Department of Public Works
Crystal Springs County Sanitation District

COUNTY OF SAN MATEO

Seneca Lane Mudslide Sewer Stabilization Project

November 14, 2017

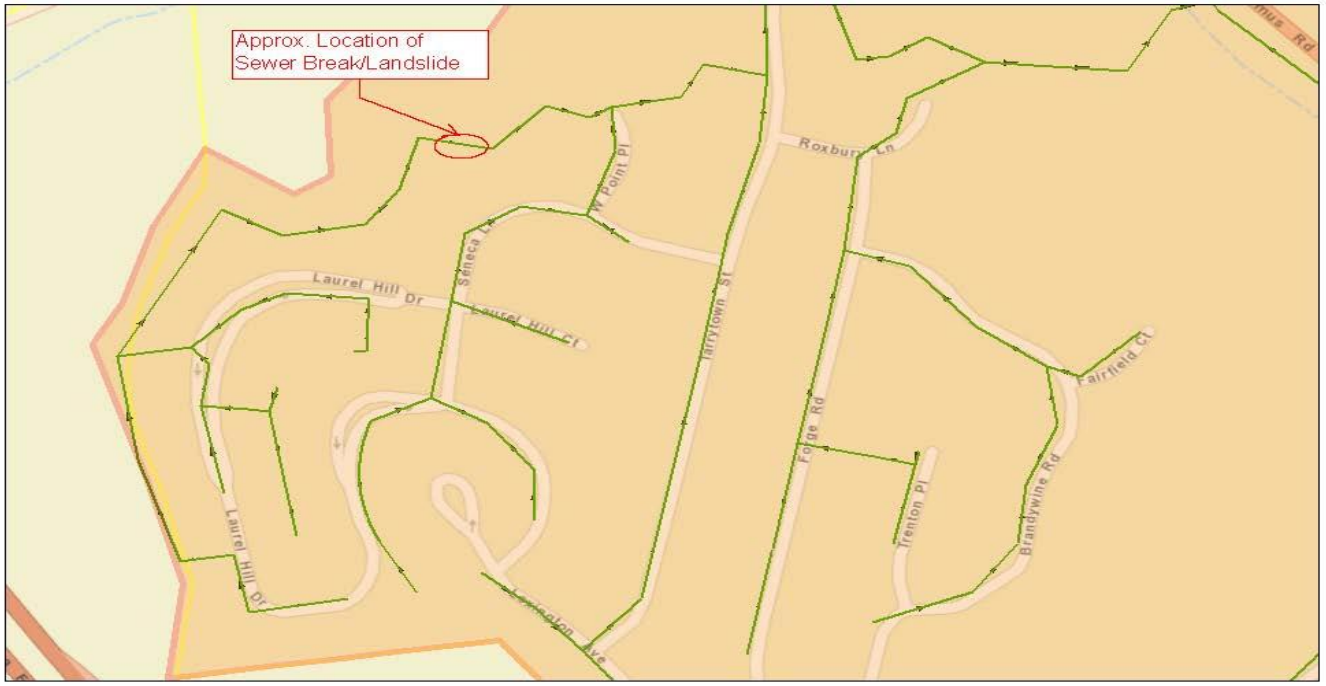
Overview of Tonight's Meeting

- What happened?
- Mudslide Progression
- Work Performed to Date
- Constructability Issues
- Repair Options
- Winterization Plan
- Anticipated Repair Project Requirements and Timeline
- FEMA
- Questions

What Happened?

Mudslide Damaged Sanitary Sewer Line

CSCSD - Easement behind Seneca Lane Sewer



February 3, 2017

Sewer Districts

CRYSTAL SPRINGS CO. SANITATION DISTRICT

Sewer Mains

CO

Sewer Flow

City

1:4,514

0 0.035 0.07 0.14 mi

0 0.0425 0.085 0.17 km

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand),

DPW
Public Works - San Mateo County

What Happened?

Mudslide Damaged Sanitary Sewer Line

COUNTY OF SAN MATEO

Mudslide Progression

January 24, 2017

COUNTY OF SAN MATEO

Mudslide Progression

January 31, 2017

COUNTY OF SAN MATEO

Mudslide Progression

February 15, 2017

COUNTY OF SAN MATEO

Mudslide Progression

February 21, 2017

COUNTY OF SAN MATEO

Mudslide Progression

March 22, 2017

COUNTY OF SAN MATEO

Mudslide Progression

September 11, 2017

Work Performed to Date

- Jan. 24, 2017 – District Crew responded to initial mudslide, installed temporary bypass system, and repaired the broken pipe section by reconnecting the main line.

