

## BIM FOR CONSTRUCTION

### *Building a Bridge to a Better Workflow*

BIM usage is growing among civil engineers working with roadways, surveying, and utilities, as many departments of transportation have begun to mandate 3D files as deliverables for all their road projects. Those who have adopted this new technology herald it as the next-generation tool for construction, even as structural engineers working with civil projects like bridges, culverts, and retaining walls have been slower to embrace BIM.

“Many people in the civil engineering industry have the idea that BIM is simply a 3D model, but in reality, it’s a whole workflow process that dramatically improves the collaboration of all parties involved with a project,” says Jalpesh Patel, Senior Technical Consultant with Allplan. The benefits of BIM are many, he explains—for project owners, engineers, and contractors alike.

“There are many longtime leaders in the bridge structural engineering sector who are reluctant to move to a new way of working,” Patel remarks. “Yet, there are contractors who are very enthusiastic about BIM and don’t mind utilizing it internally toward the end of a project, as it yields a good ROI even later in the life cycle.”

For this reason, BIM is gaining traction with design-build projects where the contractor has control of the bulk of the

project. It is also becoming a popular choice for private civil projects. Patel offers, “I would say all of the top 50 or so largest civil firms are exploring BIM internally. They’re using it abroad already and they know it’s simply a matter of time before it becomes mainstream here in the U.S. civil market.”

#### TIME SAVINGS = LOWER COSTS

Patel offers this analysis of tasks associated with a structural engineering workflow, which he describes as “conservative.” (See table below.) Using the older CAD plan method as a baseline, he compares the amount of time it takes to perform those same tasks using a BIM modeling method.

With the BIM method of modeling, the project uses only about 80% of the time it would take using a traditional CAD plan method, enabling engineering firms to reap rich benefits:

1. They can shift that time to planning and design on the front end to find more economies and efficiencies.
2. They are able to produce a superior final design that includes rich data to help minimize project risks.
3. For firms that have a project backlog, they are able to complete more of those backlogged projects in less time.

TASKS	% OF TOTAL PROJECT TIME	CAD PLAN FACTOR	BIM MODEL FACTOR
Planning and design	10%	1	0.5
Model analysis and calculations	20%	1	1
Reporting to other disciplines	5%	1	0.2
Plan production	50%	1	1
Creating reports and tables	5%	1	0.2
Project review (QA/QC)	10%	1	0.2
<b>TOTAL</b>	<b>100%</b>	<b>100%</b>	<b>80%</b>

While BIM involves an initial learning curve and a different workflow, in the end it requires less work and, consequently, less cost.

**MORE THAN A 3D MODEL**

It is key to understand that BIM is so much more than just a 3D rendering of a flat plan. One of the biggest benefits Patel cites is a common data environment (CDE). This means that the 3D model contains all relevant project data, accessible by everyone in one centralized location, in real time. This eliminates the need for progress updates to each of the different disciplines working on the same project every time a change is made.

Revisions do not involve a clumsy, error-prone process of emailing changes and potentially working with an outdated version of a plan. Using BIM, the most recent version of the project data and design is readily available. Cloud-based file hosting allows anybody involved with the project access to the model from any compatible device, from anywhere.

This level of transparency also provides insight to everyone involved about changes to scheduling, design, and costs, which then gives contractors the information they need to make the best use of time and resources. Project owners get the benefits of BIM by using it throughout the project's life cycle to get the best ROI possible, and over time, an



