionary and utilize the ISO 7817 Standard for Building information modelling – Level of Information Need. This standard defines specific concepts and principles to establish a methodology for specifying level of information need and information delivery in a consistent way.

Prerequisite Tasks	Corequisite Tasks	Timing Start
Implementation Plan	Common Data Environment Update workspaces and state kit	Q3-2024

Deliverables	Workforce Development		
	Education	Training	Procurement
Guidelines	Webinars, workshops, presentations	See pilot project program	None

TG 2.6 Modeling Standards Manual

A modeling standards manual defines the design authoring modeling requirements that are software and discipline specific. The modeling standards will be used by modelers in conjunction with the digital delivery guidelines to produce model-based deliverables. Current ODOT standards for plan production should be updated so the same workspace and state kit can be used to produce both 2D and 3D deliverables.



The modeling standards manual is a living document and will be continually updated in perpetuity. The ODOT team should investigate posting or embedding the manual on the website for reference by all stakeholders. This way stakeholders are always using the most up to date standards and updates can happen seamlessly.

The following sections should be included in the manual with additional sections added based on advancements of the overall initiative and technology:

- CADD definitions and acronyms
- Drafting standards and text
- Seed files
- File naming conventions for the CDE and discipline specific files
- Design standards libraries
- Survey data collection and feature codes
- Corridor modeling conventions and best practices
- Discipline cell conventions
- Model federation conventions and best practices
- Levels, layers and symbology with code descriptors
- Line styles and graphic definitions
- Named levels and symbology
- Item type conventions

Prerequisite Tasks	Corequisite Tasks	Timing Start
Identify model use cases	Digital Delivery Guidelines Software Training Guidance	Q4-2024

Deliverables	Workforce Development		
	Education	Training	Procurement
Manual	Webinars, workshops, presentations	See pilot project program and Industry Training and Education	None

TG 2.7 Quality Management for Digital Delivery Guidelines

The industry shift to digital delivery and Model as the Legal Document (MALD) has created the need for robust quality management procedures for 3D model deliverables. ODOT has set up a Quality Management office to provide guidance and documentation for quality management of traditional pdf and paper deliverables. The development of quality management processes for digital delivery



should complement the ODOT quality management office endeavors. This activity includes the development of quality management practices for design reviews for 3D models at each project stage. The first step is to define the quality management process map for the project lifecycle, including staff resources, roles and responsibilities, and quality artifacts.

It is advised that ODOT Design Team and Quality Management Team identify a Chief Model Manager within the central office that will be in charge of model reviews using the quality management practices. This individual will be responsible for independent model integrity project reviews prior to advertisement.

Current industry research should be reviewed when made available such as the NCHRP 10-113: Quality Management for 3D Model-Based Project Development and Delivery, along with industry collaboration with states that have 3D model quality management processes. These states include Florida DOT, Utah DOT, and PennDOT.

The interim documentation of the quality management processes can either be part of the Digital Delivery Guidelines or the Quality Management Office documentation. The quality management processes should be tested on the pilot projects and updated accordingly. Quality management review software and tools should also be investigated and piloted. The software chosen should be compatible with the digital delivery technology stack with an emphasis on compatibility with multiple data types.

Prerequisite Tasks	Corequisite Tasks	Timing Start
Digital Delivery Guidelines		Q4-2024

Deliverables	Workforce Development		
	Education	Training	Procurement
Guidelines	Webinars, workshops, presentations	See pilot project program and Industry Training and Education	None

TG 2.8 Pilot Project Criteria

The scope of this task includes developing pilot project selection and evaluation criteria. The pilot project program will be implemented as a phased approach, so the DDT will need to identify the initial priorities, goals and objectives, and model use cases to pilot. The BIM model use cases are defined in Appendix B.



The development of the pilot project selection criteria should include workflows being piloted, number of pilots, project teams or districts piloting the workflow, and potential deliverables and dependencies. A project screening and prioritization matrix will allow the ODOT DDT to identify the right projects to implement and pilot digital delivery workflows. Projects to be considered should have anticipated timelines that complete by July 2027 for either implementation of workflows or construction. Since the DDP is currently through 2027, current design projects may need to be advanced or have additional funding needs to convert the design. A robust pilot program should take redundancy into consideration to mitigate potential risks with people, processes, and technology.

The DDT should consult with other state DOTs who have conducted, or are conducting, pilot project programs on their selection criteria. Examples of state DOTs include, but are not limited to: Utah DOT, PennDOT, TxDOT, NYSDOT, Iowa DOT, and CalTrans. As part of this task, the ODOT Digital Delivery Manager will use the pilot project criteria matrix to choose the pilot projects that will be part of the Pilot Project Program in Strategic Goal 4.3.

Prerequisite Tasks	Corequisite Tasks	Timing Start
Identify model use cases	Digital Delivery Guidelines Technology Criteria Guidance	Q3-2024

Deliverables	Workforce Development		
	Education	Training	Procurement
Screening matrix workbook	None	None	None

Tactical Goal 3

Establish Workforce Development Education and Training Programs

This goal focuses on the development of training and education plans as well as materials that will be implemented under the strategic goals. The tasks included in this goal include:

- TG-3.1 Software Training Manuals and Guidance Documents
- TG-3.2 Construction and Inspection Guidelines
- TG-3.3 Training and Education Plan
- TG-3.4 Technology Criteria



TG 3.1 Software Training Manuals and Guidance Documents

This task focuses on the development of software training manuals, modules, and guidance documents. Based on the training and education plan, software training will be developed for creating or using digital deliverables, may be specific to a discipline, and have different delivery methods. These documents should be made available on the ODOT digital delivery website to both internal and external stakeholders.

Software training manuals and guidance will be developed continuously throughout the program. Final manuals will be compiled from training modules organized by competency levels but will be living documents due to the nature of technology and software updates/expansions.

Coordination with other state agencies is an integral part of this task to minimize the redo work. Training modules can incorporate training created by other agencies or vendors to maximize the effort and time it takes to develop customized trainings.

The schedule of development should follow the needs of the pilot project program. Initial software training modules developed in 2024 and needed prior to implementing the pilot project program include:

- Fundamental OpenRoads Modeling and Plan Production
- Fundamental OpenRoads Survey Workflows

Prerequisite Tasks	Corequisite Tasks	Timing Start
Identify model use cases Training and Education Plan Model Element Breakdown Structure	Modeling Standards Manual	Q3-2024

Deliverables	Workforce Development		
	Education	Training	Procurement
Guidance documents, modules, manuals	None	See pilot project program and Industry Training and Education	None



TG 3.2 Construction and Inspection Guidelines

Guidelines for construction and inspection using digital deliverables will need to be created for ODOT prior to the execution of training programs. These guidelines will provide standards and consistency for construction and inspection efforts and is vital in improving the efficiency and safety of future projects. The guidelines will provide direction for digital delivery workflows related to workflows during construction, including procedures for project set up and file management, accessing project information such as alignment-based data and quantities. It will also include standards and specifications for digital construction methods, procedures for documentation and verification of data created or manipulated during construction, and protocols for addressing model changes and construction.

