

# STAHL SHEAFFER ENGINEERING

- **Owner:**  
The Pennsylvania State University
- **Services:**  
Structural Assessment
- **Completed:**  
2015 – Present



# Underground Vault & Tunnels – Evaluation, Shoring, & Rehabilitation

The Pennsylvania State University, University Park, PA



Stahl Sheaffer has been providing continuous on-call structural assessment services for Penn State's underground utility vaults for the past six years. Our team has entered existing, deteriorated spaces; determined the viability of the structure to perform under load; developed immediate plans for stabilization as required to support pedestrian, vehicular, soil and environmental loading; performed inspections of in-place stabilization; and developed permanent solutions for rehabilitation, retrofit, or reconstruction based on the evaluated condition.

Stahl Sheaffer worked with Penn State to develop standards to provide maximum protection for the steel and concrete of the underground steam vaults and extend the life for rehabilitation and new structures. New steel and concrete utilized in the underground vault structures are specified to provide additional protection and durability to maximize the service life. We also work closely with the utility crews and contractors to avoid conflicts for installations and serviceability to ensure that the installations meet both structural and client needs.

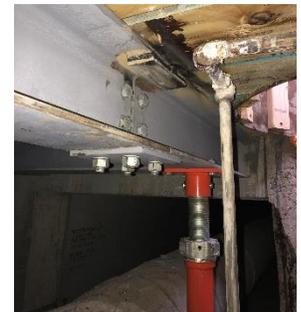
## Shoring & Stabilization

The photos below and to the left show failing steam vault lids located under roadways. Stahl Sheaffer determined that the condition of these structure was insufficient to support the vehicular loading being applied and subsequently developed the steel beam and post temporary shoring solutions pictured, which included the installation of plywood sheathing to prevent loose debris from falling on workers who needed to access the vault.

In some cases where installation of shoring was cost prohibitive, unsafe to install or otherwise inaccessible, Stahl Sheaffer coordinated with the owner and mechanical engineer to develop a stabilization solution which included specification for backfill with a medium sized clean aggregate to prevent a full collapse, creating a safe exterior condition and protecting the steam system. The aggregate was vacuumed out at the time of reconstruction without damage to the steam system and components.



Before



After

## Repair & Replacement

Stahl Sheaffer has developed documentation and repair details for deteriorated areas of existing underground vaults and tunnels to address rebar corrosion, concrete spalling, and other deficiencies. Existing conditions were documented and informed development of bid and construction documents for the repairs and restoration, including partial or full vault replacement as applicable. Designs and details were developed to address the issues causing the deterioration to maximize the lifespan of the repair as well as provide preventative measures, such as sealing, coating and waterproofing specifications for other portions of structures to remain.



*Before*



*After*



*Before*



*After*

## Pipe Support & Anchorage

Stahl Sheaffer has provided designs to rehabilitate or replace mechanical piping that have failed or deteriorated. We work closely with the mechanical engineer to coordinate loading and support requirements and provide concrete or steel anchors or pipe supports. Often this involves complex coordination with contractors and service crews to provide solutions that meet the structural needs and to facilitate a complex installation in confined spaces. In some cases, existing pipe supports can be repaired and modified to suit new utility needs as shown below.



*Before*



*After*