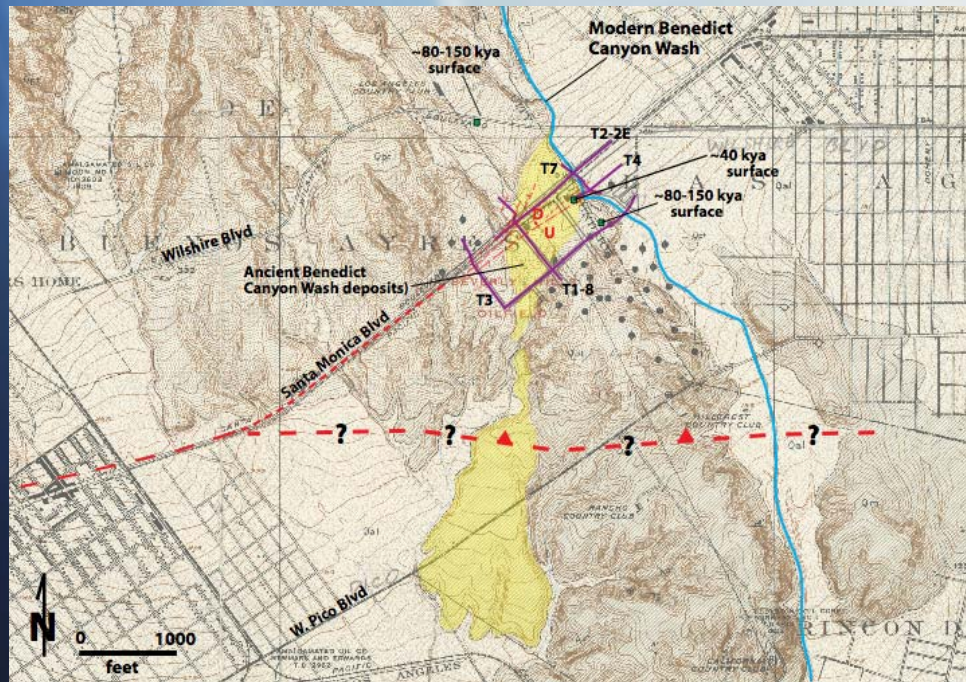


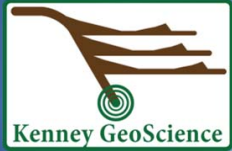
# Preliminary geomorphic, stratigraphic and structural evaluation of the Century City area



*Miles Kenney, PhD, PG  
Kenney GeoScience*

*May 17, 2012*





# Interim Conclusions

*Miles Kenney, PhD. PG*

- A reasonable re-evaluation of the existing data suggests that faults associated with the West Beverly Hills Lineament (Newport-Inglewood fault zone) do not exist.
- At least one fault identified by Parsons within the WBHL fault zone is likely real, but is considered part of the Santa Monica Boulevard fault zone (strikes more EW compared to NS). Fault F.
- The Santa Monica Boulevard faults likely do exist, but they may be:
  - Dominantly strike-slip normal
  - Secondary upper plate faults to the Santa Monica Fault Zone proper
  - Inactive

# Review of the Existing Data

- Published scientific reports and maps
  
- Subsurface work by
  - MACTEC,
  - Parsons Brinkerhoff (Parsons),
  - Leighton (LCI),
  - Earth Consultants International (ECI),
  - Soil Tectonics
  - Kenney GeoScience (KGS)



# Local Stratigraphy - key to understanding faulting

In order to understand local faulting behavior, location and activity, it is critical to understand the age and characteristics of the local stratigraphy



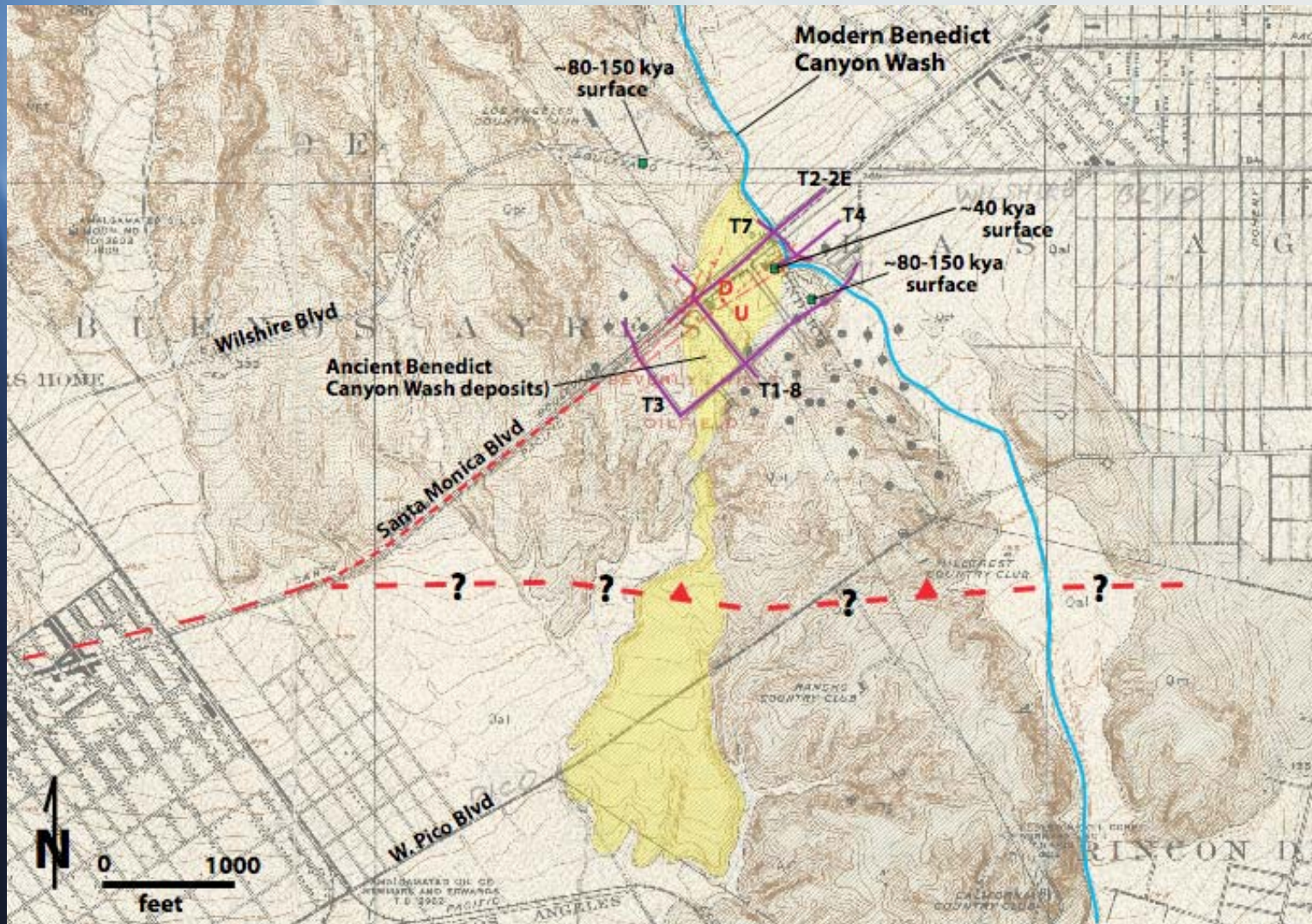


# Site Stratigraphy

GEOLOGIC UNIT DESIGNATION	SYMBOL	DESCRIPTION	ESTIMATED AGE
	<b>Af</b>	Artificial fill	
Benedict Canyon Wash Deposits <b>BCWD</b>	Modern BCWD <b>Qf/Qfo</b>	Quaternary alluvium (late to latest Pleistocene) as defined by Parsons. Drawn in some areas where the original Parsons designation of Qf/Qfo was slightly modified herein. Unit Qf/Qfo likely includes uppermost members of ancient BCWD.	~40,000 years old (Soil Tectonics, 2012b). Terrace elevation approximately 275 to 280 msl
	Ancient BCWD <b>(A)</b>	Soil profile marker horizon within Benedict Canyon Wash Deposits.	~134,000 years old (Soil Tectonics, 2012b) ~150,000 years old erosion surface created during Marine Isotope Stage 6
		"300T" terrace surface	Abandoned geomorphic terrace surface that locally ranges in elevation between approximately 275 to 350+ feet above msl.
Cheviot Hills Deposits <b>CHD</b>	<b>(B)</b>	Soil profile marker horizon that typically exists in the uppermost section of the Cheviot Hills Deposits. Type local is in Boring T2E-B1. In most places the upper soil horizons have been eroded away.	~500,000 years old as correlated to dated soils in LCI (2012) and ECI (2012).
	<b>(C)</b>	Soil profile marker horizon that typically exhibits relatively strong calcium carbonate. Type local is in Boring in Boring T7-B2.	
	<b>(D)</b>	Soil profile marker horizon that exhibits a distinctive reddish brown "spotted" or "praprrika" texture as identified in Transect 4.	Erosion Surface These soils likely do not exist due to erosion in the BHHS site and thus were not dated
	<b>(E)</b>	Soil profile marker horizon that typically exhibits manganese oxide deposits and/or carbonate.	
	<b>(F)</b>	Soil profile marker horizon that typically exhibits manganese oxide deposits and/or carbonate and generally exists just above unit Qfob.	
	<b>Qfob</b>	A distinctive sedimentary unit composed of silty sand with clay identified by Parsons (2012) and utilized in this report that exhibits abundant carbonate.	
San Pedro Sequence <b>SPS</b>	<b>Qeb</b>	A distinctive sedimentary unit dominated by clay identified by Parsons (2012) and utilized in this report that exhibits abundant carbonate. Unit likely terrestrial and is conformable with underlying San Pedro Formation.	Minimum ~574,000 years old as correlated to dated soils in LCI (2012) and ECI (2012).
	<b>Qsp</b>	San Pedro Formation. This unit was deposited in a marine environment and typically exhibits abundant shells, and distinctive dark colors. Members are generally well sorted clays, sands, and gravels.	Minimum 600,000 years old (LCI, 2012; ECI, 2012).