Work Performed to Date

- Feb. 2, 2017 – Second temporary repair installed.
- Feb. 9, 2017 – Third temporary repair installed and slope covered by plastic sheeting.

Work Performed to Date

- Feb. 15, 2017 – Third temporary repair destroyed by expansion of mudslide. Photo shows non-functioning temporary sewer main (green) and pump bypass (blue) left in place.
- District Crew monitored bypass pump system 24 hours/day until PG&E approved power connection.

Work Performed to Date

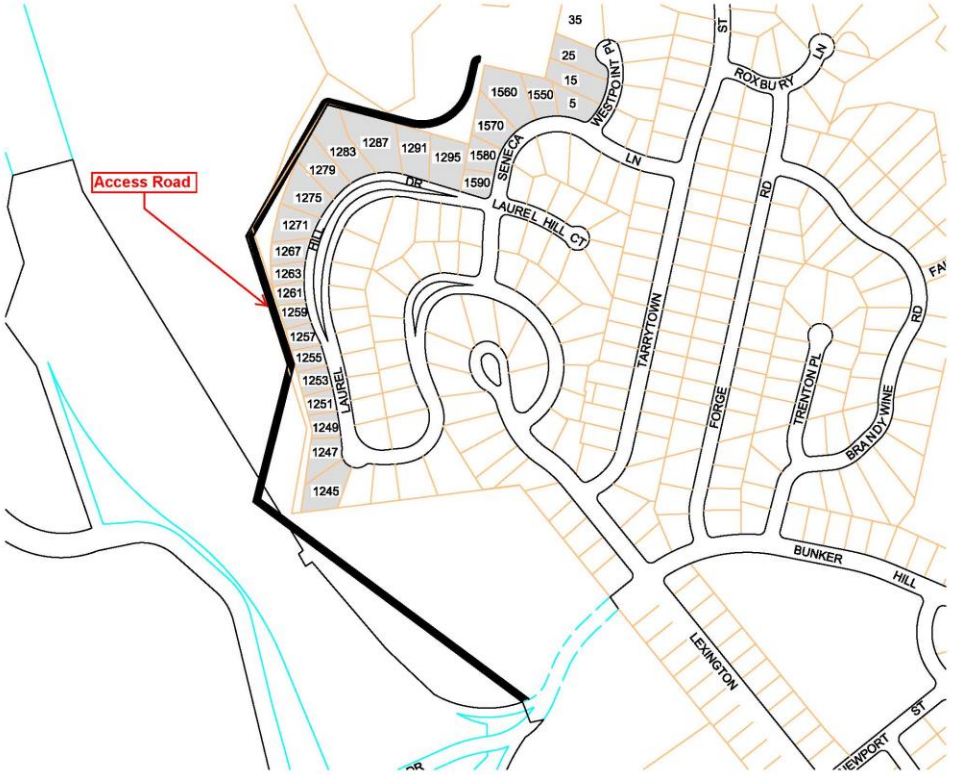
- Feb. 15, 2017 – With additional severe storms forecasted, District Crew covered uphill area and installed piping at bottom of sloped yard to capture and re-direct water away from slide area.

Work Performed to Date

- Feb. 28, 2017 – Portable restroom with power connection for bypass pump system installed.
- March 2, 2017 – Power connected & grinder pump installed in upstream manhole.

- Jun. 5, 2017 – Alarm system installed to notify County staff if any issues with grinder pump.
- District Crew performs weekly check on bypass system.

Constructability Issues



- Construction access to site from Seneca Lane is not feasible.
- Access route along Highlands Recreation District and private properties will need to be modified as necessary for equipment & materials for sewer stabilization project.

Geotechnical Investigation and Repair Options

- BKF Engineers performed geotechnical investigation and preliminary design study in conjunction with BAGG Geotechnical Engineers and Cornerstone Structural Engineers.
- Mudslide was result of relatively steep slope and deep saturation of ground by a combination of sustained heavy rainfall in the area, concentrated runoff from nearby drainage ditch, and a nearby damaged storm drain pipe.
- Total of six (6) repair options were considered.

