## ENTRY FORM



### DVASE 2018 Excellence in Structural Engineering Awards Program

#### **PROJECT CATEGORY (check one):**

Buildings under \$5M	Buildings Over \$100M	Х
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:	\$175 million		
Name of Project:	House Renewal - Winthrop House		
	Harvard University		
Location of Project:	Cambridge, MA		
Date construction was completed (M/Y):	August 2017		
Structural Design Firm:	CVM		
Affiliation:	All entries must be submitted by DVASE member firms or members.		
Architect:	Beyer Blinder Belle		
General Contractor:	Consigli Construction Co., Inc and Lee Kennedy Company		

#### Company Logo (insert .jpg in box below)



#### Important Notes:

- Please .pdf your completed entry form and email to <u>bsagusti@barrhorstman.com</u>.
- 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.

In order to improve their residence life program, Harvard University is in the midst of a 15 year, one billion dollar House Renewal program. Winthrop House is the latest River House renovation to be completed. Winthrop House consisted of two Neo-Georgian buildings, Gore Hall 98,250 SF and Standish Hall 82,000 SF, originally constructed in 1914 as separate freshman dormitories along the Charles River. In the early 1930's the two buildings were renovated and combined to become John Winthrop House, part of Harvard University's newly developed House System.

Gore and Standish Halls are both U-shaped buildings 4 and 5 stories tall with full basements. The floor structure is a terra cotta flat arch tile system spanning between steel beams spaced anywhere from 4'-0" to 8'-0" on center, supported on brick masonry bearing walls and steel columns. Gore Hall is supported on shallow foundations that bear approximately 8' below the basement slab elevation. Standish Hall foundations are grade beams on wood piles. During investigative probing, it was found that the soil had washed away below a majority of the slab on grade in both buildings. The existing slab was cracking and settling unevenly throughout the basements.

The most significant impacts to the existing structure due to the renovations were the following:

- The existing slabs on grade at the east and west wings of Gore Hall and the east wing of Standish Hall were removed in their entirety. A field of micropiles were drilled within the basement spaces to support a two-way reinforced concrete / hydraulic slab spanning to the new micropiles.
- Hundreds of new mechanical duct and pipe shafts were inserted into the buildings. The location of mechanical openings and cores required meticulous coordination. Due to the nature of the flat arch tile floor structure the removal was required to extend the full span of the arch from beam to beam. To the best of our ability the shafts were arranged to remove as little terra cotta arch as possible.
- 47 chimneys were either re-constructed or repaired between the two buildings. As part of the building renovation, most of the chimney stacks were removed below the roof or attic floors. Due to historical society requirements, the chimneys had to remain above the roof line. The chimneys were resupported at either the roof or the attic level with new steel framing.
- New terraces and tunnels connecting the east and west wings at each building were constructed to provide both ADA access to existing entrances with ramps to grade and to create additional desired spaces within the buildings. At Gore, the new terrace provided for additional seating within the Dining area and was constructed with tube steel framing and slab on metal deck. At Standish, the area below the new terrace creates small gathering and study spaces. The Standish terrace is supported by various thicknesses of one-way reinforced concrete slabs on some tube steel beams and exterior bearing walls. To maintain the required elevations and slopes at the top of the terrace and floor level at the space below, the structure thicknesses were very limited in both buildings.
- New stair openings were framed out of steel at various levels throughout the building to support new metal pan stairs.
- Two elevators were added within Standish and one elevator was added within Gore. The reinforced CMU elevator walls were also designed as bearing walls to support the existing cut framing. The elevator pit slab was supported on micropiles and the concrete pits were designed to resist hydrostatic pressures from 5' to 8' of hydraulic head.
- The building was seismically retrofitted as required by the Massachusetts Amendments to the International Existing Building Code. The floor and roof diaphragms were tied to the existing masonry walls, which required coordination with the new mechanical openings and the existing structure layout.

Prior to renovation, Gore and Standish Hall's did not have sufficient bedrooms and some students had to reside in a different location on campus, which did not easily allow for the sense of community that is the forefront of the House System. It was of utmost importance that the House Renewal at Winthrop provide for more student rooms. To accomplish this, a new 23,150 SF, 5-story building was constructed connecting to Gore Hall. The new structure has two-way flat plate reinforced concrete floor slabs supported on reinforced concrete columns. The foundation for this structure is a 2'-0" thick mat slab supported at the level of good bearing soil, matching the foundation level at the adjacent Gore Hall. The deep mat slab allowed for a layer of stone to run mechanical piping below the desired finished floor elevation. The design water table elevation was approximately 8'-0" above the bottom of the mat slab, therefore a watertight system was very important. Because Beren connects to Gore at each floor level, the very tight floor to floor elevations of the existing building needed to be met. For this reason, the two-way flat plate concrete floor could minimize the floor to floor heights and maximize on the column spacing. A portion of the upper level of Beren Hall houses a common space with a very tall pitch roof and was structured with a steel frame. The upper concrete floor level also supports a very large generator that not only serves all of Winthrop House, but a neighboring House as well. The generator is screened with a mansard roof shaped screen wall, including fake dormers and a slate roof. The screen wall aids in blending the new building with the neo-Georgian character of the remaining Winthrop House structures. One of the more interesting challenges in the design and construction of Beren Hall was the sequencing of construction with surrounding buildings. During the construction phase of the project a historic wood framed house was temporarily moved and relocated onto a portion of the Beren Hall terrace before being relocated back to its new foundation.

After only 15 months of construction, the newly renovated Winthrop House, including the newly constructed Beren Hall, opened its doors to excited students, faculty and families in August 2017.

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



Imagery ©2018 Google, Map data ©2018 Google 20 ft 🖿

#### Winthrop House - Harvard University view looking North



Imagery ©2018 Google, Map data ©2018 Google 20 ft 🛽

Winthrop House - Harvard University view looking South toward the Charles River



New Steel installed at the roof to support repaired chimney with lower stacks removed. Installation is not quite complete.

New steel installed to support chimney rebuild masonry. Rebar welded to steel for fully grouted 8" CMU.

New steel installed to support chimney rebuild masonry.



Gore Hall Terrace under construction.



Standish Hall Terrace under construction.



Beren Hall two-way reinforced concrete mat slab pour

Beren Hall during construction with a house temporarily supported on the newly built terrace.



Gore Hall interior courtyard and new terrace.



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 XNO** 

Submitted by:

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