*Texas Department of Transportation*

# Digital Delivery Program

## Implementation Plan – DRAFT

Texas Department of Transportation™


This documentation is in draft form and is currently being piloted by TxDOT's Digital Delivery Program. For any questions, comments, or feedback please send to digital-delivery@txdot.gov.


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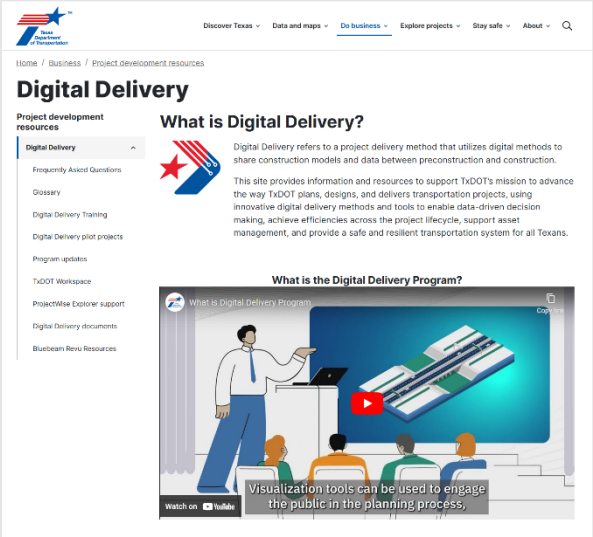
# EXECUTIVE SUMMARY

The Texas Department of Transportation (TxDOT) is embarking on a sustained, multi-year approach to integrate Digital Delivery into every aspect of its business and operations through its Digital Delivery Program (DDP). This initiative introduces innovative processes and technologies statewide, marking a significant advancement in project management and execution.




**The DDP Implementation Plan maps out specific tactical and technical tasks to advance the DDP. The document addresses three important program needs:**

1. **Documenting activities for program continuity.**
2. **Providing external reference for stakeholders.**
3. **Serving as a living document to capture program updates.**

Nine key implementation activities have been identified as steps towards accomplishing the technical, policy, and institutional needs to advance TxDOT towards Digital Delivery. These activities stem from the five strategic goals identified in the Strategic Plan.

## Key Implementation Activities

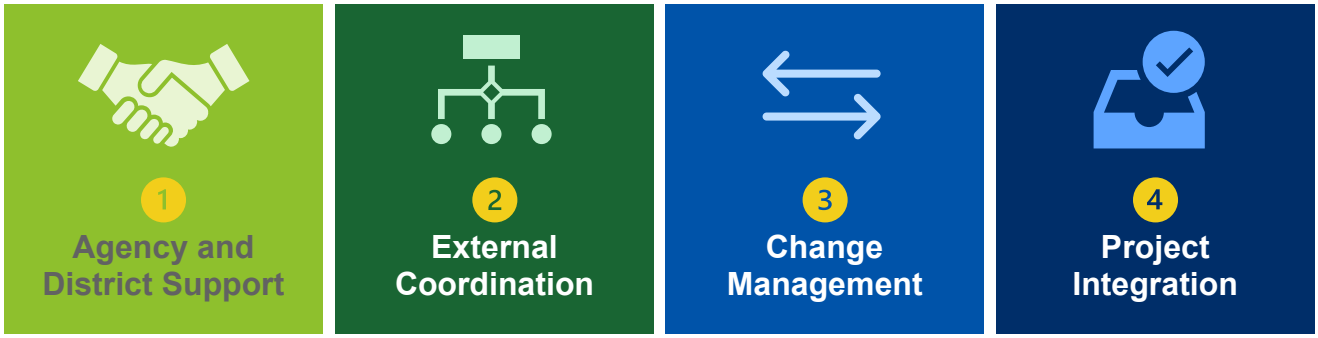
1. **Planning Documentation**
2. **Impact Assessments**
3. **Program Communication and Change Management**
4. **Pilot Project Program**
5. **Emerging Technology Investigation and Implementation**
6. **Enhancements to Existing Technology**
7. **Policy, Procedures, and Standards Documentation**
8. **Training Development and Delivery**
9. **Statewide Model Deliverable Initiative**

In this plan, each key activity is described according to a consistent framework with details provided for each of the following elements:

## Implementation Framework Elements

- **Strategic Alignment**
- **Work Groups and Stakeholders**
- **Implementation Actions**
- **Implementation Timeline**
- **Implementation Roles and Responsibilities**
- **Coordination Needs with Concurrent Activities**
- **Risk and Change Management Considerations**
- **Additional Information and References**

This plan also describes how the DDP will track progress on various key implementation activity tasks. It also describes how the DDP will define success and measure performance as TxDOT implements Digital Delivery across the agency through the tracking of four key indicators:




1. **Agency and District Support:** Level of engagement and support among internal stakeholders towards Digital Delivery initiatives
2. **External Coordination:** Amount of coordination between the DDP and external entities such as other agencies, businesses, and professional organizations
3. **Change Management:** Support given by the DDP to stakeholders across TxDOT including regular updates and training programs
4. **Project Integration:** Measure of the adoption of new tools into project workflows

The graphic on the next page provides a detailed timeline of each key implementation activity and component implementation actions and deliverables.

# Implementation Timeline

| Key Activities | | 2023 | 2024 | 2025 | 2026 |
|---|---|---|---|---|---|
| 1 Planning Documentation | | Strategic Plan | Training Plan | Digital Twin Plan | Update Plan |
| | | Communication Plan | | Model Deliverable Implementation Plan | |
| | | | Implementation Plan | | |
| 2 Impact Assessments | | Collect existing documentation | | Workgroup recommendations | |
| | | | Risk assessment | Format and finalize program documentation | |
| | | | Impact assessment by workgroup | | |
| 3 Program Communication and Change Management | | Launch website, DDP introduction at TxDOT conferences | Begin monthly champtions meeting | Launch webinars | District roadshow |
| | | | Launch newsletter | AGC & ACEC Roadshow | |
| | | | District roadshow | | |
| 4 Pilot Project Program | | SAT FM 1977 | | | |
| | | | SJT FM 1929 | | |
| | | | YKM FM 236 (letting Spring 2027) | | |
| | | LRD US 83 (letting Spring 2027); AUS FM 971 (letting Winter 2028) | | | |
| 5 Emerging Technology Investigation and Implementation | | Establish tech. eval. process | | FG - GIS; FG - Construction Management | |
| | | FG - Design Review | | | |
| | | FG - Construction Inspection | | | |
| | | FG - Digital Signing and Sealing | | | |
| 6 Enhancements to Existing Technology | Major Statewide Deployment | ORD 10.12 release | Launch mass migration tool | | |
| | | | PW 2024 upgrade | | |
| | OpenX Development | | ORD item types | 3D cell library | |
| | | | ORD roadway modeling templates | | |
| | ProjectWise Development | | PW reduced folder structure | | |
| 7 Policy, Process, and Standards Documentation | Policy | ORD 10.12 release | | Model deliverables policy (P2) | |
| | Process | DD process; Master iModel Guidance | Construction inspection progress | | |
| | | Design review (QC) process; QC checklists | | | |
| | | | 3D model breakline curation | | |
| | Standards | Data dictionary | Model Development Standards (MDS) (REV1); LOD | MDS REV 2; LOD REV 2; Update data dictionary | |
| | | | File naming convention | | |
| | | | Template point naming convention | | |
| 8 Training Development and Delivery | Pilot & WG Training | MDS & LOD training | Digital design review training | | |
| | Statewide Training | 3D modeling for intersection and driveways | Advanced template training | | |
| 9 Statewide Model Deliverables Initiative | | | Phase 1: Quality Review | | |
| | | | Phase 2: Models to Contractor (intermediate) | | |
| | | | Phase 3: Models to Contractor (full) | | |
| | | | | Phase 4: Models to Contractor (legal documents) | |

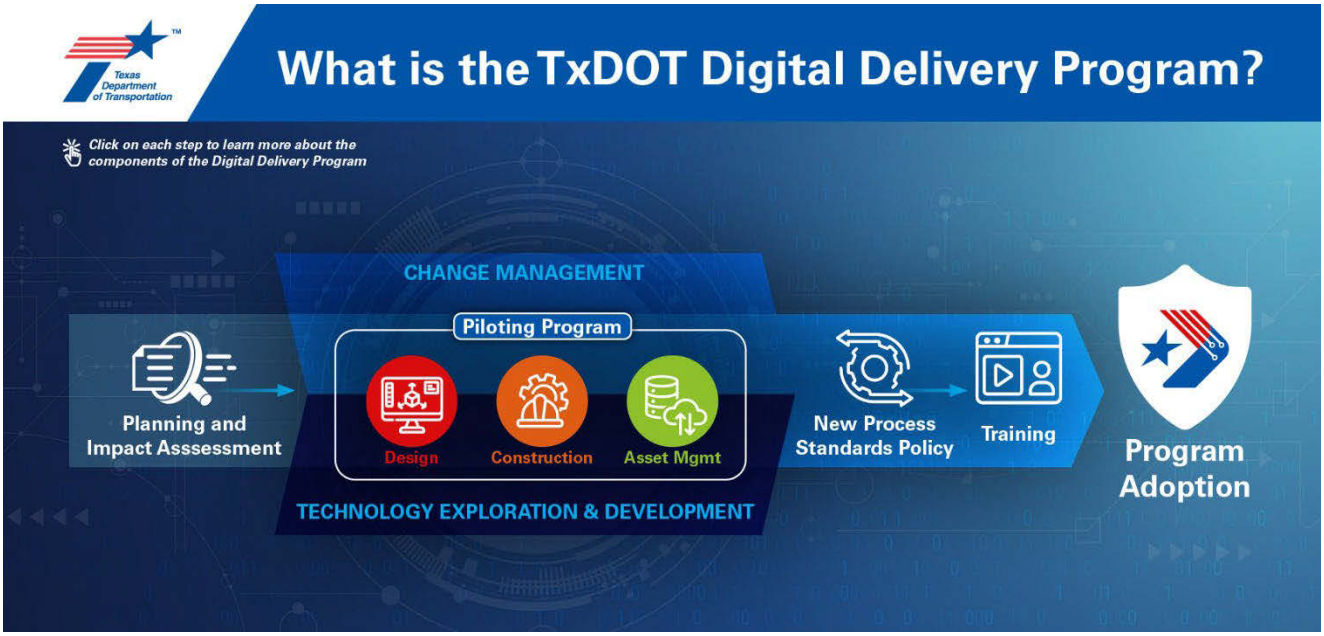
# INTRODUCTION

## Digital Delivery Program Overview

In the evolution of infrastructure projects, traditional reliance on two-dimensional plan sets is giving way to a more dynamic approach through three-dimensional modeling. Digital Delivery is the practice of using digital files and three-dimensional models to enhance the execution of infrastructure projects through planning, design, construction, and asset management. Transportation industries have been finding that these technology-driven processes allow for a more efficient, accurate, safe, and cost-effective way to deliver projects. For a brief introduction to Digital Delivery, see the What is DD? video on TxDOT's Digital Delivery website.

The Texas Department of Transportation (TxDOT) is embarking on this transformation, aiming to integrate Digital Delivery into every aspect of its business and operations through its Digital Delivery Program (DDP). The DDP establishes guidelines and goals to help TxDOT implement Digital Delivery while continually adapting to evolving technology. The graphic below provides an overview of this transformation, and the nine key activities described later in this Implementation Plan are ordered according to the program adoption process shown.

For an overview of the DDP, refer to the interactive overview of the TxDOT DDP on TxDOT's Digital Delivery website.




# Purpose of the DDP Implementation Plan

This implementation plan guides a sustained, multi-year approach to implement Digital Delivery across TxDOT. The implementation plan maps out specific tactical and technical tasks to advance the DDP. These include overarching initiatives, such as change management, communications and outreach, asset management, and processes, technology, and training needs.

**This TxDOT DDP Implementation Plan will:**

- ✓ Map out specific technical and tactical tasks to advance Digital Delivery throughout TxDOT.
- ✓ Outline current and planned activities that are helping the DDP achieve TxDOT's strategic goals.
- ✓ Establish roles and responsibilities across multiple groups and Divisions within TxDOT, including the roles of District staff, headquarters Divisions and teams, and the DDP Work Groups.
- ✓ Identify measures of success and performance metrics.
- ✓ Establish a strategic timeline for implementation of each identified task.

By including the content listed above, the TxDOT DDP Implementation Plan accomplishes three key objectives of the DDP.

