Fishback Illegal Landfill Assessment

Philip J. Shaller, Ph.D., P.G., C.E.G.
Senior Managing Scientist
Head, GEO Group

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Failure Analysis Associates®

Philip J. Shaller, Ph.D., P.G., C.E.G.
Senior Managing Scientist

Professional Profile

Dr. Philip Shaller is a Senior Managing Scientist and head of the Geo Group wi
Civil Engineering practice. He has worked for 20 years as an engineering geol
His expertise includes geological and geotechnical site investigations, slope sta
landslide and debris flow identification and mitigation, rheological modeling of
evaluation of debris flow recurrence intervals, potential travel pathways and pr
structures, geologic field mapping, analysis of aerial photographs and remote sensing images including InSAR and synthetic aperture radar imagery, sub-surface characterization by means of small diameter borings, rock coring and large diameter borings (downhole logging), assessment

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Ph.D., Geology, California Institute of Technology, 1991
M.S., Geochemistry, Montana College of Mineral Science and Technology, 1985
A.B., Geochemistry, Occidental College, 1983

Robert P. Sharp Graduate Teaching Award, California Institute of Technology, Division of Geological and Planetary Sciences, 1990

Moderator (with MW Hart), Symposium on Long-Runout Landslides and Rock Avalanches, 52nd Annual Meeting of Association of Engineering Geologists, Lake Tahoe, CA, September 23, 2009.

Licenses and Registrations

Professional Geologist, California, #6132; Certified Engineering Geologist, California, #1912; Registered Geologist, Arizona, #54316; Registered Geologist, Idaho, #1010; Registered Geologist, Washington, #261; 40-Hour HAZWOPPER certification

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Exponent, Inc.

- Multi-disciplinary engineering & science consulting firm
- 20 U.S. offices & 5 international offices
- Over 90 technical disciplines
- Staff totals over 900 and includes more than 425 Ph.D.s and M.D.s

Philip J. Shaller – Relevant Grading Experience

- The Getty Center Museum Complex
  Los Angeles, California
- The Getty Villa
  Pacific Palisades, California
- Morning Sun Landslide Remediation
  Diamond Bar, California
- Agua Caliente Museum Complex
  Palm Springs, California (design)

Philip J. Shaller, Ph.D., P.G., C.E.G.
Project Experience – Getty Center Museum

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included observing the installation of two slop
of the channel.

Served as a project geologist during construct
Brentwood, California, and is the geologist of
Developed cross sections, performed compute
combined total of more than 100 test pits, buc
drains, mass grading cuts, and spread footing

Directed the engineering geologic investigatio
River, Montana. The project called for the ex
by soft sedimentary rock, coal deposits and bu

Performed construction observation tasks, inc
1,000-foot long retaining wall footing in Chin
excavation for a water pump plant in San Diego, California. Performed geologic mapping in
mass grading cuts at a landslide overexcavation in Diamond Bar, California.

Professional Affiliations

- Geological Society of America (member)
- Association of Environmental & Engineering Geologists (member)
- Seismological Society of America (member)

Philip J. Shaller, Ph.D., P.G., C.E.G.
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Philip J. Shaller, Ph.D., P.G., C.E.G.
Senior Managing Scientist

Served as a project geologist during construction of The Getty Center museum complex in Brentwood, California, and is the geologist of record for the site's funicular tramway. Developed cross sections, performed computer-aided slope stability evaluations, and logged a combined total of more than 100 test pits, bucket auger borings, drilled pier shafts, drilled slope drains, mass grading cuts, and spread footing excavations at the museum site.

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Philip J. Shaller, Ph.D., P.G., C.E.G.
Project Experience – Getty Villa Museum

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Philip J. Shaller, Ph.D., P.G., C.E.G.
Senior Managing Scientist

Assisted in the development of an emergency response and remediation of a landslide threatening a residential development in Diamond Bar, California, and performed an emergency evaluation and geotechnical investigation of a landslide at the Getty Villa museum complex in Pacific Palisades, California.

Project manager for the Lowden Fire investiga
member team evaluating the geologic, hydrolo
project entailed aerial photo analysis, engineer
mass wasting issues, storm water runoff and se
intensity of the burn and the level of recovery

Project manager for investigation of alleged w
tilts at a 1,300-home residential development i
investigated by combining field observations a
remote sensing techniques, historical aerial ph
and available construction plans and documen

Observed and documented field load testing fo
Also performed geologic field mapping, logge
and cross sections, and participated in constru

Served as geology representative from Exponent in EERI-sponsored visit to site of January 2001 (magnitude 7.7) Gujarat, India, earthquake. Conducted 10-day field reconnaissance in

Directed an investigation of a potentially life-threatening landslide complex at Lukes Farm, Matahina Reservoir, New Zealand, and a reconnaissance slope stability hazard investigation along the Pacific Coast Highway from Santa Monica to Malibu, California.

Assisted in the development of an emergency response and remediation of a landslide threatening a residential development in Diamond Bar, California, and performed an emergency evaluation and geotechnical investigation of a landslide at the Getty Villa museum complex in Pacific Palisades, California.

Performed a variety of geotechnical site investigation activities, including logging bucket auger borings for a proposed dam near Graybull, Wyoming; mapping stream scour above a heated oil pipeline in Santa Barbara, California; directing a CPT investigation of a bridge crossing of the San Gabriel River in Pico Rivera, California; and investigating and developing cross sections for the proposed expansion of a flood control channel in San Clemente, California. The latter

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Project Experience – Morning Sun Landslide Remediation

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Philip J. Shaller, Ph.D., P.G., C.E.G.
Senior Managing Scientist

Performed construction observation tasks, including the documentation of an approximately 1,000-foot long retaining wall footing in Chino Hills, California, and observed the over-excavation for a water pump plant in San Diego, California. Performed geologic mapping in mass grading cuts at a landslide overexcavation in Diamond Bar, California.

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Philip J. Shaller, Ph.D., P.G., C.E.G.
Project Experience - Agua Caliente Cultural Museum

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Project Experience

Evaluated cause and origin of distress to single-
possible relationships to underlying fill characte

Led team that carried out post-earthquake recon
deformation following the Mexicali Earthquake
based on findings of the reconnaissance.

Evaluated the engineering geologic feasibility o
Delta and contributed to the development of a p
government and operator in quantifying potenti
the project.

Evaluated geomorphic effects of early 2005 sto
northern Los Angeles County, California. Documented areas of bank erosion by means of aerial
photo analysis and field inspection.

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Philip J. Shaller, Ph.D., P.G., C.E.G.
Senior Managing Scientist

Project manager for the geotechnical investigation of the Agua Caliente Cultural Museum, near Palm Springs, California. Conducted boulder mapping, directed test pit excavations, conducted an in-situ load test for collapsible soil, and prepared a summary geotechnical report. Also conducted an investigation of the debris flow flood hazard using aerial photos and field mapping and provided recommendations for mitigation of the hazard. Participated in discussions of footing design options with the project architect and structural engineer.

of design geotechnical report and provided geologic input for design plans.

Project manager for the geotechnical investigation of the Agua Caliente Cultural Museum, near Palm Springs, California. Conducted boulder mapping, directed test pit excavations, conducted an in-situ load test for collapsible soil, and prepared a summary geotechnical report. Also conducted an investigation of the debris flow flood hazard using aerial photos and field mapping and provided recommendations for mitigation of the hazard. Participated in discussions of footing design options with the project architect and structural engineer.

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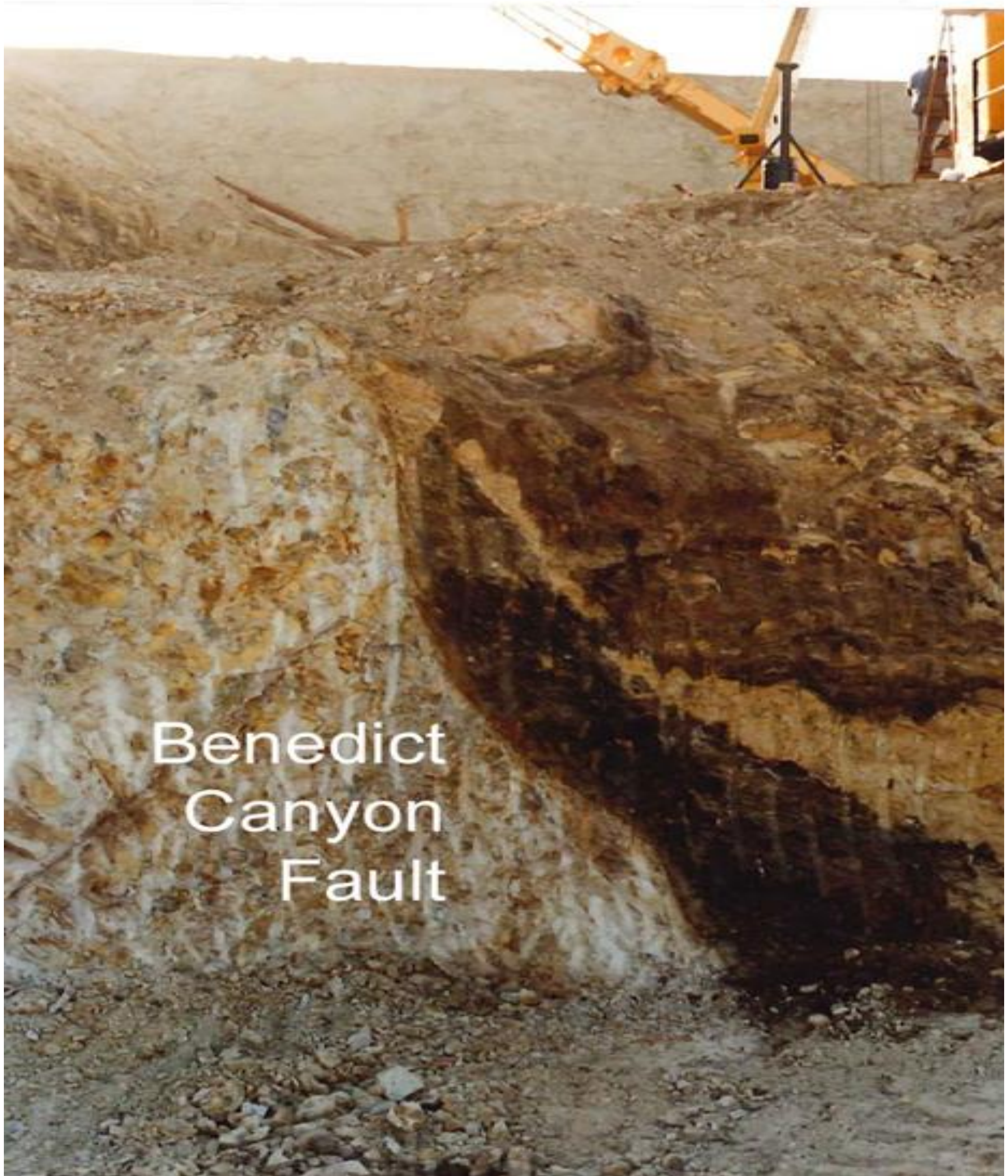
The Getty Center

- 110 acres, 15 acre building area
- Hilltop location
- Multi-year effort
- 8 major canyon fills
- 1.2 million cubic yards of soil moved
- Balanced site
- Cuts 30 to 85 feet below original ground
- 3 distinct bedrock formations

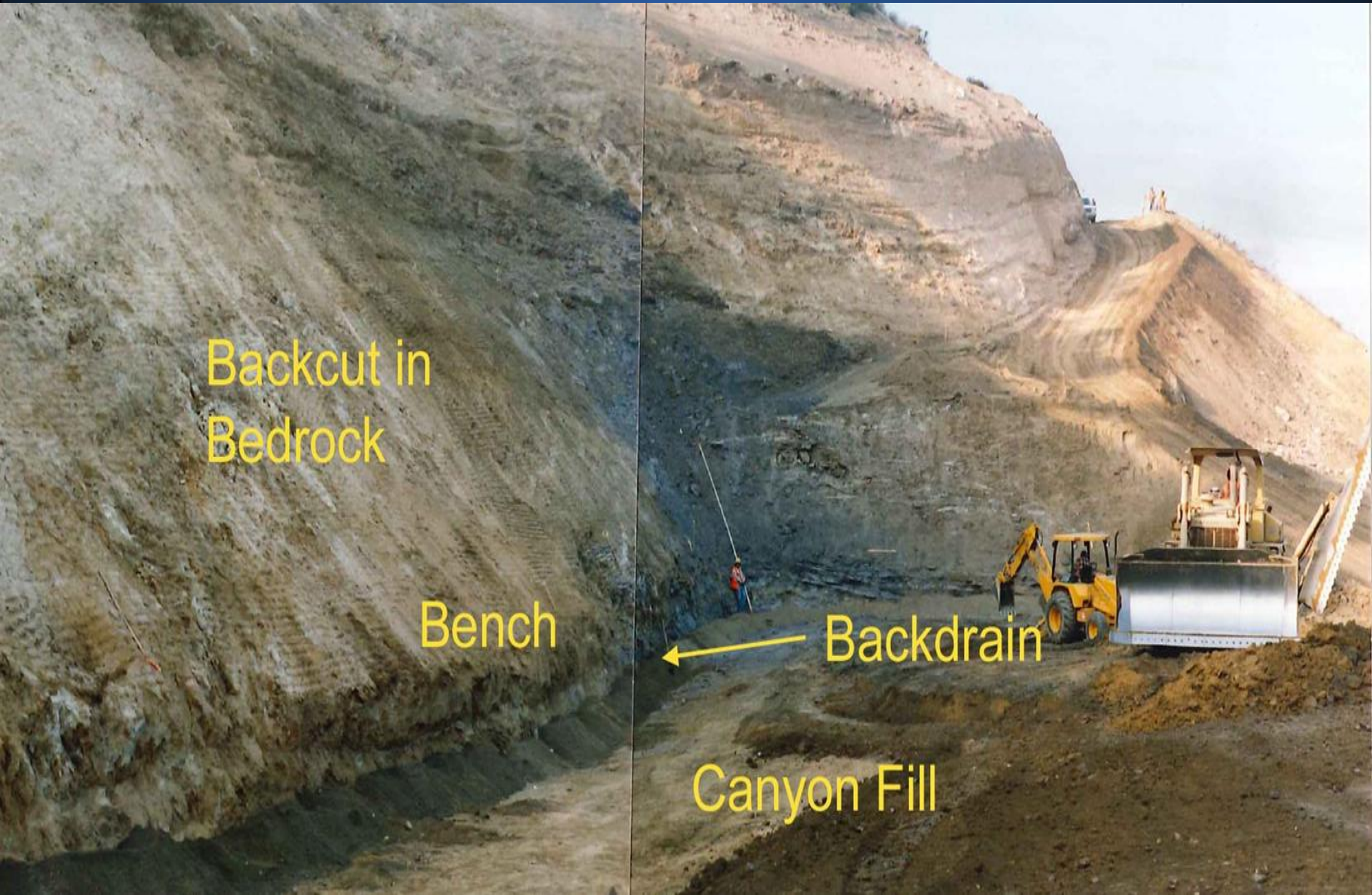
The Getty Center
Facility Underlain by (Inactive) Fault Zone



