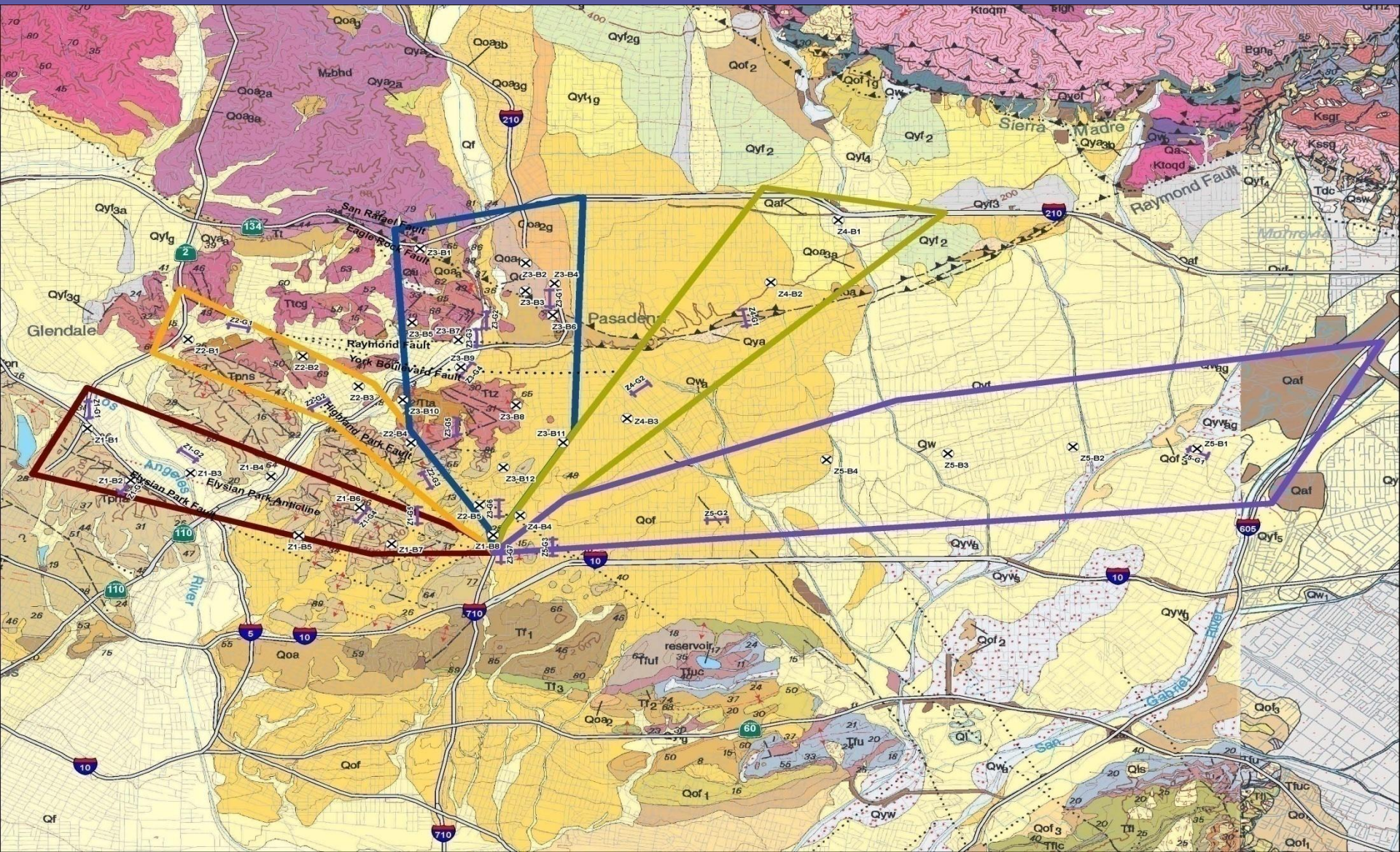
Key Factors Influencing Tunneling

- Faulting
  - Fault displacement
  - Rupture zone length
- Uniformity of geologic material
- Potential for adverse tunneling conditions
  - Flowing/squeezing soils, boulders
- Properties of geologic materials
- Groundwater conditions
- Hazardous materials

