ENTRY FORM

DVASE
2022 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:	$65 Million
Name of Project:	Harvard University Adams House - Phase 1 - Claverly and Senior House
Location of Project:	Cambridge, Massachusetts
Date construction was completed (M/Y):	March 2021
Structural Design Firm:	CVM Engineers
Affiliation:	**All entries must be submitted by DVASE member firms or members.**
Architect:	Beyer Blinder Belle Architects and Planners
General Contractor:	Lee Kennedy Co. Inc.

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.

Harvard University Adams House - Phase 1, included the renovation of Claverly House and a smaller building, Senior House. These two historic buildings were joined to create a single dormitory that is over 46,000 square feet. The final building includes 120 beds, all en suite, along with a number of new multipurpose spaces for students to study or to meet for extra curricular activities. The existing mass masonry wall, wood framed, building was originally constructed in 1893 and had not been significantly updated prior to the 2019-2021 renovation.

Since the building was constructed in the late 1800s, only limited existing drawings of the building existed. In order to understand the structural system and produce structural framing plans, the building was surveyed over a number of years with over 100 wall and ceiling probes performed. It was determined that the typical structural floor system consisted of wood joists spanning to the exterior brick masonry wall and to an interior wood bearing wall. In most cases, the floor joists were also supported on intermediate wood bearing walls. These bearing walls stacked throughout the building and were supported on large timber beams at the lower levels. Since the architectural desire was to increase the size of bedrooms and also create open common spaces, the majority of the interior bearing walls were either removed or relocated.

In theory, rearranging intermediate bearing walls does not sound difficult, but there was significant coordination between all disciplines of the design team to find the best placement for new steel transfer beams and posts. These not only had to work from an architectural standpoint, but also from an MEP standpoint as all of the MEP systems were completely demolished and replaced in a new configuration. The MEP coordination proved to be difficult as the historic floor to floor elevations could not be altered. In most instances, the new steel beams were installed within the depth of the floor joists with MEP running below.

The higher set steel was ideal for MEP, but meant there would be a lot more shoring of the existing structure to get the steel installed. In each area where a new steel beam was installed perpendicular to the floor joists, the joists had to be cut and shored on each side. In most cases, this shoring had to extend down to grade as the floors below were not capable of supporting this additional load even under construction live loads. Even though all of the shoring was a delegated design, CVM was responsible for reviewing the shoring installed on site to ensure it complied with the approved shop drawings. In some cases, shop drawings were not provided, which made it a priority to review the shoring during site visits to ensure everything was properly supported to grade.

In addition to tight MEP coordination within the building, CVM was also tasked with supporting a generator and AHU on the roof of a wood framed building. This involved a number of new steel beams at the roof level and new steel posts to grade. During construction, the existing jack arch lintels over the existing openings were found to extend farther beyond the edge of masonry opening than anticipated. This meant that the new steel beams could not simply bear on the existing masonry wall and an alternate detail was required. The new detail varied between conditions and involved seat angles and channel lintels with post installed anchors.

