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	
Buildings $15M - $40M		Other Structures Over $1M	**X**
Buildings $40M - $100M		Single Family Home	

Approximate construction cost of facility submitted:	USD 2.0 Million Approx.
Name of Project:	Pool Enclosure at The Ocean Club Condominiums
Location of Project:	Atlantic City, New Jersey
Date construction was completed (M/Y):	March, 2018
Structural Design Firm:	Klein and Hoffman, Inc. (K&H, Inc)
Affiliation:	**All entries must be submitted by DVASE member firms or members.**
Architect:	Klein and Hoffman, Inc. (K&H, Inc.)
General Contractor:	Masonry Preservation Group

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 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.

Built in 1982, the Ocean Club Condominium is an ocean-front facility on the Boardwalk in Atlantic City, New Jersey. The twin tower residential complex consists of two thirty-six story residential towers, ground level retail, a four-story parking garage, and an elevated plaza deck with an indoor swimming pool. The structure is a concrete pre-stressed post tension flat plate floor system. The plaza deck is at the 5th floor level and has a raised terrace areas and sunken landscaped planting beds. The south section facing the ocean includes a one-story enclosed swimming pool, located approximately 70' above the beach facing the direct impact from the high oceanic winds.

On April 4, 2016, a high-wind event resulted in substantial damage to a portion of the existing wood, aluminum, and polycarbonate panel pool enclosure assembly. The extent of the damage to the structure was significant and questioned the code compliance of the original pool enclosure's structure. A building codes compliance check determined the enclosure to be structurally deficient and necessitated a the development of new pool enclosure structure.

Klein and Hoffman, Inc. was retained to provide professional Architectural and Structural engineering services for the new pool enclosure structure. Below is a list challenges that were faced during the design and construction of the enclosure structure:

**The new pool enclosure was required to comply with the requirements of newly adopted IBC 2015 NJ edition, which introduces strength level winds and puts Atlantic City in a hurricane prone region.

** A fully impact resistant, energy efficient, hurricane force wind resistant structure was therefore required. Consulted manufacturers were skeptical about their system's ability to comply with the new code requirements.

** Difficult coastal environment and moist air, rich in oceanic salts, made the material and/or finish selection challenging.

** Specially extruded aluminum sections were used for the structural components of the enclosure while all connections were designed using stainless steel, thus making the code check complicated due to the hybrid nature of the systems.

** Fitting the enclosure on the existing footprint on the former concrete curb, to be considered a replacement of the existing structure, was technically challenging.

** There were a limited number of manufacturers that could meet the requirements of the performance specifications for the enclosure.

** After several iterations, a design with movable ridge opening was finalized. Movable nature of opening added little more complexity to the design.

The project began with the selective demolition of the pool enclosure, leaving the existing concrete curb and steel structure of the flat, skylight portion of the former enclosure in place. These elements would be modified and incorporated in the new design.

Custom extruded aluminum sections were used to design single sloped (both in leeward and windward direction) moment frames. The aluminum sections had built-in drainage channels to receive the fully impact resistant glass glazing system. The moment frames were designed to be installed at approximately 5'-0" o. c. along the length of the structure. These moment frames were braced by the aluminum sections to act as blocking and/or wind girts and support for the glazing panels. Existing footprint curb was modified to receive the base of the new moment frames. Saddle type base plates were designed to connect the ends of the frames with the supporting curb, thereby contributing toward the lateral load transfer from the base to the vertical sections of the moment frames.

A 45'-0" long tube steel beam (HSS) was designed to take the end reactions of 10 moment frames and joists. A cantilever structural steel section splicing with the existing steel girder was designed to transfer the reaction from the tube to the existing concrete columns. The tube steel was sized to be braced by the aluminum joists to transfer the lateral reactions back to the building's structural components. This approach reduced the torsional load on the tube beam while providing enough open space for the residents.

