Update on Construction and temporary closure of the Salesforce Transit Center

March 14, 2019

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Agenda

1. Progress on the Girder Remediation/Repair Effort
2. Progress on confirming the Facility-Wide Validation
   - Building-Wide Structural Steel (SS) Review Update
   - Building-Wide Review of Other non-SS Items including an Inspection Overview Report

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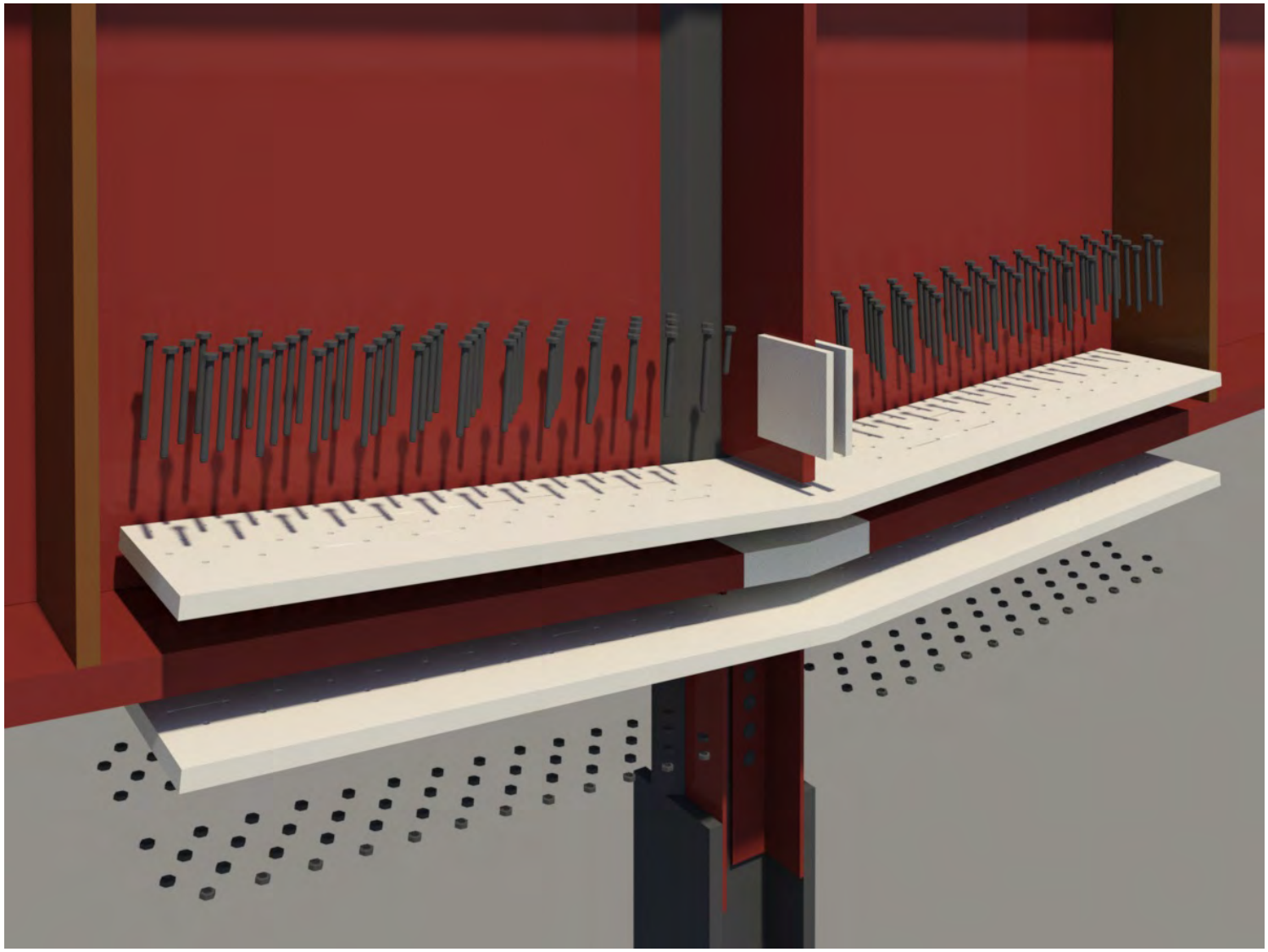
Recent Actions

Actions taken since last Board meeting:

- Fremont and First Street remediation plate material being machined in Pennsylvania as per the approved design.
- Onsite preparation work ongoing at Fremont and First Street girders as per the approved design.
- Finite Element Analysis (FEA) presented to PRP.
- Project Team* continued their building-wide review to ascertain if other areas need further review and/or inspections.
- Contractor schedule update indicates repair completion no later than June.

*Project team consists of TJPA, TT, CM/GC with associated subcontractors and suppliers/fabricators

Girder Remediation Detail



This graphic has details specific to Fremont street girders

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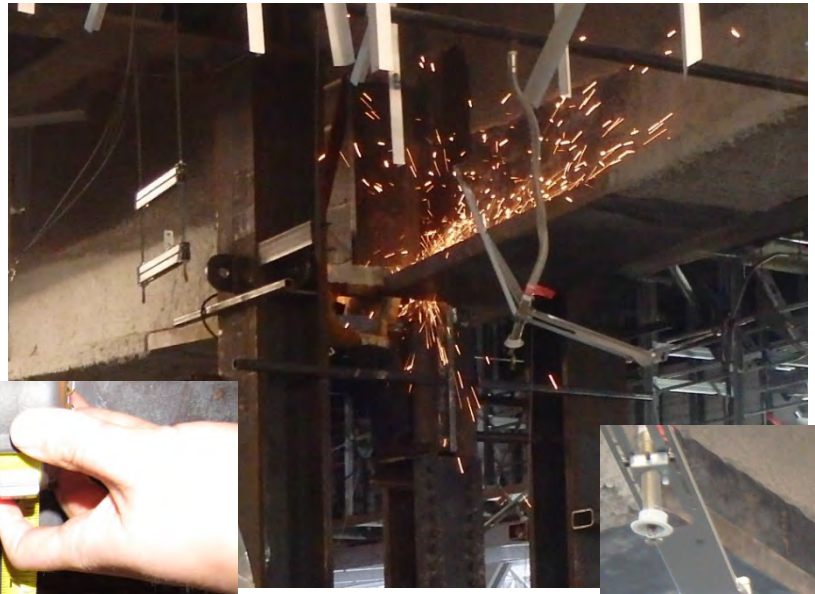
Recent Actions

Preparation of the existing girders is ongoing simultaneously at both First and Fremont streets to receive the plate material.



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Next Steps

March 2019 actions:

- Project Team* continuing their building-wide review to ascertain if other areas need further review and/or inspections.
- Material arrives onsite.
- Commencement of the Fremont and First Street remediation.

April 2019 actions:

- Project Team* to present building-wide review report to the Peer Review Panel.

Repair/Remediation expected to be completed by June.