The existing Construction and Inspection Guidance Manual is currently being updated but does not contain requirements and workflows specific to digital delivery. This activity should include auditing the manual and existing specifications in addition to providing supplemental specifications that can be used on the pilot projects. Evaluation of appropriate digital construction management and inspection solutions that are compatible with AASHTOWare Project (AWP) by evaluating options for accessing models in the field, collecting, and updating model information, and managing daily inspection documentation.

The guidelines should clearly state what is expected of the implementer/user but allow for flexibility. Guidance that is too vague is not useful. If specific software and hardware are to be used, they should be clearly specified so there is no ambiguity. When possible, graphics or infographics should be used to illustrate and more clearly convey the desired workflow and outcome. Role based guidance is growing to be more important because the incoming workforce has less knowledge of industry and role responsibilities. This guidance includes information such as what it means to be inspection, what checks and balances inspection provides, what documentation falls under inspection, what is to be built, and where to find the model element in a digital model. Examples should be included to help the user relate to and understand the context of the task. Short video tutorials may be created and embedded into the guidelines or hosted on YouTube.

While not part of the guidelines, the ODOT digital design team should investigate incentives for contractors bidding on digital delivery projects. Incentives can be for:

- Bid advantage/discount for those contractors implementing DD practices;
- Direct costs to help offset the cost of hardware, software, training via line item in bid;
- A+B bid evaluation that takes certain digital delivery practices/factors into consideration;
- Obtaining consistent training like the credentials offered by DBIA or openBIM certifications that are recognized within the industry.



Prerequisite Tasks	Corequisite Tasks	Timing Start
DBE Contractor Needs Assessment Asset Management Assessment	Hardway procurement/ identification	Q2-2025

Deliverables	Workforce Development		
	Education	Training	Procurement
Guidance documents	None	See Inspector and Contractor training	None

TG 3.3 Training and Education Plan

The purpose of a training and education plan is to identify and define the content of specific training and education courses for the program. The courses should be aimed at developing the core competencies and knowledge base for stakeholders to implement digital delivery throughout the agency. The plan will include a high-level overview of the training courses including objectives, target audience, pre-requisites, duration, and delivery methods. The plan will contain courses for digital delivery knowledge base and design authoring software.

The activities to develop the plan include:

- Identifying the course competency levels for training sessions;
- Identifying resources available to ODOT both internal resources (e.g. ODOT manuals and trainers) and external industry resources (e.g. online training courses or website links);
- Identify recommendations for skill assessments, cross training, and progressive training plans (e.g. refresher courses or Just in Time training);
- Develop training matrix that is discipline based with training delivery options.

Similar to the other foundation plans, this plan is a living document that is updated with training outcomes and best practices from peer exchanges. Future course plans may include topics on construction, inspection, and asset management.

Prerequisite Tasks	Corequisite Tasks	Timing Start
Communication and Engagement Plans Identify key stakeholder groups	Pilot Project Criteria	Q4-2024

Deliverables	Workforce Development		
	Education	Training	Procurement
Plan document	None	None	None



TG 3.4 Technology Criteria Guidance

A critical aspect of digital delivery is identifying, piloting/implementing, and managing technologies. There is no single software or hardware that will cover the project lifecycle in terms of data management and design production. The DDT will need to work with current and potential vendors to create a portfolio of technology that will be used consistently at ODOT. The criteria matrix should be used to evaluate potential technologies throughout the program timeline. A series of activities should be conducted to create guidance on evaluating new software and hardware. These activities include:

- Develop a process map of project development and asset management processes outlining inputs and outputs utilizing current software and hardware solutions. Expand the process map to include digital delivery workflows and processes.
- Create a criteria matrix to evaluate technologies that meet the needs of the pilot project program (specific model use cases), construction activities (field applications or inspection activities), or asset management processes (asset collection or digital as-builts)

Prerequisite Tasks	Corequisite Tasks	Timing Start
None	Pilot Project Criteria	Q4-2024

Deliverables	Workforce Development		
	Education	Training	Procurement
Memo with criteria matrix	None	None	None

Strategic Goal 1

Implementation of Outreach and Training Programs

This goal focuses on training programs for inspectors and contractors, along with industry outreach and education with multiple stakeholder areas. The tasks included in this goal include:

- SG-1.1 DBE Contractor Needs Assessment
- SG-1.2 Inspector Training Program
- SG-1.3 Contractor Training Program
- SG-1.4 Mock Lettings
- SG-1.5 Hardware Procurement
- SG-1.6 College and Career Tech Program
- SG-1.7 STEM K-12 Initiative



- SG-1.8 Local Agency Outreach
- SG-1.9 Industry Education and Training

SG 1.1 DBE Contractor Needs Assessment

Based on the surveys and initial contractor interviews collected as part of the needs assessment in 2023, a needs assessment of Disadvantaged Business Enterprise (DBE) contractors will be conducted to identify needs and areas of maturity. The ODOT DDT should engage the Association of Oklahoma General Contractors (AOGC) to help promote the needs assessment to their membership during local meetings or through their website. A simple 5-10 question survey could be distributed through AOGC to help identify DBE contractors across the state to interview and obtain targeted responses.

Virtual interviews will need to be conducted individually, per firm. Participants from the DBE firm should include anyone who uses CADD software or similar technology, survey data collection tools, prepares bids, or provides information to fabricators. One question that should be included in all interviews is: "What are your top two challenges regarding the project delivery process, that if addressed, would be a game changer for your firm, enabling your staff/crew to be more profitable and efficient in the pursuit and execution of projects?"

The interviews and survey should be developed to help understand the steps taken to transfer data and drawings, what software is being used, and how the staff does or does not use the data for project execution. Identifying specific contractor's needs will be key to success and prevent performing extraneous tasks.

The needs assessment should also include the following information or recommendations:

- Assess current software tools being used by DBEs and smaller contractors and identify the current knowledge base and expertise level to build recommendations from.
- Explore and identify free tools that can mitigate the investment necessary from DBEs. Training would still be required, but the constant expense of having updated resources may be mitigated through DOT provided tools.
- Develop and provide a training program with tiered delivery that can build on previous skills in a slow and methodical manner that will set up DBEs and small subs for long-term success. Often, too much is projected onto smaller contractors, which becomes overwhelming and leads to burnout or rejection of the technology and new tools.
- Explore the desire for DBE firms to partner with contractor thought leaders to begin on-going dialogs for an open exchange of ideas, resources, and information. This information would be incorporated into the contractor training program.



Following the interviews, the DDT may conduct additional workshops with DBE contractors for further level setting education or data gathering.

Prerequisite Tasks	Corequisite Tasks	Timing Start
None	None	Q3-2024

Deliverables	Workforce Development		
	Education	Training	Procurement
Report	None	None	None

SG 1.2 Inspector Training Program

An inspector training program will be developed and used across the district field offices, which will create consistency and standardization of data collection workflows when using 3D models. The program will need to consider the hardware being procured as part of Strategic Goal 1.5 and the Pilot Project Program. The training program will utilize the Construction and Inspection Guidelines developed for Tactical Goal 3.2 along with additional workshops, presentations, and software training. The program should be a phased approach to help manage the pace of change and align with procurement schedule for new hardware and software. One phase should include the usage of hardware with 2D plans before using 3D models in the field. Another phase should include data collection methods for asset information. Additional training modules should be created in conjunction with digital as-builts with ancillary assets.

