ENTRY FORM

DVASE
2019 Excellence in Structural Engineering Awards Program

PROJECT CATEGORY (check one):

Buildings under $5M		Buildings Over $100M	x
Buildings $5M-$15M		Other Structures Under $1M	
Buildings $15M - $40M		Other Structures Over $1M	
Buildings $40M - $100M		Single Family Home	

Approximate construction cost of facility submitted:	$180 million
Name of Project:	East Market Mixed Use Development/ Girard Square
Location of Project:	Philadelphia, PA
Date construction was completed (M/Y):	Phase 1: 4/2018 Phase 2: 11/2018
Structural Design Firm:	The Harman Group
Affiliation:	**All entries must be submitted by DVASE member firms or members.**
Architect:	BLT Architects
General Contractor:	Phase 1: Tutor Perini Phase 2: Clemens Construction

Company Logo (insert .jpg in box below)

Important Notes:

Please .pdf your completed entry form and email to bsagusti@barrhorstman.com.

Please also email separately 2-3 of the best .jpg images of your project, for the slide presentation at the May dinner and for the DVASE website. Include a brief (approx. 4 sentences) summary of the project for the DVASE Awards Presentation with this separate email.

Provide a concise project description in the following box (one page maximum). Include the significant aspects of the project and their relationship to the judging criteria.

PHASE 1

Due to the boom in residential high-rise construction in Philadelphia, rising concrete construction cost motivated the project team to consider alternatives. This led to the all steel frame construction of East Market. The first phase delivered a residential tower, two multi-story retail podiums, a renovated mixed-use office building, and below-grade parking with a centralized loading dock.

Located on the corner of 11th and Market Streets, The Ludlow, a 230-foot-tall, 400,000 square foot tower, uses 3,500 tons of structural steel to frame two below-grade levels for parking and back-of-house use, and two floors of retail topped with 15 floors of apartments. The all-steel framing allows for flexible retail layouts and provided economical floor-to-floor heights in the apartment tower by incorporating plank-on-steel construction.

The first structural challenge tackled with any vertical mixed-use facility is the column grid. Ideally, one column grid would serve the needs of the parking, retail and residential uses without transferring columns, as structural transfer levels are typically cost-prohibitive in the Philadelphia market. Given the goal of minimizing column transfers, the design team worked out a single column grid that accommodated all building uses while only transferring two of the 115 columns on the project, thus minimizing costs.

This project is somewhat unique for Philadelphia, as steel-framed buildings this size and height typically would have a concrete core. The team used a combination of concentric and eccentric braced frames and moment frames to provide stability for the tower.

The retail podium is braced entirely with concentric braced frames. Because of the high floor-to-floor heights in the retail podium, it wasn't financially feasible to continue the moment frames in the tower down through the retail spaces. In addition, the retail and parking layouts could not accept braced frames in the same locations as in the tower. The design team employed a lateral transfer level at the podium/tower interface to shift the lateral system from the tower into the podium. The lateral force transfer was achieved through a reinforced concrete diaphragm and a series of drag struts, taking the lateral loads out of the moment frames and braced frames in the tower and shifting them into the braced frames in the podium and parking levels.

PHASE 2

Just one year after the topping out of Phase I, Phase II, The Girard, a 23-story, 240-unit residential tower, soars 280 feet above the corner of 12th and Market Streets, 50 feet taller than the Phase 1 tower. Based on the success of the first phase, the same structural system approach was used in Phase II. The steel and plank framing scheme allowed the tower to be erected quickly in only 100 working days from start of erection to topping off, a pace better than one floor per week. The 240,000-square foot tower uses 1,750 tons of structural steel and sits on a steel podium built during Phase 1.

