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Date: January 25, 2023
Project Number: 19-009
Subject: 301 Mission Retrofit Supplemental Monitoring Report 090: Results as of January 24, 2023

## CONTEXT

This supplemental memorandum summarizes results from the monitoring plan implemented at the 301 Mission property following the process established in a letter from Simpson, Gumpertz and Heger (SGH) to the San Francisco Department of Building Inspection (SFDBI) dated March 23, 2022. Instrumentation to temporarily monitor the structure during the excavation and shoring project phases was installed on April 20, 2022, including survey prisms installed at approximately one floor level above grade on the exterior of the building. This supplemental memorandum is for review only. It only contains ongoing monitoring information. This supplemental memorandum does not contain recommendations based upon the ongoing monitoring information.

## PRESENTATION OF DATA

Figure S-01 presents the locations of the survey prisms (including both control and target prisms) as referenced in later figures.

Figure S-02 presents the differential horizontal movement toward the excavation at survey prisms installed at approximately one floor level above grade on the exterior of the building, as well as the average in each of the project north-south and east-west direction, since April 26, 2022, through January 24, 2023. Limits established in the aforementioned letter are included for reference.

Figure S-03 presents differential lateral roof deflection data due to shoring wall installation and excavation since April 26, 2022, through January 24, 2023. Limits established in the aforementioned letter are included for reference. Note that differential lateral roof deflection due to shoring wall installation and excavation is calculated following the aforementioned letter as:

$$\Delta_{R,NS} = \Delta_{R-prism,NS} - \Delta_{H,NS} - \alpha_0 T \quad (a)$$

$$\Delta_{R,NS} = \Delta_{R-prism,NS} - \Delta_{H,NS} - \alpha_{1,NS}(T - T_{1,NS}) - \alpha_0 T_{1,NS} \quad (b)$$

$$\Delta_{R,EW} = \Delta_{R-prism,EW} - \Delta_{H,EW} - \alpha_0 T \quad (c)$$

$$\Delta_{R,EW} = \Delta_{R-prism,EW} - \Delta_{H,EW} - \alpha_{1,EW}(T - T_{1,EW}) - \alpha_0 T_{1,EW} \quad (d)$$

where: $\Delta_R$ is the computed differential lateral roof deflection due to shoring wall installation and excavation during shoring wall installation (a or c) or during excavation (b or d) for the project north-south (a and b) and project east-west (c and d) directions;
$\Delta_{R-prism}$ is the differential lateral roof deflection obtained from prism data for the project north-south (a and b) and project east-west (c and d) directions;
$\Delta_H$ is the average differential horizontal movement "at-grade" for the project north-south (a and b) and project east-west (c and d) directions;
$\alpha_0$ is the weekly lateral roof deflection rate from the two months of monitoring conducted immediately prior to the shoring wall installation (i.e., monitoring data from February 22, 2022, through April 26, 2022);
$\alpha_{1,NS}$ is the weekly lateral roof deflection rate from the two months of monitoring conducted immediately prior to starting the Mission Street excavation (i.e., monitoring data from August 15, 2022, through October 16, 2022);
$\alpha_{1,EW}$ is the weekly lateral roof deflection rate from the two months of monitoring conducted immediately prior to starting the Fremont Street excavation (to be calculated once Fremont Street excavation starts);
$T$ is the number of weeks since initiation of shoring wall installation or excavation;
$T_{1,NS}$ is the number of weeks between the initiation of shoring wall installation and starting the Mission Street excavation (i.e., between April 26, 2022, and October 18, 2022); and,
$T_{1,EW}$ is the number of weeks between the initiation of shoring wall installation and starting the Fremont Street excavation (to be calculated once Fremont Street excavation starts).

Figure S-04 presents rates of differential lateral roof deflection data due to shoring wall installation and excavation since April 26, 2022, through January 24, 2023. Limits established in the aforementioned letter are included for reference. Note that the rates are calculated as:

$$\frac{d\Delta_R}{dT} \approx \frac{\Delta_{R,t} - \Delta_{R,t-1}}{T_t - T_{t-1}}$$

where: $t$ is an index representing the current instance in time; and
$t-1$ is an index representing the previous instance in time.

## CLOSING

Please contact us if you have any comments or questions, or if you would like to discuss the results presented in this memorandum.