Potential training sessions include:

- 4-hour education session (no specific training, just education) - “Digital Project Delivery 101” - to start from the basics and walk all users through the same curriculum to establish baseline knowledge.
- 4-hour workshop/hands-on training session with inspectors to clarify what digital project delivery inspection is and how it is different from previous methods. This meeting should also focus on the tools inspectors will be expected to use (hardware and software).
- 4-hour workshop/hands-on session to walk through some mock inspections while collecting/documenting data, filling out forms, taking photos, uploading to proper locations, and executing the workflow to understand how it works before starting on a “real” project.



Prerequisite Tasks	Corequisite Tasks	Timing Start
Construction and Inspection Guidelines Hardware procurement	Pilot Project Program Contractor Training Program	Q3-2025

Deliverables	Workforce Development		
	Education	Training	Procurement
Training materials, participation survey summaries	Webinars and workshops	Full training program	Hardware (TBD)

SG 1.3 Contractor Training Program

ODOT is also intent on developing a contractor training program, which includes education and software training for digital delivery projects. Based on the contractor interview assessments and DBE Contractor needs assessment, the DDT should develop a training program focusing on the challenges and gaps contractors will face using digital data and deliverables. The team should investigate methods for potential partnering with larger and smaller contractors for a mentor/protégé program. The team can collaborate with other agencies that are implementing similar programs such as PennDOT and Illinois Tollway.

Potential training sessions are similar to the inspection sessions above. Many of the needs are the same, however, questions from the participants and their perspective on the processes will vary. It is recommended to have separate trainings utilizing the same core training material and adding concepts based on the specific groups.

- 4-hour education session (no specific training, just education) - “Digital Project Delivery 101” - to start from the basics and walk all users through the same curriculum to establish baseline knowledge.
- 4-hour workshop/hands-on training session with contractors to clarify what digital project delivery is and how it’s different from past practices. This meeting should also focus on the tools contractors will be expected to use (hardware and software) and include an explanation and “tour” of the digital files contractors will be provided for bid lettings.
- 4-hour workshop/hands-on session to walk through some mock lettings and what is to be expected or encountered for bid estimation and coordination with AWP. If more involved use of technology is expected (like SYNCHRO), additional guidance should be developed and provided regarding collecting/documenting data, filling out forms, taking photos, uploading to proper location, and executing the workflow to understand how it works before starting on a “real” project.



The DDT should consider developing a DOT or AOGC sponsored and required training program that is certifiable and must be renewed annually. This requirement will help keep users up to date on new tools and help ensure everyone remains consistent without “doing their own thing” beyond the initial training. Contractor training programs would have the annual certification.

Prerequisite Tasks	Corequisite Tasks	Timing Start
DBE Contractor Assessment Construction and Inspection Guidelines Hardware procurement	Pilot Project Program Inspector Training Program Mock Lettings	Q3-2025

Deliverables	Workforce Development		
	Education	Training	Procurement
Training materials, participation survey summaries	Webinars and workshops	Full training program	Software Licenses

SG 1.4 Mock Lettings

Mock lettings are simulated or practice scenarios that are designed for testing out workflows and technology to gain practical experience or specific outcomes. The use of digital deliverables as FIO or as MALD will impact the advertising and bidding process, which will need to evolve. Conducting bid mock lettings will grant contractors and agency staff hands on experience hosting, obtaining, and utilizing model-based deliverables. The objective of the mock lettings is to develop protocols for the advertisement of digital delivery projects.

The number of mock lettings conducted during the DDP will be determined by a number of factors including the setup and access of a mock bidding environment, demo model deliverables and associated documentation, and training development. Mock lettings can be conducted as a half day workshop or run as a traditional letting period. The action plan for the mock lettings should include a process map and timeline of the advertisement process to help identify risks, issues, and metrics to measure the success of the simulations.

After Action Reviews or feedback surveys should be conducted at the end of each mock letting that will provide content for a guidance document. The guidance document should address protocols such as access to digital files, additional specifications or checklists, workflows for addressing model changes during advertisement through addendums, or integration with AWP. Agency staff, consultants, and contractors will utilize it when advertising or bidding digital delivery pilots on future projects.



Prerequisite Tasks	Corequisite Tasks	Timing Start
Construction and Inspection Guidelines DBE Contractor Needs Assessment	Contractor Training Program	Q4-2025

Deliverables	Workforce Development		
	Education	Training	Procurement
Training materials Guidance document	Webinars and workshops	Full training program	Software Licenses

SG 1.5 Hardware Procurement

Digital delivery processes develop the usage of new technologies. ODOT currently uses Leica hardware for design survey collection and TopCon equipment for construction activities. The Construction survey crew typically sets up the survey system, but inspectors are interested in using iPads/tablets and rovers for daily inspection activities and data collection. This task includes identifying construction hardware that can be piloted by a single project or district. Hardware should be interoperable with design and construction data. Potential hardware includes mapping grade GNSS: Trimble DA-2, Leica FLX-100, Bad Elf Flex, Juniper Geode 3 RTK, EOS Arrow Gold, and app tools: ESRI Field Maps/Survey123, Fulcrum, Trimble TerraFlex, PointMan, and Sitenotes.

Activities in this task include:

- Investigate hardware options for inspectors with a focus on inspection tasks and data asset collection. Special consideration for pilot tools that enhance connectivity or have offline abilities.
- Identify which districts can pilot different hardware options.
- Develop a matrix identifying the hardware to be piloted including cost, users, training needs, and District or pilot project usage.
- Demo and procure hardware to use in the field.

Prerequisite Tasks	Corequisite Tasks	Timing Start
Construction and inspection guidelines Technology criteria	Pilot Project Program	Q2-2025



Deliverables	Workforce Development		
	Education	Training	Procurement
Procurement plan/memo	None	See inspector training program	e.g. Rovers, iPads, other inspection hardware

SG 1.6 College and Career Tech Program

ODOT has established a design squad at each of the two state universities: University of Oklahoma (OU) and Oklahoma State University (OSU). These design squads have experienced ODOT design personnel working alongside student employees and provides students experience on ODOT design projects while in school. ODOT will supplement the existing programs to include education and hands-on experience with construction digital design models. Digital delivery training will provide education to students prior to joining the workforce and will create a pipeline for dispersing those skills to rural districts. As part of this component, the DDT will help provide education content for presentations, lectures, and sample data sets. The focus of these courses will be digital delivery for civil engineering through the use of new technologies.

The Oklahoma Department of Career and Technology (CareerTech) provides competency-based education in skills employers are seeking. With campuses located across the state, the CareerTech system significantly contributes to the state economic development by working closely with advisors from local industries to ensure students learn to be valued members of the workforce. ODOT plans to partner with CareerTech centers to deploy relevant digital delivery training and education, including training geared toward 3D model design and inspection equipment. Offering pre-engineering classes through CareerTech helps students in rural areas prepare to pursue engineering degrees at the state universities. Similar to the university curriculum, the ODOT team will help develop content based on the foundational plans with a focus on construction and inspection skills.

