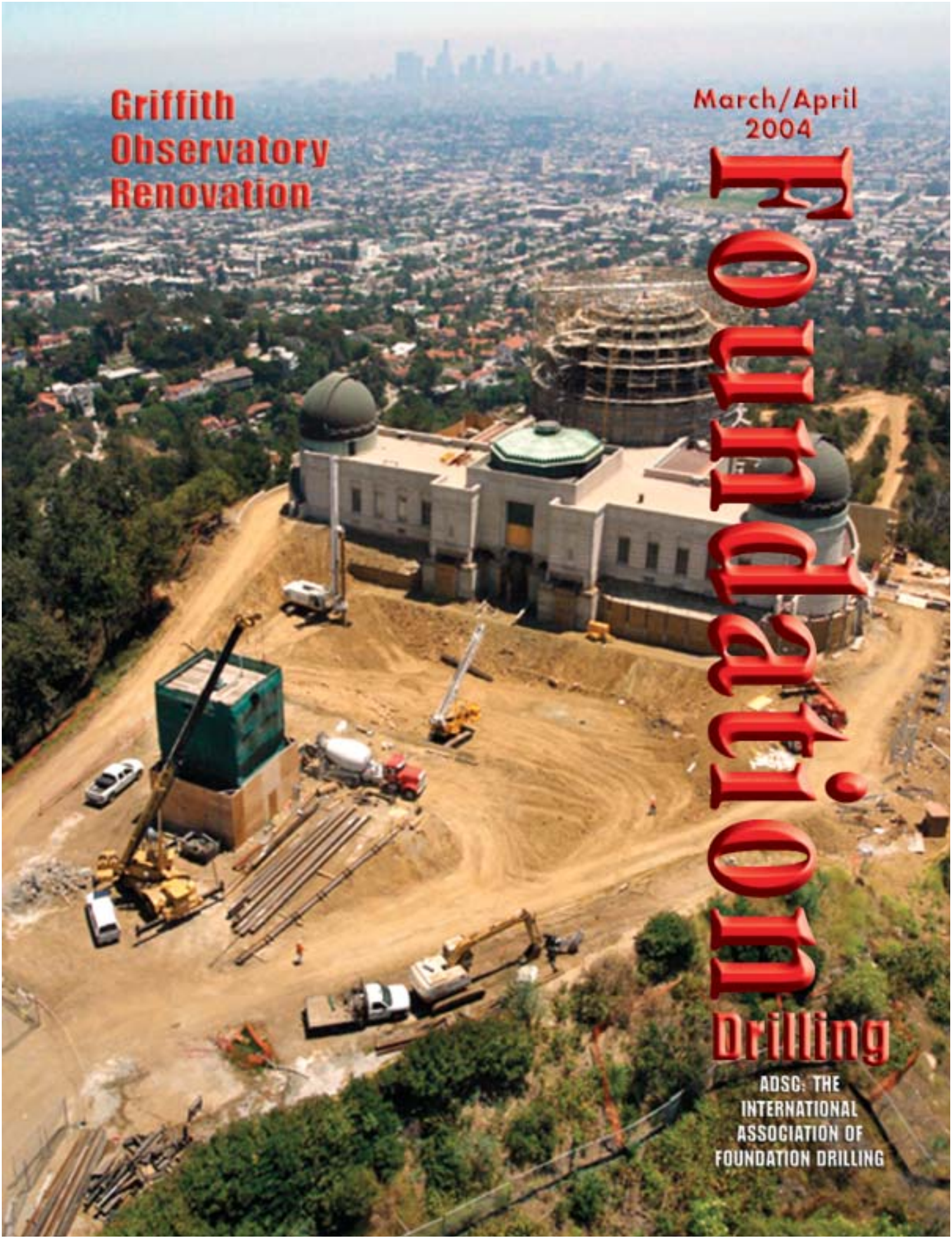