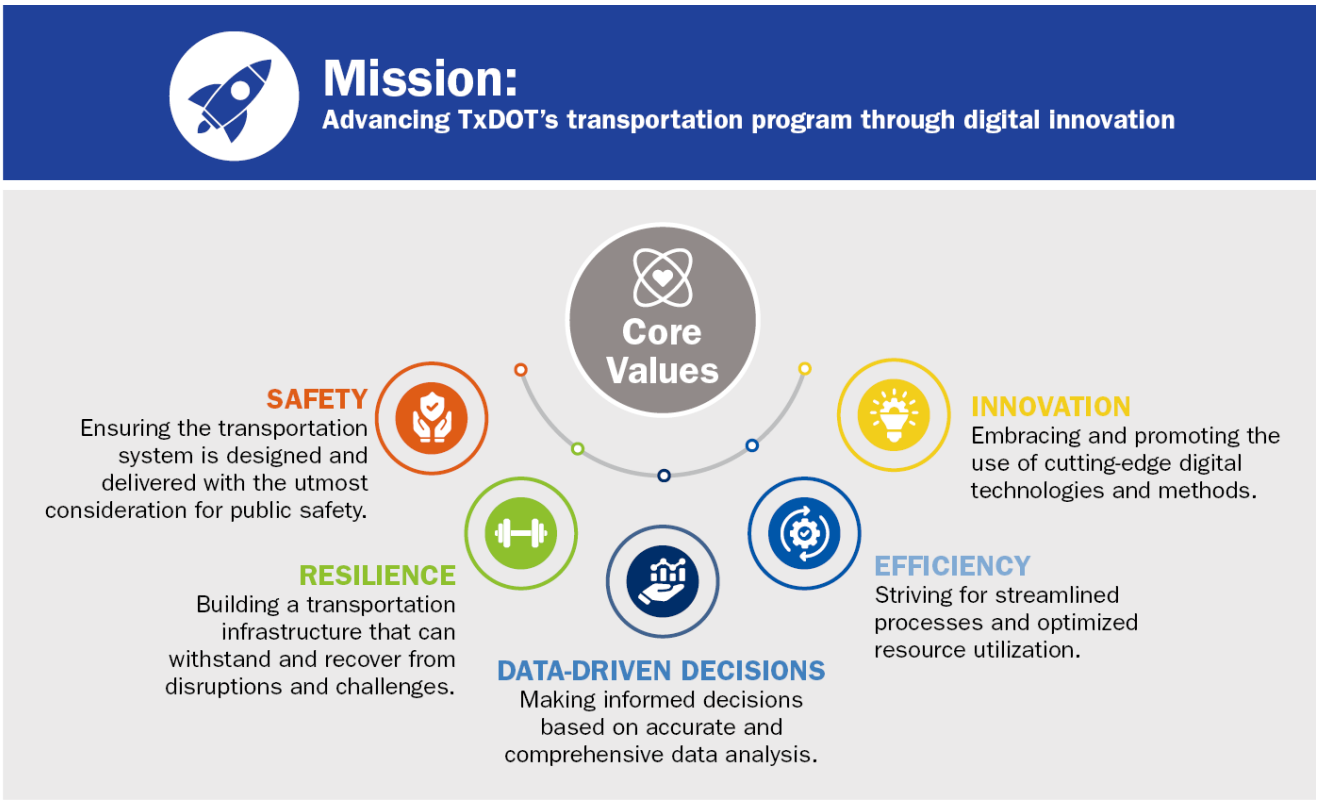
1. **Documentation for program continuity:** This plan documents the key activities and initiatives going on throughout the TxDOT DDP effort, as well as current plans for what comes next. As staff transition into and out of roles within the program, activities must be able to be continued by others.
2. **External reference for stakeholders:** This plan includes details about the process behind all DDP activities, both past and present, so that other state DOTs and stakeholders can use the document as a reference when developing their own Digital Delivery efforts, and so that TxDOT has documentation of the detailed undertakings of DDP staff and consultants.
3. **Living document to capture program updates:** This plan is a living document that will be updated one or two times per year as activities are completed, as future initiatives begin, and as more distant priorities change. Revisions will be captured in a log so changes can be easily found.

# STRATEGIC GOALS AND PROGRAM INITIATIVES

TxDOT's DDP Strategic Plan establishes the mission, core values, and strategic goals that guide TxDOT's implementation of Digital Delivery across the organization. The Implementation Plan captures those tasks and near-term initiatives that support TxDOT in achieving its mission and goals, setting the stage for DDP evolution and growth within TxDOT.

## Mission and Core Values

**Advancing TxDOT's transportation program through digital innovation.**




## TxDOT Digital Delivery Strategic Goals

The five strategic goals below represent the key priorities for TxDOT as it shifts traditional planning, design, and construction processes to digital-based strategies. These goals provide guidance to staff and consultants advancing DDP and help ensure that all new tasks and initiatives are in alignment with the mission of TxDOT DDP.

**Goal 1:** Integrate Digital Delivery into TxDOT's business processes and operations.

**Goal 2:** Standardize processes and technology across the TxDOT organization.

**Goal 3:** Manage and leverage data throughout all stages of the infrastructure lifecycle.

**Goal 4:** Prepare TxDOT's existing and incoming workforce for a fully digital transportation agency.

**Goal 5:** Advance the state of the practice for Digital Delivery by partnering with peer states and industry.

## Key Implementation Activities

The following key implementation activities have been identified as steps towards accomplishing the technical, policy, and institutional needs to advance TxDOT towards Digital Delivery. These activities stem from the five strategic goals identified in the Strategic Plan.

| Key Implementation Activities |
|---|
| • **Planning Documentation** |
| • **Impact Assessments** |
| • **Program Communication and Change Management** |
| • **Pilot Project Program** |
| • **Emerging Technology Investigation and Implementation** |
| • **Enhancements to Existing Technology** |
| • **Policy, Procedures, and Standards Documentation** |
| • **Training Development and Delivery** |
| • **Statewide Model Deliverable Initiative** |

# IMPLEMENTATION FRAMEWORK

This section introduces the implementation framework elements used within the DDP. It also discusses two core elements that influence all key implementation activities: the need for strategic alignment, and the involvement and activities of DDP work groups.

## Overview of Framework Elements

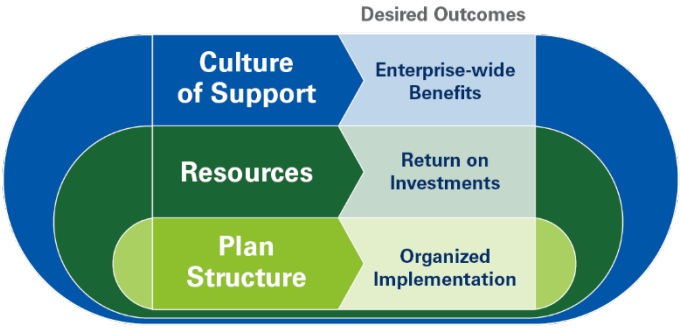
Each of the key implementation activities utilize these framework elements to outline the requirements and approach for successful implementation.

- **Strategic Alignment** – A process that ensures that the strategic plan's structure, use of resources, and culture support its strategy. Within the key implementation activity documentation, the overview and background sections as well as the summary of relevant strategic goals demonstrate the strategic alignment for each key activity.
- **Work Groups** – Groups of subject matter experts providing input and direction to specific focus areas of the Digital Delivery implementation. Work groups relevant to each key implementation activity are listed as key activity stakeholders along with other relevant partners. The ongoing activities of each work group are shown in the table beginning on Page 14.
- **Implementation Steps** – Documentation of the high-level steps needed for the DDP team to carry out the key implementation activity. These are included as numbered implementation steps for each activity.
- **Implementation Timeline** – A visual representation of all key activity-related target dates. It may also include strategic goals and steps involved in the project as well as resources necessary for the project to be successful.
- **Implementation Roles and Responsibilities** – A table with responsibilities related to the implementation actions for each key activity, organized by responsible work group or stakeholder. Roles and responsibilities may include but are not limited to identifying project obstacles and finding resolutions, securing implementation resources, analyzing strengths and requirements to each party involved in the project, and delegating tasks accordingly.
- **Coordination Needs with Concurrent Activities** – Necessary steps to take to coordinate efforts with other key implementation activities occurring at the same time to ensure alignment and efficiency.

- **Risk and Change Management Considerations** – A table of potential challenges and opportunities related to the implementation of each key activity, as identified as part of a TxDOT DDP risk management workshop (held in February 2024). Typical considerations include but are not limited to deciding what aspects of a key activity are most important, proper coordination with stakeholders, providing for needed education and communication of DDP concepts, and building consensus on decisions, and implementation of various risk reduction strategies.
- **Additional Information and References** – Content already developed or planned that is specific to each key implementation activity is included where available.

## Strategic Alignment

Strategic alignment refers to the need to align the TxDOT organizational structure and culture, the physical and monetary resources, and planning documentation with the ultimate goals for the DDP. When this is done effectively, efforts that link implementation activities to DDP goals and desired outcomes become apparent.


Some items that illuminate how a beneficial alignment of structure, resources, and culture can link to projects include:

**Planning and Structure:**

- Providing organized, step-by-step documentation shows who is responsible for which items and allows those steps to be implemented at a project level.

- A clear communication of achievable goals translates into expectations. Once these expectations are clear, the “why” behind each project becomes more apparent to project stakeholders.

**Resources:**

- Funding and time have an impact on each of the other items and empower people to achieve goals, showing the organization’s priorities rather than simply stating them.
- Implementing and supporting the technologies that best suit DDP needs will make broader program implementation possible. Without the right technologies in place, it will be difficult to achieve strategic goals and motivation will fall.
- Creating training materials will provide a bridge between the documented goals of the plan and the culture of the workplace where action will happen.

**Culture of Support:**

- Providing a comprehensive list of frequently asked questions (FAQs) and offering on-demand training content in the form of videos and guides will ensure that people will have access to the knowledge needed to achieve DDP goals any time that information is required.
- Bringing all departments on board through champion-led face-to-face development and training will ensure that resources are properly used, that the team is aware of the strategic goals, and that DDP knowledge grows across departments.

## DDP Work Groups

TxDOT has dedicated staff champions and key resources to move the DDP forward. This multi-faceted team includes TxDOT senior leaders, Division and District leadership, subject matter experts, and consultant support. The DDP has established discipline-specific work groups to examine Digital Delivery needs, priorities, and risks.

Work groups are comprised of staff from TxDOT Divisions and District representatives from across the state. This structure provides TxDOT with the perspectives and champions to move Digital Delivery forward and achieve the strategic goals for the Digital Delivery program. The table below lists key tasks and coordination activities shared by each work group, as of Summer 2024.

| Work Group (WG) | Current Key Tasks | Coordinating with Other Work Groups |
|---|---|---|
| **Design:** *Roadway* | • Impact assessments<br>• Pilot projects<br>• Technology development (workspace enhancements)<br>• Change management (supporting District roadshows, communication/collaboration improvements, gathering District input)<br>• Developing new processes, standards, and policy (DD Toolbox)<br>• Identifying training needs and develop training | • Construction<br>• Survey<br>• Technology<br>• Change Management |
| **Design:** *Bridge* | • Impact assessments<br>• Identifying a possible pilot project<br>• Technology development (workspace enhancements)<br>• Change management (supporting District roadshows, communication/collaboration improvements, gathering District input)<br>• Developing new processes, standards, and policy (Level of Design (LOD), quality assurance guide)<br>• Develop trainings | • Technology<br>• Roadway<br>• Change Management |
| **Design:** *Hydrology and Hydraulics (H&H)* | • Impact assessments<br>• Pilot projects<br>• Technology development (workspace enhancements, new data collection methods, updating computer aided design (CAD) features) | • Technology<br>• Survey<br>• Roadway |
| **Design:** *Traffic* | • Impact Assessments<br>• Establish WG scope and tasks | • Roadway |
| **Design:** *Environmental* | • Impact Assessments<br>• Developing and update processes, standards, and policy (Stormwater pollution prevention plan (SW3P) workflow)<br>• Environmental workspace enhancements | • Construction<br>• Roadway<br>• Asset Management<br>• Technology |

| Work Group (WG) | Current Key Tasks | Coordinating with Other Work Groups |
|---|---|---|
| **Design:** *Right-of-Way/Utilities* | • Planning (identifying solutions for legal documents or property exchanges)<br>• Develop processes to identify, track, and report utility conflicts in the utility conflict matrix and quantify measured Joint Bid Pay items<br>• Change management (increasing participant awareness about the aspects and benefits of Digital Delivery) | • Roadway<br>• Bridge<br>• H&H<br>• Traffic<br>• Survey<br>• Change Management |
| **Design:** *Survey/Subsurface Utility Engineering (SUE)* | • Review existing processes<br>• Pilot projects (developing signing and sealing methods of digital documents, future coordination on the use of geospatial technology)<br>• Technology development (merge upgraded workflow, workspace enhancements, updated CAD features)<br>• Identify ways to link SUE report to linear profiles with non-contiguous vertical data<br>• Conversion of as-built utility attributes into vector data converted for Right of Way Utility and Leasing Information System (RULIS) compatibility<br>• Developing new processes, standards, and policy (determine mobile light detection and ranging (LiDAR) and spatial density requirements, mobile mapping specifications) | • Technology<br>• Construction<br>• Roadway |
| **Data Governance and Asset Management (DGAM)** | • Identifying impacts coming out of other WG activities<br>• Pilot projects (developing a Data Dictionary)<br>• Change management (developing methods to gather feedback from users)<br>• Developing new processes, standards, and policy (digital as-builts) | • JEDI Project Team<br>• Construction<br>• Roadway<br>• Change Management |

| Work Group (WG) | Current Key Tasks | Coordinating with Other Work Groups |
|---|---|---|
| **Technology** | • Supporting other WGs identifying their technology needs<br>• Technology testing on Pilot Projects<br>• Coordinating requirements with vendors for future development<br>• Future coordination with Asset Management and Data Governance to identify solutions to get data in from the field<br>• As-built development | • Future coordination with Asset Management and Data Governance<br>• All work groups |
| **Construction** | • Establish a "WG Solutions Bucket Index" with key priorities identified<br>• Plan for as-built development<br>• Pilot project as-built concepts (FM 1977)<br>• Construction project data management<br>• Change management (supporting District roadshows, gathering District input) | • Environmental<br>• Technology<br>• Roadway<br>• Survey<br>• Change Management |
| **Alternative Delivery (ALD)** | • Pilot projects (deployed iTwin in Northeast Expansion (NEX) Central and NEX South for design review)<br>• Identifying strategies to ensure ALD is considered in new documentation and policies related to DDP<br>• Impact assessment that highlights differences from traditional DDP projects | • Change Management<br>• Technology<br>• Future coordination with Construction<br>• All work groups |
| **Project Development** | • Develop project scoping guidance (project identification criteria)<br>• Release new project development guidelines<br>• Minor changes to project development manual<br>• Updating design summary report requirements | • Change Management<br>• Technology<br>• Future coordination with Construction<br>• All work groups |

# TRACKING PROGRESS

The DDP involves several work groups, dozens of implementation tasks, and hundreds of stakeholders. Keeping track of progress is vital for ensuring the program remains on schedule and decisions are made with all relevant information available. To do so, the DDP has established an internal task tracker that all team members can access and update. Even with the task tracker, DDP leadership acknowledges the need to maintain some flexibility within the program as priorities and resources change.

