DroneDeploy

Extending the Value of BIM at
Every Stage of the Construction Lifecycle:

Integrating Planning with Reality

DroneDeploy enhances BIM models by augmenting planning models with reality.

Pre-construction:

Drone-generated models and analytics from DroneDeploy enhance the accuracy of BIM models, improve logistics planning, and streamline site preparation.

During construction:

Regular drone mapping creates a digital record of a project, helps BIM managers monitor progress, provides a comparison of as-built to as-designed data, and delivers visual evidence in the event project delays or disputes occur.

Post-construction:

Drone-generated imagery and analytics can help owners identify potential issues, extend the life of a structure, and minimize maintenance costs.

"Almost all projects end in litigation." That is what a DroneDeploy customer in construction recently revealed. It is hardly surprising in light of the complexity of projects, the numerous stakeholders, and the tradition of siloed work environments. A seemingly small design change or mistake in measurement can have significant ramifications for the physical and functional design—impacting project scope, schedule, and budget.

Building Information Modeling (BIM) is designed to alleviate some of those issues with its 3D model-based process. It gives architecture, engineering, and construction (AEC) professionals the insight and tools to more efficiently plan, design, construct, and manage buildings and infrastructure with a comprehensive view of the project. Builders, owners, and other stakeholders can see what their designs will look like before construction even starts—and the impact when changes arise.

BIM technology is impressive for the planning process. But nothing beats reality—and that's where drone solutions come in. Drone maps, models, and analytics extend the value of BIM with a 3D view of what is truly happening on the job site, helping project teams improve logistics and planning, identify issues as they arise, and drive visibility and accountability.

In this eBook, we will discuss how drone data solutions extend the value of BIM throughout the construction lifecycle—from planning to maintenance and every stage in between:

> The background and benefits of BIM

> Pre-construction: Enhancing accuracy, estimates, and planning

> Construction: Creating a digital record of progress

> Post-construction: Future-proofing your build

The Background
and Benefits of BIM

BIM technology is not new; it has been used commercially for decades. But initial adoption has been somewhat slow, particularly in the United States. Although countries like the United Kingdom and France have mandated BIM on all construction projects, the U.S. has yet to take this step.

U.S. adoption has been sluggish for several reasons. As with any other innovation, there have been potential users who have resisted technology change. After all, some AEC professionals—especially those working on simpler, smaller projects—have used paper to design and manage buildings for decades. Still others thought BIM would stifle creativity.

But the tide is changing. In July 2010, Wisconsin mandated the use of BIM on any public project with a budget over $5 million. The Los Angeles Community College District did the same in 2018 on the $9.5 billion renovation and construction projects across its campuses. Now 72% of construction projects in the U.S. are thought to leverage BIM.

The most powerful driving forces in increasing adoption are the numerous benefits that BIM offers AEC professionals. BIM serves as

a master digital plan that is updated in real-time, empowering multiple parties to collaborate on design and construction work, build consensus, and resolve conflicts quickly and cost effectively. Thanks to the 3D visualizations that BIM renders, decision makers have a better feel for what the end projects will look like—empowering them to make simple, cheaper adjustments even before starting to build.

Moreover, BIM addresses a significant pain point: rework, which Autodesk estimates to be 30% of construction costs. After all, if you change the lighting in a building plan, the sprinkler system might need to be moved, as well as other systems. Architects, engineers, and general contractors would want to make those discoveries early, before they cause expensive delays mid-project.

With BIM, AEC professionals are also able to test and visualize countless designs. The Beck Group, working on a unique curved church in Seoul, tested hundreds of BIM models and eventually discovered they could achieve a bending visual effect while still using flat glass, which is far less expensive than curved glass. The Beck Group estimated this change alone saved them $1 million.

Comparison of Traditional Survey Methods and DroneDeploy

Traditional Survey Methods

Accept Survey	Data Collection & Post-processing
1-2 days	**1-2 weeks**

Delivery of PDF, CAD File, Contour Map
1-2 weeks

Total Time: 2-3 weeks

DroneDeploy

Mobilize to Site	Fly Drone & Collect Data
1 days	**1-2 days**

Delivery of PDF, CAD File, Ortho Map, Contour Map, Point Cloud
1-2 days

Total Time: 1-4 days

Pre-Construction: Enhancing Accuracy, Estimates, and Planning

BIM has significant upside on its own. But its value can be extended even further with a view of project reality, which can be uniquely delivered by drone maps, models, and analytics.

BIM can provide 3D models and visualizations of projects. But some things simply cannot be visualized through BIM. For example, in the case of buildings or units sold for their scenic views, BIM cannot create the actual views from those units. But drone software, like DroneDeploy's solution, can show precisely what view will be seen from each and every planned window, giving AEC professionals and building owners the opportunity to make modifications to BIM models before construction starts.

But the value of drone software to BIM models goes beyond pretty pictures. BIM geospatial data is one of the fundamental components of a model, streamlining feasibility analysis, planning, and permitting.

Traditional ground surveying techniques can be used for BIM, but they can take weeks to complete, use limited data points, and are prone to human error. With DroneDeploy, builders can move much faster: drones capture data points precisely and accurately. Flights can be completed in a matter of hours, compared to the days it takes through traditional ground methods. Moreover, the high-resolution flight images can be securely uploaded to the cloud, where professionals can use them for immediate analysis and modeling. The 3D models that DroneDeploy delivers are perfectly suited to the 3D modeling of BIM software.