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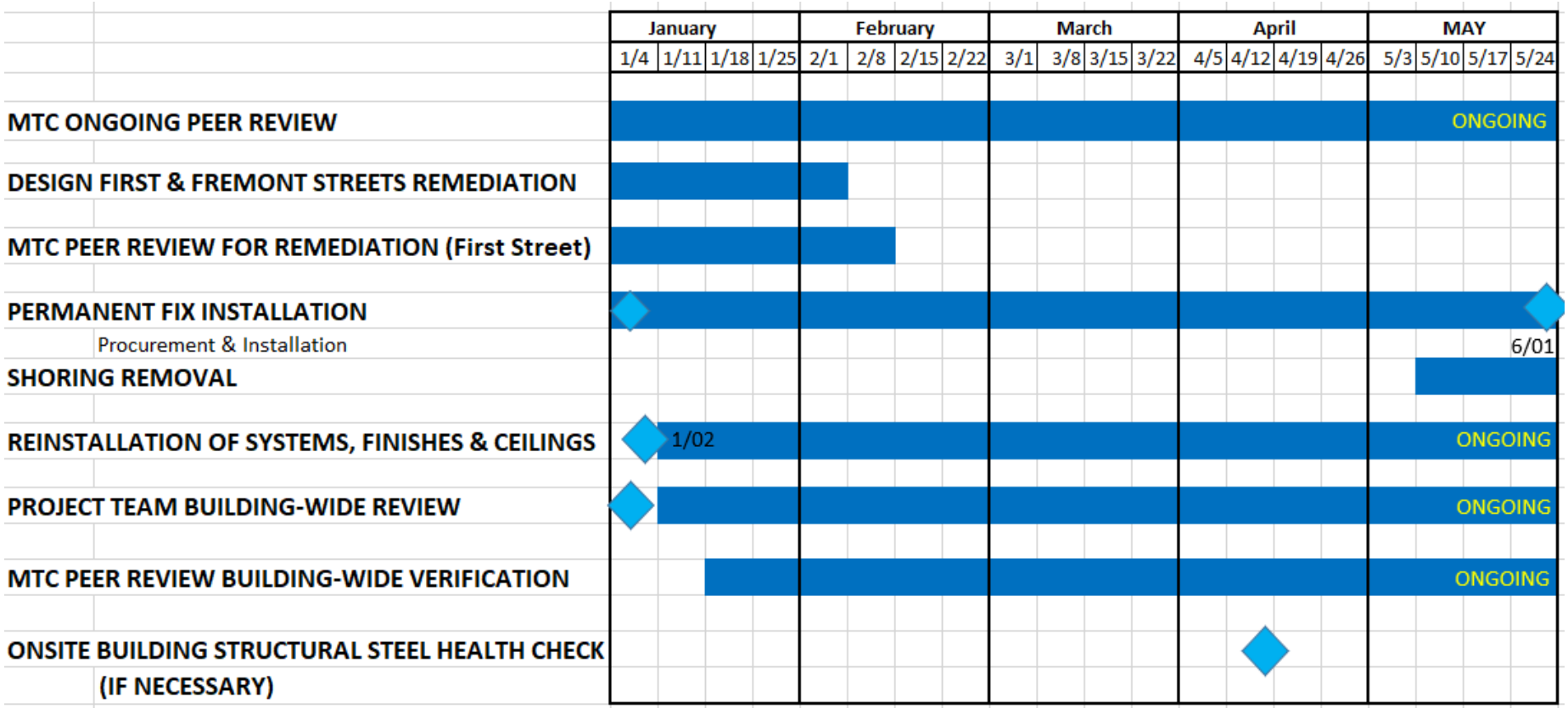
*Project team consists of TJPA, TT, CM/GC with associated subcontractors and suppliers/fabricators

Schedule



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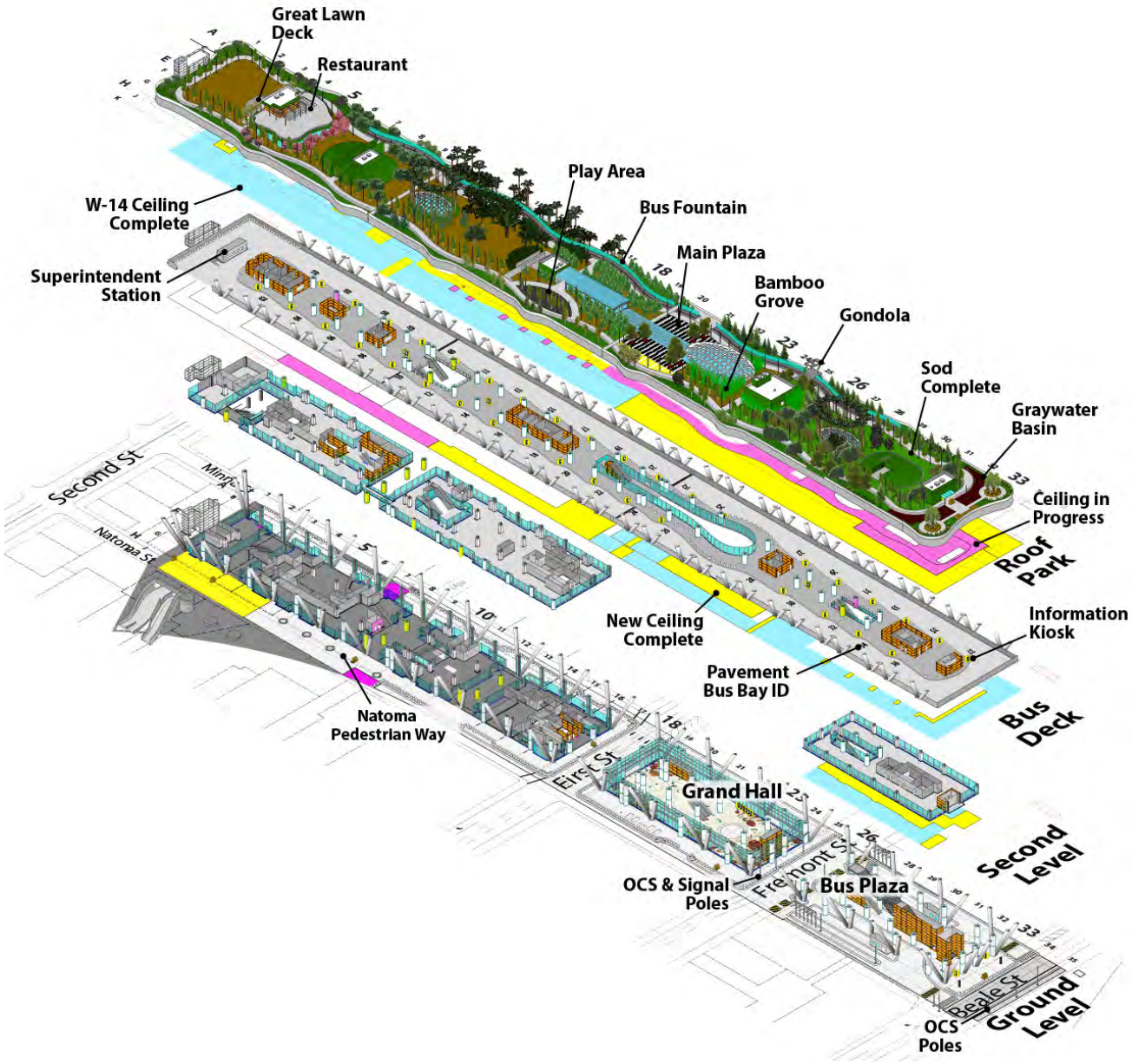
Facility-Wide Validation Framework



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Ongoing Actions

Progression through the successive sieves of the funnel help separate areas which require further research to confirm to be acceptable.

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Facility-Wide Validation Framework

- Reaffirm Structural Integrity of Building
- Review Tests & Inspection Records completed in March
- Building Management Systems Commissioning completed in April
- Revalidate Full Fire & Life Safety Systems completed in May
- Ready for Re-Occupancy

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INSPECTION OVERVIEW

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AGENDA – QA Inspection Overview

- Overview
- Special and Code Compliance Inspections
  - Structural Concrete
    - Mat Slab, Foundation Walls, Decks, Columns
  - Bus Ramp and Cable Stay Bridge
  - Micropiles
  - High Strength Bolts at Light Columns
- Other Testing, Inspections and Observations
  - Mechanical/Electrical/Plumbing
  - Additional Observations
- Commissioning and Post Commissioning

Overview

- Approximately 3 million individual QA inspections and observations were conducted for the Transbay Project, on and offsite between 2011 and 2018.
- Inspected all components of the project; Soils, Concrete, Reinforcing Steel, Structural Steel, Fireproofing, Building Systems.
- Tests and Inspections are driven by the Engineer of Record or Designer and Building Code compliance.

Structural Concrete

Testing and inspection is to ensure design strength is achieved in all concrete elements.

