Texas Department of Transportation

Digital Delivery Program

Strategic Plan – DRAFT

Texas Department of Transportation

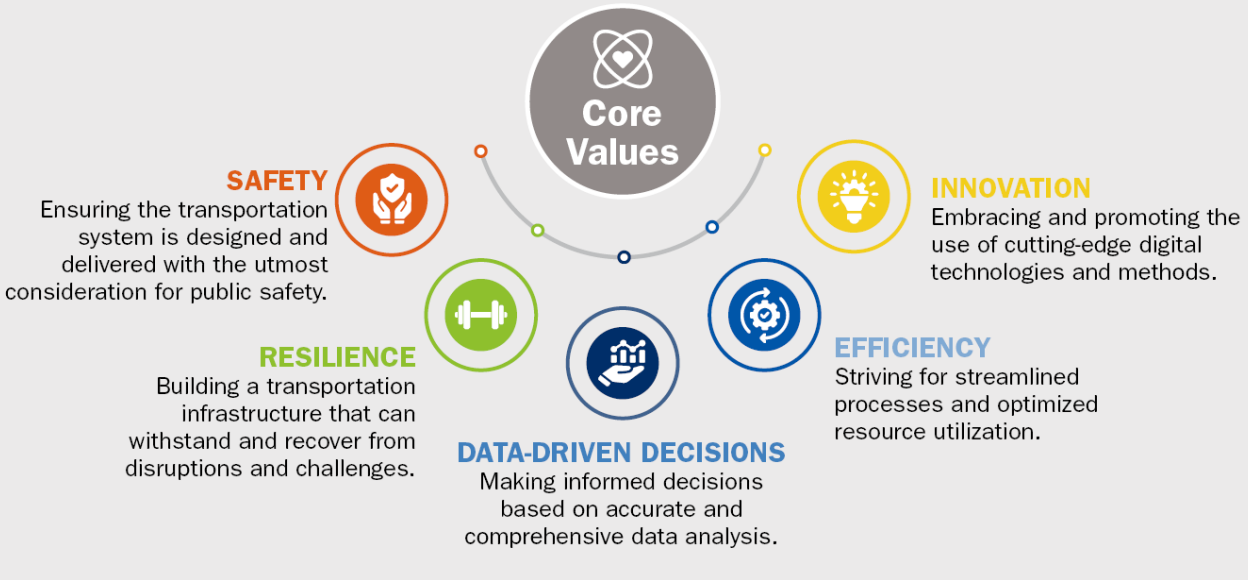
This documentation is in draft form and is currently being piloted by TxDOT's Digital Delivery Program. For any questions, comments, or feedback please send to digital-delivery@txdot.gov.

Executive Summary

The Texas Department of Transportation is shifting to a data-driven, digital approach to planning, designing, bidding, constructing and maintaining its statewide infrastructure. Over the next five years, TxDOT will begin to implement Digital Delivery processes and tools while actively engaging District and Division perspectives to address how all stages of the infrastructure lifecycle, strategic investment decisions, and design and construction processes will be transformed through Digital Delivery.

TxDOT Digital Delivery Mission and Core Values:

Mission:
Advancing TxDOT's transportation program through digital innovation



TxDOT Digital Delivery Strategic Goals:

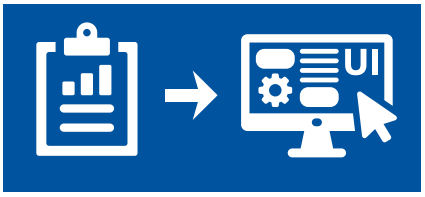
Goal 1: Integrate Digital Delivery into TxDOT's business processes and operations.
Goal 2: Standardize processes and technology across the TxDOT organization.
Goal 3: Manage and leverage data throughout all stages of the infrastructure lifecycle.
Goal 4: Prepare TxDOT's existing and incoming workforce for a fully digital transportation agency.
Goal 5: Advance the state of the practice for Digital Delivery by partnering with peer states and industry.

Introduction

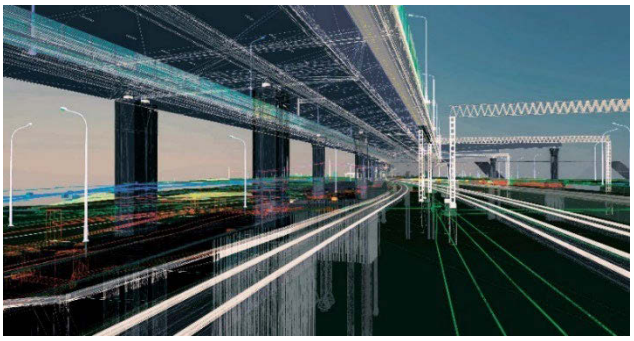
The Texas Department of Transportation (TxDOT) has a 100+ year history of constructing, operating and maintaining the largest state transportation system in the United States. From rural corridors to sophisticated multi-lane urban freeways in large urban areas, making sure travelers and goods can safely get where they need to go is an overarching priority for TxDOT. TxDOT's vast purview includes all aspects of transportation: vehicle travel on highways and arterials, multimodal operations, freight and goods movement, sea and inland ports, state and international border crossings and air travel. TxDOT initiates hundreds of projects each year focused on designing new transportation facilities, preserving and maintaining road and bridge assets, and constructing new infrastructure. TxDOT is in the business of managing thousands of miles of roads, thousands of bridges, and technology to allow for innovative system planning and operations.

What is Digital Delivery?

At its core, Digital Delivery means a shift from traditional paper plans and multiple two-dimensional details to data-rich models and digital files as the legal construction documents. The model serves as a single source of truth for the project design, so that all system users can interact with this data-based model to extract and contribute the information they need to complete their project-related activities.



Traditional Engineering Design



Traditional engineering design at TxDOT involves generating designs for roads, bridges, and intersections in design software to produce a set of plans from which projects can be constructed. The same is true for the standards and specifications that engineers and designers use; they are often found in manuals, policies, and standard sheets to which staff refer and incorporate into their designs. Contractors have relied on a robust set of plan sheets to bid on and construct projects. TxDOT inspectors refer back to plan sheets to ensure the project is getting built according to the design. When complete, the plan sets and associated files are stored – electronically, in hard copies, or both – and can be referenced in the future for maintenance, inspection, rehabilitation or redesign and reconstruction. Information and decisions from past projects can be challenging to find when they are needed, as project elements reside with different DOT divisions, districts and work units.

The typical two-dimensional plan sets represent a portion of the information TxDOT develops as part of an infrastructure project. While modern project management software can support an improved level of coordination among different stages of project development and construction, there are inevitable silos as many different DOT divisions, districts and work units have their own roles in the infrastructure lifecycle.

Opportunities in a Digital Design and Construction World

With Digital Delivery, the processes to plan, design, bid, construct and maintain infrastructure shift to a fully data-driven approach. Projects are conceived and designed using three-dimensional techniques (and future four- and five-dimensional capabilities) allowing a level of visualization not possible with traditional two-dimensional design. Project details from all stages of project planning and development can be integrated into three-dimensional plans, including data produced or used by transportation planners, environmental review staff, surveyors, designers, asset management teams, and others. Construction documents shift to Building Information Modeling, or BIM, which allows contractors, inspectors and engineers to share data in real time. Field reviews and construction decisions are tracked through the digital model, reducing potential risks for miscommunication or errors. All project details from inception through completed construction and through later stages of the infrastructure lifecycle are linked to the digital model, providing a foundation for more reliable as-built information and asset maintenance data than current methods.