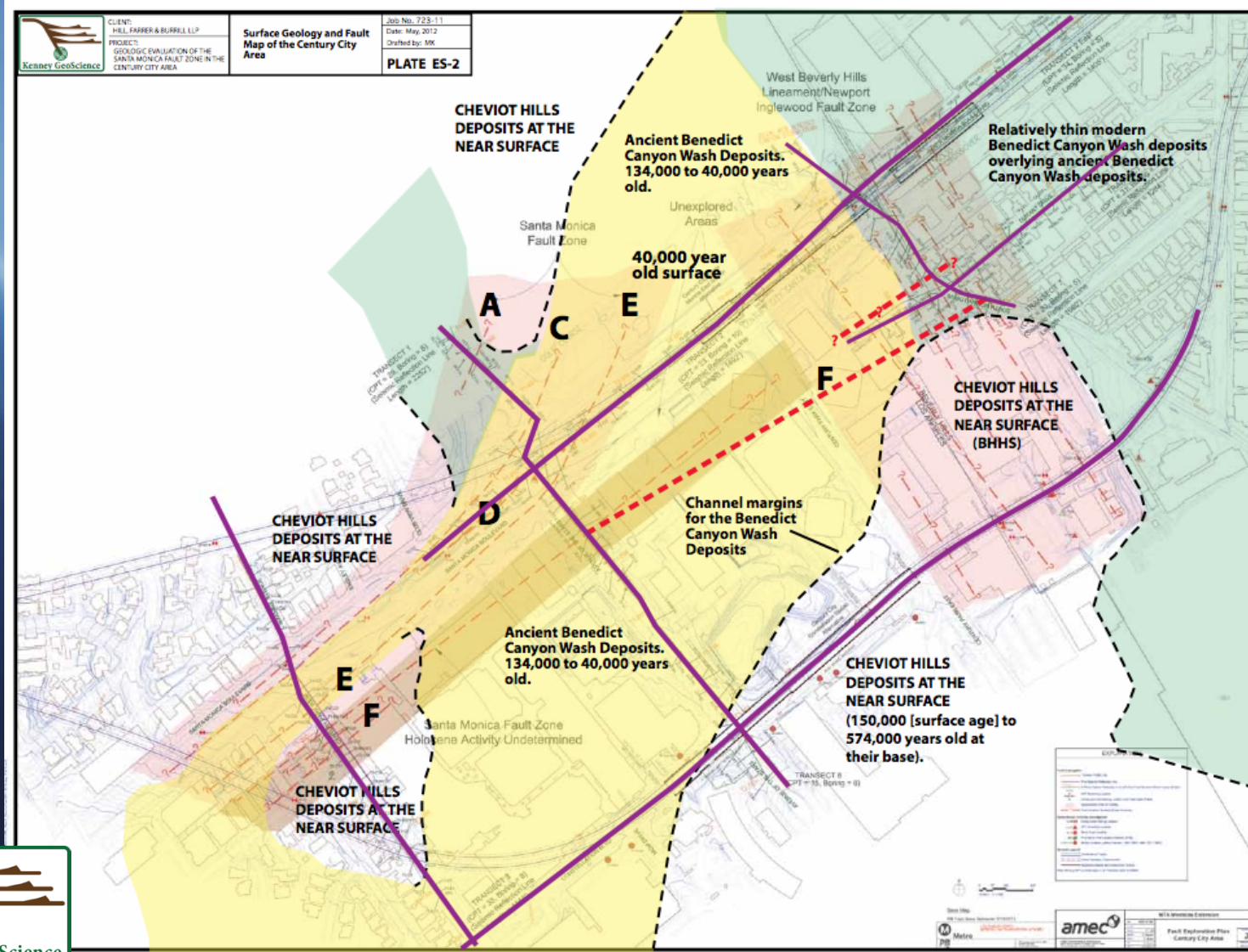


# Ancient Benedict Canyon Wash





# Site Geologic Map - I think the first one made to date!



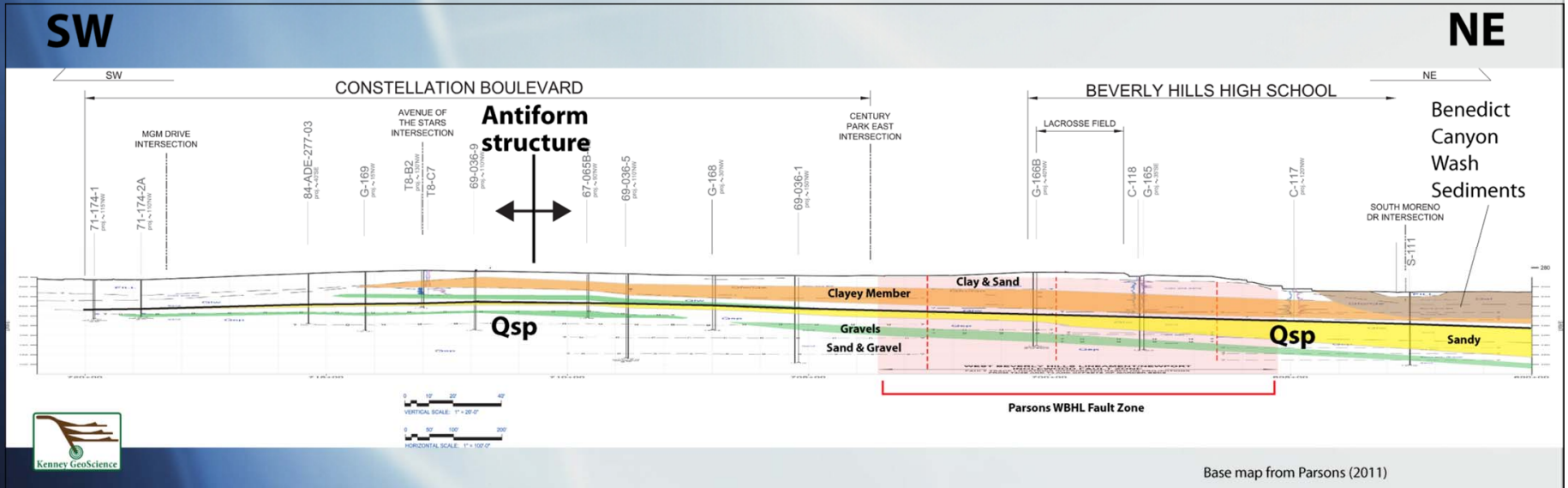
Do the West Beverly Hills Lineament Faults  
really exist?





# Constellation Transect - Geologic composition evaluation

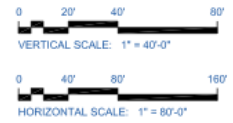
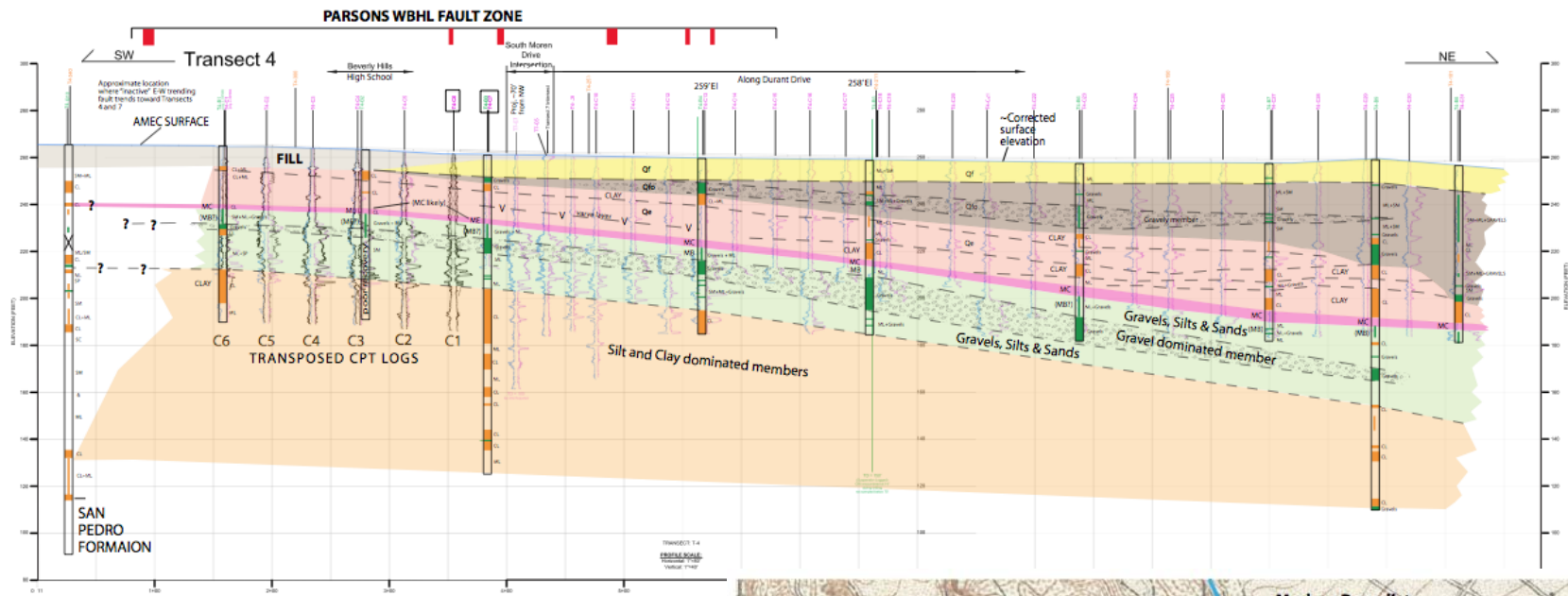
## Scale 10x vertical exaggeration



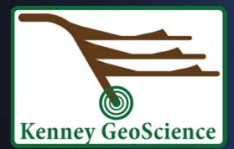
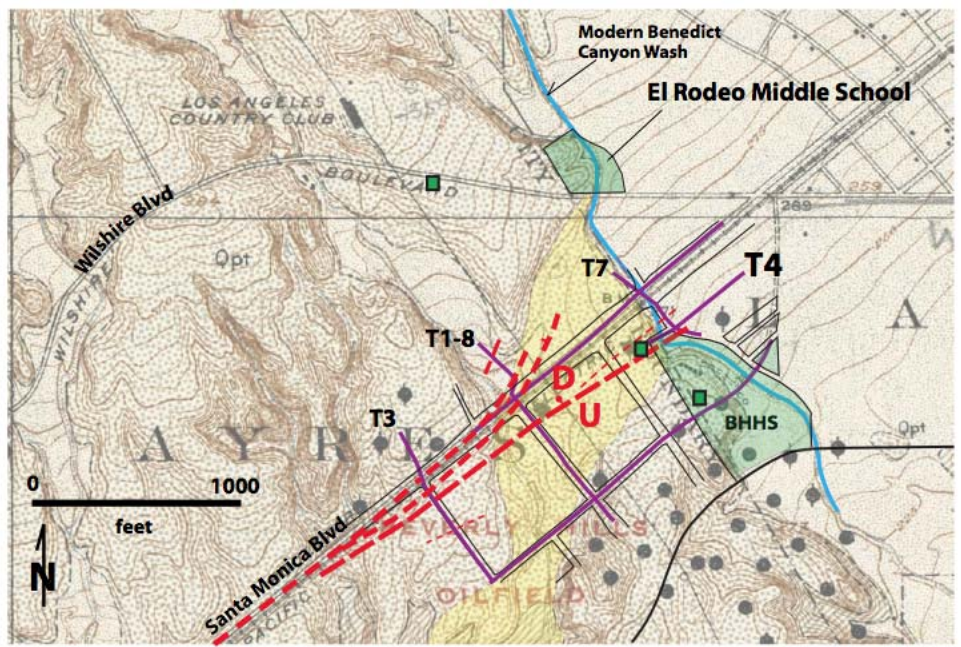
SW

# TRANSECT 4 OF PARSONS - ALTERNATIVE EVALUATION

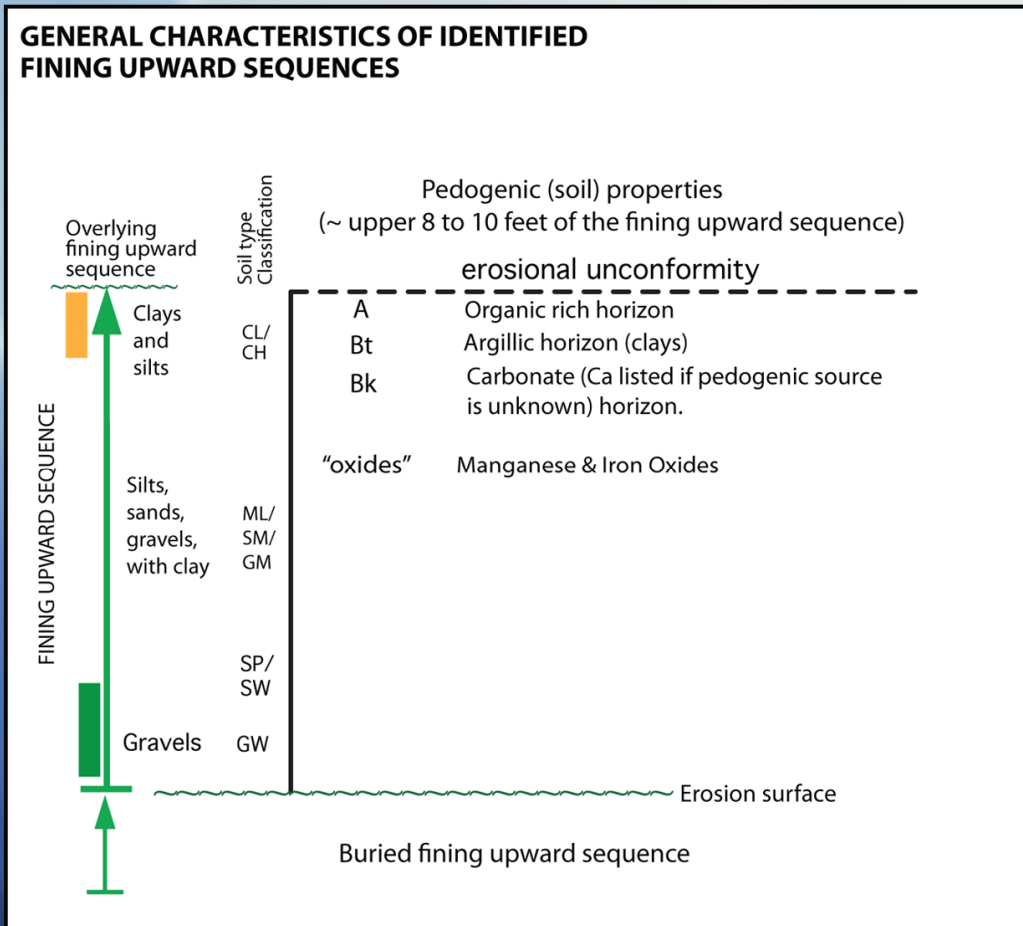
NE



Modified from Parsons report 4951-10-1561 dated 10.1. for Transect 4.

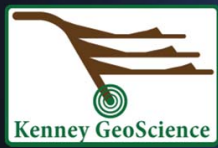
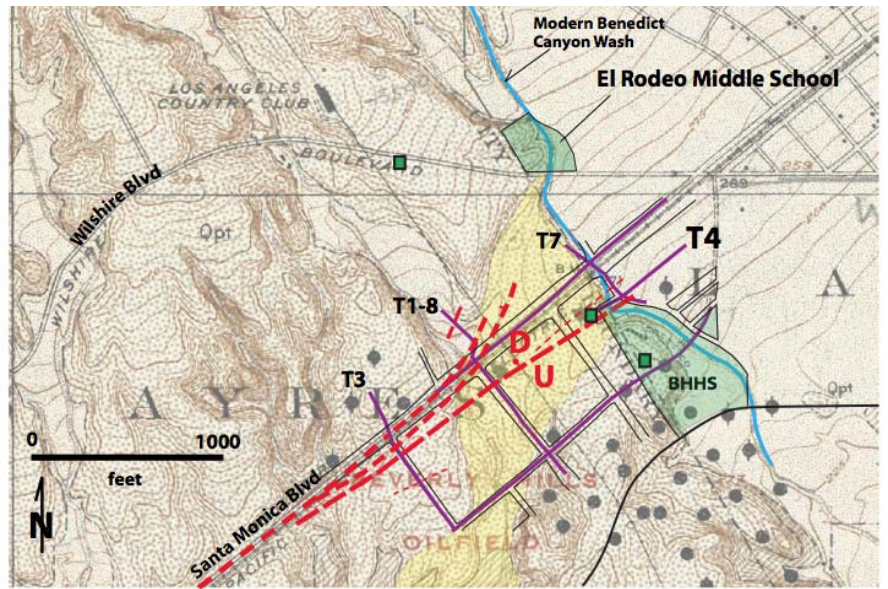
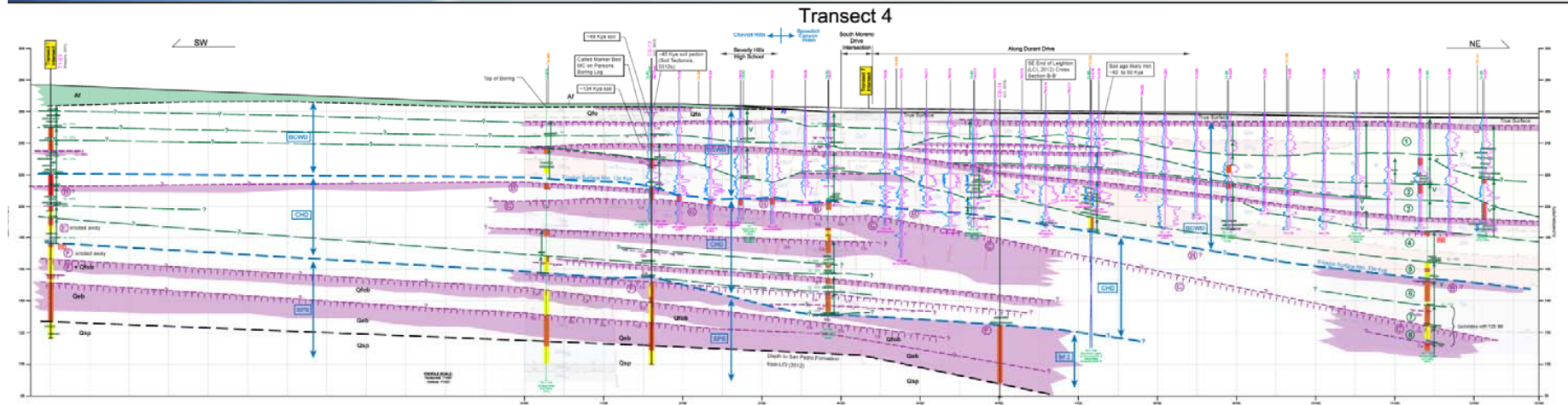