The Getty Center
¾-Mile Long Elevated Funicular Tram

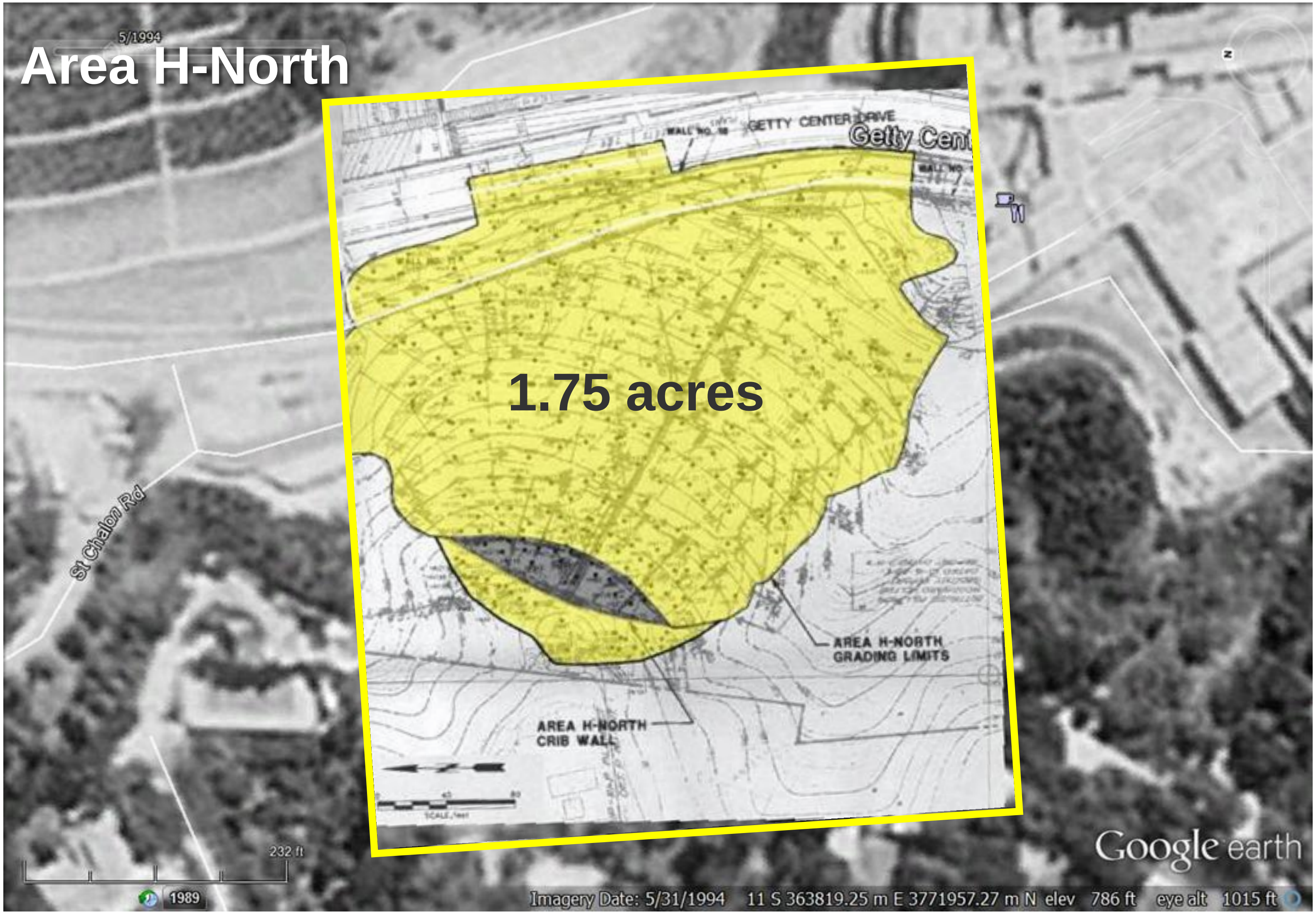
The Getty Center - Fill Areas

The Getty Center - Benching and Filling

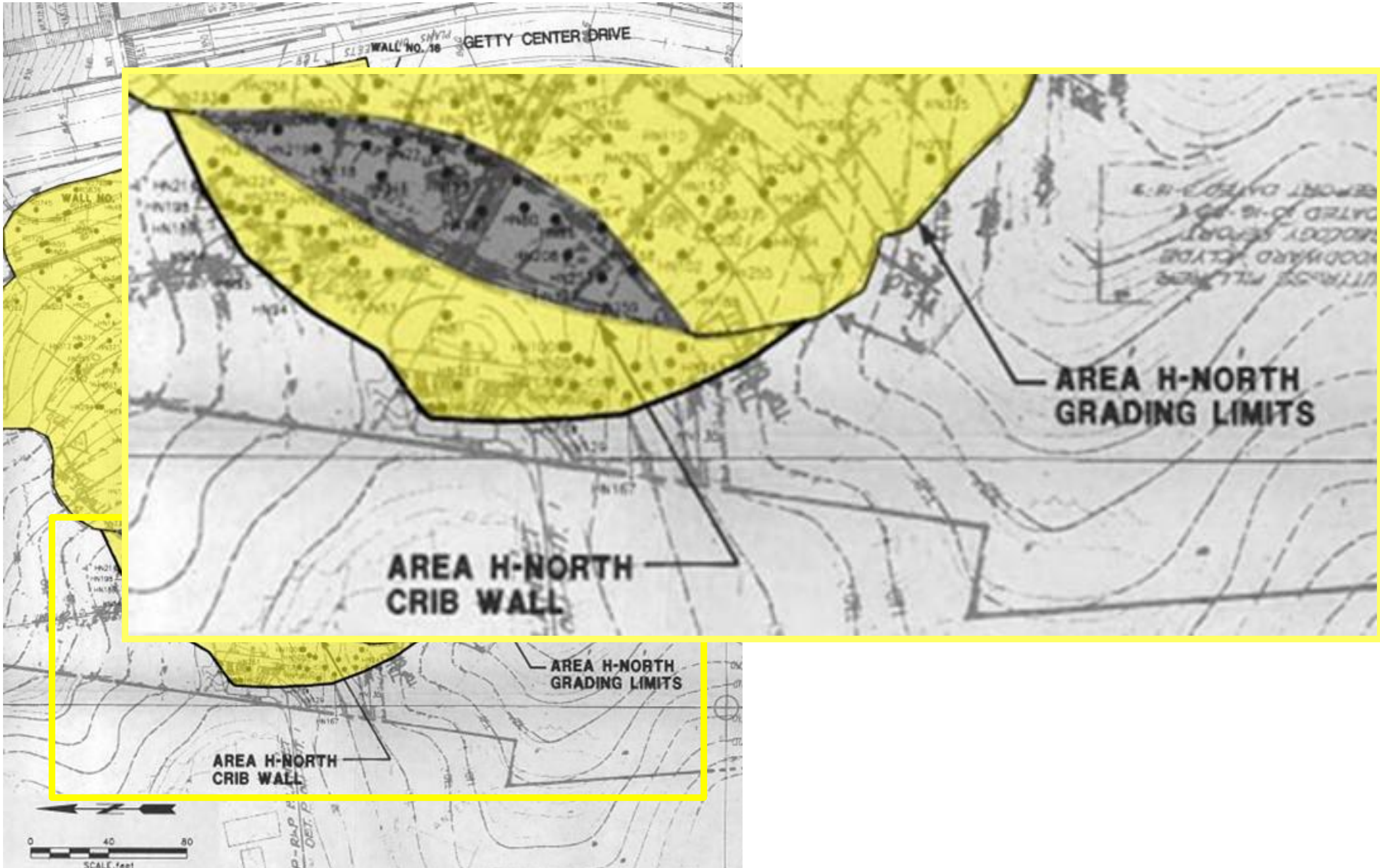


The Getty Center – Documentation
August 1989

The Getty Center – Documentation
May 1994



The Getty Center – Documentation
Density Test Locations



The Getty Center – Documentation
Density Test Locations

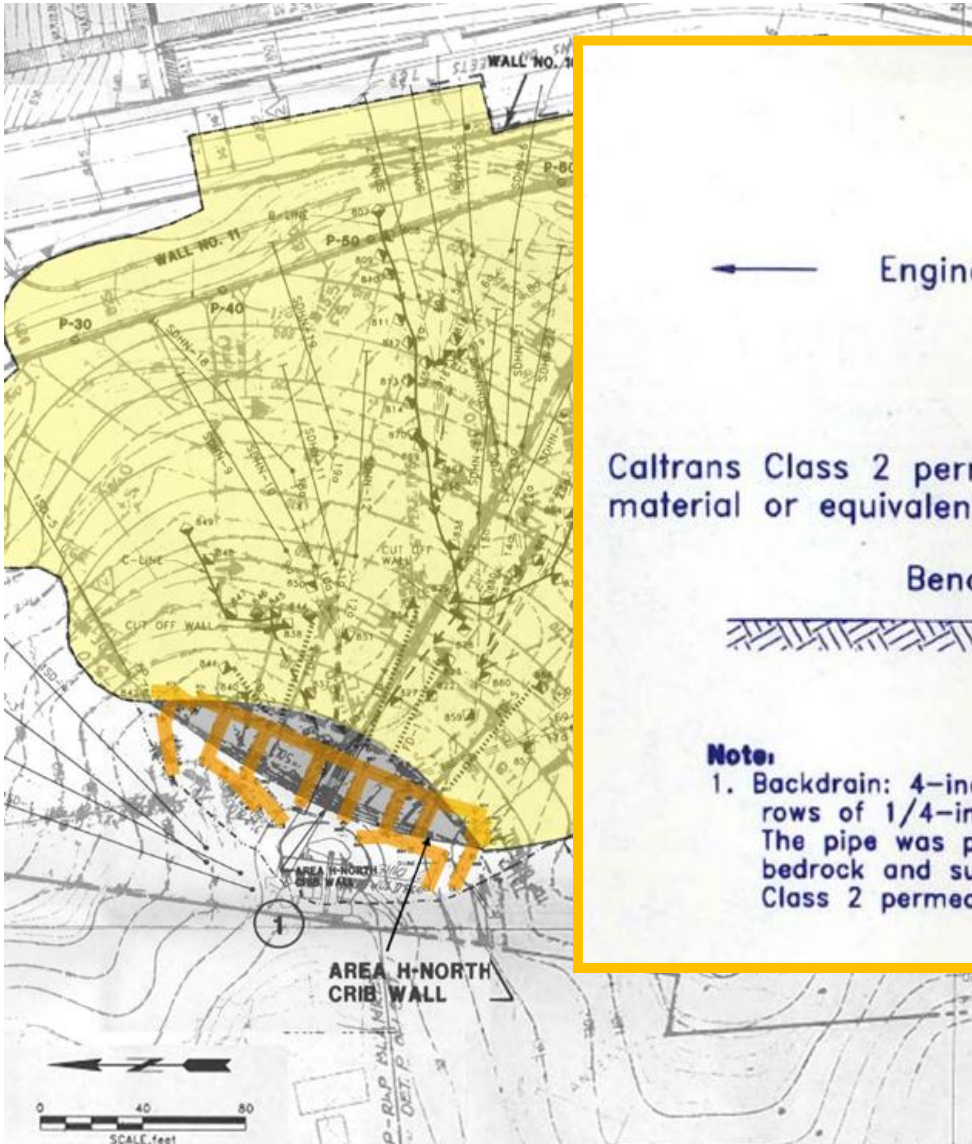
TABLE 5

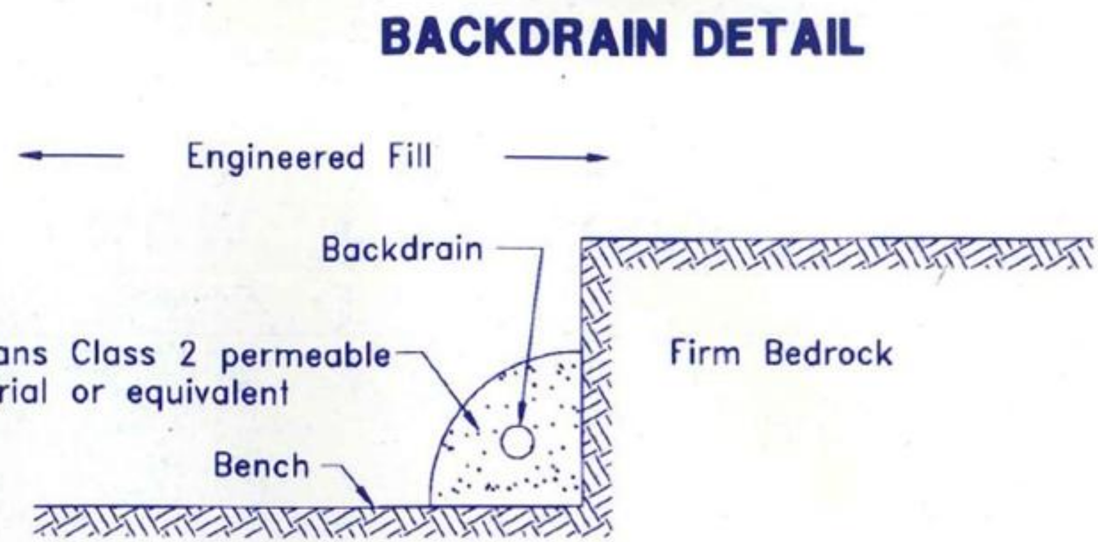
SUMMARY OF IN PLACE DENSITY TEST RESULTS
AREA H-NORTH FINAL COMPACTION REPORT
THE GETTY CENTER

Test Date	Test Number (Note 1)	Test Type (Note 2)	Test Location: General Location (Note 3)	Test Location: North Coord	Test Location: East Coord	Approx. Elev. (Note 4)	Field Moisture Content (percent)	Field Dry Density (pcf)	Lab Max Density (pcf)	Lab Test Number	Relative Compaction (percent)	Required Relative Compaction (percent)	Retested by Test Number
9/28/93	HN271	C	Lower Canyon fill	41405	43757	754.0	11.0	112	124.0	SK-302	90	90	
9/28/93	HN272	C	Lower Canyon fill	41466	43738	752.0	11.0	117	126.0	SK-296	93	90	
9/28/93	HN273	C	Lower Canyon fill, slope face	41430	43699	742.0	9.0	108	124.0	SK-302	87	92	HN276
9/28/93	HN274	C	Lower Canyon fill	41365	43710	755.0	12.5	112	124.0	SK-302	90	90	
9/29/93	HN275	C	Lower Canyon fill, slope face	41375	43667	745.0	10.0	115	124.0	SK-302	93	92	
9/29/93	HN276	C	Lower Canyon fill, slope face	41432	43700	742.0	13.0	116	124.0	SK-302	94	92	
10/1/93	HN277	C	Lower Canyon fill	41347	43651	754.0	12.5	112	124.0	SK-302	90	90	
10/1/93	HN278	C	Lower Canyon fill, outer 10' of slope	41323	43678	757.0	13.0	119	126.0	SK-296	94	92	
10/4/93	HN279	C	Lower Canyon fill	41419	43787	758.0	12.5	115	126.0	SK-296	91	90	
10/4/93	HN280	C	Lower Canyon fill	41377	43781	760.0	13.0	119	126.0	SK-296	94	90	
10/4/93	HN281	C	Lower Canyon fill, outer 10' of slope	41448	43744	753.0	12.0	113	126.0	SK-296	90	90	
10/4/93	HN282	C	Lower Canyon fill, outer 10' of slope	41509	43739	756.0	12.5	116	126.0	SK-296	92	92	
10/4/93	HN283	C	Lower Canyon fill	41420	43761	761.0	13.0	117	126.0	SK-296	93	90	
10/5/93	HN284	C	Lower Canyon fill	41342	43726	762.0	12.5	110	126.0	SK-296	87	90	HN286
10/5/93	HN285	C	Lower Canyon fill	41309	43724	764.0	12.0	116	126.0	SK-296	92	90	
10/5/93	HN286	C	Lower Canyon fill	41344	43727	762.0	11.5	115	126.0	SK-296	91	90	
10/5/93	HN287	C	Lower Canyon fill	41333	43763	763.0	11.5	111	123.0	SK-299	90	90	
10/5/93	HN288	C	Lower Canyon fill	41433	43795	765.0	13.5	114	123.0	SK-299	93	90	
10/6/94	HN289	C	Lower Canyon fill, outer 10' of slope	41448	43760	763.0	11.0	114	123.0	SK-299	93	92	
10/6/93	HN290	C	Lower Canyon fill, outer 10' of slope	41413	43750	766.0	11.0	112	123.0	SK-299	91	92	HN292
10/6/92	HN291	C	Lower Canyon fill	41326	43719	767.0	13.0	113	123.0	SK-299	92	90	
10/6/92	HN292	C	Lower Canyon fill, outer 10' of slope	41415	43749	766.0	13.5	115	123.0	SK-299	93	92	
10/6/93	HN293	C	Lower Canyon fill, outer 10' of slope	41521	43753	761.0	10.5	107	123.0	SK-299	87	92	HN294
10/6/93	HN294	C	Lower Canyon fill, outer 10' of slope	41523	43753	761.0	12.0	120	123.0	SK-299	98	92	
10/6/93	HN295	C	Lower Canyon fill	41499	43755	764.0	12.0	113	123.0	SK-299	92	90	
10/6/93	HN296	C	Lower Canyon fill	41331	43700	765.0	13.0	117	124.0	SK-302	94	90	
10/7/93	HN297	C	Lower Canyon fill	41357	43725	768.0	12.5	116	126.0	SK-296	92	90	
10/7/93	HN298	C	Lower Canyon fill, outer 10' of slope	41514	43775	767.0	11.0	116	126.0	SK-296	92	92	
10/7/93	HN299	C	Lower Canyon fill	41312	43710	769.0	10.5	112	126.0	SK-296	89	90	HN300
10/7/93	HN300	C	Lower Canyon fill	41314	43711	769.0	11.5	120	126.0	SK-296	95	90	

7/15/96

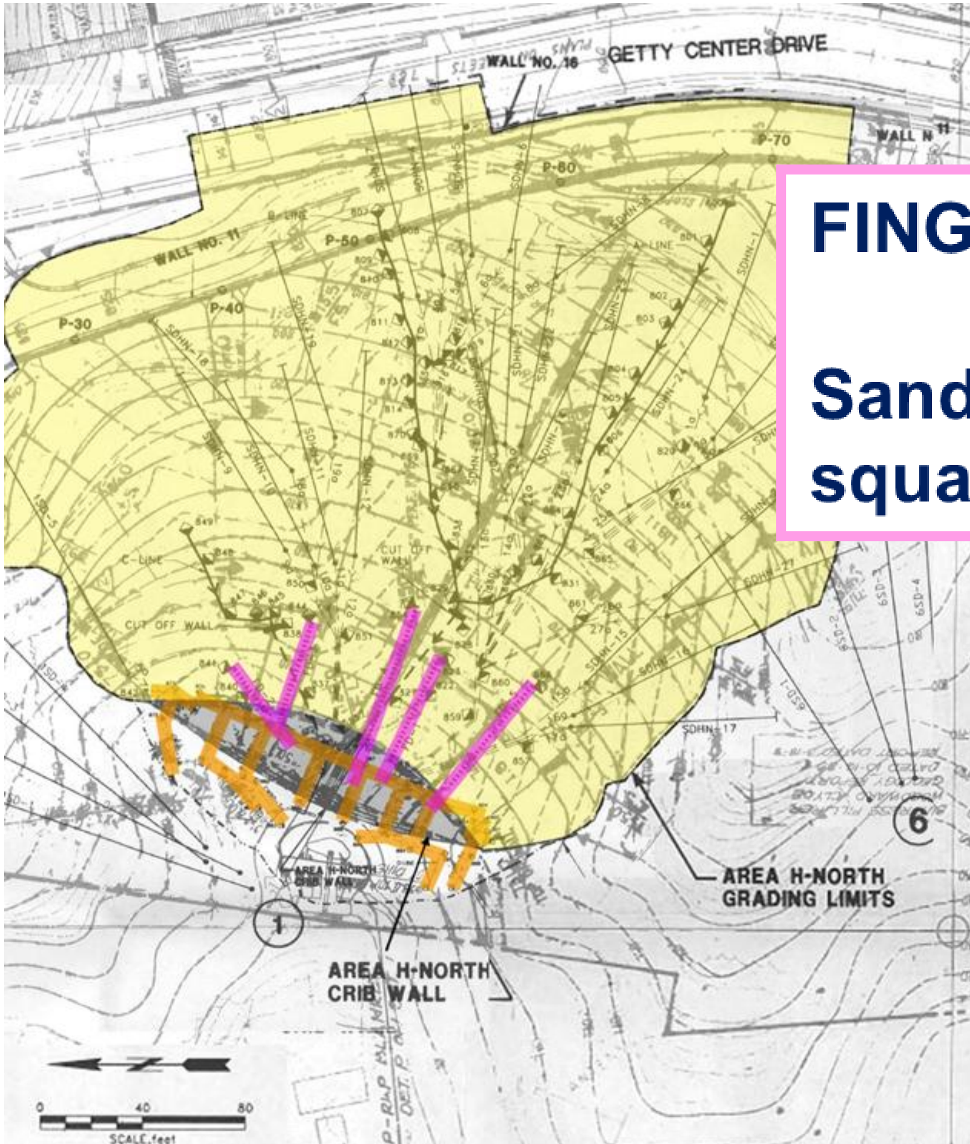
The Getty Center – Documentation
Subdrain System





Note:
1. Backdrain: 4-inch diameter Sch. 40 pipe perforated with four rows of 1/4-inch diameter holes in the bottom half of the pipe. The pipe was placed on the back of a bench excavated into firm bedrock and surrounded by a minimum of 1 cubic foot of Caltrans Class 2 permeable material or equivalent.

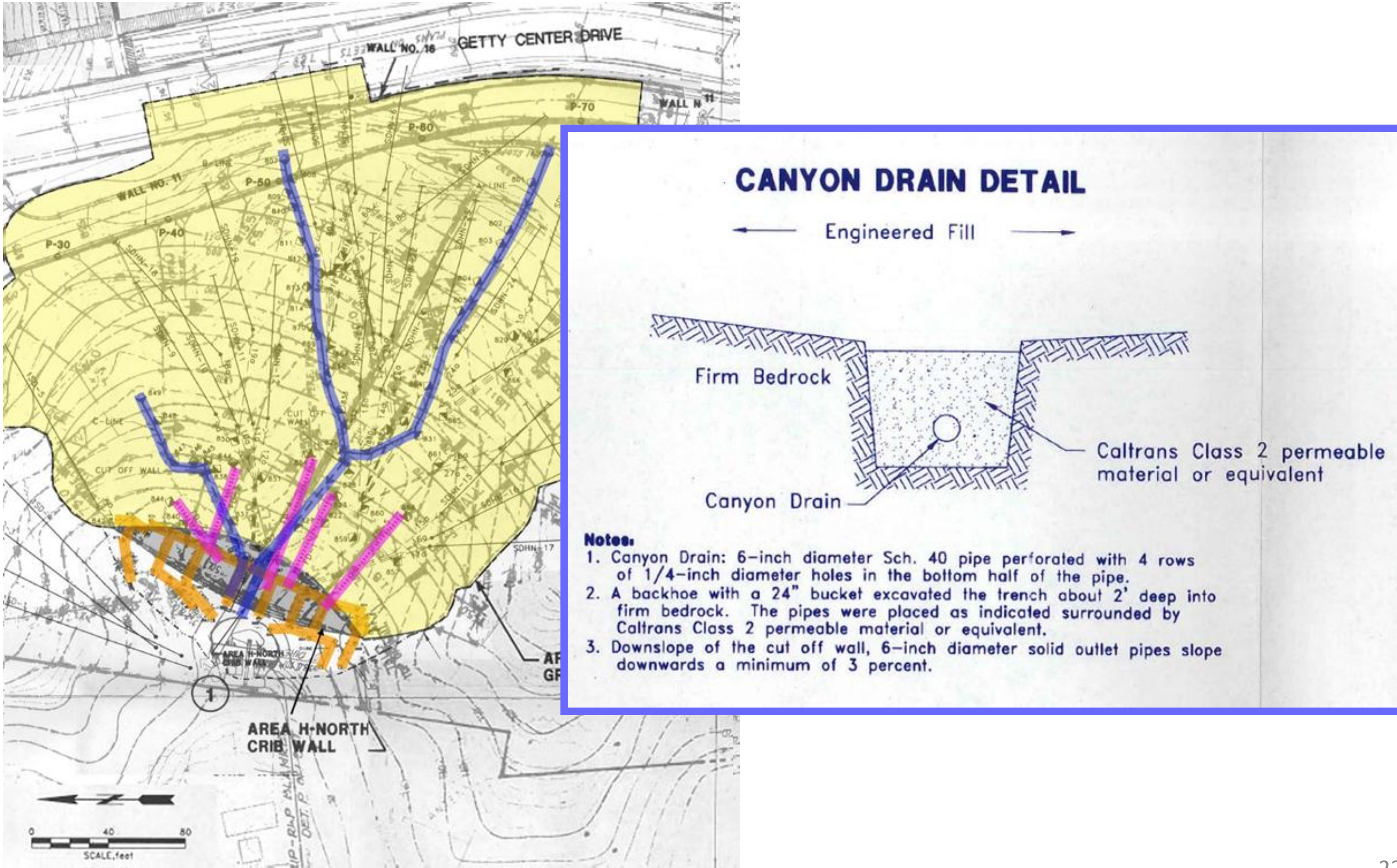
The Getty Center – Documentation
Subdrain System



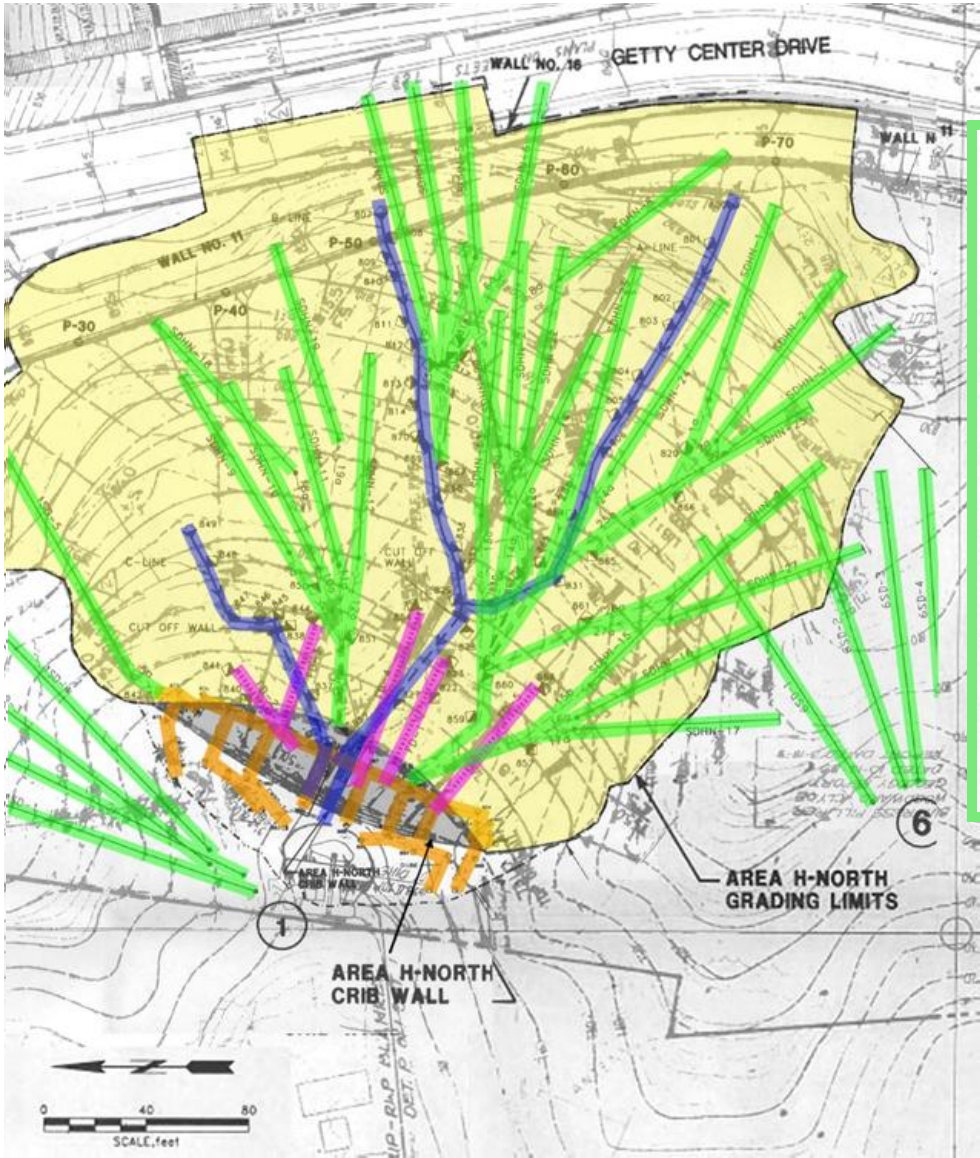
FINGER DRAIN:

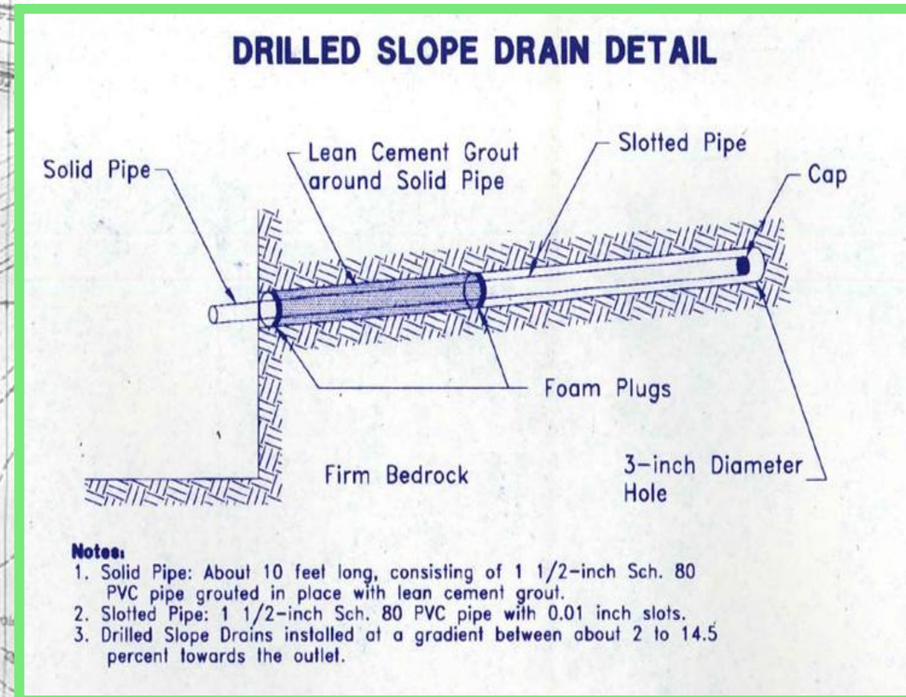
Sandy gravel placed in 2-foot-square trenches

The Getty Center – Documentation
Subdrain System

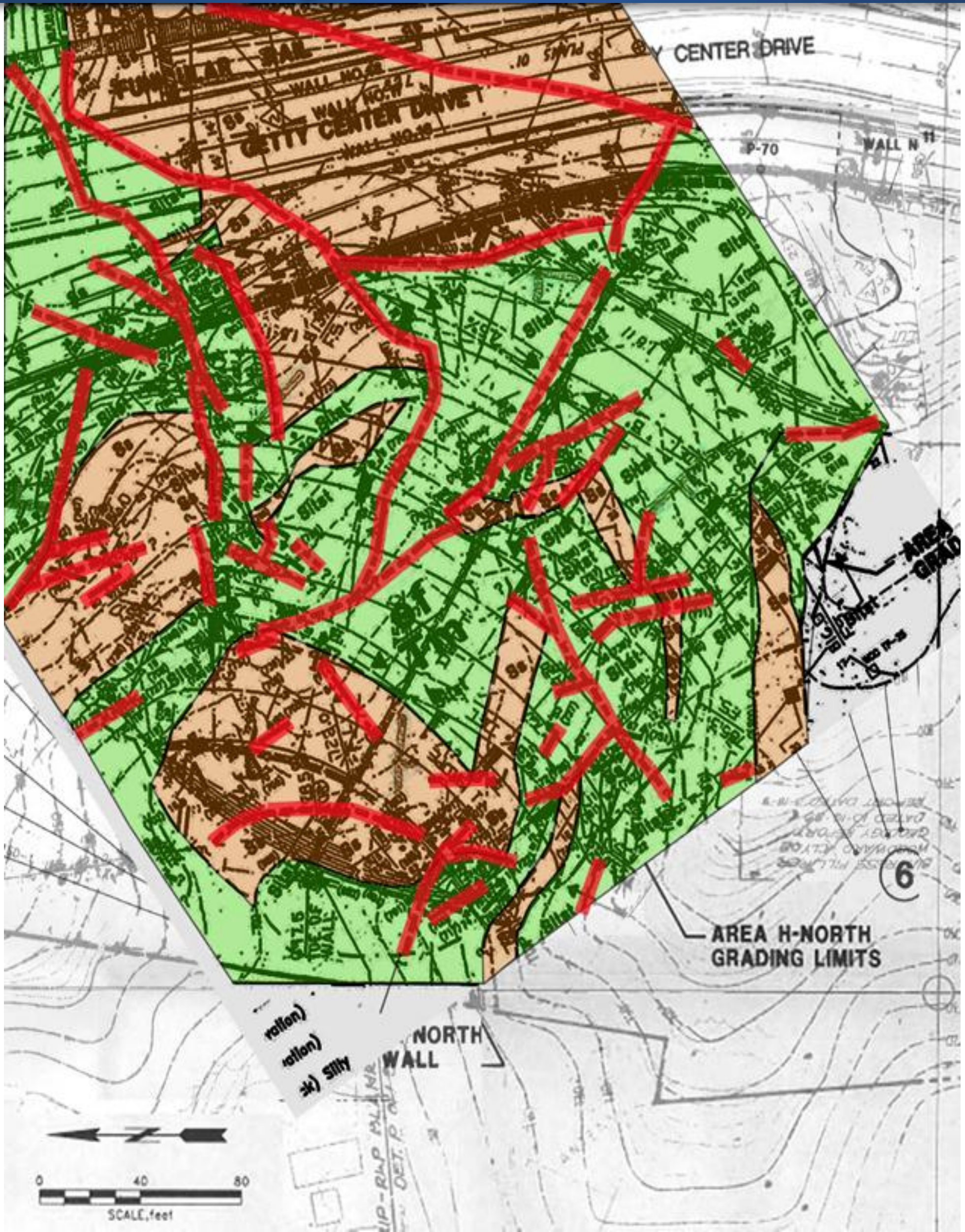


The Getty Center – Documentation
Subdrain System





The Getty Center – Documentation
Geologic Documentation



Fishback Property

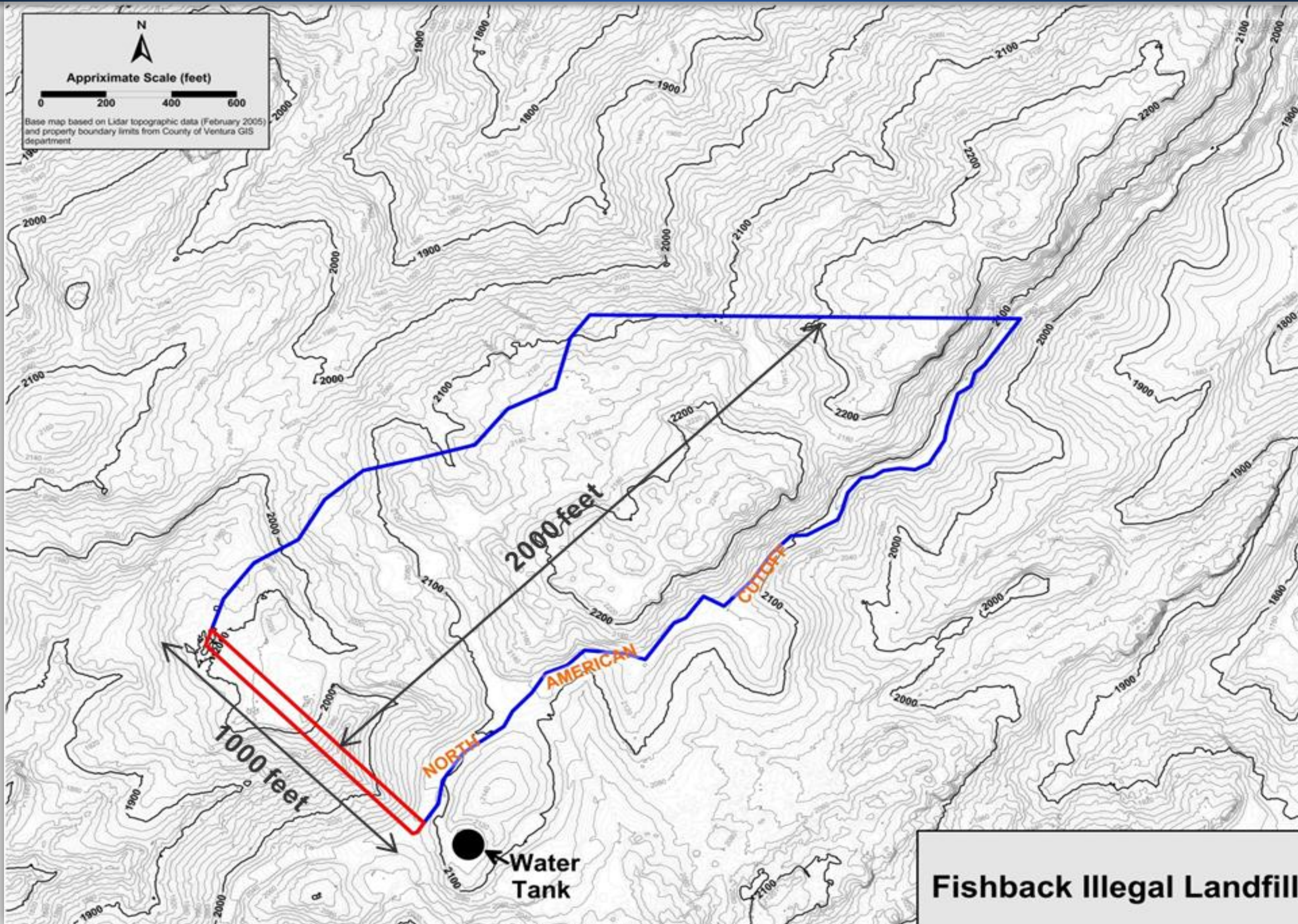
- 42.3-acre parcel located 3 miles west of Chatsworth, California
- Created by merging 18 parcels northwest of North American Cutoff
- Rugged hills, rock outcrops, thin soils

Site Location Map

Site Location

Exponent®

Property Map



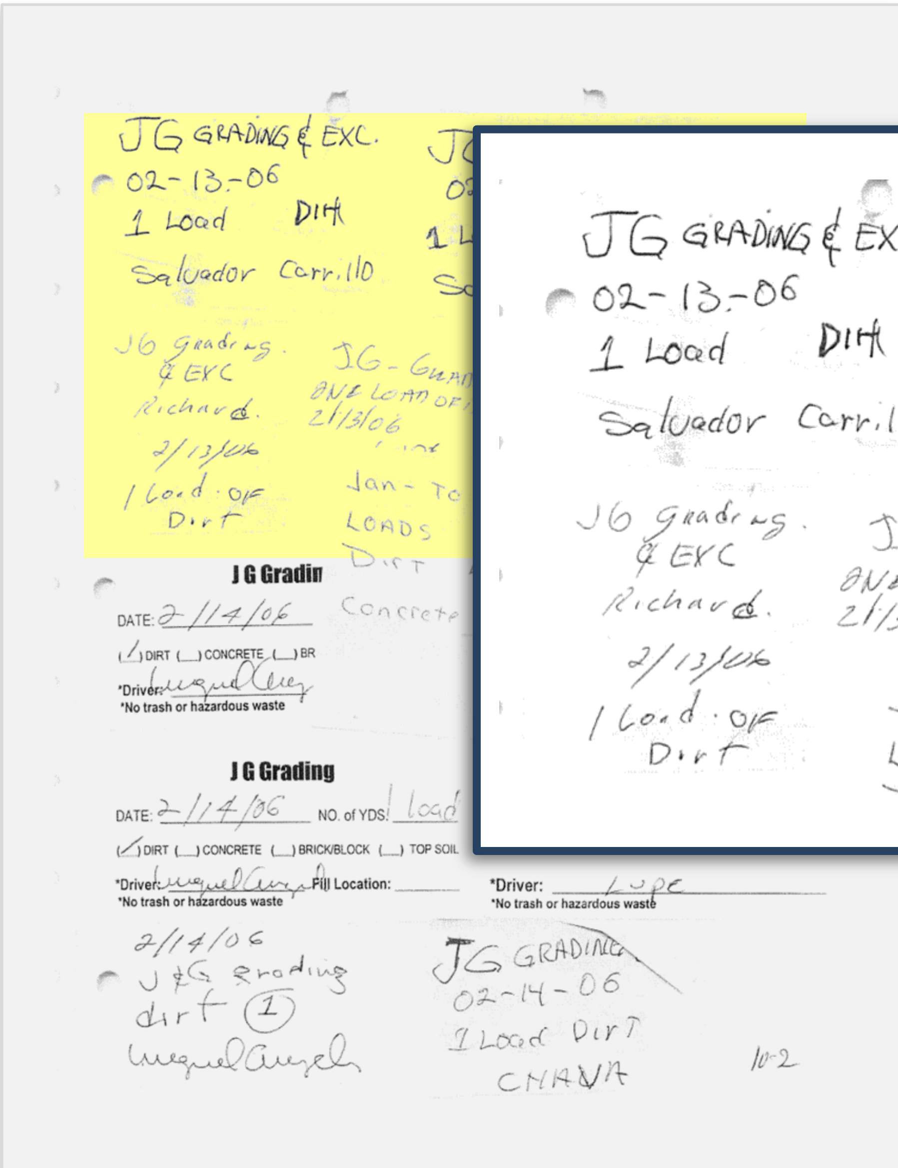
Issues Addressed by Exponent

- Delivered Loads Assessment
- Timeline of Fill Placement
- Volume Assessment
- Proposed Development Plans
- Construction Assessment
- Site-Specific Condition Assessment
- Future Impacts

Delivered Loads Assessment

- First documented loads delivered in February 2005
- Final documented loads delivered in December 2006
- Peak month = January 15 - February 15, 2006 (746 documented loads)
- 7,664 to 8,073 documented loads by 48 different contractors
- Corresponds to 76,370 to 80,460 yd3 imported to site

Delivered Loads Assessment – Source Documents
Original Load Tickets



JG GRADING & EXC.
02-13-06
1 Load Dirt
Salvador Carrillo

J6 Grading & EXC
Richard.
2/13/06
1 Load OF Dirt

JG - GRADING
ONE LOAD OF DIRT
2/13/06
Jan - To
LOADS
Dirt
Concrete

J G Gradin
DATE: 2/14/06
(✓) DIRT ( ) CONCRETE ( ) BR
*Driver: Miguel Angel
*No trash or hazardous waste

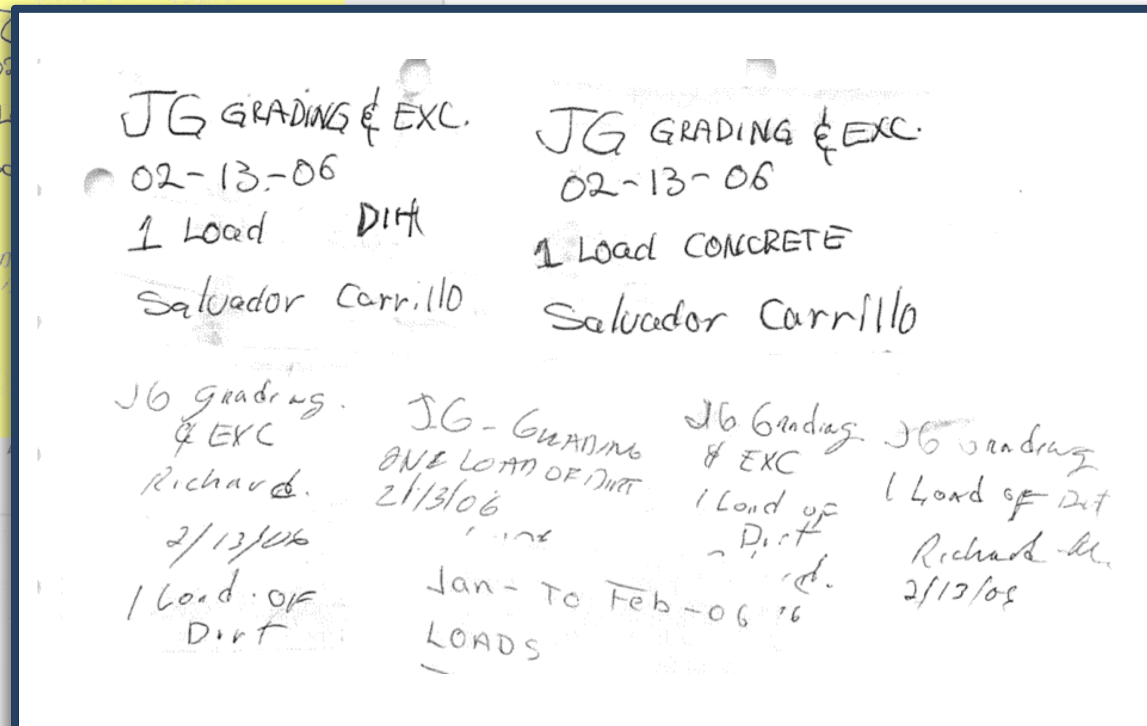
J G Grading
DATE: 2/14/06 NO. of YDS: 1 load
(✓) DIRT ( ) CONCRETE ( ) BRICK/BLOCK ( ) TOP SOIL
*Driver: Miguel Angel Fill Location:
*No trash or hazardous waste

*Driver: Lupe
*No trash or hazardous waste

2/14/06
J&G grading
dirt 1
Miguel Angel

JG GRADING
02-14-06
1 Load Dirt
CHANA

10-2



JG GRADING & EXC.
02-13-06
1 Load Dirt
Salvador Carrillo

JG GRADING & EXC.
02-13-06
1 Load CONCRETE
Salvador Carrillo

J6 Grading.
& EXC
Richard.
2/13/06
1 Load OF Dirt

JG - GRADING
ONE LOAD OF DIRT
2/13/06
Jan - To Feb - 06
LOADS

J6 Grading
& EXC
1 Load of Dirt

J6 Grading
1 Load of Dirt
Richard M.
2/13/06

Delivered Loads Assessment – Source Documents
Tally Sheet

11

5	Budget
17	Constantino
2	D.S.
3	EL dorado
5	Franks
4	J.S.
1	J.G.
46	JJ.G.
1	Hoy
77	legaspi
2	R.J.C
1	Univ Ueno
1	Budget
1	D.S
16	Franks
5	Hoy
41	legaspi
12	JJ.G.
4	J.G.
1	R.J.C.
11	Shoemaker
1	Hoy
10	Budget
6	J.S
10	JJ.G.
3	J.G.
50	Shoemaker
23	legaspi

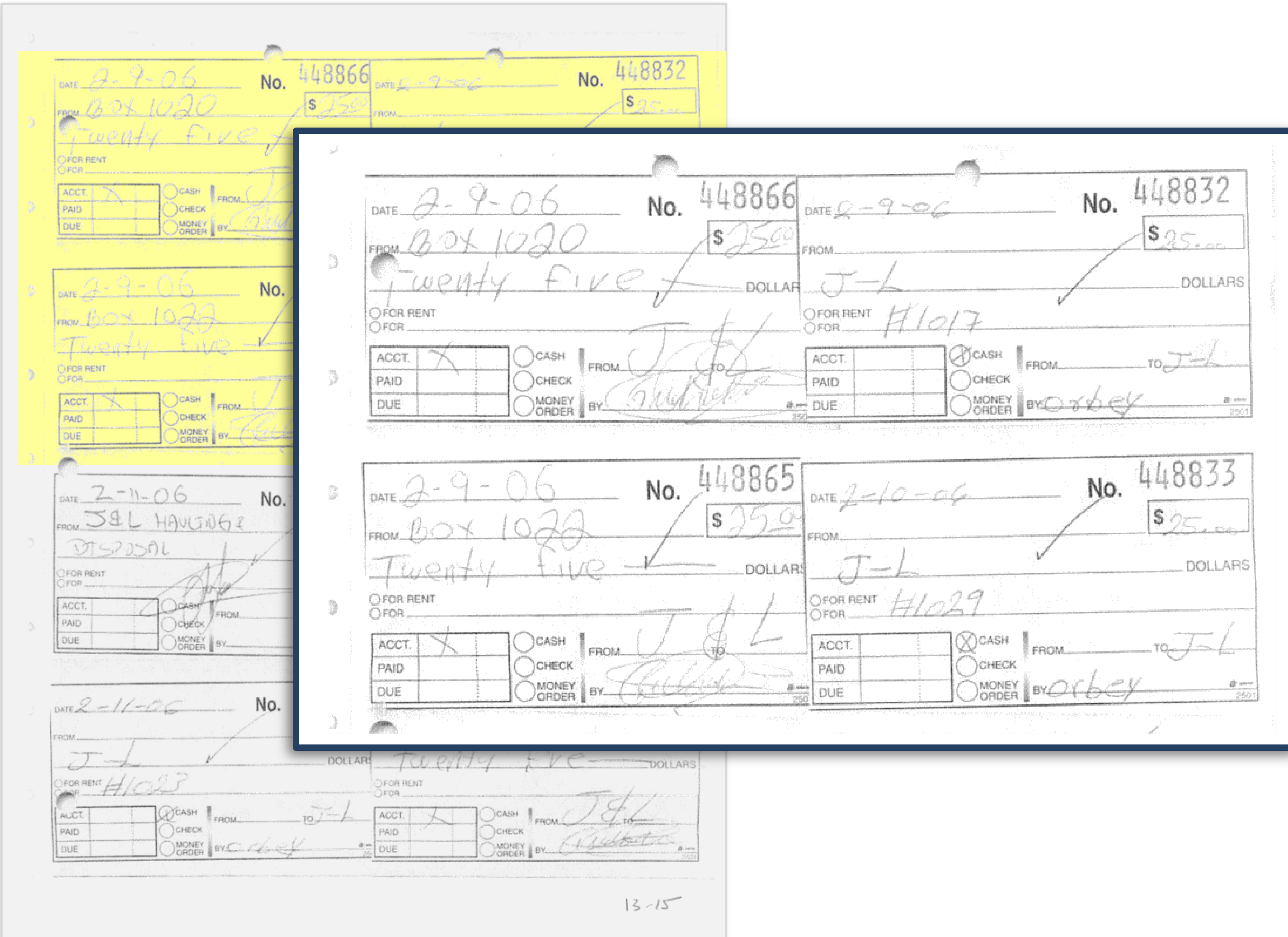
2683

Pl/Def) 5 for I.D.
Wit: [illegible]
Date: Oct 29 10
Dianne Jones, CSR No. 3328

5	Budget
17	Constantino
2	D.S.
3	EL dorado
5	Franks
4	J.S.
1	J.G.
46	JJ.G.
1	Hoy
77	legaspi
2	R.J.C
1	Univ Ueno
1	Budget
1	D.S
16	Franks
5	Hoy
41	legaspi
12	JJ.G.
4	J.G.
1	R.J.C.
11	Shoemaker
1	Hoy
10	Budget
6	J.S
10	JJ.G.
3	J.G.
50	Shoemaker
23	legaspi