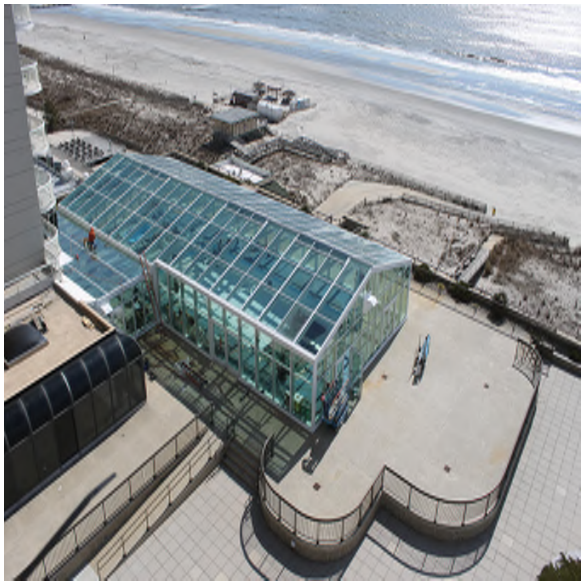
In order to avoid the ridge separation during the stress reversal behavior under wind loads, the rafters of the moment frames were connected with a collar tie. Two side by side moment frames were used at critical locations to cope up with the torsional behavior of the structure. Threaded rod cross braces were designed to increase the in-plane lateral load carrying potential of the vertical sections of the moment frames. The connection plates were sheathed in white aluminum covers to create a bright, open interior aesthetic. The enclosure structure was designed with the intention of using the available sections of the existing enclosure as much as possible without compromising the strength and serviceability.