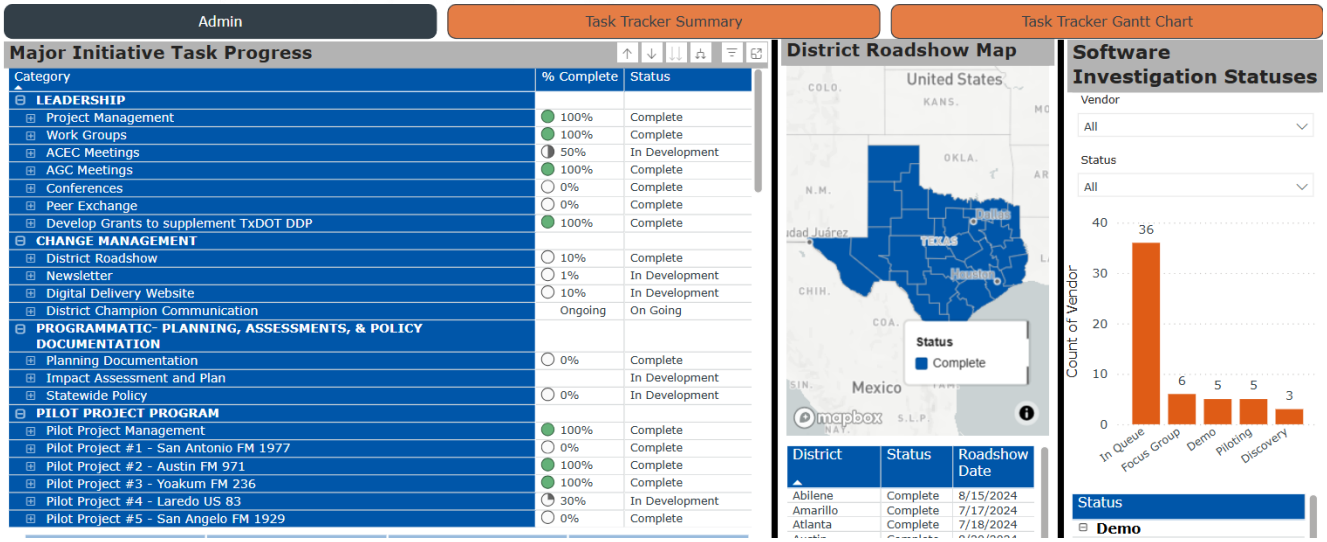
## DDP Task Tracker

The DDP Task Tracker is designed to centralize project data, track milestones, and facilitate collaboration among the DDP team. The primary objectives of implementing the DDP Task Tracker include enhancing project management capabilities, improving communication, and providing stakeholders with transparent updates on project status and milestones.

The items included in the DDP Task Tracker were chosen to highlight the most vital information within each task. The following items are included for each task in the Task Tracker:

- **Task Description** – The task description identifies the individual task. Tasks may have sub-tasks listed beneath.
- **Owner** – The owner is the DDP team member responsible for the task. Their role is to ensure progress is made and the task is completed by the due date. The owner must also update the Task Tracker for their task as items such as status and percent complete change.
- **Working Group** – The lead work group is the group for which the task was designated. The task is primarily the role of this group.
- **Start Date and Due Date** – The start and due dates for each task provide a timeline for milestones. The Task Tracker also includes a Gantt chart which uses the start and due dates for each task so a complete timeline for the DDP can be created.
- **Status** – The task's status is a general description of the current stage of the task. Possible statuses include not started, in development, in review, paused, in pilot phase, complete (internal), and complete (public).
- **Percent Complete** – This item describes the progress of the task as a numerical percentage value.

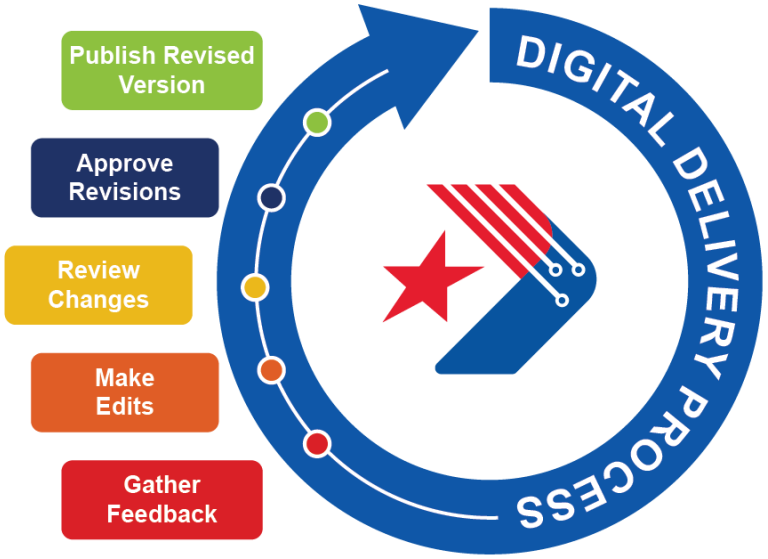
Information within the DDP Task Tracker is reported to stakeholders through a dynamic dashboard. The dashboard is designed to summarize the tracker for a more programmatic view of current efforts. It includes a shortened version of the task tracker, District Roadshow map, technology investigation statuses, counts of tasks by category and status, and a Gantt chart. The image on the next page shows the main page of the dashboard.




All data within the DDP Task Tracker is manually input and updated by either DDP leadership or the owners of tasks. The Task Tracker is a spreadsheet that automatically updates the dashboard when edited.

## Program Flexibility

Processes and strategies being used by the DDP must have the ability to adapt in response to changing requirements and priorities. This flexibility is necessary for maintaining efficiency within the program. The DDP website is a valuable tool that provides flexibility to the program by allowing documents to be easily updated as changes are made.




Feedback will be collected annually to perform a full review on the strategic goals and short-term and long-term implementation activities. This review process, conceptualized in the graphic on the next page, will allow the program to reprioritize tasks and allocate resources according to the new priorities. The process will conclude in time for each new fiscal year. Each work group will also align their priorities to fit within the overall program initiatives. All reviews and modifications will be documented either as part of this living document or in another location.

# MEASURING SUCCESS

The DDP requires significant investments in technology, process improvements, and organizational change. Measuring success in these initiatives is crucial to ensure the program implementation is in alignment with its strategic goals.

Ongoing monitoring and evaluation allow DDP leadership to measure the success of the DDP. Having an accurate knowledge of success also provides accountability and transparency for stakeholders, opportunities for more optimized resource allocation, and the means for continuous improvement. While measurements of success may be used by the DDP to guide their planning and implementation strategies on individual tasks, it is not currently a reporting requirement for DDP efforts or key implementation activity.

## Defining Success

Success within the DDP is achieved through various levels of assessment. While individual work groups may have specific methods to evaluate the success of their processes or initiatives, there are also overarching programmatic measures that DDP leadership will track throughout the transition. Success is determined by:

**Agency and District Support** – Receiving collaboration and support from Districts and TxDOT leadership is critical for ensuring the program incorporates a wide range of input from across the agency. This assesses the level of engagement and support among internal stakeholders towards Digital Delivery initiatives. (i.e. How much support is DDP getting from TxDOT?)

**External Coordination** – Communication on projects in partnership with external entities, such as other agencies, businesses, and professional organizations allows for knowledge sharing and faster adoption of new practices. These powerful relationships will benefit all transportation agencies as they adopt Digital Delivery practices. (i.e. How much coordination is happening with other groups?)

**Change Management** – Implementing Digital Delivery statewide requires continuous coordination and communication with stakeholders across TxDOT to include them as partners in the transition. Regular updates, training programs, and readily accessible support from the DDP are crucial to fostering buy-in. (i.e. How much support is DDP giving to TxDOT?)

**Project Integration** – The development and implementation of Digital Delivery methods is ongoing. Measuring the adoption of new tools into project workflows will help the DDP team determine how to prioritize further efforts. (i.e. How are projects using Digital Delivery?)

## Programmatic Performance Metrics

To assess the progress and effectiveness of the transition to Digital Delivery, specific performance metrics must be determined and regularly tracked. These metrics directly relate to the programmatic measures of success. These metrics should be realistic to measure, the data needed for reporting results should be easy to acquire, and the metrics should be reflective of progress as quantified by how success is defined within the DDP.

As the DDP continues to evolve, DDP leadership will oversee the development and documentation of different success metrics for work groups, pilot projects, and other aspects of the program. Metrics should be re-evaluated annually and adjusted as the program progresses. Metrics that may be considered include, but are not limited to:

1. **Agency and District Support**
   - Training and education activity participation
   - Positive feedback documented through a regular survey of participants
2. **External Coordination**
   - Number of presentations (internally and externally at conferences, different groups, and to peers)
   - Number of peer exchanges
   - Number of organizations in regular contact (agencies, businesses, professional organizations)
   - Amount of grant money received
   - Contractor and Associated General Contractors of America (AGC) buy-in
3. **Change Management**
   - Number of trainings developed or updated
   - Number of Roadshows
   - Number of meetings or instances of DDP communication with stakeholders
4. **Project Integration**
   - Number of pilot projects
   - Number of Districts with pilot projects
   - Number of new processes and procedures updated or created
   - Number of contractors involved in a pilot project
   - Number of consultants outside the DDP involved in a pilot project
   - Time to deliver projects or Digital Delivery elements within projects
   - Project costs

5. **Other Programmatic Efforts**
    - Number of participants
    - Milestone dates met
    - Number of documents being developed or updated
    - New software platforms and features being explored
    - Survey responses gauging effectiveness of training and pilot project implementation
    - Bentley ProjectWise reporting (number of projects in OpenRoads Designer and ProjectWise)

For additional benefits and metrics, refer to the Federal Highway Administration's (FHWA) National Strategic Roadmap.

# KEY IMPLEMENTATION ACTIVITIES

## Key Activity #1: Planning Documentation

***Completion Date:***
2025

***Key Activity Stakeholders:***
- Change Management WG
- Work Group Leads and Members
- DDP Leadership

***Goals Addressed:***
Goal 1: Integrate Digital Delivery into TxDOT's business processes and operations.

### *Key Activity Overview*

Develop planning documentation to clarify the goals, strategy and vision of DDP, identify key stakeholders, and outline strategies for stakeholder engagement.

### *Key Activity Background*

Planning documents for DDP are being developed concurrently as technical work is already underway. These documents will contribute to the overall change management process and guide the successful implementation of DDP throughout TxDOT.

### *Implementation Steps*

**Implementation Step #1:** Determine the expected uses and needs for each planning document by conducting planning activities including stakeholder interviews, workshops, and best practice research from other state departments of transportation (DOTs). Gather information to be used in developing an outline for each.

- Strategic Plan
- Implementation Plan
- Training Plan
- Communication Plan

**Implementation Step #2:** Based upon each outline, develop planning documents for DDP, including a Strategic Plan, Implementation Plan, Training Plan, and Communication Plan. Receive review from work group leadership, program leadership, and District and Division leadership.

**Implementation Step #3:** Develop a Digital Twin Plan in coordination with the TxDOT Journey to Enterprise Data Integration (JEDI) program using information gathered from the pilot projects and technology evaluations.

### *Implementation Timeline*

| Year | 2023 | 2024 | 2025 |
|---|---|---|---|
| **Key Milestones** | • Strategic Plan<br>• Communication Plan | • Implementation Plan<br>• Training Plan | • Digital Twin Plan |

### *Implementation Roles and Responsibilities*

| Key Activity Stakeholders | Roles and Responsibilities |
|---|---|
| **Change Management WG** | • Conduct interviews, workshops, and other planning activities.<br>• Research best practices from other DOTs.<br>• Create outlines, drafts, and final documents.<br>• Coordinate document reviews and quality control (QC). |
| **Other Work Group Leads** | • Participate in planning activities.<br>• Review and provide feedback on documents as requested by the Change Management Work Group. |
| **DDP Leadership** | • Participate in planning activities.<br>• Review and provide feedback on documents as requested by the Change Management Work Group. |

### *Coordination Needs with Concurrent Key Activities*

- Work groups have begun other DDP activities that may be discussed in planning documents, and these work groups will need to continue providing updates as work progresses.
- Planning documents will help guide priorities and activities for the work groups.
- Impact assessments from the Digital Twin Work Group will highlight needs for the Digital Twin Plan.
- Technology enhancements, District and Division needs, and documentation of best practices from other key activities will drive the development of the Training Plan.

### *Risk and Change Management Considerations*

| Risk and Change Management Challenges | Risk and Change Management Opportunities |
|---|---|
| • Some work groups have progressed further than others and contribution to planning documentation may be unequal<br>• Early adopters creating their own ways of doing things | • Culture of innovation towards workload reduction<br>• Leadership support<br>• Change culture of siloed work<br>• Improved workflows and efficiency |

| Risk and Change Management Challenges | Risk and Change Management Opportunities |
|---|---|
| • Perception of "forced" adoption<br>• TxDOT culture and the adoption of change - transforming the existing culture that resists change to a learning and accepting change organization<br>• Lack of understanding of Digital Delivery | • Standardized processes and training<br>• Better coordination with external stakeholders<br>• Leverage ALD early adoption items as Pilot Projects and collaborate on best practices |

## *Additional Information and References*

### *Planning Documentation Overview*

The table below describes each planning document developed as part of the DDP and its purpose within the program.

| Name | Purpose/Overview |
|---|---|
| **Strategic Plan** | Planning document that identifies core values, goals, key initiatives, and provides a roadmap to reach the goals for the Digital Delivery Program. |
| **Implementation Plan** | This document builds on the Strategic Plan by providing practical application by assigning roles, responsibilities, and incremental timelines for achieving the overall Program goals. |
| **Training Plan** | The purpose is to align TxDOT workforce capabilities with DDP objectives. It will establish a training strategy for employees, determine a timeline for implementation, and outline methods for continually improving training programs. |
| **Communication Plan** | The purpose is to define roles within the project team and internal staff (stakeholders), establish a protocol for documentation and communication throughout the program, and determine a timeline for both internal and external communications during the phases of the program. |
| **Digital Twin Plan** | Evaluate technology and best practices for Digital Twins used in the transportation industry and provide recommendations on how to incorporate Digital Twins into Texas' bridge and roadway assets. |


# Key Activity #2: Impact Assessment

***Completion Date:***
2026

***Key Activity Stakeholders:***
- Work Group Leads and Members
- DDP Leadership

***Goals Addressed:***
Goal 1: Integrate Digital Delivery into TxDOT's business processes and operations.

## *Key Activity Overview*

Assess the potential impacts of Digital Delivery within each work group on TxDOT's existing manuals, processes, and workflows. From these assessments, recommend updates to processes, workflows, and training.

## *Key Activity Background*

Digital Delivery will affect existing systems and their related policies, procedures, and guidelines for every discipline within TxDOT. Each work group is responsible for considering the implications of Digital Delivery for their unique disciplines and will work together to assess risks, impacts, and opportunities. They will provide recommendations for workflow changes, technology updates, and training.

## *Implementation Steps*

**Implementation Step #1:** Collect and assess existing systems and the related policy, guidelines, and Standard Operating Procedures (SOPs). Work groups provide input on existing TxDOT processes to create an understanding of the current process, responsible parties, and requirements, and gather documentation to be reviewed in an Impact Assessment Inventory. Conduct a Risk Assessment to identify and mitigate any potential risks associated with Digital Delivery.