- Inspect for:
  - Concrete Verification Verify concrete batch plant tickets for mix design and add mixtures match design and/or approved types
    - Perform “slump cone” test per ASTM C143
    - Record supplier, air temperature, concrete mix temperature, air content & weight
  - Concrete Sampling
    - Report location of placement, sample size, time/duration of placement, No. of samples & mix
    - Secure samples sets per ASTM C172
  - Concrete Placement Observation
    - Verify placement times & procedure
  - Concrete Testing
    - One sample per 100 CY
    - Shrinkage test per ASTM C157
    - Test cylinders per ASTM C31 & C39

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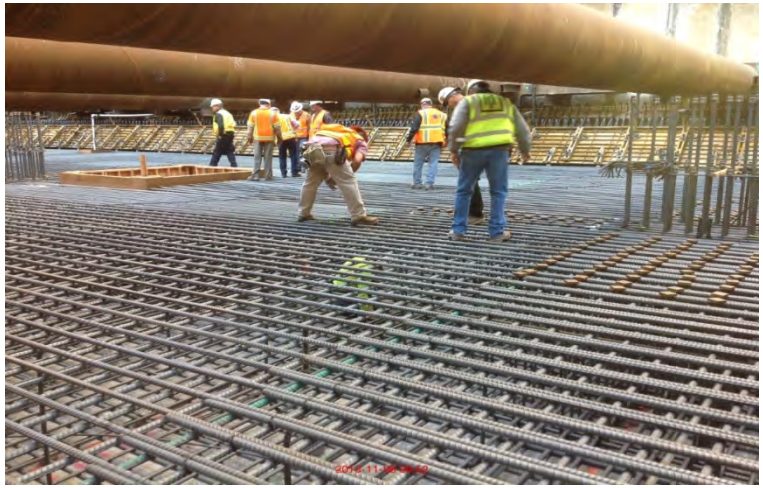
Typical Concrete Placement



Rebar inspection prior to concrete pour

Checking concrete batch tickets

Concrete Placement Observation

Concrete Test Cylinders

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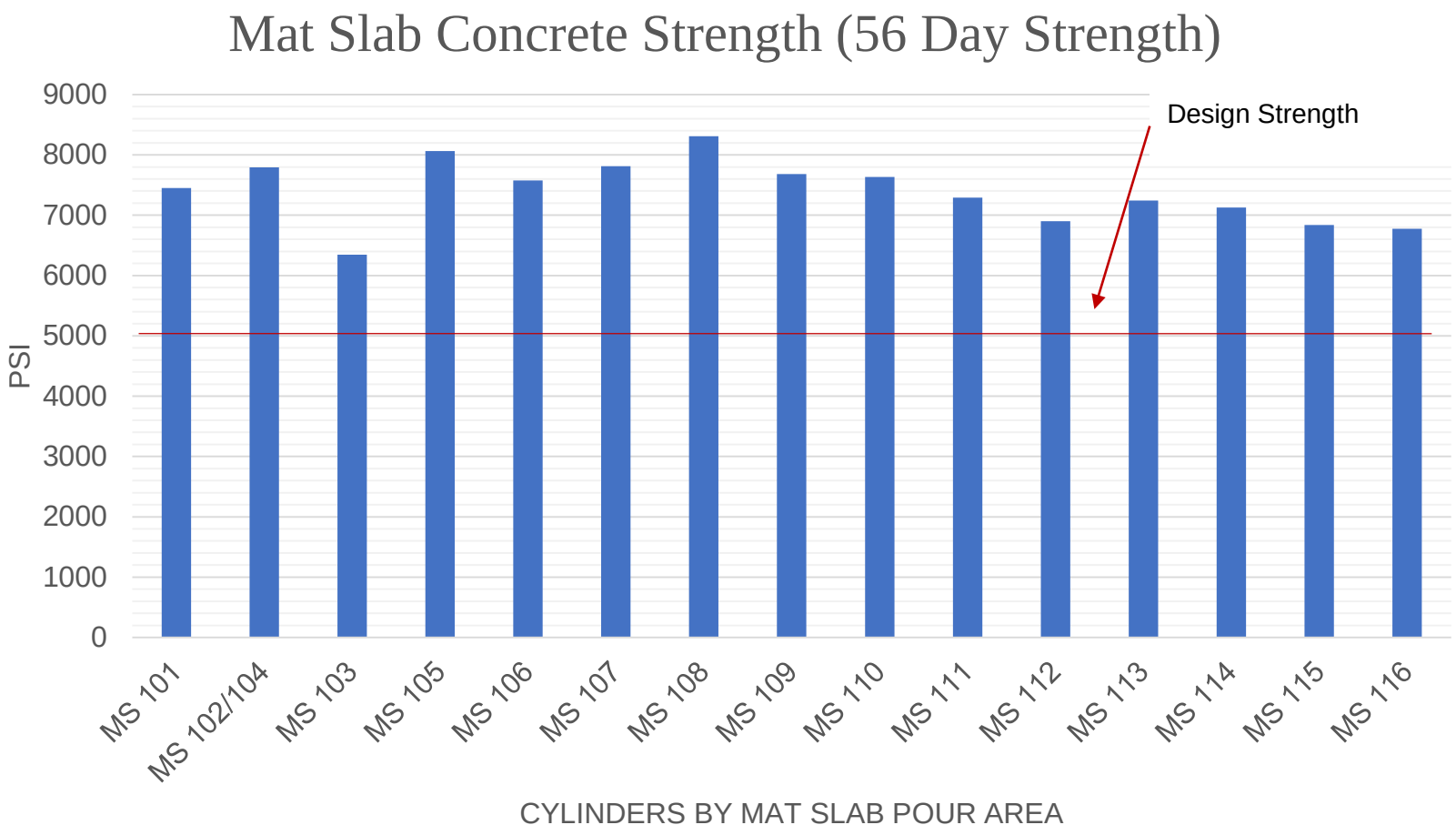
Concrete Strength Test Results



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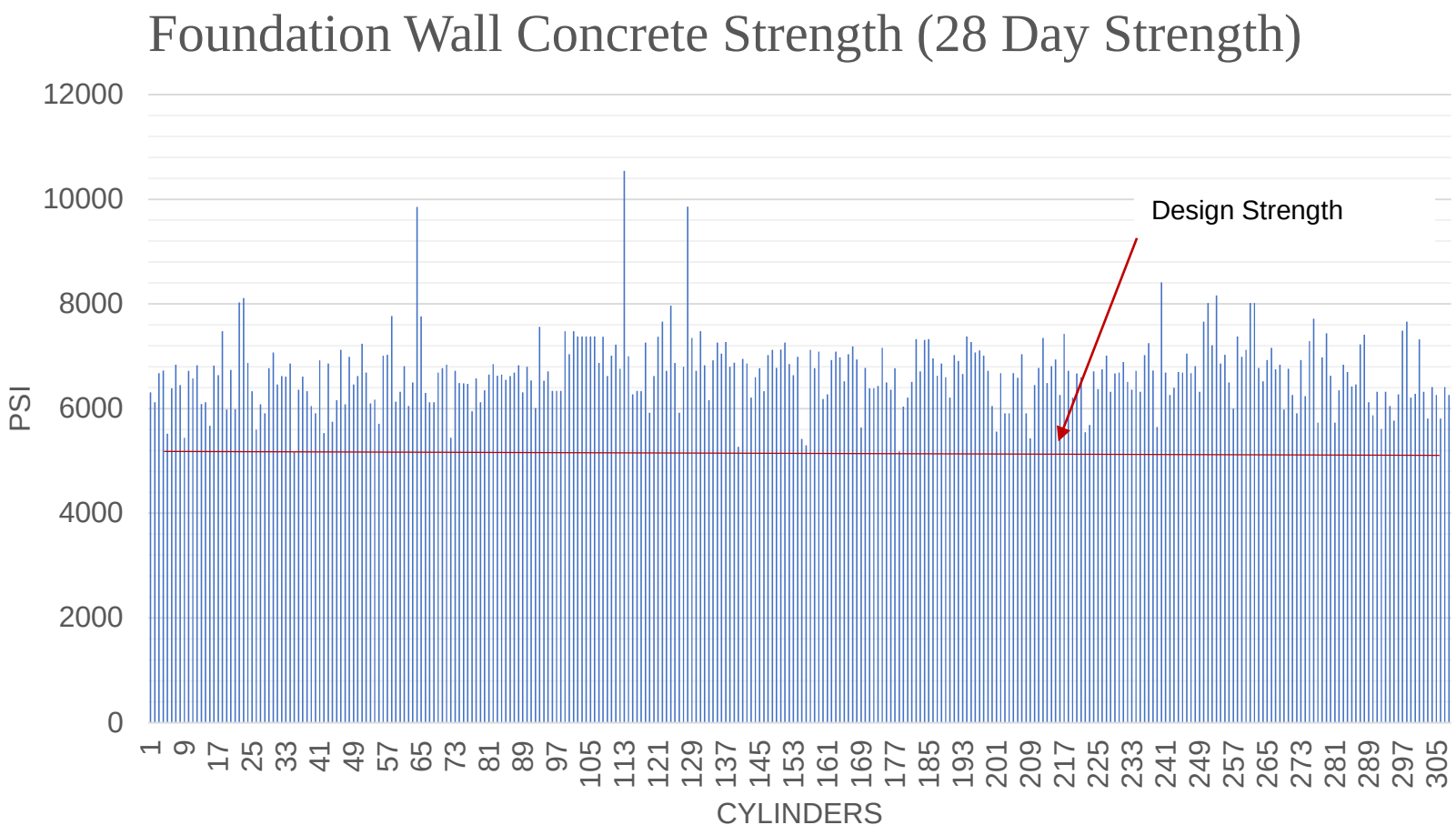
Concrete Strength Test Results



