



DBI Report: 301 Mission Voluntary Foundation Retrofit

San Francisco Board of Supervisors, GAO Committee
November 4, 2021

Oversight

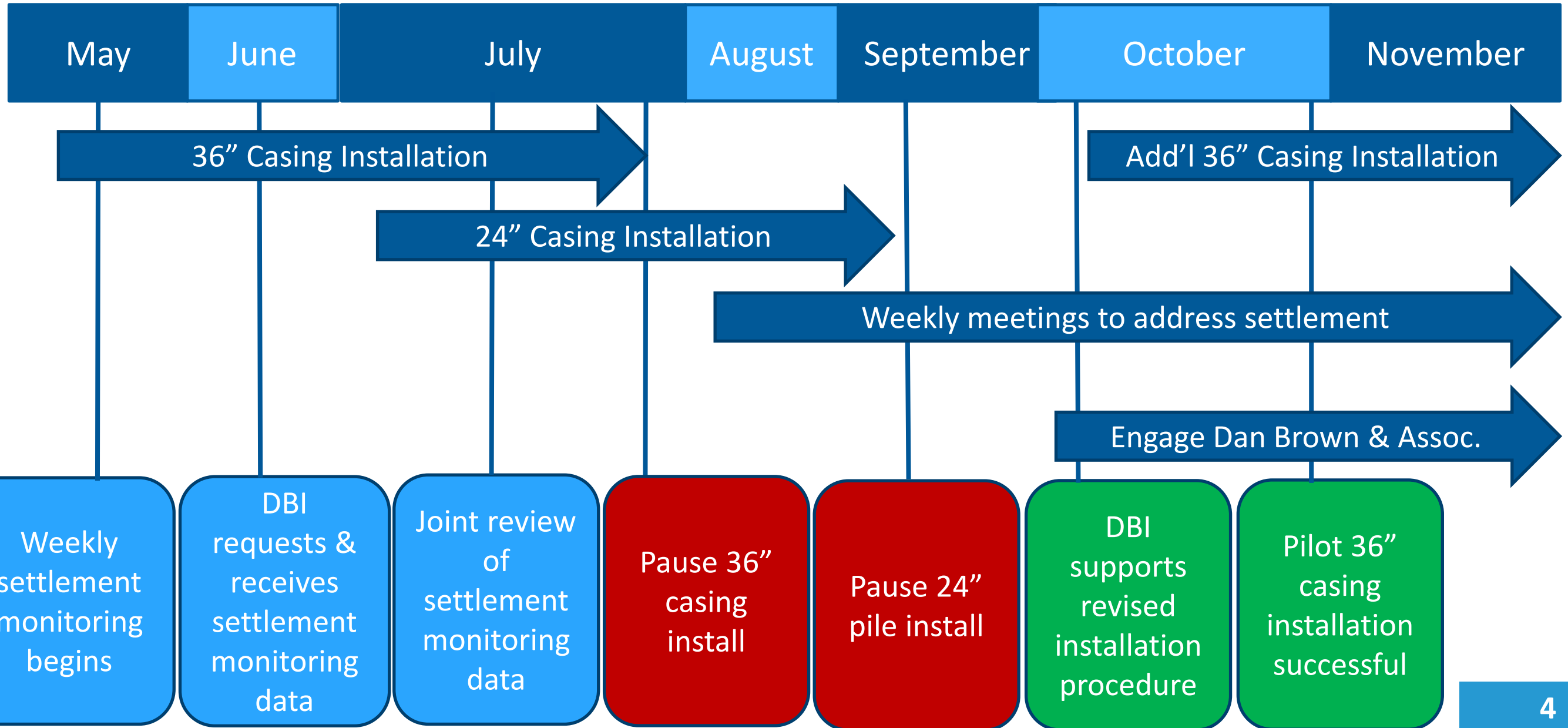
Ongoing - Functionality & Habitability

- Respond to complaints and observations
- Review building maintenance reports
- Twice annual DBI inspections

For Retrofit - Ensuring Structural & Public Safety

- Review plans and issue permits
- Convene the Engineering Design Review Team (EDRT) and review engineering analysis/findings

Timeline



Current Status



DBI/EDRT/HOA Project team consensus:

301 Mission remains structurally sound, habitable and accessible

- The building is expected to settle further over time
 - Additional southeast settlement is central to the voluntary retrofit plan
- Building currently has approx. 22.5” of northwest tilt and is holding steady, even during the recent installation of the pilot casing
- Elevators, drains, plumbing, access, electrical, fire safety, emergency exits are all functional
 - This fall, DBI, SF Fire and private inspections found all systems functional and code-compliant