2683

Delivered Loads Assessment – Source Documents Receipts



DATE 2-9-06 No. 448866
FROM Box 1020 $ 25.00
Twenty five DOLLARS
FOR RENT
FOR
ACCT. PAID DUE
CASH CHECK MONEY ORDER
FROM J & L TO
BY

DATE 2-9-06 No. 448832
FROM $ 25.00
J-L DOLLARS
FOR RENT H1017
FOR
ACCT. PAID DUE
CASH CHECK MONEY ORDER
FROM TO J-L
BY Corbey

DATE 2-9-06 No. 448865
FROM Box 1020 $ 25.00
Twenty five DOLLARS
FOR RENT
FOR
J & L
ACCT. PAID DUE
CASH CHECK MONEY ORDER
FROM TO
BY

DATE 2-10-06 No. 448833
FROM $ 25.00
J-L DOLLARS
FOR RENT H1029
FOR
ACCT. PAID DUE
CASH CHECK MONEY ORDER
FROM TO J-L
BY Corbey

13-15

Delivered Loads Assessment – Source Documents Bi-Weekly Invoice Summary

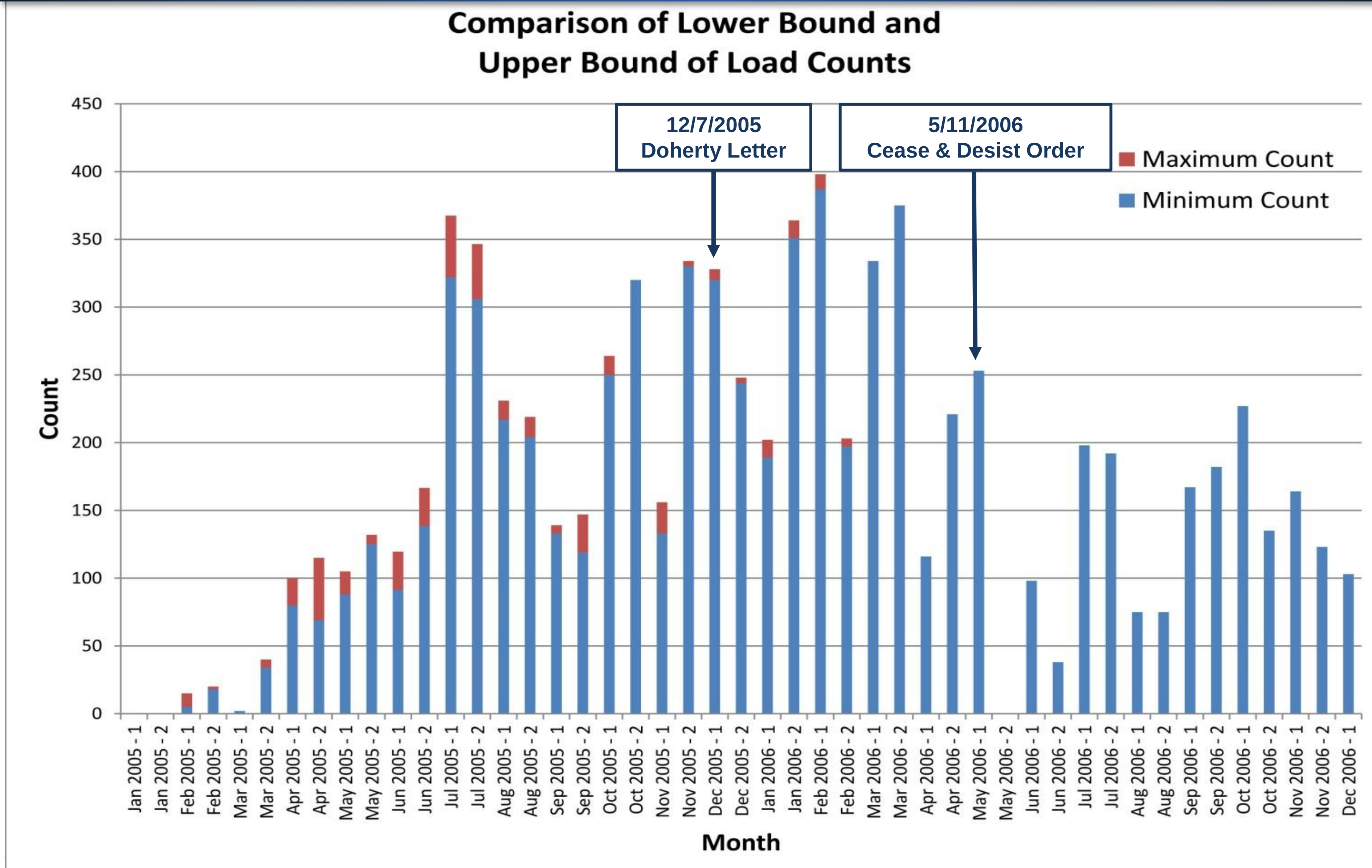
Invoice Summary

Invoice Date	Company	Current	Past Due	Invoice Total	Collections	Receivables
1/1/2006	A & B Trucking	$ 1,275.00	$ 2,450.00	$ 3,725.00	$ 1,000.00	$ 2,725.00
1/1/2006	A & R Trucking	$ 350.00		$ 350.00	$ 350.00	
1/1/2006	B. C. Roll Off	$ 125.00		$ 125.00		$ 125.00
1/1/2006	Budget	$ 425.00	$ 1,075.00	$ 1,500.00	$ 1,000.00	$ 500.00
1/1/2006	D & S Shavings	$ 425.00	$ 525.00	$ 900.00	$ 500.00	$ 400.00
1/1/2006	Esterline Excavation	$ 150.00		$ 150.00		$ 150.00
1/1/2006	Frank's Hauling	$ 775.00	$ 125.00	$ 900.00	$ 900.00	
1/1/2006	Gordon Hoy	$ 125.00	$ 150.00	$ 275.00	$ 150.00	$ 125.00
1/1/2006	Larry Hoy	$ 25.00	$ 225.00	$ 250.00		$ 250.00
1/1/2006	I V Disposal	$ 75.00		$ 75.00	$ 75.00	
1/1/2006	Jesus Perez	$ 25.00	$ 325.00	$ 350.00		$ 350.00
1/1/2006	J C Hauling	$ -	$ -	$ -		
1/1/2006	J G Grading	$ 150.00		$ 150.00		$ 150.00
1/1/2006	J J & G Excavation	$ 25.00	$ 275.00	$ 300.00	$ 275.00	$ 25.00
1/1/2006	J & L Hauling	$ 350.00	$ 550.00	$ 900.00		$ 900.00
1/1/2006	J & S Trucking	$ 200.00	$ 400.00	$ 600.00	$ 400.00	$ 200.00
1/1/2006	Legaspi Trucking	$ 450.00	$ 550.00	$ 1,000.00		$ 1,000.00
1/1/2006	Perez Excavating		$ 50.00	$ 50.00		$ 50.00
1/1/2006	R. J. L. Rent A Bin	$ 175.00		$ 175.00		$ 175.00
1/1/2006	Rock N' Roll Off	$ 725.00	$ 125.00	$ 850.00		$ 850.00
1/1/2006	Romero		$ 75.00	$ 75.00		$ 75.00
Totals:		$ 5,850.00	$ 6,900.00	$ 12,700.00	$ 4,650.00	$ 8,050.00

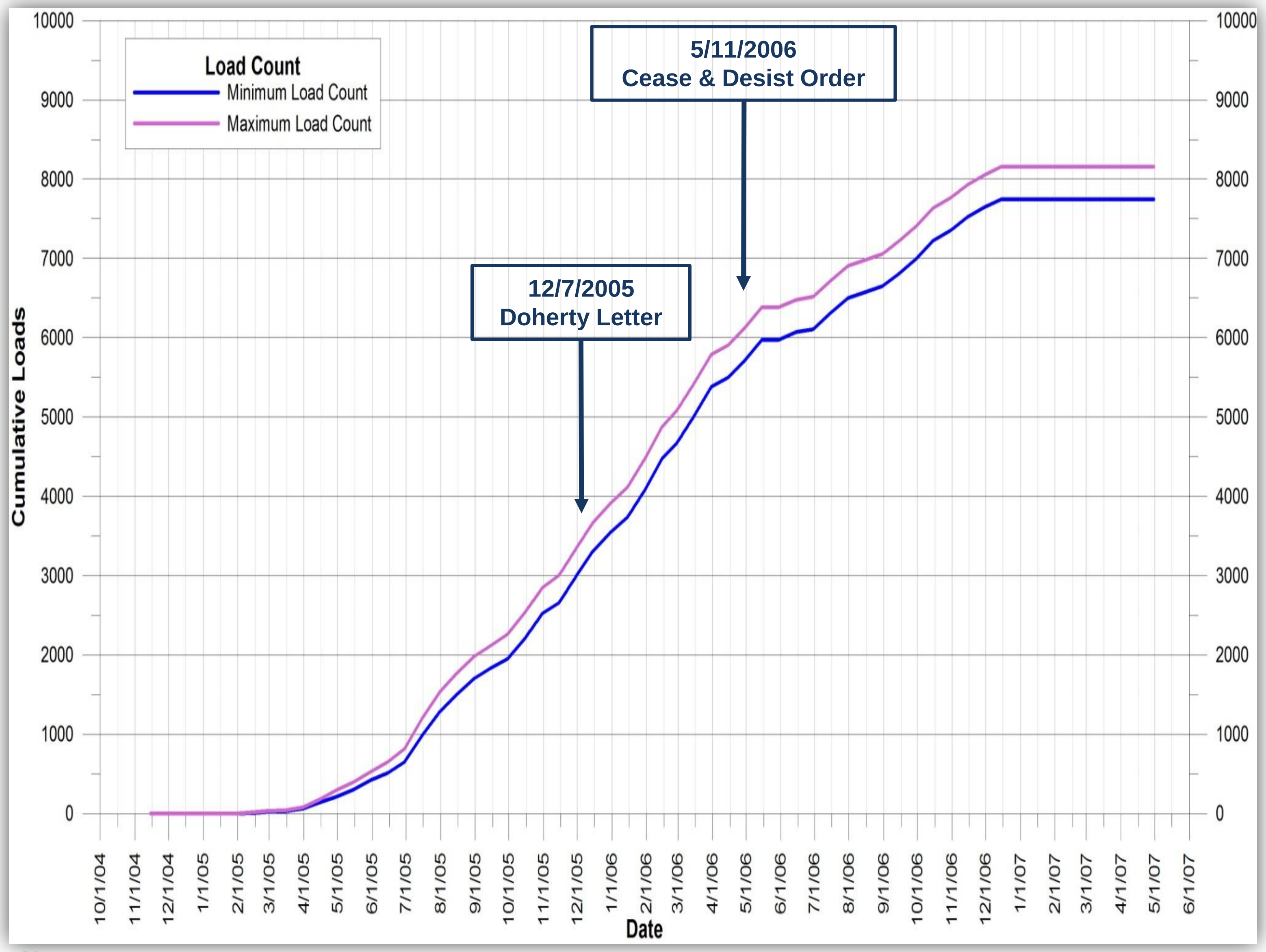
Delivered Loads Assessment

- Most trucks thought to deliver about 10 yd3 per load
- Some loads documented at 8 yd3, some estimated to run as high as 12 yd3
- Inherent uncertainty ~1 yd3/load (~10%)
- Volume of material delivered to site (based on existing load records) ~69,000-88,000 yd3

Timeline of Fill Placement



Timeline of Fill Placement



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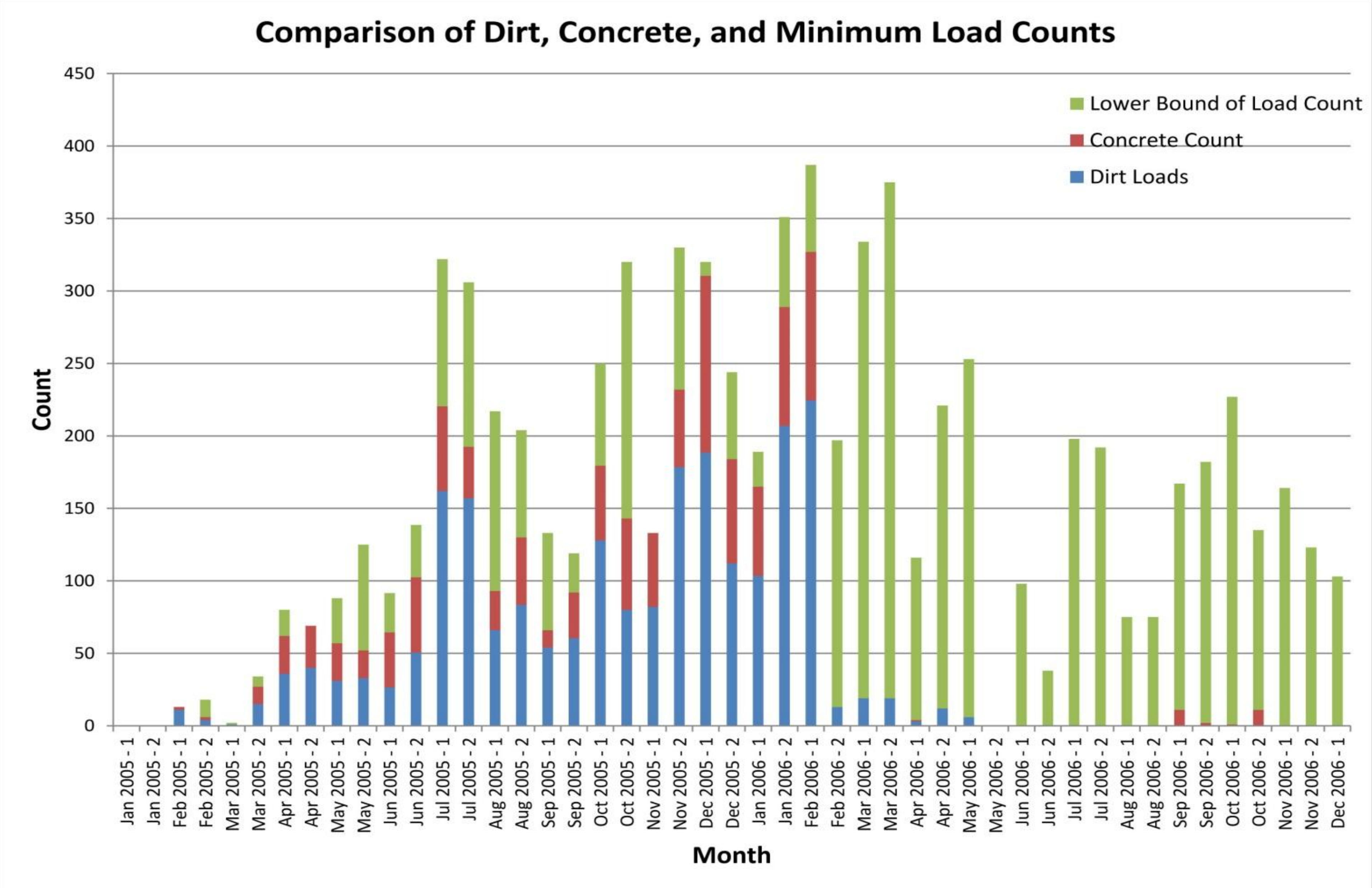
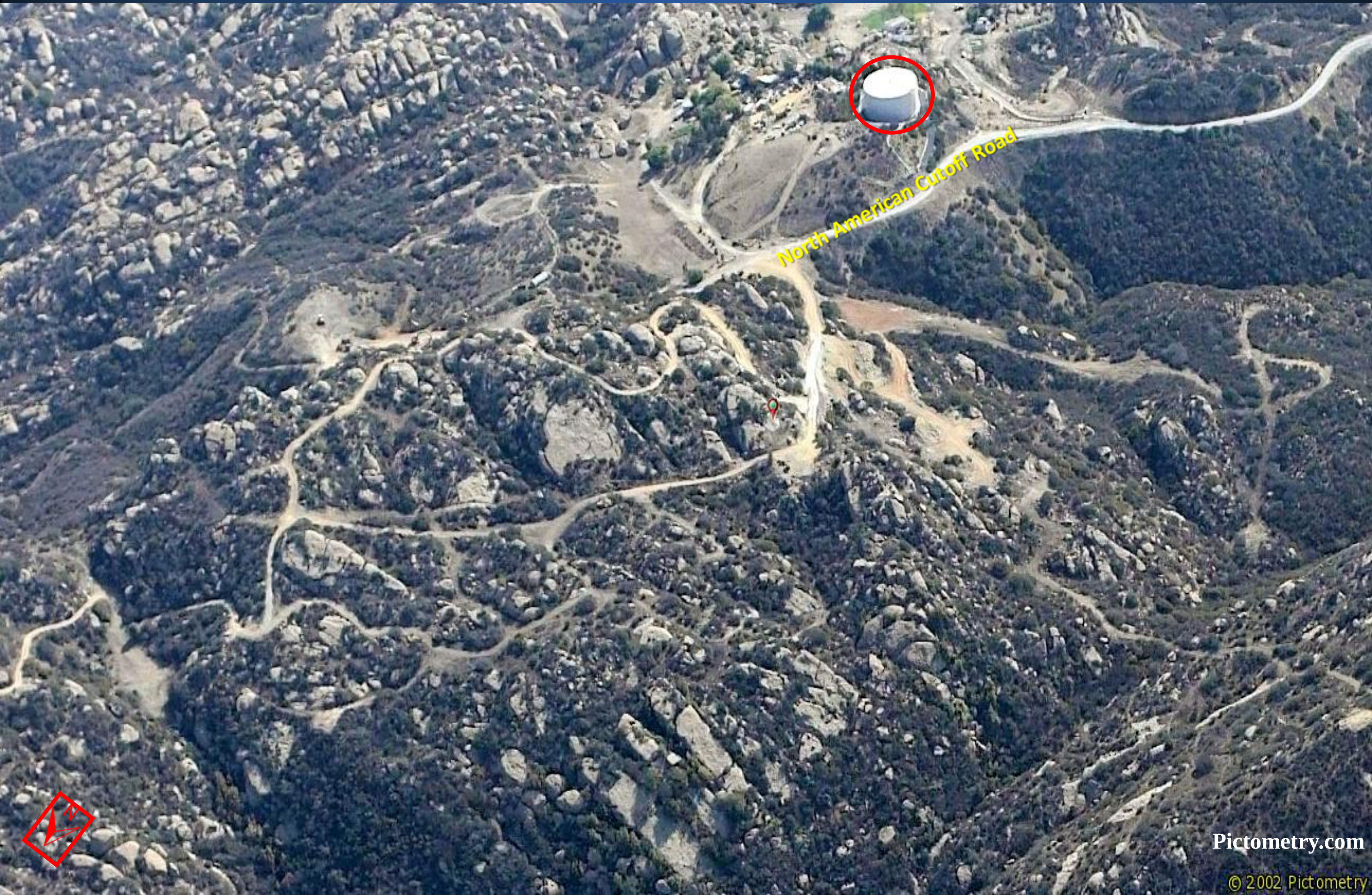
Character of Fill Material