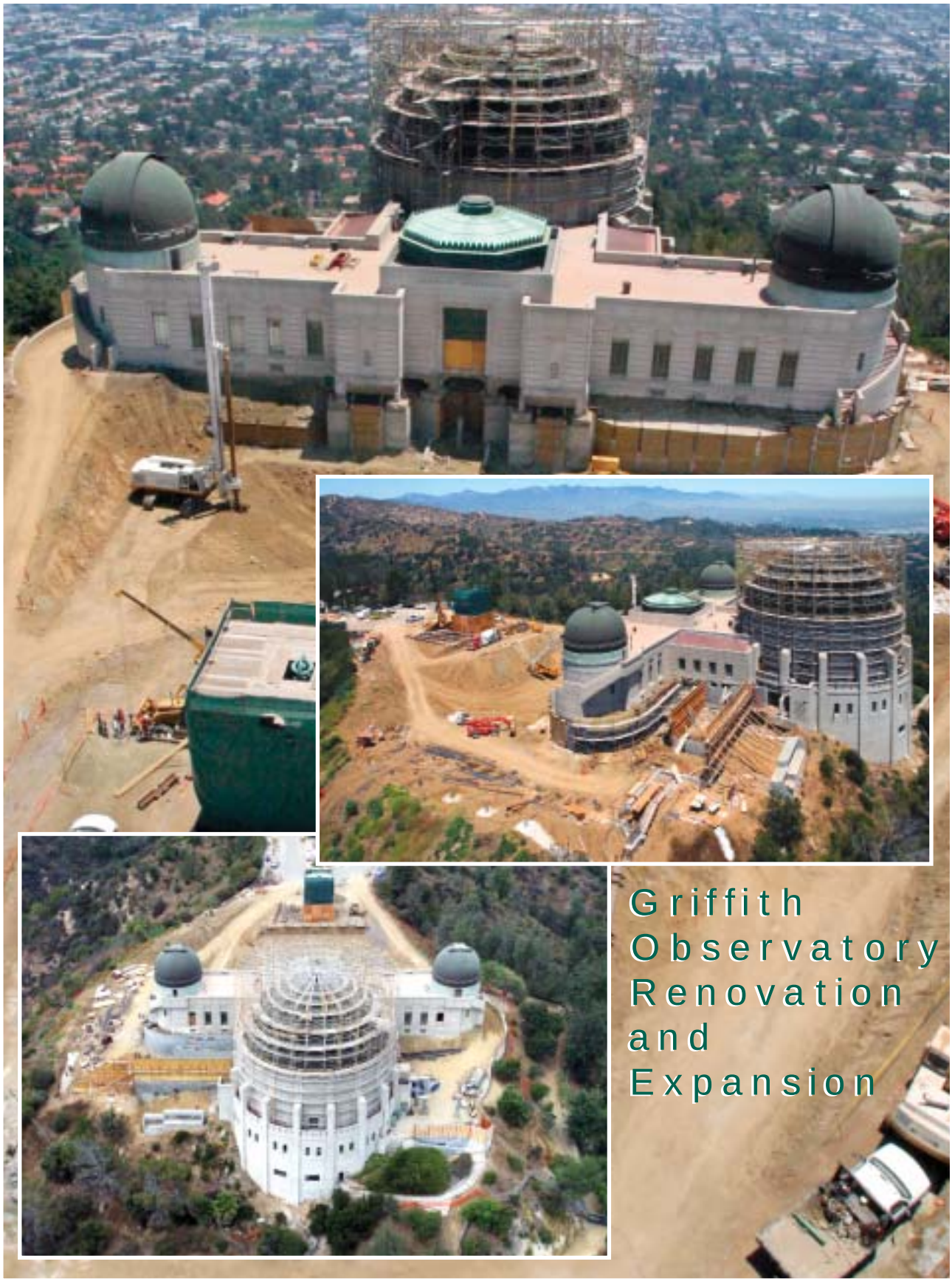

