ENTRY FORM

DVASE
2019 Excellence in Structural Engineering Awards Program

PROJECT CATEGORY (check one):

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

Approximate construction cost of facility submitted:	$77,600,000
Name of Project:	Perelman Center for Political Science and Economics, University of Pennsylvania
Location of Project:	Philadelphia, PA
Date construction was completed (M/Y):	September 2018
Structural Design Firm:	Keast & Hood Structural Engineers
Affiliation:	**All entries must be submitted by DVASE member firms or members.**
Architect:	KPMB Architects
General Contractor:	Hunter Roberts Construction Group

Company Logo (insert .jpg in box below)

KEAST & HOOD
STRUCTURAL ENGINEERS

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.

Keast & Hood provided structural engineering for the creation of a unified 7-story academic building at the University of Pennsylvania. The project included renovation of the existing 54,440SF West Philadelphia Title and Trust Co. building built in 1925 and the construction of a new 56,700SF addition to the north.

The project includes a 120-seat auditorium, classroom space, undergraduate meeting rooms, as well as offices for faculty. It also features a 30-foot cantilevering feature stair, comprised of architecturally exposed structural steel that connects three floors.

To create a unified academic building, the decision was made to construct the new addition using concrete. Concrete allowed for thin, flat-plate floors that enabled alignment with the existing building's shallow 12'-0 floor to floor elevations for seamless transitions between the two structures. Architecture firm KPMB celebrates the building material with exposed concrete columns at the both the interior and exterior.

The addition is founded on a combined system of large reinforced concrete spread footings and deep foundation concrete caissons. A heavily reinforced 54" thick concrete mat slab with 8 tie-down rock anchors counteracts the uplift forces anticipated at the base of the reinforced concrete shear wall tower. Reinforced concrete shear walls for the building's lateral system, with a series of concrete columns supporting the flat plate floor system, create the balance of the addition's structure.

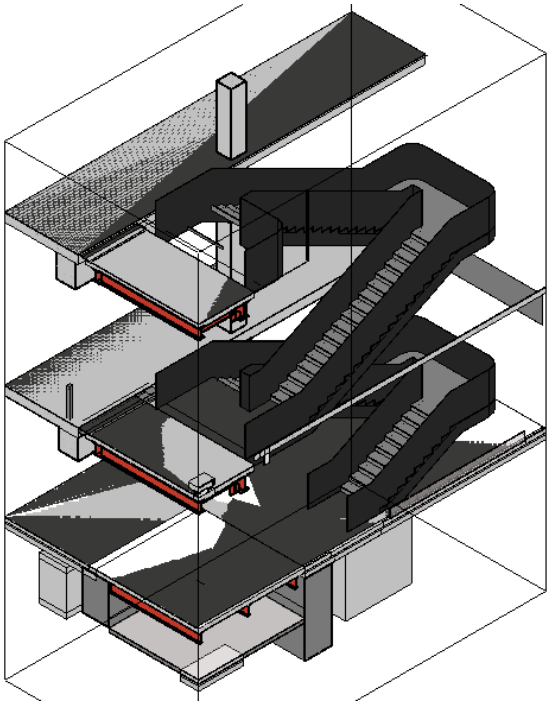
One major exception to this system exists due to the large, open auditorium at the basement level. To accommodate the open layout, two story high trusses were introduced to clear-span over the space, bearing on enlarged concrete piers at the ends of the building's shear walls. These steel transfer trusses support the flat plate concrete floor structure of the first, second, and third floors, as well as concrete columns that were detailed to post up from the top chords of each truss. Engineers detailed the concrete to tie into top and bottom chords of the trusses. A unique aspect of this project included the higher degree of coordination between steel and concrete contractors on one building.