**Implementation Step #2:** Identify impacts and opportunities within existing systems from TxDOT work groups in partnership with national Digital Delivery experts. Perform diverse cross-discipline coordination and quality checks during the assessments.

**Implementation Step #3:** Assign priorities to the impacts and opportunities and provide recommendations to address impacts with input from work groups. Impacts are prioritized based on the effect of the impact and the ease of addressing the impact.

**Implementation Step #4:** Provide final documentation of assessments and recommendations. Final documentation on findings should be developed to meet the needs of the program and scale of the process: memo, report, workflow diagram, etc.

### *Implementation Timeline*

This Key Activity is prioritized differently based on the process being assessed. The Implementation Timeline is broken into two separate timelines to account for different priority items.

| Year | 2023 | 2024 | 2025 |
|---|---|---|---|
| **Key Milestones for Top Priority Processes**<br><br>*Digital Delivery process, design and model review processes, construction and inspection processes* | • Collect and assess existing systems and the related policy, guidelines, and SOPs | • Identify impacts and opportunities<br>• Assign priorities and provide recommendations | • Provide final documentation of assessments and recommendations |

| Year | 2024 | 2025 | 2026 |
|---|---|---|---|
| **Key Milestones for Other Priority Processes**<br><br>*Business processes, design development processes, asset management processes* | • Collect and assess existing systems and the related policy, guidelines, and SOPs | • Identify impacts and opportunities<br>• Assign priorities and provide recommendations | • Provide final documentation of assessments and recommendations |

### *Implementation Roles and Responsibilities*

| Key Activity Stakeholders | Roles and Responsibilities |
|---|---|
| **Work Group Leads and Members** | • Provide input on existing processes and requirements for design, project delivery, inspection, and data collection.<br>• Review documents and provide input on proposed DDP processes<br>• Identify impacts and opportunities to existing process, policy, and procedures related to their respective work group.<br>• Prioritize impacts based on the magnitude of the impact and the ease of updating.<br>• Provide input on recommendations to address impacts. |
| **DDP Leadership** | • Oversee the work and progress of each work group.<br>• Compile final recommendations to address impacts.<br>• Provide input on the preferred format of final documentation to meet the needs of the agency. |

### *Coordination Needs with Concurrent Key Activities*

- Many processes involve multiple disciplines and require coordination between work groups to organize their findings and develop recommendations.
- All work group recommendations will be made public to work groups, District champions, and District and Division leadership. Any public facing materials will be shared on the TxDOT website and approved by TxDOT communications for brand consistency.

### *Risk and Change Management Considerations*

| Risk and Change Management Challenges | Risk and Change Management Opportunities |
|---|---|
| • Understanding of Digital Delivery and what a potential impact or opportunity could be<br>• Ensuring decision makers are present and have all pertinent information<br>• Siloed approach to project delivery will not work for Digital Delivery projects | • Educate work groups on TxDOT's Digital Delivery goals and national state of the practice<br>• Cross coordinate between work groups to share overlapping concerns and opportunities |

## Additional Information and References

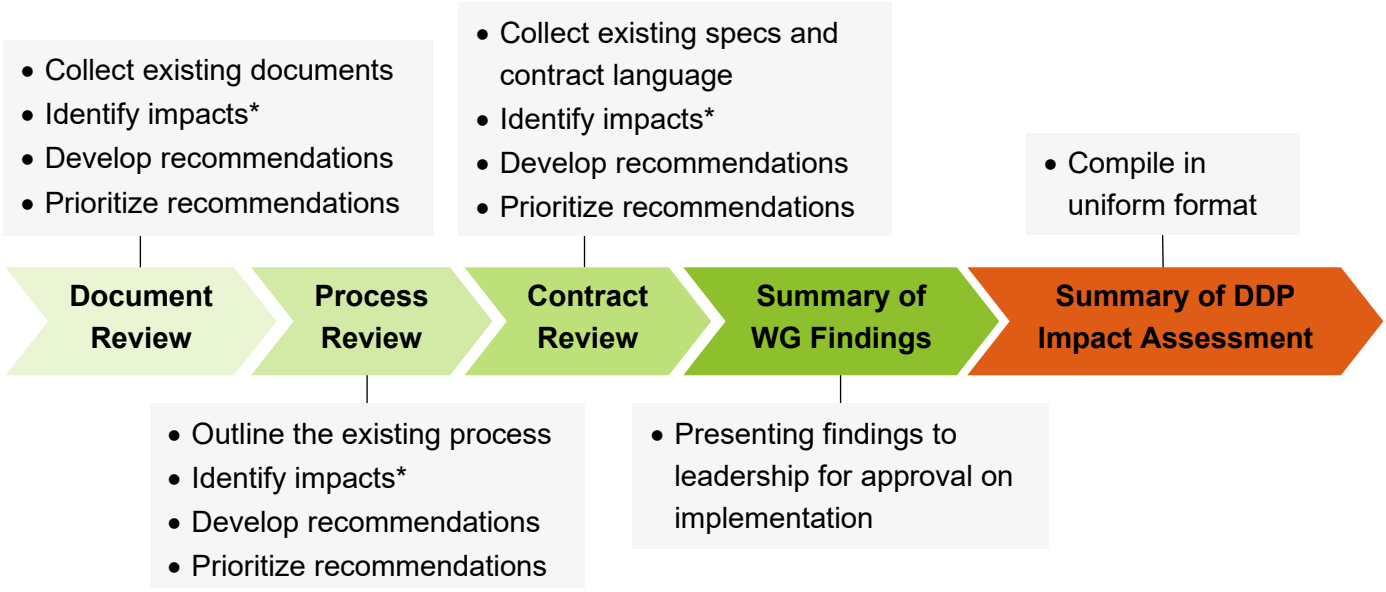
### Work Group Impact Assessment Progress

The table below lists the status for each work group impact assessment, as of Summer 2024.

| Process | WGs involved | Progress |
|---|---|---|
| **Digital Delivery process** | Design, DGAM, Construction, Technology, Project Development, ALD | Complete |
| **Design and model review processes** | Design, Project Development | In-development |
| **Construction and inspection process** | Construction, Technology, DGAM, Design, AGC | In-development |
| **Business processes** | Design, Project Development, American Council of Engineering Companies (ACEC) | Not started |
| **Design development process** | Design, Project Development, Technology, DGAM | In-development |
| **Asset management processes** | DGAM, Design, Technology, Construction | Not started |

### Work Group Impact Assessment Process Diagram

The figure below outlines the steps for conducting impact assessments within each work group.




**Impact refers to the potential positive or negative effects on a given business process. Negative impacts include safety risks, financial costs, and disruptions, while positive impacts can involve improved efficiency, economic gains, and enhanced safety or operations.*

# Key Activity #3: Program Communication and Change Management

***Completion Date:***
Ongoing

***Key Activity Stakeholders:***

- Change Management WG
- Other Work Groups
- Identified District and Division DDP Champions
- General TxDOT Staff
- External Partners
- DDP Leadership

***Goals Addressed:***

**Goal 1:** Integrate Digital Delivery into TxDOT business processes and operations.

**Goal 4:** Prepare the TxDOT existing and incoming workforce for a fully digital transportation agency.

## *Key Activity Overview*

Establish a communication process to support change management as Digital Delivery is adopted agencywide.

## *Key Activity Background*

Regular communication will help ensure all impacted groups are able to provide feedback and will increase the likelihood of buy-in across the agency. DDP has developed a Communication Plan to identify key stakeholders, District and Division champions, forms of communication, and strategic communication events.

## *Implementation Steps*

**Implementation Step #1:** Develop communications materials including a Digital Delivery website and quarterly newsletter to share updates on DDP with TxDOT stakeholders. Key programmatic messages to communicate are:

- What is Digital Delivery?
- Overview of the Digital Delivery Program
- Benefits of Digital Delivery
- Strategic Goals

**Implementation Step #2:** Participate in national and statewide conferences related to digital innovation and TxDOT design, construction, procurement, and project delivery.

**Implementation Step #3:** Provide opportunities for in-person engagement from across TxDOT that showcase DDP and how it will impact and provide opportunities for TxDOT operations.

- Digital Delivery District Roadshows
- AGC and ACEC District Roadshows
- Senior Leadership Meetings

**Implementation Step #4:** Provide ongoing updates through webinars and District Champion meetings that report the progress of all key activities identified in the Implementation Plan.

### *Implementation Timeline*

| Year | 2023 | 2024 | 2025 |
|---|---|---|---|
| **Key Milestones** | • Develop Communication Plan<br>• Develop key communications materials<br>• Introduce the DDP at TxDOT's Bridge & Road and Short Course Conferences | • Complete Digital Delivery District Roadshows<br>• Begin quarterly newsletter<br>• Provide interactive technology demo at TxDOT Short Course Conference | • Complete AGC & ACEC District Roadshows<br>• Begin DDP webinars<br>• Begin planning 2026 roadshows and communication events |

### *Implementation Roles and Responsibilities*

| Key Activity Stakeholders | Roles and Responsibilities |
|---|---|
| **Change Management WG** | • Develop and implement recommendations from Communication Plan.<br>• Lead content development and schedule for the 2024 District Roadshows.<br>• Support the implementation of future communication and change management events. |
| **Other Work Groups** | • Provide subject matter expertise to support the development of communication material.<br>• Provide regular updates to the Change Management WG on status of key activities in the Implementation Plan. |
| **Identified District and Division DDP Champions** | • Serve as local subject matter experts and support facilitation of subsequent change management events to other District and Division staff.<br>• Provide feedback on new DDP policies, processes, and procedures. |
| **General TxDOT Staff** | • Engage with Digital Delivery District Roadshows to learn about DDP and share feedback.<br>• Participate in communication and change management events.<br>• Provide feedback on new DDP policies, processes, and procedures. |
| **External Partners** | • Participate in communication and change management events.<br>• Provide feedback on new DDP policies, processes, and procedures. |
| **DDP Leadership** | • Communicate support of program in conjunction with TxDOT leadership.<br>• Identify key communication events and opportunities.<br>• Support the schedule development for Digital Delivery District Roadshows. |

### *Coordination Needs with Concurrent Key Activities*

- Sharing news about DDP successes and outcomes will require coordination across work groups:
    - Pilot Project teams should share lessons learned and schedule updates.
    - Technology WG should share findings from technology investigations.
    - As new technology enhancements are released for statewide use, the Change Management WG should be informed to provide external communications.
    - As new policy, processes, and standards are developed, the Change Management WG should be informed to provide external communications.
    - All work groups should report on efforts that are underway to administer training, including details on the learning objectives, intended audience, and format (i.e. e-learning).
- Work groups from across disciplines will need to be receptive to feedback received through the program communication process. This feedback may impact how policies, procedures, and tools are developed and shared across TxDOT.

### *Risk and Change Management Considerations*

| Risk and Change Management Challenges | Risk and Change Management Opportunities |
|---|---|
| • Communication of the right ideas<br>• Lack of a clear, centralized message<br>• Perception of "forced" adoption<br>• Keeping messages too high-level and ignoring technical details<br>• Lack of expertise or training to develop projects for Digital Delivery<br>• The need for more training may cause fatigue of training<br>• Some Districts may be behind or ahead of others<br>• Geographic and discipline silos | • District and Division leadership support<br>• Coordination with external stakeholders<br>• Providing regular status updates that show all different aspects of DDP, including Districts, Divisions, etc.<br>• Standardized processes and training for Digital Delivery<br>• Improved understanding of Digital Delivery general concepts |

## *Additional Information and References*

### *Change Management Communication Schedule*

The communication schedule below outlines the DDP plan for communicating development and changes related to Digital Delivery, both internally and externally.

| Communications Element | 2024 | 2025 | 2026 | 2027 | 2028 |
|---|---|---|---|---|---|
| **Website** | As needed | | | | |
| **Newsletter** | Quarterly (or as needed) | | | | |
| **Champions** | Monthly Champion Calls (or as needed) | | | | |
| **Roadshow** | Digital Delivery Roadshows | Digital Delivery Roadshows | Digital Delivery Roadshows | | |
| **Conferences & Trainings** | • National conferences: Transportation Research Board (TRB) and International Highway Engineering Exchange Program (IHEEP) (each winter and fall)<br>• TxDOT conferences: Bridge and Road, Short Course (each spring and fall)<br>• Additional conferences evaluated yearly | | | | |
| **Webinars** | Every 6 months | | | | |

# Key Activity #4: Pilot Project Program

***Completion Date:***
Ongoing

***Key Activity Stakeholders:***

- Design WG
- Construction WG
- Technology WG
- Asset Management and Data Governance WG
- Pilot Project Leads and Staff

***Goals Addressed:***

**Goal 1:** Integrate Digital Delivery into TxDOT's business processes and operations.

**Goal 2:** Standardize processes and technology across the TxDOT organization.

**Goal 3:** Manage/ leverage data throughout all stages of the infrastructure lifecycle.

## *Key Activity Overview*

Identify DDP goals and elements that can be strategically tested using pilot projects. These pilot projects will support the investigation of new technologies and processes, and assist in the development of new policy, procedures, and guidelines. Pilot projects are critical to provide a testing space that does not disrupt current business processes and prepares TxDOT for the transition to Digital Delivery and Digital Twin processes.

## *Key Activity Background*

As of Spring 2024, there are ten active pilot projects. These pilot projects were chosen to test priority pilot goals for the agency such as delivering models as the legal document (MALD), digital design review, and digital construction inspection. Pilot projects began early on in the program, as a means of gaining hands-on, real-world feedback by pairing subject matter experts (SMEs) with TxDOT staff through on-the-job training and frequent coordination to discuss organizational processes, technology requirements, and training documentation.

## *Implementation Steps*

**Implementation Step #1:** Determine pilot goals for design development, deliverables, construction inspection, and data collection and analysis.

**Implementation Step #2:** Identify specific software, hardware, and processes as pilot elements that can be tested to achieve the pilot goals. Develop a data dictionary for use on the pilot projects.

**Implementation Step #3:** Establish a pilot element for testing on a TxDOT project through vendor and SME support for any necessary workspace development and integration, installation and procurement, and other training. Develop training materials and SOPs to facilitate integration and use within each pilot project.

**Implementation Step #4:** Identify relevant projects with appropriate timelines in which to test the identified pilot elements.

**Implementation Step #5:** Conduct pilot projects. During design and construction, meet regularly to discuss the technical issues and modeling details along with the design details. Coordinate with vendors and technology SMEs to refine model reviews and implement necessary changes based upon outcomes of pilot projects.