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

Exterior View

Interior View

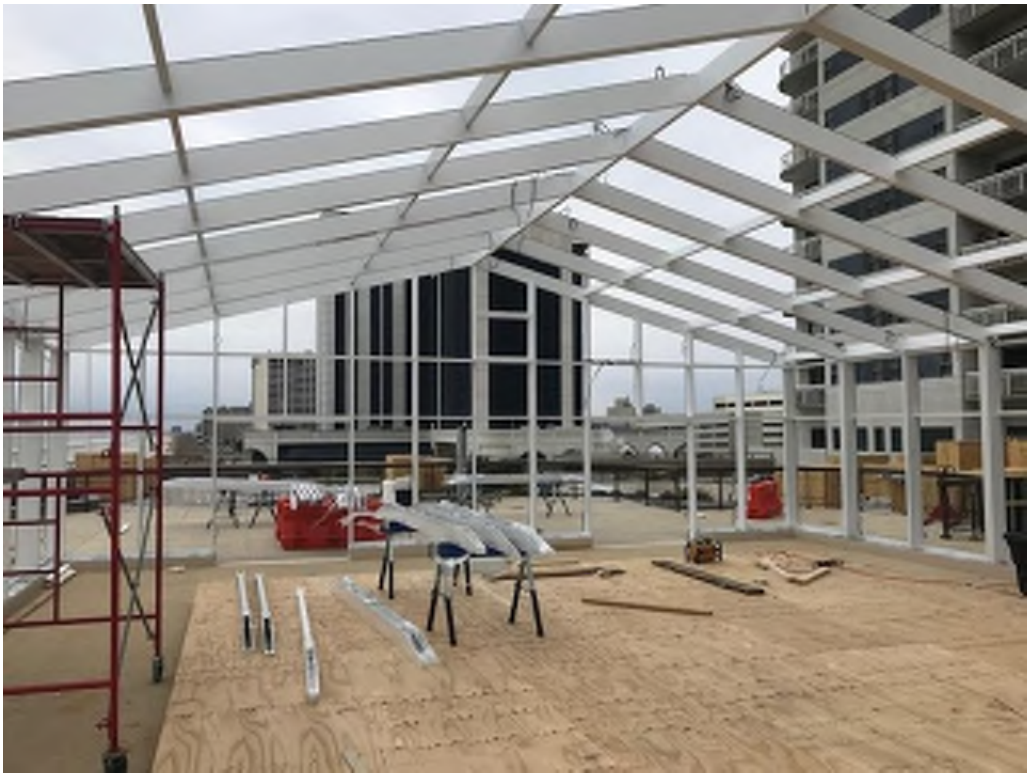
Previous Pool Enclosure



Exterior View

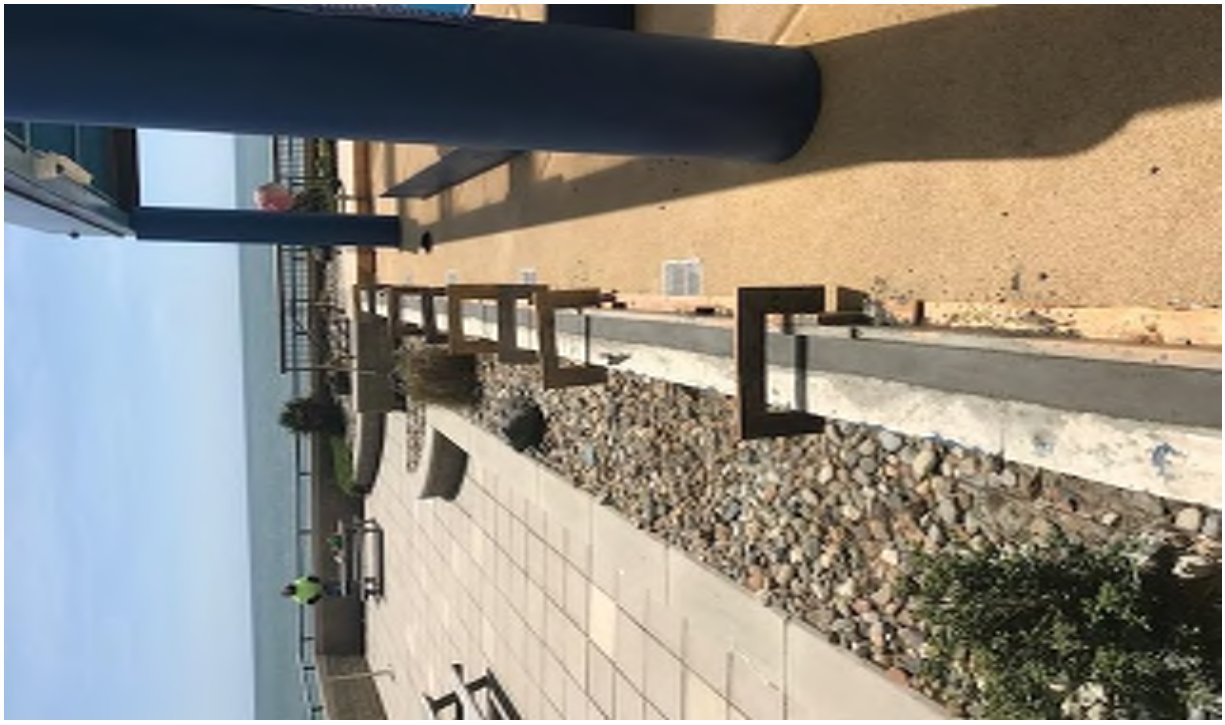
Interior View

New/Existing Pool Enclosure