Casing Installation Conditions



- Construction must stop if northwest building settlement reaches $\frac{1}{4}$ " per casing based on weekly data provided by the HOA's project team
- Civil engineer from Dan Brown Associates must be on site during pilot casing installation
- DBI Senior Building Inspector will conduct a daily field inspection
- Daily prism measurements of lateral tilt at the top of the building will be distributed to oversight team at the end of each working day and after each casing is installed
- At the conclusion of each casing installation, construction will pause to allow DBI, the EDRT, Dan Brown Associates, and the HOA's project team to review the prism data and ensure the building remains within a safe range before proceeding

Ongoing DBI Oversight



DBI will continue closely monitoring test pile/retrofit work

- Daily inspections by a senior inspector
- Weekly coordination meeting
- Established tilt and settlement limits and conducting ongoing review of data
- Investigate every complaint about the building
- Weekly posting of monitoring data to sfdbi.org/reports

Under all conditions, if soil settlement reaches ¼ inch per casing, the voluntary retrofit will be stopped for further evaluation

Engineering Design Review Team

EDRT

Prof. Greg Deierlein, PhD (chair)

Marko Schotanus, PhD, PE, SE

Craig Shields, PE, GE

Shahriar Vahdani, PhD, PE

Roles & Responsibilities

- Per San Francisco AB 082:

“provide an independent, objective, technical review of those aspects of the project design identified in the review”

“The Review shall not be construed to replace quality assurance measures ordinarily exercised by the Structural or Geotechnical Engineer of Record in the design of a structure or development of geotechnical design recommendations”

- Permit for Voluntary Seismic Upgrade and Foundation Stabilization (Dec. 2018 to August 27, 2019)
- Review of Foundation Retrofit Construction (Dec. 2020 – present)

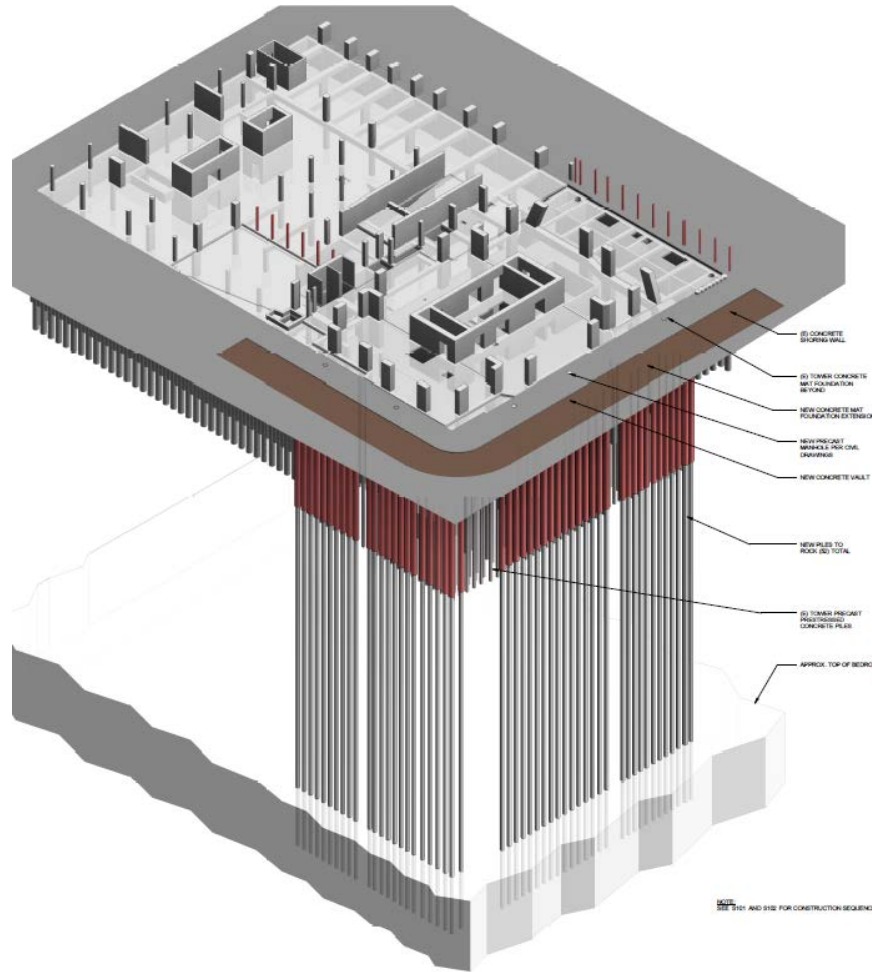
Voluntary Foundation Retrofit

Objectives

- Arrest settlement & tilt, reduce future building settlement, and assure long-term building stability
- Improve Seismic Performance of the Foundation
- Meet requirements of San Francisco Existing Building Code for Voluntary Seismic Improvements