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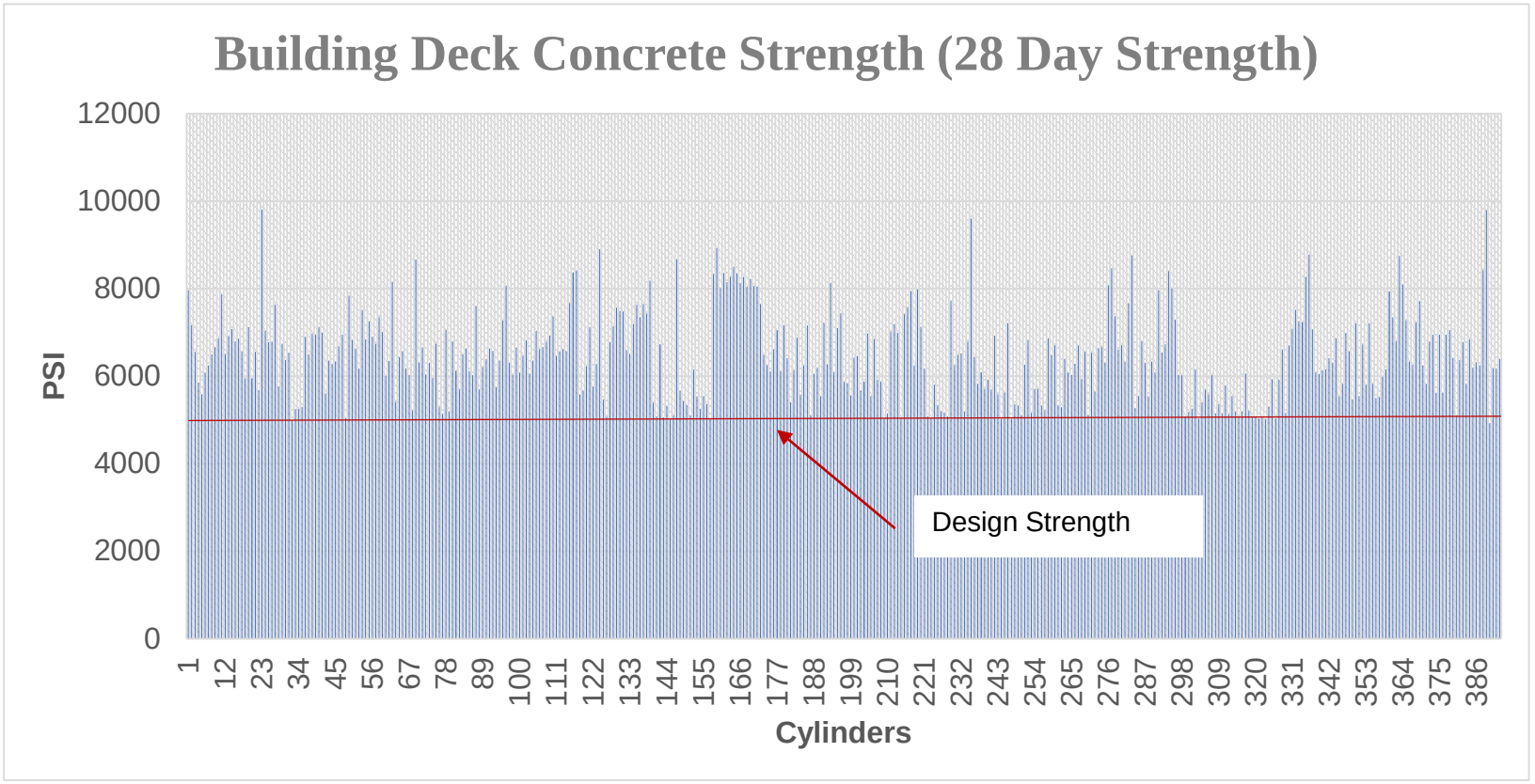
Concrete Strength Test Results



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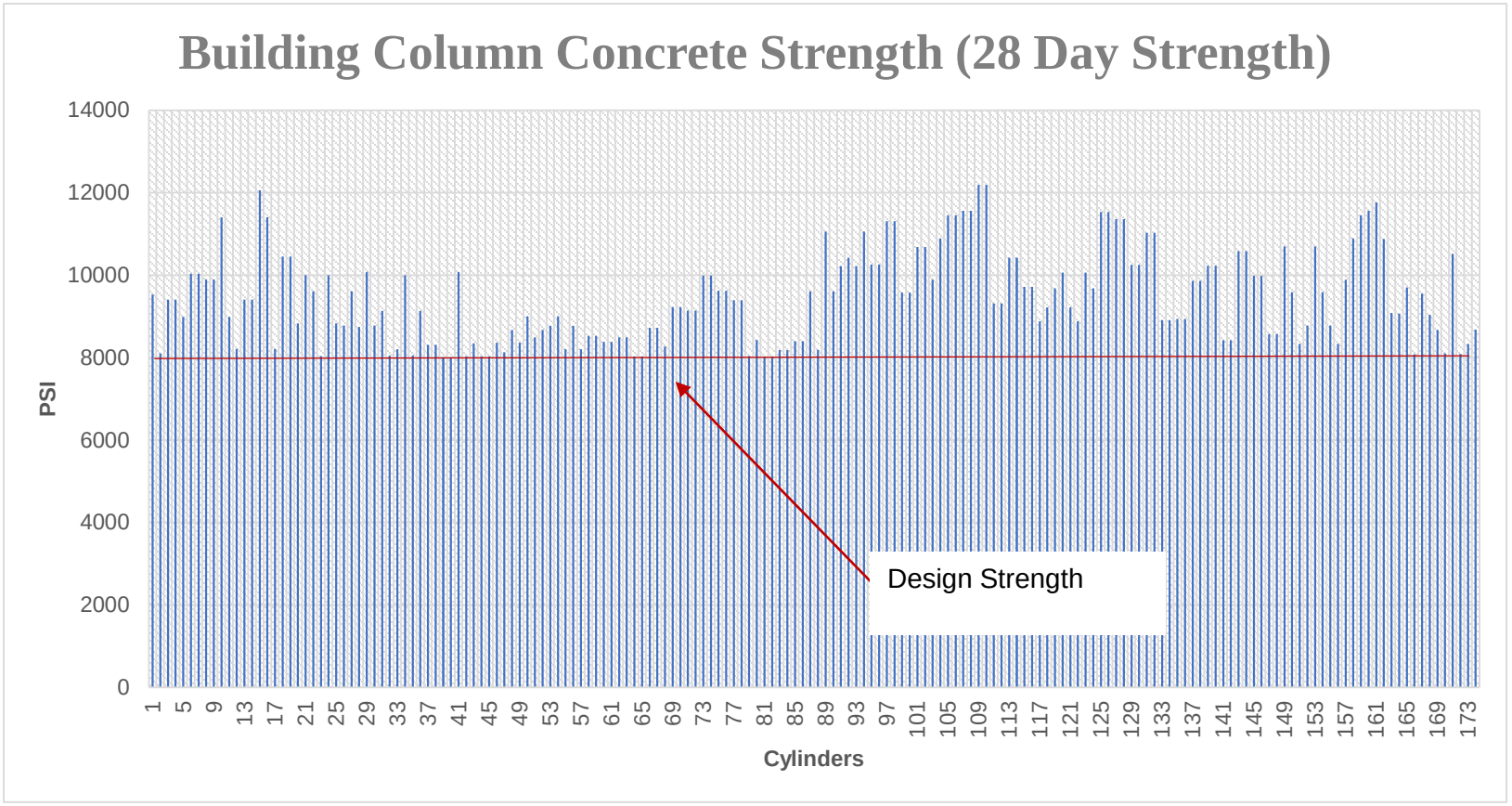
Concrete Strength Test Results



