ENTRY FORM



DVASE 2018 Excellence in Structural Engineering Awards Program

PROJECT CATEGORY (check one):

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

Approximate construction cost of facility submitted:	\$800,000
Name of Project:	The Royal Theater Historic Facade Wall Bracing
Location of Project:	1520-36 South Street, Philadelphia, PA 19146
Date construction was completed (M/Y):	August 2017
Structural Design Firm:	Orndorf & Associates, Inc.
Affiliation:	All entries must be submitted by DVASE member firms or members.
Architect:	N/A
General Contractor:	G&M Efestos Contracting, Inc.

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.

For many years after its original construction, the Royal Theater stood as one of the major focal points of African American culture in Philadelphia. From 1919 until its closure in 1970, theater attendees passed through its tall arched lobby into an open interior space. The two floors above the lobby area, which served as administrative offices for the theater, were supported by concrete deck and steel beams that spanned between multi-wythe brick masonry walls. The roof above the open theater area was supported by long-span steel trusses supported at each end by tall brick masonry piers. In the basement below the lobby, large mechanical equipment powered the theater and connected to utilities below the street. Years of abandonment and neglect compromised the structural integrity of the theater's roof framing members and exterior masonry walls, creating an unsafe condition.

To help preserve the character of the Royal Theater and bring new life to the long-vacant lot, Orndorf & Associates was asked to design a structural bracing system to temporarily support the front façade while the rest of the existing deteriorated building was demolished and a new mixed-use building is constructed in its place. Beyond the high lateral load design criteria, we were confined to a narrow site with relatively poor soil conditions. Furthermore, we were asked to provide a bracing system that had minimal impact on the existing façade's exterior appearance.

The bulk of the conceptual design for the project was complete after our first internal meeting, where we envisioned steel braces centered on existing door and window opening locations. The existing façade features a good number of openings and is generally symmetric, allowing for a relatively even distribution of load into the bracing structure. In total, five vertical steel braces with steel outriggers that pass through existing openings clamp the wall from each side to transfer lateral load into the steel structure and foundations.

With an approximate height of 43'-0" and length of 80'-6", O&A assumed that the wall had no out-of-plane stiffness beyond the steel braces during our analysis. Following ASCE 7-05 Section 6.5.14 for the design of wind loads on solid freestanding walls and solid signs, O&A analyzed the lateral load path across the wall face, through each steel outrigger and into the main vertical braces and foundation system. Since no openings were present near the top of the façade, O&A designed long cantilever outriggers to brace the top of the wall. To further protect the façade's historic appearance, plywood shims were called for as a buffer between the new steel and existing brick.

At the foundation level, each steel brace is supported by a system of deep concrete grade beams spanning between deep micropile foundations located approximately below each steel column. The poor quality of soil (in terms of uplift, bearing capacity, and lateral resistance) required each micropile to extend far below grade and have a minimum embedment of 2'-0" into the concrete grade beams to achieve a fixed top condition.

Because the braces extend up and over the top of the façade, the columns nearest to the outside face of the façade are stepped back approximately 3'-0" to allow for enough clearance to bypass the existing façade ornamentation. To further narrow our site, the entire foundation system was limited to the width of the sidewalk. Midway through our design process, we learned that the width of our site was approximately 2'-0" narrower than anticipated, which would have induced approximately 25% more load into each of the steel columns. To maintain our column design, a cantilever steel beam at the base of each brace was added that extend over the top of the outer grade beams to support the far steel column.

To alleviate concerns of lateral load pushing up against an unbraced rubble wall foundation below the existing façade O&A incorporated two levels of steel strut and waler bracing that span between existing basement walls. The top level was designed to take the place of the existing first floor slab in the event of its demolition during construction of the new mixed-use development, and the bottom level of struts and walers were designed to brace the bottom of the rubble wall foundation during the removal of the existing basement slab to pour new building foundations.

After design documents were submitted, O&A remained heavily involved with the construction process to ensure that the braces were properly constructed. Several challenges were dealt with in the field involving construction of the foundation system, including the redesign of some grade beams due to multiple micropiles being installed outside of the reasonable dimensional tolerances. Steel reinforcement within some of the grade beams had to be altered per construction sketches to help carry load from each steel column into offset micropile foundations.

As work commences on the Royal Theater mixed-use development behind the existing historic façade, the steel bracing system will remain in place until the wall can be positively attached to a completed diaphragm with underlying lateral load resisting elements at each level.

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











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? X YES NO

Submitted by:				
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