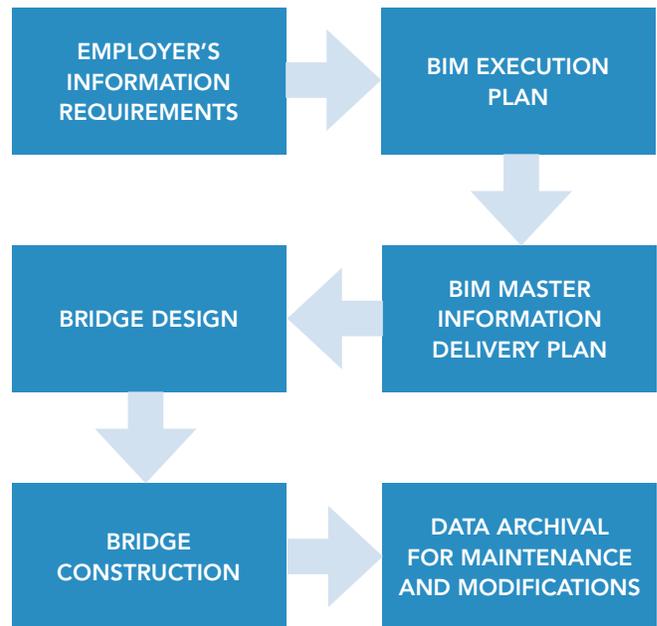
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engineering firm builds up a BIM library of work that allows reuse of its most efficient or impressive project designs and facilitates future improvement through lessons learned.

There are also many BIM-compatible software applications that further leverage its power—for example, comparing ongoing costs against total budget, generating quantity take-offs for tendering software and integrating timesheets to allocate labor expenses accurately to the project.

**THE WORKFLOW**

Here's a basic, high-level workflow for the BIM process in bridge-building from concept to maintenance:



Once the initial project requirements are defined, and an overall strategy for the BIM process has been laid out, the master information delivery plan is established. The MIDP specifies the BIM platform, software, and file types, defines reporting requirements and describes the level of development (LOD)—the standards by which the BIM project will be delivered.

The design for the bridge is then completed and constructed using information contained in the common data environment (CDE)—the shared information resource supporting BIM. After construction, this information is handed

over to the project owner, who will use it throughout the life cycle of the project for inspections, rehab, deck replacements, and modification work.

**EVERYONE BENEFITS**

Project owners, engineers and contractors alike benefit from BIM.

Owners get real-time insight into their projects as they progress. They are able to monitor budgets and schedules to make sure everything is on track and within the agreed-upon scope. They have access to all the data created during the entire life cycle of the bridge, from the very beginning to current day, giving them an organized, comprehensive tool with which to operate and maintain their structure.

Engineers get more complete data from BIM, facilitating better decisions during the design phase. As we have seen, the common data environment offers time-savings over traditional plan workflows by streamlining the communication among project shareholders. This also reduces the hours engineers must spend addressing requests for information (RFIs) before construction by allowing them to provide a detailed and realistic virtual model of the bridge.

Contractors save time and money on shop drawings, fabrication, and construction models. The 3D model and associated data enables them to create more accurate estimates and better schedules, saving time and money. Better construction planning also creates a safer working environment for their on-site employees.

**THE WAY FORWARD**

BIM is growing in popularity, even if its adoption is a bit slow by some civil engineers here in the U.S. Patel suggests, "It's important to remember that one doesn't become an expert overnight. Once engineers find a BIM solution suitable for their operation, they need to roll up their sleeves and learn to use it. The BIM way of working is here to stay."

The power of BIM is remarkable, and once the learning curve has been mastered, engineers will discover that BIM can provide a host of benefits beyond just the flash of 3D modeling. It not only reduces the amount of work and cost



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involved with their projects, it also provides better collaboration, greater owner satisfaction, improved workflow, and ultimately, a heightened reputation.

Patel strongly advocates for BIM, saying, "There is no better time than now to take hold of BIM. Software vendors are strongly competitive and are providing discounts and freebies to get users to try it and commit for the next few years. They're also open to feedback about improvements and new features."

In other words, BIM's time has come. Find out how you can make it work for you.

**ALLPLAN**  
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Allplan is a leading vendor of OpenBIM solutions for structural and civil engineers, building contractors, project managers, and BIM managers. Our software enables the integration of 3D into preexisting 2D workflows, and allows different disciplines and trades to collaborate in a streamlined, efficient workflow. A key subsidiary of the Nemetschek Group, Allplan solutions are used by over 240,000 engineers, contractors, and AEC professionals in 41 countries.

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