Timeline of Fill Placement

November 6, 2002 - Two Years before Start

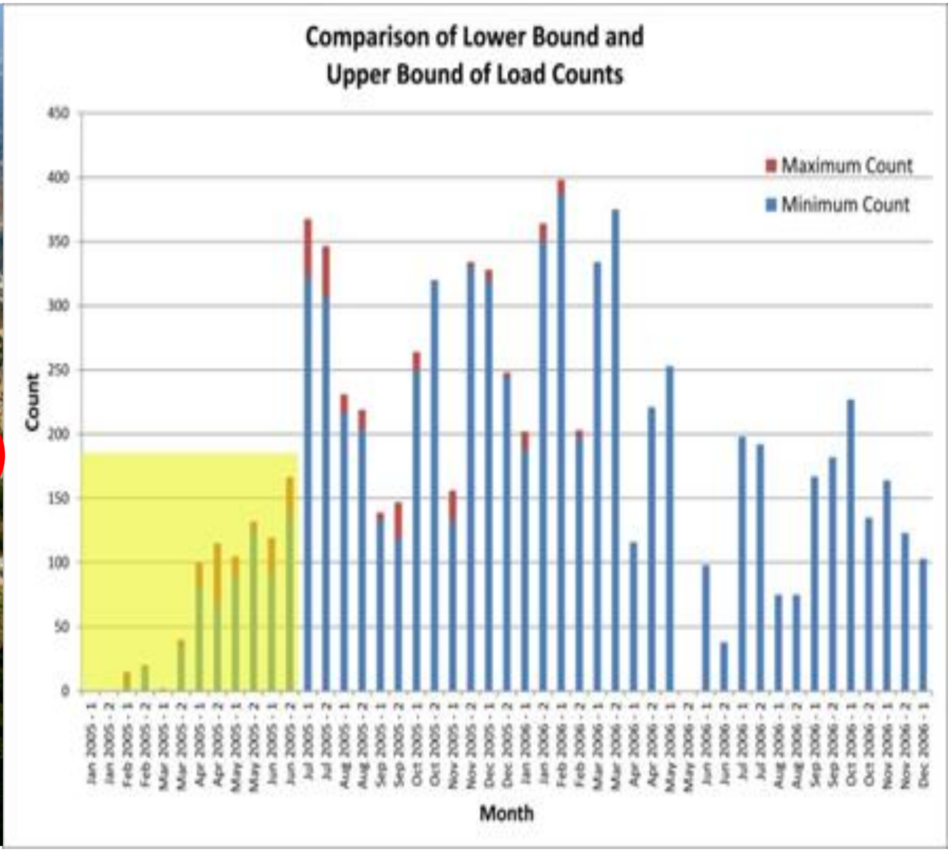


Timeline of Fill Placement

November 12, 2004 - Three Years before Start

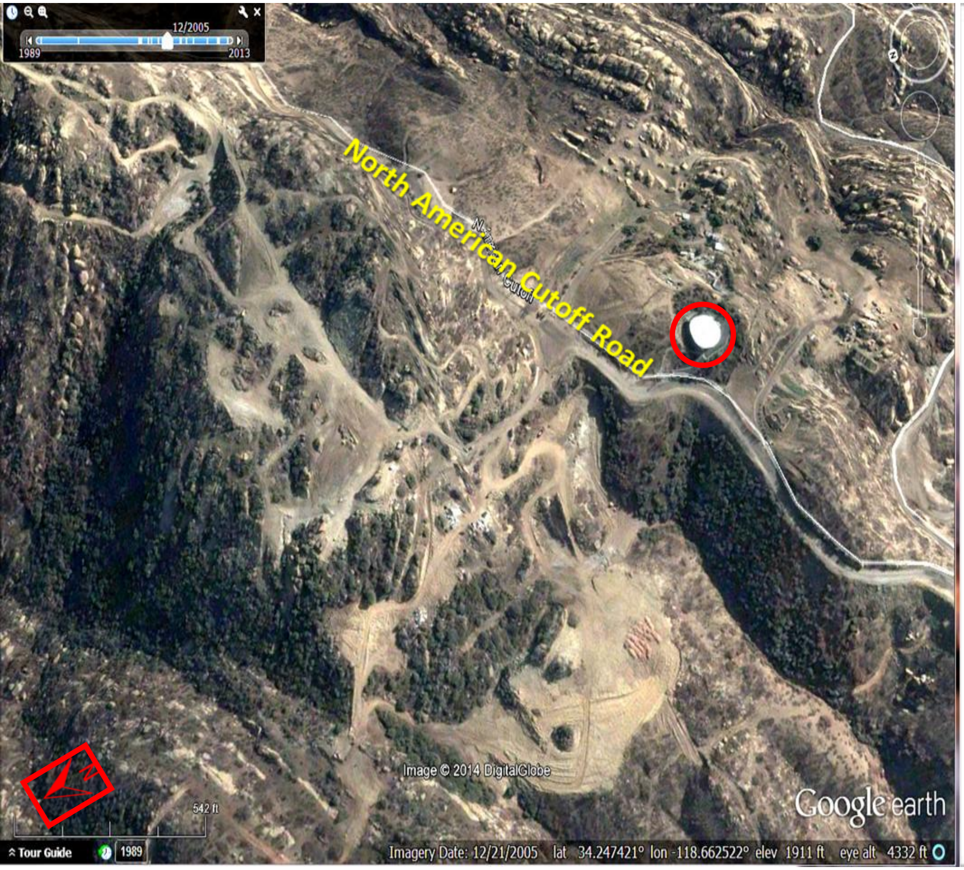
Timeline of Fill Placement

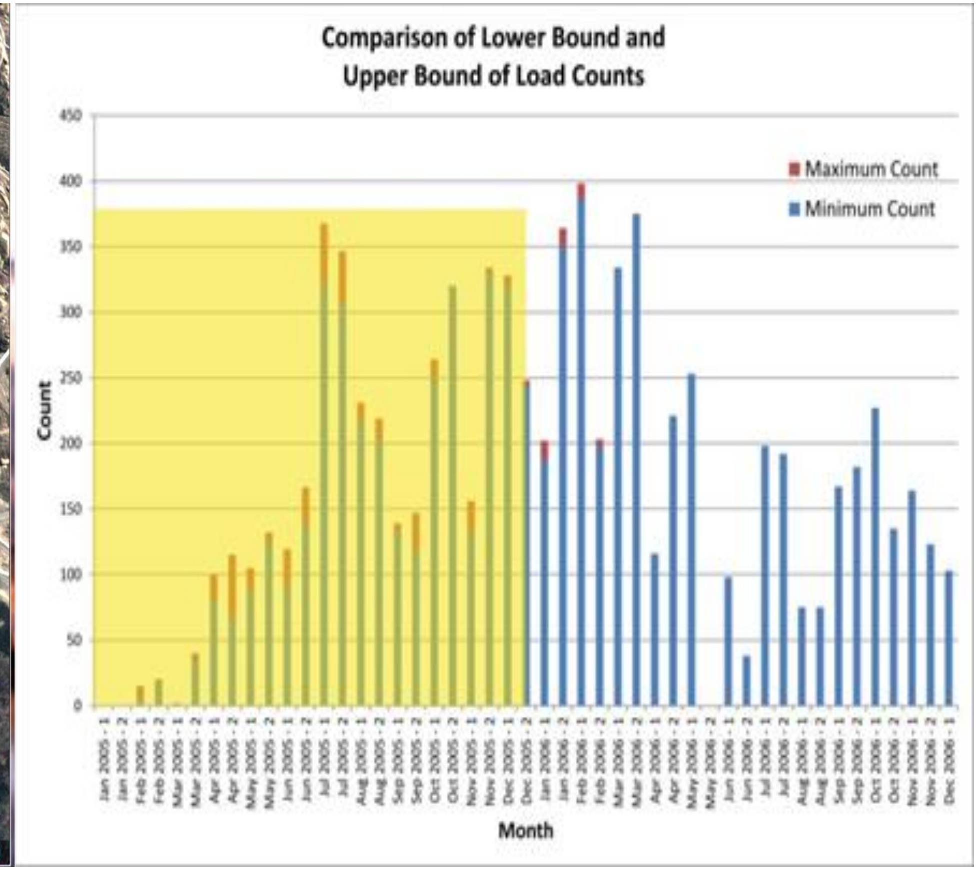
June 25, 2005 – Five Months after Start



Timeline of Fill Placement

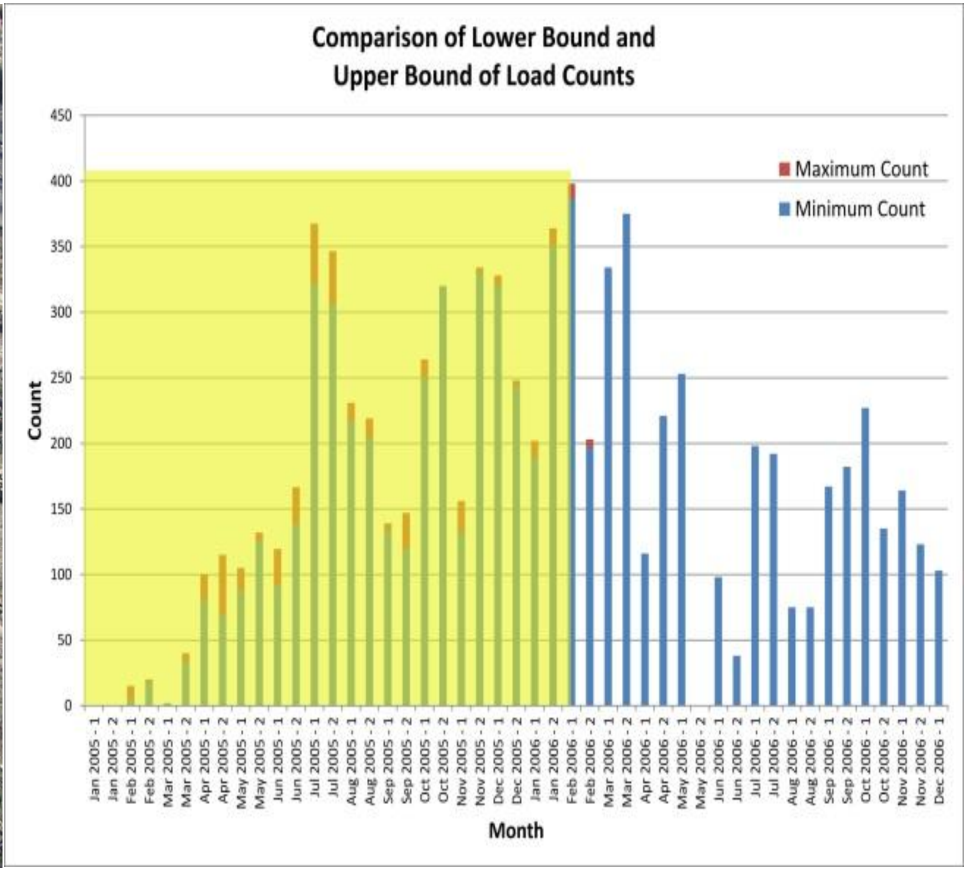
December 21, 2005 – Ten Months after Start