# Evaluation of Fining Upward Sequences (FUS) along Parsons Transects





# Transect 4 FUS

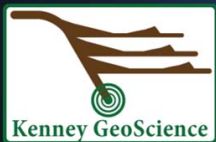
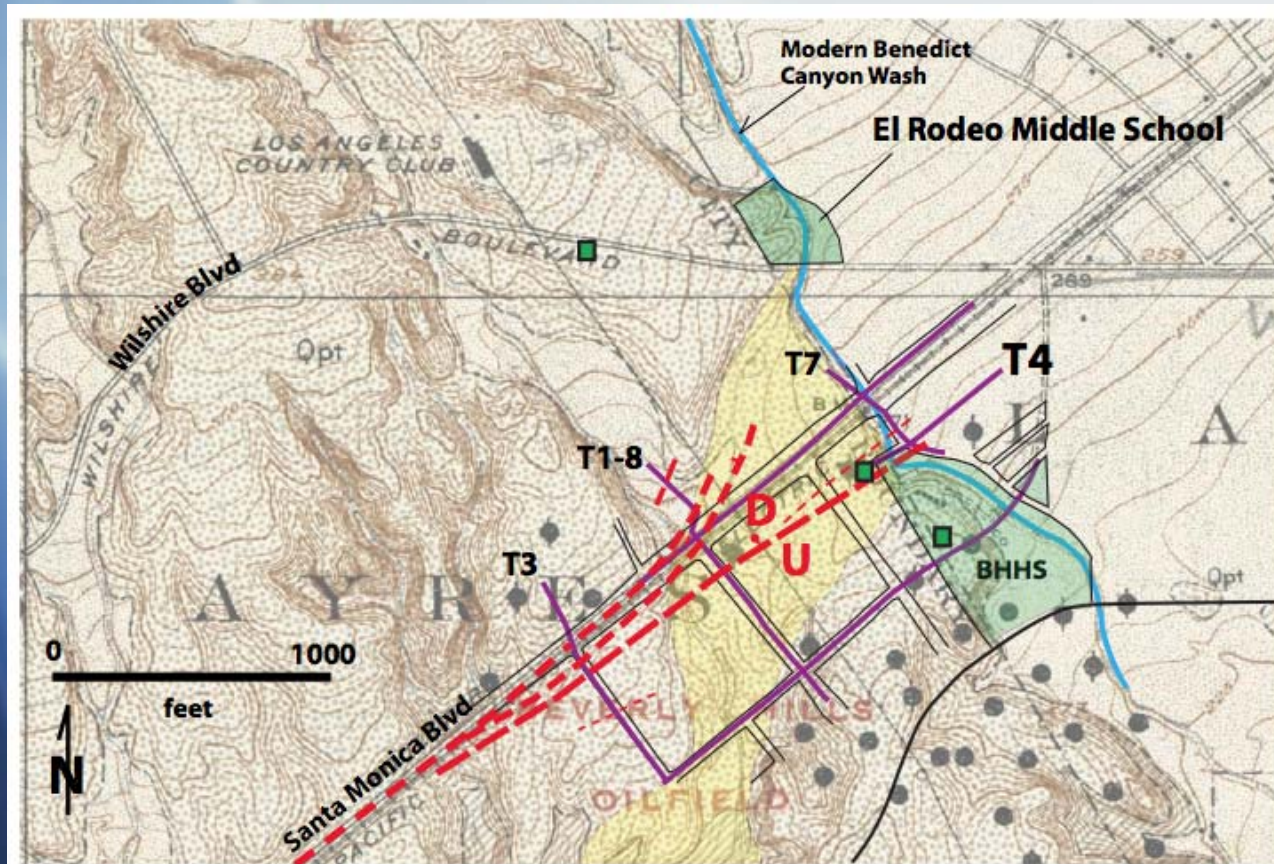






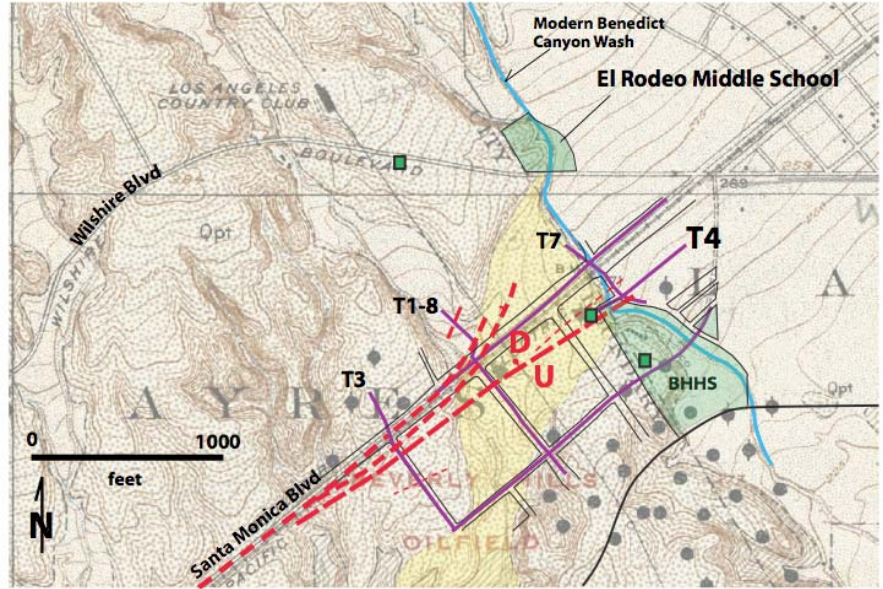
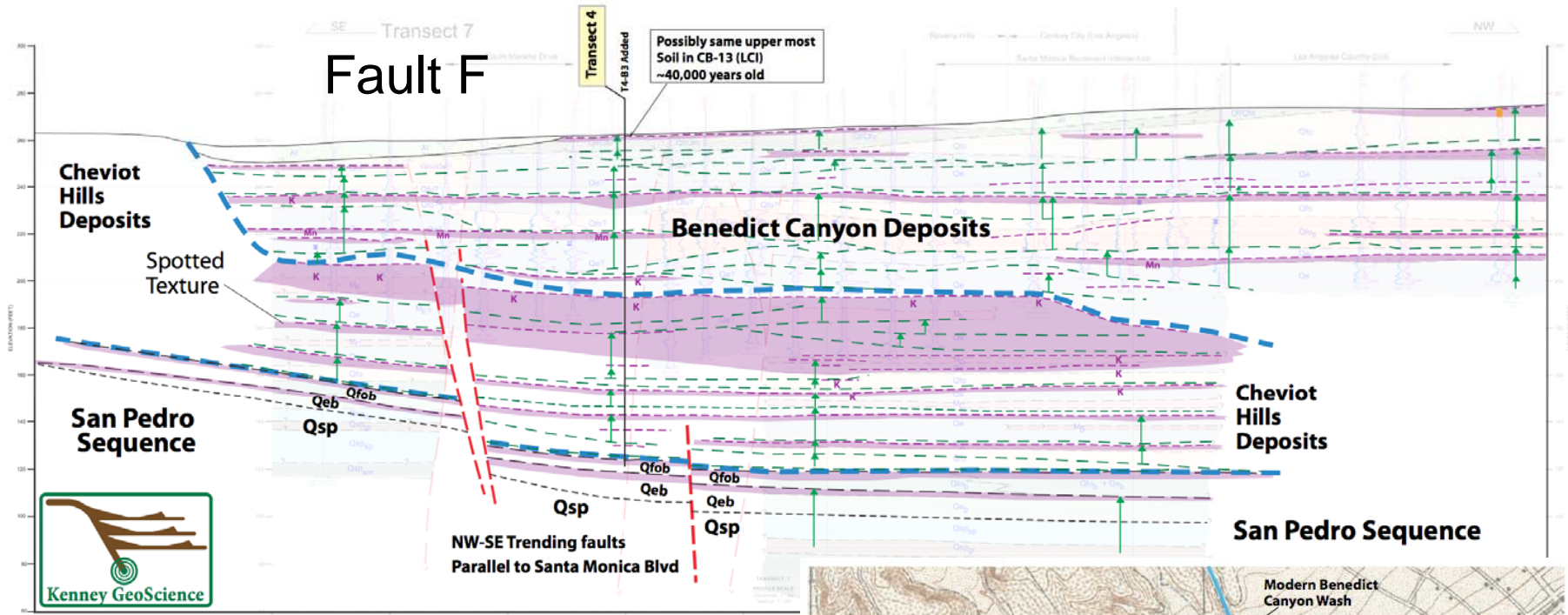


One and possibly two faults were however identified in the WBHL FZ area along Transect 7.



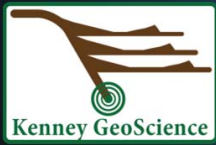
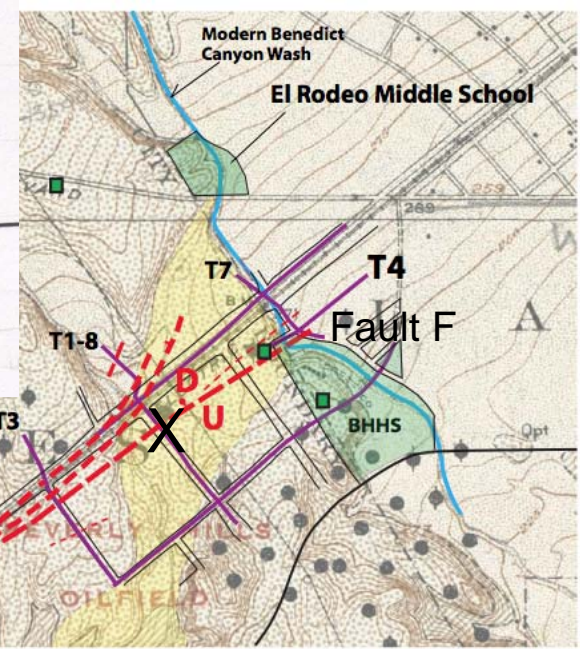
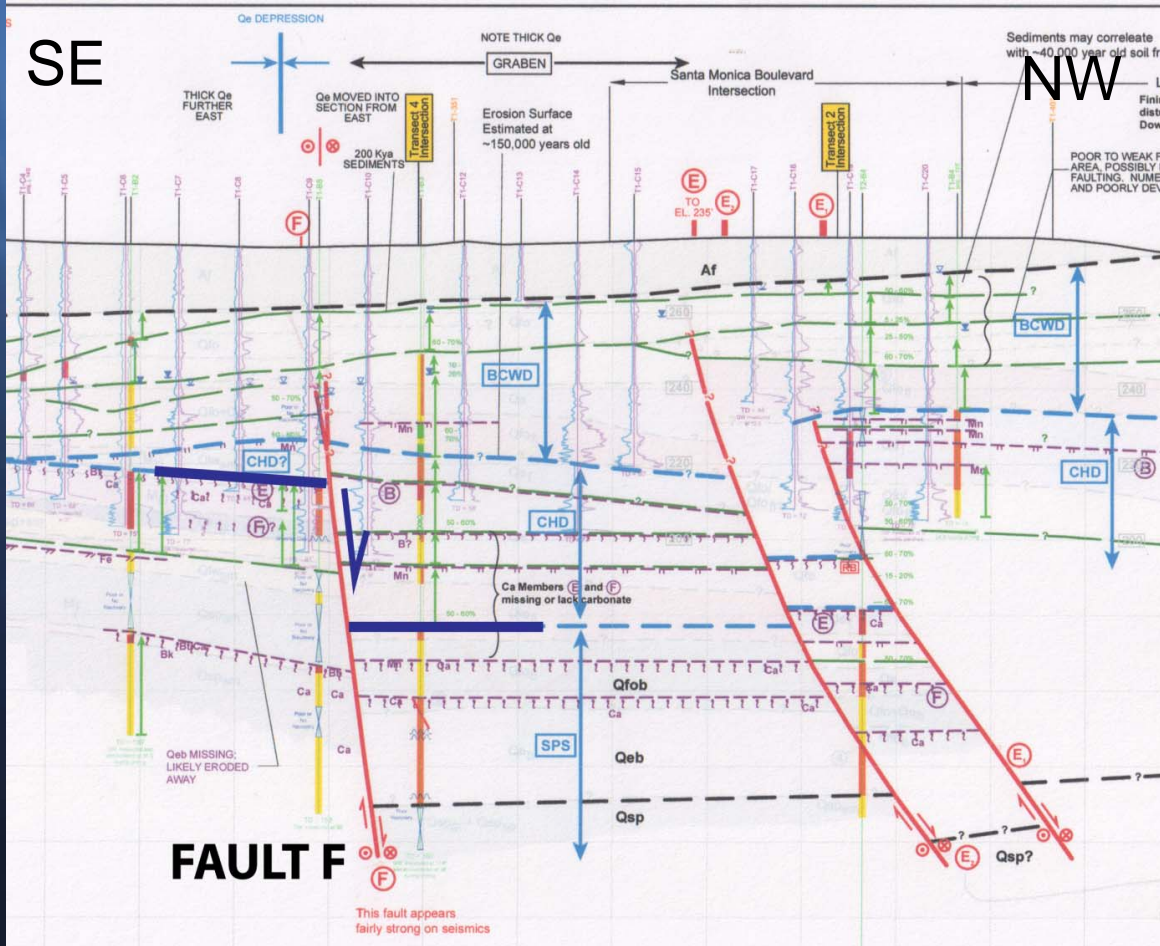