Geological Zones



Geotechnical Exploration Program

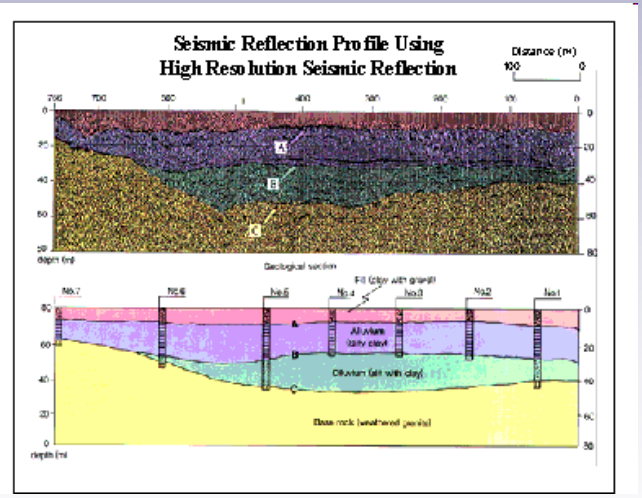
- Data collection and review
- Geologic mapping
- Geophysical Testing
  - Seismic Reflection Tests
  - Surface Wave Method
- Drilling, sampling, and logging
- Laboratory testing

Boring Activities

- 33 small diameter borings
- Vertical and Inclined drilling
- Each boring took 10 to 15 days to complete
- Work area was about 12 feet by 80 feet
- Drilling performed during daytime hours

Seismic Reflection Testing

- 20 seismic reflection surveys
- Non-destructive
- Geophysical testing was performed between 7 PM and 6 AM.
- One location per day