Software vendors, such as Bentley and Autodesk, provide free software licenses to students and professors with .edu licenses. Other technology vendors may provide subsidized or free hardware to education institutions to help provide students with hands on experience. ODOT should work with their strategic vendor partners to provide training options, technology, and content for the developed curriculums.

Training and education for educators and professors may also be needed as part of this activity. Development and coordination of these courses should begin at the start of the DDP with a target goal to implement in the fall of 2025. ODOT should also coordinate with other states on their education program developments such as PennDOT and TxDOT.



Prerequisite Tasks	Corequisite Tasks	Timing Start
None	None	Q4-2024

Deliverables	Workforce Development		
	Education	Training	Procurement
Curriculum materials, Student reports	Webinars and workshops	TBD	None

SG 1.7 STEM K-12 Initiative

Workforce development and education is one of the key components of the program, with a focus on developing the next generation of engineers, data scientists, and construction staff. As part of the initial phase of the DDP, the ODOT team will work with two programs that work with children from kindergarten to 12th grade.

The Tulsa Regional STEM Alliance (TRSA) works to provide science, technology, engineering, and mathematics (STEM) programs both in and out of the classroom. ODOT and their partners will work with TRSA to develop curriculum and compile components of a civil engineering focused STEM Kit. Once developed, TRSA will pilot the kit through their STEM Shoppe to provide educators free access to the kit and to encourage educator feedback.

Additional elementary school outreach would be two-fold. First, through the expansion of an app, AfterMath, which helps students grow their math literacy with the addition of 3D visualization. Second, through STEM camps held at school districts in metropolitan and rural areas of Oklahoma. ODOT will join with Oklahoma State University and Dr. Tyler Ley to expand these programs, including extending AfterMath for 7th, 8th, and 9th grades and providing support to the 15 rural STEM camps.

Prerequisite Tasks	Corequisite Tasks	Timing Start
None	None	Q3-2024

Deliverables	Workforce Development		
	Education	Training	Procurement
STEM kits Presentations Curriculum documents	Webinars and workshops	Kit training	Purchasing/distributing STEM Kits for educational groups



SG 1.8 Local Agency Outreach

Local agency outreach is a key piece of the overall digital delivery puzzle. While the pilot project program will initially focus on DOT funded projects, local agencies are stakeholders to these projects. As the industry progresses through this digital transformation, it is important to educate everyone about the benefits of digital delivery and the changes the DOT is implementing through the use of new technology and workflows. Through this task, the DDT will set up recurring touch points with local agencies identified during the development of the engagement plan. These touch points may be through local meetings, webinars, or in person workshops. The goal of this task to is educate stakeholders but also initiate the first steps with workforce development for local agencies, municipalities, and tribal groups.

ODOT will leverage relationships with the Association of County Commissioners of Oklahoma (ACCO), the Association of Central Oklahoma Governments (ACOG), and the Indian Nation Council of Governments (INCOG), to conduct information sessions to help municipalities understand the program and its benefits. In addition, ODOT will update any developed software tools with unique municipal drainage structures to be used for projects that span both ODOT and the local municipality.

Additional activities should include coordination with other state DOTs, such as Texas, Arizona, and Idaho, embarking on digital delivery collaboration with municipalities and tribes. The Every Day Counts (EDC-7) innovation for Strategic Workforce Development is expanding to rural and tribal communities.

Prerequisite Tasks	Corequisite Tasks	Timing Start
Identify stakeholders Communication and Engagement Plans	Website updates Hosting Forum development	Q1-2025

Deliverables	Workforce Development		
	Education	Training	Procurement
Memos	Webinars and workshops	See Industry training and education	Potential guest licenses

SG 1.9 Industry Education and Training Implementation

Industry education and training implementation is a continual activity that will happen throughout the program. Industry education encompasses the execution of presentations about digital delivery,



new technologies, and digital workflows for design, construction, and asset management. Training includes the execution of design authoring software training manuals both for internal and external stakeholders. Training for contractors and inspection staff is included in separate training programs. The development of webinars and presentations are part of this activity. It may be advantageous to engage strategic communication professionals to work with the DDT to provide consistency with manuals and education and training presentations. It is suggested that the education and training resources produced are made available for stakeholders and hosted on the digital delivery website or similar online training platform.

Prerequisite Tasks	Corequisite Tasks	Timing Start
Training and Education Plan Engagement Plan Training modules	Local Agency Outreach	Q2-2025

Deliverables	Workforce Development		
	Education	Training	Procurement
Webinars, presentations, feedback summaries	Full education program	Full training program	Potential guest licenses

Strategic Goal 2

Strategy and Risk Calibration

This goal focuses on the continual monitoring and alignment of strategy and risk management throughout the program. The tasks that are included in this goal are:

- SG-2.1 Strategic Plan Updates
- SG-2.2 Risk Registry



SG 2.1 Strategic Plan Updates

Similar to the implementation plan yearly updates, the strategic plan should be reviewed and updated every year. This should begin to take place 9-10 months after the initial creation or previous updates. A review of the strategic plan would include updating the overall roadmap and identifying the progress or changes made on the tactical and strategic goals. Updates to the plan should be presented to executive staff and uploaded to the digital delivery website.



Prerequisite Tasks	Corequisite Tasks	Timing Start
9-12 months elapsed since plan creation or updates	None	Q2-2025 Q2-2026 Q2-2027

Deliverables	Workforce Development		
	Education	Training	Procurement
Updated reports	None	None	None

SG 2.2 Risk Registry Updates

The risk registry matrix should be reviewed at least annually to identify new risks, add mitigation measures to current risks, and update risk status. Risks that no longer apply should be retired and documented as such. The risk registry should be available to the DDT on the internal website.

Prerequisite Tasks	Corequisite Tasks	Timing Start
9-12 months elapsed since plan creation or updates	None	Q2-2025 Q2-2026 Q2-2027

Deliverables	Workforce Development		
	Education	Training	Procurement
Updated risk matrix	None	None	None

Strategic Goal 3

Championing change through leadership empowerment

This goal focuses on implementing the change management and communication plans through empowering champions. The tasks included in this goal include:

- SG-3.1 Identify Champions and Stakeholders
- SG-3.2 Implement Change Management through Communication



SG 3.1 Identification of Stakeholders and Champions

The first step in establishing practices to manage the pace of change is identifying stakeholders and champions. The DDP will progressively grow over 4 years, incorporating new stakeholders and champions. This task includes the creation of a living appendix listing stakeholders that will be attached to the communication plan defined in Tactical Goal 1.3. Identified champions will advocate for the DDP, promoting the values and successes during the program. Stakeholders have specific



interests in the outcome of the program and may be differentiated between primary and secondary roles.

A list of stakeholders and associated links should be developed and frequently updated. Stakeholders may include industry associations, suppliers, contractors, consultants, agencies and organizations within Oklahoma, government councils and planning organizations, and national agencies and organizations. Additional stakeholders will include state DOTs with ADCMS grants for current and future contracts.