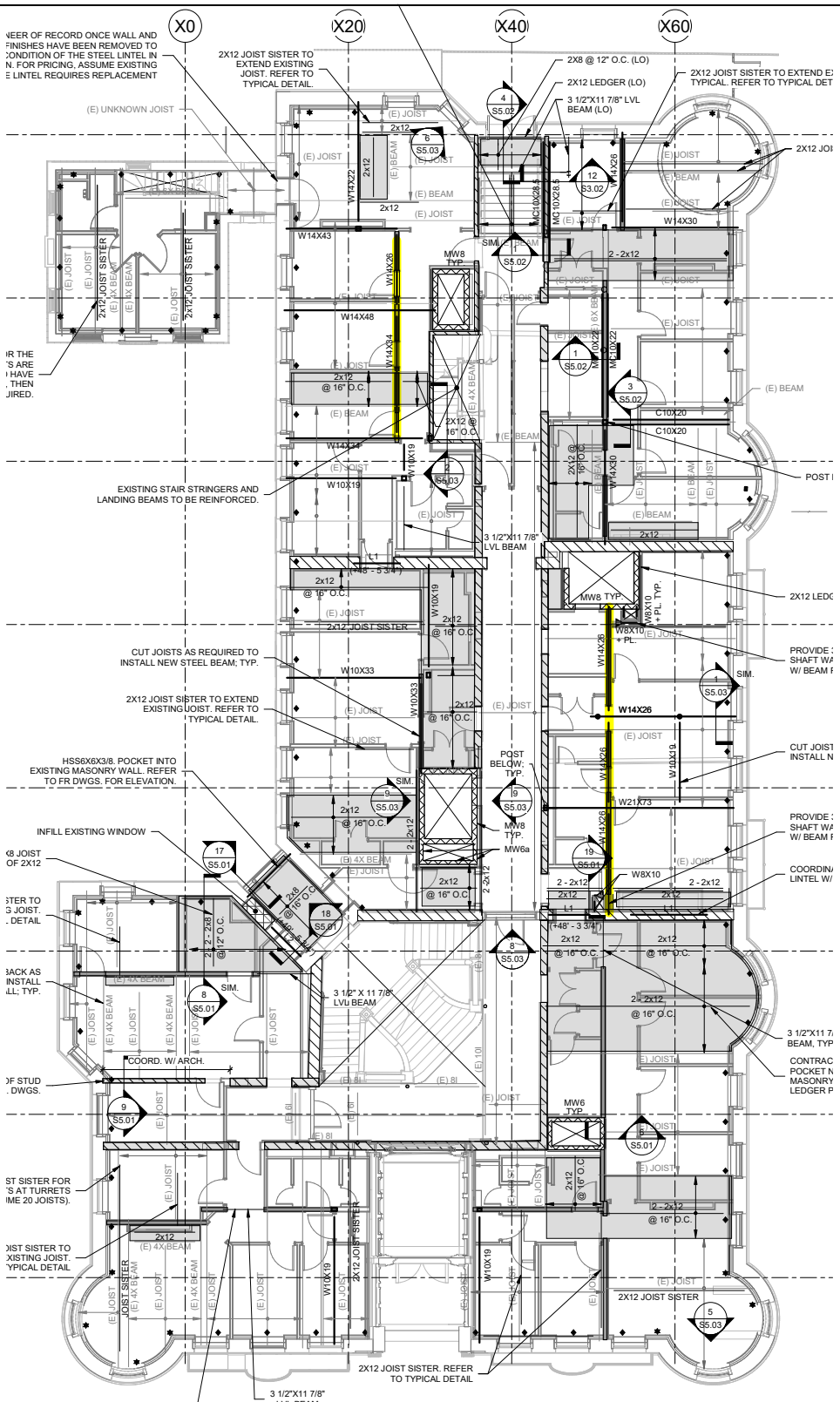
In addition to the exterior mass masonry walls, there are two interior masonry walls that historically acted as fire separation between the different areas of the building. All of the masonry walls are supported on massive granite block foundations. Since granite is a naturally sourced material, each block is a different shape and extends past the face of the brick masonry differently. This made constructing one of new elevator pits tricky due to its close proximity to one of the interior masonry walls.

During exploratory surveys, it was found that the granite block foundation extended 18" from the brick wall in the location of one of the new elevators. The area surrounding the elevator was very tight from an architectural standpoint and shifting the elevator away from the masonry wall by 18" was not an option. Not only was there an issue with the width of the granite foundation, but it was also discovered that the foundations under the interior masonry walls did not extend farther than 18" below the crawl space slab. Both of these issues ultimately lead to the decision to shore the existing masonry wall and remove the granite block foundations in the area of the new elevator pit.

CVM worked closely with the general contractor as well as the delegated shoring engineer to ensure the detailing and construction of this shoring went as smoothly as possible. The final shoring strategy included needle beam shoring the masonry wall and heavy duty pole shores. The contractor elected to step up and away from the excavation instead of utilizing sheeting and shoring as the lateral loads introduced from the pole shores would have exceed the capacity of wood lagging. The option to do any substantial sheeting and shoring was not possible due to the overhead constraints in the crawl space. In conjunction with the shoring, CVM detailed the new foundation under the existing masonry wall to be constructed in two parts, so that the first part could be installed while the shoring was in place and could then support the existing masonry wall while the rest of the elevator pit was constructed.