The Business Case for Digital Delivery

Traditional infrastructure planning, design, construction and maintenance processes have served TxDOT well for many years. TxDOT recognizes that as technology advances, Digital Delivery provides opportunities for process improvements that will lead to efficiency through data-driven decision making. The Department too must adapt to fully realize the benefits of Digital Delivery. Strategic investment decisions, and real-time project and construction decisions, can be data-driven with the full picture of project details and information available. This positions TxDOT to continue to plan and deliver its world-class infrastructure in a way that is innovative, safe, cost-effective, efficient and comprehensive.

Digital Delivery will transform every aspect of TxDOT's business, from how the Department plans and prioritizes the infrastructure it develops, how it evaluates different alternatives, to how projects are designed, constructed and operated across the state. Digital Delivery supports TxDOT's mission, vision, values and goals, and aligns with the Department's strategic focus on innovation, accountability and smart decision-making for the critical infrastructure and transportation network that keeps Texas moving.

TxDOT Mission:
Connecting you with Texas.

TxDOT Vision:
A forward-thinking leader delivering mobility, enabling economic opportunity and enhancing quality of life for all Texans.

TxDOT Strategic Goals

- Promote Safety
- Deliver the Right Projects
- Focus on the Customer
- Foster Stewardshiop
- Optimize System Performance
- Preserve our Assets
- Value our Employees

Benefits of Digital Delivery:

Digital Delivery benefits TxDOT in many ways. While there is a strong focus on design and construction in the digital space, the benefits of Digital Delivery will influence all areas of project development, data management, infrastructure maintenance and project administration. By implementing and sustaining a Digital Delivery Program (DDP) at the Department, TxDOT will see benefits across several areas of the department, including occupational safety, design, construction management and asset management:

- ☑ Improve safety on construction sites by integrating technologies that enhance construction inspection methods, provide a direct reference the digital model, inform decision making in the field, and allow staff to conduct construction inspection activities more rapidly and from safer locations on the site.
- ☑ Reduce the length of exposure and associated safety risks for construction personnel in work zones through improved construction efficiencies made possible through enhanced phasing decision support from the project digital model.
- ☑ Allow for more accurate three-dimensional renderings and visual outputs to assess and validate alternatives, communicate what projects could look like to TxDOT groups and stakeholders, and gain informed consensus. More accurate designs translate into improved constructability of projects.
- ☑ Utilize data-driven decisions about infrastructure investments and timing. With the full and accurate picture of all potential project issues, needs and concerns, TxDOT can make optimum decisions about when and how resources are invested to enhance and preserve its statewide infrastructure.
- ☑ Improve the accuracy of project quantities, calculations and estimates, which will save taxpayer dollars by reducing errors and omissions, improving accuracy of cost estimates and reducing potential change orders.
- ☑ Enable more efficient access to all elements of an infrastructure project through all project stages, from planning through technical assessments and studies, to construction decisions, final construction as-built information and maintenance details. Digital delivery will help to automate and enable new types of data to be linked to projects and streamline how information is attached to each project, saving time, resources, and money.
- ☑ Estimate infrastructure maintenance needs and timeframes using accurate and comprehensive data captured in ‘as-built’ information.
- ☑ Standardize processes across the TxDOT organization, improving consistency of project development, design, construction and maintenance across all 25 TxDOT Districts. From project inception through construction and beyond, Digital Delivery will help to align TxDOT’s operations across the department.

National Impact

TxDOT is at the forefront of state departments of transportation that are migrating to Digital Delivery strategies. Emerging technologies and new standards are evolving at the national level. TxDOT and other early adopters are

actively coordinating and sharing lessons learned, as well as engaging with industry associations and technical groups to promote a broader understanding of needs and priorities across multiple aspects of Digital Delivery implementation. As a leader in the movement toward Digital Delivery, TxDOT is an essential agency in shaping tools and processes for the industry at large, and for developing solutions that will benefit every infrastructure project in Texas.

Change Management Guides TxDOT's Shift to Digital Delivery

Digital Delivery represents a significant shift in TxDOT's business and operating environments, and TxDOT business units are evaluating how they will adapt and change processes to meet the needs of the new digital environment.

Communication

At an organization level, change will be managed through strategic and continuous communications and active outreach to engage Districts and TxDOT Division groups. Communications will focus on changes to processes, new workspace environments, and progress on pilot projects.

Training

Training will be an integral component of implementing Digital Delivery, and TxDOT will develop and facilitate a variety of training programs including in-person and virtual options to prepare staff for new technologies, new processes and digital project environments.

Feedback

TxDOT will seek feedback from staff throughout the development and roll-out of the Digital Delivery Program to understand what is working well, where processes need more focus, and to better understand how Districts and groups can be supported through this transition.

Change management is an overarching priority for TxDOT to be sure that Digital Delivery is developed, implemented and communicated in ways that will promote successful adoption.

Change management also will be implemented at a more granular level into the software, hardware and system transitions during the Digital Delivery implementation. TxDOT Information Technology (IT) staff will have an integral role in formulating processes to manage changes and updates, developing templates and data standards, and develop governance strategies to support new digital processes. IT change management will be a critical factor in minimizing disruptions to workflows and processes during various transitions throughout the Digital Delivery program implementation.

The Digital Delivery Strategic Plan

TxDOT initiated the **Digital Delivery Strategic Plan** in 2023 to provide a roadmap for ongoing development of the Department's Digital Delivery program. The Strategic Plan is part of a suite of initiatives TxDOT is moving forward on to advance Digital Delivery across the Department. In addition to the Strategic Plan, TxDOT's Digital

Delivery program will be enhanced through **pilot projects** that will 'test drive' new processes and technologies to help inform future strategies.

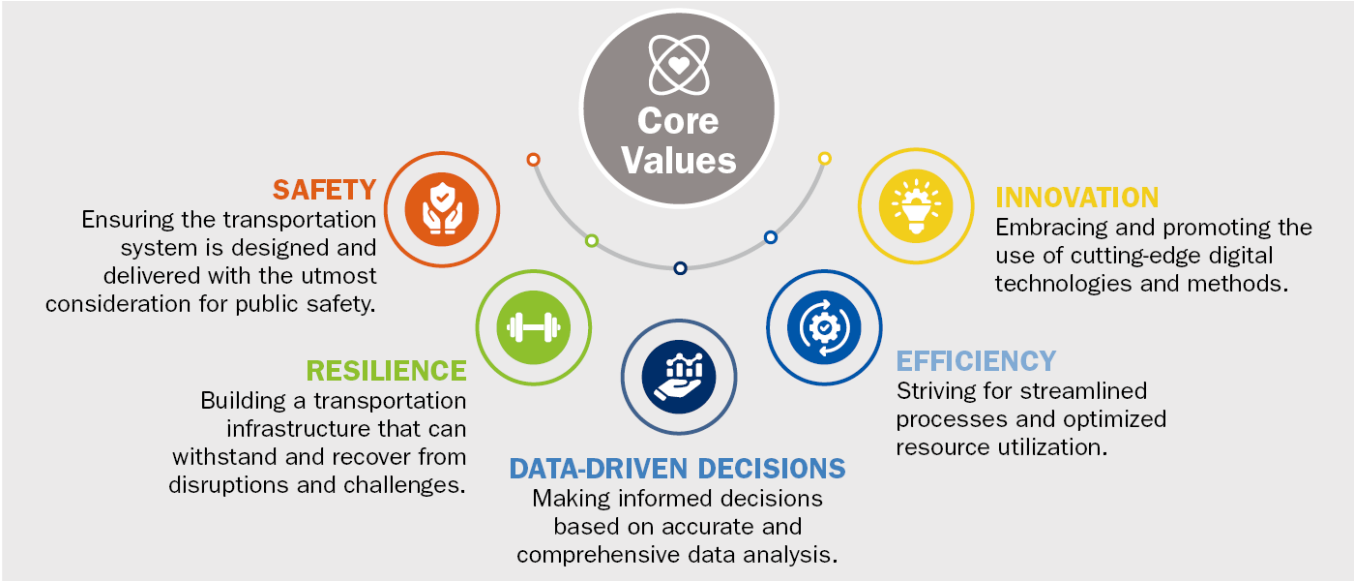
The Strategic Plan:

- ☑ Establishes a mission and objectives for TxDOT's Digital Delivery Program.
- ☑ Articulates the business case for Digital Delivery at TxDOT.
- ☑ Emphasizes how change management supports successful migration to a Digital Delivery process.
- ☑ Identifies key initiatives and 'early wins' to advance Digital Delivery across TxDOT.

Over the next five years, TxDOT will be incrementally rolling out core focus areas aimed at meeting the technical, policy and institutional needs that will be evolving with Digital Delivery. Subsequent **Implementation Plans** will map out specific technical and tactical tasks to advance Digital Delivery throughout TxDOT. Pilot projects will help to test drive new tools and processes so that TxDOT can assess additional implementation and training needs.

TxDOT's Digital Delivery Mission and Core Values

MISSION: Advancing TxDOT's transportation program through digital innovation



TxDOT's Digital Delivery Strategic Goals

The five Digital Delivery Strategic Goals outlined below will advance TxDOT's mission and core values of the Department's Digital Delivery initiative. Each of these goals captures the collective priorities and objectives for integrating digital data use across all aspects of TxDOT's core business of planning, designing, constructing, operating and managing the transportation network.

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

- ☑ Improve how TxDOT uses technology to create efficient and accurate designs, bid documents, and asset records to enhance constructability, reduce construction timelines and mitigate safety hazards.
- ☑ Implement a comprehensive change management process to guide communications, training, and program monitoring to shift to a digitally driven culture at TxDOT.
- ☑ Leverage findings and lessons learned from pilot projects to understand gaps and needs, and to identify strategies that lead to successful adoption of Digital Delivery agency wide.
- ☑ Monitor progress of Digital Delivery implementation at TxDOT, document and quantify the impact of benefits and efficiencies to demonstrate the value of this important shift and identify risks that could impact the program.

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

- ☑ Capture processes from multiple perspectives to understand how best to integrate and optimize how TxDOT divisions, groups and Districts can benefit from Digital Delivery.
- ☑ Evaluate and acquire technologies to automate, streamline and standardize how TxDOT does business in all Districts.
- ☑ Utilize innovative procurement strategies and service models to future-proof technology to support Digital Delivery as it evolves and matures.
- ☑ Develop and mainstream Digital Delivery procedures and policies to ensure consistency throughout TxDOT.
- ☑ Evaluate TxDOT offices to confirm availability of equipment and configurations needed for Digital Delivery.

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

- ☑ Remove information silos so that relevant data is available across different stages of infrastructure planning, design, construction, operations and management.
- ☑ Automate access to updated data as assets are implemented, maintained and enhanced.
- ☑ Establish standards for project information and asset information to move data through the infrastructure lifecycle.
- ☑ Implement tools and technology to facilitate seamless access and use of key data.

- ☑ Update TxDOT's enterprise systems used to store and manage data to support Digital Delivery needs.

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

- ☑ Empower champions and discipline-specific workgroups to identify where new training is needed and optimal methods for integrating required technical training into new employee onboarding and ongoing career development.
- ☑ Implement a robust and comprehensive training program to equip TxDOT staff with the knowledge and technical capabilities to sustain the department's Digital Delivery program.
- ☑ Provide staff with the time, tools, and resources to thrive in a TxDOT-wide digital process environment.

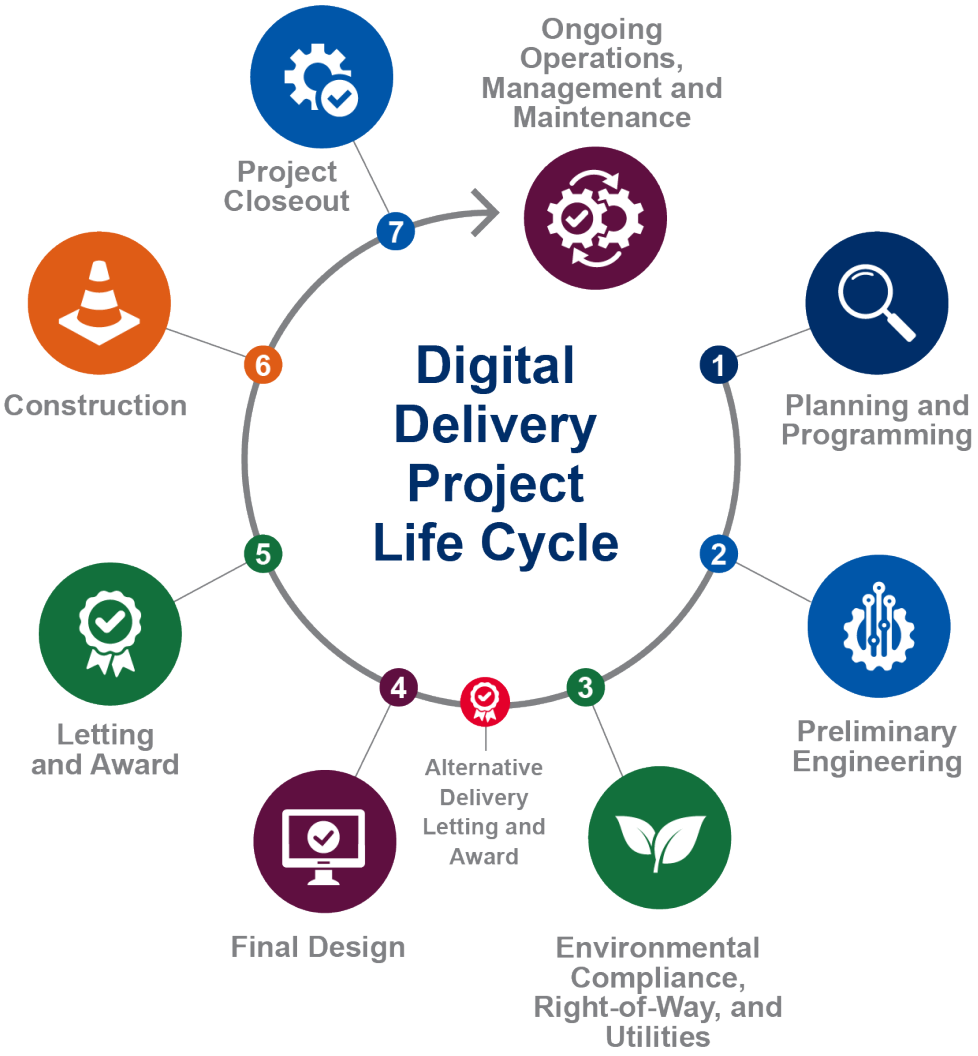
Goal 5: Advance the state-of-practice for Digital Delivery by partnering with peer states and industry.