SE **ALTERNATIVE EVALUATION OF PARSONS TRANSECT 7** NW



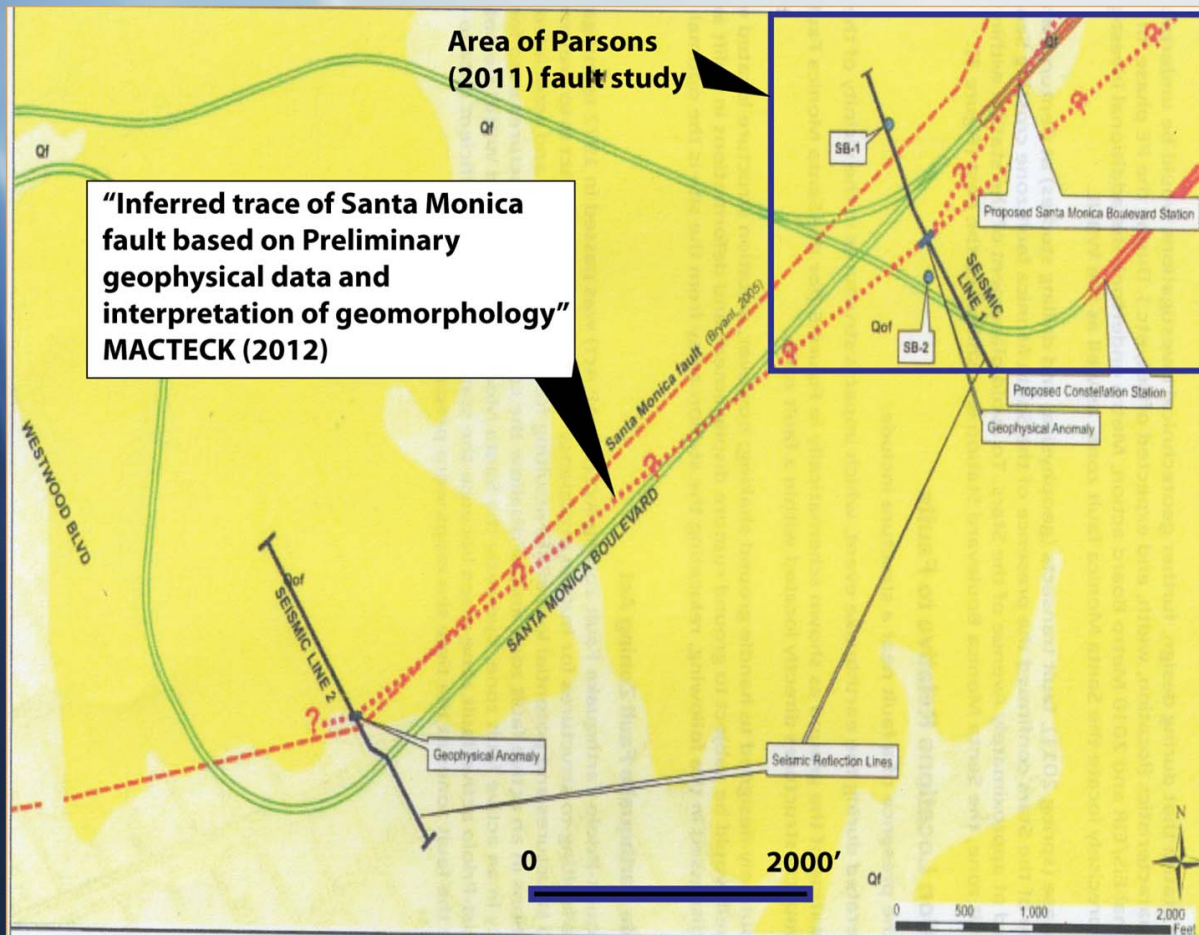


# Transect 1-8 FUS - Close up of Fault F



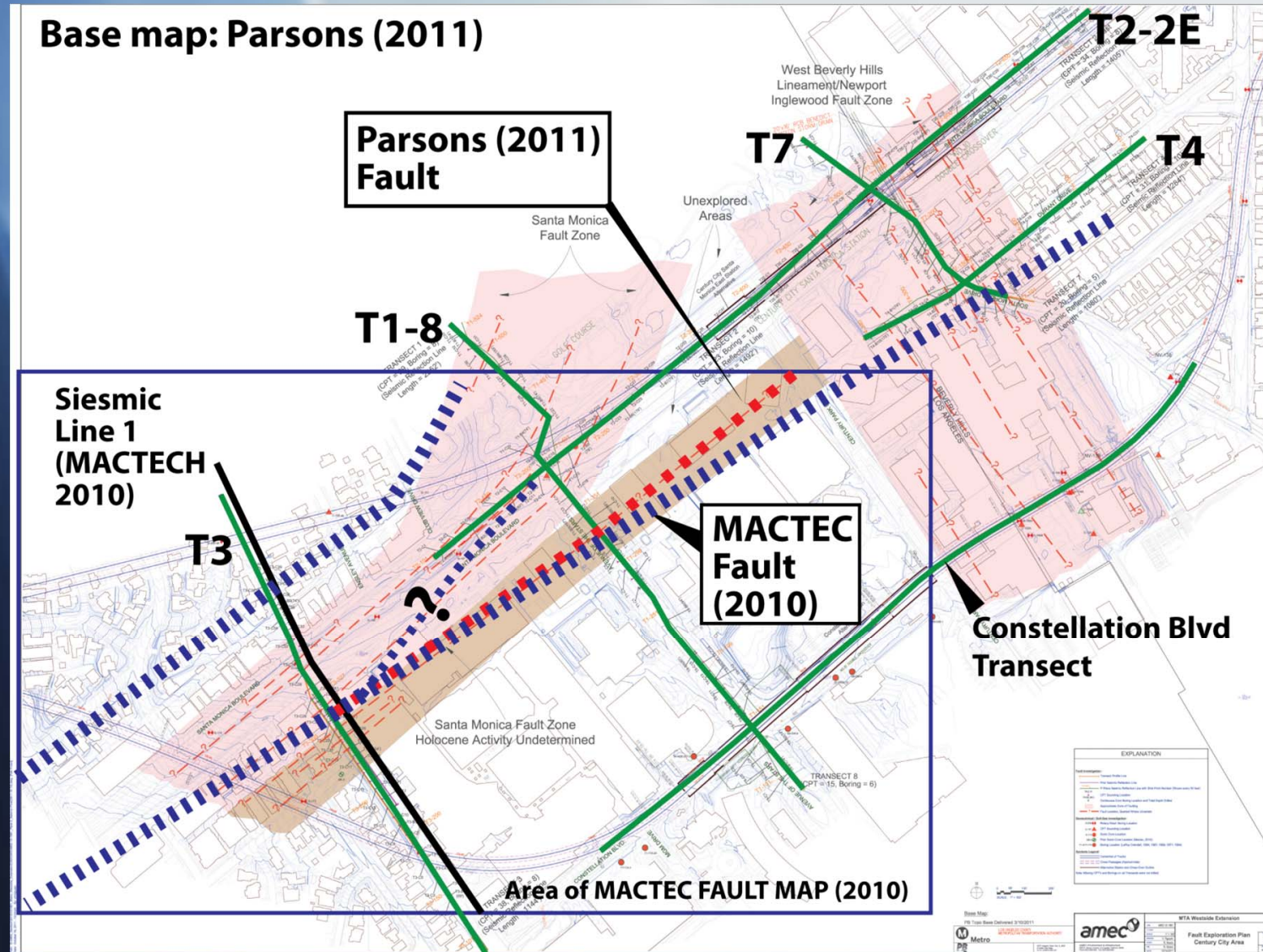
# Additional evidence for Fault F to reach Transect 7

Fault F was already mapped by MACTECH (2010)

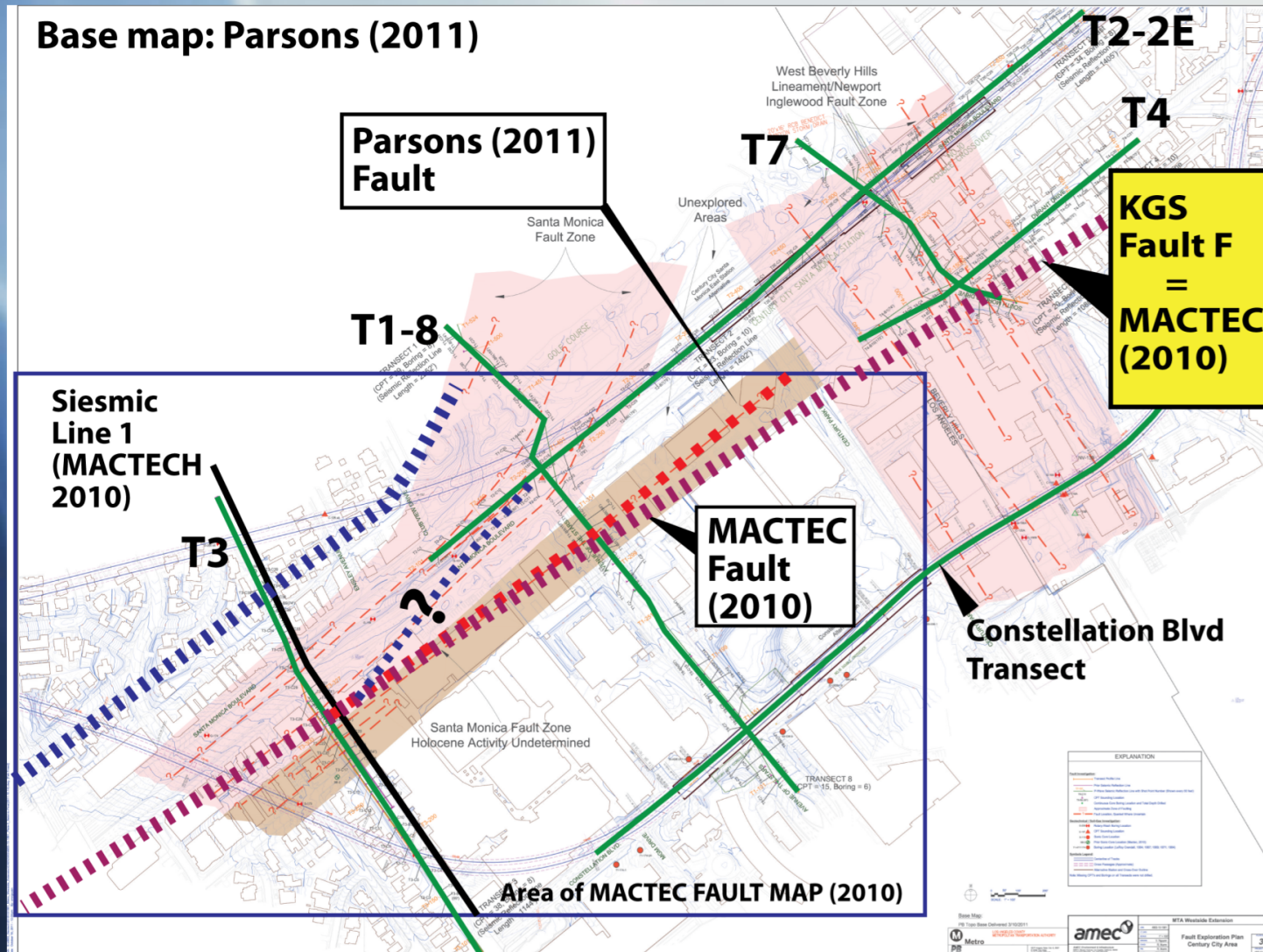




# Fault Map Overlay - MACTECH AND PARSONS

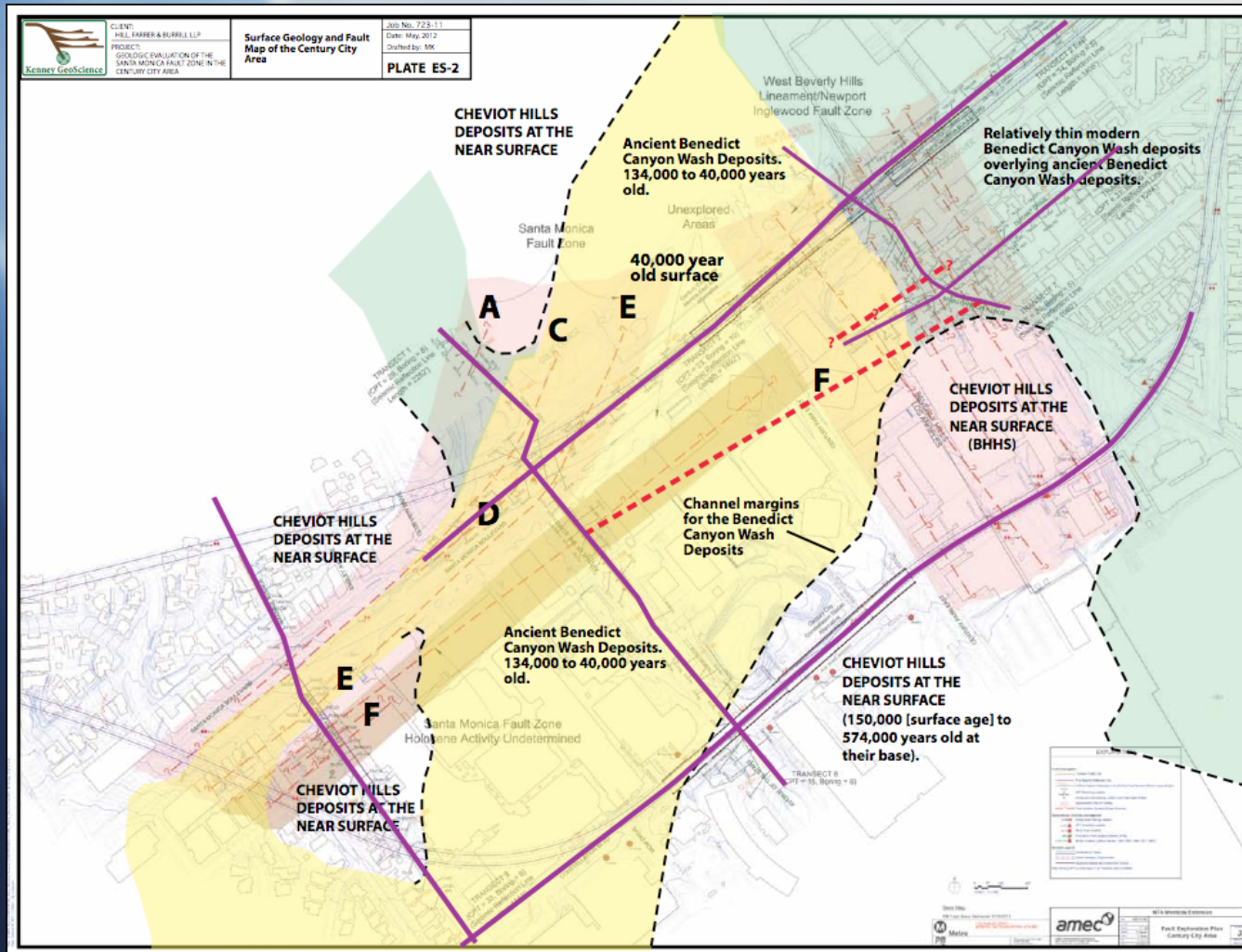


# Fault Map Overlay - MACTECH AND PARSONS





# Fault F to Transect 7



# Interim Summary

- The WBHL faults likely do not exist.
- Our analysis indicates that at least one fault mapped within the WBHL by Parsons is likely real, but strikes NE-SW and is part of the SMBFZ (Fault F).

