ENTRY FORM

DVASE
2021 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:	**$100+ million**
Name of Project:	**New College House West - UPENN**
Location of Project:	**40th & Walnut Street, Philadelphia, Pennsylvania**
Date construction was completed (M/Y):	**April 2021**
Structural Design Firm:	**CVM**
Affiliation:	**All entries must be submitted by DVASE member firms or members.**
Architect:	**Bohlin Cywinski Jackson**
General Contractor:	**INTECH**

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 annual virtual presentation 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.

At approximately 250,000 SF, New College House West (NCHW) located at 40th and Walnut Street, will provide over 430 beds for students, as well as faculty apartments, for those attending the University of Pennsylvania. NCHW will house student rooms in suite arrangements, as well as support college house functions such as a coffee bar, dining area, seminar and study rooms, a living room, and a fitness room.

The U-shaped complex includes a 13-story tower with penthouse along Walnut Street and two low-rise 5-story wings projecting to the south, with the western wing tight to the existing Walnut Street West Library. The two low-rise wings are connected with a one-story dining pavilion with an elevated exterior terrace and exposed fire-trol columns. The structural system for the tower and low-rise wings consists of hollow core precast plank and steel beams utilizing the girder-slab system for the interior slab support to maximize the clear distance of floor to floor heights with MEP coordination. The precast plank is designed to cantilever 4'-6" to create bay windows beginning at the 3rd floor of the low-rise wings along with plank cantilevering in various locations within the tower. The lateral system consists of steel braced frames in the tower and a combination of steel braced frames and moment frames in the low-rise wings, with a total steel weight of approximately 1400 tons. The foundations are supported on 129 caissions ranging from 3'-0" diameter up to 6'-0" diameter with a maximum design compression load of approx. 2000 kips and uplift design loads of approx. 1100 kips.

With an aggressive construction schedule, the owner, design team, and contractor engaged in a Design Assist process early in design with both the metal panel and curtain wall manufacturers. This approach proved to be extremely valuable as preferred details were coordinated early on in the design process and incorporated into the Construction Documents, including the correct loading on the structure based on one, two or three story tall prefabricated facade panels as well as coordinating connection details between the delegated designs of the prefabricated wall panels and precast plank.

CVM was able to respond to various structurally challenging areas of NCHW while achieving BCJ's vision. This includes the 11 story cantilevered stair at the northwest corner of the Tower. Careful coordination between CVM, BCJ, and the curtain wall manuf. was required to not only meet the vibration concerns for the cantilevered stair but also the curtain wall deflection criteria. The steel frame was bent to follow the profile of the stair to aid in hiding the stair structure when viewed through the curtain wall.

This was not the only challenging stair on the project. A slate tread monumental stair with an offset singular cantilevered column with cantilevers in 3 directions spans between the first and second floors of the Tower. With the offset cantilevered column support, not only was vibration a concern, the eccentric loading due to an unbalanced loading condition was also a key factor in the design. A dynamic analysis of the stair was performed to confirm vibrations would not be an issue following AISC Design Guide 11, 2nd edition.