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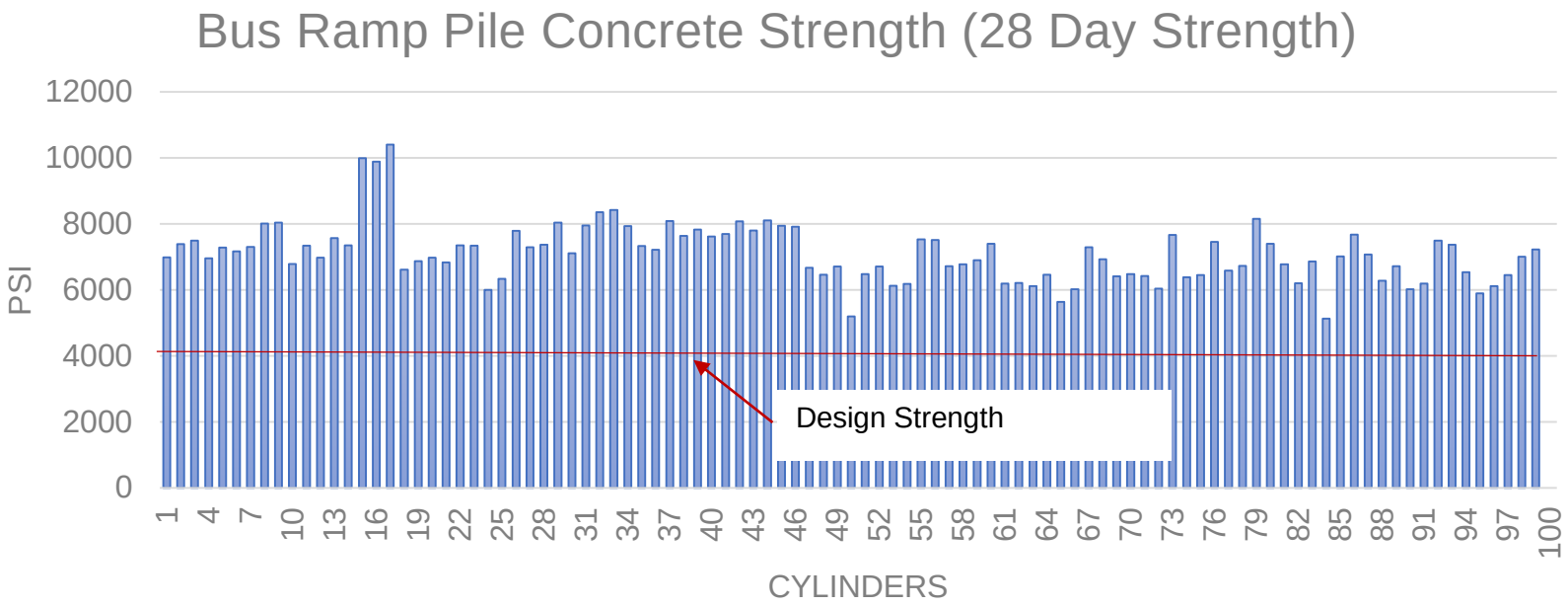
Concrete Strength Test Results



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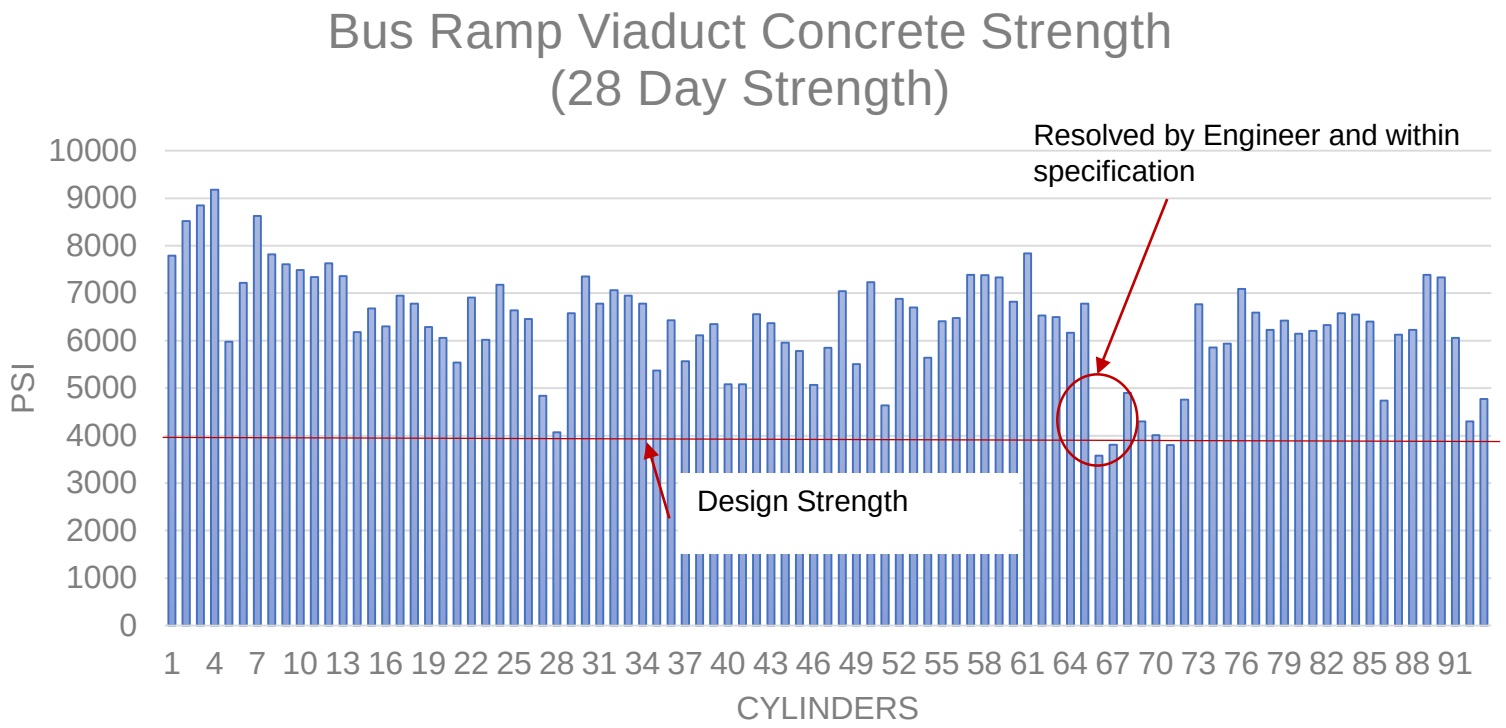
Concrete Strength Test Results



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Micropiles

Testing and inspection is to ensure designed maximum pull strength is achieved.