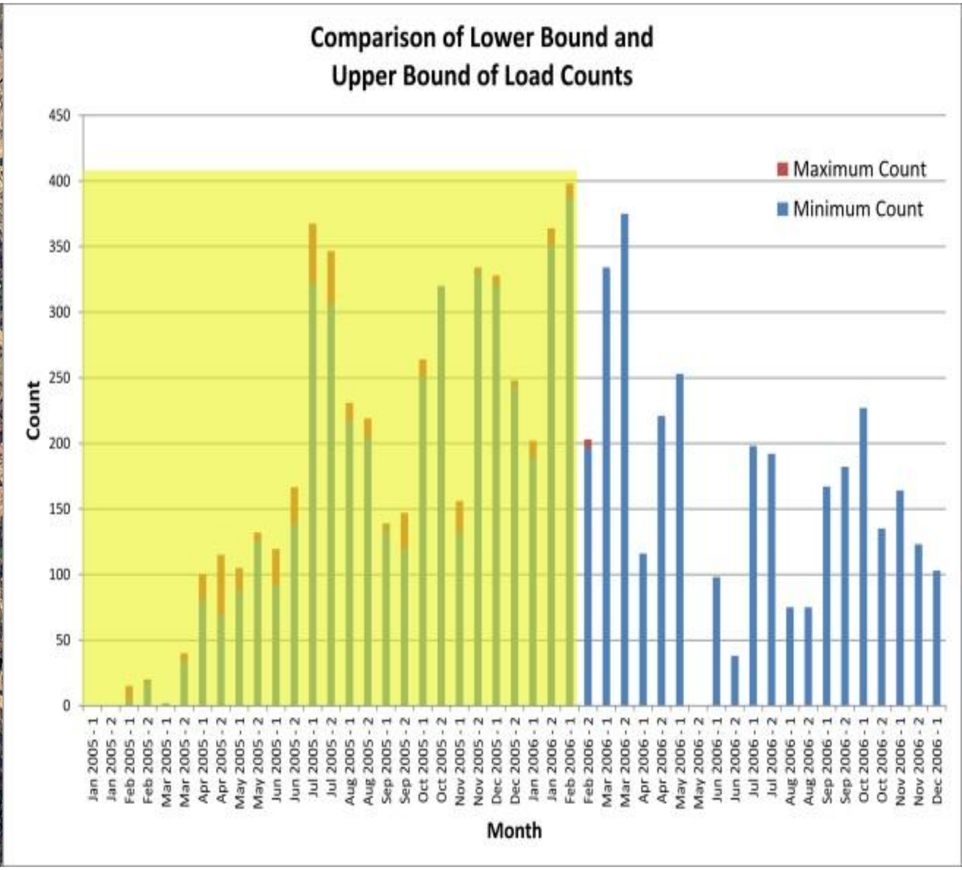
Timeline of Fill Placement

February 5, 2006 – One Year after Start



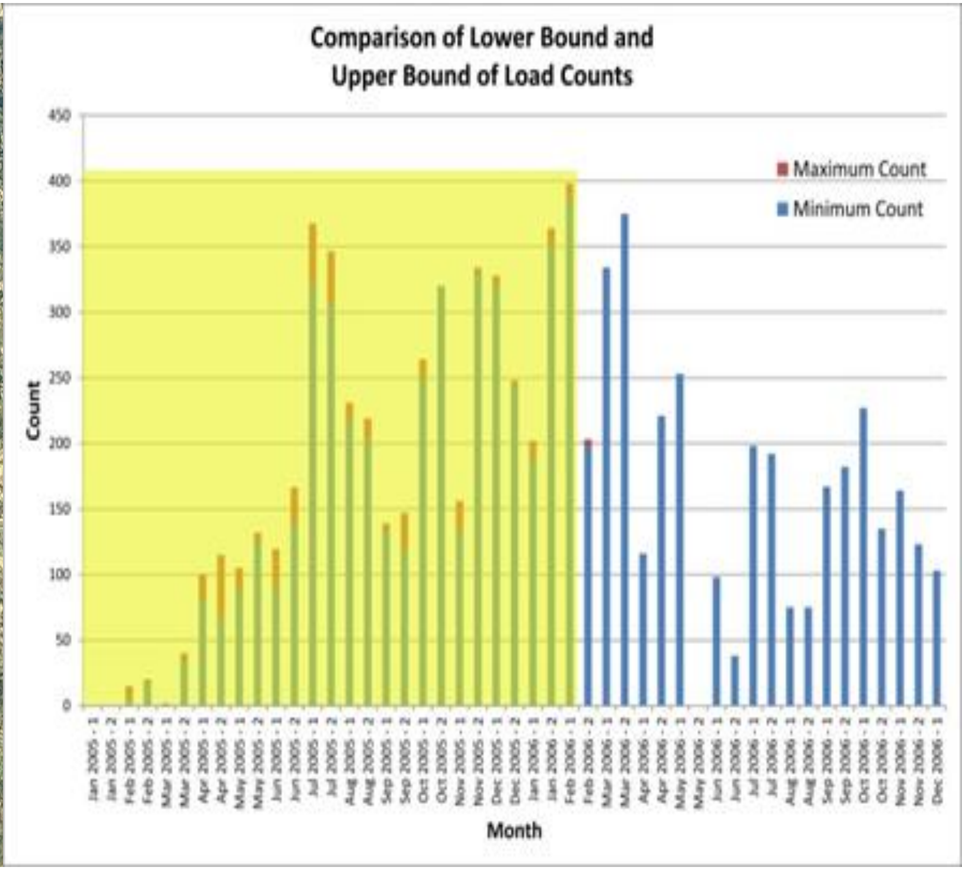
Timeline of Fill Placement

February 14, 2006 – One Year after Start



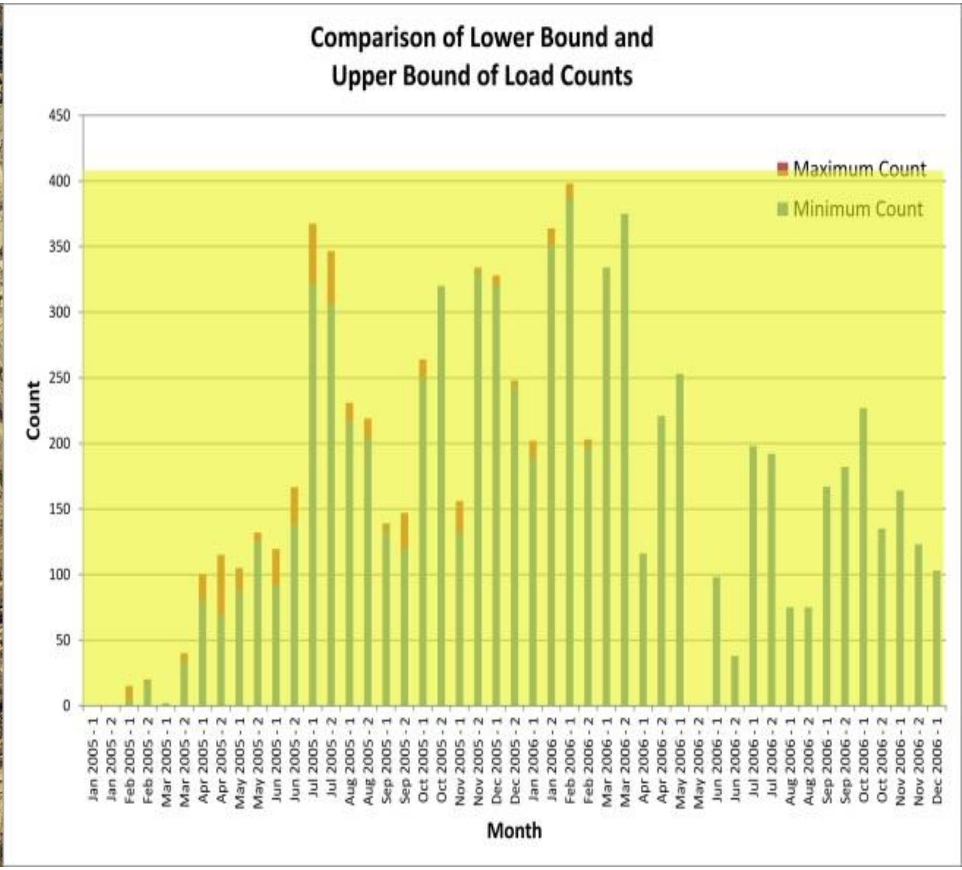
Timeline of Fill Placement

February 14, 2006 – One Year after Start



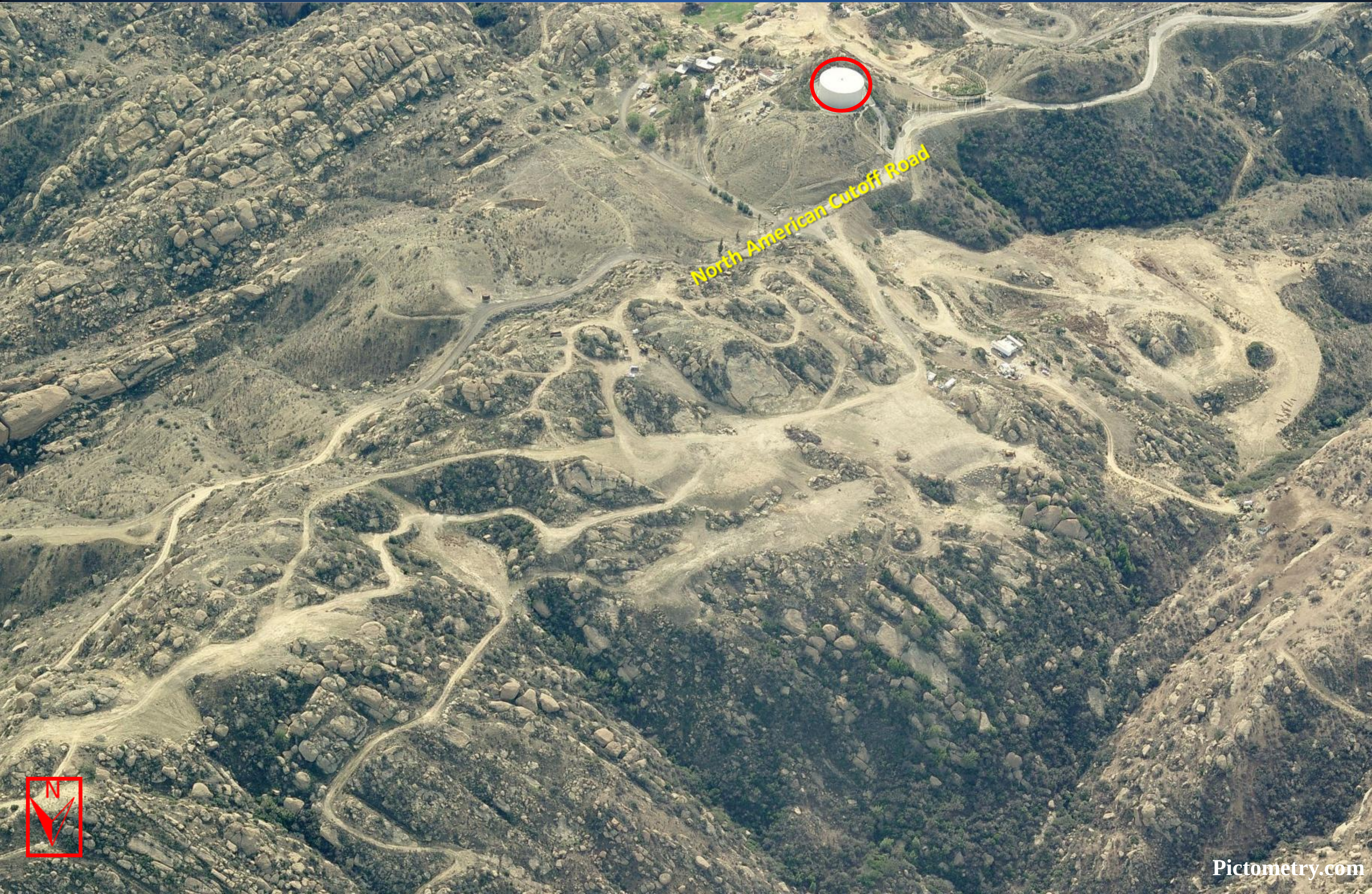
Timeline of Fill Placement

February 1, 2008 – Two Years, Eleven Months after Start



Timeline of Fill Placement

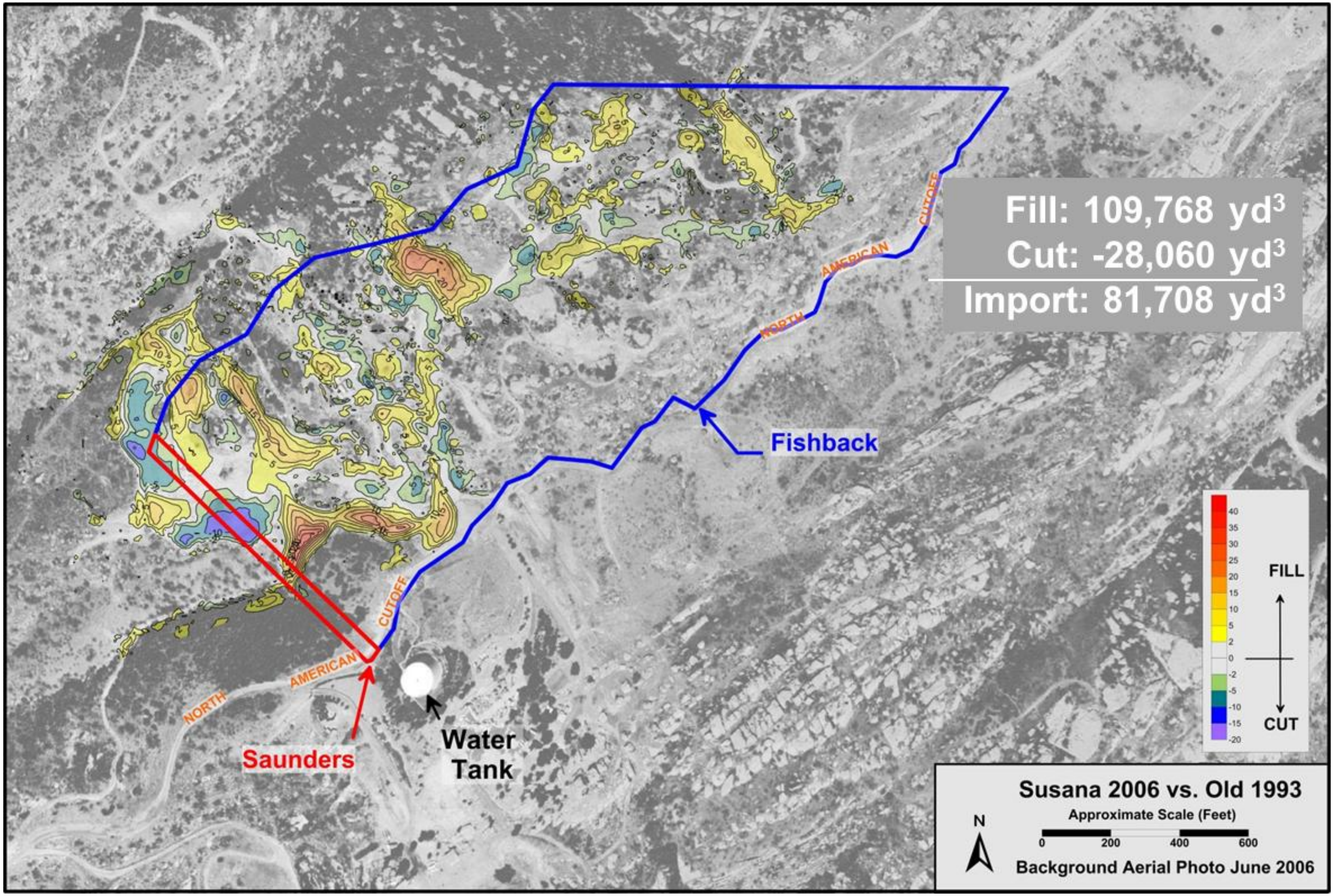
February 1, 2008 – Two Years, Eleven Months after Start



Timeline of Fill Placement

January 16, 2012

Volume Assessment



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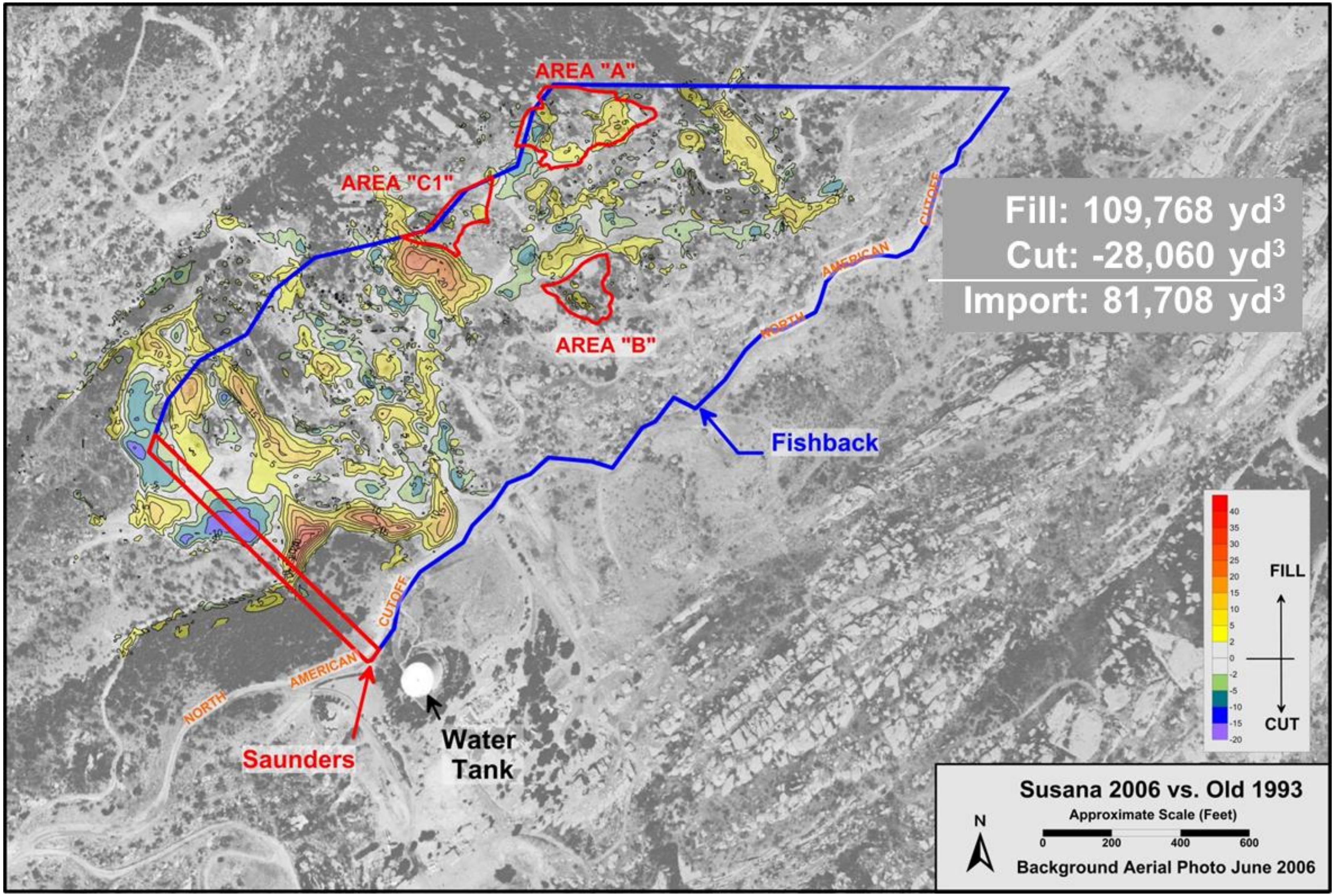
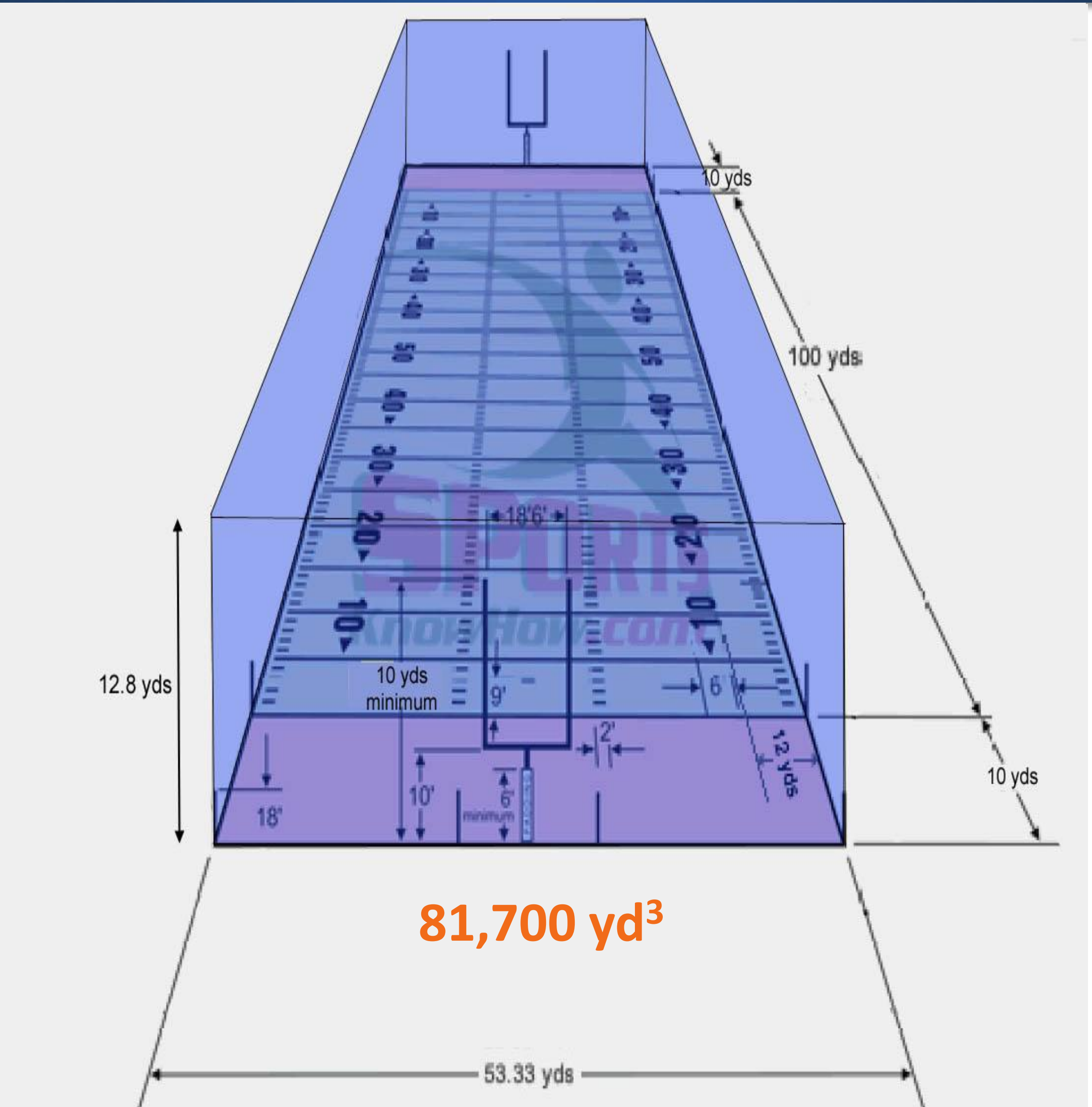
Volume Assessment

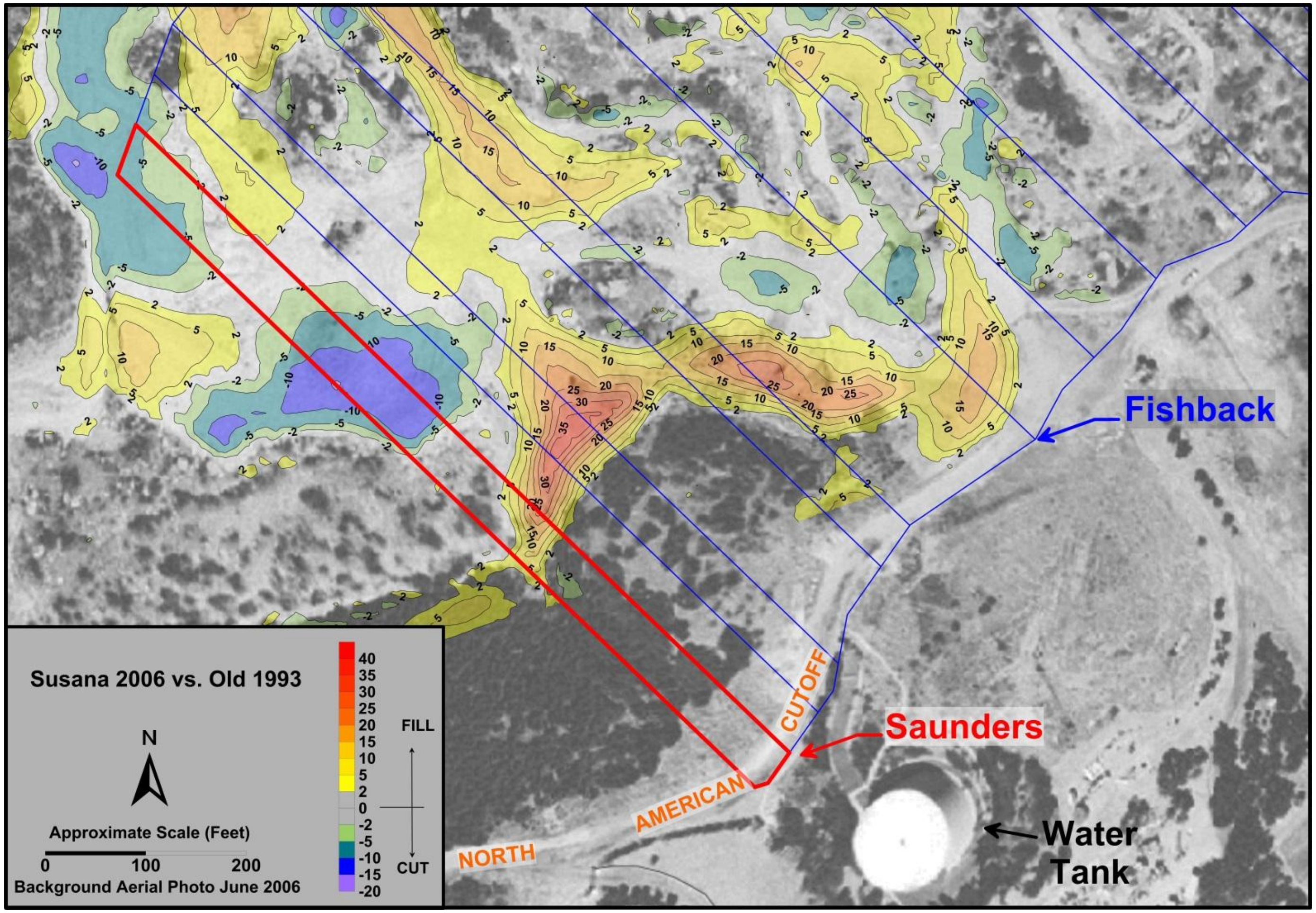


Volume Assessment

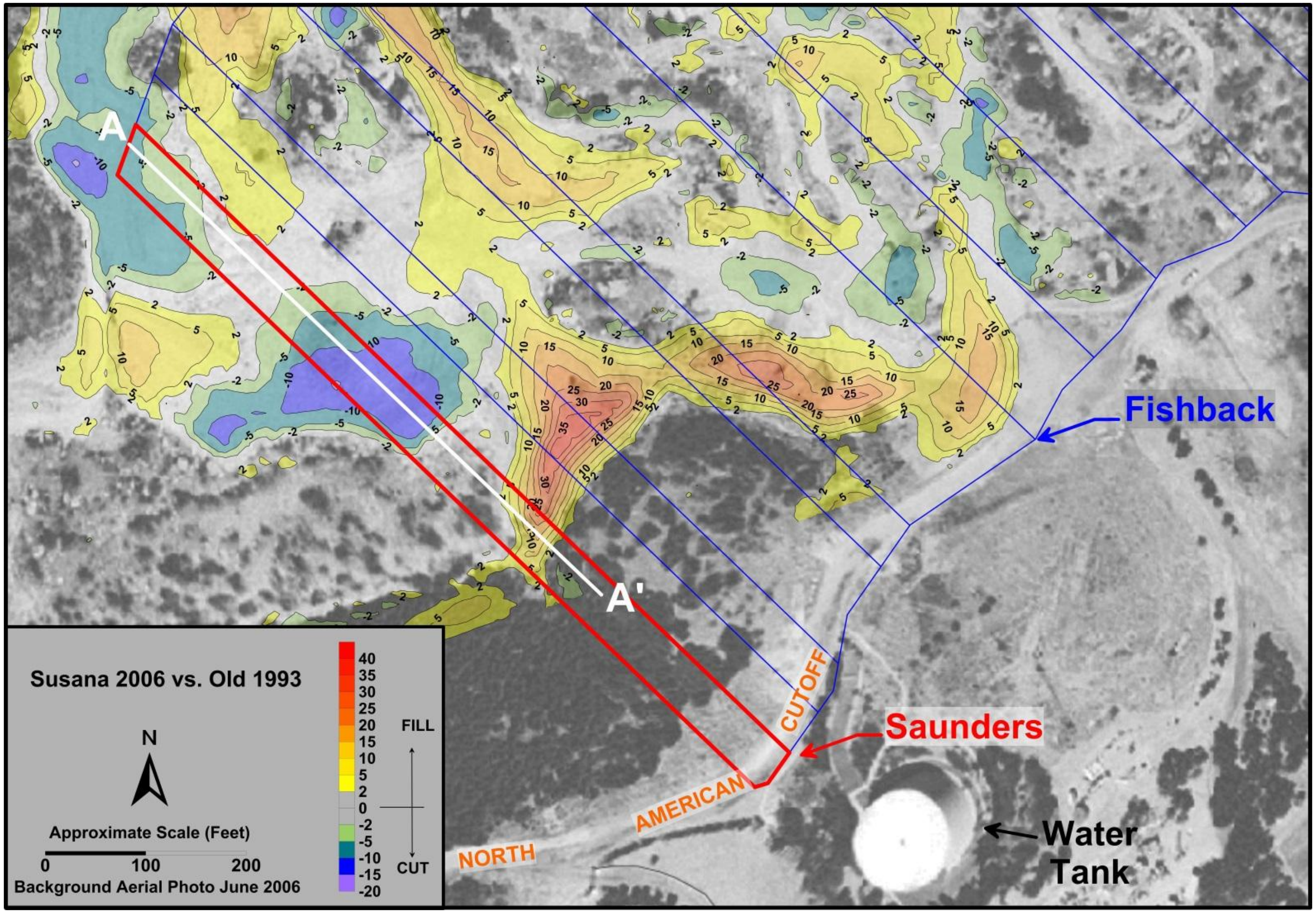


81,700 yd^3

Volume Assessment - Saunders



Volume Assessment - Saunders



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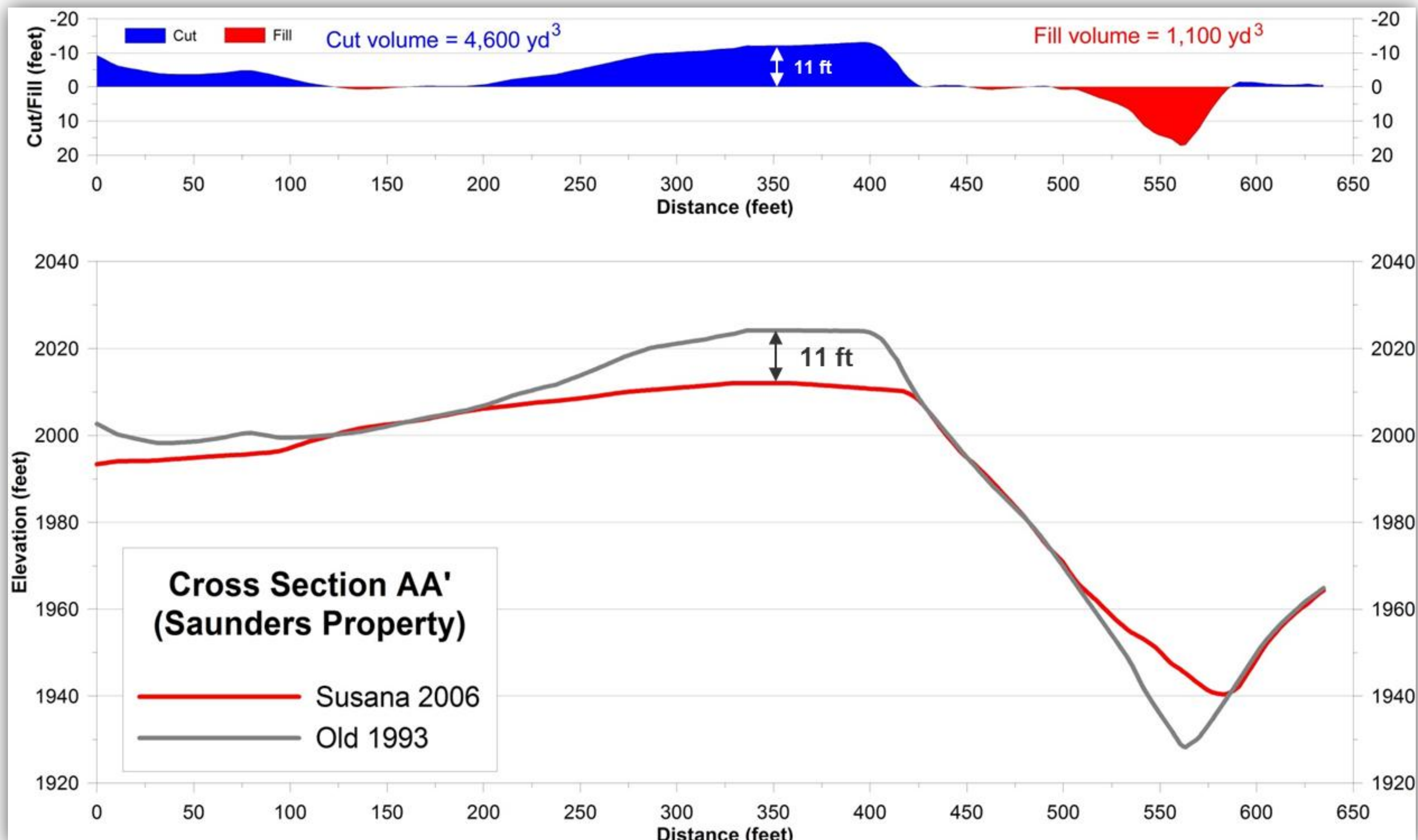
Cut and Fill - Saunders



