

2023 Slip-Out Repair Project Higgins Canyon Road

Krzysztof Lisaj, P.E.

Deputy Director of Engineering
and Resource Protection

Department of Public Works

April 13, 2023

COUNTY OF SAN MATEO



Meeting Agenda

- **Introductions**
- **Overview of Recent Storms**
- **Higgins Canyon Road Failures and Closure**
- **Response Efforts to Date**
- **Continuing Efforts**
- **Temp. Repair/Opening**
- **Q&A**

Introductions

Department	Representative
Supervisor's Office	Supervisor Ray Mueller
Department of Public Works	Ann Stillman, Director of Public Works
Department of Public Works	Krzysztof Lisaj, Deputy Director of Public Works
Department of Public Works	Alex Zhang, Associate Civil Engineer
County Department of Emergency Management	Dave Cosgrave, Supervising District Coordinator
Cal Fire	David Hibdon, Battalion Chief
Sheriff's Office	Sgt. John Carrol
Sheriff's Office	Dan Bennett, Emergency Management Coordinator
Emergency Management Services	Travis Kusman, Director
Cal Engineering and Geology	Dan Peluso, Senior Principal Engineer
Cal Engineering and Geology	Scott Alman, Senior Principal Engineer

Overview of Recent Storms

- The County experienced an unprecedented amount of rain through the end of 2022 and into 2023
- Resulted in roadway failures, slip-outs, flooding, and 4 road closures
- To date, we have identified over 15 different locations that will require a future project
- Rain in February and March continue to impact the County and existing road failure sites



Stage Road – Roadway Closed

Overview of Recent Storms



Laguna Drive – Roadway Closed



Old La Honda Road – Roadway Closed

Overview of Recent Storms



Canada Road – Culvert/Sink Hole



Cloverdale Road – Slide/Debris Removal

Higgins Canyon Road Failure and Closure

- Multiple Slope Failures occurred along Higgins Canyon Road due to the winter storms
 1. Near 1780 Higgins Canyon Rd
 2. Near 2180 Higgins Canyon Rd
 3. Near 2665 Higgins Canyon Rd
- County of San Mateo Department of Public Works (Public Works) assessed each site and installed erosion control & traffic control measures
- Public Works will monitor these sites, plus others on Higgins Canyon Road for movement

