

# BIM

## Ghafari Creates Revit Model of Chicago Federal Center Using EdgeWise™

### Goal:

- Create Revit Model

### Project Facts:

- Over 1 million square feet
- 500 Scans
- Night time scanning

### EdgeWise™ Benefits:

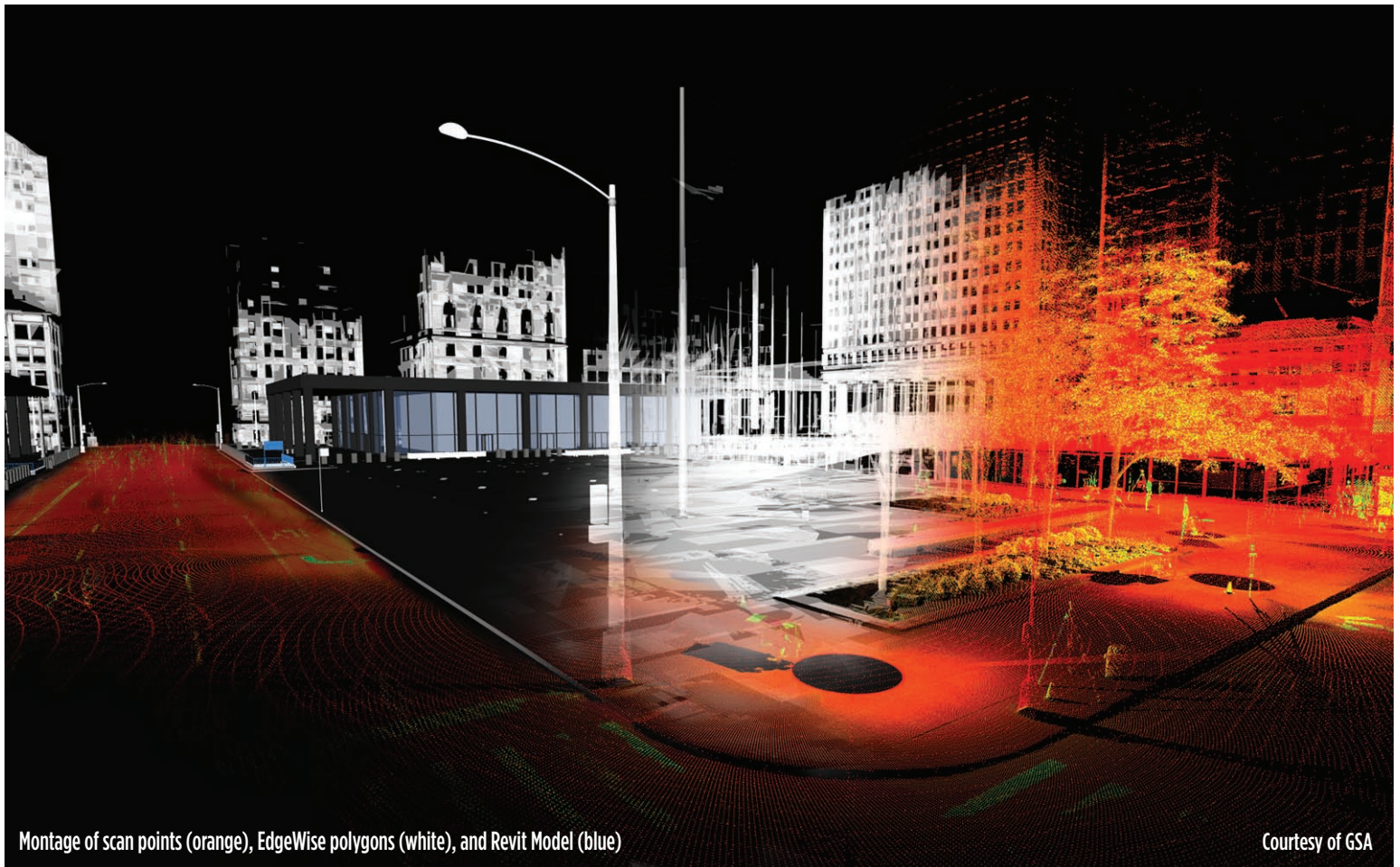
- Eliminated redundant modeling step for creation of BIM data
- Gave design team access to data much faster
- Minimized overall modeling effort