**Implementation Step #6:** Develop and document recommendations based on findings from pilot projects.

### *Implementation Timeline*

| Year | 2023 | 2024 | 2025 |
|---|---|---|---|
| **Key Milestones** | • Determine pilot goals<br>• Identify pilot elements that will be tested<br>• Pilot projects begin testing pilot elements<br>• Develop a preliminary data dictionary for FM 1977 | • Pilot projects continue testing pilot elements<br>• Projects are supported by the developments of the Digital Delivery Toolbox | • Pilot projects continue<br>• Recommendations based on the first pilot projects are developed<br>• Further data dictionary development based on results from FM 1977 pilot |

### *Implementation Roles and Responsibilities*

| Key Activity Stakeholders | Roles and Responsibilities |
|---|---|
| **Design WG** | • Identify use cases that need testing and relevant pilot project opportunities.<br>• Support testing of Digital Delivery Toolbox and procedures on pilot projects. |
| **Construction WG** | • Identify use cases that need testing and relevant pilot project opportunities.<br>• Develop training materials and standard procedures to facilitate integration and use within pilot projects. |
| **Technology WG** | • Develop new organization policy to support new approaches and technology that enable DDP.<br>• Test new and enhanced technology requirements and workflows. |

| Key Activity Stakeholders | Roles and Responsibilities |
|---|---|
| **Asset Management and Data Governance WG** | • Support testing of Digital Delivery Toolbox and procedures on pilot projects.<br>• Use pilot projects to evaluate the attribution of data to assets for tracking and the development of digital as-builts. |
| **Pilot Project Leads and Staff** | • Test and provide feedback regarding standardized DDP processes and Digital Delivery Toolbox items from use on pilot projects.<br>• Train staff, consultants, and contractors to use Digital Delivery methods through deployment on pilot projects. |
| **All Key Activity Stakeholders** | • Meet regularly to discuss pilot project performance as pilot projects occur. |

### *Coordination Needs with Concurrent Key Activities*

- Pilot project testing of various aspects of Digital Delivery processes, standards, and the Digital Delivery Toolbox will identify needed improvements to those resources.
- Results from pilot project evaluation will be used to develop and refine Digital Delivery SOPs such as design review and construction inspection processes.
- Pilot project evaluations will likely provide the most important field testing of potential technology enhancements related to Digital Delivery.

### *Risk and Change Management Considerations*

| Risk and Change Management Challenges | Risk and Change Management Opportunities |
|---|---|
| • The need for more training may cause fatigue of training<br>• Siloed approach to project delivery will not work for Digital Delivery projects<br>• Loss of integrity of data with the change from paper plans to Digital Delivery<br>• Contractors increase their bids to account for risk if deliverables are not understood | • Opportunity for designs to be higher quality<br>• Improved workflows and efficiency |

## *Additional Information and References*

### *Pilot Project Digital Delivery Goals*

The graphic below summarizes key goals for the overall DDP pilot project program.

**DESIGN**

3D modeling for constructability and clash detection

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Data attribution to CAD elements for model-based quantity reporting

---

Digital review tools for model review and comment resolution

**DELIVERABLES**

Model as legal documents

---

3D Model Breaklines for Automated Machine Guidance (AMG) and estimating

---

PDF roll plots for reduced plan sheets

**CONSTRUCTION**

Digital review in the field

---

Digital as-builts

---

e-Ticketing for materials documentation

---

Digital construction management tools

**ASSET MANAGEMENT**

Data attribution to CAD elements for asset tracking

---

Digital as-builts

### *Pilot Project Map*

For the current status of the pilot projects, refer to the map on DDP website https://www.txdot.gov/business/resources/digital-delivery/pilot-projects.html.

### *Pilot Project Overview Table*

The table below shows the ten Digital Delivery pilot projects identified for development as of August 2024, along with project progress information and listed pilot elements.

| Highway Name | District | Scope | Letting Date | Elements Piloted |
|---|---|---|---|---|
| **FM 1977** | **San Antonio** | Plans, Specifications, and Estimates (PS&E). 0.311 mile reconstruction and widening from FM 621 to the Guadalupe-Caldwell County line. | Jan 2025 | • Hybrid Project – 3D model and paper plan set<br>• Signed and sealed contractor documents<br>• Reduced paper plan set<br>• Legal DGNs – seals and document control method Model Development Standards (MDS)<br>• Addendum process<br>• Survey standards and surveyor's digital signing<br>• As-builts |
| **FM 1929** | **San Angelo** | PS&E. 8.5 miles of rehabilitation of existing road from US 83 to Lake County Road. | November 2026 | • Digital Delivery team leading design with District support |
| **FM 236** | **Yoakum** | PS&E. 5 mile conversion from two-lane to three-lane facility. Includes proposed roadway realignment, widening, medians, and drainage improvements. | May 2027 | • Assessing strategies to improve schematic delivery |
| **US 83** | **Laredo** | Schematic and PS&E. 3.74 mile roadway widening and reconstruction from one mile north of SH 255 to Los Botines Lane. | September 2027 | • Assessing strategies to improve schematic delivery |

| Highway Name | District | Scope | Letting Date | Elements Piloted |
|---|---|---|---|---|
| **FM 971** | **Austin** | PS&E. 3.14 mile roadway widening from CR 334 to SH 95. Includes proposed pedestrian and drainage improvements. | October 2028 | • 3D modeling to track plan sheet updates |
| **US 59** | **Laredo** | 1.208 mile interchange improvement from 0.54 miles south of Del Mar Boulevard to 0.67 miles north of Del Mar Boulevard. | August 2023 | • Construction management |
| **RM 1376** | **San Antonio** | 3.003 mile hazard elimination and safety project including roadway widening and guard fence installation from RM 473 to 0.8 miles south of Upper Sisterdale Rd. | June 2023 | • Construction management |
| **Southeast Connector** | **Fort Worth** | 16.6 miles of construction of IH 20 from Forest Hill Drive to Little Road, IH 820 from IH 20 to Brentwood Stair Road, and US 287 from Village Creek Road to Sublett Road. Alternative Delivery method. | October 2021 | • Digital design review<br>• 3D modeling with a bridge<br>• PDF roll plots<br>• Model visualization<br>• Bentley Synchro |
| **IH 2/IH 69C DB Pharr Interchange Project** | **Pharr** | 7.8 mile interchange improvement from 2nd Street to FM 2557 along IH 2 in San Juan and from Nolana Loop to IH 2 in Pharr. | TBD | • Construction management |
| **SH 6** | **Bryan** | Widen freeway facility from four to six lanes, improve frontage roads, add local access lanes, and add bicycle and pedestrian facilities. | December 2024 | • Construction management |

# Key Activity #5: Emerging Technology Investigation and Implementation

***Completion Date:***
2027

***Key Activity Stakeholders:***

- Technology WG
- Pilot Project Leads and Staff
- TxDOT Information Technology Division
- Other Work Groups

***Goals Addressed:***

**Goal 2:** Standardize processes and technology across the TxDOT organization.

**Goal 5:** Advance the state of practice for Digital Delivery by partnering with peer states and industry.

## *Key Activity Overview*

Investigate, test, and improve technology resources and products to support the transition to Digital Delivery. Summarize findings and identify the impacts of Digital Delivery on the future workspace environment for TxDOT staff.

## *Key Activity Background*

Technology investigation, including both hardware and software products, is currently occurring, and needs are being evaluated for survey, design, review, letting, construction, inspection, and asset management. This investigation will support efforts to standardize processes and technology across TxDOT.

## *Implementation Steps*

**Implementation Step #1:** Complete technology needs evaluations related to DDP.

**Implementation Step #2:** Establish criteria, processes, and target timelines for selecting, procuring, migrating, and managing new Digital Delivery technology and supporting systems.

**Implementation Step #3:** Evaluate existing and emerging technology solutions associated with Digital Delivery applications through a standardized intake and evaluation process. Create Focus Groups to perform a detailed evaluation of promising solutions.

**Implementation Step #4:** Lead discussions with vendors to implement updates to existing technology products based upon evaluation results.

**Implementation Step #5:** Summarize expected impacts Digital Delivery will have on the future workspace environment for TxDOT staff.

### *Implementation Timeline*

| Year | 2023 | 2024 | 2025 |
|---|---|---|---|
| **Key Milestones** | • Evaluate technology needs for DDP<br>• Establish a technology evaluation process | • Begin evaluating potential technology solutions<br>• Work with vendors to implement changes to technology based on DDP needs | • Continue evaluating potential technology solutions<br>• Work with vendors to implement changes to technology based on DDP needs |

### *Implementation Roles and Responsibilities*

| Key Activity Stakeholders | Roles and Responsibilities |
|---|---|
| **Technology WG** | • Lead technology evaluations and management process development.<br>• Develop recommendations to share with TxDOT Information Technology Division.<br>• Summarize expected impacts Digital Delivery will have on the future workspace environment for TxDOT staff.<br>• Conduct vendor assessments. Regularly evaluate technology vendors for reliability, support quality, and long-term viability to ensure that they can meet TxDOT's ongoing needs.<br>• Establish technology lifecycle management. Define the lifecycle for each technology, from acquisition through to decommissioning, ensuring that plans are in place for updates, upgrades, and eventual replacement.<br>• Regularly gather input from end-users to ensure that selected technologies meet their needs and improve their daily workflows. |
| **Pilot Project Leads and Staff** | • Evaluate technology through implementation on pilot projects.<br>• Monitor pilot project performance. Implement performance tracking metrics for pilot projects to ensure that they meet predefined success criteria and can be scaled across the organization.<br>• Capture and share lessons learned from pilot implementations to inform future technology rollouts and avoid repeating mistakes. |

| Key Activity Stakeholders | Roles and Responsibilities |
|---|---|
| **TxDOT Information Technology Division** | • Vet and incorporate Technology WG recommendations for Digital Delivery technology investments as part of other ongoing Division responsibilities.<br>• Make sure that all technology selections comply with the organization's IT governance policies, including data security, privacy, and regulatory requirements.<br>• Work with other TxDOT departments to ensure that new technologies integrate smoothly with existing systems, minimizing disruption and maximizing operational efficiency. |
| **Other Work Groups** | • Evaluate and provide feedback to the Technology WG on relevant technology as requested.<br>• Participate in cross-functional evaluations. Encourage collaboration between work groups during the evaluation phase to ensure that technologies meet the needs of various departments and do not create silos.<br>• Support change management initiatives. Assist in communication and training efforts to help ensure smooth adoption and minimize resistance to new technologies. |

### *Coordination Needs with Concurrent Key Activities*

- Technologies being considered for investment as part of Digital Delivery should be tested on pilot projects to understand their effectiveness and needs for improvement.
- Technologies that receive TxDOT's investment will require significant training and skill building requirements for staff development.
- Comparison of technology and software evaluations with tools developed internally as part of the Digital Delivery Toolbox may identify instances where internal tools are better suited to DDP needs than vendor solutions.
- Technologies that seem promising will need to be evaluated through technology focus groups that will be established as part of DDP.
- Compatibility with Digital Twin Planning needs and Data Dictionary Development needs will be needed for lasting DDP technology solutions.
- Technology investments must align with the broader organizational strategy and contribute to long-term goals such as digital transformation and operational efficiency.
- Continuous review of the TxDOT's technology standards will be needed to keep pace with industry advancements and changing organizational needs.

## *Risk and Change Management Considerations*

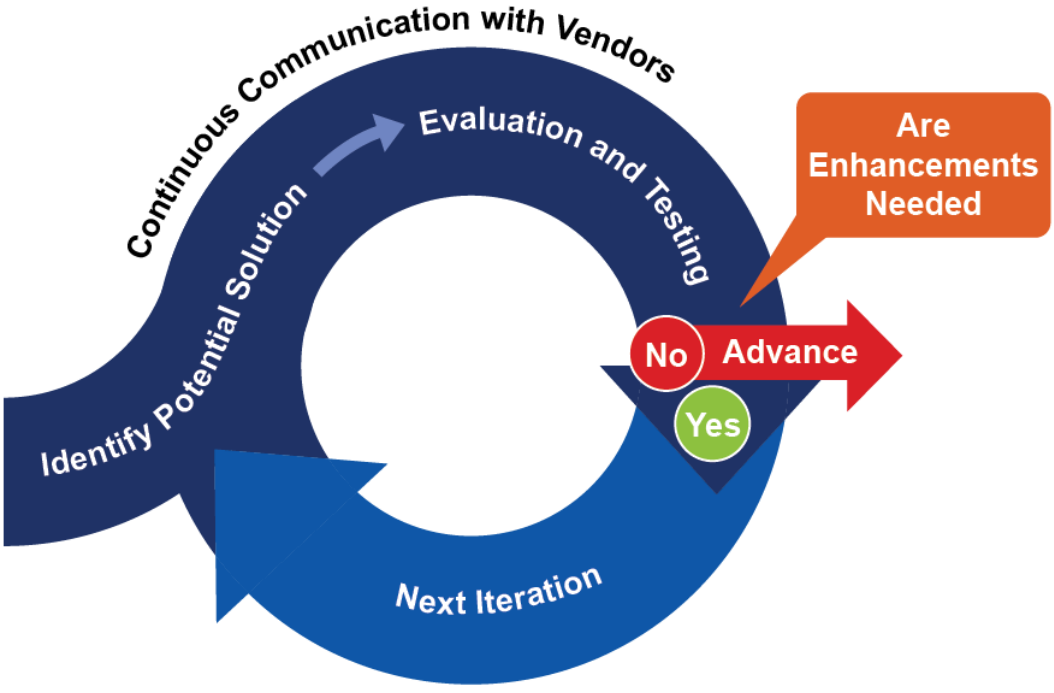
| Risk and Change Management Challenges | Risk and Change Management Opportunities |
|---|---|
| • Technical failures and software functionality gaps<br>• Keeping up with software updates and versions<br>• Over-worked staff do not have the time to implement a new delivery process<br>• May miss some of the benefits of Digital Delivery in construction if requirements are not defined<br>• Digital Delivery workflows are acquiring and developing more information<br>• Software always changing<br>• Not generating standardized processes for CAD, design, review, inspection, etc.<br>• Procurement processes may impact schedule<br>• Security requirements, particularly related to software-as-a-service (SaaS) products, will extend timeline<br>• Coordinating technology adoption across different departments, each with its own processes, workflows, and priorities<br>• Effective data migration when transitioning to new technologies, preserving data integrity and minimizing downtime<br>• Integrating new technologies with legacy systems that may still be in use, preserving functionality while planning for upgrades or replacements | • Project staff understanding the power of Digital Delivery and buy into it, leading to more technology enhancements<br>• Final design speed can be improved by reducing redundant entries<br>• Design is easily accessible<br>• Able to test and implement new technology<br>• New technologies can foster a culture of continuous improvement and innovation, encouraging employees to explore new ways of working<br>• Investing in scalable technologies that can grow with the organization, ensuring that the infrastructure can support future expansion and increased demand<br>• Using data analytics tools provided by new technologies to improve decision-making processes, and identifying trends and insights that can drive strategic initiatives |

## Additional Information and References

### Software Needs and Evaluation Process Diagrams

The figures below show the list of software needs being evaluated for different stages of the project delivery process within the context of DDP, as well as the process of continuous evaluation of technologies that TxDOT is using.