# Geomorphic Analysis

- Preserved terrace surfaces across Santa Monica Boulevard - Cross Sections
- Drainage analysis
- Lineament analysis along Santa Monica Blvd
- Preserved terrace surfaces overlying faults



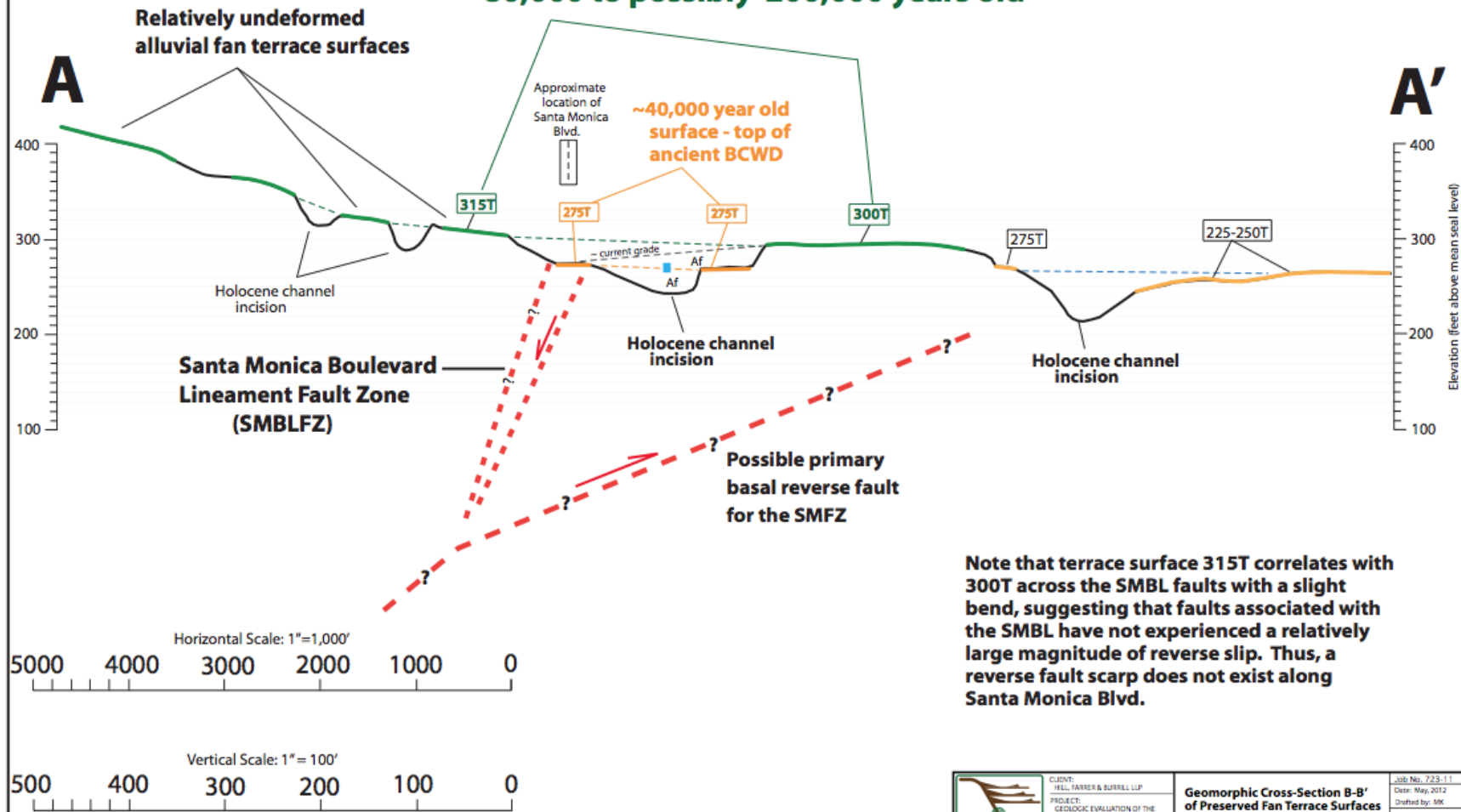




North

South

### Correlated Terrace Surface ~80,000 to possibly 200,000 years old



CLIENT: HELL, FARRER & BURRILL LLP  
 PROJECT: GEOLOGIC EVALUATION OF THE SANTA MONICA FAULT ZONE IN THE CENTURY CITY AREA

**Geomorphic Cross-Section B-B' of Preserved Fan Terrace Surfaces**

Job No. 723-11  
 Date: May, 2012  
 Drafted by: MK  
**PLATE ES-5**

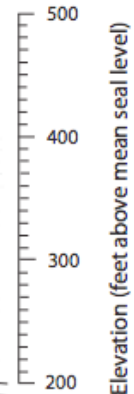


North

South

B

B'



**Correlated Terrace Surface**  
~80,000 to possibly 200,000 years old

325-425T

315T

270T

275-280T

250T

225T

Approximate location of Santa Monica Blvd.

Qal

Dip of the SMBLFZ at depth is uncertain, but based on Parsons (2012), appears to dip steeply to the north in the upper 200 feet.

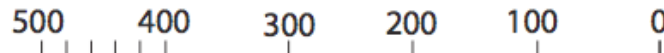
**Santa Monica Boulevard Lineament Fault Zone (SMBLFZ)**

**Note that the 315T terrace surface is relatively down on the north side of the SMBL fault zone, thus strongly suggesting that this fault zone is likely not dominantly reverse, and is likely dominated by normal and/or strike-slip motion.**

Horizontal Scale: 1"=1,000'



Vertical Scale: 1" = 100'



CLIENT: HILL, FARRER & BURRILL, LLP  
PROJECT: GEOLOGIC EVALUATION OF THE SANTA MONICA FAULT ZONE IN THE CENTURY CITY AREA

**Geomorphic Cross-Section B-B' of Preserved Fan Terrace Surfaces**

Job No. 722-11  
Date: May, 2012  
Drafted by: NK

PLATE ES-6



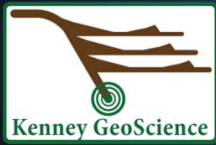
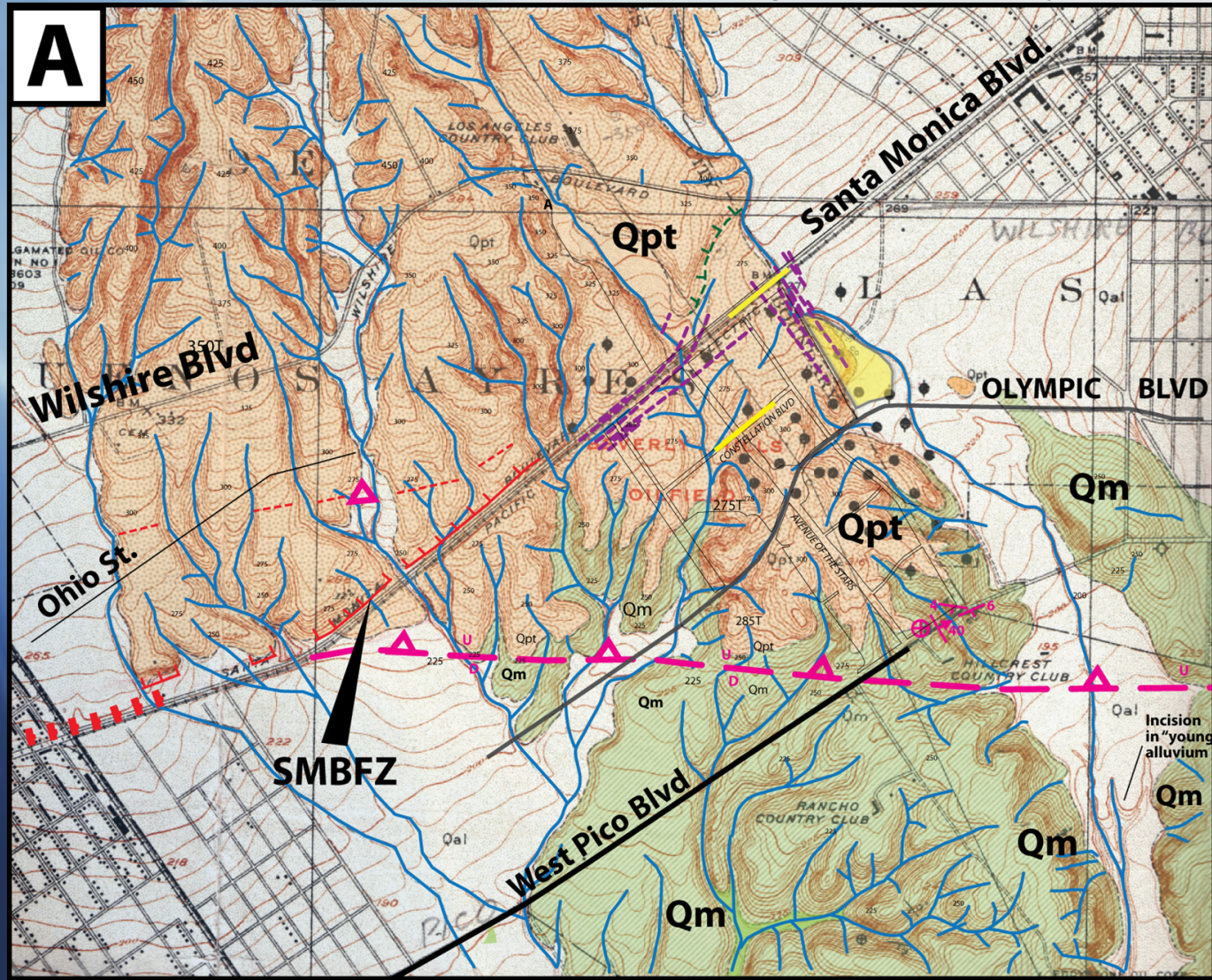
# Results

Faults along Santa Monica Boulevard have not exhibited significant reverse faulting



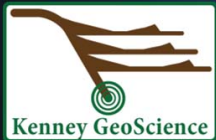
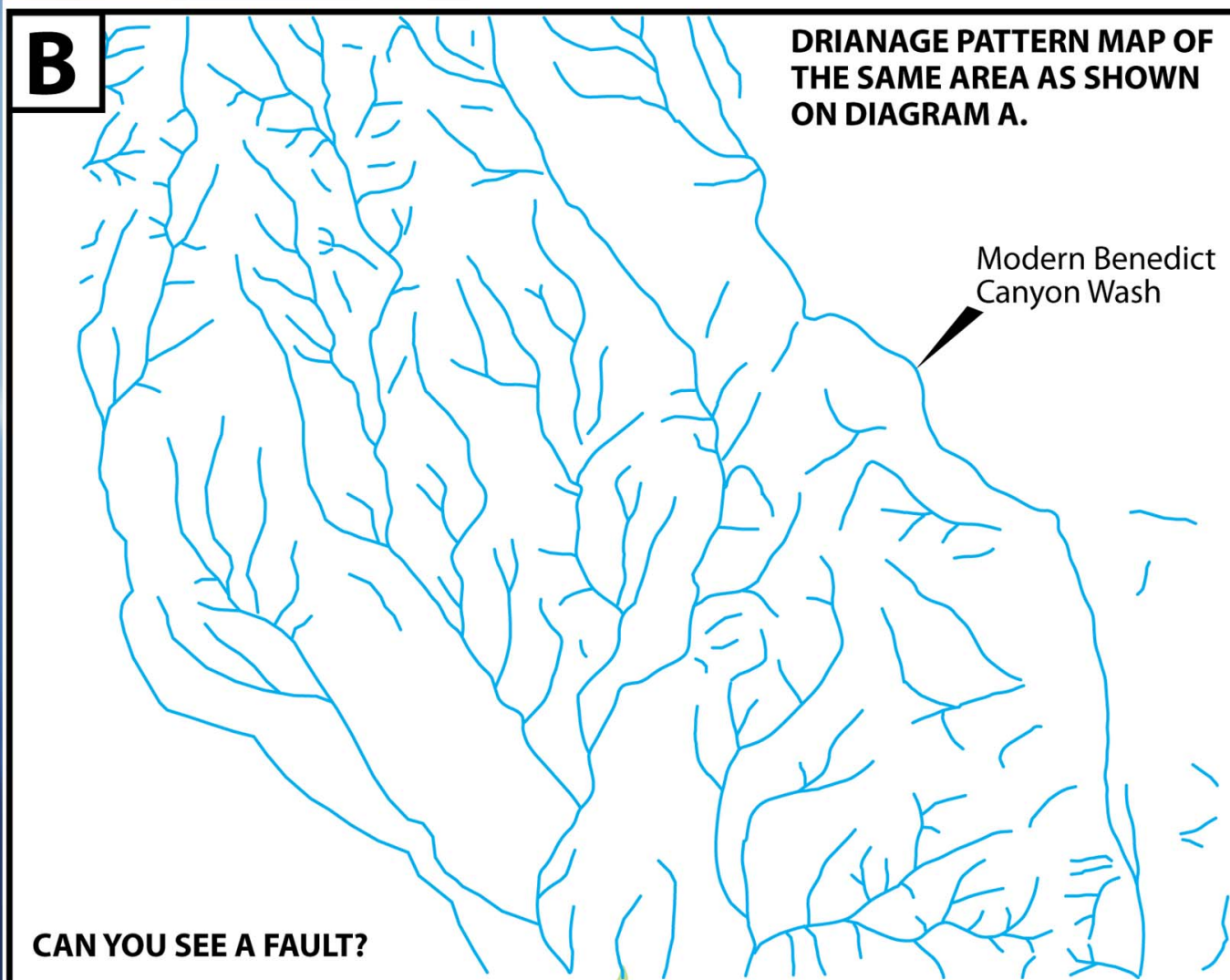


