

ENTRY FORM



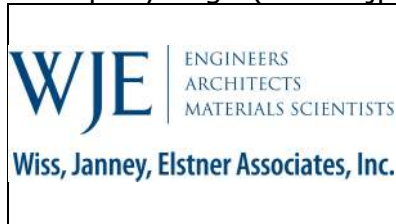
DVASE 2022 Excellence in Structural Engineering Awards Program

PROJECT CATEGORY (check one):

Buildings under \$5M	X	Buildings Over \$100M	
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:	\$3,900,000
Name of Project:	The Preservation of Penn State's Old Main Bell Tower
Location of Project:	The Pennsylvania State University University Park, Pennsylvania
Date construction was completed (M/Y):	August 2020
Structural Design Firm:	Wiss, Janney, Elstner Associates, Inc. (WJE)
Affiliation:	All entries must be submitted by DVASE member firms or members.
Architect:	Wiss, Janney, Elstner Associates, Inc. (WJE)
General Contractor:	Masonry Preservation Services, Inc. (MPS)

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.

The Preservation of Penn State's Old Main Bell Tower

Versions of the Pennsylvania State University's iconic Old Main have stood tall over generations of students since construction began in 1857. First built with the help of undergraduate labor from limestone quarried on-site, Old Main is the heart of an academic community nestled within Pennsylvania's agricultural heartland. The current Neo-Classical 1930 structure blends carved stone masonry within a motif emblematic of the University's commitment to "promote the liberal and practical education of industrial classes." Above it all stands Old Main's eighty-eight-foot tall bell tower topped with a limestone-clad dome and lantern.

Prior to construction, Wiss, Janney, Elstner Associates, Inc. (WJE) performed a condition assessment of Old Main to develop a comprehensive and proactive approach to restoring and maintaining the building's exterior enclosure and components. The project team utilized a combination of aerial drone surveys, close-up inspections via industrial rope access, and exploratory openings, to evaluate the dome cladding's existing construction and anchorage details. This hands-on approach allowed the client and project team to "ask the structure" and gain up-close insight necessary to develop a preservation program. The investigation revealed a variety of conditions that necessitated the rehabilitation and reconstruction of the dome's cladding and anchorage system.

Work began on the bell tower preservation in Spring 2019 with WJE's project partner Masonry Preservation Services, Inc. (MPS). The team utilized a collaborative and iterative approach to develop solutions based on existing conditions and project requirements. Several of these challenges included cleaning the limestone while capturing 100% of the runoff, reconstruction of original fragile stone balusters, removal of joint sealant from all of the existing limestone joints, as well as the replacement of damaged original prismatic glass in the dome's lantern. The project team also worked with PSU Architectural Engineering students to conduct a lighting study focused on re-illuminating the bell tower lantern with a custom-designed LED fixture.

The major focus of this project was the removal of the existing dome's limestone cladding to address stone unit distress and improve water management. The complexity of this puzzle was increased by the need to complete removal and reconstruction of the dome's limestone cladding using nothing but hand tools and simple hoists. WJE worked closely with MPS to develop an anchorage solution that accommodated a variety of existing conditions and the two-plane curvature of the existing cladding units. Empirical and graphical structural analysis techniques were used to analyze the existing dome structure with historic references originally published by Concrete Publications Limited of London from the approximate time period of the dome's original construction. The analysis informed the design of a custom lateral anchorage system for the 200-pound dome stones. This project-specific solution provided restraint against outward thrust but accommodated differential circumferential movement due to thermal expansion. Where new stone units were needed, a 3D laser scan was used to fabricate new limestone units matching the existing unit profile.

Through every step of the project, the project team utilized an expansive toolbox of trade expertise, technical tools, and open communication to preserve this collegiate landmark and utilized traditional craftsmanship and team collaboration to make the preservation a success.