Software providers will likely need to further develop and test their software, potentially through multiple pilot rounds, to ensure it meets DDP requirements.



### *Software Testing and Deployment Process Summary*

For general technology evaluation, an agile process will be used to onboard new technology solutions efficiently while ensuring they meet organizational needs, as shown in the graphic below.


This process streamlines the intake procedure, ensuring fairness, transparency, and collaboration between TxDOT and its vendors. Automation tools will be used where possible to minimize interruptions throughout the process. Documentation and scoring of the software will be used in decision-making for the eventual adoption of the best solutions.

For design solution applications and workspaces, an agile process will be used to allow for regular releases of updates while maintaining a continuous development and improvement cycle.

Recommendations to improve likelihood of success include:

- Define and communicate updates to goals and requirements.
- Identify the right participants for each type of testing.
- Test for performance, security, and scalability.
- Specify focused testing with identified requirements as well as continuous, exploratory testing but be sure to do both.
- Establish an appropriate communication cadence at each phase of testing or deployment.
- During focused testing, use a daily scrum to remain agile and maintain momentum.
- Implement user-friendly tools for reporting findings (i.e., spreadsheets and dashboards).
- Ensure appropriate testing sample sizes.
- Ensure software and hardware access for testers.
- Ensure environment availability and stability for testing.
- Develop internal and external communications.
- Understand and follow Change Advisory Board (CAB) deployment requirements.
- Send end user support instructions and prepare the support team to be on-call for issues.
- Always have a backup or rollback strategy prepared.

# Key Activity #6: Enhancements to Existing Technology

## *Key Activity Overview*

Existing technology systems require enhancements and integration to enable Digital Delivery workflows and optimize data and information management best practices.

## *Key Activity Background*

TxDOT's existing systems that frequently interface with Digital Delivery include but are not limited to:

- Bentley OpenX applications and ProjectWise (PW)
- TxDOT Connect
- Bluebeam Revu
- Trimble field applications
- AASHTO Site Manager
- Esri ArcGIS

## *Implementation Steps*

**Implementation Step #1:** Define best practices and procedures for development, testing, and deployment for Bentley ProjectWise and OpenX applications including checklists, process diagrams, dashboard tracking, and defining roles and responsibilities.

**Implementation Step #2:** Establish unique working environments for development and testing based on access requirements and the needs of teams such as those involved with Digital Delivery pilot projects.

**Implementation Steps #3 through #6 are repetitive as technology features are completed and additional needs are identified.**

**Implementation Step #3:** Identify gaps and set priorities for technology enhancements. Define requirements based on current business processes, Digital Delivery best practices, and stakeholder input. Ensure alignment with organizational goals and future scalability.

***Completion Date:***
Ongoing

***Key Activity Stakeholders:***

- Technology WG
- Design WG
- Construction WG
- DGAM WG
- Identified District and Division DDP Champions
- TxDOT Geospatial Data Management Team
- TxDOT Information Technology Division
- TxDOT Strategic Initiatives and Innovation Division
- DDP Leadership

***Goals Addressed:***

**Goal 1:** Integrate Digital Delivery into TxDOT business processes and operations.

**Goal 2:** Standardize processes and technology across the TxDOT organization.

**Goal 3:** Manage/ leverage data throughout all stages of the infrastructure lifecycle.

**Implementation Step #4:** Develop enhancements to technology via a systematic process involving stakeholder input and ongoing feedback to align requirements with technology limitations, opportunities, and expectations.

**Implementation Step #5:** Test enhancements as part of Digital Delivery pilot projects prior to deploying statewide. Major enhancements require District input and feedback. Several considerations that determine how long the testing and pilot period should be before moving to the next step include:

- Risk assessment to statewide production
- Amount of stakeholder input during development
- Timing and schedule of pilot projects
- Urgency of software enhancement for statewide use

**Implementation Step #6:** Develop documentation that clearly outlines usage expectations, workflow requirements, and necessary training materials. This step involves significant coordination between work groups, stakeholders, and existing training teams to ensure consistency and relevance. Effective documentation should be accessible, comprehensive, and aligned with current processes to facilitate smooth implementation and user adoption.

**Implementation Step #7:** Deploy enhancements for statewide use through processes defined in Implementation Step #1.

### *Implementation Timeline*

| Year | 2023 | 2024 | 2025 |
|---|---|---|---|
| **Key Milestones** | • Develop process documentation for Bentley PW and OpenRoads Designer (ORD)<br>• Develop software testing checklists for ORD<br>• Identify priority elements for development | Priority elements undergo development, testing, and piloting:<br>• ORD item types and roadway corridor templates<br>• PW reduced folder structure, workflows, and document naming convention<br>• PW Migration Workflow for ORD 10.12<br>• Mass Migration tool to assist in depreciating old CAD authoring software | • Develop a robust 3D cell library<br>• Deploy priority elements for statewide use |

### *Implementation Roles and Responsibilities*

| Key Activity Stakeholders | Roles and Responsibilities |
|---|---|
| **Technology WG** | • Lead the development and identification of needed technology enhancements.<br>• Develop solutions with the help of other work groups and pilot teams.<br>• Lead the testing and piloting of enhancements.<br>• Document all information required for user adoption. |
| **Design WG** | • Provide subject matter expertise for identification and prioritization of needed technology enhancements.<br>• Participate in piloting enhancements during pilot projects.<br>• Provide feedback on documentation and training material. |
| **Construction WG** | • Provide subject matter expertise for identification and prioritization of needed technology enhancements.<br>• Participate in piloting enhancements during pilot projects.<br>• Provide feedback on documentation and training material. |
| **DGAM WG** | • Provide subject matter expertise to support the identification and prioritization of needed technology enhancements.<br>• Participate in piloting enhancements during pilot projects.<br>• Provide feedback on documentation and training material. |
| **TxDOT Geospatial Data Management Team** | • Review and assist with enhancements to GIS programs. |
| **TxDOT Information Technology Division** | • Provide needed information and software to Technology WG members.<br>• Assist with developing enhancements and testing. |
| **TxDOT Strategic Initiatives and Innovation Division** | • Provide input on selected enhancements and priorities.<br>• Review final enhancements before release. |
| **DDP Leadership** | • Provide input on selected enhancements and priorities.<br>• Communicate support of final technology enhancements in conjunction with TxDOT leadership. |

### *Coordination Needs with Concurrent Key Activities*

- Work groups have begun to identify software needs for DDP and will continue providing recommendations to enhance existing TxDOT systems as work progresses.
- New software enhancements will drive the development of new policy, guidelines, and SOPs.
- Select software enhancements will be tested through pilot project investigations.
- Training programs will need to be tailored to specific technologies that TxDOT implements for Digital Delivery.

### *Risk and Change Management Considerations*

| Risk and Change Management Challenges | Risk and Change Management Opportunities |
|---|---|
| • Technical failures and software functionality gaps<br>• Keeping up with software updates and versions<br>• Potential for setbacks when software updates occur mid-project<br>• Over-worked staff do not have the time to implement a new delivery process<br>• Digital Delivery workflows are acquiring and developing more information<br>• Software is always changing<br>• Coordinating technology adoption across different departments, each with its own processes, workflows, and priorities<br>• Effective data migration when transitioning to enhanced technologies, preserving data integrity, and minimizing downtime<br>• Perception of "forced" adoption<br>• Geographic and discipline silos | • Project staff understanding the power of Digital Delivery and buying into it, leading to more technology enhancements<br>• Final design speed can be improved by reducing redundant entries<br>• Enhanced technologies can foster a culture of continuous improvement and innovation, encouraging employees to explore new ways of working |

## *Additional Information and References*

### *Mass Migration to Achieve a Single CAD Platform*

TxDOT will be transitioning to newer versions of ORD, while gradually phasing out older, unsupported versions. This effort will consolidate all design authoring onto a single platform and version across the organization. This shift will streamline processes, improve collaboration, and ensure compliance with evolving industry standards.

While all new projects are currently required to begin in ORD 10.12, an automated migration effort will help to unify new and existing projects. TxDOT will seek to migrate all existing projects to a single version of ORD to align with all new project creation.

A process to ensure agile workspace development and deployment will also be implemented to provide regular workspace updates and identify strategic opportunities to adopt new software releases, while continuing to transition all projects collectively. **The benefits of this effort are outlined below.**

**1. Consistency in Design Deliverables**

- Uniform Standards Compliance: Utilizing a single platform ensures that all design outputs adhere to TxDOT's established standards and guidelines, reducing variability between projects.
- Streamlined Review Processes: Consistent formats and workflows lead to clearer communication during reviews, minimizing discrepancies and enhancing the approval process

**2. Improved Collaboration Across Disciplines**

- Interdisciplinary Coordination: A single tool enables seamless data exchange between different engineering disciplines (e.g., roadway, structures, and drainage), promoting integrated design workflows.
- Enhanced Data Sharing: The tool's ability to integrate with other systems (e.g., GIS platforms and project management systems) facilitates efficient information sharing, improving coordination across project teams.

### 3. Operational Efficiency

- Reduced Errors and Rework: Centralizing design processes within one tool reduces the potential for errors associated with transferring data between multiple platforms, leading to fewer revisions and increased project efficiency.
- Accelerated Decision-Making: Real-time data accessibility within the tool allows for timely updates and decisions, reducing delays and expediting project timelines.

### 4. Cost Reduction

- Lower Licensing and Training Costs: Using a single tool reduces the need for multiple software licenses and simplifies training requirements, leading to significant cost savings.
- Simplified IT Support: With a unified system, IT teams can focus on maintaining and supporting one platform, reducing overall system complexity and support costs.

### 5. Streamlined Training and Development

- Consistent Training Programs: Standardized use of a single tool simplifies the development of training programs, leading to more efficient onboarding and skill development for staff.
- Faster Workforce Adaptation: New employees and existing staff can adapt more quickly to project workflows, given the consistency in tools and processes across the organization.

### 6. Scalability and Future-Proofing

- Alignment with Industry Advances: Modern design tools, such as ORD, are frequently updated to incorporate advancements in technology, including model-based design and BIM integration. This makes it easier for TxDOT to remain aligned with industry trends and best practices.
- Scalability for Increased Project Demands: A single, flexible design platform is better suited to scale with increasing project size or complexity, ensuring long-term adaptability without the need for adopting new tools.

# Key Activity #7: Policy, Procedures, and Standards Documentation

## Key Activity Overview

Establish policy, procedures, and standards to ensure consistent digital deliverables for statewide use.

## Key Activity Background

After understanding the existing state of practice and goals for Digital Delivery through the Strategic Plan and Impact Assessments, the team has focused on developing policy, procedures, and standards. Development is prioritized based on DDP program goals, scope, impact and risk assessments, ease of introducing change, and pilot project needs.

***Priority 1:***

- Quality Control (QC)
- Project Development and Delivery
- Asset Management
- Software Requirements for CAD Authoring and Common Data Environment (CDE)
- Letting Process

***Priority 2:***

- Construction Inspection
- Model Management
- Alternative Delivery
- Environmental SW3P

***Completion Date:***
2026

***Key Activity Stakeholders:***

- DDP Leadership
- Design WG
- Change Management WG
- Project Development WG
- Technology WG
- Asset Management and Data Governance WG
- Alternative Delivery WG
- Pilot Project Leads
- TxDOT Enterprise Management Team

***Goals Addressed:***

**Goal 1:** Integrate Digital Delivery into TxDOT's business processes and operations.

**Goal 2:** Standardize processes and technology across the TxDOT organization.

## Implementation Steps

**Implementation Step #1:** Develop policy and Expectation of Use communication to ensure TxDOT stakeholders meet software, design, and deliverable requirements.

**Implementation Step #2:** Develop SOPs and standards based on national best practices and current TxDOT policies. DDP leadership and TxDOT subject matter experts (SMEs) determine the preferred format for new documentation, including items such as Model Development Standards (MDS) and data dictionary requirements.

**Implementation Step #3:** Pilot project teams and work group participants review and test draft documentation to provide feedback prior to implementing statewide.

**Implementation Step #4:** Post guidelines and SOPs on TxDOT's Digital Delivery website as a comprehensive Digital Delivery Toolbox for model development, review, and deliverables to enhance and optimize design, letting, construction, and maintenance of assets.