## FIGURES

Figure S-01A – Instrument Location Map: Horizontal Survey Control and Target Points at First Level
Figure S-02 – Differential Horizontal Movement Toward Excavation Since 04/26/2022 through 01/24/2023
Figure S-03A – Differential Lateral Roof Deflection Data due to Shoring Wall Installation and Excavation since 04/26/2022 through 01/24/2023
Figure S-04A – Rate of Differential Lateral Roof Deflection Data due to Shoring Wall Installation and Excavation since 04/26/2022 through 01/24/2023

## DATES

2022/04/26-28: Fremont St. Shoring Pile Test Installation
2022/05/03: Fremont St. Shoring Pile Installation Start
2022/05/26: Fremont St. Shoring Pile Installation on Hold
2022/06/13: Mission St. Shoring Pile Installation Start
2022/08/05: Mission St. Shoring Pile Installation End
2022/09/08: Mission St. Jet Grouting Start
2022/10/05: Mission St. Jet Grouting End
2022/10/08: Fremont St. Shoring Pile Installation Resumed
2022/10/17: Mission St. Excavation Start
2022/11/12: Fremont St. Shoring Pile Installation End
2022/11/16: Mission St. Excavation to Mat Extension Depth
2022/12/07: Fremont St. Jet Grouting Start
2023/01/23: Mission St. Jacking Load Application Start

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Project No. 0220-00383 HORIZONTAL TARGET EXHIBIT.dwg

**EXHIBIT MAP**
301 MISSION ST
COUNTY OF SAN FRANCISCO
STATE OF CALIFORNIA
APRIL 2022

Note: Image provided by Guida on 04/26/2022

| Project No: 19-009.00 | Date: 5/3/2022 | Created By: NBW | Checked By: DGM | Figure No: **090S-01** |
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INSTRUMENT LOCATION MAP
HORIZONTAL SURVEY CONTROL AND TARGET POINTS AT FIRST LEVEL

Millennium Tower Perimeter Pile Upgrade: Instrumentation Monitoring Data
City and County of San Francisco, California

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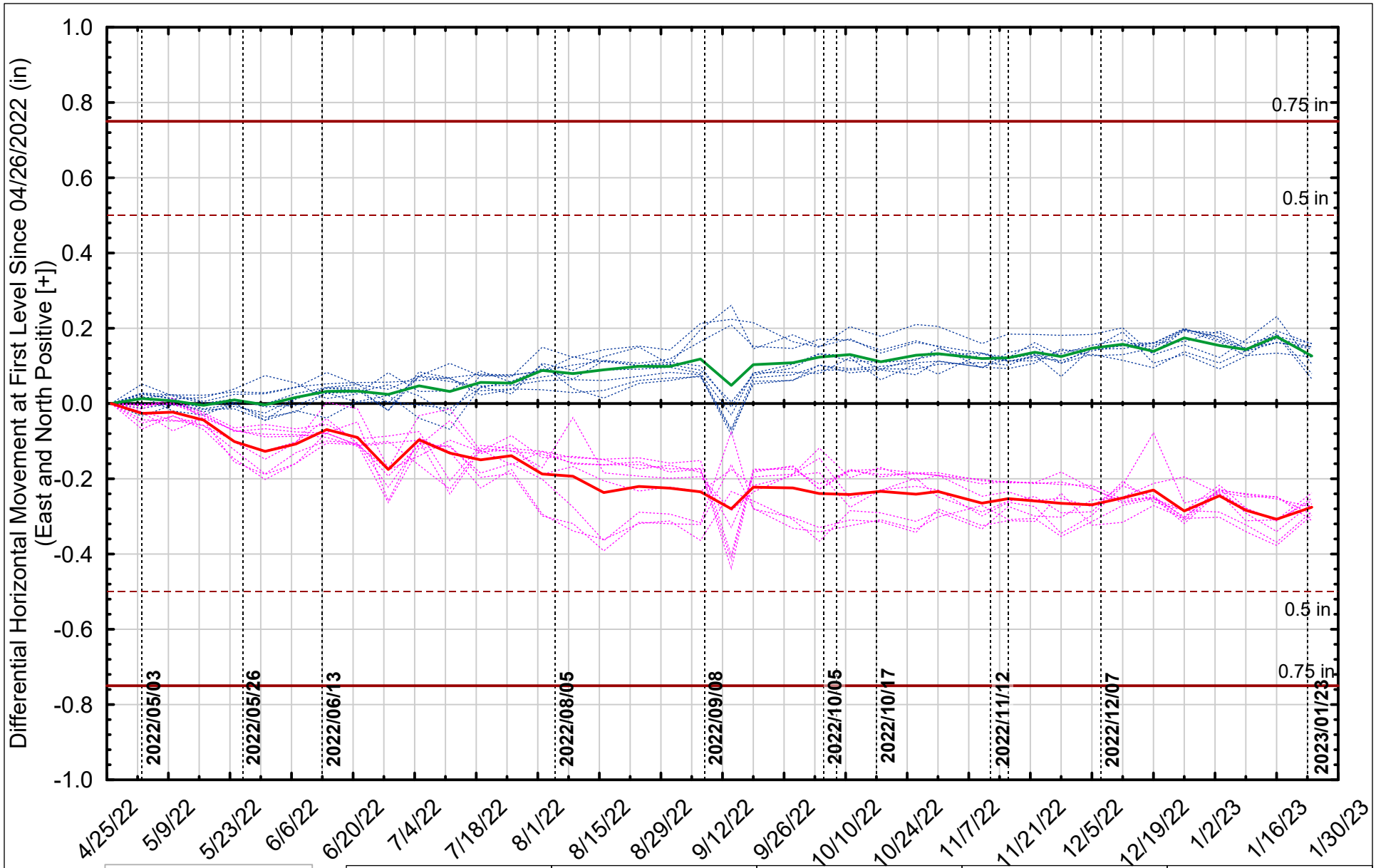