The methods and criteria applied to the seismic evaluation generally follow the *San Francisco AB 083* and *PEER TBI Guidelines for Performance-Based Seismic Design of Tall Buildings*

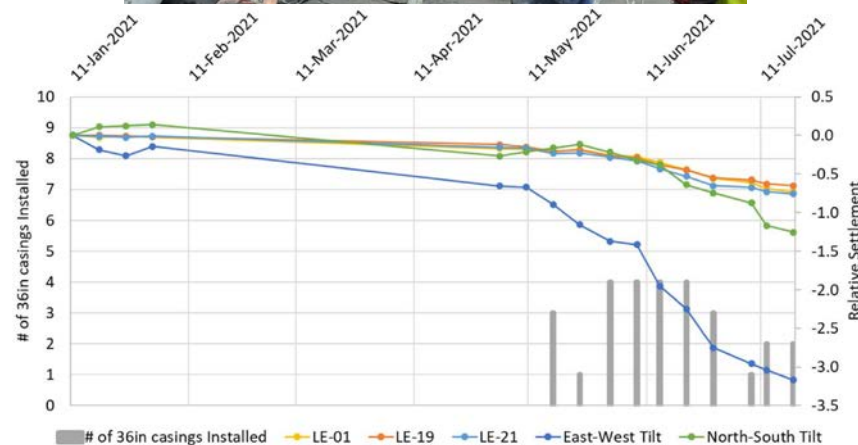
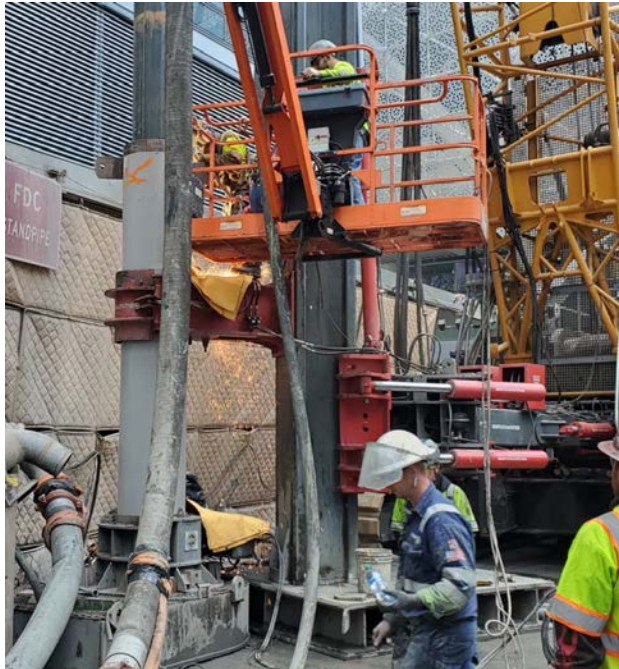
Key Technical Aspects: Permit Review



- **Perimeter Piles:** steel piles to rock, fully encased, sleeved through Colma sand, grouted, and prestressed
- **Earthquake Safety:** Building response/safety under gravity and earthquake loading (3D nonlinear analyses of existing and new piles, mat, and building superstructure)
- **Future Tilt:** Safety under current and possible future tilt (westward tilt of 29", i.e., 2x the 14.3" in July 2019)
- **Mat Extension:** Safety of 10' thick concrete mat, with pile anchorage fuse, jet-grouted base
- **Long-Term Tilt Settlement:** Post-retrofit settlement & tilt recovery (geotech testing and settlement analyses)
- **Pile Test and Monitoring:** Indicator pile testing and settlement/ monitoring