- Inspect for:
  - Material Certifications
    - Confirm bar diameter/Grade/Type/Length (2.5”dia., ASTM A615 Grade 80, heat number, 75 feet long)
  - Installation Verification
    - Identification number and Location
    - Grout Mix verification -consistency & specific gravity measured using Mud Balance (API RP-13B-1) or Flow Cone Method (CA Test 541)
    - 3 day strength 2000 psi and 28 day strength 4000psi
  - Proof Testing
    - Verify equipment calibration - gauge & ram
    - Perform a “pull” test on every micropile to 1.54X the design strength or 308 kips
    - Displacement verification – less than 0.0825” in 10 minutes at 308kips
    - Creep movement verification – less than 0.04” in 10 minutes; less than 0.08” in 6 to 60 minutes at 308kips

Micropile Testing

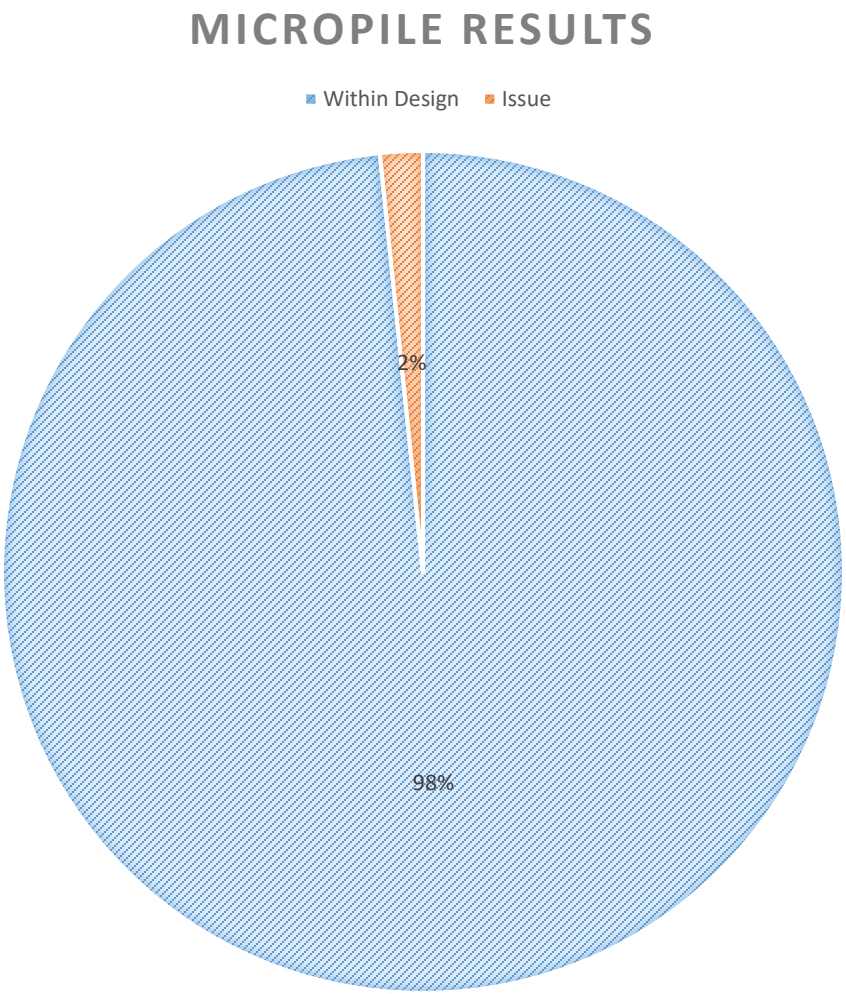
Micropile Pull Test Underway

Micropile Test Results

Of the 1896 Micropiles completed, there were 2% that had issues that were eventually resolved.

<u>The issues found in the 2% were:</u>

Documentation	10
Location	10
Grouting	3
Material	6
Soil	1
Testing	1



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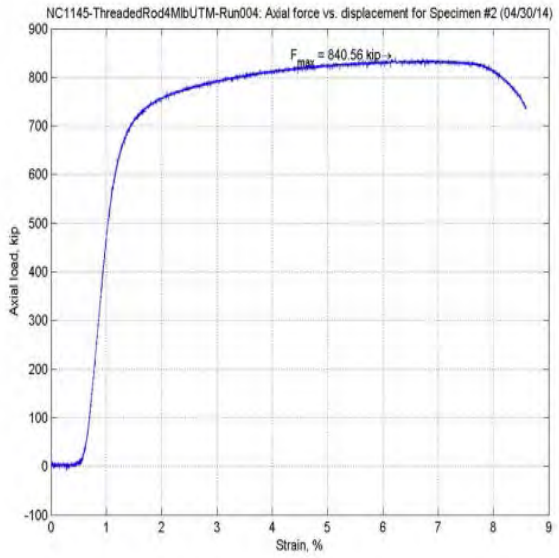
High Strength Bolts

Bolts must meet strength requirements and be tensioned to design specification.

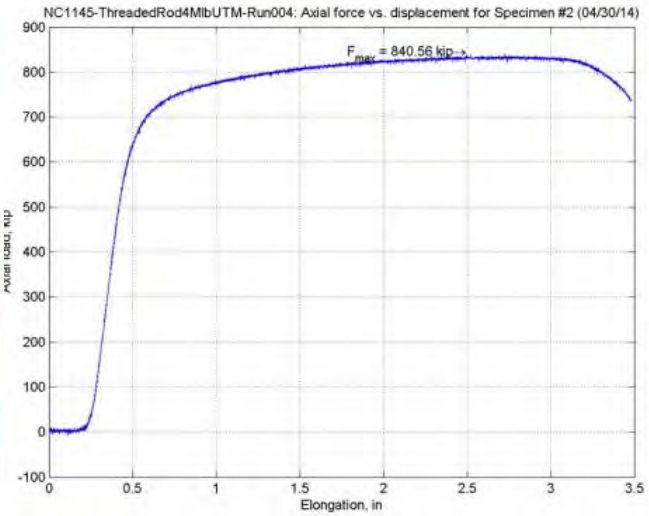
- Inspect for:
  - Material Certification & Sampling/Testing
    - Verify Material and Mill Certification
    - Collect Samples to be taken per specification/engineer
  - Equipment Calibration
    - Verify equipment calibration reports
  - Proof Testing
    - Failure Testing to 840kips (specific to Light Column Bolts)
    - Testing (pulling, bending, breaking) per ASTMA722/722M, A370, A700, E30

High Strength Bolt Lot Testing



Strain testing to design limits

Testing Bolt Samples



Elongation testing to design limits

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High Strength Bolt Tensioning

Bolt tensioning underway at Light Column

Bolt Tensioning Inspection

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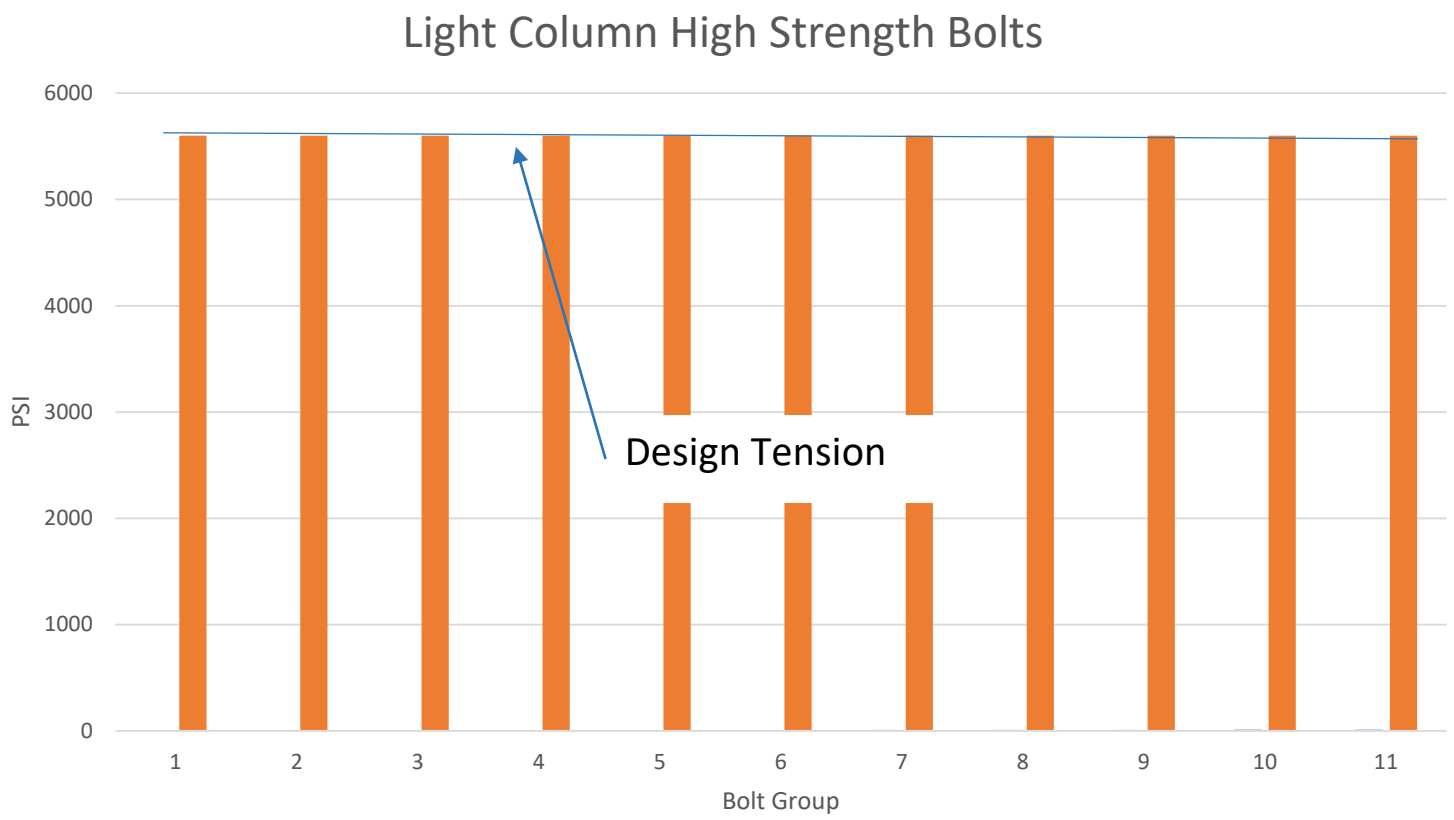
High Strength Bolt Tensioning Results