Prerequisite Tasks	Corequisite Tasks	Timing Start
None	Communication and Engagement Plans	Q3-2024

Deliverables	Workforce Development		
	Education	Training	Procurement
Appendix included in the communication plan	None	None	None

SG 3.2 Implement Change Management through Communication

Implementation of the program is complex with new technologies, workflows, and roles and responsibilities being assigned to stakeholders. The ODOT DDT will need to continually communicate with all stakeholders in an impactful way. This task includes the execution of the communication and engagement plans in parallel with the change management plan. The execution of the plans includes providing industry outreach updates through modes identified in the communication and engagement plans. The digital delivery [website](#) will be the primary source of information about the program and should include an FAQ and progressive roadmap that is continually reviewed and updated.

Change management activities will be monitored and measured, along with obtaining feedback about the overall adoption and progression of digital delivery workflows and technology by all stakeholders. Additional industry communication can be expanded upon, collected, and promoted through the digital delivery website with appropriate program branding. Quarterly updates should be compiled and provided to the key stakeholders whose role is “Informed” (Appendix A).

Prerequisite Tasks	Corequisite Tasks	Timing Start
Foundational Plans	Pilot Project Program	Q3-2024



Deliverables	Workforce Development		
	Education	Training	Procurement
Communication deliverables (e.g. website, presentations, documents)	Webinars, workshops, presentations	None	None

Strategic Goal 4

Lifecycle Data Exchanges

This goal focuses on a phased approach to implementing data exchanges for the entire asset lifecycle through a pilot project program. The tasks included in this goal include:



- SG-4.1 Pilot Project Program
- SG-4.2 Industry Peer Exchanges
- SG-4.3 After Action Reviews

SG 4.1 Pilot Project Program

The pilot project program will be implemented over the course of the DDP through a phased approach. The overarching goal is to test the workflows and guidance in the foundational manuals utilizing the training guidance and manuals that will dictate the agency standards for future projects. These foundational manuals include the Digital Delivery Guidance Manual (TG-2.5), Modeling Standards Manual (TG-2.6), Quality Management for Digital Delivery Guidelines (TG-2.7), and - Software Training Manuals and Guidance Documents (TG-3.1). The program is defined in Tactical Goal 2.8, which identifies the selected digital delivery pilot projects. This task includes project guidance, technical support, and evaluation of the pilot projects during design and construction.

The pilot project selections will be based on the model use cases and correlated to contractual digital deliverables (Model as the Legal Document) or 2D deliverables derived from model-based design methods. When requiring the use of contractual digital deliverables, it is important to consider how this information is conveyed from phase to phase, such as to construction and asset management. The DDT will need to have touch points with these key stakeholders during the design phase to communicate how the deliverables will be accessed and used during advertisement, construction, and operations.



Pilot Project Support:

The DDT and subject matter experts will support the pilot project teams through different means such as biweekly meetings, hands-on training, and project workshops.

Additional activities will include:

- Analysis of contract items for continual support to the designer through construction, partnering meetings for contractors, and software support.
- Setup and facilitation of project design files in the common data environment and technology stack for seamless data exchanges between design and construction.
- Incorporate feedback into the foundational modeling standards, guidance, and requirements.
- Contract management coordination and pre-bid meetings.

Prerequisite Tasks	Corequisite Tasks	Timing Start
Pilot Project Criteria Foundational Manuals	Build out of CDE	Q2-2025

Deliverables	Workforce Development		
	Education	Training	Procurement
Deliver and construct pilot projects. After-action reviews	Full education program of fundamental standards	Full training program of software	Licenses, software packages

SG 4.2 Industry Peer Exchanges

As part of the ADCMS grant, the DDT will participate in bi-annual collaborative meetings. External to these meetings, the ODOT team will host two peer exchange workshops within the program schedule. The two workshops include a construction peer exchange and a work zone congestion peer exchange. The purpose of these peer exchanges is to identify current industry practices that can be applied within Oklahoma and develop an implementation plan and roadmap.

The construction peer exchange workshop will focus on identifying opportunities for advancing the state of digital delivery in the construction phase. ODOT will contact other states with more advanced digital delivery practices to help identify lessons learned and best practices that will assist ODOT in their adoption of digital delivery processes on construction projects.



The peer exchange workshop on work zone congestion focuses on identifying safety measures that can be implemented in work zones. Specific topics may include integration of technology advancements, data collection processes, and/or user safety including risk management when using devices such as drones and automated devices. Discussions can focus on developing work zone and safety plans, integration of technological advancements, and identifying any barriers to implementation, such as legislative constraints. One option for work zone congestion is automated work zone speed enforcement. Maryland DOT, PennDOT, and Connecticut DOT have implemented automated speed enforcement measures by enabling legislation.

These workshops can be informal peer exchanges or through FHWA funded peer exchanges to facilitate other state DOT attendance. The ODOT team should investigate current industry practices and identify potential peer exchange states. The team should also utilize the ADCMS agencies and coordinate through the bi-annual meetings to identify trends or questions.

Prerequisite Tasks	Corequisite Tasks	Timing Start
None	None	Q2 - 2026 Q1 - 2027

Deliverables	Workforce Development		
	Education	Training	Procurement
Memo summary of peer exchanges	Webinars and workshops	None	None

SG 4.3 After Action Reviews

The purpose of an after action review (AAR) is to understand what took place during the activity, why the outcome of the activity happened, and determine how to improve the process or overall strategy. To help monitor the DDP, formal AARs should take place after specific activities specified in the Engagement Plan. The engagement plan will define which tasks in the program will have AARs and the frequency that they occur.

An AAR guidance memo should be created to define the process of conducting an AAR and identify simple templates and presentations that can be used. There are four components in conducting an AAR:

- Plan and Prepare – Identify participants and define objectives.
- Conduct – Facilitate an open discussion focusing on failures and successes.
- Analyze and Document – Document the discussion and provide recommendations.
- Follow-Up – Conduct recommendations as action items and measure improvements.



AARs should be scheduled and assigned to a facilitator and a note taker. The facilitator should assess the purpose and objectives of the task under review and drive the structured discussion. The facilitator may choose specific tools to drive the conversation, such as a slide deck, online survey tool (e.g. Mentimeter), or worksheets. Following an AAR, a summary should be created for review by the DDT in a timely manner to help improve current activities or plan new ones. Action items should be tracked by the ODOT Digital Delivery Manager.