Griffith Observatory Renovation
March/April 2004
Foundation Drilling
ADSC: THE INTERNATIONAL ASSOCIATION OF FOUNDATION DRILLING



Griffith Observatory Renovation and Expansion

Griffith Observatory Renovation and Expansion

by Dan Gay
Estimating Project Manager
Magco Drilling, Inc.

In April 2002, Magco Drilling Inc. was subcontracted by S.J. Amoroso Construction Co., Inc. to install temporary shoring, drilled shafts and underpinning for the Griffith Observatory Renovation & Expansion Project in Los Angeles, California. The building is a historical monument originally constructed from 1933 to 1935. Magco Drilling contracted ADSC Technical Affiliate member, Cefali and Associates, Inc., Studio City, California to provide design and engineering for the shoring and underpinning.

The existing building was a single story structure with a reinforced concrete foundation, first floor, pan joist system and exterior walls. The roof construction was structural steel and reinforced concrete slabs. Exterior walls were up to fourteen inches thick with concrete slabs for floor and roof. This type of construction made the building extremely heavy. Wall footing loads in some cases were up to 12 kips/ft. The foundation was composed of a reinforced concrete stem wall founded on either isolated pads or a continuous foundation. The footings were founded in bedrock of sandstone and basalt.

Access at the east and west ends of the Observatory building.

The site was graded in the early 1930s by cutting the top of the ridgeline and placing fill on the flanks of the ridge to create a level pad for the construction of the observatory. The bedrock underlining the foundations consists of very hard, but locally jointed and fractured sandstone of the Topanga formation that has, at numerous locations, been intruded with hard, fine-grained basalt.

Because of the historically important visual signature of the site, it was decided early on that the proposed additions should not compromise the historic fabric of the building. For this reason the entire addition will be almost entirely below grade.

Because of the historically important visual signature of the site, it was decided early on that the proposed additions should not compromise the historic fabric of the building. For this reason the entire addition will be almost entirely below grade. Below grade exhibit halls will be added in front of the building and a new level will be added below a large portion of the existing building.

The first order of work was to

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Excavating prior to placing underpinning columns. Piece of cake!

Magco "worms", Mike Maggio and Dan Gay at worm hole entrance.

design and install temporary shoring, consisting of steel soldier beams, tie back anchors and timber lagging around the perimeter of the observatory building. The soldier piles were up to 40 feet in length. Once in place, the shoring system provided lateral support for a 17' deep excavation within 3' of the building.

The underpinning provided existing column support to allow construction of the new lower level below the existing observatory. The overhead clearance below the building averaged aproximately four feet. Piece of cake, right? Actually, this is a comfortable work environment for Magco Drilling.

Simultaneously, Magco installed 24" and 30" diameter drilled shafts at the east and west ends of the observatory. The shafts were drilled through sandstone and basalt. The lengths ranged from 45-60 feet deep. Specialized drilling equipment was deployed to reach some of the shafts at the west end of the project that were located out and down on the existing slope.

The third and most challenging component of the project was to design and install underpinning below the existing pad foundations. The underpinning provided existing column support to allow construction of the new lower level below the existing observatory. The overhead clearance below the building averaged approximately four feet. Piece of cake, right? Actually, this is a comfortable work environment for Magco Drilling.

A total of 30 footings had to be underpinned for the proposed construction. To create access through both sides of the building, Magco cored through the east and west walls below grade then shored the walls and footings. Once the walls were shored, saw cutting through the existing below grade walls created a larger opening for access.

The underpinning was done in two different ways. The first utilized earth shoring soldier piles and steel, wide flange beams spanning between beams to support the existing footings. The second method involved the use of steel plate bearing pads and 8 inch steel pipes, which supported a pair of W14x, steel beams. These underpinning assemblies were preloaded with hydraulic jacks before being locked off and the existing footing and pedestal removed. A new concrete footing and pedestal was then installed.