Higgins Canyon Road Failure and Closure

Slope Repair Project
completed in 2022

1. near 1780 Higgins Canyon Rd

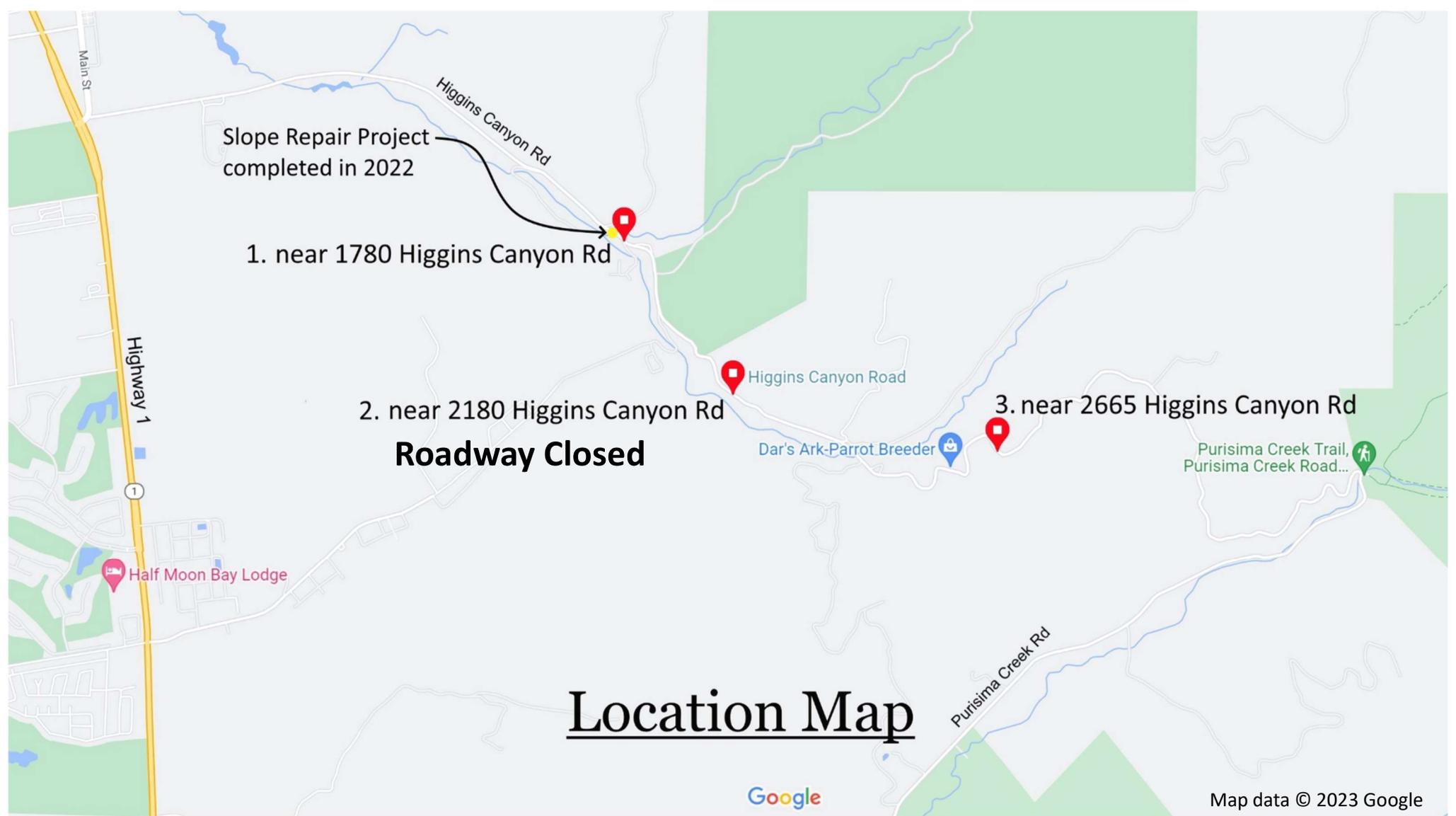
2. near 2180 Higgins Canyon Rd
Roadway Closed

3. near 2665 Higgins Canyon Rd

Location Map

Google

Map data © 2023 Google



Higgins Canyon Road Failure and Closure

Slope Failure Near 1780 Higgins Canyon Rd

- Slope failure first occurred in Fall 2021
- County road maintenance crew repaired the slope in November 2021, with an emergency permit
- Slope failed again in the 2021/2022 winter storm events. Conditions worsened in the 2022/2023 winter storm events



Higgins Canyon Road Failure and Closure

Slope Failure Near 2180 Higgins Canyon Rd

- Slope failure first occurred in January 2023 due to the 2022/2023 winter storm events
- Large eucalyptus trees had fallen
- Pavement on the road buckled and continues to deteriorate
- Road is currently closed for safety concerns
- Vehicles are detoured to use Purisima Creek Rd



Higgins Canyon Road Failure and Closure

Slope Failure Near 2665 Higgins Canyon Rd

- Two roadside slip-outs have occurred within the area.
- Slope failures occurred in January 2023 due to the 2022/2023 winter storm events
- Larger failure is approximately 200 feet in length
- Smaller failure is approximately 25 feet in length.