Furthermore, DroneDeploy integrates with leading BIM software solutions like Autodesk and Procore so reality capture and planning are seamless, vastly improving estimates of scope, budget, and scheduling.

Construction: Creating a Digital Record of Progress

Once a project progresses past the evaluation and planning phase, drones can play an even more central role in enhancing BIM models.

As AEC professionals are preparing the site for the build, they can use the analytics in DroneDeploy to estimate how much earth must be moved, how much it will cost, and how long it will take. They can also plan exactly where to put equipment on the ground to maximize efficiency in the short and long term. And when the actual earthmoving begins, builders can use DroneDeploy's volume measurements to compare surface plans to what subcontractors have actually moved to identify discrepancies.

Once the building phase commences, AEC professionals can create precise, programmable flight patterns with DroneDeploy so drones fly the exact same routes on a regular basis. This enables builders to consistently get repeatable and unmatched intelligence into the progress of a project.
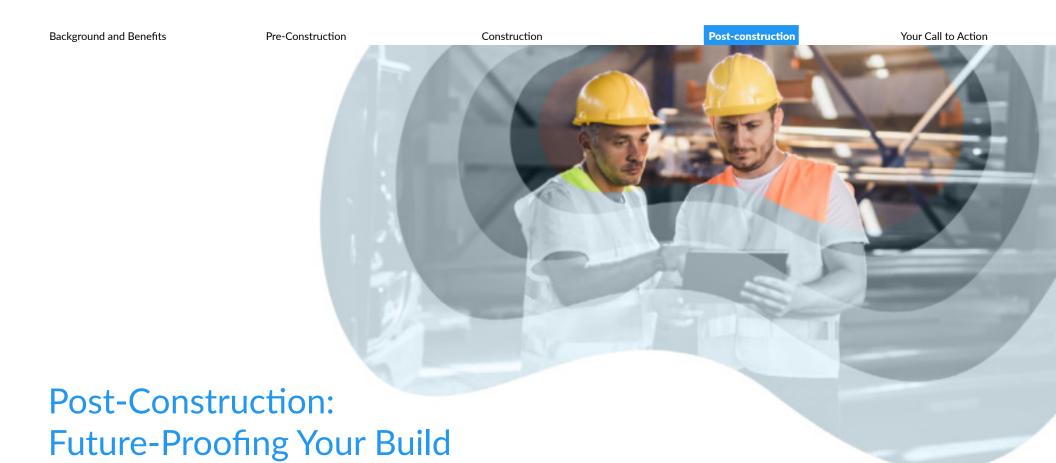
Images and analytics from DroneDeploy validate as-built versus as-designed work with reliable and auditable aerial data. General contractors can confirm subcontractors' work at any stage. If there are issues as the project advances, AEC professionals can integrate data representing site reality with the BIM models and send them to the right parties to address. With more complete and concrete data on site progress, builders can avoid unforeseen costs by communicating more efficiently with stakeholders on progress.

When all parties to a construction site work from the same view of reality, everyone is more accountable, and drone imagery and analytics serve as the foundation for quality control.

As a DroneDeploy customer explains, "People may not be attentive to drawings. Anything measured by a person is subject to human error." Not so with drone images—which is why his company uses DroneDeploy to compare reality against the plan.

In addition to quality control, DroneDeploy is a powerful solution for documentation, particularly when multiple parties are involved in the construction. For example, at the time a builder hands off the project to the next party, the builder can document properties relative to the BIM model. If challenges arise later, the builder can reference that documentation as the source of truth. Similarly, drone images can also help builders provide evidence that they are following proper safety regulations or zoning laws.

Finally, drone imagery and analytics can help build stronger relationships between owners and clients. BIM enables AEC professionals to give owners real-time site conditions and progress—thereby fostering a new level of communication and trust. And when unanticipated conditions occur, drones can help alleviate potential conflict. As a DroneDeploy customer explains, "Showing an owner images of an excavator underwater goes a long way to explaining why a project may be stalled."

Post-Construction:
Future-Proofing Your Build

After the ribbon-cutting ceremony, BIM and DroneDeploy continue to play key roles in extending and improving the life of a structure and minimizing maintenance costs. That is important, as estimates suggest that just 25% of costs come from a building's construction; the rest come from maintenance and operations over its service life. With drone software, building owners can be proactive, instead of reactive, in monitoring and maintaining assets.

For example, if a building is using far more energy than similar buildings, DroneDeploy's thermal maps can help owners and managers identify areas with significant energy loss and other overlooked issues. BIM could then be used to model how alternative energy sources, such as solar, could be implemented and assess the environmental impact.

Similarly, an existing building near a fault line might at risk of earthquake damage. Drone images and analytics can help identify foundational issues such as sinking, while BIM modeling brings to life what a retrofitted building will look like both internally and externally.

The combination of BIM and drone software can be powerful solutions in minimizing long-term building costs and optimizing the life of all structures.

Your Call to Action

BIM is a powerful technology, but paired with DroneDeploy it unlocks a trove of benefits that makes a better use of your time, reduces costs, improves safety, and provides accurate and up-to-date records.

To learn more about our integrations with leading BIM software, read about our integrations with **Autodesk** and **Procore.**

To take advantage of BIM and DroneDeploy at every stage of your next project **talk to an expert.** Our team can help you make the most use of drone technology and drone mapping, analytics, BIM, and business intelligence solutions.