**Overview:** Ghafari Associates recently created a Revit model of the Chicago Federal Center under a compressed timeframe in order to facilitate the design of the restoration process. To capture the as-built information required, Ghafari collected over 500 laser scans covering the more than one million square foot plaza and sub-levels. Once the scans were registered, EdgeWise™ was used to automatically extract planar surfaces, which were then brought into Revit to create the final model.

**Ghafari Company Profile:** Ghafari Associates, LLC (<http://www.ghafari.com>) is a fully-integrated architecture, engineering and consulting firm with diverse experience and offices around the world. Ghafari is recognized as an industry leader in applying 3D BIM, laser scanning and Integrated Project Delivery principles across the design / fabrication / construction value stream, and has helped numerous clients achieve breakthrough project results.



Courtesy of GSA



Montage of scan points (orange), EdgeWise polygons (white), and Revit Model (blue)

Courtesy of GSA

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**Project Background:** Under an IDIQ contract with the US General Services Administration's Great Lakes Region, Ghafari was selected to design the restoration of the Chicago Federal Center Plaza. The Federal Center was designed by Mies van der Rohe in the 1960s and is home to Alexander Calder's steel sculpture, "The Flamingo".

At the plaza level, the restoration of the plaza deck / roof requires the removal of the existing waterproofing system and the installation of a new system with improved thermal insulating properties to increase energy efficiency. This process also requires the removal and reinstallation of approximately 130,000 sq. ft. of granite pavers and a new plaza drainage system. The plaza level work also includes the restoration of various plaza components, such as the Calder sculpture, vehicle ramps, benches, landscaped planters, security bollards, handicapped curb ramps and associated work. Sub-plaza levels also require multi-discipline renovations.

**Field Collection:** Ghafari's laser scanning teams used a Leica 6000 phase-based scanner to collect 500 scans. This work was carried out over a period of thirty days using teams of two people at a time. The scanning was performed at night to prevent interruption of normal work activity as well as to eliminate as much pedestrian "noise" as possible from the scan data. The data collected from these scans would serve as the basis for Ghafari's design team generation of Revit models and drawings for the plaza restoration.



**Point Cloud Processing and Revit Modeling:** Due to the project's compressed schedule, Ghafari's modeling team began creating the Revit model in parallel with the scanning effort using existing 2D drawings of the plaza and sub-levels. Despite inaccuracies in these older 2D drawings from the 1960's, they still provided a starting point that could be updated by the scan data.

As the scan data came in from the field, it was first registered using Leica Cyclone. Next, EdgeWise™ was used to automatically extract rectilinear, Revit-friendly .dxf polygons from the point clouds. These polygons were directly imported into Revit, skipping an entire manual modeling step that was traditionally one of the most time-consuming processes associated with scan-to-Revit modeling. Once these EdgeWise™ polygons were in Revit, the modelers could then either adjust their existing models (from the 2D plans) or build new features directly on top of the EdgeWise™ polygons. Finally, NavisWorks was used to validate the resulting Revit model against the point cloud.

*"EdgeWise™ allowed our team to significantly improve point cloud to Revit data and work flow efficiencies. The EdgeWise polygons from the 500 scans gave our team a quick way to create surfaces and model only what was needed – when it was needed – to support design-side delivery dates."* - Bob Mauck, Ghafari Associates

**Benefits:** Without EdgeWise™, the design team would have had to manually model the observed surfaces in the point cloud, take the results into Revit, and model it all over again to create the BIM data. EdgeWise™ allowed Ghafari to eliminate the duplicate modeling effort by automatically creating polygon models that could be directly used within Revit. This gave the Revit design team access to the data much faster and minimized the overall modeling effort, significantly reducing scan-to-model costs.