# Geomorphic drainage analysis

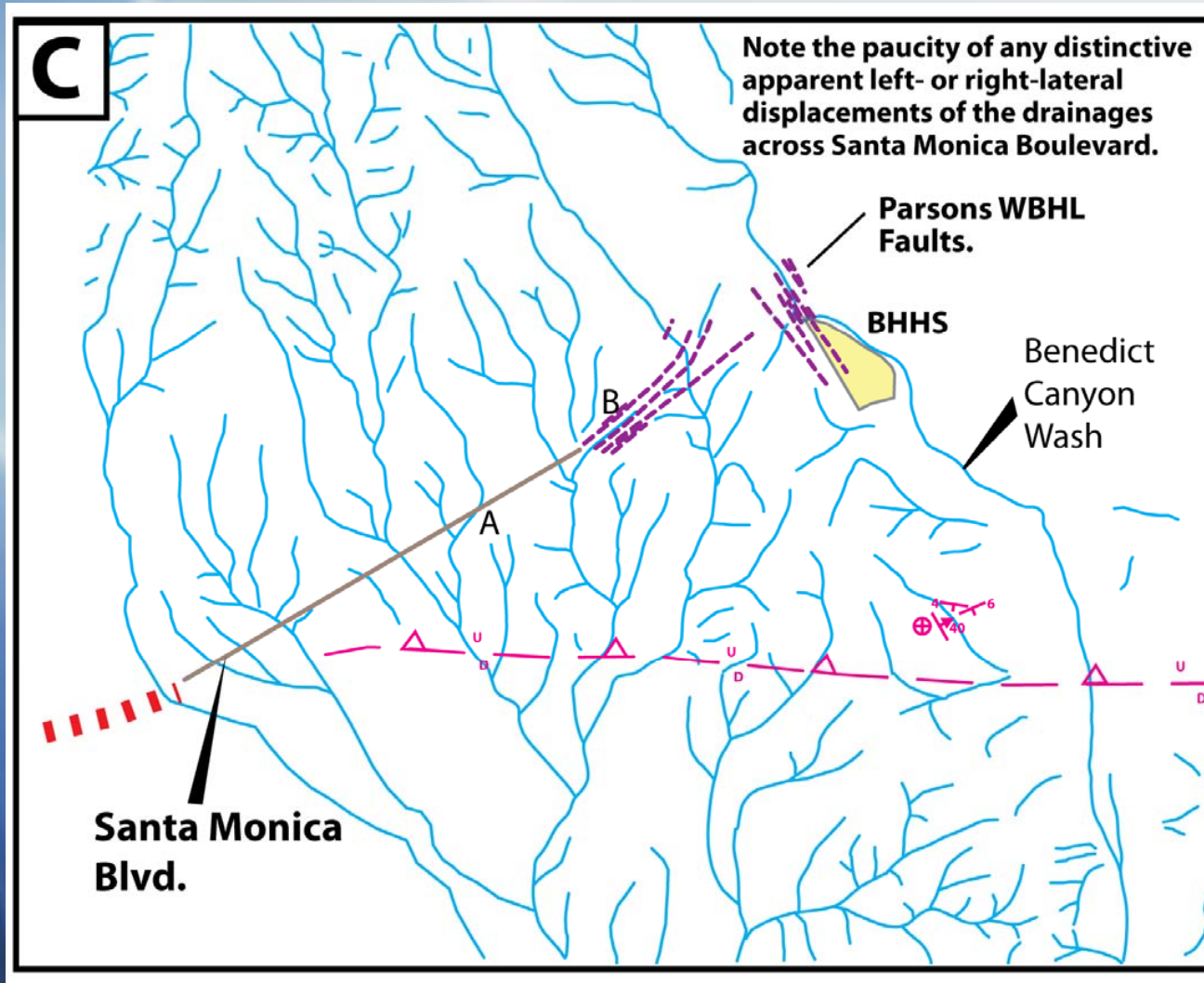




# Geomorphic Drainage Analysis



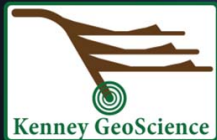
# Geomorphic Drainage Analysis



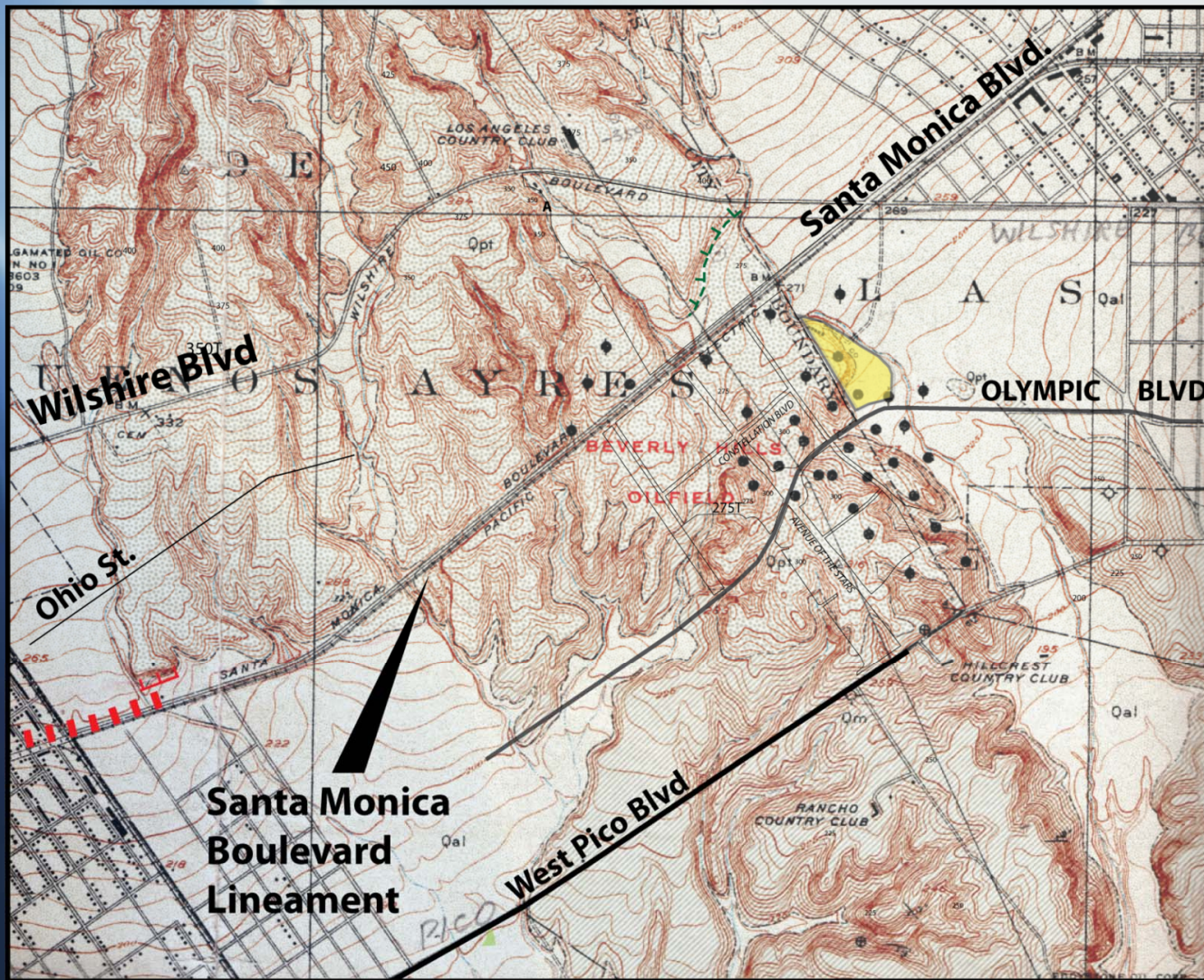


# Results of drainage analysis

- Tributary system does not appear systematically offset by either right- or left lateral displacement.
- Infers that the Santa Monica Blvd Lineament appears dominated by erosion and depositional processes – thus possibly not active



Is there a lineament along SMB?  
Yes, and it is VERY linear,  
suggesting dominantly strike-slip motion





Any well defined fault scarps in the  
~40,000 years old terrace surface? = **NO**



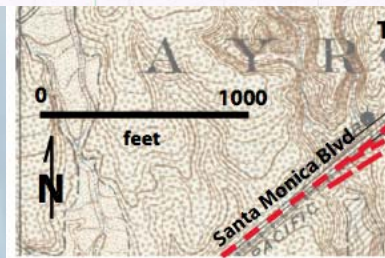
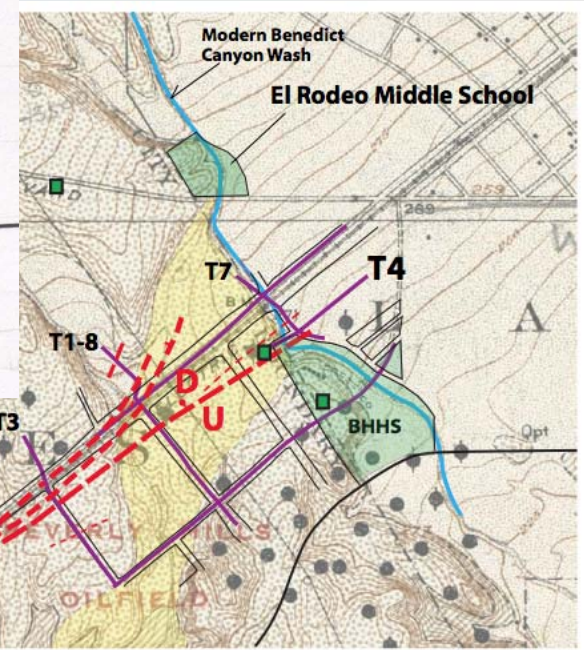
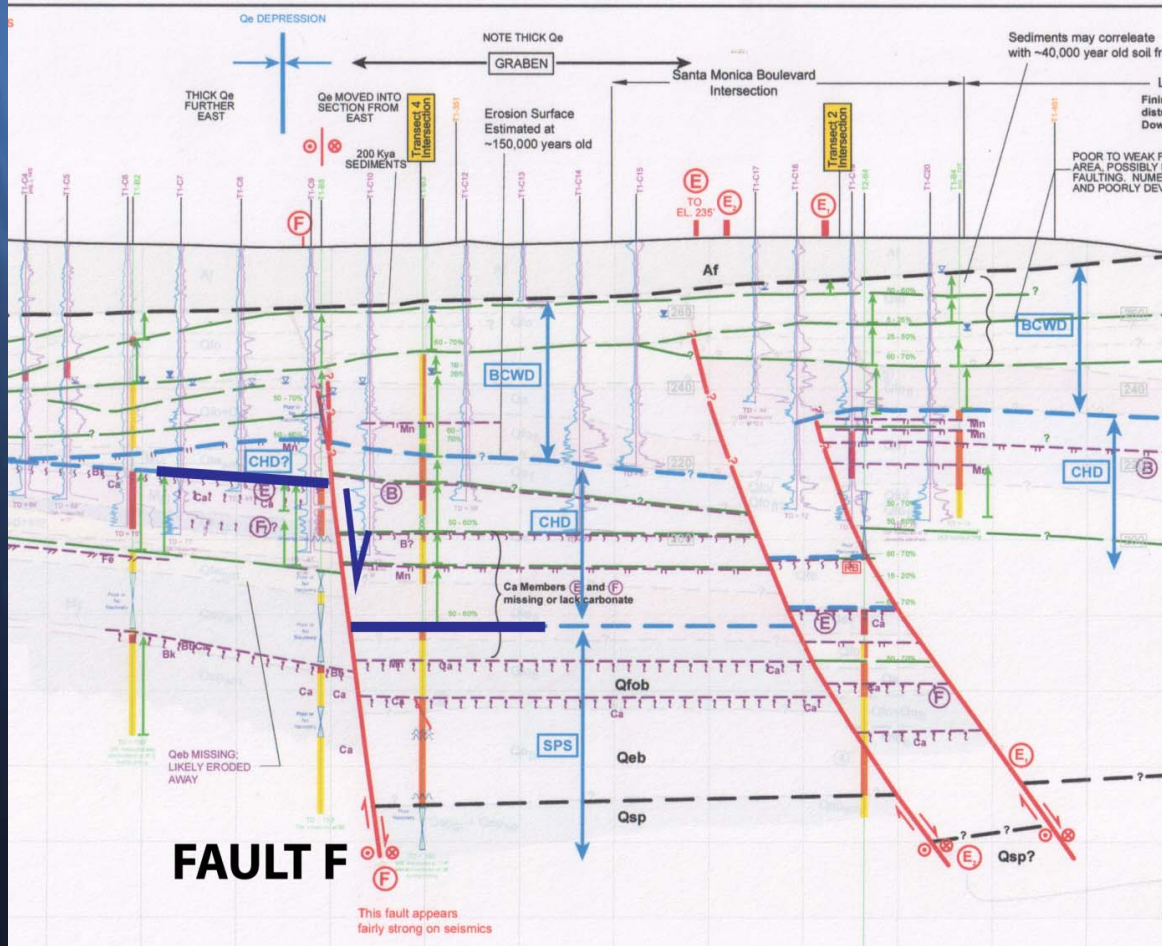