Higgins Canyon Road Failure and Closure

2180 Higgins Canyon Road – Aerial Image



COUNTY OF SAN MATEO



January Slide Movement

January 11, 2023



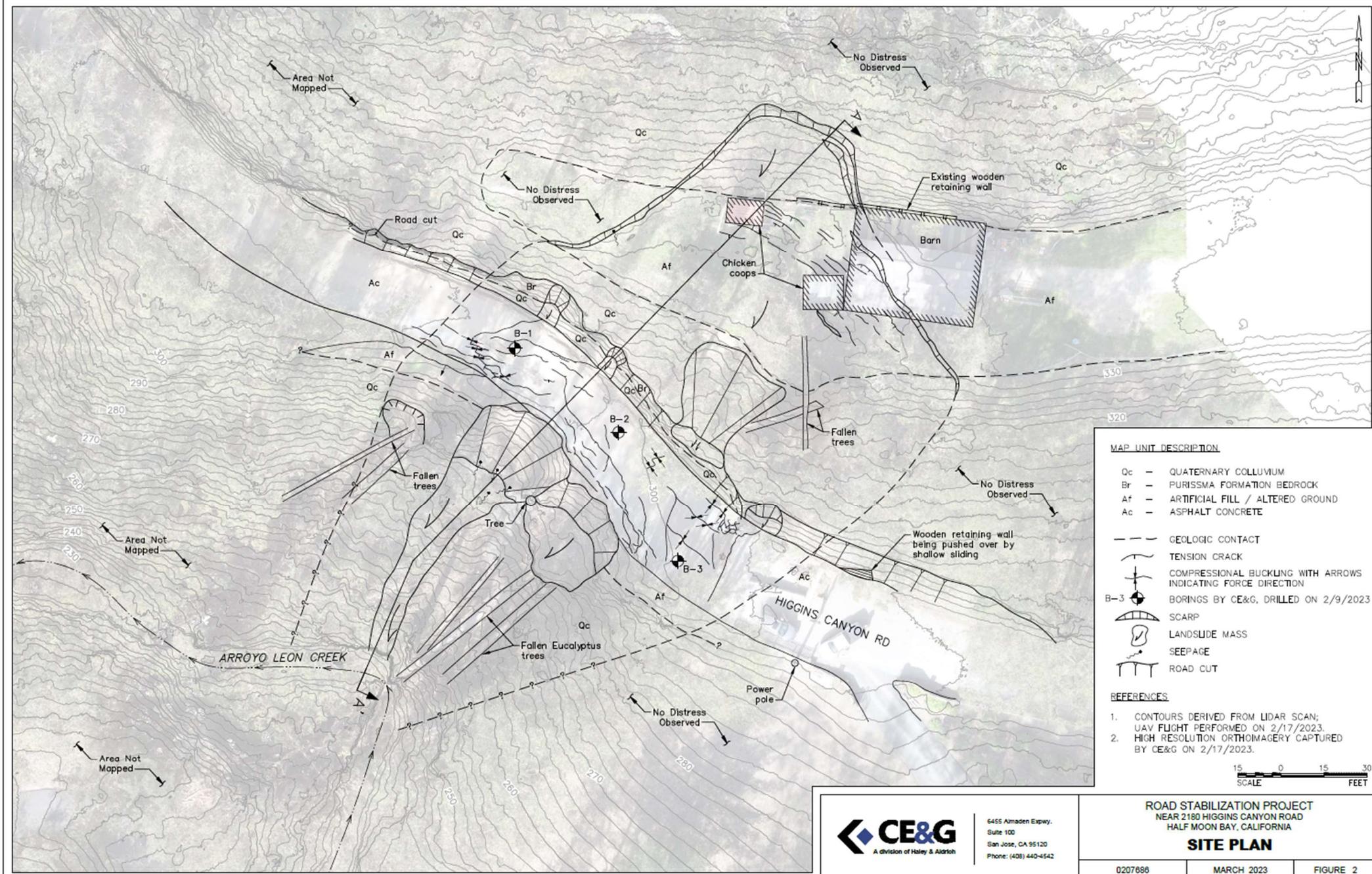
January Slide Movement

January 26, 2023

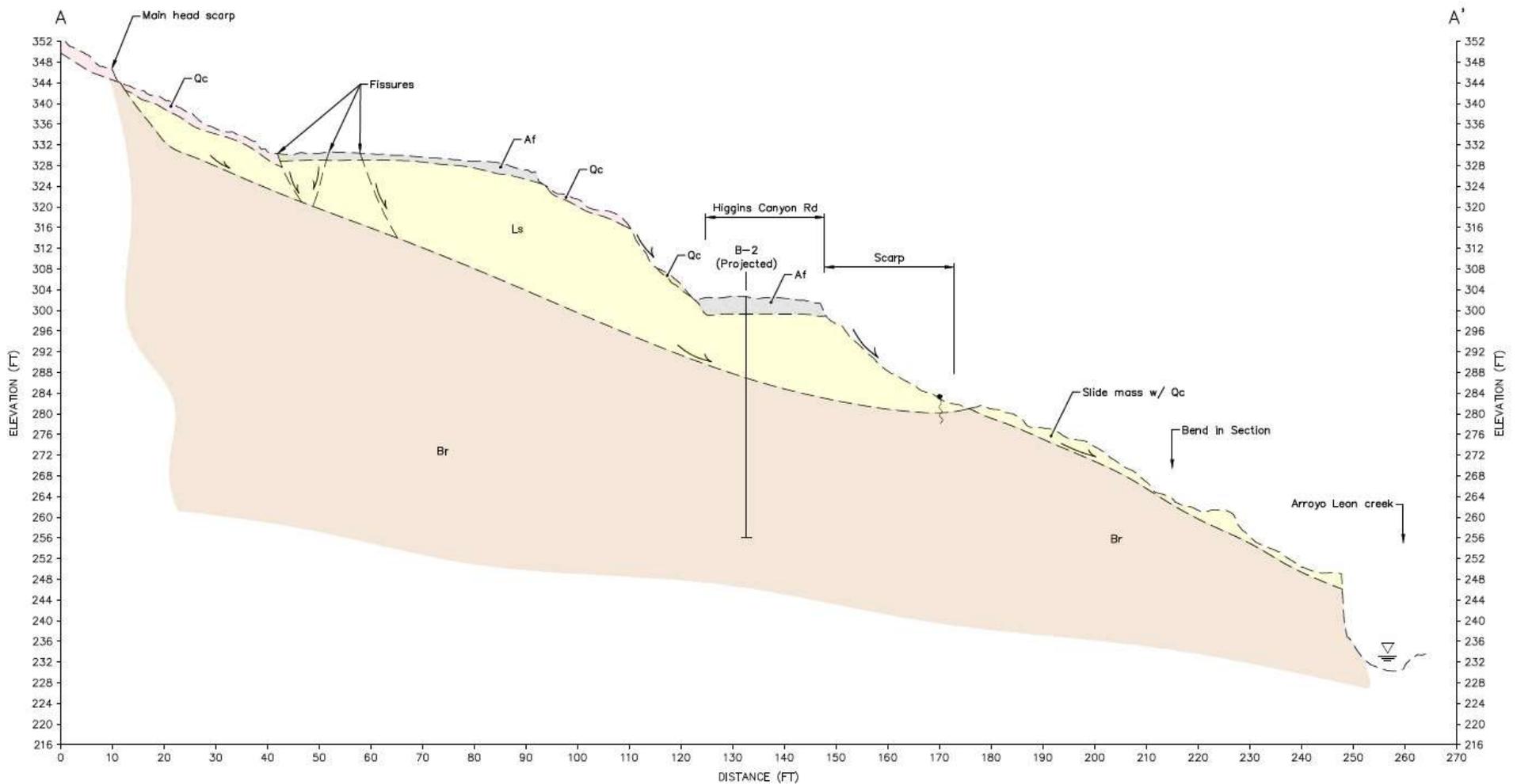


What we know so far

- The Slide is Still MOVING!!
- Greater Than 75% of the Slide's Mass is Above Higgins Canyon Road.
- Saturation Allowed the Previously Static Soil Mass to Move. The Soil Mass is Still Wet and Therefore Remains Unstable.
- The Roadway Repair Requires Structural Protection of Higgins Canyon Road From the Slide Mass Above the Roadway.
- Slip Plane is Twenty (20) Feet, or Greater Beneath Higgins Canyon Road.