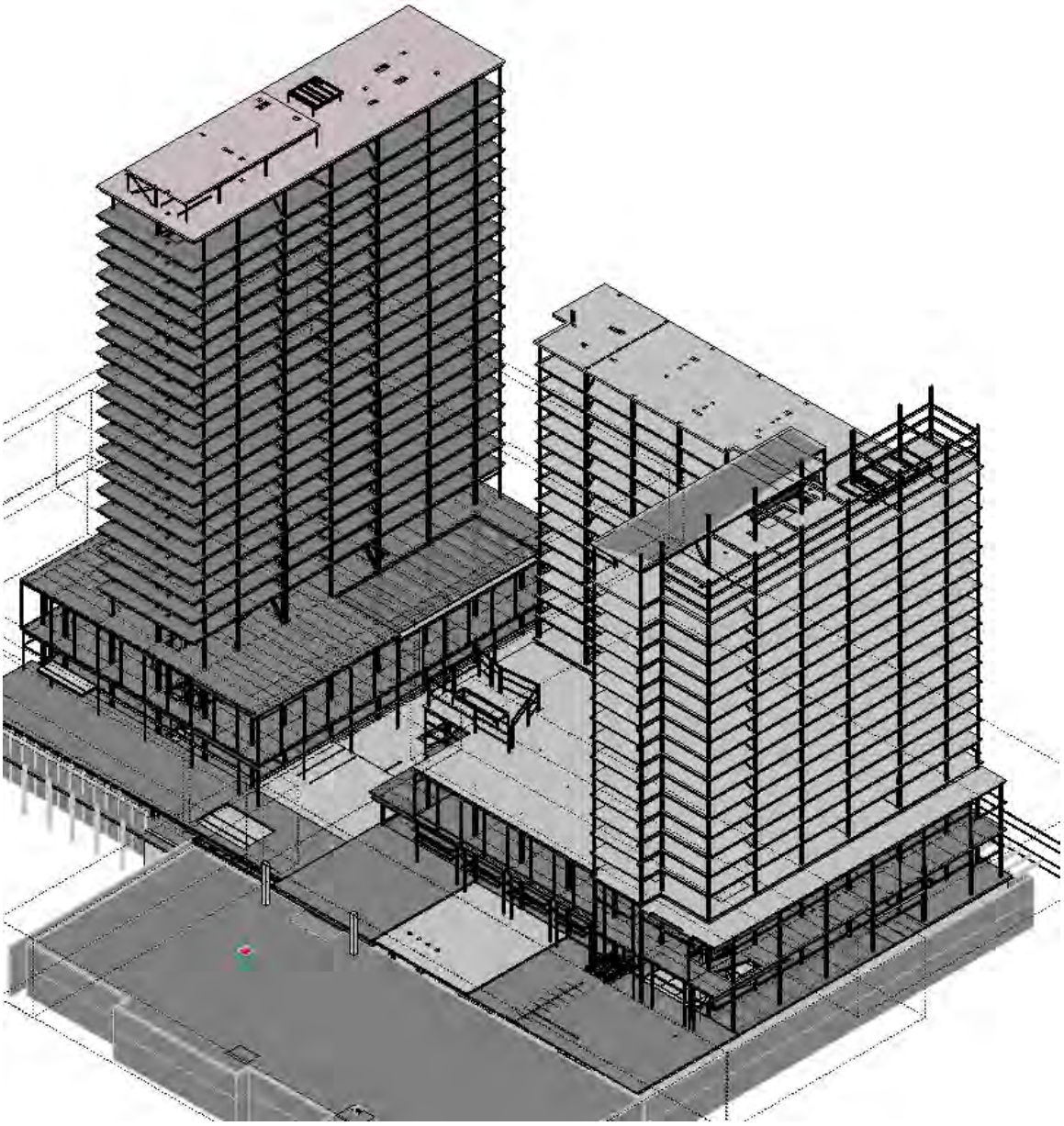
The structural team designed a steel "core" for the building, consisting of six braced frames that are continuous from the foundations to the top of the tower. The design also facilitated using the same column grid through the parking, retail and tower levels, thereby eliminating costly column transfers and helping the project stay on budget.

With the use of the steel lateral system and floor framing, The Girard currently stands as the second tallest all-steel residential building in Philadelphia since the introduction of the International Building Code.

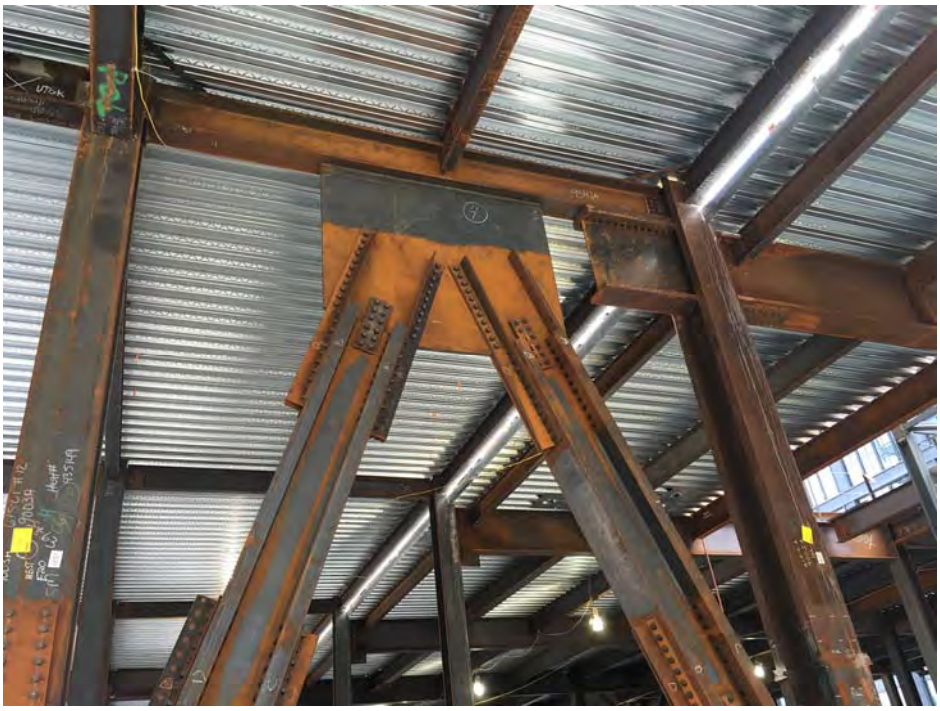
Using precast plank floor system for this height of construction provided design challenges related to lateral force transfer in the floor diaphragm and bracing of the columns. Some of the perimeter column loads at the base of the tower are on the order of 1,600 kips (factored). Where beams did not frame into the columns in both directions, the team was not comfortable relying solely on the plank to brace these heavily loaded columns. The solution was to bury a tension tie in the top of architectural walls. These tension ties connected the exterior columns to an interior column, which in turn would be braced by the buildings' lateral system. In addition, the spandrel beams were tied together to create a tension/compression loop at the perimeter that allowed the spandrel beams to act as the tension/compression diaphragm steel to help the diaphragm span laterally from the perimeter of the building to the lateral core.