- ☑ Engage with key state and national industry partners, including Texas Association of General Contractors (AGC), American Association of State Highway Transportation Officials (AASHTO), Federal Highway Administration (FHWA), and the Highway Engineering Exchange Program (HEEP) to leverage advancements and contribute insights to national standards from TxDOT's Digital Delivery program.
- ☑ Advance the dialogue through peer exchanges with other state DOTs to share best practices and help move industry in a positive direction to achieve TxDOT and state DOT digital objectives.
- ☑ Partner with the Texas engineering and construction communities to promote readiness to do business with TxDOT in a new digital project development environment.

Digital Delivery and the TxDOT Project Life Cycle

TxDOT's transportation projects take time and effort to plan, design, construct, and maintain. As a result, the agency follows standardized project development and delivery processes to make sure that efforts stay on schedule and within budget. TxDOT's Digital Delivery Program will impact the project development and delivery processes at virtually every step of the way, introducing new opportunities to improve these processes. The figure below shows the key steps along the TxDOT project life cycle, with an overview of how TxDOT carries out each step today as well as a look at how the process might be improved through Digital Delivery.

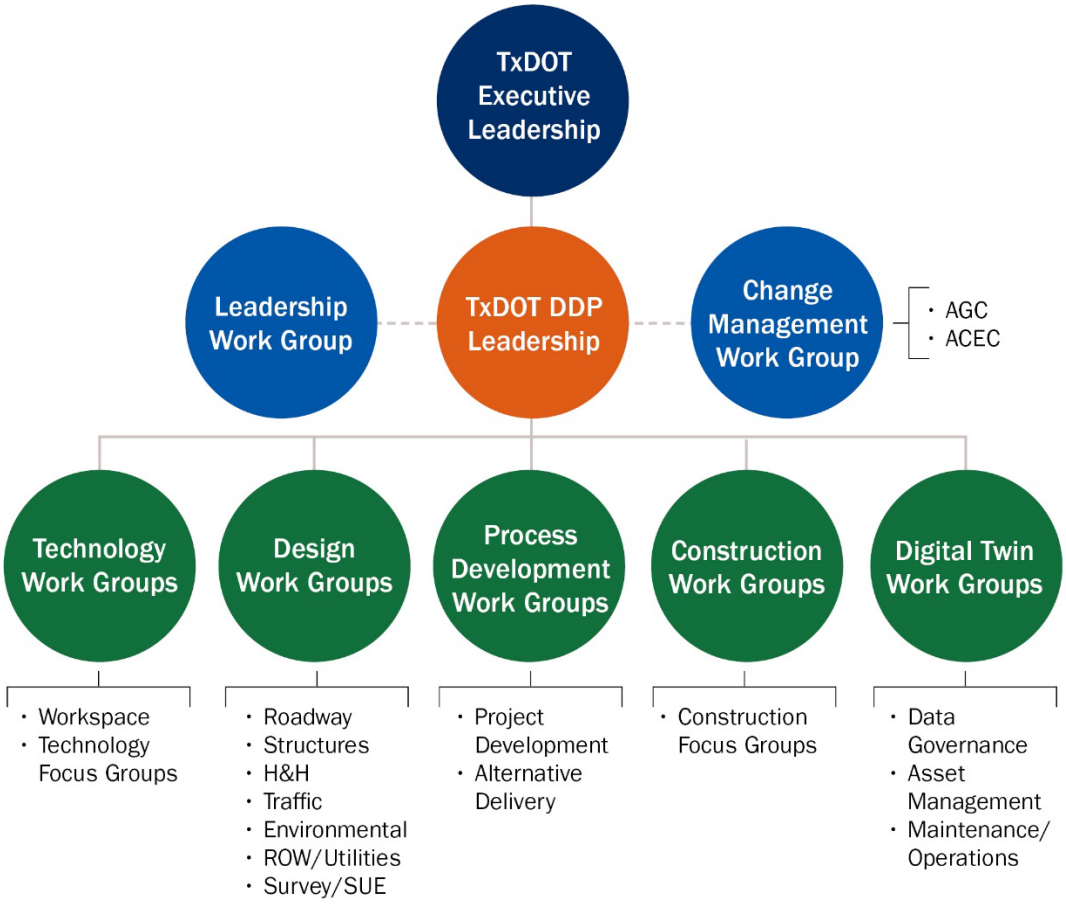
Alternative Delivery procurement methods, such as Design-Build and Comprehensive Development Agreements, allow for expedited project delivery. While Alternative Delivery methods use a different sequence of stages, some elements are similar and will be influenced by Digital Delivery strategies.



Project Life Cycle Step	Existing Processes	Digital Delivery Opportunities
Planning and Programming	▪ Internal discussions regarding system needs. ▪ Federal, state, or local directive.	☑ Digital model to help staff identify project opportunities based on asset data compared against standards and regulations.
Preliminary Engineering	▪ Schematic (30%) design development and definition of overall project configuration. ▪ Development of preliminary studies and analyses.	☑ Schematic-level conflict detection within the digital model to inform future plan development. ☑ Layering of preliminary study and analysis feature data within a digital model to define design constraints more effectively.
Environmental Compliance, Right-of-Way, and Utilities	▪ Coordinate with stakeholders to identify and mitigate challenges. ▪ Studying and planning for project environmental requirements.	☑ Establish required limit of disturbance boundaries within the project digital model. ☑ Model-based documentation of planning and environmental decisions impacting design.
Final Design	▪ Detailed design and review phases, up through final design. ▪ Preparation of bid documents. ▪ For Alternative Delivery projects, final design is performed by the Design-Build contractor post-award.	☑ Automated model checks against design requirements and standards. ☑ Link relevant data from surveys, environmental reviews, and assessments within the three-dimensional design profile. ☑ Model-based calculations to identify busts or inconsistencies in material quantities and costs.
Letting and Award	▪ Request for a submission of bids through a public advertisement. ▪ Receipt of bids and selection of the best responsive bid. ▪ Alternative Delivery projects award prior to final design.	☑ Sharing digital design models containing project elements for bidders. ☑ Develop and share guidance for digital deliverables to support bid preparation. ☑ Model-based calculations to increase accuracy and timeliness of estimating.
Construction	▪ Facilitation of project construction activities. ▪ Administration of the contract throughout the construction period.	☑ Use the digital model for hold point inspections in the field. ☑ Incorporate project management software for issue tracking. ☑ Automate checks for completion of quality checks, issue resolution and change order documents. ☑ Recording of change orders and other deviations from design in digital as-builts.
Project Closeout	▪ Final inspection and acceptance of the completed project.	☑ Incorporate appropriate project data into the digital model of the project facility.
Ongoing Operations, Management and Maintenance	▪ Regular inspection and maintenance of built facilities. ▪ Development and implementation of operational changes to facilities.	☑ Build and store foundational data in a digital twin to support asset management initiatives. ☑ Model operational changes and assess expected impacts using a digital twin prior to implementation. ☑ Automate incorporation of maintenance activities in digital twin.