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DIFFERENTIAL HORIZONTAL MOVEMENT TOWARD EXCAVATION
SINCE 04/26/2022 THROUGH 01/24/2023

Millennium Tower Perimeter Pile Upgrade: Instrumentation Monitoring Data
City and County of San Francisco, California

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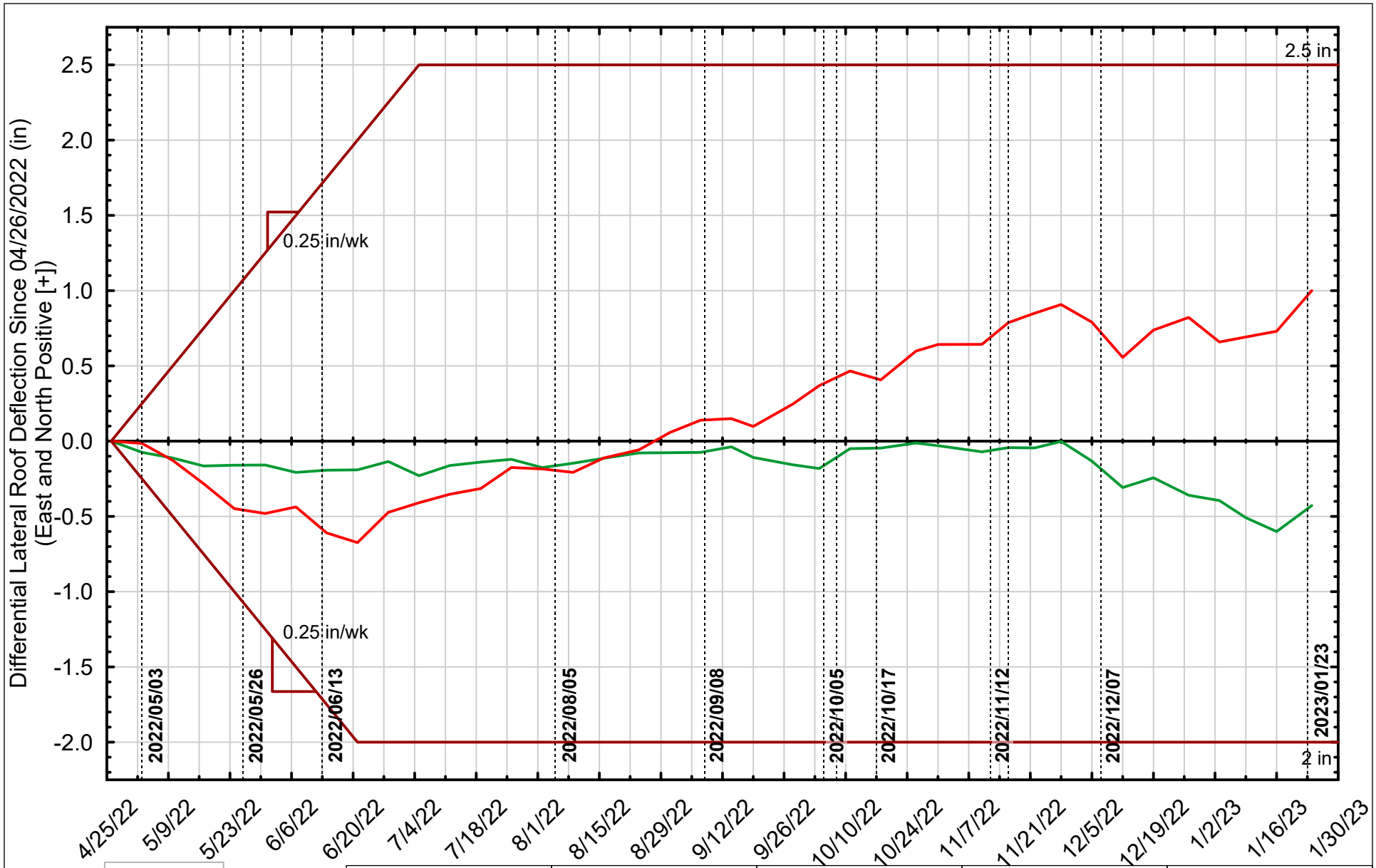