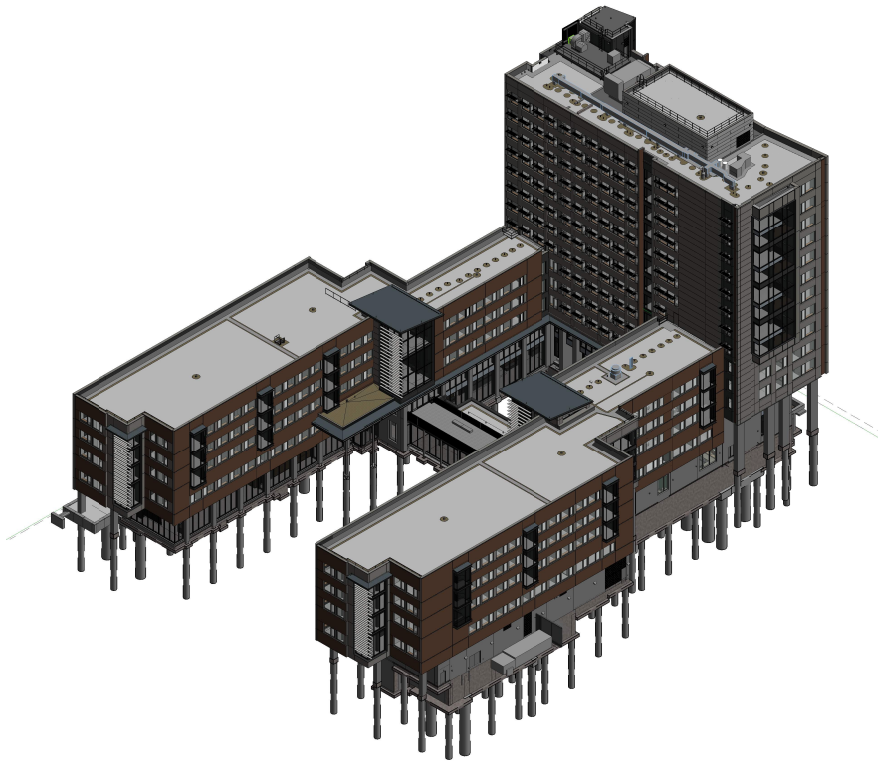
The architect had a vision for the sloped roofs at the "knuckles" of the low-rise wings in which the structural column was held back from the curtain wall system while having a large, thin roof overhang. This resulted in a double 8'-0" cantilever in both directions where the support steel is hidden in the plane of the roof deck to provide the thin roof overhang profile desired.

An even more impressive roof cantilever occurs at the main entrance along 40th street and the desire to not have an exterior column aiding in the large canopy. In this situation, another double cantilever roof was provided which extended 16'-0" & 7'-0", with a thin roof profile required. CVM took advantage of the ballasted roof on the back-span and used an upturned beam with the roof assembly/curb to provide the adequate stiffness required for the aggressive double cantilever.

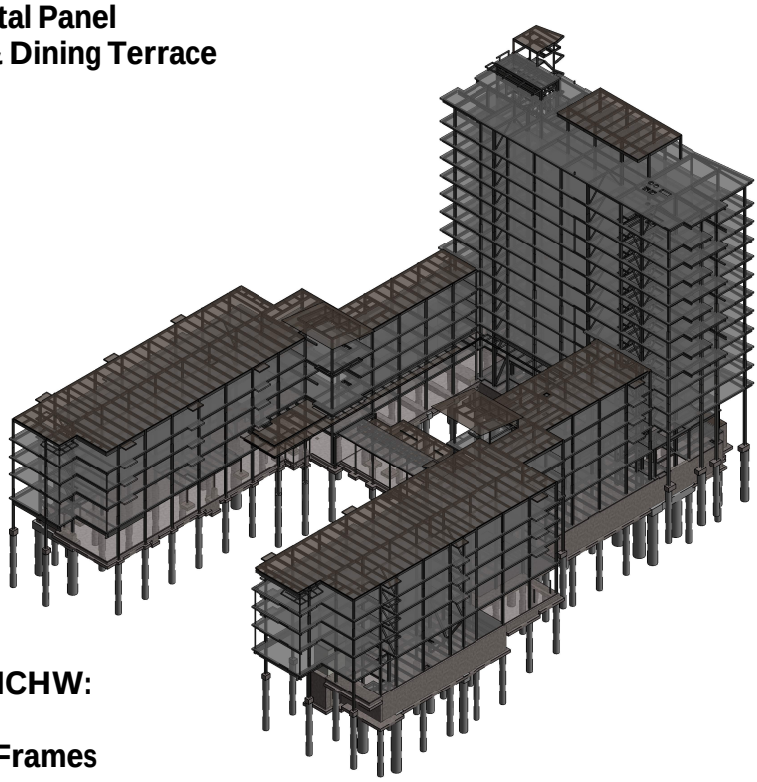
To create a more open feeling at the south end of the wings along Locust Walk, W26 & W33 transfer beams at the 2nd floor cantilever to the south provide support to 4 stories above for column free corners at grade to aid in pedestrian traffic. Careful consideration and coordination was required between the structural system and the metal panel and curtain wall systems from a vertical deflection standpoint as these panels were hung off of the transfer beams.