TxDOT's Digital Delivery Team

TxDOT has dedicated staff champions and key resources to move the Department's Digital Delivery program forward. This multi-faceted team includes TxDOT senior leaders, Division and District leadership, and consultant support. Change Management and Leadership work groups are addressing internal and external communications, training and providing feedback to leadership and other work groups. Discipline-specific work groups are established to examine Digital Delivery needs, priorities and risks, and these work groups are addressing implementation as well as unique needs across disciplines. Technology and Digital Twin work groups are addressing data management, GIS, data governance, hardware and software considerations. Process Development work groups are focused on project development and letting. Descriptions for each work group are included in this section. 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.**



- **Digital Delivery (Leadership):** The Digital Delivery Leadership work group is comprised of representatives from Districts and Divisions related to the preconstruction, construction, and asset management functions within the project development lifecycle. This is the steering committee for all initiatives within the DDP.
- **Change Management:** The Change Management work group strategizes on Digital Delivery communications and messaging to internal and external stakeholders, establishing tools for communication (including a Digital Delivery website), and is building a feedback loop to support program development. This work group is coordinating with industry groups and associations, including through the Texas Association of General Contractors (AGC) and the American Council of Engineering Companies (ACEC).
- **Technology:** The Technology work group is evaluating computer aided design processes, software and hardware solutions to support Digital Delivery initiatives, including Model Development Standards, Level of Development, data dictionary development, Bentley Workspace Metadata buildout, and others. New workflows and technology requirements for Digital Delivery are identified by the DDP team, which are communicated to the Technology work group and used when evaluating potential technology solutions through a formalized intake and evaluation process.
- **Design:** This work group is evaluating all design components including Roadway, Drainage, Structures, Traffic, Utilities, Right-of-Way, Survey, and Environmental in the context of Digital Delivery. It is tasked with understanding discipline-specific requirements for model deliverables, identifying risks and impacts to existing processes, providing guidance to pilot projects, and developing guidelines, policy, and best practices for Digital Delivery and model-based design projects. The Design discipline subgroups coordinate on Digital Delivery needs and data requirements with the Technology, Construction, and Digital Twin Work Groups.
- **Process Development:** The Process Development work group evaluates processes concerning project development such as milestone deliverables and data transfer and will recommend updates to integrate Digital Delivery requirements. This workgroup also includes process evaluation and changes to contract language related to procurement and letting as well as Alternative Delivery considerations.
- **Construction:** The Construction work group includes several subgroups focused on design interpretation during construction, specifications, implementation workflows, and digital as-builts. This group is evaluating pay items, 3D breaklines, design involvement during construction, vendor/supplier needs and internal TxDOT processes related to construction, including change orders and inspections.
- **Digital Twin:** The Digital Twin work group includes subgroups focused on Asset Management, Maintenance/Operations and Data Governance. These groups are evaluating the asset/project lifecycle, including data standards, practices for integrating Digital Delivery products and data into agency asset management processes and updates to maintenance processes and tools. The Data Governance group is establishing a data dictionary, documenting digital data needs across different disciplines and project stages, and supporting a strategy for seamless information sharing across the infrastructure lifecycle.

TxDOT Digital Delivery Near-Term Initiatives

TxDOT has identified eight strategic initiatives to support Digital Delivery program development. These strategic initiatives address needs related to change management, data management, software integration, development of tools to support pilot projects, and training. Initiatives are in varying levels of readiness, based upon TxDOT staff capacity and program maturity. Future initiatives and priorities will be identified by the work groups and using knowledge gained through the pilot projects.

1 *Establish Digital Delivery work groups to advance TxDOT's program.*

Corresponding Strategic Goal: Integrate Digital Delivery into TxDOT's business processes and operations.

Readiness: Underway

Duration: Ongoing

Level of Effort: High

Initiative Lead: Digital Delivery Program Leadership

DDP Roadmap Key Deliverables and Outcomes: Established Digital Delivery work groups

Initiative Key Activities	Implementation Guidance	Key TxDOT Staff
1a. Identify and establish programmatic work groups across all aspects of DDP planning and implementation.	Work group areas could include those focused on communications, technical topics (including workspace, data governance), multi-disciplinary design perspectives, and program areas such as letting, construction and asset management.	Digital Delivery Program Leadership
1b. Select work group members so that each group has broad representation from multiple TxDOT Districts and Divisions.	Each work group should include 10-20 people, including designated group leads. Participation should be evenly split between District and Division staff. Work group leads should identify interested participants among staff from across TxDOT.	Digital Delivery Program Leadership Work group leads
1c. Study and report on DDP planning, implementation, roll-out, evaluation, and monitoring.	Each work group should establish a reoccurring meeting time and meeting agendas. Work group leads should also have regularly scheduled meetings with DDP leadership to discuss findings and key needs, issues, benefits risks and mitigation strategies.	Digital Delivery Program Leadership Work group leads and participants
1d. Coordinate among work groups to exchange information and identify cross-collaboration needs.	Digital Delivery Program leadership should direct work group leads to strategically partner on key program initiatives based on feedback gathered from individual meetings.	Digital Delivery Program Leadership

2 *Develop a Digital Delivery change management communications and messaging approach.*

Corresponding Strategic Goal: Integrate Digital Delivery into TxDOT's business processes and operations.

Readiness: Underway

Duration: 12 months

Level of Effort: Medium

Initiative Lead: Change Management Work Group

DDP Roadmap Key Deliverables and Outcomes: Change management plans and materials

Initiative Key Activities	Implementation Guidance	Key TxDOT Staff
2a. Establish an internal communications plan that outlines key program development milestones and how TxDOT staff can become involved.	Develop an internal set of goals and a program roadmap that leadership can reference and use broadly as a communication tool with TxDOT staff. The Communications Plan should include regular internal touchpoint opportunities with TxDOT staff along the program development timeline.	Digital Delivery Program Leadership Change Management and Leadership Work Groups
2b. Establish an external communications plan that includes development of public facing materials.	Develop and publish a set of public-facing communication materials including a program website, frequently asked questions and related resource pages, professional outreach through conferences and presentations, and other touchpoints with industry partners and other public agencies.	Digital Delivery Program Leadership Change Management Work Group TxDOT Communications Division
2c. Identify internal digital delivery champions from each District and Division who support the initiative and provide staff with involvement opportunities and advance access to resources.	Champions may already be part of work groups, but there may be others who show interest. These champions should receive targeted program communications and be tasked with sharing that messaging with their teams. Champions should provide feedback on resources to work groups before they are finalized and shared more broadly.	Change Management Work Group District and Division Digital Delivery Program Champions

3 *Develop a Digital Delivery project toolbox through pilot project investigation.*

Corresponding Strategic Goals: Standardize processes and technology across the TxDOT organization and manage and leverage data throughout all stages of the infrastructure lifecycle.