**Implementation Step #5:** Update documentation based on TxDOT stakeholder feedback.

## *Implementation Timeline*

### *Implementation Timeline – Policy*

| Year | 2023 | 2024 | 2025 | 2026 |
|---|---|---|---|---|
| **Key Milestones** | • Develop ORD Policy | • Post ORD policy statewide | • Develop and post PW policy<br>• Expectation for model deliverables – phase 1 & 2<br>• Asset Management Policy | • Expectations for model deliverables – phase 3 |

### *Implementation Timeline – Procedures*

| Year | 2023 | 2024 | 2025 | 2026 |
|---|---|---|---|---|
| **Key Milestones** | • Develop and pilot Priority 1 items | • Refine Priority 1 items based on pilots & post to Digital Delivery website<br>• Develop and pilot Priority 2 items | • Refine Priority 2 items based on pilots & post to Digital Delivery website<br>• Identify Priority 3 Elements | • Develop additional procedural documentation<br>• Incorporate statewide feedback on previous documentation |

**For priority descriptions, see section below for list of Digital Delivery processes and elements.*

**Documentation for Priority 1 Procedures:**

- Model Management Plan
- QC Process SOP
- QC Checklists
- 3D Model Breakline Curation
- File Naming Convention
- iModel Creation Guidance

**Documentation for Priority 2 Procedures:**

- Digital Signing & Sealing
- Construction Inspection SOP
- SW3P SOP
- Phased Modeling Guidance

***Implementation Timeline – Standards***

| Year | 2023 | 2024 |
|---|---|---|
| **Key Milestones** | • Level of Development (LOD) Spreadsheet developed for San Antonio pilot<br>• Data Dictionary standards developed for San Antonio pilot | • Provide a Data Dictionary and MDS workshop for DDP stakeholders and pilot teams<br>• Identify Priority 1 assets for development of the statewide data dictionary<br>• MDS Guidance draft developed for pilot use<br>• LOD Spreadsheet for roadway, drainage, bridge, and traffic developed for pilot use<br>• ALD Tenets of Digital Delivery, highlighting differences from traditional delivery |

| Year | 2025 | 2026 |
|---|---|---|
| **Key Milestones** | • Post first draft of MDS and LOD for statewide use<br>• MDS and LOD expanded for bridge, environmental, traffic and utilities elements<br>• Develop data requirements for Priority 1 assets in the statewide data dictionary<br>• Deliver training to first pilot construction team<br>• Identify Priority 2 assets for development of the statewide data dictionary | • Post first draft of data dictionary for public use<br>• Develop data requirements for Priority 2 assets in the statewide data dictionary<br>• Post second draft of MDS and LOD for statewide use |

### *Implementation Roles and Responsibilities*

| Key Activity Stakeholders | Roles and Responsibilities |
|---|---|
| **Design WGs** | • Lead development of standardized DDP processes.<br>• Lead development of Digital Delivery Toolbox. |
| **Change Management WG** | • Disseminate information and collect feedback through District roadshows, District and Division champions meetings, the Digital Delivery newsletter, and other presentations. |
| **Project Development WG** | • Support development of standardized DDP processes.<br>• Support development of Digital Delivery Toolbox.<br>• Support development of digital letting and addenda processes. |
| **Technology WG** | • Support development of standardized DDP processes.<br>• Lead the development of technology enhancements when needed for new DDP processes. |
| **DGAM WG** | • Lead the development of Data Dictionary.<br>• Support development of Digital Delivery Toolbox. |
| **Alternative Delivery WG** | • Create ALD Tenets of Digital Delivery.<br>• Identify and coordinate ALD Pilot Projects. |
| **Pilot Project Leads** | • Support development of Digital Delivery Toolbox.<br>• Test and provide feedback regarding standardized DDP processes and Digital Delivery Toolbox items from use on pilot projects. |
| **TxDOT Enterprise Management Team** | • Review and approve policies before release. |
| **DDP Leadership** | • Direct and review documentation. |

### *Coordination Needs with Concurrent Key Activities*

- Impact assessments from individual work groups will highlight needs for new policy, guidelines, and SOPs.
- Work groups have begun to develop DDP-specific policies and procedures and will continue providing recommendations for existing manuals as work progresses.
- DDP-specific policies and the Digital Delivery Toolbox will be tested through pilot project investigations.
- Data standards developed in the Data Dictionary will help TxDOT produce and exchange information seamlessly and integrate standard resources statewide.
- New DDP processes may require enhancements to existing technologies.
- Technology enhancements and best practices will drive the development of new SOPs requiring coordination with the Technology WG and vendors.
- Statewide Model Deliverables Initiative requires robust communication of expectations through policy, procedures, and standards documentation.

### *Risk and Change Management Considerations*

| Risk and Change Management Challenges | Risk and Change Management Opportunities |
|---|---|
| • Understanding of Digital Delivery and what a potential impact or opportunity could be<br>• Lack of understanding of Digital Delivery<br>• Loss of integrity of data with the change from paper plans to Digital Delivery<br>• Early adopters creating their own ways of doing things<br>• Not generating standardized processes for CAD, design, review, inspection, etc.<br>• Internal designers not following DDP processes, resulting in incomplete data and deliverables<br>• Risk of orphaning Alternative Delivery Division if care is not taken to accommodate those differences as Digital Delivery is developed<br>• Differences in ALD versus traditional project timelines and responsibilities | • Culture of innovation helps to reduce workload<br>• Leadership support<br>• Improved identification of data needs and requirements for construction<br>• Ability to have more data-driven decisions through data standards<br>• Ability to use data analytics in asset management through data standards<br>• More standardized process for project development and management<br>• Using new Digital Delivery processes on a Design-Build pilot<br>• Allow some variance in ALD Digital Delivery projects while ensuring model alignment during the asset management phase<br>• Safety improvements due to higher quality design and better construction efficiency |

## Additional Information and References

### DDP Processes and Standards Overview

The table below describes the purpose of each of the processes and standards being developed for DDP.

| Name | Description |
|---|---|
| **Digital Delivery Process** | This development effort identifies areas where new Digital Delivery processes will impact the existing project lifecycle. It will be used to help determine policy, guidelines, and SOPs that are required to modify existing processes. |
| **QC Process** | This effort provides instructions for establishing the roles, responsibilities, and sequence of work for quality control and design review of digital design files (models) and submittal documents during project milestones. See the **QC Process Summary** for more details. |
| **QC Checklists** | This effort provides comprehensive lists of the sheets, files, and models required for each phase of a project, as well as a checklist for quality control review to ensure design, CAD standards, and deliverable requirements are met. |
| **Construction Inspection Process** | This effort identifies areas where new Digital Delivery processes may impact the existing inspection process. See the **Construction Inspection Process Summary** for more details. |
| **Model Development Standards (MDS)** | The result of this effort is a manual that provides guidance on how to develop, design, and deliver models (digital files) to the contractor. This document emphasizes the need to communicate design intent and mitigate risk between design and construction through LOD standards. |
| **Model Management Plan** | This effort will create a project management and set up document that identifies roles and responsibilities, applicable model use cases, and applicable software solutions and versions to be used on the project. |

### *Digital Delivery Toolbox Contents*

The table below describes elements currently being developed as part of the Digital Delivery Toolbox.

| DDP Tool | Tool Purpose |
|---|---|
| **3D Model Breaklines** | 3D Model Breaklines are essential in Digital Delivery projects because they allow for seamless generation and importation of design surfaces by contractors into construction and surveying applications. |
| **Master iModel Guidance** | Master iModel Guidance outlines best practices for utilizing Bentley's digital design review platform to create a federated model known as a Master iModel. The document includes iModel container setup, CAD guidance, and file organization recommendations. |
| **File Naming Convention** | A standardized File Naming Convention is necessary for all Digital Delivery projects, as it helps identify different file types and ensures consistency across projects in facilitating communication between designers, reviewers, and contractors. |
| **Template Point Naming Convention** | A Template Point Naming Convention presents a standardized naming convention for 3D Model Breaklines. The convention is vital for ensuring consistency and effective communication between the design and construction phases. |
| **Phased Modeling** | For Digital Delivery projects, Phased Modeling will be a new requirement to ensure constructability of the proposed design. |
| **Item Types** | Item Types in OpenRoads Designer is a tool used to add additional information to elements in design files, such as bid item information, basis of estimate information, or design notes, providing details that may not be available digitally. These attached item types can also generate quantity reports, and the data can be passed into geographic information system (GIS) tools for use in the field during construction and asset management. |
| **Quantity Reporting** | Quantity Reporting provides guidance on how to effectively pull Item Type information and document quantities stored in the model. |
| **Signing and Sealing** | This tool provides guidance on signing and sealing models as the legal documents. |

### *Construction Inspection Process Summary*

DDP construction implementation planning has initially focused on needs of DDP pilot projects. There is expected to be some variability in DDP pilot project construction needs because of differences in project scope, changing tools and solutions that will be piloted, and because of the lessons that are learned from previous projects. As pilot project experiences are accumulated, the solution for a programmatic construction training will emerge.

An understanding of baseline needs for DDP construction project workflows and technical solution needs was formed through a collaborative brainstorm approach between the DDP Construction leaders and the TxDOT staff who participate in the Construction WG. Over the course of several meetings and documentation review periods, a comprehensive list was developed of all processes involved with TxDOT construction project administration and inspection. This comprehensive list of construction project processes was collaboratively analyzed for potential impacts that would occur when the plan is replaced with a Design Model through MALD. The processes that were significantly impacted by MALD were identified as the highest priority solution needs for construction projects in DDP. Those highest priority solution needs are:

1. **Replacing plan with design model**
2. **Construction project data management**
3. **As-built and asset management model**
4. **Design model change policy**
5. **SW3P workflow adaption**

These five highest priority solution needs led to development of task forces to assess possible solutions, often involving other work groups within the DDP.

Technology tools required for proposed solutions were also identified. That process involved assessing software like Bentley Synchro and ProjectWise, Trimble SiteVision and Trimble Business Center, Procore, and Autodesk Construction Cloud (ACC) for their digital construction process workflows and data management capabilities. Demonstrations and testing of software for replacing plan sets with digital models is very important. The goal of this testing is to find software solutions that can address as many of the DDP highest priority solution needs as possible. The results of this software functionality testing will be further proven through pilot project experiences.

As of August 2024, the Construction WG is in the software testing phase. Extensive software functionality testing will be performed during the fall of 2024. During testing, construction project workflows will be developed with the goal of delivering Digital Delivery Construction training to the first DDP pilot construction team from December 2024-March 2025. The first DDP construction pilot project will break ground in March 2025. During the pilot, the DDP Construction WG will monitor activity on the pilot project and provide support to the TxDOT construction team. Lessons learned on the first pilot will help the DDP construction team prepare workflows and training for subsequent pilots, and the accumulated knowledge of several pilots will be compiled into recommended standard processes of Digital Delivery construction for final DDP construction solutions delivery.

### *Construction Inspection Process Development Timeline*

**July 2023 – December 2023:**
Develop comprehensive list of construction project processes.

**December 2023 – March 2024:**
Identity construction project processes on the first DDP pilot that are impacted by Digital Delivery.

**March 2024 – July 2024:**
Collaboratively assess different construction solution options and plan solutions for first DDP construction pilot.

**August 2024 – December 2024:**
Test construction solutions and develop workflows for the first DDP pilot.

**December 2024 – March 2025:**
Deliver training to the first DDP pilot construction team.

**March 2025 – July 2025:**
Support the initial pilot team and gather lessons learned.

**July 2025 – July 2027:**
Repeat piloting processes of workflow development and training for subsequent DDP pilots.

**July 2027 – March 2028:**
Compile lessons and pilot experiences into a formalized DDP Construction Training course.

### *Quality Control (QC) Process Summary*

The QC Process initiative includes the following tasks:

1. **Develop a QC process and checklists** for Digital Delivery projects that includes review for new model deliverables. **Status: In pilot phase, with draft public release in Q4 2024.**
    - QC process documentation has been developed to be software agnostic since the preferred model review software is still to-be-determined.
        - Key roles and responsibilities are outlined throughout the document, and a new model manager role is established to account for the new responsibilities of overseeing new Digital Delivery and software requirements.
        - Key steps within the process include:
            - Project step up,
            - Quality control (performed by the design team),
            - Milestone review (performed by District plan reviewers), and
            - Submit ready-to-let package (performed by the PS&E Processing section within the Design Division).
    - QC Checklists have been developed to incorporate best practices for model review from other DOTs and general QC processes used in TxDOT's Districts and Divisions.
        - Utah DOT Florida DOT were other key state DOT references. Over 10 Districts submitted their QC checklists for PS&E. The Austin District checklist was used as the basis for the PS&E Checklist. The Fort Worth District checklist was used as the basis for the Schematic Checklist.

2. **Provide guidance** on how to access and use model review software. **Status: Ongoing until a preferred software solution is selected.**
    - The team has been supporting pilot projects by providing software specific "Quick Start Guides" on how to use Bentley's 3D review platform to District and Division staff, so that District and Division staff can complete QC processes.
    - The team has led and supported hands-on training for pilot teams on how to use the QC checklists and model review software.

3. **Investigate preferred solutions** for model review in coordination with the pilot project program and the technology software investigation initiative. **Status: Ongoing until a preferred software solution is chosen.**
    - The team convened a software focus group for Bluebeam Revu on 3D review and commenting capabilities. The focus group determined it was not a viable solution at the time of review.

- The team convened a software focus group for Bentley Infrastructure Cloud (ICP) to investigate Design Review/iTwin/Validate on 3D review and commenting capabilities. The team determined it is the best solution on the market to date for 3D review but there are constraints for implementing the tool as a statewide solution. TxDOT's Information Technology Division (ITD), Bentley, and the DDP are investigating solutions that could make this a statewide solution for 3D review.
- The team is investigating and potentially forming software focus groups for GIS and for ACC on 3D Model Review. The team will request two or three DOT peer exchange testimonials for each software solution as part of the investigation.

### *Data Dictionary Development Summary*

A data dictionary is a document that describes the data elements, formats, sources, and relationships of data. It helps to improve the consistency, accuracy, and completeness of different sources of data, as well as to facilitate communication and collaboration among stakeholders who use the data. A data dictionary is important because it enables TxDOT to manage the data lifecycle, comply with standards and regulations, and leverage data for decision making and innovation.

A preliminary data dictionary has been created for the FM 1977 pilot project in the TxDOT San Antonio District. The data dictionary defines potential data that can be moved through the design and construction phases of a project and utilized within enterprise systems downstream. It was used as an example to explain a data dictionary and how it can help define data flows within the Digital Delivery data lifecycle.

The next steps in the data dictionary process are to expand, test, and update the data dictionary. The data dictionary needs to be expanded to include all data elements that will move from design into construction, and all data elements that will move from construction to enterprise data sets. Once the data dictionary has been created, the data structures and flow need to be tested on multiple pilot projects using an iterative update process. By following these steps, the data dictionary can serve as a reliable and useful reference for the data management and data flow within the Digital Delivery process.

# Key Activity #8: Training Development and Delivery

***Completion Date:***
Ongoing

***Key Activity Stakeholders:***

- DDP Leadership
- Change Management WG
- Design WG
- Construction WG
- Technology WG
- DGAM WG
- Project Development WG
- TxDOT Workforce Development
- TxDOT Communications Division
- General TxDOT Staff
- External Partners

***Goals Addressed:***

**Goal 1:** Integrate Digital Delivery into TxDOT business processes and operations.

**Goal 4:** Prepare the TxDOT existing and incoming workforce for a fully digital transportation agency.

## *Key Activity Overview*

Provide training on Digital Delivery policy, procedures, and standards for TxDOT stakeholders to support change management and overall program adoption.

## *Key Activity Background*

Training material and methods will take on a variety of formats from presentation, demonstrations, white papers, SOPs, videos, workflow manuals, and more. The DDP will utilize existing trainings from other state DOTs and professional organizations to bolster the pace of the DDP investigation and implementation. The DDP has developed a Training Plan that defines training goals, resources, and implementation process.