Prerequisite Tasks	Corequisite Tasks	Timing Start
Communication and Engagement Plans	None	Q1-2025

Deliverables	Workforce Development		
	Education	Training	Procurement
AAR guidance memo and training AAR summaries	None	Brief training session for those conducting after-action reviews	None

Strategic Goal 5

Lifecycle data processes for operations and maintenance

This goal focuses on developing lifecycle data processes for data collection and exchanges for operations and maintenance. Special attention will be given to e-ticketing and data exchanges with AASHTOWare Project (AWP). The tasks included in this goal include:



- SG-5.1 Asset Management Assessment
- SG-5.2 Digital As-builts with Ancillary Assets

SG 5.1 Asset Management Assessment

The purpose of an Asset Management Assessment is to identify improvement opportunities and recommendations through a maturity assessment of current asset management processes utilized within ODOT. Through discussions with ODOT, an assessment framework will be identified. Typical frameworks include:

- NCHRP 08-90 Gap Analysis Tool
- Institute of Asset Management (IAM) gap assessment framework
- Specific element frameworks, such as NCHRP 814 Data Assessment Framework
- Infrastructure Management Manual (IIMM) Asset Management Maturity Framework

Activities included in this task may include:



- Establish clear goals for the assessment by meeting with key stakeholders to confirm the goals and focus elements. Goals could relate to the organization setup (e.g. processes, data, technologies, or all of the above), and/or to specific asset classes (e.g. pavement, culverts). The goal criteria will help tailor the assessment framework in order to properly measure the level of maturity.
- Review assessment frameworks and tailor for ODOT’s goals. This framework can be used in the future for more assessments and will match ODOT’s vision for asset management. This vision would go beyond the elements currently listed in ODOT’s Transportation Asset Management Plan (TAMP).
- Review the implementation of AASHTOWare Project and the potential integrations with GIS and e-ticketing.
- Conduct a maturity assessment through interviews and identify improvement opportunities and recommendations.
- Validate findings through three, 2-hour workshops and prepare a set of recommendations based on workshop feedback.
- Prepare prioritization framework and improvement roadmap.

Prerequisite Tasks	Corequisite Tasks	Timing Start
External – AEGIST Report Information Management Improvement Plan	None	Q1-2025

Deliverables	Workforce Development		
	Education	Training	Procurement
Report	Webinar, presentation	None	None

SG 5.2 Digital As-builts with Ancillary Assets

The purpose of digital as-builts is to improve the tracking, exchange, and archive of asset information. Building on the Information Management Improvement Plan and the Asset Management Assessment, this task will identify the key information elements that are important for effective management of ancillary assets. Through this task, the team will investigate ancillary assets to target for improvement and define a long-term plan for effective implementation. This task will incorporate lessons learned from FHWA’s EDC-6 Innovations for e-ticketing and Digital As-builts, along with other state DOT ADCMS work. Coordination with state DOTs such as Minnesota DOT, PennDOT, Delaware, Connecticut DOT, and CalTrans on their collection of ancillary assets can be conducted prior to internal investigations.

Activities included in this task include:



- Discuss high-level assets and prepare a list of ancillary assets to target for improvement (e.g., guardrails, traffic cameras). These typically would be assets that require regular maintenance intervention for effective operations (e.g., cameras that require regular cleaning and calibrating) or safety-critical assets (e.g., guardrails).
- Conduct a series of interviews with ODOT staff to identify the list of key data elements that can be collected during the design stage for these assets, and how they would be enriched during construction.
- Validate the selected ancillary assets and data elements using data stewards within ODOT through a 2-hour workshop.
- Prepare a list of information elements to be captured during design through digital as-builts and/or enriched with information during construction as well as their use in asset management. This list will show the flow of data and ensure that all data captured will serve a valid purpose during construction and/or operations and maintenance.

Based on these activities, a plan to manage digital as-builts will be developed. Additional funding to implement the plan may be necessary.

Prerequisite Tasks	Corequisite Tasks	Timing Start
Information Management Improvement Plan Asset Management Assessment	None	Q3-2025

Deliverables	Workforce Development		
	Education	Training	Procurement
Document	TBD	TBD	None



Appendix A: RACI Chart and Metrics



Goal	Task	Responsible	Accountable	Consulted	Informed	Metrics
TG-1.1	Implementation Plan	• DD Consultants	• ODOT DD Manager		• Executive Sponsor	• Volume of educational materials • Funding utilization
TG-1.2	Change Management Plan	• DD Consultants	• ODOT DD Manager		• Technical Committee	• Website engagement
TG-1.3	Communication Plan	• DD Consultants	• ODOT DD Manager	• ODOT DD Engagement	• Technical Committee	• Website engagement
TG-1.4	Engagement Plan	• DD Consultants	• ODOT DD Manager	• ODOT DD Engagement	• Technical Committee	• Website engagement
TG-1.5	Risk Registry	• DD Consultants	• ODOT DD Manager	• ODOT Executive Leadership	• Executive Sponsor	• Number of risks mitigated
TG-2.1	Information Management Improvement Plan	• DD Consultants	• ODOT DD Manager	• ODOT Data Governance Working Group	• Technical Committee	• Volume of educational materials
TG-2.2	Develop and Implement Common Data Environment	• DD Consultants • ODOT DD Technology Team	• ODOT DD Manager	• ODOT DD Design Team	• Industry Stakeholders	• Metrics on usage to be determined after implementation
TG-2.3	Guidance for CDE	• DD Consultants • ODOT DD Technology Team	• ODOT DD Manager			• Volume of educational materials
TG-2.4	ISO 19650 Training	• ODOT DD Design Team	• ODOT DD Manager		• ODOT DD Engagement Team	• Number of staff trained
TG-2.5	Digital Delivery Guidelines	• DD Consultants • ODOT DD Design Team	• ODOT DD Manager	• ODOT DD Technology Team	• Technical Committee	• Website engagement • Number of model use cases implemented



Goal	Task	Responsible	Accountable	Consulted	Informed	Metrics
TG-2.6	Modeling Standards Manuals	<ul style="list-style-type: none"> • DD Consultants • ODOT DD Design Team 	<ul style="list-style-type: none"> • ODOT DD Manager 	<ul style="list-style-type: none"> • ODOT DD Technology Team 	<ul style="list-style-type: none"> • Technical Committee 	<ul style="list-style-type: none"> • Website engagement
TG-2.7	Quality Management for Digital Delivery	<ul style="list-style-type: none"> • DD Consultants • ODOT Quality Management 	<ul style="list-style-type: none"> • ODOT DD Manager 	<ul style="list-style-type: none"> • ODOT DD Technology Team 	<ul style="list-style-type: none"> • Technical Committee 	<ul style="list-style-type: none"> • Website engagement
TG-2.8	Pilot Project Criteria	<ul style="list-style-type: none"> • DD Consultants • ODOT DD Design Team 	<ul style="list-style-type: none"> • ODOT DD Manager 		<ul style="list-style-type: none"> • Technical Committee 	<ul style="list-style-type: none"> • Number of pilot projects identified using criteria
TG-3.1	Software Training Manuals or Guides	<ul style="list-style-type: none"> • DD Consultants • ODOT DD Design Team 	<ul style="list-style-type: none"> • ODOT DD Manager 	<ul style="list-style-type: none"> • ODOT DD Technology Team • ODOT DD Engagement Team 	<ul style="list-style-type: none"> • Industry Stakeholders 	<ul style="list-style-type: none"> • Number of guidance documents and manuals • Website engagement
TG-3.2	Construction and Inspection Guidelines	<ul style="list-style-type: none"> • DD Consultants • ODOT DD Design Team 	<ul style="list-style-type: none"> • ODOT DD Manager 	<ul style="list-style-type: none"> • ODOT District Leads 		<ul style="list-style-type: none"> • Website engagement
TG-3.3	Training and Education Plan	<ul style="list-style-type: none"> • DD Consultants • ODOT DD Design Team 	<ul style="list-style-type: none"> • ODOT DD Manager 	<ul style="list-style-type: none"> • ODOT DD Engagement Team 		<ul style="list-style-type: none"> • Volume of educational materials
TG-3.4	Technology Criteria	<ul style="list-style-type: none"> • ODOT DD Design Team • ODOT DD Technology Team 	<ul style="list-style-type: none"> • ODOT DD Manager 	<ul style="list-style-type: none"> • DD Consultants • ODOT District Leads 		<ul style="list-style-type: none"> • Funding investment • Number of districts involved with technology initiatives • Cost of new software piloted