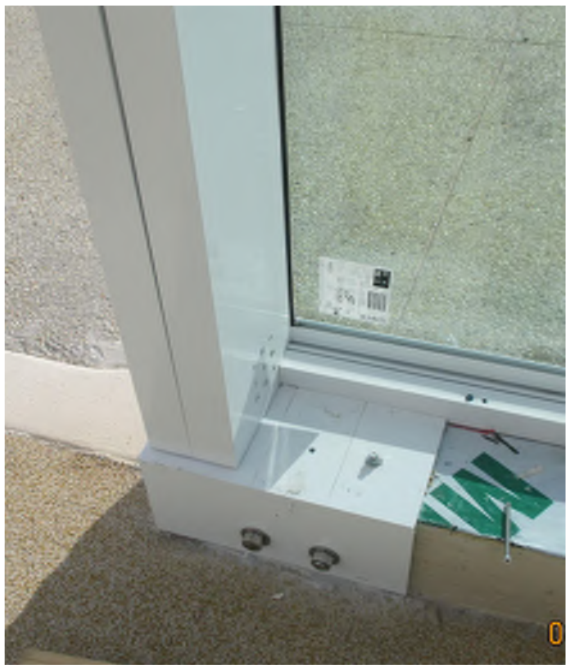


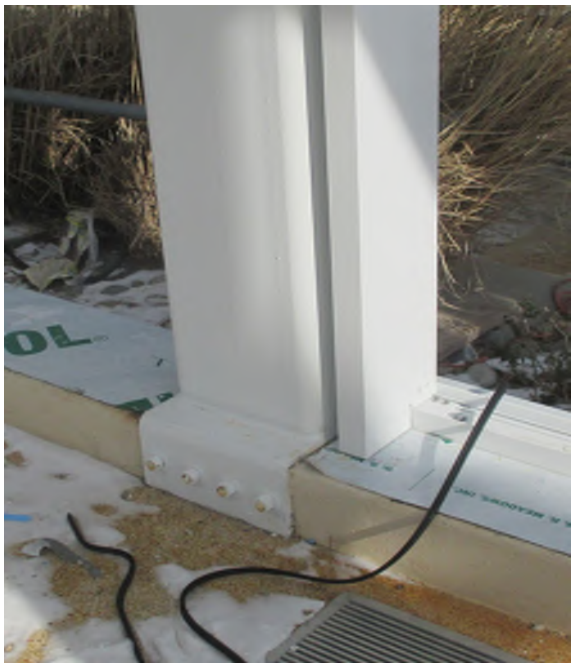
Aluminum Moment Frames

Internal Connection Plates

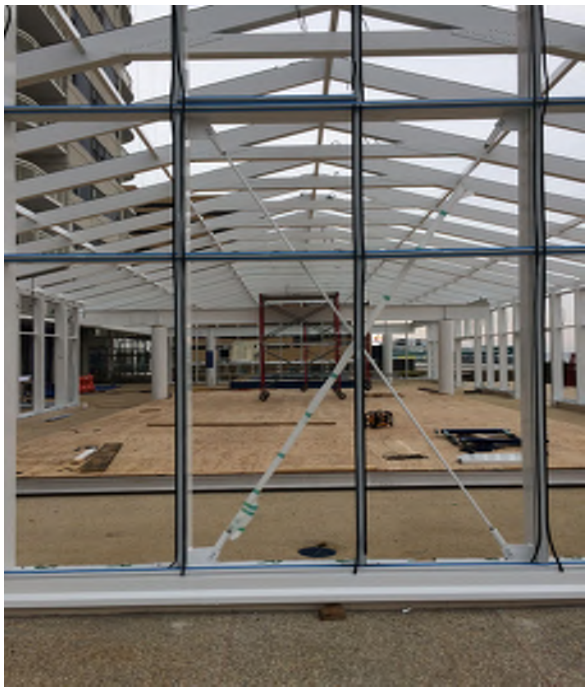


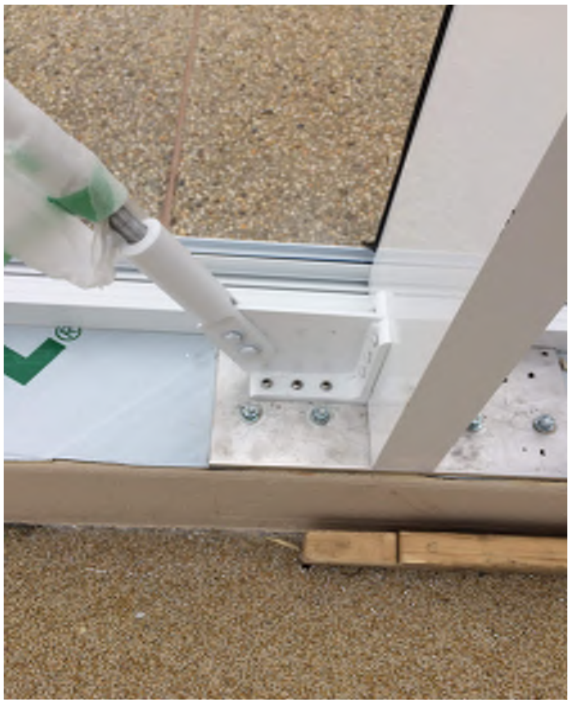
Modification of Existing Curb to Receive New Enclosure