## *Implementation Steps*

**Implementation Step #1:** Identify and prioritize specific training needs to equip stakeholders with the necessary knowledge to integrate Digital Delivery into project delivery.

**Implementation Step #2:** Develop and provide internal training for pilot project teams and other DDP work group members to support the investigation of new Digital Delivery technology and processes. Pilot teams and work group members will need to provide feedback on training material.

**Implementation Step #3:** Develop content for official training courses and provide initial pilot training sessions for District and Division DDP champions and work groups to provide feedback before statewide release.

**Implementation Step #4:** Refine training based on test feedback and roll out DDP training and e-learning courses statewide through strategic deployment that considers the audience with the highest need, method of training, and the availability of the training delivery team.

### *Implementation Timeline*

| Year | 2023 | 2024 | 2025 |
|---|---|---|---|
| **Key Milestones** | • Begin development of Training Plan<br>• Identification of training needs<br>• Official course developed: 3D Modeling for Intersection and Driveways | • DDP internal training for pilot projects and work groups<br>• Official course developed: Advanced Template Training | • Continue testing training and refining content based on feedback |

### *Implementation Roles and Responsibilities*

| Key Activity Stakeholders | Roles and Responsibilities |
|---|---|
| **DDP Leadership** | • Identify new training opportunities and direct implementation planning.<br>• Communicate support of program in conjunction with TxDOT leadership. |
| **Change Management WG** | • Communicate to stakeholders available training resources. |
| **Design, Construction, DGAM and other Work Groups** | • Provide subject matter expertise to support the development of training material.<br>• Provide initial reviews of training and related feedback to Change Management WG. |
| **Training Staff** | • TxDOT and consultant staff with training expertise will lead the delivery of official training courses.<br>• Provide review of informal trainings and training materials. |
| **Pilot Project Teams** | • Provide feedback on training material and method for future use. |
| **Identified District and Division DDP Champions** | • Participate in pilot training sessions and provide feedback.<br>• Serve as local subject matter experts and support facilitation of subsequent training to other District and Division staff. |
| **TxDOT Workforce Development** | • Assist in development and review of training material.<br>• Oversee training staff. |

| Key Activity Stakeholders | Roles and Responsibilities |
|---|---|
| **TxDOT Communications Division** | • Review material being released to both internal staff and external partners. |
| **General TxDOT Staff** | • Complete Digital Delivery training once it is ready. |
| **External Partners** | • Participate in Digital Delivery training once it is ready. |

### *Coordination Needs with Concurrent Key Activities*

- Formal and informal training will be administered by various parties requiring detailed coordination and planning.
- Training will need to be tailored to specific technologies that TxDOT implements for Digital Delivery.
- Pilot project teams should identify additional training needs and request informal training from work group SMEs.
- Work groups developing new policy, procedures, and standards should present new documentation with supporting training materials tailored to the audience and learning objective at hand.
- Work groups from across disciplines will need to be receptive to feedback received through the program communication process. This feedback may impact how policies, procedures, and tools are developed and shared across TxDOT.

### *Risk and Change Management Considerations*

| Risk and Change Management Challenges | Risk and Change Management Opportunities |
|---|---|
| • Not generating standardized processes for CAD, design, review, inspection, etc.<br>• Lack of expertise or training to develop projects for Digital Delivery<br>• The need for more training may cause fatigue of training<br>• Some Districts may be behind or ahead of others<br>• Geographic and discipline silos | • Leadership support<br>• Standardized processes and training for Digital Delivery<br>• Improved understanding of Digital Delivery general concepts<br>• Self-paced training videos available on the TxDOT Digital Delivery website |

## Additional Information and Resources

### Current Digital Delivery Training Efforts

The table and list below detail the current and potential future training courses created for TxDOT staff and partners related to Digital Delivery skill building.

| Training Course | Audience |
|---|---|
| **DES 750 - OpenRoads Designer for Plan Development** | Designers |
| **DES 751 - OpenRoads Designer for Survey** | Surveyors |
| **DES 752 - Drainage and Utility Design using ORD DU** | Drainage Designers |
| **DES 753 - Advanced ORD Training (Ramp & Intersection Modeling)** | Designers |
| **DES 760 - ProjectWise for Power Administrators** | Project Administrators |
| **DES 761 - ProjectWise Training for Users** | Designers |

### Potential Future Training Courses

- Phased Modeling in ORD
- Modeling Bridges Using OpenBridge Modeler (OBM)
- Other Design Elements Using ORD
- Design Review for Digital Delivery
- Construction Inspection for Digital Delivery
- Introduction to Digital Delivery
- Advanced Template Design

# Key Activity #9: Statewide Model Deliverable Initiative

***Completion Date:***
2027

***Key Activity Stakeholders:***
- Construction WG
- Design WG
- Technology WG
- Change Management WG
- DDP Leadership

***Goals Addressed:***
**Goal 1:** Integrate Digital Delivery into TxDOT's business processes and operations.

**Goal 4:** Prepare the TxDOT existing and incoming workforce for a fully digital transportation agency.

## *Key Activity Overview*

Implement statewide policy requiring model deliverables as part of the contract package, also known as Model as the Legal Document (MALD).

## *Key Activity Background*

To implement this key activity, the team has developed a four-phase approached to take incremental steps toward fully MALD projects.

- Phase 1: Internal Quality Review of Models
- Phase 2: For-Information-Only Model Deliverables Pre-letting (Interim)
- Phase 3: For-Information-Only Model Deliverables Pre-letting with statewide 3D review solution
- Phase 4: MALD on select projects

Using a phased approach towards MALD will allow design teams and contractors to transition efficiently. Each of the phases will be implemented strategically, with steps for planning, training, policy, and technology improvements required to carry out the initiatives.

## *Implementation Steps*

**Implementation Step #1:** Define the requirements for phase and outline challenges and mitigations for decision tracking. Identify the following:

- Which projects are applicable?
- What model files are applicable?
- Who will submit, retrieve, and review the model deliverables?
- How with the files be submitted, stored, retrieved, and reviewed?
- What critical needs exist for technology investigation or enhancements, SOP or standards documentation, and end user training?

**Implementation Step #2:** Policy, procedures, and standards required to implement Step #1 are developed, tested, piloted, and deployed statewide. Documentation undergoes thorough review period prior to statewide deployment which includes pilot project feed and WG and Leadership

review. See Key Activity #7 for additional details specifically related to model development, QC, and letting procedures and SOPs.

**Implementation Step #3:** Technology solutions required to implement Step #1 are developed, tested, piloted, and deployed statewide. Technology solutions go through a rigorous focus group testing process and development cycle prior to statewide deployment. See Key Activities #5 and #6 for technology activities specifically related to model development, QC, and letting processes.

**Implementation Step #4:** Develop and deliver training material to support Step #2 and #3. See Key Activity #8 for additional details.

**Implementation Step #5:** Phased implementation of MALD through policy and external communication. Provide user support and collect feedback from stakeholders throughout implementation.

## *Implementation Timeline*

| Implementation Steps | Notes | 2024 | | | | 2025 | | | | 2026 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| **Phase 1 - Quality Review** | | | | | | | | | | | | | |
| **Develop Plan** | | | | | | | | | | | | | |
| **Develop & Deploy SOPs, standards, and other guidelines** | Model QC process and checklists. Guidance for Bentley's iTwin technology. | | | | | | | | | | | | |
| **Develop & Deploy Technology** | PW work area for review | | | | | | | | | | | | |
| **Develop & Deploy Training** | Training for DDP team and participants on QC process, checklists, and Bentley's iTwin tool | | | | | | | | | | | | |
| **Develop & Deploy Policy** | Information communication through District champions only | | | | | | | | | | | | |
| **Phase 1 in effect** | | | | | | ▶ | | | | | | | |
| **Phase 2 - FIO Models (interim)** | | | | | | | | | | | | | |
| **Develop Plan** | | | | | | | | | | | | | |
| **Develop & Deploy SOPs, standards, and other guidelines** | QC checklist; 3D model breakline curation process; Template Point Naming Convention; Draft MDS & LOD spreadsheet | | | | | | | | | | | | |
| **Develop & Deploy Technology** | ORD roadway corridor templates and workspace enhancements | | | | | | | | | | | | |
| **Develop & Deploy Training** | Training needs as defined by District and Division staff | | | | | | | | | | | | |
| **Develop & Deploy Policy** | ORD Policy in place; Expectation memo for Phase 2 requirements | | | | | | | | | | | | |
| **Phase 2 in effect** | | | | | | | | ▶ | | | | | |

| Implementation Steps | Notes | 2024 | | | | 2025 | | | | 2026 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| **Phase 3 - FIO Models (full)** | | | | | | | | | | | | | |
| **Develop Plan** | | | | | | | | | | | | | |
| **Develop & Deploy SOPs, standards, and other guidelines** | 3D review with software workflows | | | | | | | | | | | | |
| **Develop & Deploy Technology** | 3D review software; PW "future state" (including folder structure & item types) | | | | | | | | | | | | |
| **Develop & Deploy Training** | Training needs as defined by District and Division staff | | | | | | | | | | | | |
| **Develop & Deploy Policy** | PW Policy in place | | | | | | | | | | | | |
| **Phase 3 LIVE** | | | | | | | | | | | | | ▶ |
| **Phase 4 - MALD** | | | | | | | | | | | | | |
| **Develop Plan** | Project Dev WG to confirm model use case with project type | | | | | | | | | | | | |
| **Develop & Deploy SOPs, standards, and other guidelines** | Final MDS & LOD spreadsheet | | | | | | | | | | | | |
| **Develop & Deploy Technology** | Additional 3D cell development and feature types | | | | | | | | | | | | |
| **Develop & Deploy Training** | Training needs as defined by District and Division staff | | | | | | | | | | | | |
| **Develop & Deploy Policy** | Identify project types with DD use case | | | | | | | | | | | | |
| **Phase 3 in effect** | TBD | | | | | | | | | | | | |

### *Implementation Roles and Responsibilities*

| Key Activity Stakeholders | Roles and Responsibilities |
|---|---|
| **Design WG** | • Support the development of MALD memos and policies.<br>• Develop model review tools and checklists.<br>• Lead training program identification, development, and delivery of training. |
| **Construction WG** | • Coordinate with construction teams for the review of model deliverables. |
| **Technology WG** | • Investigate and recommend solutions for model review tools and new technology workflows.<br>• Development of technology enhancements to support model development, review, and delivery processes. |
| **Change Management WG** | • Reinforce communication for internal and external stakeholders. |
| **DDP Leadership** | • Distribute MALD memos and policies.<br>• Lead the development of MALD memos and policies. |

### *Coordination Needs with Concurrent Key Activities*

- Design and Technology WG will coordinate on workspace enhancements and the procurement of technology solutions related to standardizing model deliverables and performing QC of the models.
- Change Management WG will collect updates from work groups regarding progress on Model Deliverables and report during communication activities.

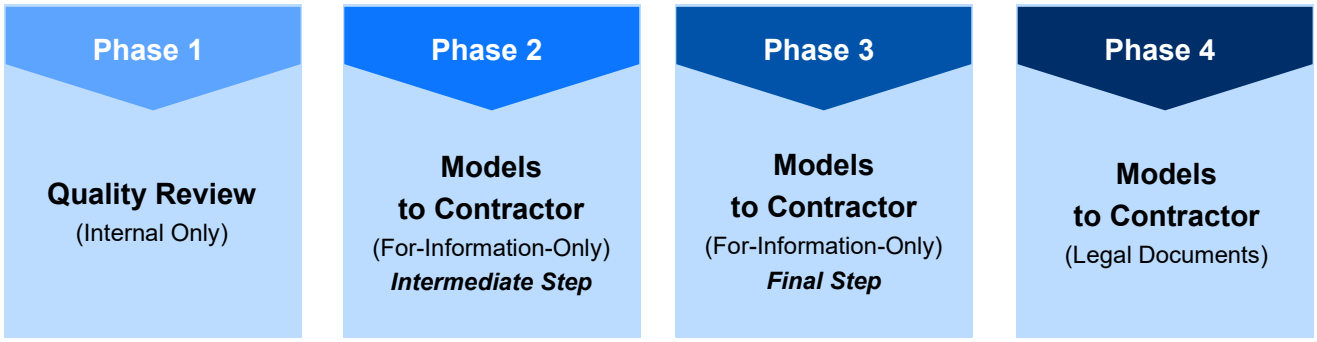
## Risk and Change Management Considerations

| Risk and Change Management Challenges | Risk and Change Management Opportunities |
|---|---|
| • Shortage of resources within the District to review and implement new policies<br>• Confusion interpreting the data between paper plans and model deliverables<br>• The model files have inconsistent content and quality resulting in less reliable data for the contractor<br>• The format of model files including the file type and software version can impact the ability to consume and interpret the files without matching software and versions<br>• The software investigation for a 3D review tool is underway | • Culture of innovation towards reducing workload<br>• Leadership support and the communication of benefits, including safety improvements<br>• Improved identification of data needs and requirements for construction, asset management, and other downstream users<br>• Develop standardized processes<br>• Training and outreach for new processes |

## Additional Information and References

### MALD Phased Process Summary

The figure and text below describe the phased approach the DDP is using to implement MALD across TxDOT.




**Phase #1:** Designate model files from Districts and Divisions participating in the DDP for an internal quality review of the current state of practice regarding the workspace and modeling techniques and the ability to export 3D model breaklines directly from the corridors and import into contractor software and equipment.

The quality review will provide input to the DDP on the completeness of the 3D models, the number of projects developing models, the number of projects adhering to the 2022 ORD memo, and what training or guidance is still needed. Districts and Divisions will get feedback on the models to communicate the model expectations to their designers and consultants.

**Phase #2:** Require applicable projects to submit key model files as for-information-only (FIO) for contractor review prior to letting. Contractors can use this information to expedite and inform the bidding process during earthwork take-offs. The contracting community, through AGC, has requested model files be delivered as soon as possible to allow the local industry to become familiar with using models and to prepare for their inclusion in the contract package as MALD.

**Phase #3:** Incorporate a 3D review solution for TxDOT Districts, Divisions, and Plan Reviewers as well as the implementation of Digital Delivery PW initiatives. This step allows for TxDOT reviewers to have full confidence in the design and files provided to the contractor.

**Phase #4:** Full use of models as legal documents.