Goal	Task	Responsible	Accountable	Consulted	Informed	Metrics
SG-1.1	DBE Contractor Needs Assessment	<ul style="list-style-type: none"> • DD Consultants 	<ul style="list-style-type: none"> • ODOT DD Manager 	<ul style="list-style-type: none"> • ODOT District Leads 	<ul style="list-style-type: none"> • Technical Committee 	<ul style="list-style-type: none"> • Number of DBW contractors participating in assessment
SG-1.2	Inspector Training Program	<ul style="list-style-type: none"> • DD Consultants • ODOT District Leads 	<ul style="list-style-type: none"> • ODOT DD Manager 	<ul style="list-style-type: none"> • ODOT DD Engagement Team 	<ul style="list-style-type: none"> • Technical Committee 	<ul style="list-style-type: none"> • Number of districts involved with inspector training • Number of training sessions
SG-1.3	Contractor Training Program	<ul style="list-style-type: none"> • DD Consultants • ODOT DD Design Team 	<ul style="list-style-type: none"> • ODOT DD Manager 	<ul style="list-style-type: none"> • ODOT DD Engagement Team 	<ul style="list-style-type: none"> • Technical Committee • Industry Stakeholders 	<ul style="list-style-type: none"> • Number of contractors participating • Number of training sessions
SG-1.4	Mock Lettings	<ul style="list-style-type: none"> • DD Consultants • ODOT DD Design Team 	<ul style="list-style-type: none"> • ODOT DD Manager 	<ul style="list-style-type: none"> • ODOT DD Engagement Team • ODOT DD Technology Team • Industry Stakeholders 	<ul style="list-style-type: none"> • Technical Committee 	<ul style="list-style-type: none"> • Number of mock lettings • Number of contractors participating in mock lettings • Number of survey responses
SG-1.5	Hardware Procurement	<ul style="list-style-type: none"> • ODOT DD Design Team 	<ul style="list-style-type: none"> • ODOT DD Manager 	<ul style="list-style-type: none"> • ODOT DD Technology Team • ODOT District Leads 		<ul style="list-style-type: none"> • Funding investment • Number of devices procured for staff • Cost of hardware piloted
SG-1.6	College and Career Tech Program	<ul style="list-style-type: none"> • DD Consultants • ODOT DD Design Team 	<ul style="list-style-type: none"> • ODOT DD Manager 	<ul style="list-style-type: none"> • Education Stakeholders 		<ul style="list-style-type: none"> • Number of students participating in programs



Goal	Task	Responsible	Accountable	Consulted	Informed	Metrics
SG-1.7	STEM K-12 Initiative	<ul style="list-style-type: none"> • DD Consultants • ODOT DD Design Team 	<ul style="list-style-type: none"> • ODOT DD Manager 	<ul style="list-style-type: none"> • Education Stakeholders 		<ul style="list-style-type: none"> • Number of STEM kits distributed
SG-1.8	Local Agency Outreach	<ul style="list-style-type: none"> • DD Consultants • ODOT DD Design Team 	<ul style="list-style-type: none"> • ODOT DD Manager 	<ul style="list-style-type: none"> • Industry Stakeholders 	<ul style="list-style-type: none"> • Executive Sponsor • Technical Committee 	<ul style="list-style-type: none"> • Number of agencies involved • Number of local agency workshops or peer exchanges
SG-1.9	Industry Education and Training	<ul style="list-style-type: none"> • DD Consultants • ODOT DD Design Team 	<ul style="list-style-type: none"> • ODOT DD Manager 	<ul style="list-style-type: none"> • Industry Stakeholders • ODOT DD Engagement 	<ul style="list-style-type: none"> • Technical Committee 	<ul style="list-style-type: none"> • Number of workforce development programs • Number of training and education sessions • Number of people attending/participating in each session
SG-2.1	Strategic Plan Updates	<ul style="list-style-type: none"> • DD Consultants • ODOT DD Design Team 	<ul style="list-style-type: none"> • ODOT DD Manager 		<ul style="list-style-type: none"> • Executive Sponsor • Technical Committee 	<ul style="list-style-type: none"> • Number of plans updated • Funding utilization
SG-2.2	Risk Registry Updates	<ul style="list-style-type: none"> • DD Consultants • ODOT Leadership 	<ul style="list-style-type: none"> • ODOT DD Manager 		<ul style="list-style-type: none"> • Executive Sponsor 	<ul style="list-style-type: none"> • Number of risks removed or decommissioned
SG-3.1	Identify champions & stakeholders	<ul style="list-style-type: none"> • DD Consultants • ODOT DD Design Team 	<ul style="list-style-type: none"> • ODOT DD Manager 	<ul style="list-style-type: none"> • ODOT DD Engagement 	<ul style="list-style-type: none"> • Technical Committee 	<ul style="list-style-type: none"> • Number of champions identified and participating



Goal	Task	Responsible	Accountable	Consulted	Informed	Metrics
SG-3.2	Implement Change Management through Communication	<ul style="list-style-type: none"> • DD Consultants • ODOT DD Design Team • ODOT District Leads 	<ul style="list-style-type: none"> • ODOT DD Manager 	<ul style="list-style-type: none"> • Industry Stakeholders 	<ul style="list-style-type: none"> • Executive Sponsor • Technical Committee 	<ul style="list-style-type: none"> • Website engagement • Number of videos, documents available • Number of stakeholders involved in initiatives • Number of meetings with stakeholders
SG-4.1	Pilot Project Program	<ul style="list-style-type: none"> • DD Consultants • ODOT DD Design Team 	<ul style="list-style-type: none"> • ODOT DD Manager 		<ul style="list-style-type: none"> • Technical Committee • Industry Stakeholders 	<ul style="list-style-type: none"> • Number of pilot projects and participants • Number of districts participating with pilots • Number of project teams involved with pilots • Number of after-action reviews
SG-4.2	Industry Peer Exchanges	<ul style="list-style-type: none"> • ODOT DD Design Team 	<ul style="list-style-type: none"> • ODOT DD Manager 		<ul style="list-style-type: none"> • Executive Sponsor 	<ul style="list-style-type: none"> • Number of industry peer exchanges • Number of participants
SG-4.3	After Action Reviews	<ul style="list-style-type: none"> • ODOT DD Design Team 	<ul style="list-style-type: none"> • ODOT DD Manager 	<ul style="list-style-type: none"> • DD Consultants 	<ul style="list-style-type: none"> • Technical Committee 	<ul style="list-style-type: none"> • Number of after-action reviews collected
SG-5.1	Asset Management Assessment	<ul style="list-style-type: none"> • DD Consultants • ODOT Asset Management Team 	<ul style="list-style-type: none"> • ODOT DD Manager 	<ul style="list-style-type: none"> • ODOT DD Design Team 	<ul style="list-style-type: none"> • Technical Committee 	<ul style="list-style-type: none"> • Volume of educational materials
SG-5.2	Digital As-builts with ancillary assets	<ul style="list-style-type: none"> • DD Consultants • ODOT Asset Management Team 	<ul style="list-style-type: none"> • ODOT DD Manager 	<ul style="list-style-type: none"> • ODOT District Leads 	<ul style="list-style-type: none"> • Technical Committee 	<ul style="list-style-type: none"> • Number of ancillary assets being collected for digital delivery use cases