- Site Plan of existing conditions (as of March 20, 2023) near 2180 Higgins Canyon Rd developed by CE&G.



MAP UNIT DESCRIPTION

- Qc - QUATERNARY COLLUVIUM
- Br - PURISSIMA FORMATION BEDROCK
- Af - ARTIFICIAL FILL
- Ac - ASPHALT CONCRETE
- SEEPAGE



6455 Almaden Expwy.
Suite 100
San Jose, CA 95120
Phone: (408) 440-4542

ROAD STABILIZATION PROJECT
NEAR 2180 HIGGINS CANYON ROAD
HALF MOON BAY, CALIFORNIA
CROSS SECTION A-A'

0207686

MARCH 2023

FIGURE 6

- Cross section of existing conditions (as of March 20, 2023) near 2180 Higgins Canyon Rd developed by CE&G.

Slope Failure at the Outboard Edge of the Road

- 2 landslide scarps directly adjacent to one another
- Scarp #1 is approximately 37 feet wide, 20-25 feet in length
- Scarp #2 is approximately 33 feet wide and 12 feet in length



Inboard Road Cut

- Road cut at the inboard edge of Higgins Canyon Road ranges from about 6 to 15 feet in height and is inclined at about 55 degrees.
- Multiple shallow landslides were observed along the road cut



Uphill Fissures

- The upslope of the site is also experiencing displacement of the ground
- Multiple fissures were observed on the grounds on the uphill side of the road
- Lateral supports will be required