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Volume Assessment

- Comparison of August 1993 and August 2006 aerial topographic surveys yields 81,700 yd3 import
- Load counts to August 2006: 6,498 to 6,907
- Volume according to load count:
  64,400 to 68,500 yd3
- 79% to 84% of import volume accounted for by load count

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Volume Assessment

- Between February 2005 and December 2006, 76,400 to 80,500 yd3 imported to site per load receipts

- If these volumes represent 79% to 84% of the actual import, then the total volume of material imported to the site is ~100,000 yd3

Development Plans

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Development Plan 1
March 1, 2008

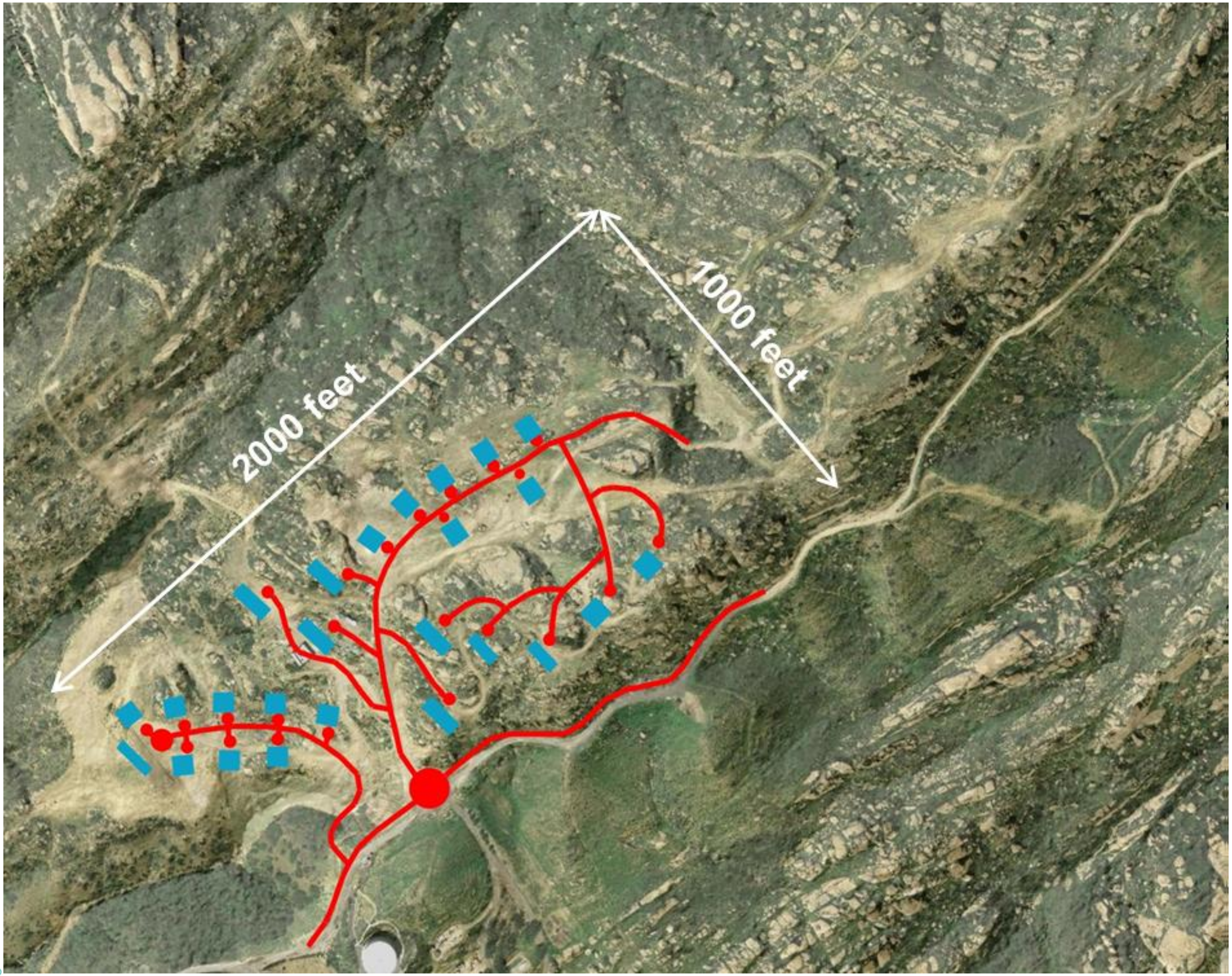


Image: Terraserver.com

Exponent

Development Plan 2
March 1, 2008

Image: Terraserver.com

Exponent®

Development Plan 3
March 1, 2008

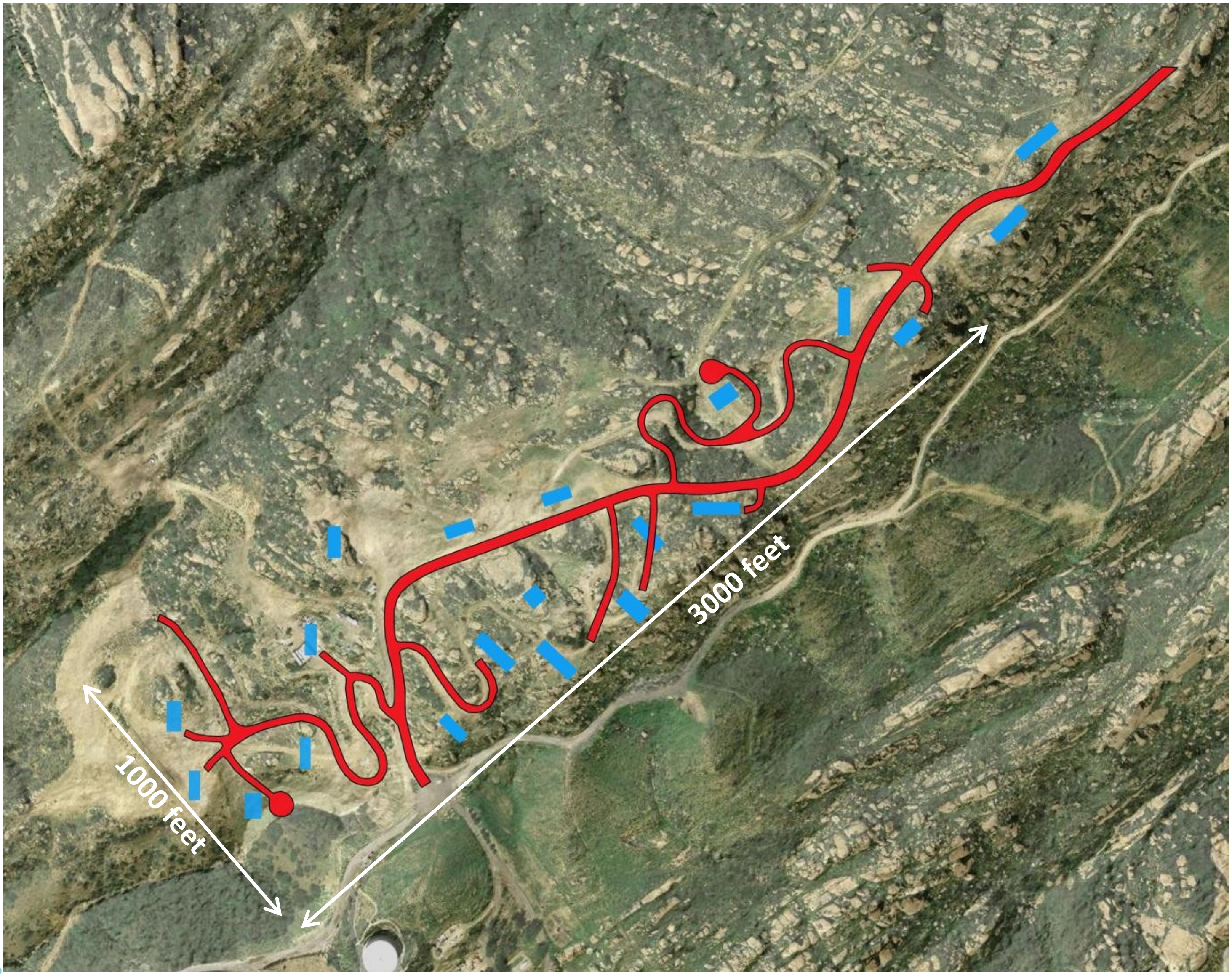


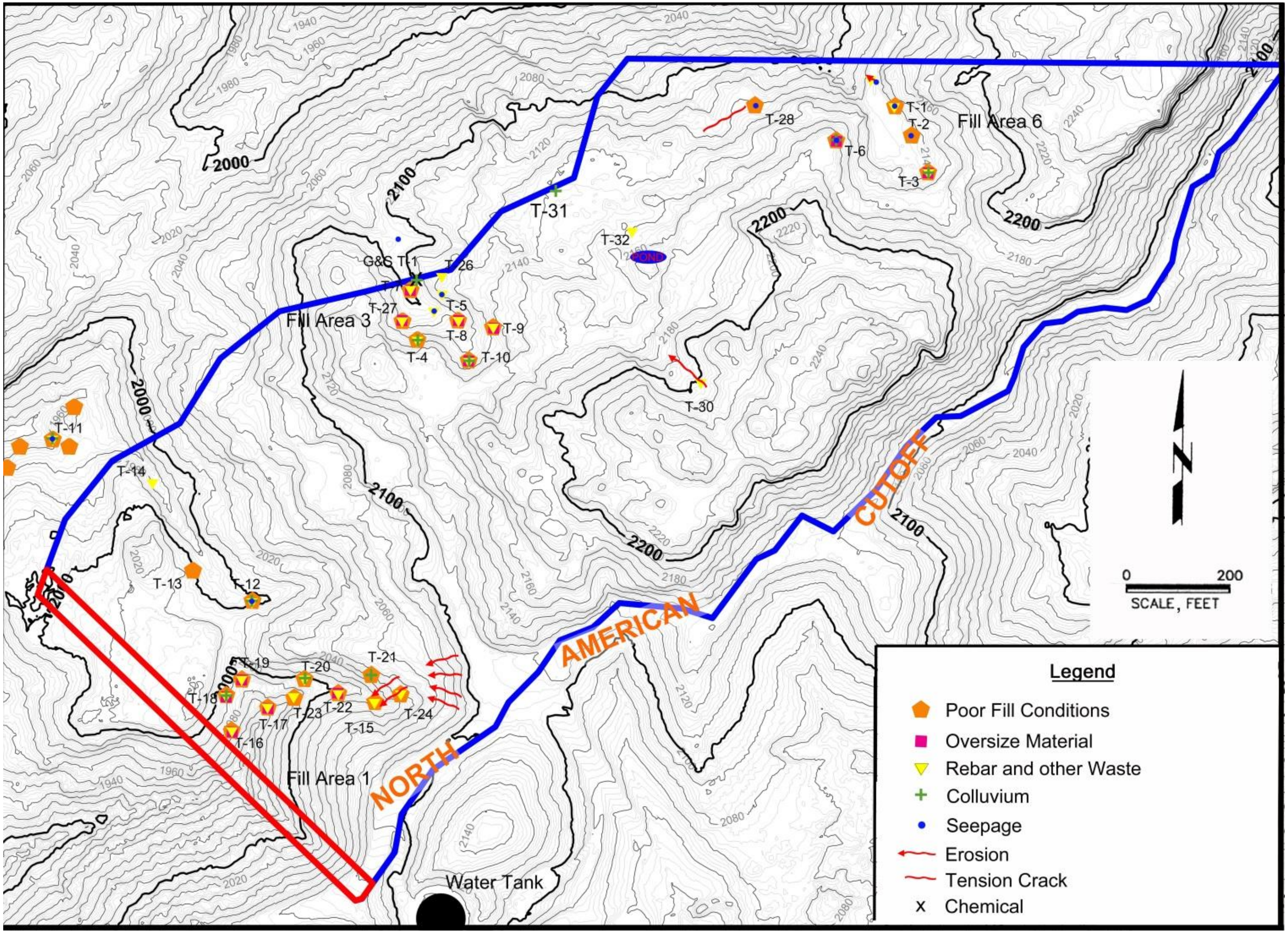
Image: Terraserver.com

Exponent

Site-Specific Condition Assessment

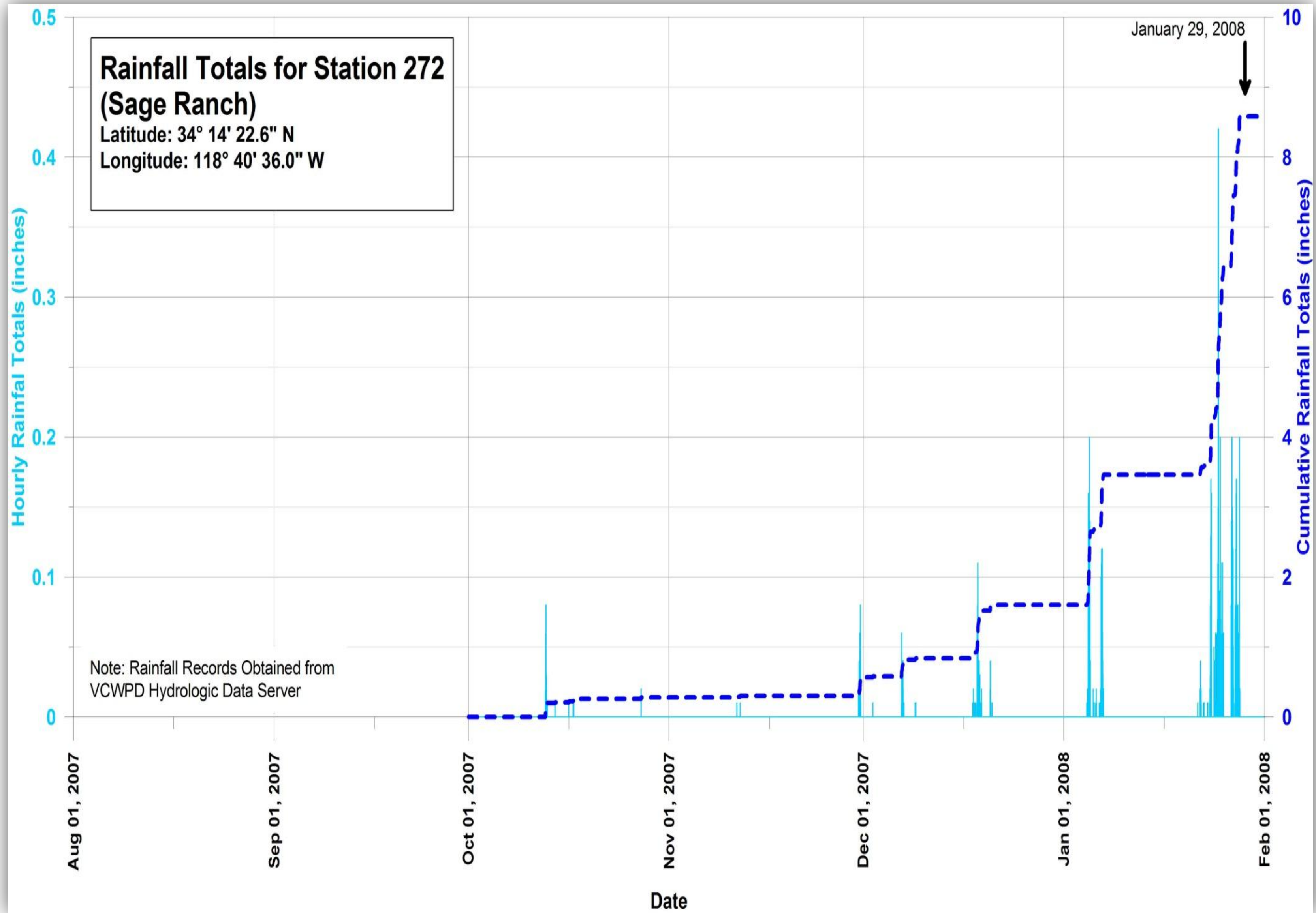
- County Ground and Aerial Survey, January/February 2008
- Exponent field visit, March 2010
- Ninyo and Moore Subsurface Investigation, March 2010
    - Approximately 1300 yd3 of material observed
- Exponent Aerial Survey, January 2012