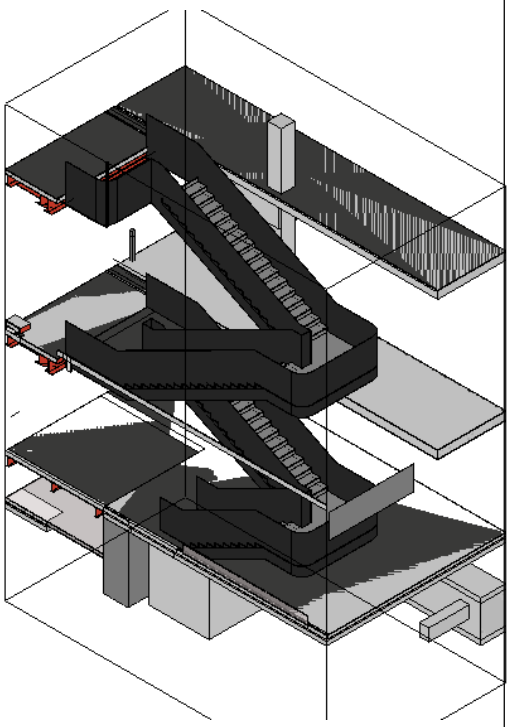
Utilizing a flat plate structure, engineers pushed the slab design to the limits to maximize column layout spacing. Stud rails were heavily used in lieu of drop caps at columns for a constant flat slab elevation. Columns are pulled back from the curtainwall face, creating a thin slab edge and producing significant cantilevers with shallow slab profile - a significant architectural feature in addition to the exposed architectural concrete columns. An unexpected benefit of the concrete structure, it proved easy to coordinate with the construction of the glass curtainwall using embedded halfen anchors within the face of the slab edge.

At the Interface of the new and existing building, engineers designed a creative corbeled bracket system. The reinforced concrete bracket at the expansion joint re-supports the new floor infill within the existing building, bridging over the expansion joint and utilizing a slide bearing connection. At one of these large brackets, engineers designed a 16"x42" wide opening within the beam to serve as the main corridor distribution from the existing structure servicing the new addition for MEP.

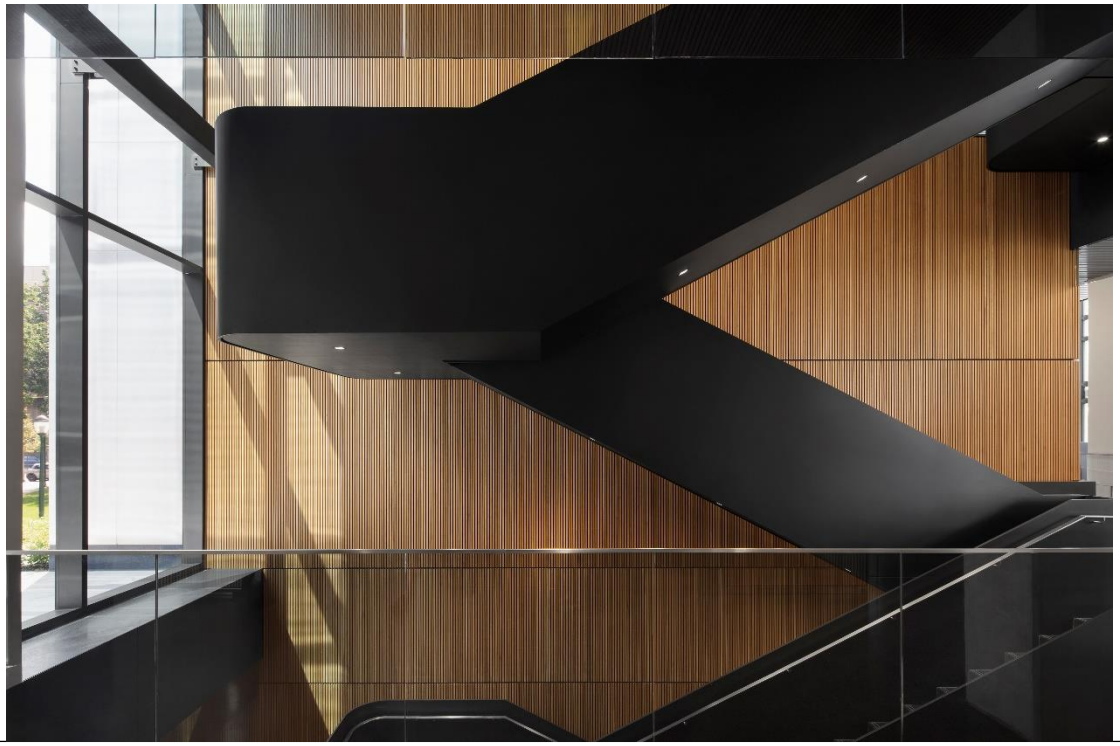
- The following 5 pages (maximum) can be used to portray your project to the awards committee through photos, renderings, sketches, plans, etc…

