

STRUCTURAL DESIGN HELPS DUKE WIN COVETED GE OFFICE PROJECT

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Duke Realty Corporation is completing construction of a 400,000 sq ft built-to-suit office campus for GE Aviation (a unit of General Electric Corporation). The project, one of the most competitively sought design build projects in the region, includes two L-shaped 200,000 sq ft four-story tilt-up buildings. To help Duke win this project, Steven Schaefer Associates engineers Greg Riley and Ryan Konst worked with Duke subcontractors Lithko Concrete Contracting and [George Steel Fabricating, Inc.](#) to find the most economical design. Schaefer's reputation for willingness to work with contractors to optimize the design is one reason Duke chose them to be the structural engineer for the project. "Duke has a very hands-on design process," notes Jay Smith of [Duke Realty Corporation](#). "Steven Schaefer Associates has adapted well to Duke's system and has provided solid engineering under sometimes demanding project constraints. We know when they are committed to a deadline they will deliver as promised."

Duke and Schaefer selected load bearing tilt-up concrete walls because of the many benefits that system provides – cost effective construction, easy to maintain, extremely durable, high insulation values, fire resistance, etc. But a four-story tilt-up building can provide some structural challenges.

Although always a concern, a four-story tilt-up building with 54-ft tall panels required additional considerations and attention to panel thickness and weight. The panel design process is a balancing act where the panel thickness needs to be sufficient for the panel to be lifted into place without damaging the panels but still thin enough that a crane can efficiently lift and place the panels. In some instances panel thicknesses are increased for architectural reasons. In this project, the architect desired a very thick panel between the main entry windows to provide bold shadow lines. The resulting panel weight for the taller 62-ft tall entry panel was too much for the crane at the job site to lift so the panel was cast and erected in two parts, and stitched together at a floorline.

The tilt-up drawings Schaefer provided for this project included all the architectural reveals, mechanical penetrations, embed plates, lifting inserts, and reinforcing. By coordinating and consolidating all of this information from multiple disciplines into a single panel drawing, Schaefer was able to help the various sub-contractors work more efficiently, reduce field errors, and meet an aggressive schedule.

The two buildings for GE Aviation used no interior bracing or moment frames and had no columns against the exterior walls. The concrete tilt-up walls were used for support of gravity loads and the lateral stability of the building. The L-shape of each building required an expansion joint between one wing and the core. Schaefer provided the fabricator and contractor multiple floor framing designs to help them choose the most economical system. Although George Steel prefers to use composite steel beam framing, which is frequently more economical for multi-story offices, they selected a panelized bar joist floor system based on market conditions at the time. Jim Graham, the project manager for George Steel said "The teamwork and communication between Steven Schaefer Associates and George Steel worked very well. In addition to designing the most economical members, Greg Riley sat down with me and together we evaluated every connection relative to strength, price and constructability."

On the new GE Aviation office campus, the effective use of tilt-up construction and optimized steel framing provided the owner with a cost-effective project in the time-frame they desired. "Steven Schaefer Associates has been a true team player over the last five years. They have been an invaluable member of our design build delivery team and have helped us deliver efficient structural systems for several office and industrial projects" says Jay Smith of Duke.