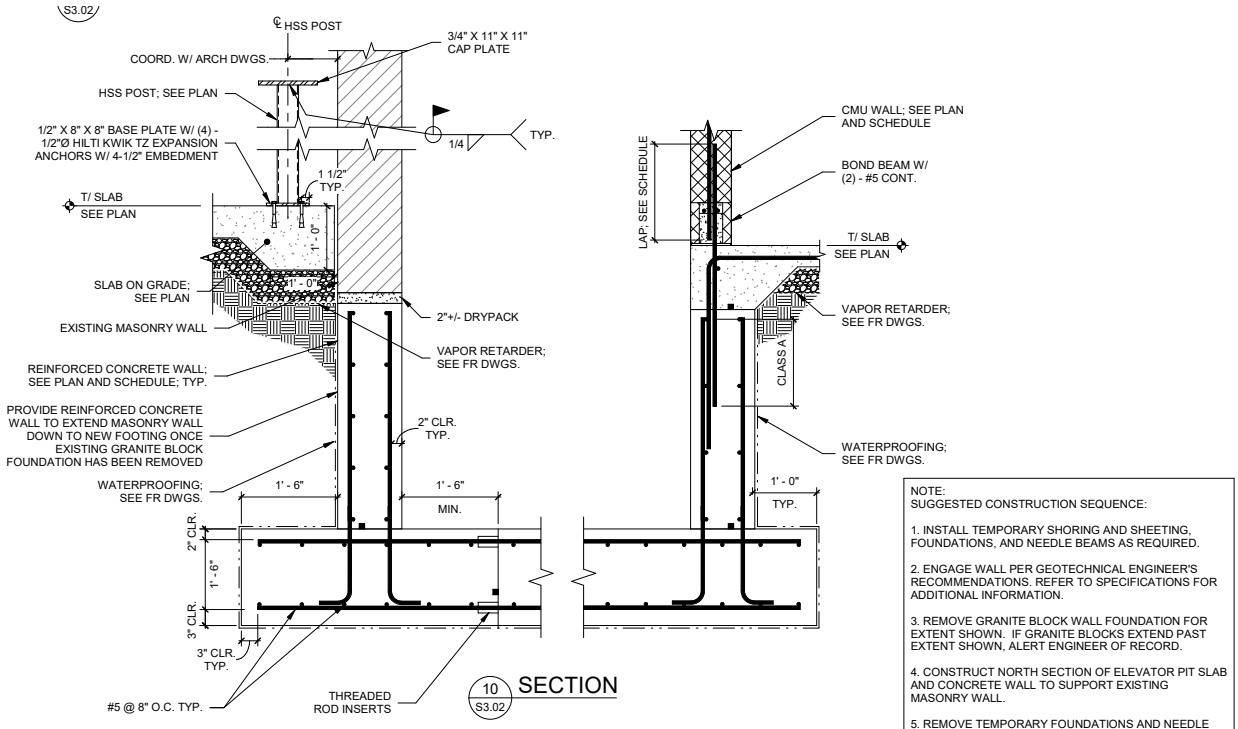
Even through all the challenges that the design team and contractor faced, the newly renovated Claverly House is a sight to behold. To us, the building looks even better today than it did in 1893 and now functions more appropriately as a dormitory for Harvard University. The structural surgery that was involved with creating the new floor plans is now hidden by finishes that are modern but pay tribute to the historic nature of the building.

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



1 S1.01 FIRST FLOOR FRAMING PLAN
1/8" = 1'-0"

Figure 1 - Lower floor plan showing some of the new steel installed to transfer the intermediate bearing walls that exists above.



NOTE:
SUGGESTED CONSTRUCTION SEQUENCE:

1. INSTALL TEMPORARY SHORING AND SHEETING, FOUNDATIONS, AND NEEDLE BEAMS AS REQUIRED.

2. ENGAGE WALL PER GEOTECHNICAL ENGINEER'S RECOMMENDATIONS. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.

3. REMOVE GRANITE BLOCK WALL FOUNDATION FOR EXTENT SHOWN. IF GRANITE BLOCKS EXTEND PAST EXTENT SHOWN, ALERT ENGINEER OF RECORD.

4. CONSTRUCT NORTH SECTION OF ELEVATOR PIT SLAB AND CONCRETE WALL TO SUPPORT EXISTING MASONRY WALL.

5. REMOVE TEMPORARY FOUNDATIONS AND NEEDLE BEAMS. INSTALL SHEETING AND SHORING AS REQUIRED. CUT DOWN HELICAL ANCHORS AS REQUIRED TO CONSTRUCT REMAINING PORTION OF ELEVATOR PIT SLAB.

Figure 2 - New work section through the existing masonry wall where the granite block foundations were removed. The foundation was poured in two sections to help act as shoring under the existing masonry wall, so that the needle beam shoring could be removed prior to finalizing the pit.

Figure 4 (Above) - Tempory needle beam shoring in place to support the interior masonry wall while the existing foundations were removed and replaced.

Figure 3 (Below) - Wall dowel bars sticking up from the 1st pour of concrete for the foundation under the masonry wall that supported this wall until the remaining pit was poured.

Figure 5 (Top left) - A new steel post to support new steel transfer beams with a number of shoring posts supporting the existing timber beams.

Figure 6 (Top right) - A sea of shoring posts to support both the existing timber beams that are being reconfigured and new steel beams prior to final connections.

Figure 7 (Middle right) - Upper level shoring shown on multiple floors for a stacked open. This shoring extended to grade.

Figure 8 - (Bottom right) - A future study nook showing the water infiltration prior to waterproofing which was installed on the exterior side of the wall. See finished space in Figure 11.