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Cable Stay Bridge/Bus Ramp

All cable strands tested, coated & sealed – to meet design loading criteria and resist corrosion

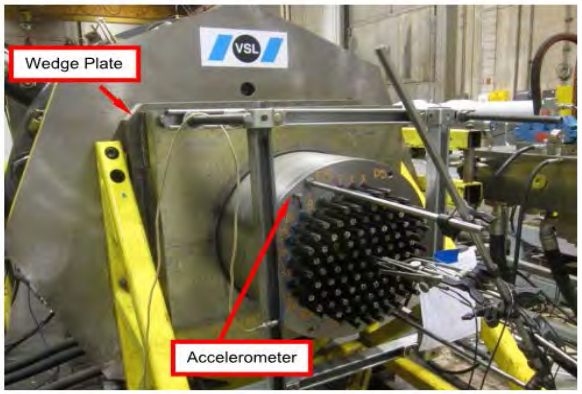
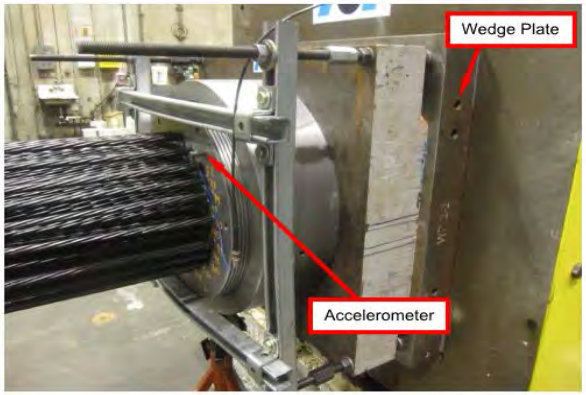


Figure 2-2 Cable East Anchor Head (Fixed)



Pre-testing of strand materials

Total of 714 strands installed – all met design criteria

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Mechanical Electrical & Plumbing (MEP) Inspections

Transbay mechanical, electrical and plumbing systems were inspected by city and/or state departments for code compliance.

Agency	Total Inspections
City	
SF Fire Department	126
SF DBI Electrical	1472
SF DBI Plumbing	507
SF DBI Mechanical/Building	2047
SF DPW Civil & Sewer	49
State	
Elevator/Escalator	29*
Other	
PGE	65

*Reflects final inspections only

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Additional Oversight and Observation

Agencies with input on Transit Center and areas of focus

- SFMTA — 250 onsite visits
  - Muni Bus Plaza and Overpasses (First, Fremont & Beale Streets), roadways, signalization, coordination
- AC Transit — 25 onsite visits
  - Bus service preparation checks
- CalTrans — 18 onsite visits
  - Landscaping review, underground utility coordination, roadway configuration & striping, documentation audits

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MEP – Commissioning

Commissioning is used to prove performance is as intended.

- Inspect for:
  - Installation Verification - Conducted by Contractor
    - To field verify and document proper installation of the system equipment, assemblies, and components prior to conducting startup.
  - Equipment Startup & Pre-functional Checkout - Conducted by Contractor
    - To ensure that equipment will operate as intended and manufacturer warranties are not voided.
  - Systems Readiness Checklist (SRC) - Completed by the Contractor (Reviewed by the Cx)
    - To ensure equipment and systems have been properly installed, connected, started, and are now operational, and that the equipment is ready for the start of functional testing.
  - Functional Performance Test (FPT) are conducted - Conducted by the Cx (% of system commissioning)
    - To dynamically test the equipment and system performance under full operation as they would operate upon project completion.

Commissioning
Systems Readiness Checklist

enovity

System Readiness Checklist (SRC)

Transbay Center

Last updated: 2/19/2018

Exhaust Fans (VFD) EF-1-A-1

Note: The installation of each fan is tracked on the "EF Checklists" sheet. Once all fans are installed and ready for functional testing the SRC should be completed and signed off.

	Equipment Installation Verification (IV):	Company	Initials	Date	Comments
1	Unit model number, factory options and performance specifications (fan CFM / HP), verified consistent with approved submittal.	DMI	BB	2018.06.19	
2	Fan installation complete and compliant with design documents, schedules, and manufacturer guidelines.	DMI	BB	2018.06.19	
3	Electrical installation (power wiring, disconnects, starters, emergency power, etc.) and O&M access verified complete and compliant with design documents, manufacturer guidelines and specifications.	Fisk	BLS	7/6/2018	
4	All equipment have ID tags installed that comply with specification requirements.	DMI	BB	2018.06.19	
5	**Installation Verification (IV) checklist has been created and completed by Mechanical Contractor and transmitted to CxA.**	DMI	BB	2018.06.19	
	Equipment Startup & Pre-Functional Checks/Tests:	**Company**	**Initials**	**Date**	**Comments**
6	Factory testing completed per spec 23 34 00 (2.2-B). **Certified test reports transmitted to CxA.**	DMI	BB	2018.06.19	
7	Startup completed per manufacturer's written instructions per spec 23 34 00 (3.1-A). **Startup report completed and transmitted to CxA.**	DMI	BB	2018.06.19	
8	Startup checks completed per spec 23 34 00 (3.2). **Reports transmitted to CxA.**	DMI	BB	2018.06.19	
9	VFD startup completed per manufacturer's written instruction by a factory-authorized start-up service per spec section 23 05 14 (3.1-B). **Certified startup forms transmitted to CxA.**	DMI	BB	2018.06.19	
10	Complete attached Exhaust Fan Checklist to provide installation verification. **Completed checklist transmitted to CxA.**	DMI	BB	2018.06.19	
	Controls IV & Pre-Functional Checks/Tests:	**Company**	**Initials**	**Date**	**Comments**
11	BACnet integration to VFD's completed and verified functional.	JCI	MN	11/14/2018	
12	BMCS controls IV & pre-functional checks completed (point-to-point, sensor checks, etc.). **BMCS pre-functional checklists transmitted to CxA.**	JCI	MN	11/14/2018	
13	Operator workstation graphics completed & verified compliant with specifications including all necessary setpoints and monitored points.	JCI	MN	10/26/2018	
14	Sequences programmed and pre-tested in accordance with the approved Sequences of Operations.	JCI	MN	1/24/2019	
15	All alarmable points have been set up, activated, and added to graphics.	JCI	MN	8/14/2018	
16	Trending has been set up and activated for all points specified to be trended.	JCI	MN	8/14/2018	
17	Control loops properly tuned (no hunting / cycling).	JCI	MN	1/24/2019	
	Testing, Adjusting and Balancing (TAB):	**Company**	**Initials**	**Date**	**Comments**
18	TAB Completed per spec 23 05 93. All readings are within specified tolerances.	DMI/NABCO	AKO	2018.06.10	
19	**Preliminary TAB report transmitted to CxA.**	DMI/NABCO	AKO	2018.06.10	
	Final Sign-off by CxC	**Company**	**Initials**	**Date**	**Comments**
20	SRC is complete (all line items above are initialed as completed or comment clearly explains why not completed) and supporting documentation obtained.	WOJV	TLM	2/12/2019	
	Final Sign-off by Enovity	**Company**	**Initials**		**Comments**
21	**SRC is complete and supporting documentation indicates system is ready for Functional Performance Testing**	Enovity			

