

Playbook:

Road and Bridge Construction Planning Solution



Getting Started with 3D/4D Digital Design and Construction Workflows

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3D/4D Digital Design and Construction Workflows Overview

The heavy civil industry is at a critical juncture. With governments spending more on infrastructure globally, not only is there an influx of new projects, but funding is also becoming available.

However, to take advantage of this opportunity, road and bridge owner-operators must overcome an increasing number of challenges including inflation, rising material costs, and workforce shortages.

One way to close this gap is by leveraging 3D/4D digital design and construction workflows.

For road and bridge owner-operators, it means using 3D models for a paperless, streamlined process, enabling more collaboration and better coordination between design and construction teams so that you can safely deliver more projects faster.

Establishing new workflows might sound great, right? But maybe a little overwhelming?

This is why we have created this 3D/4D digital design and construction workflow playbook.



Play 1

Transition from 2D Plan Sets to 3D Models for Construction

Disconnected workflows between design and construction teams are a key reason for shifting to 3D/4D model-based workflows.

Traditionally, design teams flatten their 3D design models to 2D PDFs for construction planning, losing much of the design intent and leading to lengthy review processes, costly change orders, and schedule delays.

But as construction teams adopt digital technology, 3D design models become more valuable, enabling teams to capture additional project data, improving the coordination between design delivery and construction planning.

To begin the transition from 2D to 3D, start by analyzing the data needs of the end user. How does a project manager, supervisor, inspector, or contractor currently do their job? What are the most critical data needs?

Generally, most organizations can begin by looking at the pay items and the associated work. Construction teams base most of their work on methods of measurement and payments. Providing this data set is a critical part of digital workflows. Then, you can understand the processes needed to produce these data sets within the model, including adjustments to current design practices.

Benefits

3D design models will enhance collaboration between design and construction teams, ultimately improving the design quality and the ability to share design intent, enabling you to expedite your design or construction review processes by 30% or more.



Play 2

Provide Construction Teams with 3D Models for Preconstruction Planning

A key part of any project is preconstruction planning, including the development of schedules, construction sequencing, and cost estimates. By flattening 3D designs into 2D plan sets, preconstruction activities become difficult to plan and execute with the level of accuracy needed to be successful.

When construction teams have access to 3D design models, they can turn them into 4D construction models, enabling them to:



- ◆ **Generate hyper-accurate estimates and reduce project costs.** Utilizing 4D construction models for model-based quantity take-offs (QTO) will automatically estimate what labor and material is needed to construct the project.
- ◆ **Reduce risk and increase safety before construction even begins** by simulating construction projects in 3D/4D models. Project simulation allows road and bridge owner-operators and their partners to anticipate the impacts of construction on things such as the environment, traffic flows, and the local economy.
- ◆ **Optimize project plans, schedules, and resources** by splitting up road and bridge models into constructible components, depicting how they will be built. For example, roads are often designed as miles-long model objects. However, they're built in multiple phases and steps.
- ◆ **Increase collaboration and mitigate risk** by sharing 3D/4D construction sequences, enabling the entire team to fully understand the project. These sequences enhance stakeholder visibility into project performance and allow teams to make improved, real-time decisions, keeping projects in control, on time, and on budget.

Play 3

Implement 3D/4D Digital Design and Construction Workflows on Your Projects

When it comes to implementing new technology and changing your workflows, there are different approaches.