Readiness: Underway

Duration: 24 months

Level of Effort: High

Initiative Lead: Design Work Groups

DDP Roadmap Key Deliverables and Outcomes: Model review standard operating procedures and tools to be used on 2024 fully digital pilot project, asset management Digital Twin framework

Initiative Key Activities	Implementation Guidance	Key TxDOT Staff
3a. Develop tools to prepare projects for the digital delivery project development workflow.	Workflow preparation tools could include, but are not limited to, design model checklists, a data dictionary, data confidence worksheets, pre-project readiness forms, and training program needs assessments.	Process Development Work Group Design Work Groups
3b. Develop tools to assess the effectiveness of digital delivery projects once they are complete.	Assessment tools could include, but are not limited to, post-project assessment forms and a return-on-investment analysis framework. Tools should evaluate projects using identified Digital Delivery program metrics.	Design Work Group Technology Work Group
3c. Develop an asset data framework that can incorporate into the project development workflow and can incorporate into concurrent Digital Twin program development.	The data framework will require input from many work groups representing TxDOT staff at each part of the project delivery process. Due to the size of the required data framework, multiple iterations will likely be necessary as Digital Delivery efforts mature.	Digital Twin Work Group
3d. Test drive tools on pilot projects, and use pilot projects to identify additional tools, processes and resources needed.	As tools are being developed, Digital Delivery Program Leadership should survey TxDOT Districts and Divisions to identify suitable pilot projects that could be used to test and refine tools from the Digital Delivery project toolbox.	Digital Delivery Program Leadership Process Development Work Group Pilot Project Staff

4 *Investigate software solutions to develop a Digital Delivery software migration and integration strategy.*

Corresponding Strategic Goals: Standardize processes and technology across the TxDOT organization.

Readiness: Underway

Duration: 24 months

Level of Effort: Medium

Initiative Lead: Technology Work Group

DDP Roadmap Key Deliverables and Outcomes: Digital Delivery Program software investigation

Initiative Key Activities	Implementation Guidance	Key TxDOT Staff
4a. Partner with TxDOT's Information Technology Division (ITD) to identify needed software related to Digital Delivery and how this software can be procured and managed in a way that complies with Digital Delivery program needs.	TxDOT ITD has established processes and standards for integrating new technology and software into TxDOT's existing systems, and software introduced as part of the Digital Delivery Program will need to conform with these processes. Identifying needed software early in the program development process will provide ITD the necessary time for review.	Workspace Work Group Technology Group TxDOT ITD
4b. Identify software integration needs and deployment schedules and use this information to form and staff a team within ITD to manage these ongoing needs.	Once software needs have been identified, TxDOT ITD will need to analyze the extent to which required integration and ongoing support will require new ITD staff. ITD will need to develop and carry out a staffing plan in response to these needs.	TxDOT ITD
4c. Establish criteria, processes, and target timelines for selecting, procuring, migrating, and managing new Digital Delivery software and supporting systems.	The software migration and integration strategy will need to consider the phasing of new software tools and how each will supplement or replace existing ones. The strategy will also need to consider how pilot projects might be handled if they require the use of software that has not yet been fully integrated.	Workspace Work Group Technology Work Group TxDOT ITD

5 *Develop Digital Delivery resources to support the construction phase of the project development lifecycle.*

Corresponding Strategic Goals: Standardize processes and technology across the TxDOT organization and manage and leverage data throughout all stages of the infrastructure lifecycle.

Readiness: Kickoff in mid-2024

Duration: 12 months

Level of Effort: Medium

Initiative Lead: Construction Work Group

DDP Roadmap Key Deliverables and Outcomes: Digital construction exploration

Initiative Key Activities	Implementation Guidance	Key TxDOT Staff
5a. Investigate compatibility with Digital Delivery for existing construction phase tools used by TxDOT and contractors and note compatibility concerns.	Many tools used in the construction phase of projects, such as materials ticketing and daily diaries, present both challenges and opportunities for integration into digital models. Noting these existing limitations will be useful in developing methods to support integration of these important tools into the Digital Delivery system.	Construction Work Group Technology TxDOT Districts Contractors
5b. Engage multiple perspectives from construction for feedback and input on priority tools, processes, training and other needs.	Identifying these priorities through stakeholder outreach will be key to building support for Digital Delivery in the construction phase. Conducting this outreach can also help with selecting well-suited pilot projects to test the Digital Delivery approach.	Construction Work Group TxDOT Districts TxDOT Alternative Delivery Division (ALD) TxDOT Construction Division (CST)
5c. Develop new tools to support Digital Delivery needs during the project construction phase and allow construction personnel to interact directly with the Digital Delivery systems that TxDOT establishes.	Based on the needs and priorities identified through stakeholder outreach, newly developed tools and software may be needed. These solutions may come from vendors or could be developed internally.	Construction Work Group TxDOT ALD TxDOT CST TxDOT ITD

6 *Conduct Digital Delivery impact assessments to identify detailed program development needs.*

Corresponding Strategic Goals: Prepare TxDOT's existing and incoming workforce for a fully digital transportation agency and advance the state-of-practice for Digital Delivery by partnering with peer states and industry.

Readiness: Underway

Duration: 6 months

Level of Effort: Low

Initiative Lead: Digital Delivery Program Leadership

DDP Roadmap Key Deliverables and Outcomes: Digital Delivery Program Implementation Plans

Initiative Key Activities	Implementation Guidance	Key TxDOT Staff
6a. Partner with applicable work groups to complete digital delivery impact assessments for TxDOT as an organization.	Each TxDOT District and Division has formalized processes for conducting business, and a migration to Digital Delivery will impact many of those processes. Each organizational group within TxDOT will need to identify what policies, processes, and procedures will need to change as digital delivery is implemented throughout the agency.	Digital Delivery Program Leadership All Work Groups
6b. Review assessment results to identify and document existing agency capabilities and institutional assets, as well as required next steps to further develop the organizational maturity of the TxDOT Digital Delivery Program.	Once self-assessments are complete, Digital Delivery Program Leadership should review the results to identify strengths, weaknesses, and opportunities for growth. Required next steps will largely be outputs of the self-assessment tools used.	Digital Delivery Program Leadership
6c. Incorporate capabilities, assets, and next steps into targeted implementation plans tailored to individual work groups, Districts, and Divisions.	Targeted implementation plans should address weaknesses and opportunities for growth and should expand on the next steps identified in the self-assessment tools. The plans should acknowledge and leverage identified agency strengths so that these resources can be matched with relevant next steps.	Digital Delivery Program Leadership All Work Groups

7 *Update TxDOT policies and procedures that will be impacted by Digital Delivery.*

Corresponding Strategic Goals: Standardize processes and technology across the TxDOT organization.