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Commissioning
Functional Performance Test Report

Cx Functional Performance Test (FPT)								
Enovity	Test: BMCS Alarms		Participant Name	Company		Dates Present		Comments
	Project: Transbay Center							
	System: General EF (VFD)							
	Equip. ID: TBD							
	Last Edited On: 7/11/2017							
Step #	Test Description	Expected Response / Performance	Observed Response / Performance	Pass?	Cx Issue?	Date Completed [Ctrl;]	Time Completed [CtrlShift;]	Comments
0	INSTRUCTIONS: CxA will witness tests for the exhaust fan. For a Re-Test, enter new row below failed test and record the Re-Test Results. Note Re-Test in the Comments.							
1	**EF Failure Alarm** With the fan command and run status ON, turn off power at the disconnect.	Failed EF run status is OFF (commanded ON).						
		Fan Failure alarm is generated by BMCS and displayed on alarm log and system graphic.						
	Clear the EF Status Failure/Alarm Return power to the fan.	Alarm clears.						
		EF is no longer failed.						
	Document if the alarm must be manually cleared to restore operation or if automatically clears and restores operation.	System returns to normal.						
2	**FAILURE POSITIONS** Simulate a BMCS power failure	Ventilation fan remains in last commanded state						
	Remove power failure simulation	Fan returns to normal operation						
3	**Return to Normal. Verify all overrides and setpoints are returned.**	NA						

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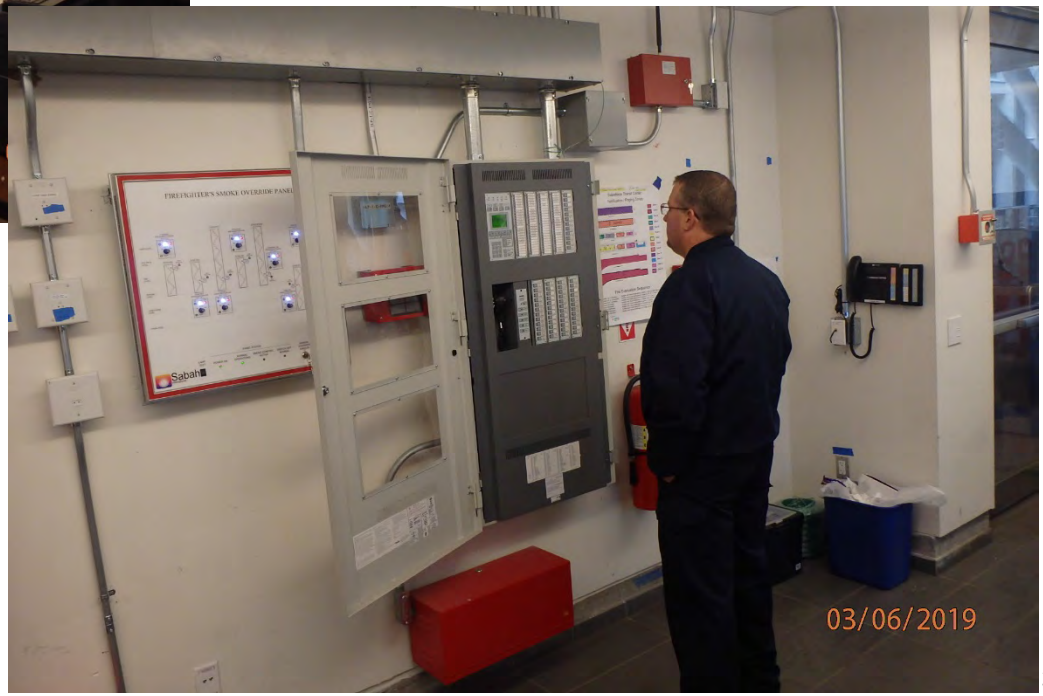
Post Commissioning

Monitoring & Managing the Building Systems.

Transit Center Monitored 24 hours per day/ 7 days per week

Building Management System

Building Fire Alarm Panel



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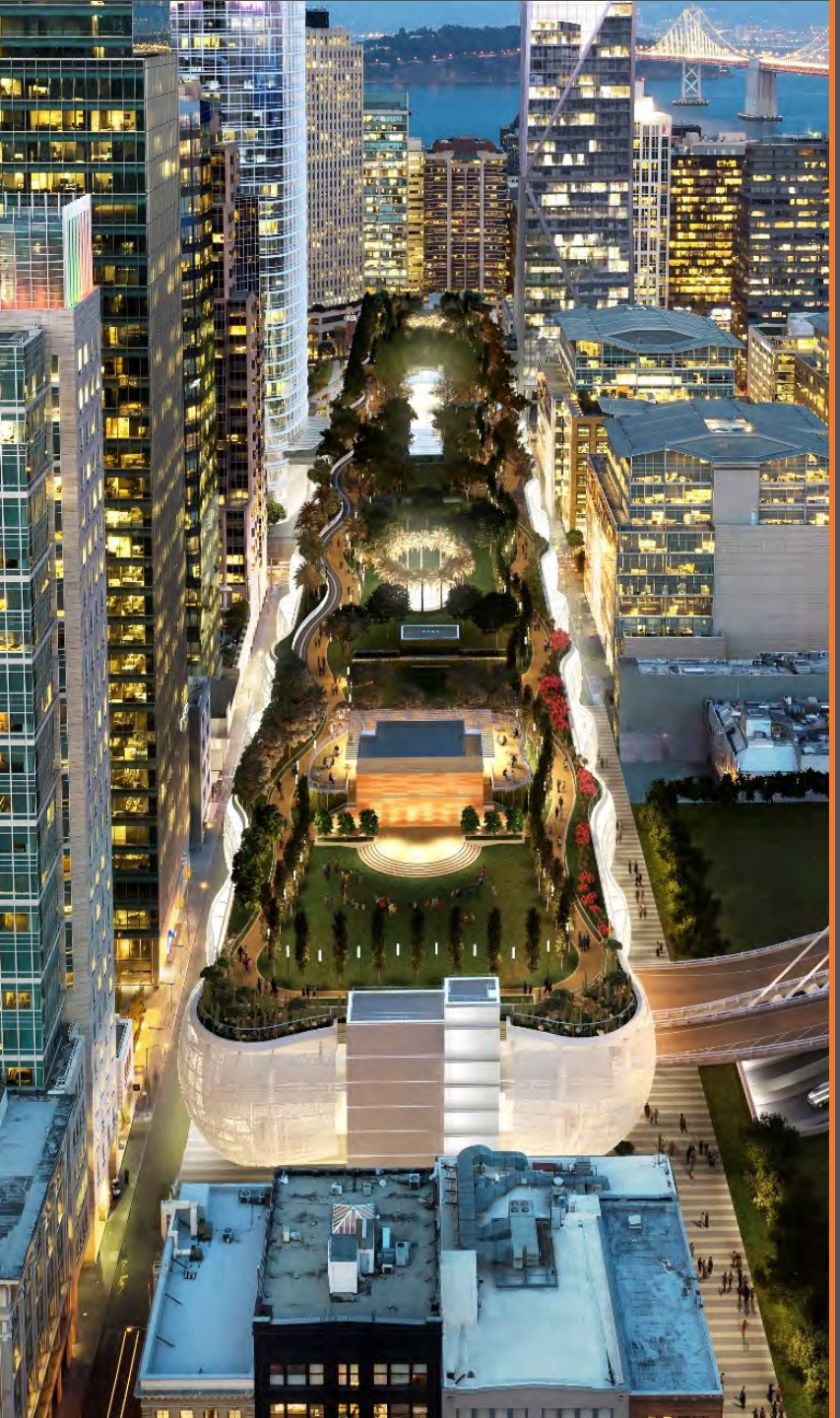

Thank you

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