Repair Options

Option 1. Line Reconstruction with No Mudslide Repair

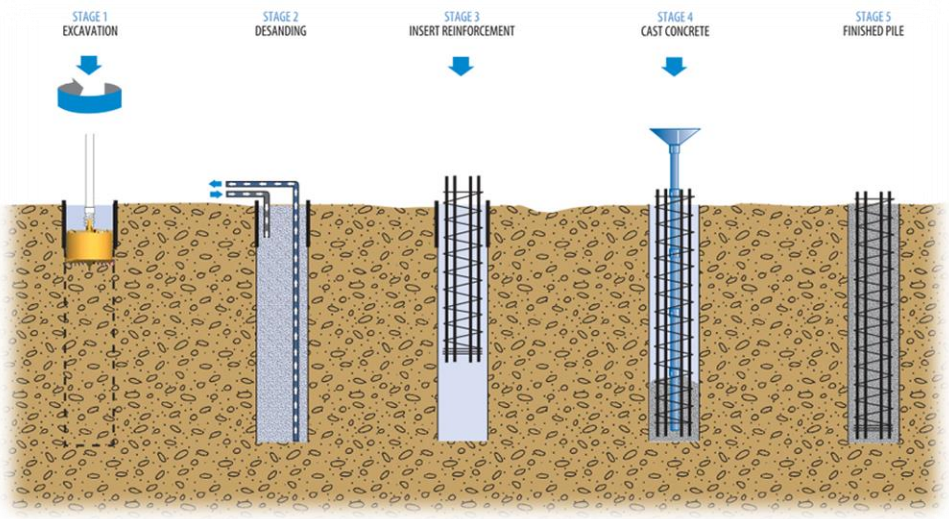
- Ruled out as it would serve as temporary solution, due to potential of future slope failures.

Repair Options

Option 2. Reconstruct Slope Stability of Hillside

- Remove the loose mudslide material from scarp area down to the competent material and place rip rap lined with fiber fabric, keyed into the excavation area. (Example of Rock Rip Rap Construction on left)
- **Ruled out for the following reasons:**
  1. Extremely large volume of earthwork
  2. Access route issues
  3. Clearing the loose mudslide materials by steep cuts likely to result in temporary slope instability

Repair Options



Option 3. Large Diameter Piling

- Requires 5 foot diameter cast-in-drilled hole concrete piles spaced at roughly 30 feet on center with intermediate beam to span and support the pipe from pile to pile.
- **Ruled out for the following reasons:**
  1. Large diameter drilled piles would not stabilize the mudslide
  2. Significant lateral force requires deep and costly construction
  3. Issues with bringing large drilling equipment into the site

Repair Options

Option 4. Cantilevered Retaining Wall

- Can be supported on both shallow and deep foundations, soil conditions require spread footing
- **Ruled out for the following reasons:**
  1. 14 foot wide footing required would cause easement issues
  2. Temporary shoring cannot be installed due to soil conditions
  3. Cost associated with excavation and shoring would be high.

Repair Options

Option 5. Soldier Pile Wall

- Steel piles placed in drilled holes backfilled with cast-in-place concrete and faced with timber lagging.
- **Ruled out for the following reason:**
  1. Maximum height of this type of wall is typically limited to 12-14 feet, our project requires a taller wall.

Repair Options

Option 6. Soldier Pile Retaining Wall with Tie-Backs (Recommended)

- Consists of a soldier pile wall with horizontal walers of either structural steel or reinforced concrete beams spanning between piles.
- Walers support high strength steel ground anchors (tie-backs) consisting of drilled holes with grouted in prestressing steel tendons or bars extending from the wall face to an anchor zone located behind potential failure planes associated with the retained soil or rock mass.
- Tie-back walls are typically used to stabilize unstable sites and are readily used for heights up to 80 feet.

Summary of Repair Options Evaluated

Non-Structural Options

1. Line Reconstruction with no Mudslide Repair (ruled out)
2. Reconstruct Slope Stability of Hillside (ruled out)

Structural Options

3. Large diameter piling (ruled out)
4. Conventional reinforced concrete cantilevered retaining wall (ruled out)
5. Soldier pile retaining wall (ruled out)
6. Soldier pile retaining wall with tie-backs (selected)

Considering the pros and cons of each of the non-structural and structural options, the selected option for this project is the construction of a soldier pile retaining wall with tie-backs.

Winterization Plan

- Construction will not take place until summer 2018
- Winterization plan to be implemented Nov-Dec for winter 2017-2018 to minimize further damage from additional movements
- Winterization plan includes installing plastic sheeting according to the recommendations of the geotechnical study to minimize surface water infiltration into the underlying mudslide debris and control runoff

Anticipated Repair Project Requirements and Timeline

- Final design to be prepared by BKF by early 2018
- Temporary access easements for construction equipment and materials are anticipated to be required from adjacent properties
- Additional permanent easements at the repair site are also anticipated to be required from adjacent properties
- Construction is anticipated in Summer 2018 after competitive bid process
- Anticipated construction completion by October 2018
- Preliminary construction cost estimate $1.05 million

FEMA

- District has been working with FEMA to seek reimbursement for eligible work associated with response, repair, design, and construction of permanent repair
- FEMA application for public assistance grant was submitted in September 2017
- FEMA will review application and provide recommendations in next few months

Questions

The toilet is only meant to flush the three P's— pee, poop and paper.