The close proximity of the existing shallow footings combined with

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Existing columns were preloaded from 12-90k. Columns formed, poured & grout packed.

adverse soil conditions and the depth of the new improvements proved to be a challenge for Magco. When possible, low profile equipment was utilized for the excavations. At many locations, Magco performed hours of hand mining. Some of the excavations reached depths of 16' below the existing grade.

In addition to the east and west access ports to the underside of the building, Magco shored and underpinned footings at the north entrance. This area was dubbed with the name "Worm Hole." The Worm Hole corridor and connecting stairway will allow access between two improved areas, stepping downward from the underside of the existing building to the front underground expansion. Situated directly north of the main entrance, the underground expansion will house two new exhibit halls and a 200-seat theater.

We are proud to say that due to extensive planning, engineering and care, not one floor tile was disturbed throughout the construction.

Limited overhead clearance, unique configuration of the existing ceiling beams and column loads proved to be a challenge.

The Worm Hole corridor is relatively narrow and quite deep. The change in elevation and close proximity of the footings to be underpinned required creative design and construction efforts. As experienced at other locations throughout the project, adverse soil conditions added to the challenge. Our past experience designing and constructing intricate shoring systems really came into play at this location.

Throughout the construction, Amoroso and the City of Los Angeles monitored the elevation of the columns, slabs, floor tiles and travertine marble flooring. We were cautioned that any movement or damage would be unacceptable. All of the materials are considered historic and could not be matched or replaced. We are proud to say that due to extensive planning, engineering and care, not one floor tile was disturbed throughout the construction.

During the mass excavation, a small landslide developed. The Owner and Amoroso directed Magco to provide additional shoring adjacent to the historical monument directly north of the building. Due to the extra efforts of Magco, Cefali & Associates, Amoroso and the cooperation from the City of Los Angeles, this emergency shoring was designed and implemented in a matter of 3-4

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City inspector and engineer, "This costs how much?!"

days. Under normal circumstances this process would have taken a minimum of six weeks.

During the design stages and construction, Magco encountered many challenges and unexpected conditions. Keep in mind that we were required to design and work from 1933 as-built drawings. The entire project was designed, constructed and completed on time as a result of the efforts, experience and direction of Magco's Owner, Mike Maggio, Estimator and Project Manager, Dan Gay and Superintendent, Jason Pavalonis. Cefali and Associates Inc. provided cutting edge design and engineering. The owners and staff of Magco Drilling, Inc. thank and appreciate the City of Los Angeles, Bureau of Parks and Recreation and S.J. Amoroso Construction Co., Inc. for their professionalism, expertise and support throughout the project.■

PROJECT TEAM

Project Name: Griffith Park Observatory Renovation and Expansion

Project Owner: City of Los Angeles
Bureau of Parks and Recreation
Larry Gonsalves, Project Manager

Project Cost: $80,000,000.00

ADSC Contractor: Magco Drilling, Inc., Owners -
Mike Maggio and Holly Maggio
Estimator/Project Manager - Dan Gay
General Superintendent - Robert Walls
Project Superintendent - Jason Pavalonis
Operators - Brandon Maggio
and Gary San Angelo
Welder - Randy Capan
Laborers - Javier Lopez,
Gilbert Garciaand, and Pedro Eleno

General Contractor: S.J. Amoroso Construction Co., Inc.
Bob Eaton, Project Manager
Mike Vaughn, Project Superintendent

Soils Engineer: Geotechnologies, Inc.* / Consulting

Structural Engineer: Martin Huang International
Ken Wong

Shoring and Underpinning Design: Cefali & Associates, Inc.*
Dave Cefali

Outside Services:
DYWIDAG-Systems International*
Mike Kelley and Bernhard Froemel
Macsteel / Doug Moore and
Jolinda Cochran
Champion Equipment Sales* / Vince Jue
Soilmec* / Pierro Guardigli
MAIT, S.p.A* / Maria Grazia-Tonti

**Denotes ADSC Members*