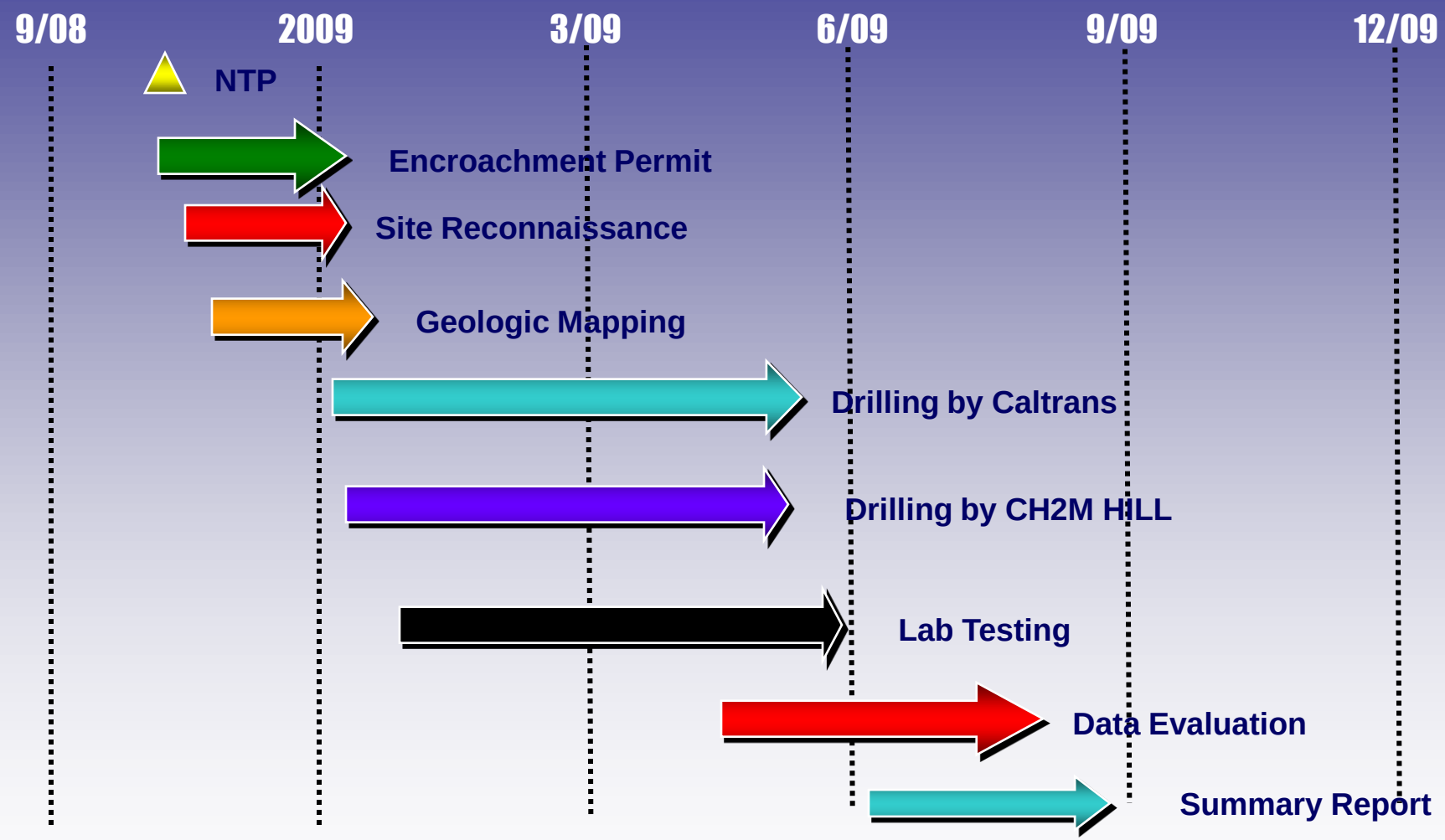
Surface Wave Testing

- A total of 80 tests
- Used traffic noise and hammer blows
- Tests done during daytime;
- Approximately 2 hours each
- 3 tests per day
- Non-destructive
- Minimal impact to public

Summary

Zones	# of Borings	Total Lineal feet (ft)	# of Geophysical Lines	# of Surface Waves	Length of Tunnel (mi)
1	8	2,800	5	20	5.2 – 5.7
2	5	1,600	3	12	4.9 – 5.6
3	12	3,700	7	25	4.4 – 5.4
4	4	1,100	2	10	6.2 – 7.4
5	4	1,100	3	13	9.6 – 11.5