Alongside of the renovations of multiple historic buildings on this site, the total project forms a full city block, creating a catalyst for the redevelopment of the historic retail corridor of center city Philadelphia. The introduction of residential and new retail to this site has spurred major retail renewal and other residential development east of City Hall along the city's main east-west thoroughfare, Market Street.

The following 5 pages (maximum) can be used to portray your project to the awards committee through photos, renderings, sketches, plans, etc…



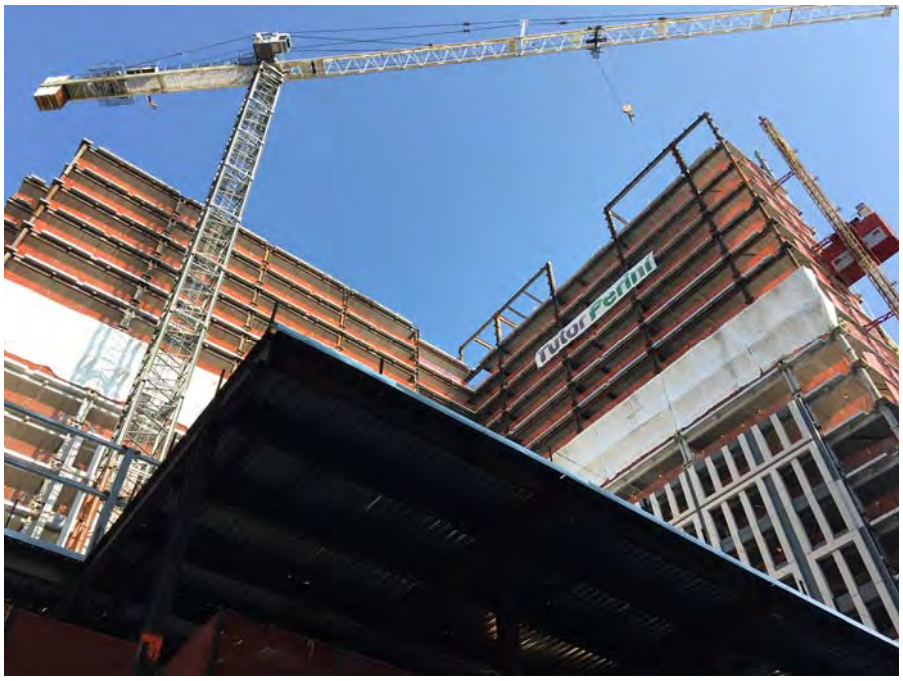
Rendering of Phases 1 and 2 of the East Market Project showing the two retail podiums and two apartment towers.



Phase 1 Braced frame with lateral drag connection shown on the upper right to transfer lateral forces from the tower to the podium.

Phase 2 braced frame column splice at the 4th floor. Note beam penetrations for getting utilities into the units.

Phase 2 – Note eccentric braced frame to accommodate the central corridor as well as the beam penetrations to allow utilities to run in the corridors.



Phase 1 Topping Off

Phase 2 tower Topping Off

Phase 2 tower nearing completion

By signing, signatory agrees to the following and represents that he or she is authorized to sign for the structural design firm of record:

All entries become the property of DVASE and will not be returned. By entering, the entrant grants a royalty-free license is granted to DVASE to use any copyrighted material submitted.

If selected as an award winner, you may be offered the opportunity to present your project at a DVASE breakfast seminar. Would you be willing to present to your colleagues? ☑ ***YES*** ***NO***

Submitted by:

Print name: Jan Vacca	**Signature:** 	**Date:** **3/27/19**

Submitting Firm:	**The Harman Group**	
Mailing address:	**900 West Valley Forge Road, Suite 200** **King of Prussia, PA 19406**	
Telephone: **610-337-3360**	**Fax:** **610-337-3359**	**Email:** **jvacca@harmangroup.com**