The success of this project was an entire collaborative team effort, especially between CVM, BCJ, and INTECH, to deliver the newest college house to the University of Pennsylvania, which is scheduled to open in the Fall of 2021.

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

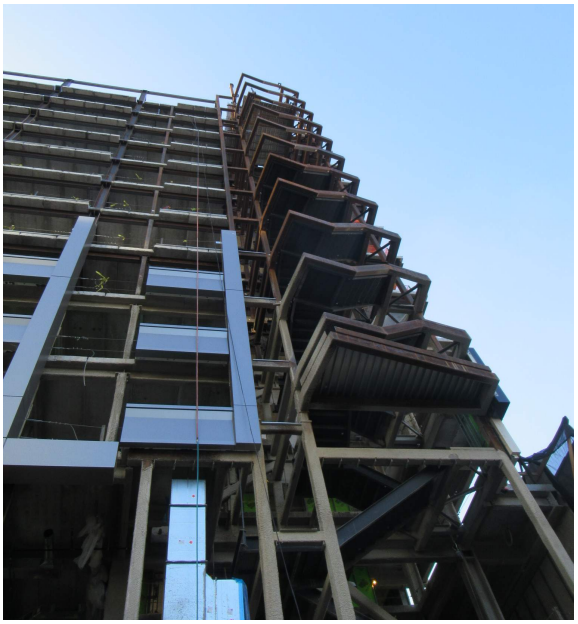


Revit Model of NCHW:
Facade: Curtain Wall & Metal Panel
Green Roofs on Low-Rise & Dining Terrace



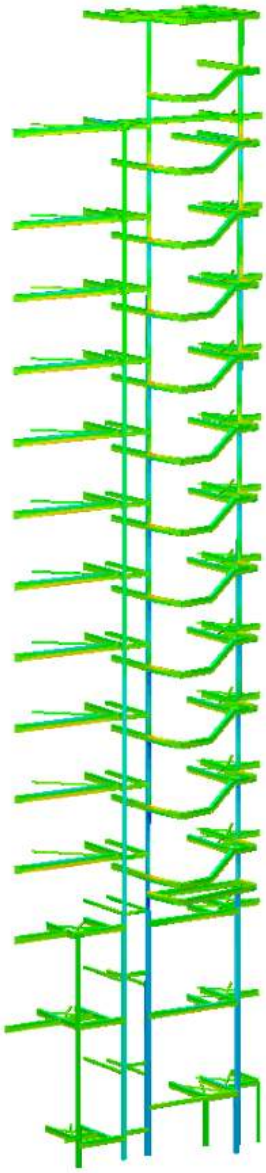
Structural Revit Model of NCHW:
Precast Plank & Steel
Braced Frames & Moment Frames
Caissons

View looking south: steel and metal panel erection (left) next to finished facade (right), both showing the cantilevered stair 3 stories above grade.

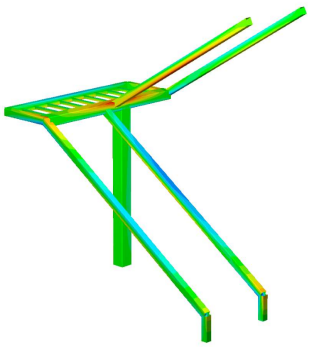


View looking up at cantilevered stair: steel framed (left) next to finished curtain wall facade (right)

Above: View looking up through the
middle of the cantilevered stair.
Right: Analytical Model of cantilevered stair.



Above: Monumental Stair - steel completed.
Right: Analytical Model of monumental stair.



Extended Canopy at Courtyard

Cantilevered bay and roof at low-rise "knuckle"

Left: View of Dining Pavilion connecting the low-rise wings.

Left: View of sloped cantilevered "knuckle" with exterior fire-trol porch columns

View of NCHW looking north across Locust Walk

Picture of NCHW from Webcam

NCHW looking southeast, adjacent to Walnut Street West Library

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:	**Signature:**	**Date:**
Jeffrey C. Pitchford, PE		3-26-2021

Submitting Firm:	CVM	
Mailing address:	1002 West 9th Avenue King of Prussia, PA 19406	
Telephone: 610-989-3800	**Fax:** 610-989-3677	**Email:** jpitchford@cvmprofessional.com