Exploration Program Schedule



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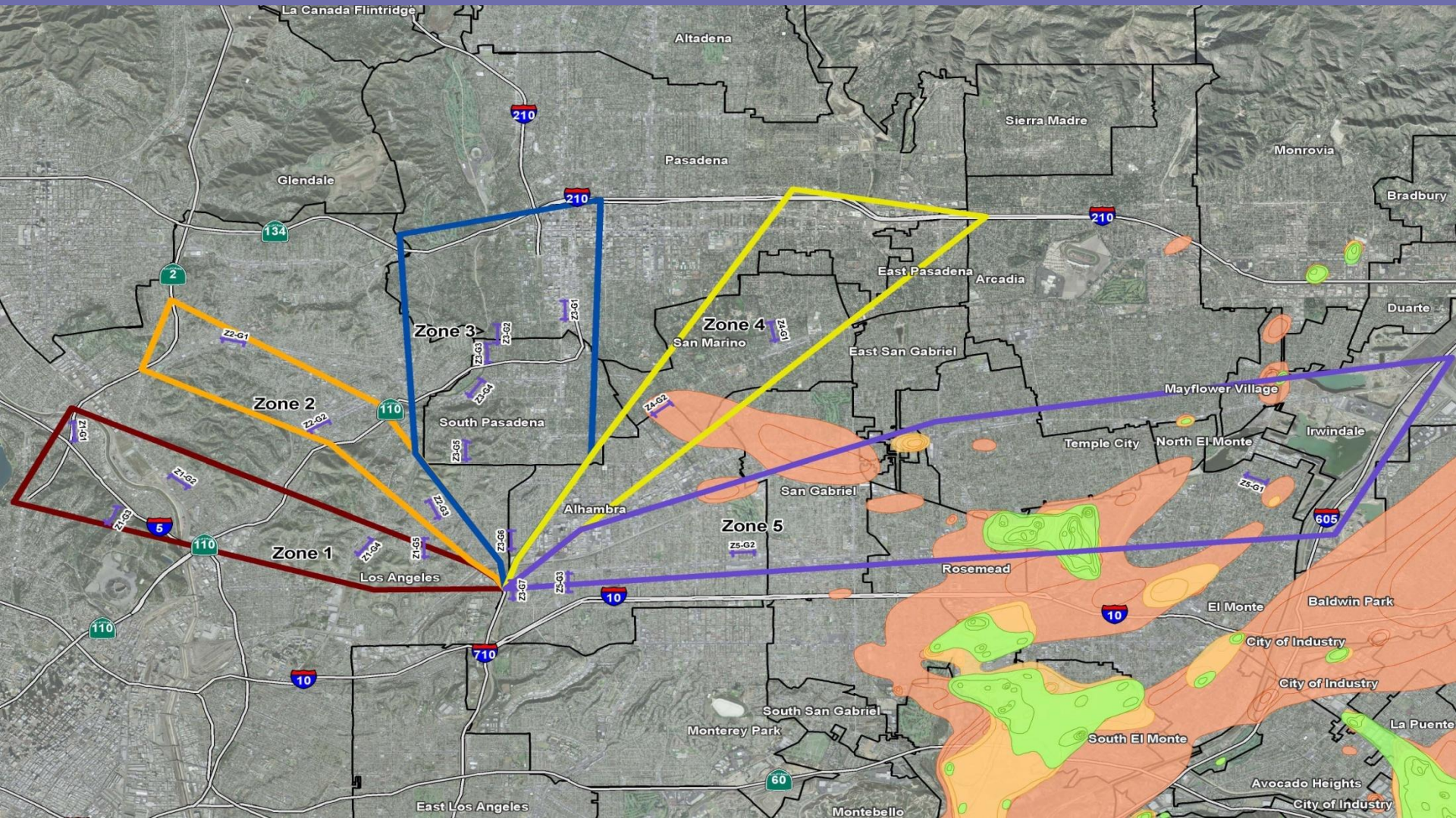
Preliminary Findings

- Two superfund sites were identified
- The sites are located within Zones 4 and 5
- Groundwater in this area is known to be contaminated with Volatile Organic Compounds
- Depth of groundwater ranges from 50 feet to 150 feet below ground surface
- Tunnel is expected to be at about 200 feet below ground surface

Superfund Site Locations within Zones 4 and 5



Current Activities

- Conducted borings in Zones 1, 2, 3 and 4.
- Geological data has been obtained in Zones 1 through 5 from US EPA, DWR and other sources.
- A total of 8 borings and 3 geophysical lines have been eliminated.
- Borings were conducted by both Caltrans and CH2M HILL
- Borings conducted January to May 2009.

Summary of Public Outreach Activities

Total visits to Homes/Businesses: 2,000
Borings: 25

Stakeholders added to database: 121
Geophysical Line Testing: 17
Surface Wave Testing: 80

City	Exploration Activity	# of Visits	# of Stakeholders added to Database
Alhambra	Borings: 4 Geophysical Line: 5 Surface Wave: 11	443	38
Los Angeles	Borings: 14 Geophysical Line: 7 Surface Wave: 27	740	51
Pasadena	Borings: 5 Geophysical Line: 2 Surface Wave: 4	143	8
South Pasadena	Borings: 2 Geophysical Line: 2 Surface Wave: 6	423	17
San Marino	Borings: 0 Geophysical Line: 1 Surface Wave: 1	50	7

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Neighborhood & Community Outreach

- Steering and Technical Advisory Committees
- Elected Officials Briefings
- Presentations
- Community Meetings & Events, Focus Groups
- Boring Notices, Fact Sheets, FAQs, Newsletter
- Website
- Canvassing
- Advertising & Articles in Local Newspapers
- Field Office and Outreach
- Information Line

