Community Meeting

UPDATE ON ASILOMAR LANDSLIDE
RETAINING WALL PROJECT

City of Los Angeles Bureau of Engineering
August 24, 2016
AGENDA FOR MEETING

Who are we?
Why are we here?
What have we been doing?
What have we learned?
What are our options?
When will this happen?
What do you think?
Who are we?
Why are we here?
Why are we here?

Diagram: Venn diagram with three circles labeled Community Input, Technical Feasibility, and Cost Considerations. The intersection of these circles is labeled "The Sweet Spot."
What have we been doing?
What have we been doing?

- Previous Studies
- Geotechnical Exploration
- Laboratory Tests
- Slope Stability Analyses
- Alternative Wall Options
Previous Studies Performed by Others

- Moran, Proctor, Mueser & Rutledge (1959)
- State of California in conjunction with City of Los Angeles, City of Santa Monica, and County of Los Angeles (1959)
- Geofon, Inc. (1989, 1995)
- Robertson Geotechnical, Inc. (1989, 1990)
- Haley Tucker, Inc. (1997)
- URS Greiner Woodward & Clyde (1999)
- Joseph Provenzano (2001)

Previous Studies Performed for the City

What have we been doing - Geotechnical Exploration
What have we been doing - Geotechnical Exploration

24-inch diameter bucker auger drill rig at borehole FB-8

Sample labeling and storage for proposed laboratory testing

Sample review and field classification
What have we been doing - Geotechnical Exploration

Los Angeles Bureau of Engineering, Asilomar Landslide
What have we learned?
What have we learned - Geology

Base map source: Topo of Asilomar Landslide Area, LABOE

Legend:
- **af**: Artificial Fill
- **Qals**: Active Landslide Deposits
- **Qt**: Terrace Deposits
- **Tm**: Molave Formation
- **Possible Location of Landslide Slip Surfaces**
- **Bedding Orientation**
- **Water Table Used in Slope Stability Analysis**
- **Geologic Contacts**

Location of Proposed Wall and Grading

Borehole Lithology Index:
- **Terrace Deposits (Qt)**
- **Siltstone**
- **Sandstone**

City of Los Angeles Bureau of Engineering, Asilomar Landslide Project
What have we learned - Geology
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LEGEND

af  Artificial Fill
Qals  Active Landslide Deposit
Qt  Terrace Deposits
Tm  Malibu Formation

Possible Location of Landslide Slip Surfaces
Redding Orientation
Water Table Used in Slope Stability Analysis
Geologic Contacts

Proposed Wall
Location of Proposed Wall and Grading

Base map source: Topo of Asilomar Landslide Area, LABOE

Asilomar Landslide
Section D-D'

City of Los Angeles Bureau of Engineering, Asilomar Landslide Project
What have we learned - Geology

Base map source: Top of Asilomar Landslide Area, LABOE

**LEGEND**

- **af**: Artificial Fill
- **Qals**: Active Landslide Deposit
- **Qt**: Terrace Deposits
- **Tm**: Tertiary Molasse

- **Possible Location of Landslide Slip Surfaces**
- **Bedding Orientation**
- **Water Table Used in Slope Stability Analysis**
- **Geologic Contacts**

**Proposed Wall**

- **Location of Proposed Wall and Grading**

**Borehole Lithology Index**

- **Terrace Deposits (Qt)**
- **Siltstone**
- **Sandstone**

**Asilomar Landslide**

Section D-D'
The proper design of the proposed retaining structures requires information about the shear strength of the soil and rock materials that comprise the slope.

Strength data needed primarily for:

1. Modelo Formation Across Bedding
2. Modelo Formation Along Bedding (also for landslide slip surfaces)
3. Terrace Deposits
What have we learned - Shear strength

Shear Strength Test Results

Terrace Deposit

Along Bedding – Modelo Formation

Across Bedding – Modelo Formation

Geologic Model
What have we learned - Slope stability

City of Los Angeles Bureau of Engineering, Asilomar Landslide Project
What have we learned - Overall factor of safety improvements

- Original slope and water table, along-bedding
  \[ F.S. = 1.03 \]

- Tieback wall and original water table, along-bedding
  \[ F.S. = 1.15 \]

- Tieback wall and dewatered water table, along-bedding
  \[ F.S. = 1.25 \]

- Tieback wall local stability
  \[ F.S. = 1.57 \]
What are our options?
Retaining Wall with Tiebacks and Slope Reconstruction

Features
- Soil/rock anchors (tiebacks)
- Soldier piles
- Drainage panels
- Permanent facing (shotcrete or cast in place)

Advantages
- Conventional construction
- Limited construction zone on Asilomar Blvd.
- Adaptable design
- Allows drainage of groundwater

Benefits
- Improved access road
- Improved stability
- Aesthetics
Two Tier Retaining Wall with Tiebacks

Features
- Two Tier Retaining System
- Soil/rock anchors (tiebacks)
- Soldier piles
- Drainage panels
- Permanent facing (shotcrete or cast in place)

Advantages
- Conventional construction
- Limited construction zone on Asilomar Blvd.
- Adaptable design
- Allows drainage of groundwater
- Reduced import/export

Benefits
- Improved access road
- Improved stability
- Aesthetics
- Reduced construction traffic
Large Diameter Concrete Piles

Features
- Large diameter concrete piles
- Permanent facing (shotcrete or cast-in-place)
- Drainage panels behind facing

Advantages
- Limited construction zone on Asilomar Blvd
- Earthwork can be avoided
- No tiebacks needed
- Allows drainage of groundwater

Benefits
- Improved access road
- Improved stability
- Limited aesthetics
- No tiebacks beneath road
Soil Nail Wall

Features
• Soil Nail
• Shotcrete facing
• Drainage panels behind shotcrete facing

Advantages
• Minimal construction zone on Asilomar Blvd
• Conventional construction
• No permanent wall facing needed
• Allows drainage of groundwater
• Adaptable design
• Resilient design

Benefits
• Regraded access road optional
• Improved stability
• Aesthetics
• Reduced construction traffic
Soil Nail Wall
Deep Soil-Cement Mixed (DSM) Columns

Features
• Deep-Soil-Cement (DSM) mixed columns

Advantages
• Improves ground in-place
• No construction on slope
• End product completely underground
• Small volume of off haul material
• Resilient design

Benefits
• Natural look preserved
• Limited construction traffic
• Improved stability
• Aesthetics
• Sustainable construction
Deep Soil-Cement Mixed (DSM) Columns

4' DIAMETER DSM COLUMNS @ 7’x7’ GRID
When will this happen?
When will this happen?

1. PRE-DESIGN PHASE
   - GEOTECHNICAL STUDY/DORINGS
   - DEVELOPMENT & ANALYSIS OF ALTERNATIVES
   - PRESENTATION OF ALTERNATIVES
   - COMMUNITY MEETING #1
   - MARCH 2016

2. DESIGN PHASE (18 MONTHS*)
   - SELECTION OF FINAL ALTERNATIVE
   - DESIGN DEVELOPMENT OF RETAINING WALL
   - COMMUNITY MEETING #2
   - AUGUST 24, 2016

3. CONSTRUCTION PHASE (30 MONTHS)
   - PERMITTING
   - COMMUNITY MEETING #3
   - SEPTEMBER 2017

*Note: The design phase duration is estimated to be 18 months.
What do you think?