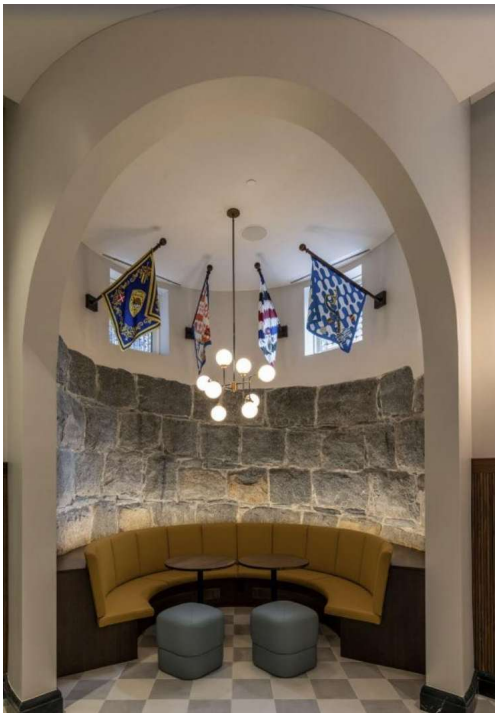


Figure 9 (Top) - Overall exterior shot of the front of Claverly House after all renovation work was completed.

Figured 10 (Bottom Left) - The main entrance doors into Claverly House showing the double high ceiling and ornate wood and plaster work that was all protected and restored.

Figure 11 (Bottom Right) - Inside one of the study nooks that shows the granite block foundations. This was was completely waterproofed from the exterior to keep the interior space dry.

Figure 12 - Elevator lobby at the elevator where the significant shoring took place to remove the existing foundations.

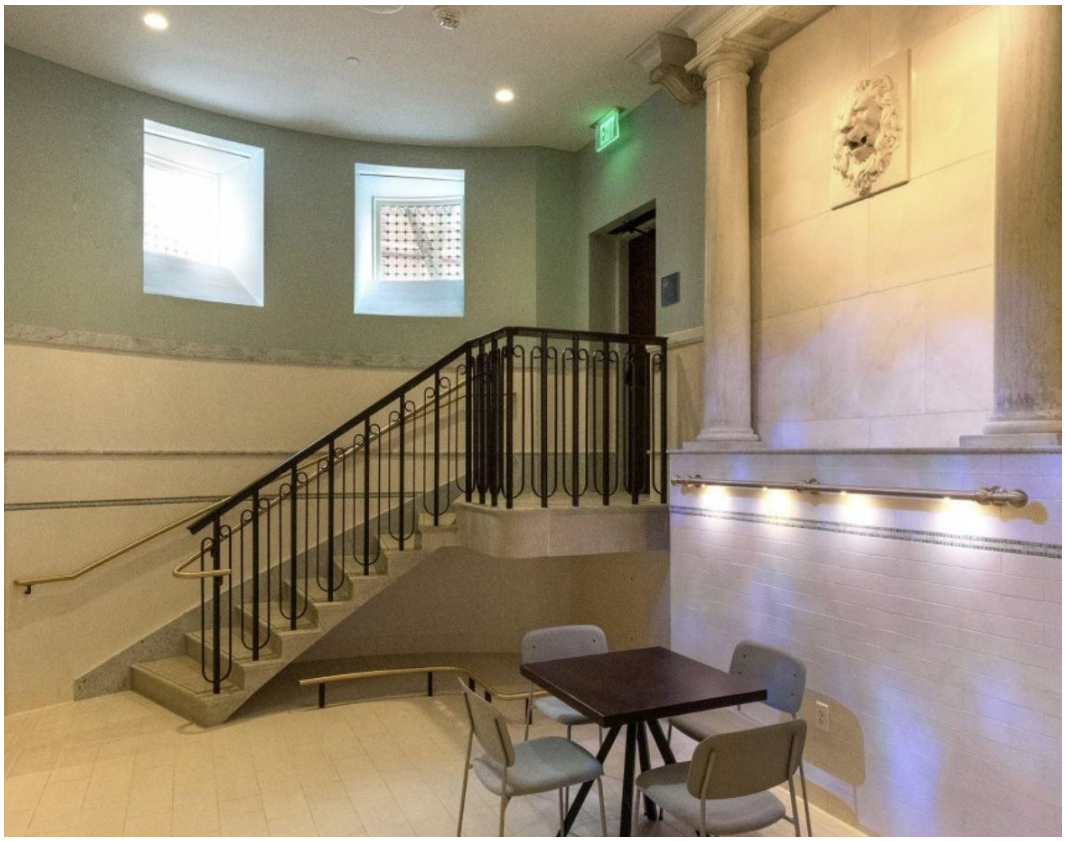


Figure 13 - A curved, cantilevered, precast concrete stair that was designed by CVM that leads into a new study area for students. This stair is mimicked from stone cantilevered stairs that have been constructed since the 1600's.

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:

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