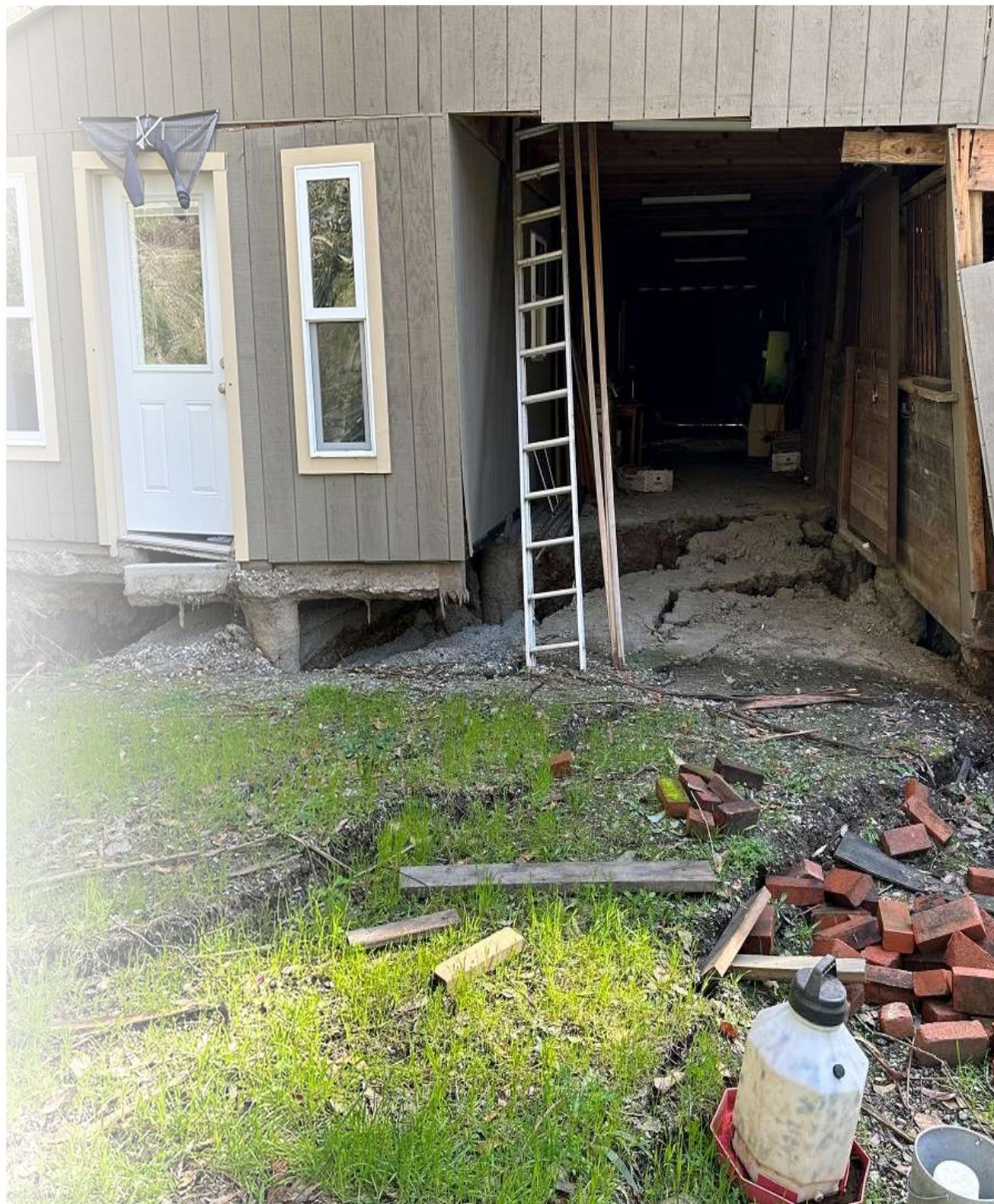
Closer Look of Uphill Movement

- Uphill movement at
property address 2175
Higgins Canyon Rd



Closer Look of Uphill Movement

- Uphill movement at property address 2175 Higgins Canyon Rd



What we accomplished so far

- County and CE&G site reconnaissance and monitoring
 - January 10, 19 & 23, 2023
 - February 17 & 20, 2023
 - March 6 & 20, 2023
- Road closure for safety concerns w/ detour in place
- Subsurface investigations
- Coring samples were taken at 3 different locations on-site on February 9, 2023
 - Total depth of 26, 46.5, and 30.5 feet below ground surface
- Laboratory testing of materials
 - Obtain information concerning the samples' qualitative and quantitative physical properties
 - Geotech Report will be completed and posted to website the week of April 24, 2023

Goals

- **Stabilize the Roadway Embankment and Structural Prism**
- **Improve Drainage**
- **Restore the Road**
- **Re-open the Road to Public**

Design/Construction Considerations

- Land sliding and still unstable
- Abilities to drill and excavate encountered materials
- Seismic design considerations
- Corrosion
- Maintaining proper surface and subsurface drainage

Recommended Slope Repair Alternatives

- Reinforced Earth Slope Repair
- Soldier Pile Retaining Wall
- Mechanically Stabilized Earth (MSE) Retaining Wall

Reinforced Earth Slope Repair

- Large excavation to remove loose dirt and fill with engineered fill material
- Reinforce with geogrid in between layers of fill
- Install subdrain system to relieve hydrostatic pressure from groundwater