Readiness: Underway

Duration: 18 months

Level of Effort: Medium

Initiative Lead: Design Work Groups

DDP Roadmap Key Deliverables and Outcomes: Model development standards, Statewide Digital Delivery policy

Initiative Key Activities	Implementation Guidance	Key TxDOT Staff
7a. Review Impact Assessments and identify gaps in standards, policies and procedures.	Compare the results of the Impact Assessments with finding from the pilot projects to identify areas where guidance is lacking.	Digital Delivery Program Leadership All Work Groups
7b. Develop new standardized policies and procedures from gathered input.	Design subgroups will focus on their areas of expertise to develop design specific guidance for model development and delivery. Process workflows and standard operating procedures (SOPs) will be developed to define new requirements. Partnership with the Strategic Planning Division (STR) will be useful in leveraging past change management experience within TxDOT.	Design and DDP Leadership Work Groups Process Development Work Group Change Management Work Group TxDOT STR
7c. Identify opportunities to modify existing policies, procedures, and systems to improve data transfer capabilities between Districts and Divisions.	Many District and Division representatives identified a need to improve the transfer and sharing of the data that employees throughout the agency collect and store in various systems. The TxDOT Digital Delivery Program presents an opportunity for that data to be stored in a definitive digital model.	Change Management and Digital Twin Work Groups

8 *Establish a Digital Delivery training program and transition strategy.*

Corresponding Strategic Goals: Prepare TxDOT's existing and incoming workforce for a fully digital transportation agency, and advance the state-of-practice for Digital Delivery by partnering with peer states and industry.

Readiness: Underway

Duration: 18 months

Level of Effort: Medium

Initiative Lead: Change Management Work Group

DDP Roadmap Key Deliverables and Outcomes: Digital Delivery Program training and transition strategy

Initiative Key Activities	Implementation Guidance	Key TxDOT Staff
8a. Review existing staff roles, responsibilities, job descriptions, and career advancement ladders to gauge the impact that TxDOT's Digital Delivery Program will have on various organizational roles within TxDOT.	Standard descriptions of roles for TxDOT positions at all levels should be reviewed to understand how Digital Delivery will change the day-to-day experience for TxDOT employees.	Change Management Work Group TxDOT Human Resources Division (HRD)
8b. Assess approaches related to staffing, training, and organizational charts to determine how the TxDOT Digital Delivery Program will change these existing practices.	From a review of changing employee roles, TxDOT will need to identify internal training needs and opportunities for transitions into new staffing positions.	Change Management Work Group TxDOT HRD
8c. Assess external workforce training needs and determine how TxDOT can partner with institutions to prepare the next generation of TxDOT employees.	TxDOT will need to identify what new skills will be beneficial for entry level staff working with facets of the Digital Delivery Program, so that TxDOT can share those skillset needs with external educational providers and vendors.	Change Management Work Group TxDOT HRD

Rising to the Challenge

TxDOT is initiating a key shift in moving to Digital Delivery, which will influence every area of the Department's business. New technologies, new processes, and new workflows offer TxDOT many opportunities to build in efficiencies and reliability in how TxDOT designs, constructs and maintains its infrastructure assets. Digital Delivery also introduces challenges and risks that need to be addressed to ensure successful implementation.

Many of the near-term initiatives are focused on identifying gaps in processes, policies and business operations that TxDOT needs to address. Coordination across the organization, including leadership, business units, Divisions and Districts is in place and will facilitate open communication and swift resolution of priority needs. Technology partners that are already working with TxDOT will have integral roles to update and modify workspaces, maintain front- and back-end systems for project management, manage and store extensive amounts of data, and share information.

Overarching Challenges

TxDOT identified four key challenges to be addressed to promote the Department's successful transition to a robust digital environment. TxDOT is assessing how to mitigate these challenges and build in success strategies.

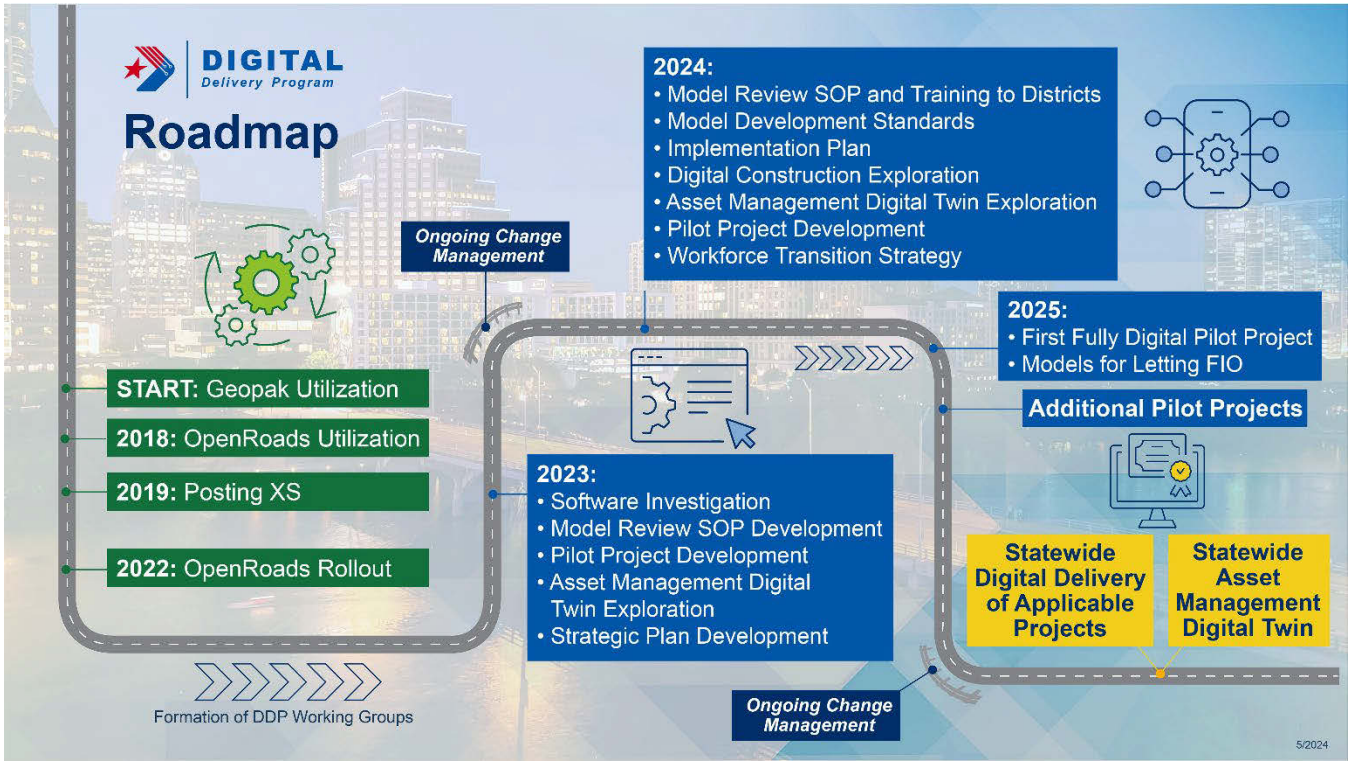
Digital Delivery Challenge	How TxDOT is Addressing
Change Management Digital Delivery will transform every aspect of how TxDOT plans, designs, builds, operates and maintains infrastructure. Managing this shift means that TxDOT needs to engage Division and District staff so that the department can identify needs and gaps, understand unique impacts to different groups, and communicate status of program rollout and upcoming changes.	▪ The Change Management Timeline includes adoption schedules and key milestones, and TxDOT will manage Digital Delivery implementation and actively communicate any changes to the timeline. ▪ Communications Strategy to include outreach to Districts with proactive communications about upcoming changes. ▪ Pilot projects will inform needs and demonstrate Digital Delivery in real-world project environments. ▪ Lessons learned will be incorporated at each step to inform ongoing and future implementation.
Managing Data Across the Project Lifecycle **Data needs to be leveraged and used across the full project lifecycle, which means the right data needs to be collected and made available at other project stages. Data at different project stages may be siloed, outdated or difficult to use. Digital Delivery provides an opportunity to elevate how TxDOT manages data to promote efficiency, accuracy and accessibility.**	▪ Data Governance and Management strategy to provide a comprehensive roadmap for how data will be collected, stored, used and accessed across the full project lifecycle. ▪ Assess Digital Delivery data needs and challenges from the technical, policy, design, performance management, planning and asset management perspectives. ▪ Develop a data dictionary and specifications to support standardization across TxDOT. ▪ Implement standard data formats including meta-data, quality parameters, and accessibility requirements. ▪ Develop enterprise-wide policies and solutions for data storage, management and access.