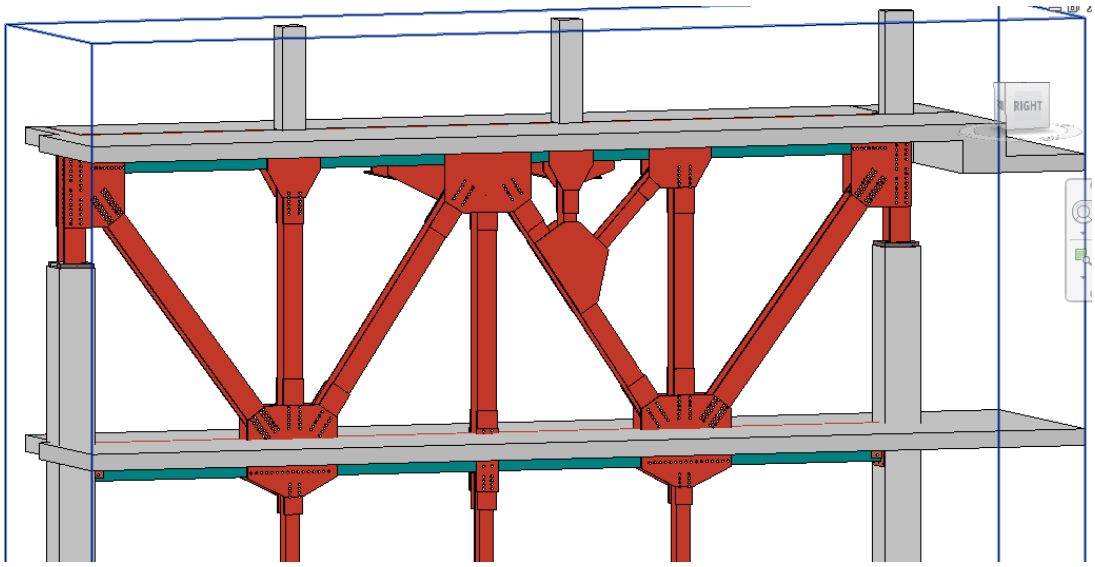
Engineers had to provide retention and supplementation of the existing historic building's structure. For the addition, thin, flat-plate floors align with the existing building's floor elevations for seamless transitions between the two structures.





The monumental stair is a 30-foot cantilevering feature, comprised of architecturally exposed structural steel that connects three floors. The stair guards double as the structural stringers and are constructed using ¾" to 1" thick steel plates, roughly 60" tall, left exposed to highlight the stair's robust construction and provide an industrial quality. Hidden above the stair ceiling are horizontal HSS trusses created to stiffen the stair structure.





To accommodate the open layout, 120-person auditorium at the basement level, engineers designed two, story high trusses to clear-span over the space, bearing on enlarged concrete piers at the ends of the building's shear walls.

These steel transfer trusses support the flat plate concrete floor structure of the first, second, and third floors, as well as concrete columns that were detailed to post up from the top chords of each truss.

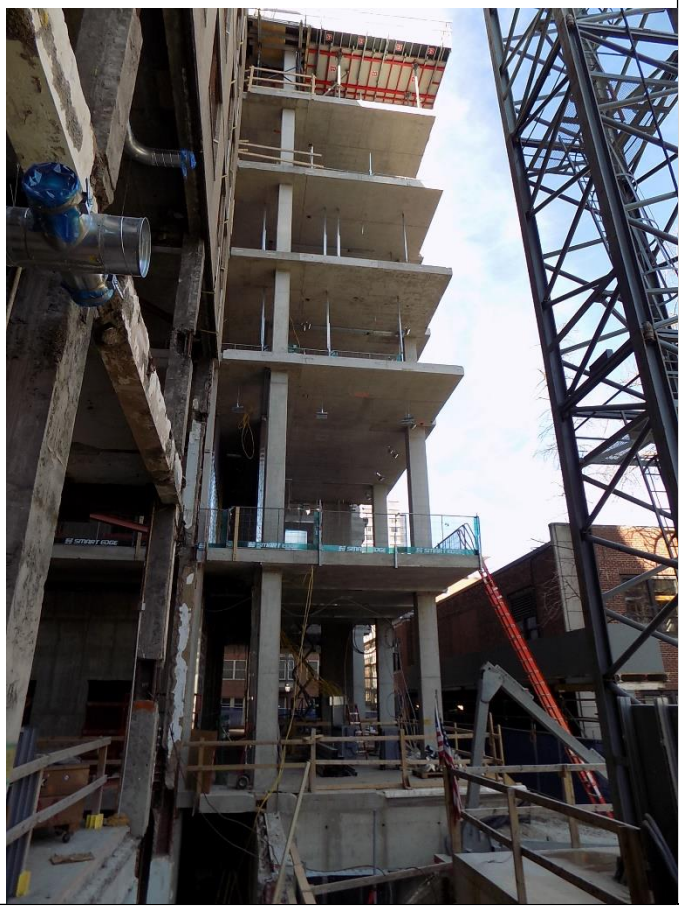
A unique aspect of this project included the necessary coordination between steel and concrete contractors on one building.