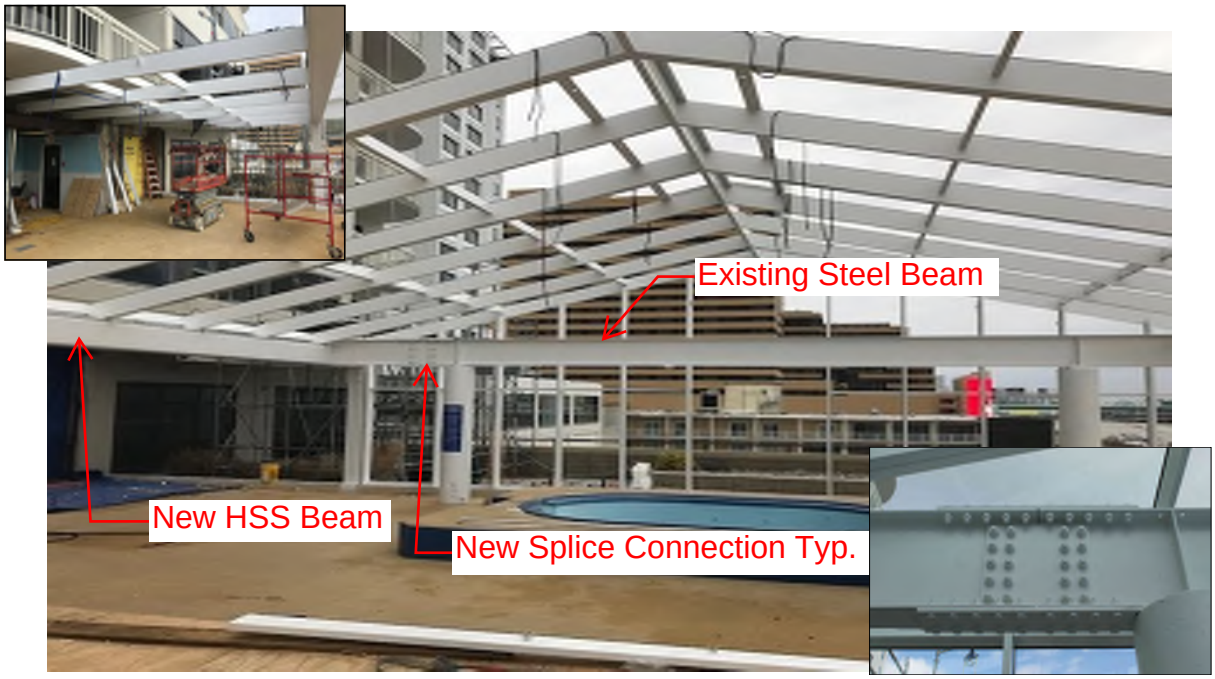


Saddle Type Base Plate and Side by Side Double Moment Frames

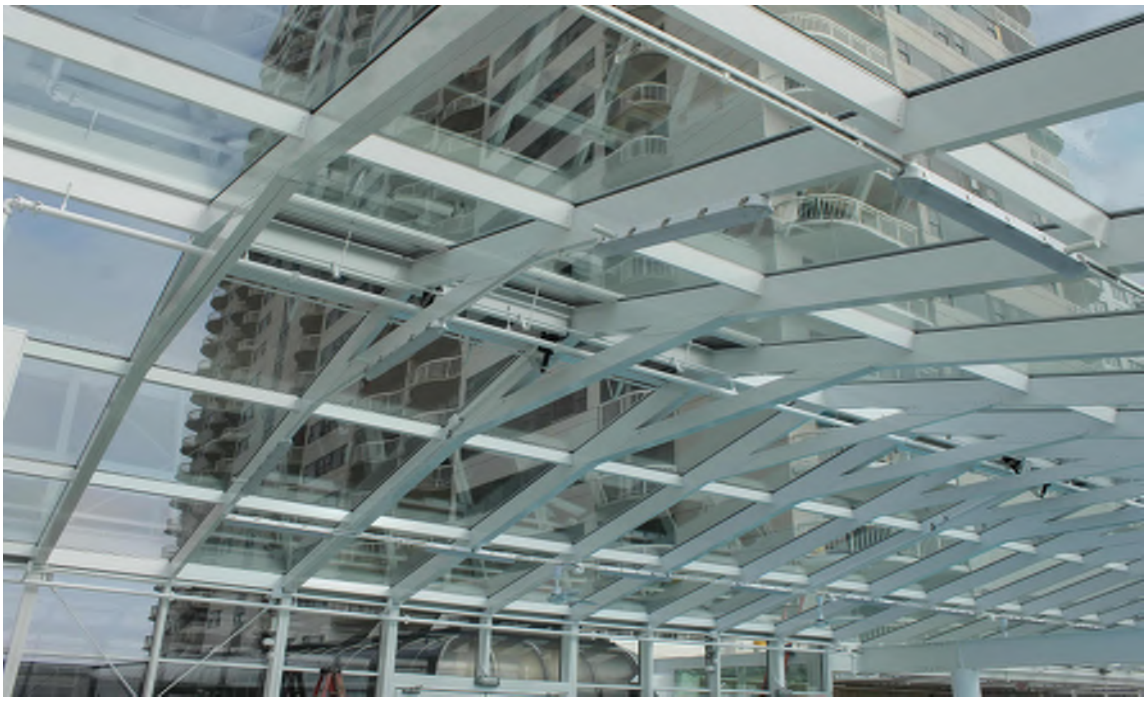




Threaded Rod Cross Brace Typ.



New HSS Beam and a Typ. Splice to Connect New Structure to existing Steel Beams.



Ridge Vent, Collar Tie & Connection, Double and Single Moment Frames

Overview of the Entire Enclosure Structure

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: Syed M. Shoaib, P.E.	**Signature:** 	**Date:** 03-30-2018
Submitting Firm:	**Klein and Hoffman, Inc.**	
Mailing address:	**1818 Market Street, Suite 2520 Philadelphia, PA 19103**	
Telephone: 267-386-3089	**Fax:**	**Email:** sshoaib@kleinandhoffman.com