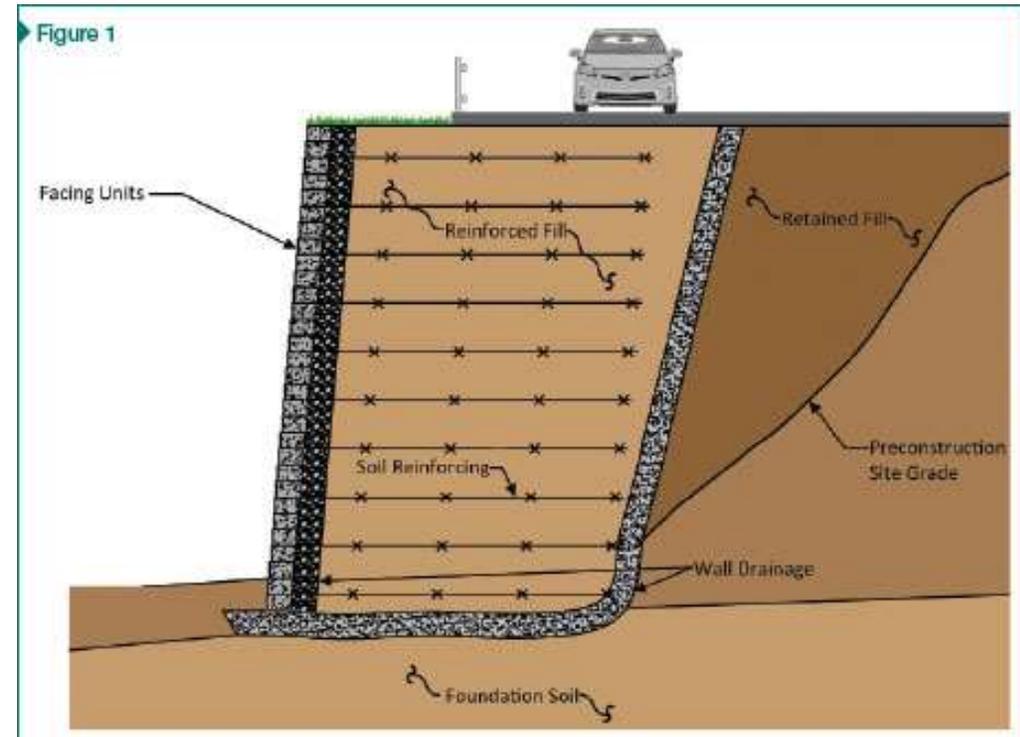
Soldier Pile Retaining Wall

- Construct with timber or concrete lagging
- Tiebacks likely required for wall height above 12 feet
- Drainage features behind the retaining walls



Mechanically Stabilized Earth (MSE) Retaining Wall

- Poured in place concrete piers form wall footing. Concrete pier cap supports the bottom row of block retaining wall.
- Existing slide material is excavated and replaced.



- Earthen material is replaced in layers with mechanical stabilization material layered into the backfill. Block wall, mechanical stabilization material and earth all lock together into one cohesive structural unit replacing the slide material.

Temporary Repair/Opening

- We understand that this closure causes inconvenience and frustration, but the safety of the public is our top priority
- Slide is still active
- Rain continues to affect the slide
- No temporary repair option is feasible at this point in time

Temporary Repair/Opening

- Monitoring slide and allow for a 30 day “drying period”
- Re-evaluate if slide is moving or has “stabilized” after approximately 30 days
- Consider:
 - Potential for opening roadway for pedestrians / bicycles formally
 - Potential for opening roadway for additional uses
- Cannot dry in humid (i.e. rainy) conditions
- Anticipated to be mid-May

Temporary Repair/Opening

- Created parking area on Half Moon Bay Side of slide
- If pedestrian/bicycle access is allowed, look into moving barriers closer to slide area to short the walking distance

Schedule

- **Spring 2023**: Secure FEMA funding, develop project scope and design project
- **Summer 2023**: Advertise and bid out project
- **Late Summer 2023**: Project construction
- **Fall 2023**: Project complete

Future Project Updates

- Project website will be updated frequently with the latest information
- Goal will be to provide monthly updates on progress, or as new information becomes available
- We will add a “subscribe” button so that you will be notified of any new updates

Thank you

Questions, Comments, and Input

Contact:

Alex Zhang
Project Engineer
azhang@smcgov.org
650-363-4100

Wency Ng
Project Manager
wng@smcgov.org
650-363-4100

Project Website:

<https://www.smcgov.org/publicworks/2023-slip-out-repairs-near-2180-higgins-canyon-road>

COUNTY OF **SAN MATEO**