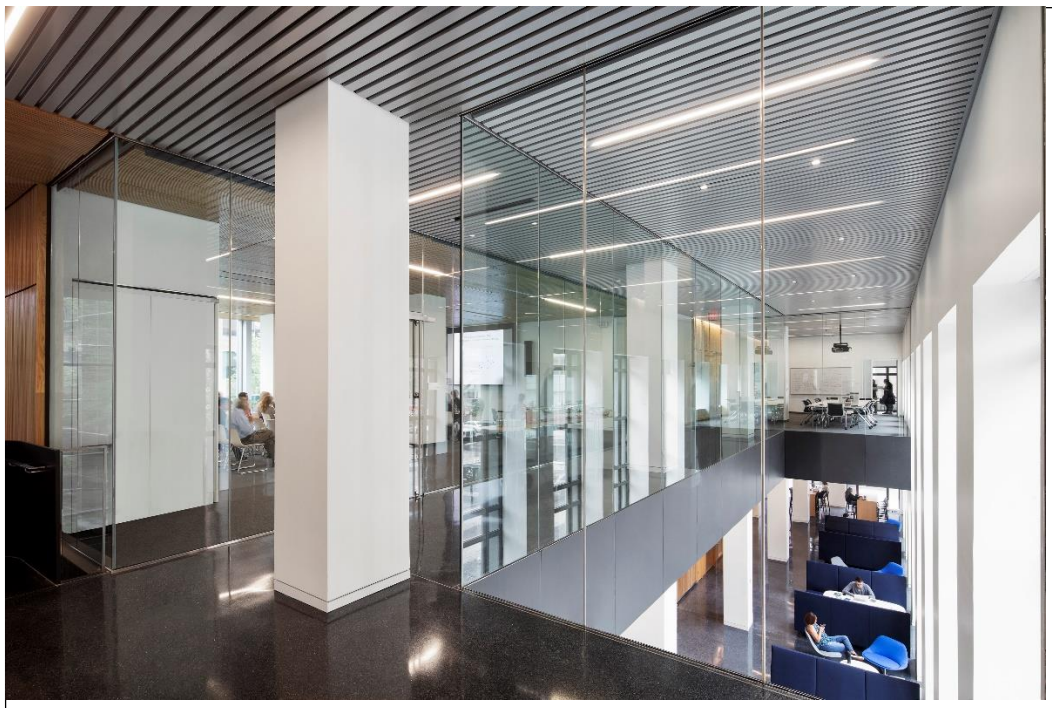
Phasing was important and it was a successful example of the two building types working together on one site.

At the end of the building's construction, steel came back onto the site at the roof level, for a steel framed roof over the mechanical penthouse.

Above: The large opening in a massive concrete transfer beam to serve as the main corridor distribution from the existing structure to the new addition for MEP. Engineers worked with the MEP consultant to allow distribution without coordinating around beams, detailing the reinforcement of the concrete transfer beam to provide for a 16”x42” wide opening.

Right: Columns are pulled back from the curtainwall face, creating a thin slab edge and producing significant cantilevers with shallow slab profile - a significant architectural feature in addition to the exposed architectural concrete columns.





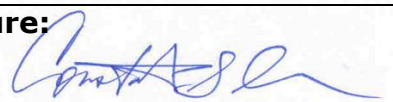
The final project creates a unified home for the Perelman Center for Political Science and Economics, seamlessly combining the historic 1920's building and the modern addition into one vital asset for the university that promotes transparency and allows for collaboration amongst students, faculty, and staff.

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 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: Constantine G. Doukakis, PE	**Signature:** 	**Date:** 3/18/2019
Submitting Firm:	Keast & Hood Structural Engineers	
Mailing address:	400 Market Street, Suite 1250, Philadelphia, PA	
Telephone: 215-625-0099	**Fax:** 215-625-9408	**Email:** apopovic@keasthood.com