# Results of Lineament Analysis

- Straight trend of the Santa Monica Boulevard Lineament suggests **strike-slip displacement** as apposed to dip-slip but not offset drainages = **suggesting inactive**
- No well defined scarps associated with the SMBFZ or proposed WBHL fault zone on the ~40,000 year old terrace surface. = **suggesting inactive**

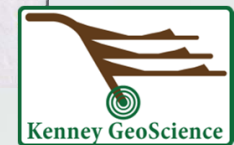
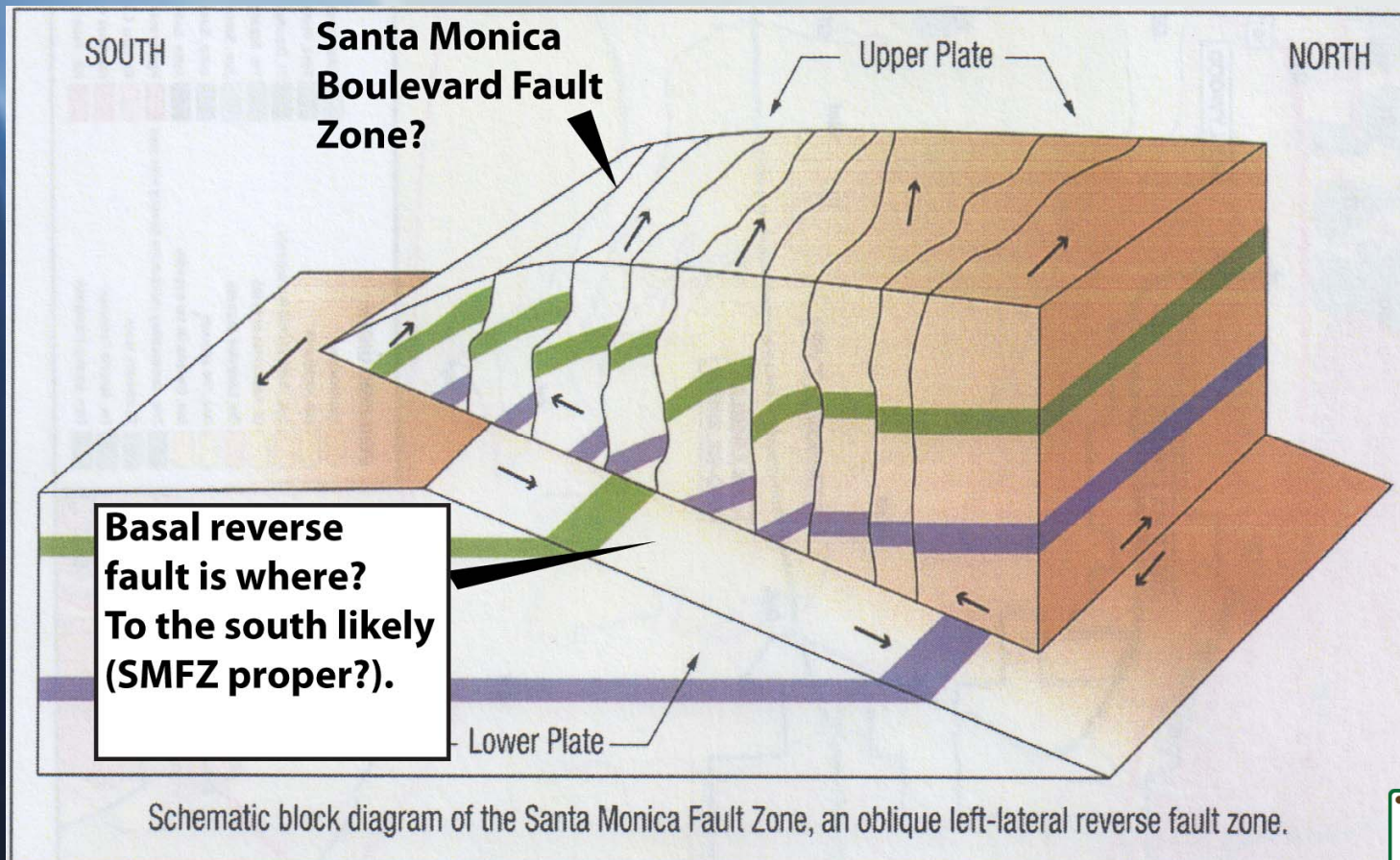


# Are the faults along Santa Monica Boulevard inactive?





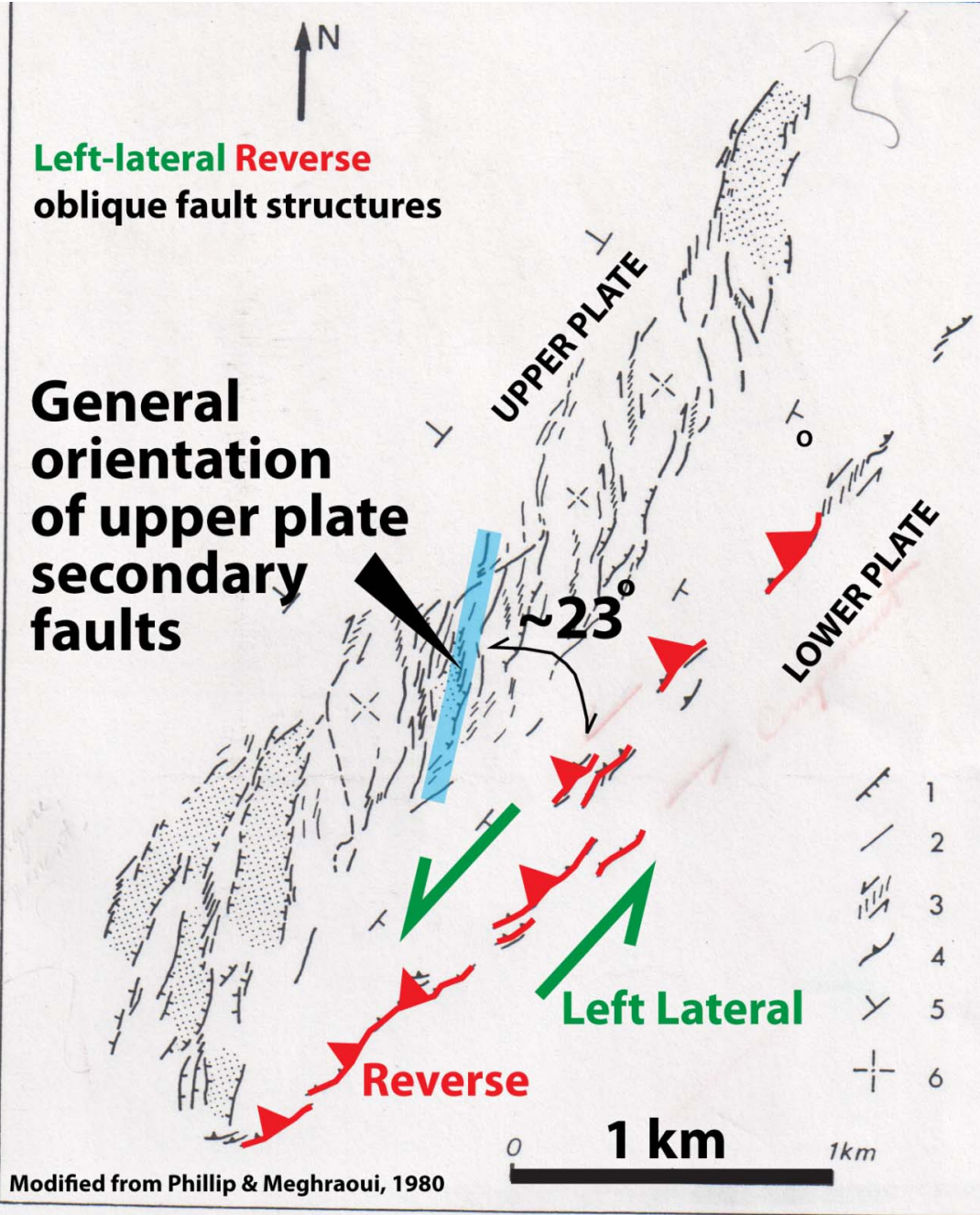
# Is the SMBFZ a “secondary” upper plate fault?





Left-lateral Reverse  
oblique fault structures

General  
orientation  
of upper plate  
secondary  
faults

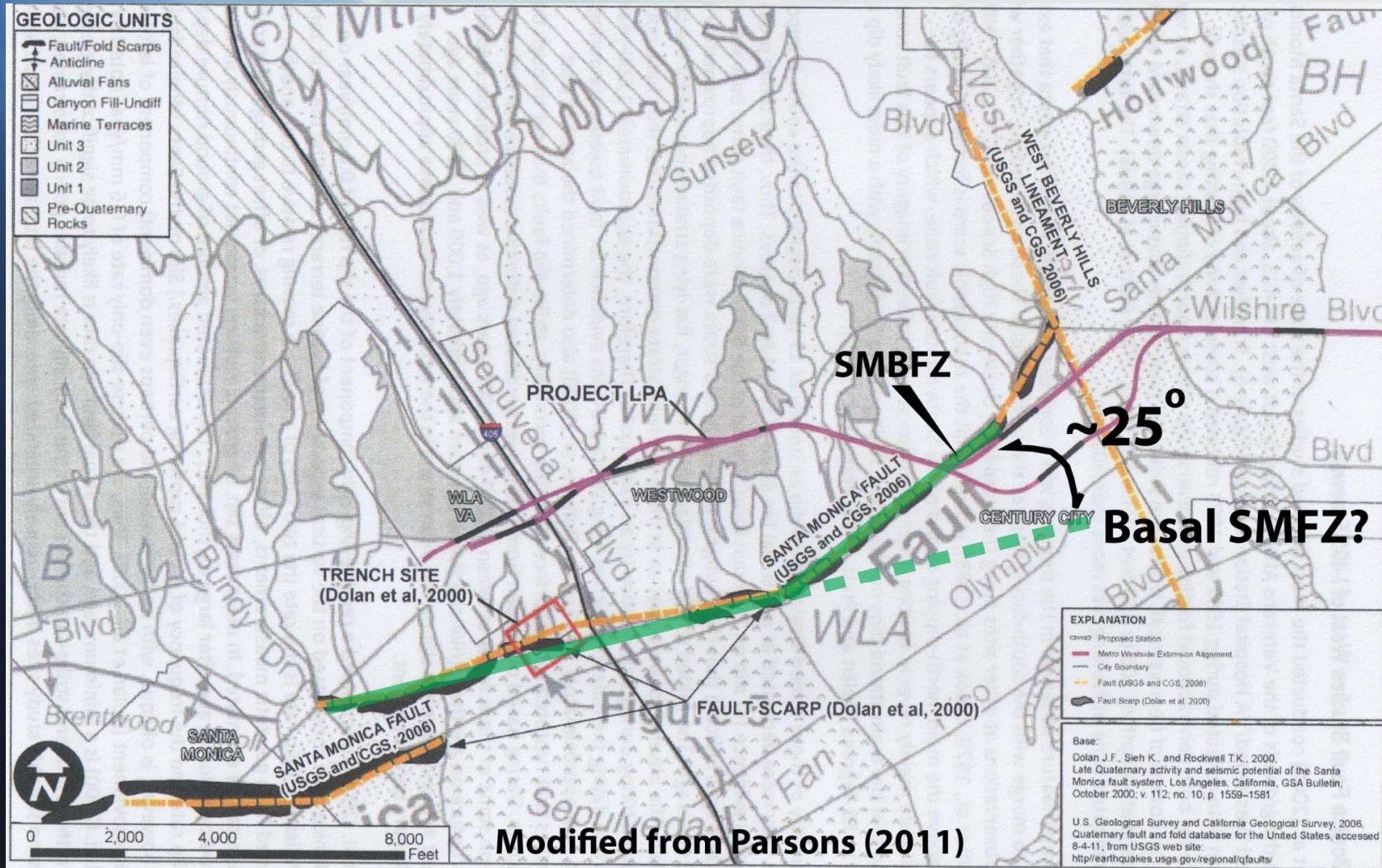


Is the  
SMBFZ a  
secondary  
upper  
plate  
fault?





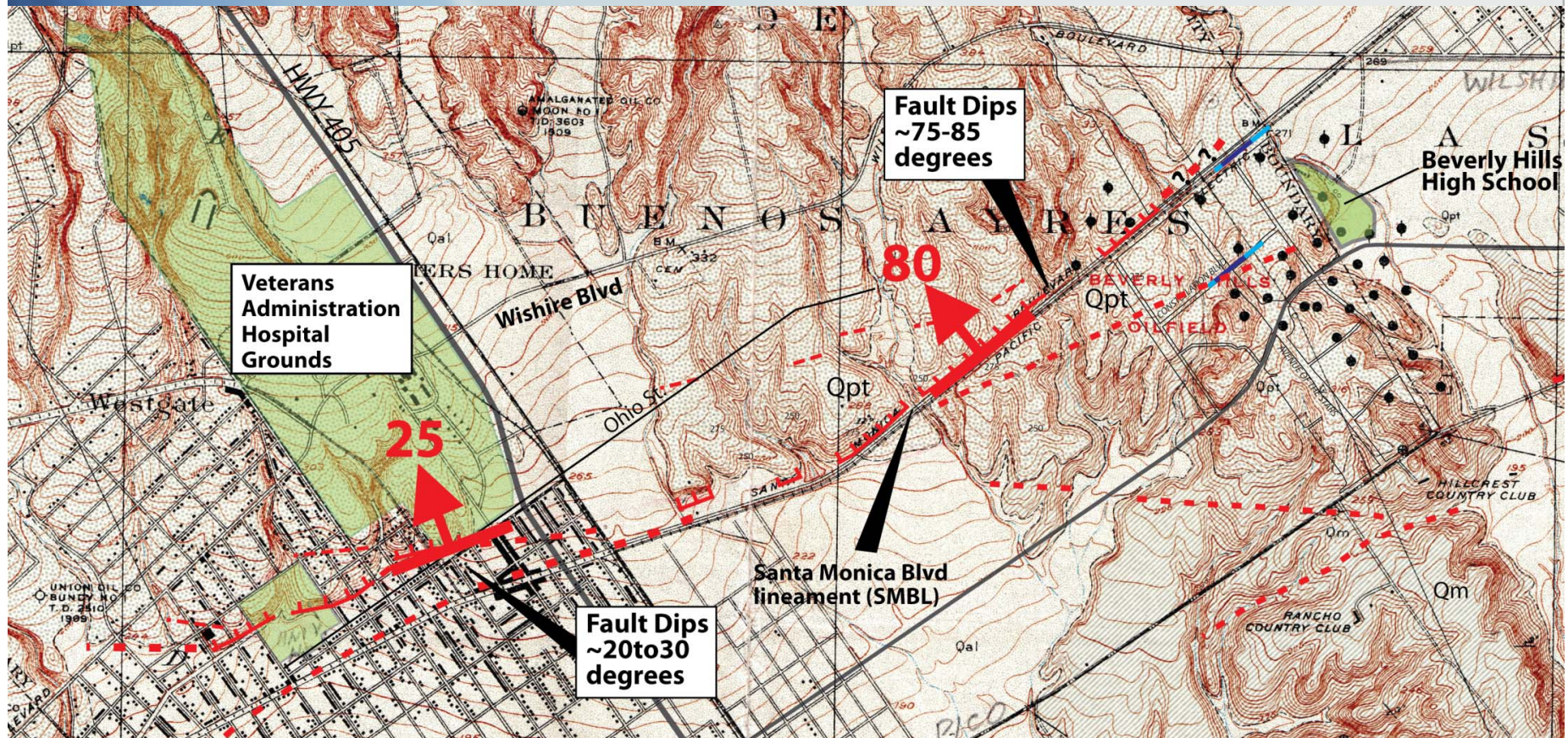
# Is the SMBFZ a secondary upper plate fault?