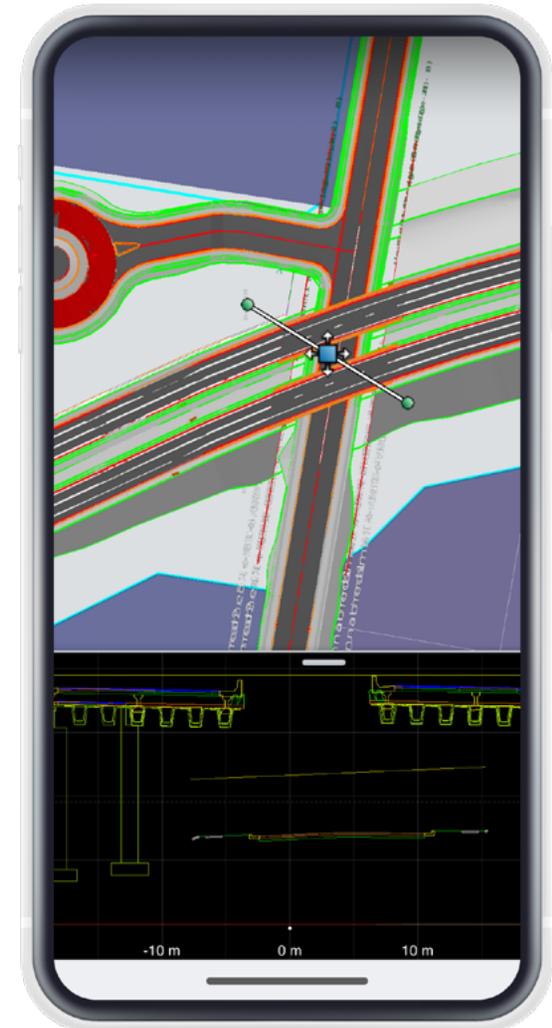
Some firms want to tackle everything all at once. Others are too overwhelmed to know where to even begin, so they do not. And then there are a few who take on just a little at a time.

We suggest the latter approach, so here are a few tips to get started.

- ◆ **Gain buy in from your leadership** by leveraging industry success stories, like this [Minnesota DOT \(MnDOT\) Highway 169 \(TH 169\) 2.8-mile roadway expansion project](#) to illustrate the value and ROI of digital delivery.
- ◆ **Partner with consultants** such as WSB, which offers their new [digital construction management solution and advisory service](#), built to help the civil sector overcome

the challenges of adopting model-based digital workflows.

- ◆ **Engage a technology vendor** with solutions that will help you achieve your digital design and construction goals, such as [SYNCHRO™](#), which includes 3D/4D workflows designed for heavy civil infrastructure.
- ◆ **Create a digital delivery committee** to implement and prioritize 3D/4D digital workflows, including goals and timelines, on a project that has enough monetary value but is not overly complicated.



Play 4

Learn from Other Road and Bridge Owner-Operators' Experiences

With so many road and bridge owner-operators already starting to implement 3D/4D digital workflows on their projects, there are many lessons learned and success stories of which you can take advantage. Here are a few.

- ◆ **Manage the pace of change.** Implementing new 3D/4D digital workflows does not happen overnight. Take it step by step, be patient, and trust the process.
- ◆ **Training, training, and more training.** Because 3D/4D digital workflows involve new processes for design and construction teams, look to your technology vendor and/or consultant to provide training – early and often.
- ◆ **Communicate as often as possible.** Conduct weekly coordination meetings with your construction and design teams to share tips and tricks and lessons learned to encourage collaboration.
- ◆ **Gain stakeholder alignment and consistency.** Because 3D/4D digital workflows involves new terminology and workflows, it is important to identify and use consistent deliverables, file formats, naming conventions, and saved views that all stakeholders agree upon.
- ◆ **Advance technology incrementally over time.** Look for opportunities to actively upskill your digital design and construction teams and choose technology vendors that can future-proof your operation.
- ◆ **Document lessons learned** Implementing 3D/4D digital workflows is a marathon, not a sprint, so document as many lessons learned as possible so you can continually improve as the journey progresses.



The Road and Bridge Construction Planning Solution Will Meet You Where You Are

The benefits of 3D/4D digital design and construction workflows are many and proven – lower project costs, saved time, improved constructability, enhanced visualization, boosted communication of design intent, and enhanced construction efficiency – resulting in quickly and safely delivering more sustainable projects.

All these benefits mean that road and bridge owner-operators can help close the productivity gap by working more efficiently and doing more with less, ensuring that their roadways and bridges are the best that they can be for the communities that they serve.

- ◆ Expedite design review efficiency and processes by 30%.
- ◆ Increase collaboration, quality, and safety of projects.
- ◆ Provide 15% or more reduction in change orders.
- ◆ Offer improved asset operation and management with digital as-built records.

[Let us help you begin your 3D/4D digital workflows with confidence.](#)