Appendix B: BIM Model Use Cases

Existing Condition Modeling

A process for creating a digital representation of the existing condition as the basis to design or construct against. Modeling of existing conditions may include the ground surface and surface features (e.g., edge of pavement or shoulder, retaining walls), alignments, surface assets (e.g., lighting, drainage structures, striping, aerial cables), bridge structures and elements, land boundary information (e.g., ROW, property corners, monuments, legal boundaries), subsurface utilities, structures, and features (e.g., gas lines, ground and soil characteristics, buried foundations), and bathymetry surfaces.

The existing condition may be modeled with 2D and 3D data, derived from multiple sources such as GIS data, collected survey, record documents and drawings, subsurface utility investigations, and soil borings. This collection of data is used to produce the existing condition models. Due to the nature of these elements, the level of accuracy will vary depending on the data available and the collection methods. This variability in accuracy must be accounted for through standards and requirements in survey manuals in order to provide clearly communicated, consistent, and established confidence levels for elements of existing conditions models.

Design Authoring

A process to develop design models that represent and define the proposed design intent. These models can be both 3D and 2D, may represent the final design condition or a temporary condition, serve as the single source of truth in a model-based design process, and are typically specific to individual project disciplines (e.g., roadway, drainage, lighting, structures, temporary construction). Individual disciplines may be broken down by geographic or other forms of segmentation. These individual design models can then be referenced together to create federated models of the project or components of the project. Design models are developed using common standards for coordinate systems and configuration settings, which may be enforced by using a Common Data Environment to store and connect the various parties and elements of the project. Design Authoring is dependent on Existing Condition Modeling, and it is a foundational Model Use Case which is necessary to enable further Model Use Cases.

Visualization

This process leverages the design and existing condition models to produce visual representations that convey the project limits and intent. Quality imagery reduces design ambiguity leading to greater understanding and better communication amongst all stakeholders involved with or



impacted by the project. To be effective, a 3D modeled design is required, and, depending on the design phase of the project, the design models may have significantly more or less detail and development. In early phases of design development, producing visualizations from design models requires that modeling all design elements desired in the visualization of the project, even if the design confidence and development of these items is low. Creating the visualizations by directly using the live design model is the foundation of this model use case.

Visualizations can be produced at various quality levels and in different formats. Many design authoring software have the ability to create renderings or export directly to visualization software to create low-medium quality products. There are also significantly more advanced programs that can create ultra realistic renderings. Renderings can take many formats, including 3D still images, 3D “flythrough” video simulations, photo compositing, video compositing, and augmented or virtual reality.

Design Model Review

Model-based design processes can be accompanied by design model reviews and 3D coordination. Reviews may be performed using rule-based checks, model viewing and validation software for manual interrogation of models, or outputs and reports generated directly from the model. For example, an alignment report may be generated and reviewed to validate the alignment satisfies design criteria, and an automated clash detection process may be run to verify that there are no conflicts between specified existing and proposed modeled elements. This process validates the design model meets design criteria and guidelines. While the medium for performing a design review in a model-based process is different, it follows the same general rules and requirements for performing reviews of traditional engineered drawings and plans. Similar to the traditional design production process, the level of development and information within a model-based design will vary according to the design stage of the project.

Design Cost Estimation

Modeled elements are used to report or extract quantities for the proposed design from the proposed model. These quantities are then aligned to a schedule of bid items and unit costs to determine an estimate of cost for proposed work. Design models can be developed to varying levels of development and accuracy, which needs to be considered when extracting quantities. At final design, the model requires a high level of development and information to provide biddable quantity estimates.



Contract Model (Letting Model)

This use case replaces the traditional pdf plan set contractual deliverables with models. The contractual model serves as the engineer sealed document, which the contractor uses for bidding and building. Letting models must meet a high level of development, detail, and information. Models may replace traditional plan documents entirely for a project or only partially for specific disciplines or elements of a project. Projects with letting models may also have other accompanying data and documents, such as specifications, bid schedules, quantity tables, reports, etc., which may be in various document type formats. These additional documents may be for information only or contractual.

4D Construction Phasing

This process partitions the design model elements based on the proposed construction phasing and then links each element to a construction schedule. The schedule association is used to turn on or off the display of the modeled elements, in chronological sequencing, to illustrate the planned construction operations as a function of time. The output 4D renderings communicates to stakeholders the impacts over the course of the project. This use case also helps illustrate and plan out construction sequencing, access, and temporary traffic control needs.

Construction Authoring (Build Model)

During construction, a contractor may build their own construction models either based upon or using the data contained in the letting model. By adding in additional data to support construction activities, the construction model serves the contractor's needs and purposes during construction based on their means and methods, schedule and staging, workforce management, available equipment, fabrication needs, etc. The construction model may also be broken into smaller partitions based on discipline or location to reduce the amount of data being presented for different crews and equipment.

A contractor may use the construction model to plan their construction activities (such as schedule, access, staffing), perform quantity takeoffs and estimates for modeled bid items, bid items that are associated with modeled elements, set construction layout and staking of the proposed project elements, and/or import directly for AMG and stringless paving.

Construction models are distinct from design and letting models, as they focus on what the contractor needs to build a project. These models are still governed by the letting models, which are the contractual requirements for a project. Whether a contractor leverages the data in the letting



models directly or creates additional data to integrate with or match the letting models, the construction model must meet the project requirements of the letting model.

Model-Based Construction Management

Under this use case, construction management and inspection utilize the letting models to verify, document, and accept as-constructed project elements. Model-based applies to using the letting model to verify the geometry of built elements as well as utilizing the information associated with the modeled elements (e.g., specifications, materials, notes, and other requirements). Another part of the construction management process is performing reviews of submittals from the contractor prior to engaging in construction activities or ordering supplies. In model-based workflows, this process would involve reviewing submitted fabrication models and documents and comparing against the letting models and associated requirements.

Digital As-Built (Record Model)

This process creates a digital model representation of a project as constructed. Methods for creating this model include updating the letting model to reflect important changes that occurred during construction, capturing, and utilizing new survey data of the post construction condition to create the model of record, or a combination of the two. The data and elements provided in a design model may be substantially more than is required for a digital as-built, which should be tailored to an agency's as-built data collection needs. The digital data that represents the model of record may include 2D/3D geometry, documents, reports, photographs, videos, GIS information, etc. The combination of as-constructed modeled elements and digital data serve as the digital project delivery for a model of record suitable for operations and maintenance.