Community's Involvement

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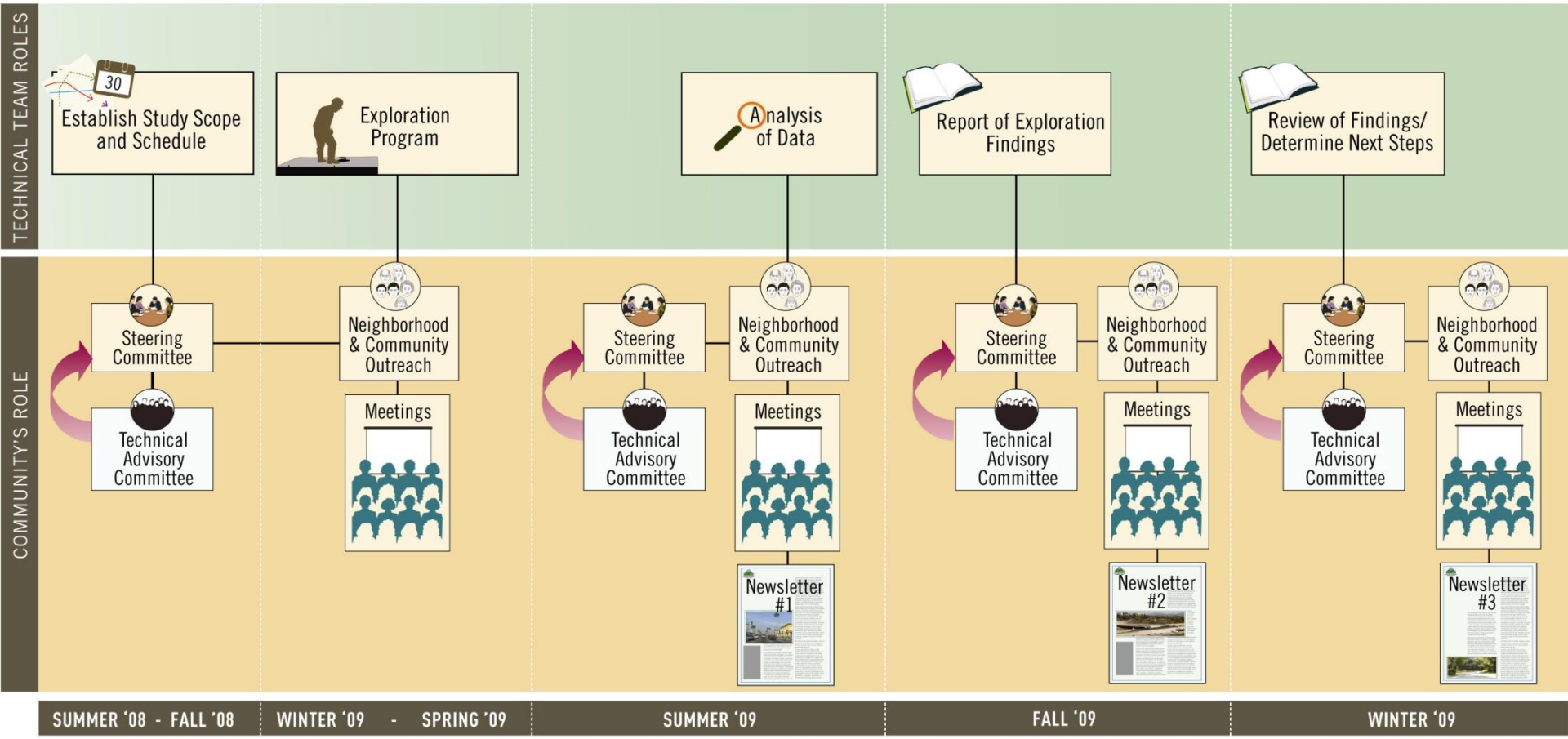
SR-710 Tunnel Technical Study Public Involvement



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Question and Answer