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

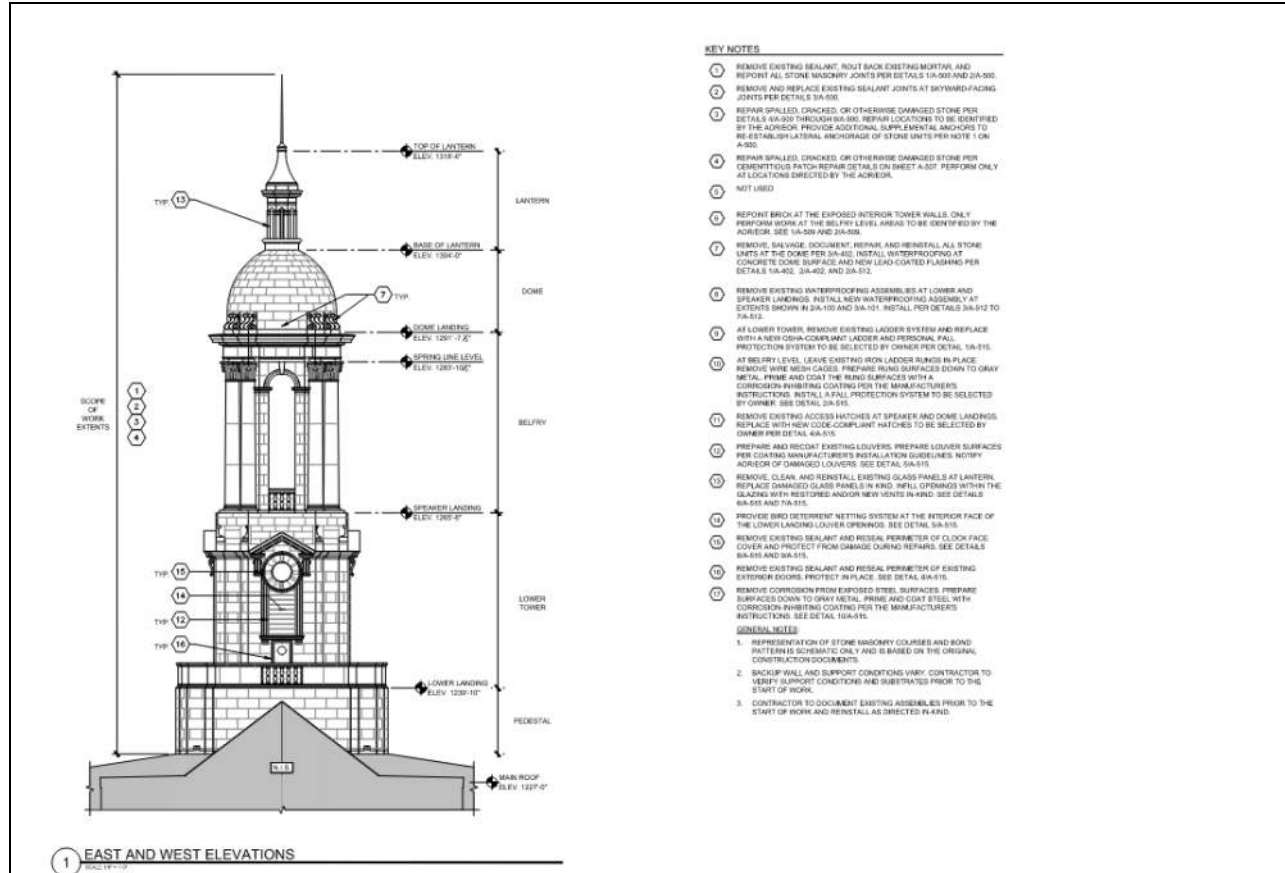


Figure 1. Typical elevation of bell tower from construction documents

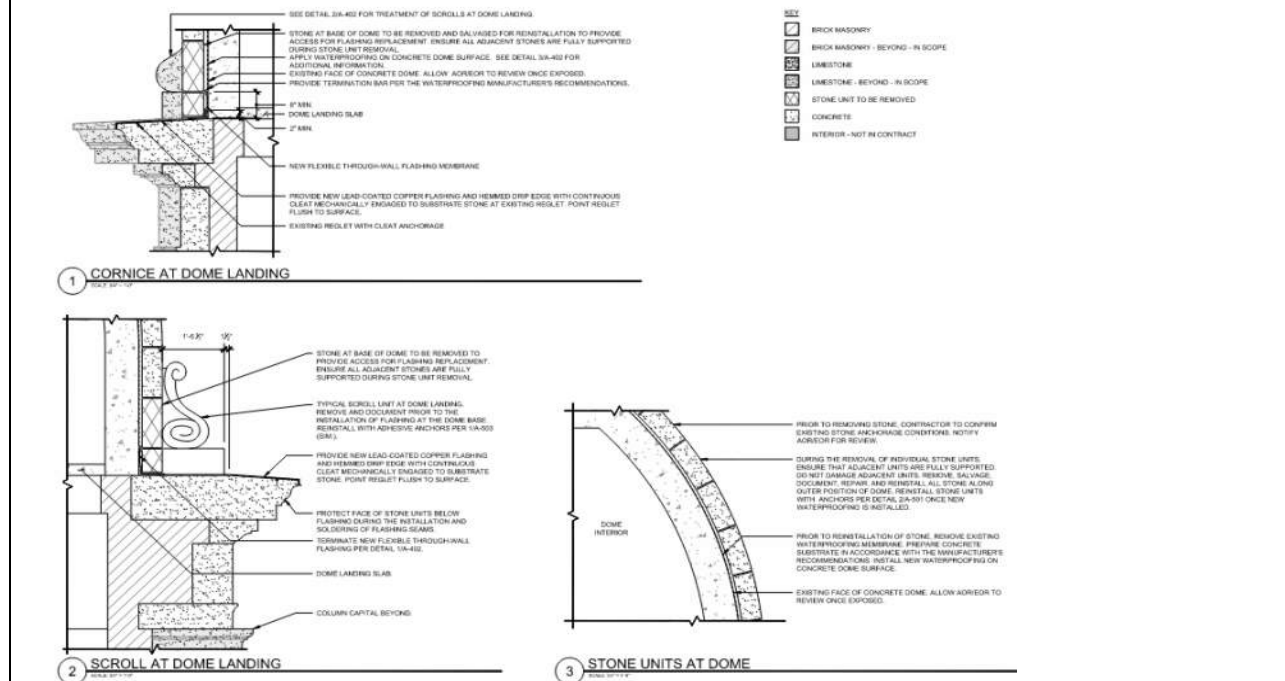


Figure 2. Typical sections of bell tower from construction documents

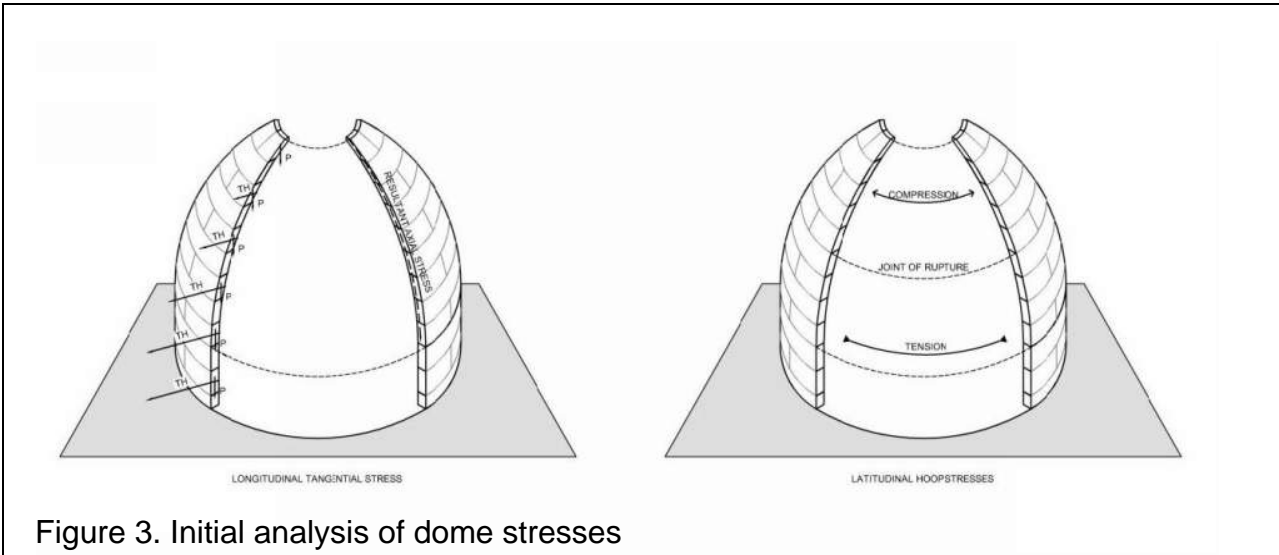


Figure 3. Initial analysis of dome stresses



Figure 4. Industrial rope access survey of bell tower



Figure 5. Bell tower encased in scaffolding



Figure 6. Limestone cladding removal and waterproofing in progress



Figure 7. Dome restoration in progress



Figure 8. Bell tower restoration complete




Figure 8. Bell tower restoration complete

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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