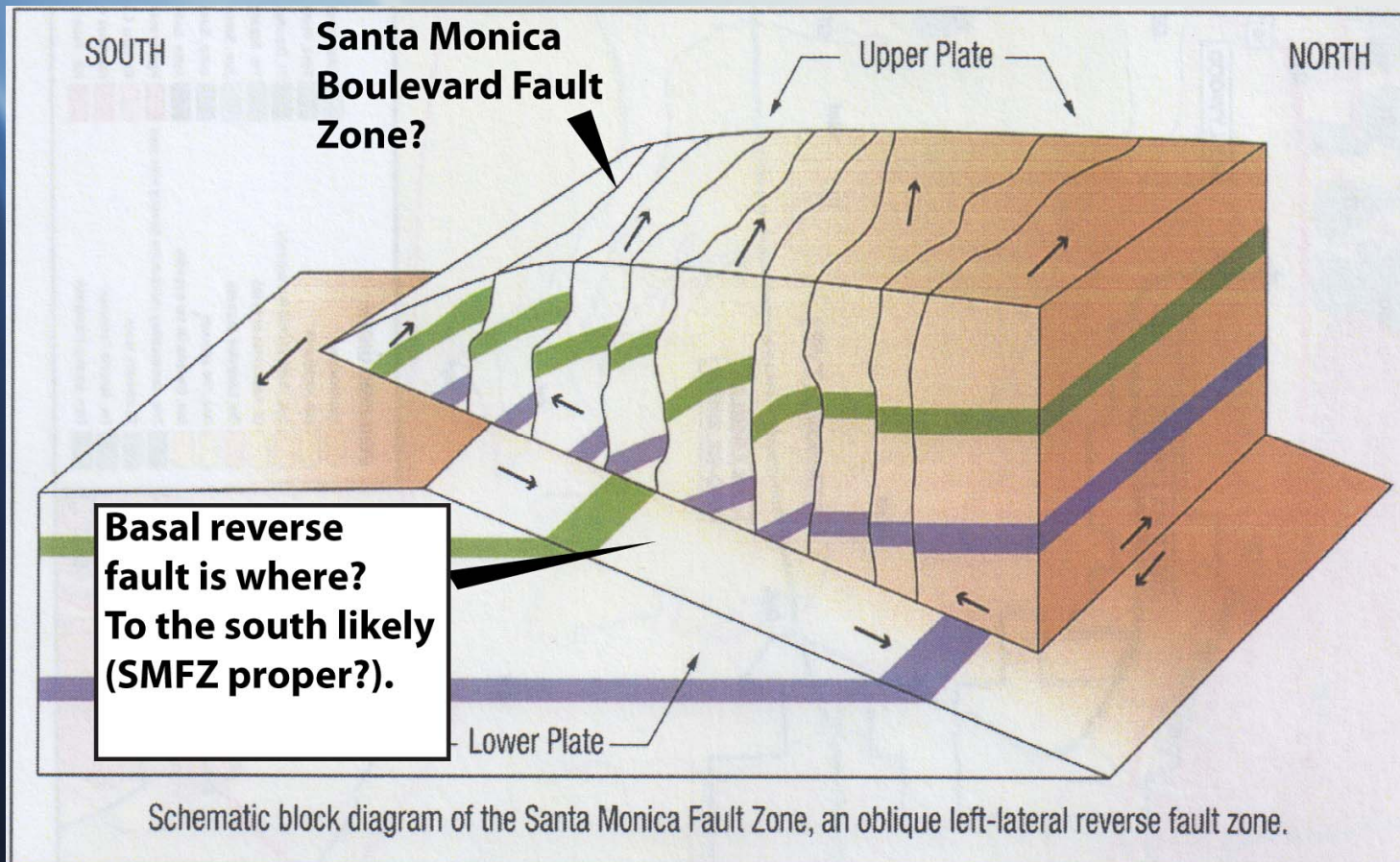
# Is the SMBFZ a secondary upper plate fault? - Continued

## Lets look dips

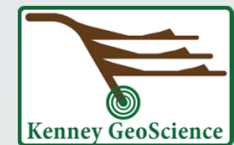
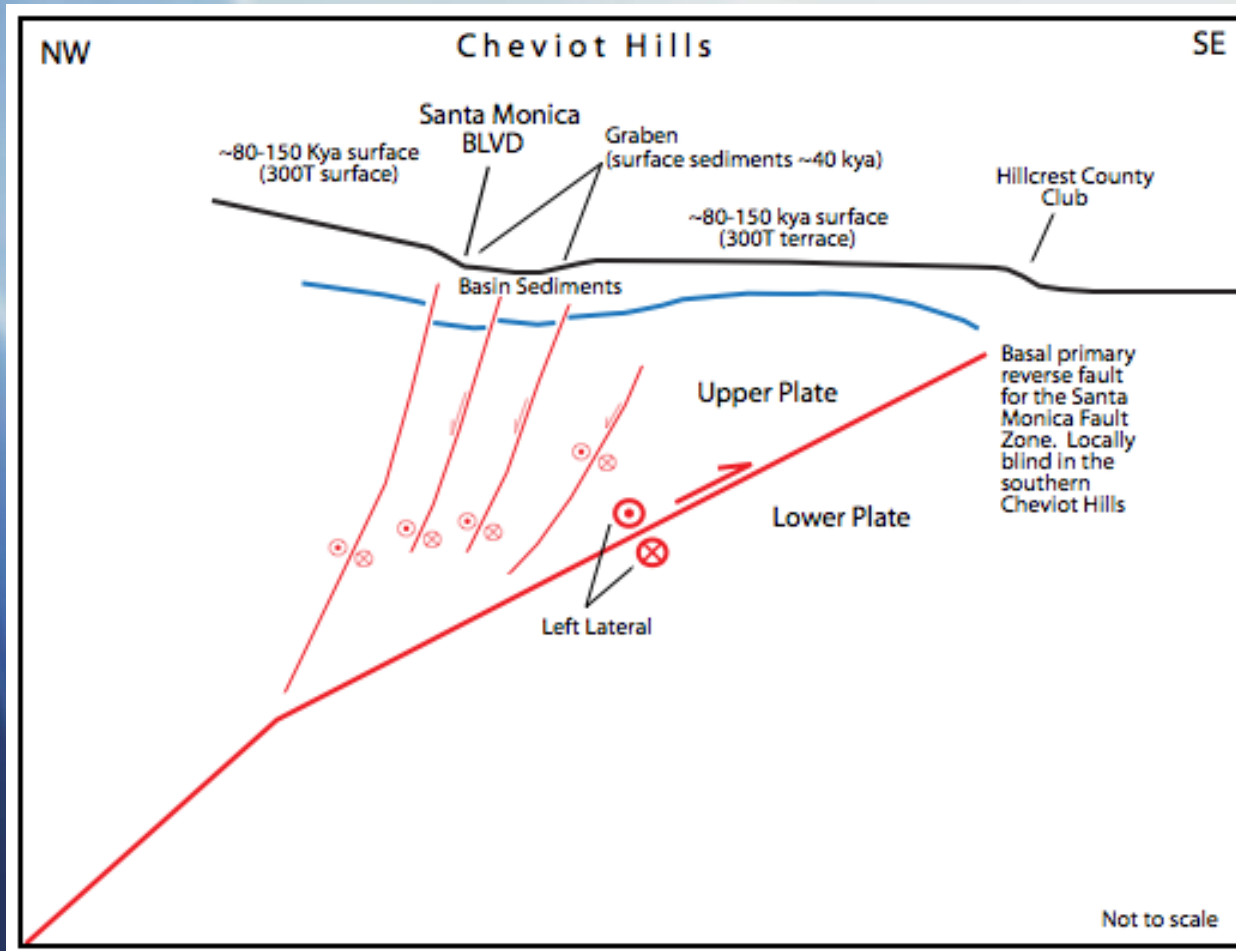




# Is the SMBFZ an upper plate fault?

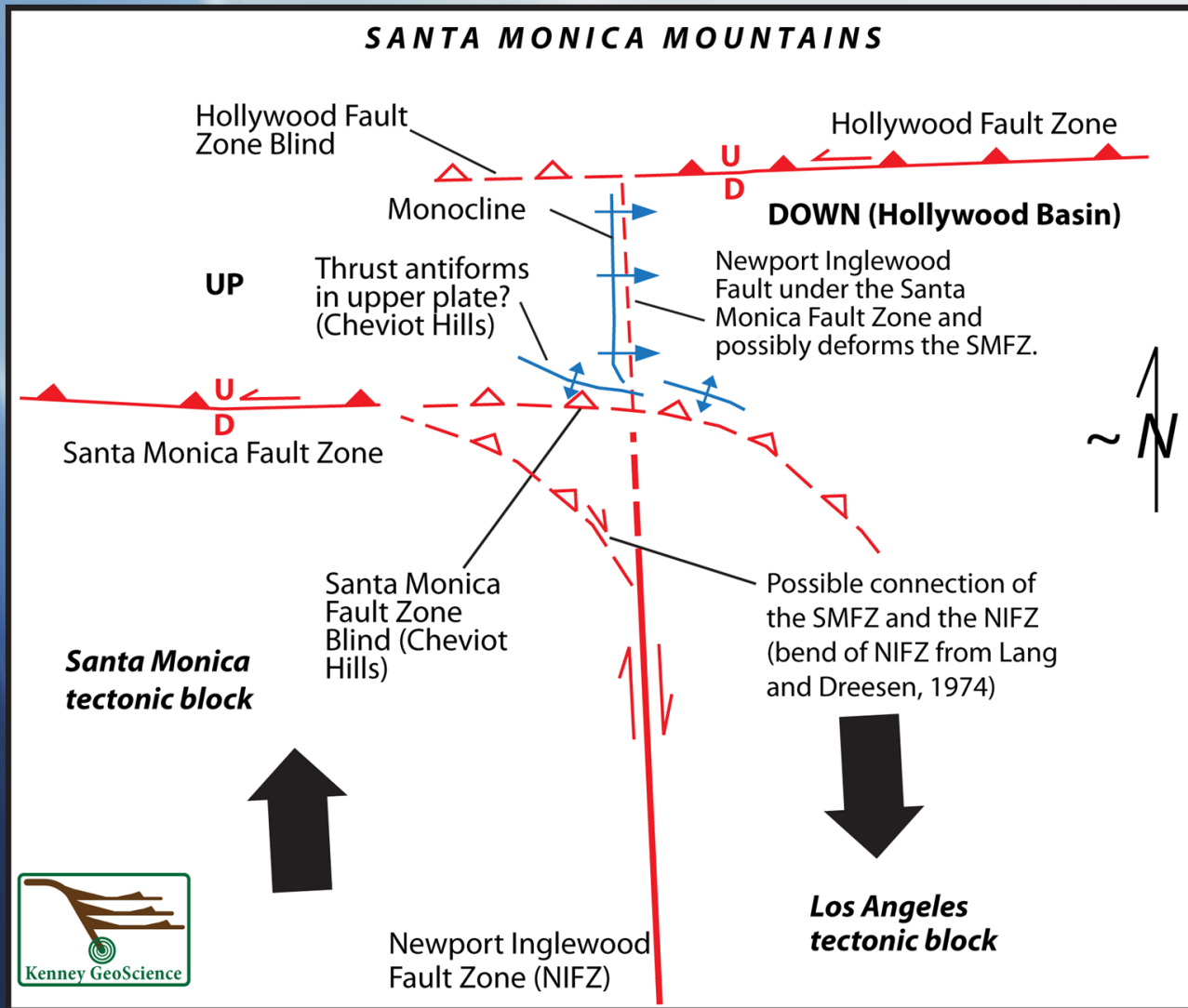


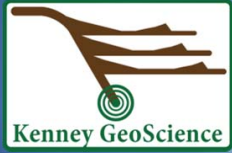
# Proposed cartoon model of local faulting in the Cheviot Hills





# Proposal for Regional Kinematic Model





# Interim Conclusions

*Miles Kenney, PhD. PG*

- A reasonable re-evaluation of the existing data suggests that faults associated with the West Beverly Hills Lineament (Newport-Inglewood fault zone) do not exist.
- At least one fault identified by Parsons within the WBHL fault zone is likely real, but is considered part of the Santa Monica Boulevard fault zone (strikes more EW compared to NS). Fault F.
- The Santa Monica Boulevard faults likely do exist, but they may be:
  - Dominantly strike-slip normal
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