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DIFFERENTIAL LATERAL ROOF DEFLECTION DATA
DUE TO SHORING WALL INSTALLATION AND EXCAVATION
SINCE 04/26/2022 THROUGH 01/24/2023
Millennium Tower Perimeter Pile Upgrade: Instrumentation Monitoring Data
City and County of San Francisco, California

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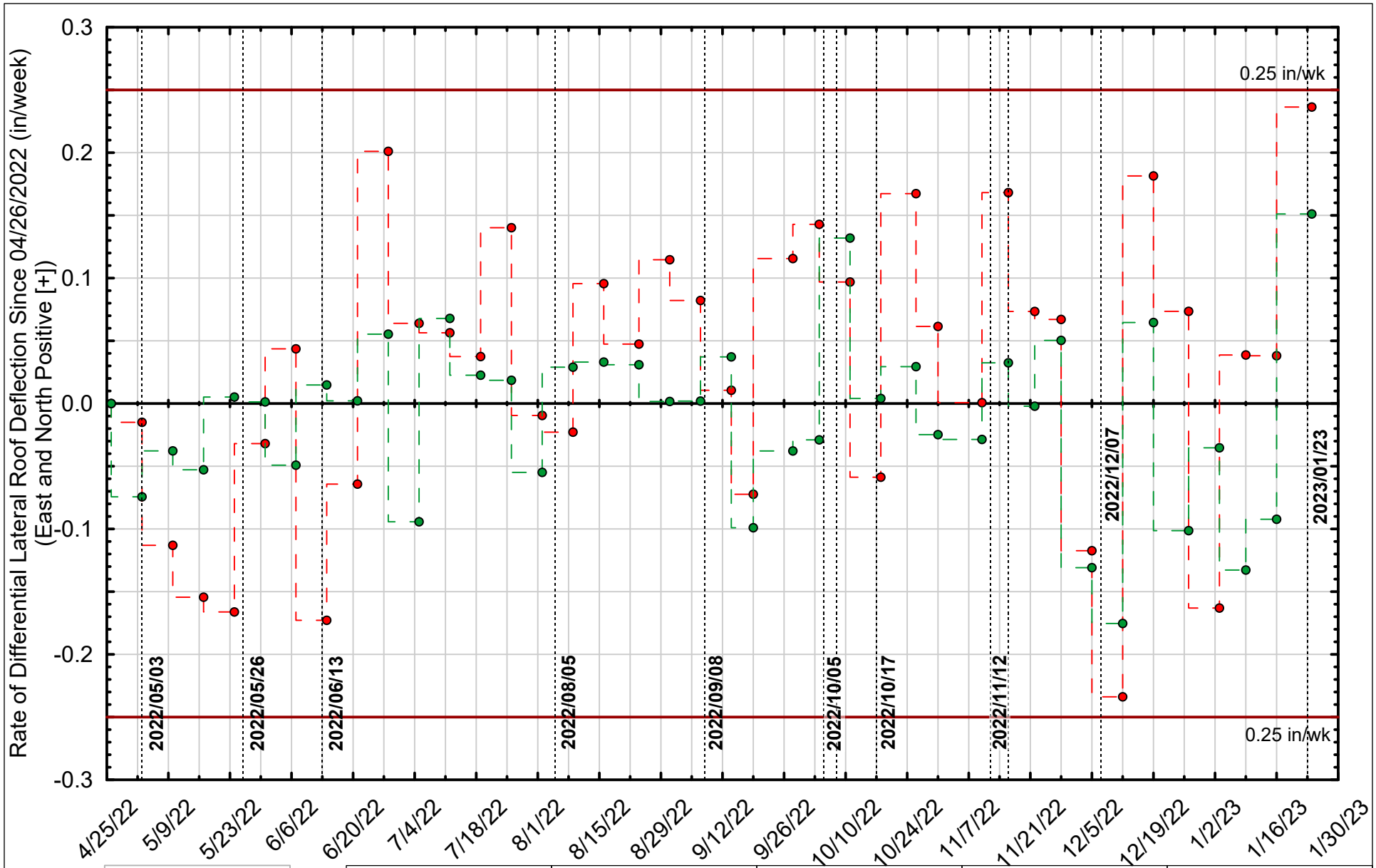


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RATE OF DIFFERENTIAL LATERAL ROOF DEFLECTION DATA
DUE TO SHORING WALL INSTALLATION AND EXCAVATION
SINCE 04/26/2022 THROUGH 01/24/2023
Millennium Tower Perimeter Pile Upgrade: Instrumentation Monitoring Data
City and County of San Francisco, California