Review During Construction

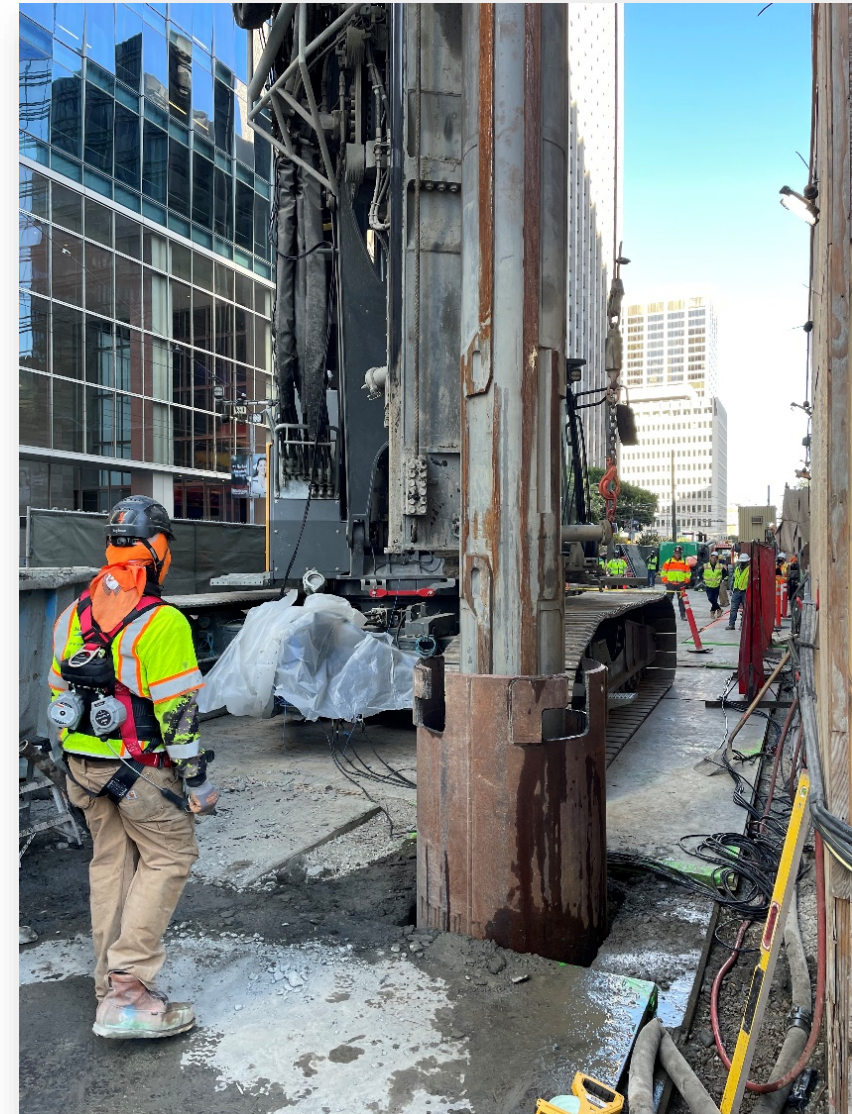
EDRT



- Soil & rock borings, downhole instrumentation (Jan-Feb)
- Indicator pile construction and testing (Feb-March)
- Refinements/modifications to design (April – present)
- 36” casing and 24” pile installations (May – present)
- Accelerated settlement – evaluating causes and mitigation procedures (in progress for 24” piles)
- Modified pile installation procedures
- Contingency planning – modified retrofit options

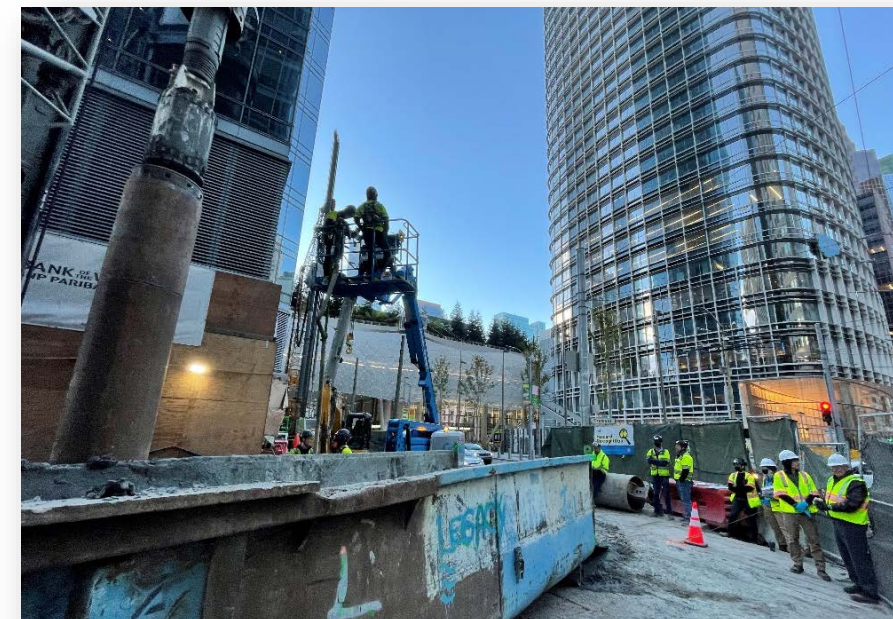
Casing Install Procedure Pilot Program

- Observations by Ben Turner, Ph.D., G.E. of Dan Brown and Associates (DBA)
- DBA specializes in design and construction-related aspects of deep foundations



Casing Install Procedure Pilot Program

- Two 36-inch casings were installed in accordance with the Pilot Program procedures (#33) and Supplemental Specifications (#32)
- Observed measurements of water level and soil plug thickness
- Negligible settlement = success



Next: additional 36-inch casing + 24-inch pile



THANK YOU