Digital Delivery Challenge	How TxDOT is Addressing
Preparing TxDOT's Workforce for Digital Operations For TxDOT to fully benefit from the investment in Digital Delivery, current and future staff will need training to equip them to use new technologies, new design and inspection methods, and the new processes that will be introduced. TxDOT also will benefit by having a prepared workforce ready to join the department who are already familiar with and skilled with Digital Delivery concepts and tools.	▪ Training Plan to address initial and ongoing training requirements for TxDOT staff. Training will be provided in a variety of formats, including in-person, virtual and self-paced. ▪ Leverage resources from technology vendors and providers to support training TxDOT's workforce. ▪ Monitor effectiveness of training tools and resources and expand training opportunities as the Digital Delivery program scales. ▪ Partner with colleges and universities to help inform the curricula related to digital delivery technical requirements so these entities can prepare the talent pipeline for a career at TxDOT. ▪ Collaborate with industry to facilitate training for contractors and designers who work with TxDOT, particularly for smaller companies, so that they can be competitive in seeking TxDOT projects.
Implementation and Phasing **TxDOT's Digital Delivery program is being implemented in stages. Pilot projects will help to inform priority focus areas, strategies and tools. There will be parallel processes running while Digital Delivery is mainstreamed throughout the TxDOT organization. Managing this phased approach requires careful planning to migrate to new processes, technologies and workflows.**	▪ Capture lessons learned and outcomes from pilot projects. ▪ Establish success metrics and criteria for pilot projects to provide objective 'truth checking' of implemented Digital Delivery strategies. ▪ Prepare incremental milestone schedules and build in time to evaluate and assess benefits, challenges and risks. ▪ Implement rigorous technology testing to understand how new systems and data management strategies are supporting digital processes. ▪ Provide continuous opportunities for feedback and recognize when strategies need to pivot. ▪ Implement ongoing training programs to align with Digital Delivery program phases. ▪ Acknowledge successes and efficiencies experienced throughout the path toward mainstream implementation.

Digital Delivery Roadmap and Implementation Priorities

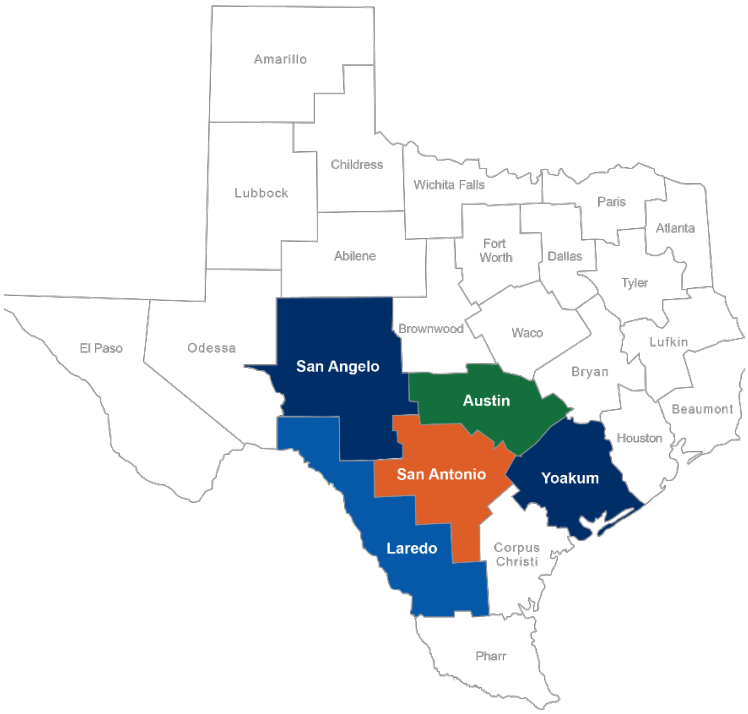
TxDOT is developing a five-year Implementation Plan that outlines key tasks, timeframes and leads for all aspects of its Digital Delivery program. Near-term priorities are being initiated in 2023 and 2024 to develop standards, data dictionaries, data management and governance strategies, evaluate different software and develop various tools to include in the future Digital Delivery toolbox. These near-term priorities are shown in the Roadmap on the following page.

Ongoing activities, including communications and training through the change management process will support the transition to Digital Delivery at TxDOT. Work Groups will continue to provide tactical support and direction across a range of disciplines and technical focus areas and will shape the future roadmap priorities and updates.



Pilot Projects

TxDOT's Digital Delivery program will implement and test new software, processes and tools. Initial pilot projects in metro, urban, and rural TxDOT Districts on construction and alternative delivery projects will help to inform Digital Delivery approaches to design, mapping, survey, letting, and construction inspection. Pilot projects in the **San Antonio, Austin, Yoakum, San Angelo and Laredo Districts** are examining different aspects of Digital Delivery, including model development standards, data standards, digital deliverables and digital design review. These pilots will help TxDOT to understand how to develop, review and deliver new digital deliverables. Understanding how new types of software align with project processes, and where TxDOT may need to provide additional tools or training for District staff are additional outcomes from the pilot efforts.



Measuring Progress

TxDOT's Digital Delivery program requires success metrics and criteria at each stage of development and implementation, and TxDOT will need ongoing assessments of how well the Digital Delivery program is serving the department. Digital Delivery offers many opportunities to improve efficiency, accuracy, and cost-effectiveness across a range of processes, including planning, design, letting, construction and asset management. TxDOT will measure incremental progress, and success of the overall program, by implementing performance management as an overarching element to the Digital Delivery phased implementation.

It is essential that each work group consider what success criteria and metrics are most insightful to specific disciplines and processes. Additional considerations for how TxDOT can build performance monitoring and management into the Digital Delivery program implementation include:

- Document specific success metrics, criteria and methodology for each discipline and program element.
- Identify 'early wins' to build confidence and demonstrate near-term return on investment.
- Understand what data and information are needed to track and measure progress.
- Establish processes to review and analyze performance, implementation and adoption, as well as processes for how to address program elements that are not meeting established success criteria. This also includes a process to share outcomes of the reviews with TxDOT leadership and DDP champions. Sharing what is working well, and what may be encountering challenges, will help to build trust across the organization.
- Develop metrics that address outputs (i.e., number of projects using the Digital Delivery workspace, number of trainings held) and outcomes (impact and benefit).
- Build out and scale metrics commensurate with roll out and implementation of Digital Delivery strategies.