Condition Assessment Summary



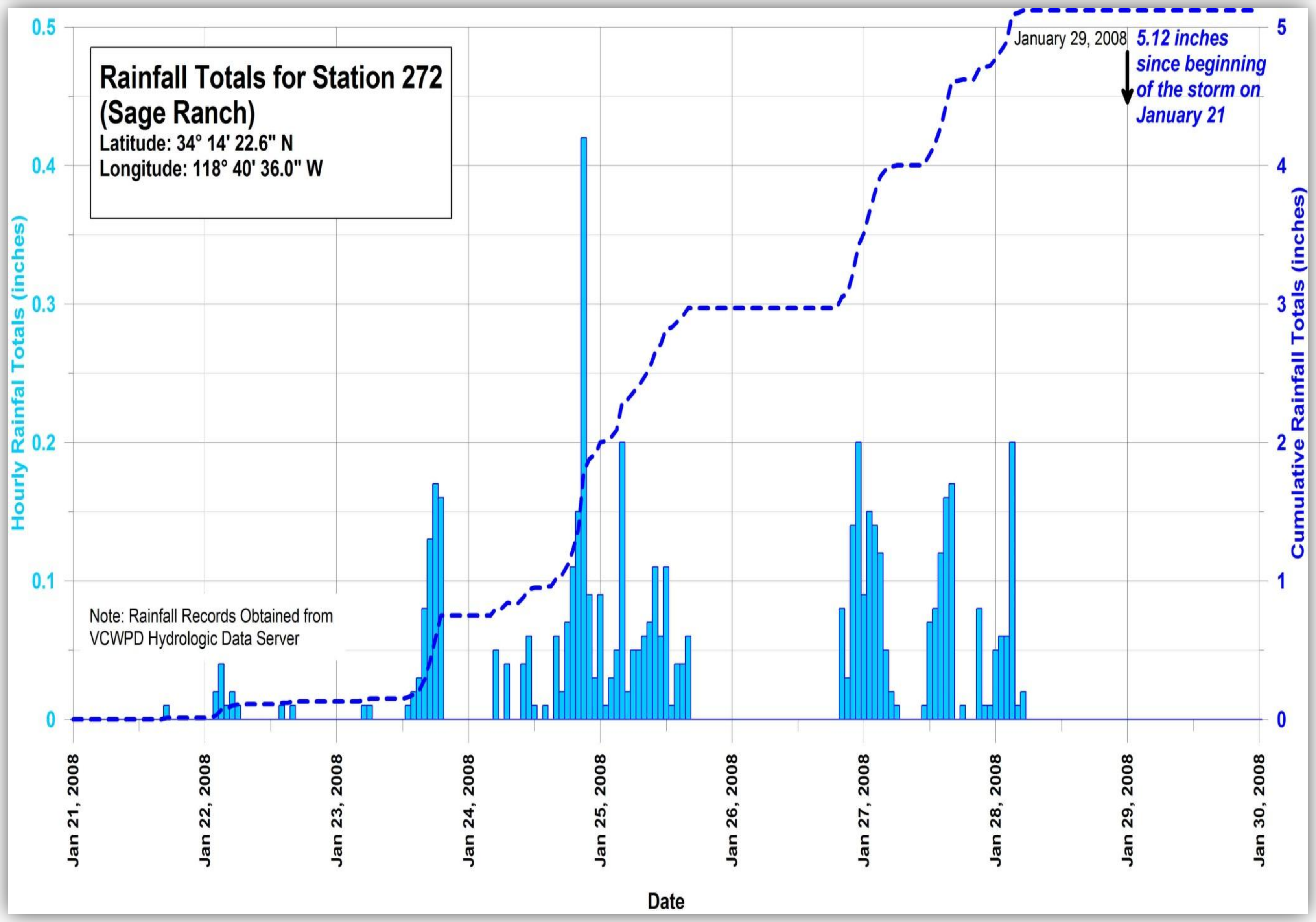
January 2008 Rainfall Analysis

January 2008 Rainfall Analysis



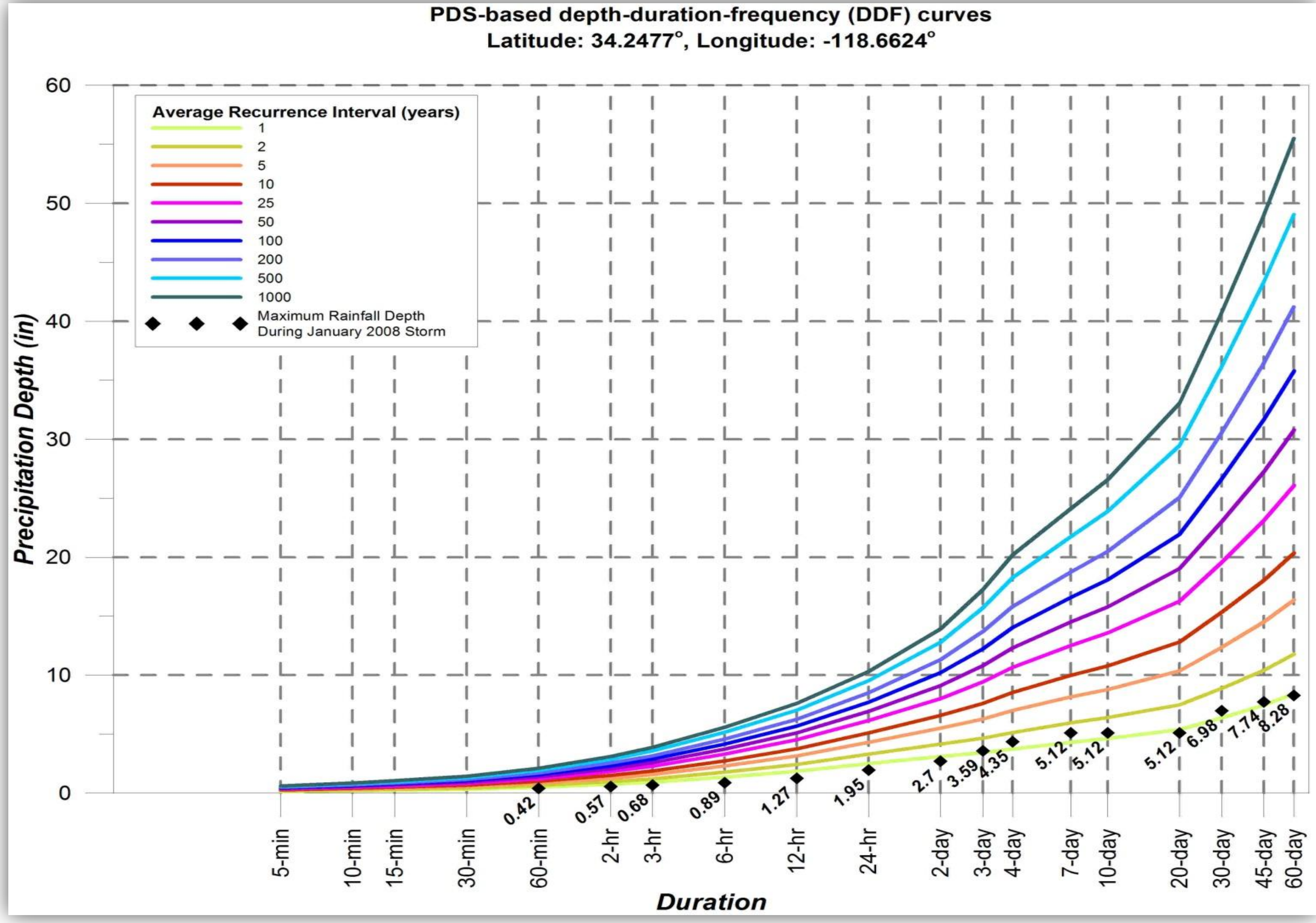
Exponent®

January 2008 Rainfall Analysis

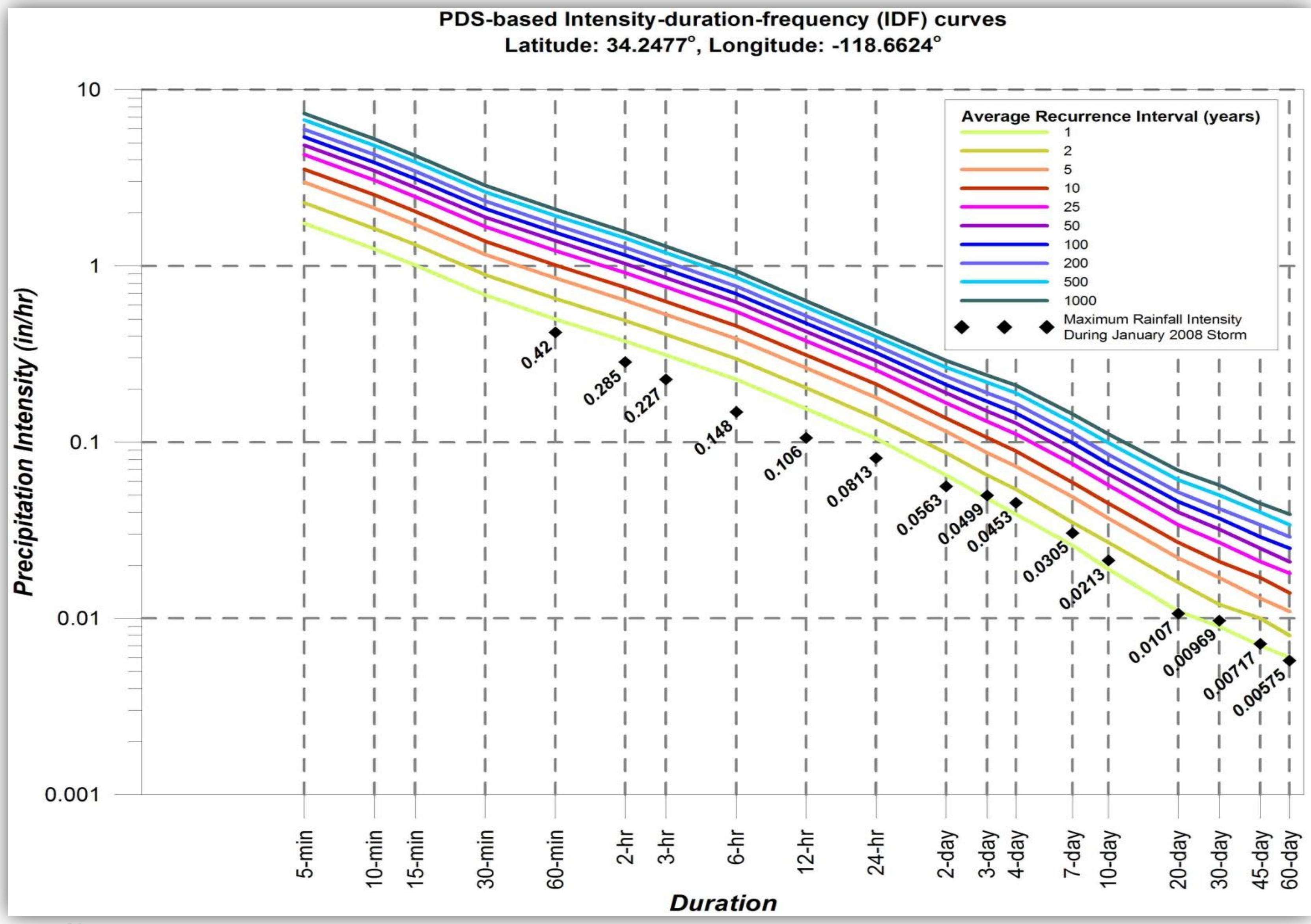


Exponent®

January 2008 Rainfall Analysis



January 2008 Rainfall Analysis



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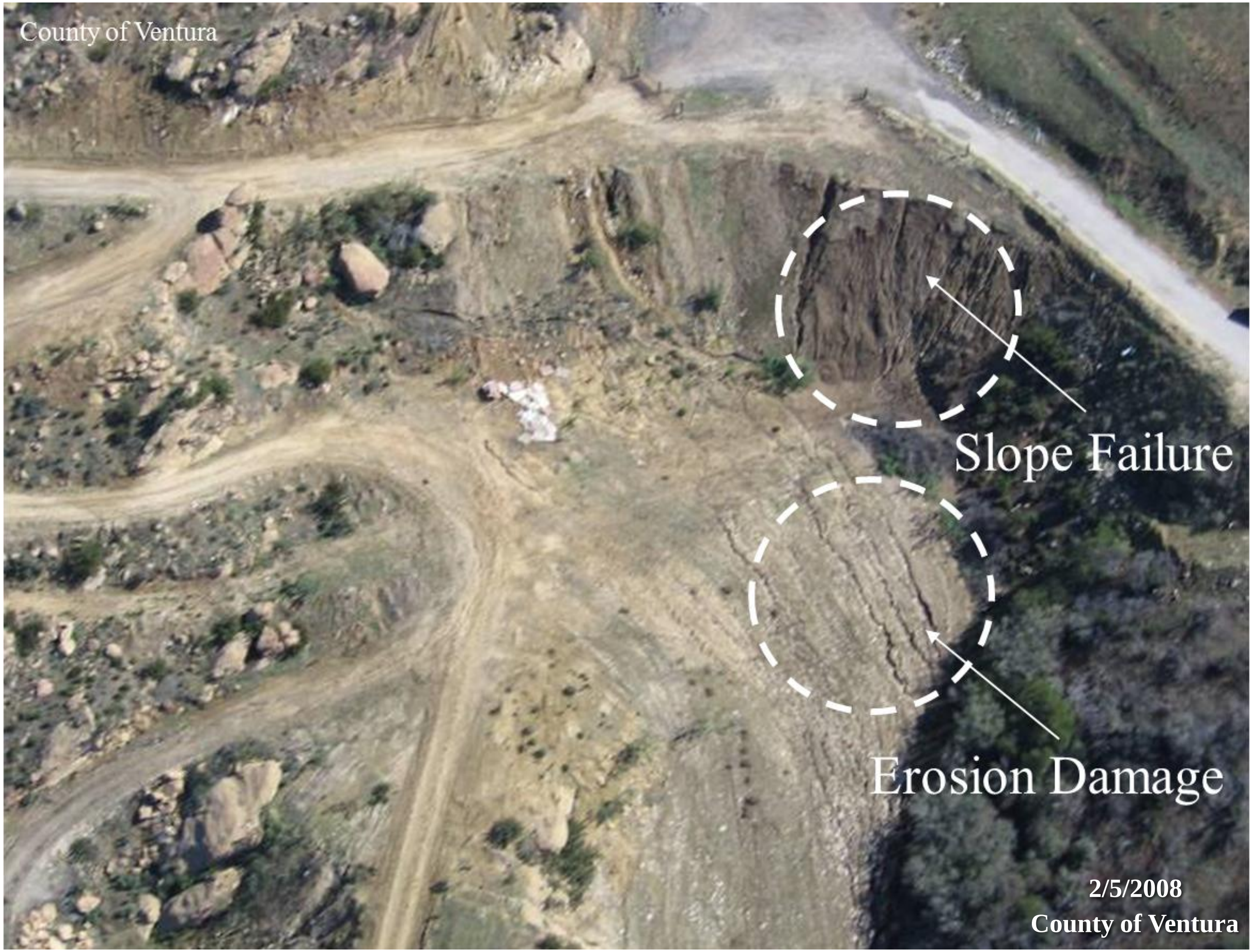
Erosion Issues – Fill Area 1



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Erosion Issues – Fill Area 1
Slope Erosion and Exposed Construction Waste

Erosion Issues – Fill Area 1
Erosion Gully Exposing Construction Debris

Erosion Issues – Fill Area 1
Erosion Rills Exposing Construction Material

Erosion Issues – Fill Area 1

Erosion Rills Exposing Construction Material

Erosion Issues – Fill Area 1
Exposed Construction Debris in Rills North of Fill Area 1

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Erosion Issues – Fill Area 1

Exposed Construction Debris in Rills North of Fill Area 1

Erosion Issues – HECO B

Exponent

Erosion Issues – HECO B

Erosion Damage HECO B

Erosion Issues – Fill Area 6
Fill Material Exposed at Toe of Fill Area 6

Erosion Issues – Fill Area 6
Exposed Debris at Toe of Site 3

Erosion Issues – Fill Area 6

Erosion Damage: Exposed Debris-Note Soil Staining

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Erosion Issues – Area C1 - Erosion Gully

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Erosion Issues – Area C1 - Erosion Gully

Exponent®

Erosion Issues – Area C1

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Tension Cracks - HECO A

Top of Slope Tension Cracks at HECO Area A

Tension Cracks - HECO A

Ponding

Oversize Material

Exponent

Oversize Material

LINK-BELT 330LX HYDRAULIC EXCAVATOR VIEW ARTICLES ON THIS ITEM

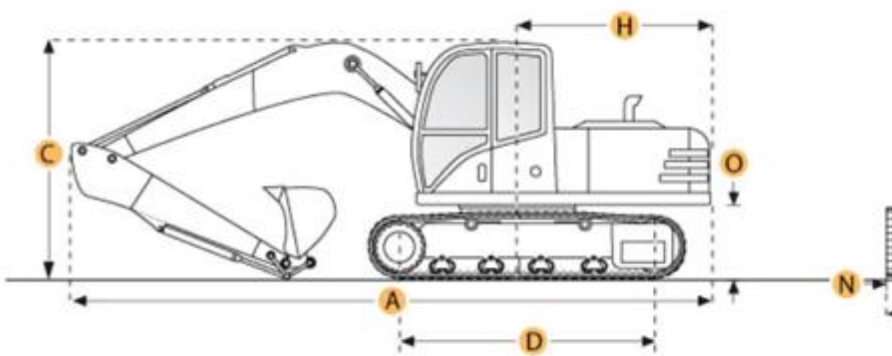
Print specification

Looking to purchase this item?

Find a LINK-BELT 330lx Hydraulic Excavator being sold at Ritchie Bros. auctions.

Need to sell equipment?

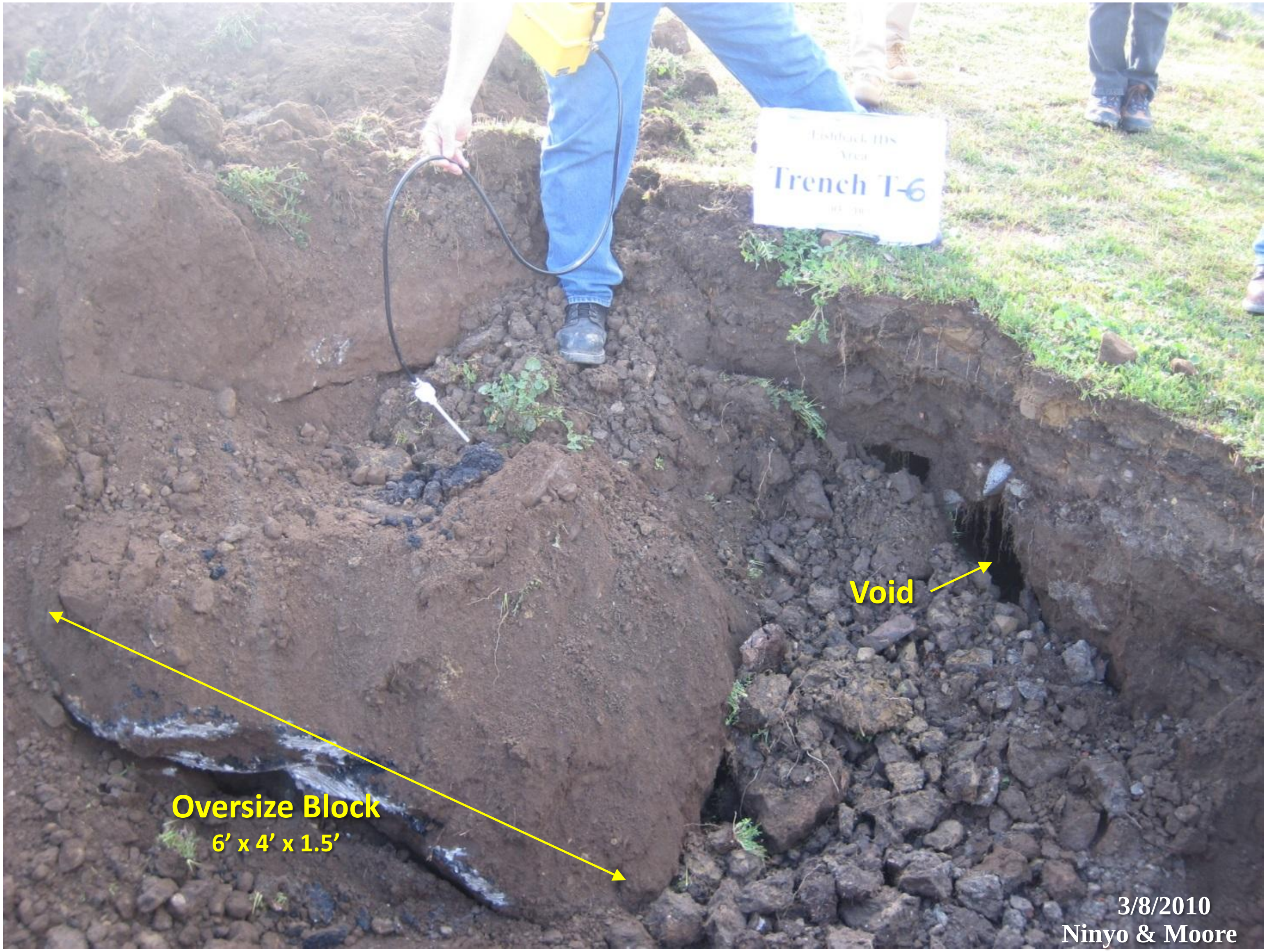
Complete this form and a Ritchie Bros. representative will contact you.



Selected Dimensions

Boom/Stick Option	Boom/Stick Option (HEX) 1	
A. SHIPPING LENGTH OF UNIT	36.2 ft in	11040 mm
C. SHIPPING HEIGHT OF UNIT	10.8 ft in	3290 mm
I. MAX CUTTING HEIGHT	34 ft in	10370 mm
J. MAX LOADING HEIGHT	23.7 ft in	7230 mm
K. MAX REACH ALONG GROUND	36 ft in	10980 mm
L. MAX VERTICAL WALL DIGGING DEPTH	20.8 ft in	6350 mm
M. MAX DIGGING DEPTH	24.1 ft in	7340 mm
Dimensions		
B. WIDTH TO OUTSIDE OF TRACKS	11.2 ft in	3400 mm
D. LENGTH OF TRACK ON GROUND	13.3 ft in	4040 mm
G. HEIGHT TO TOP OF CAB	10.5 ft in	3200 mm
H. TAIL SWING RADIUS	11.2 ft in	3420 mm
O. COUNTERWEIGHT CLEARANCE	4 ft in	1210 mm
Undercarriage		
F. TRACK GAUGE	8.5 ft in	2600 mm
N. SHOE SIZE	31.5 in	800 mm

Oversize Material and Void - Trench T6



Oversize Material - Trench T-8

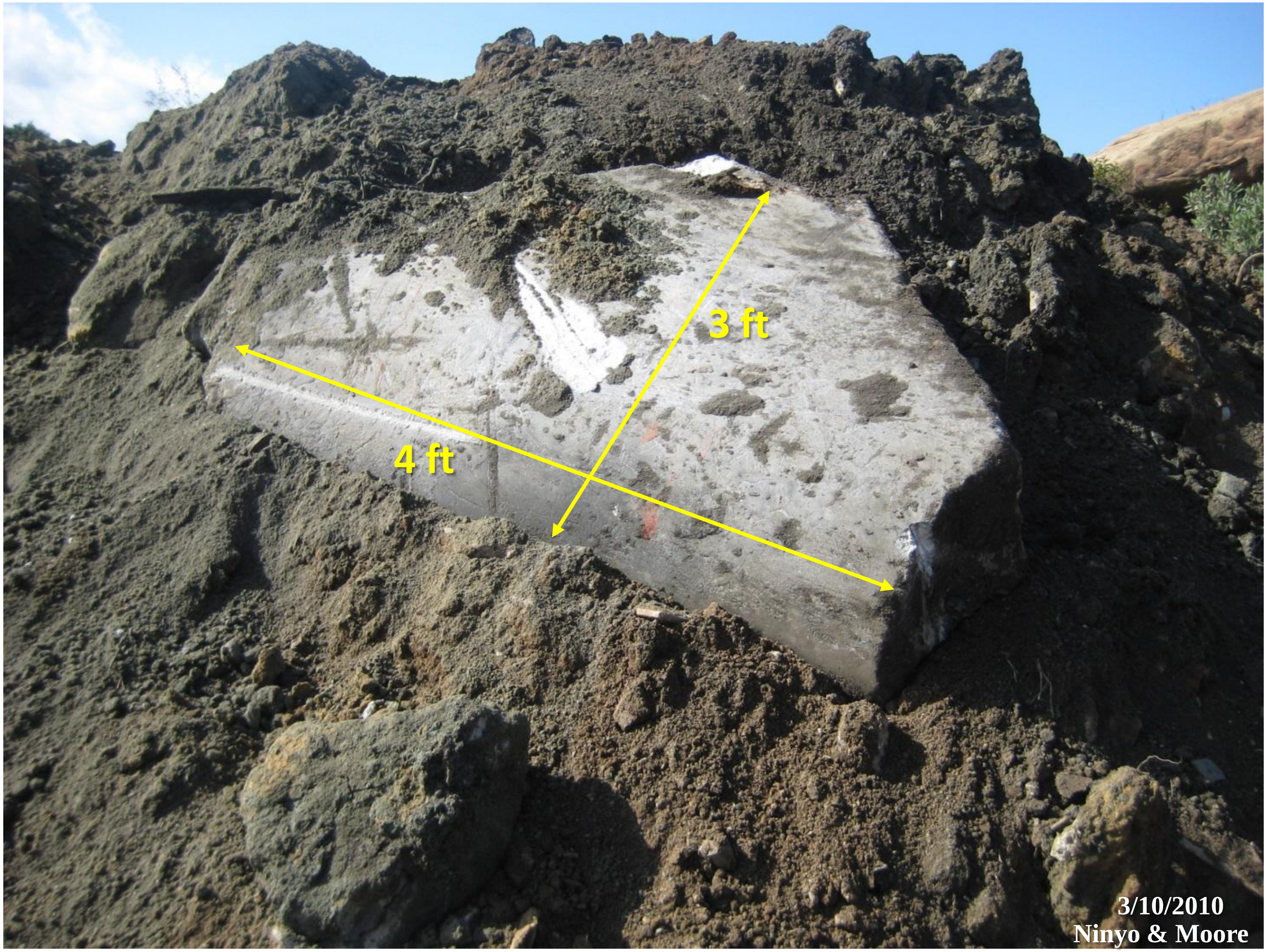
Exponent

Oversize Material - Trench T-10

Oversize Material - Trench T-17

Exponent

Oversize Material - Trench T-19



Oversize Material - Trench T-27

Oversize Material - Trench T-27

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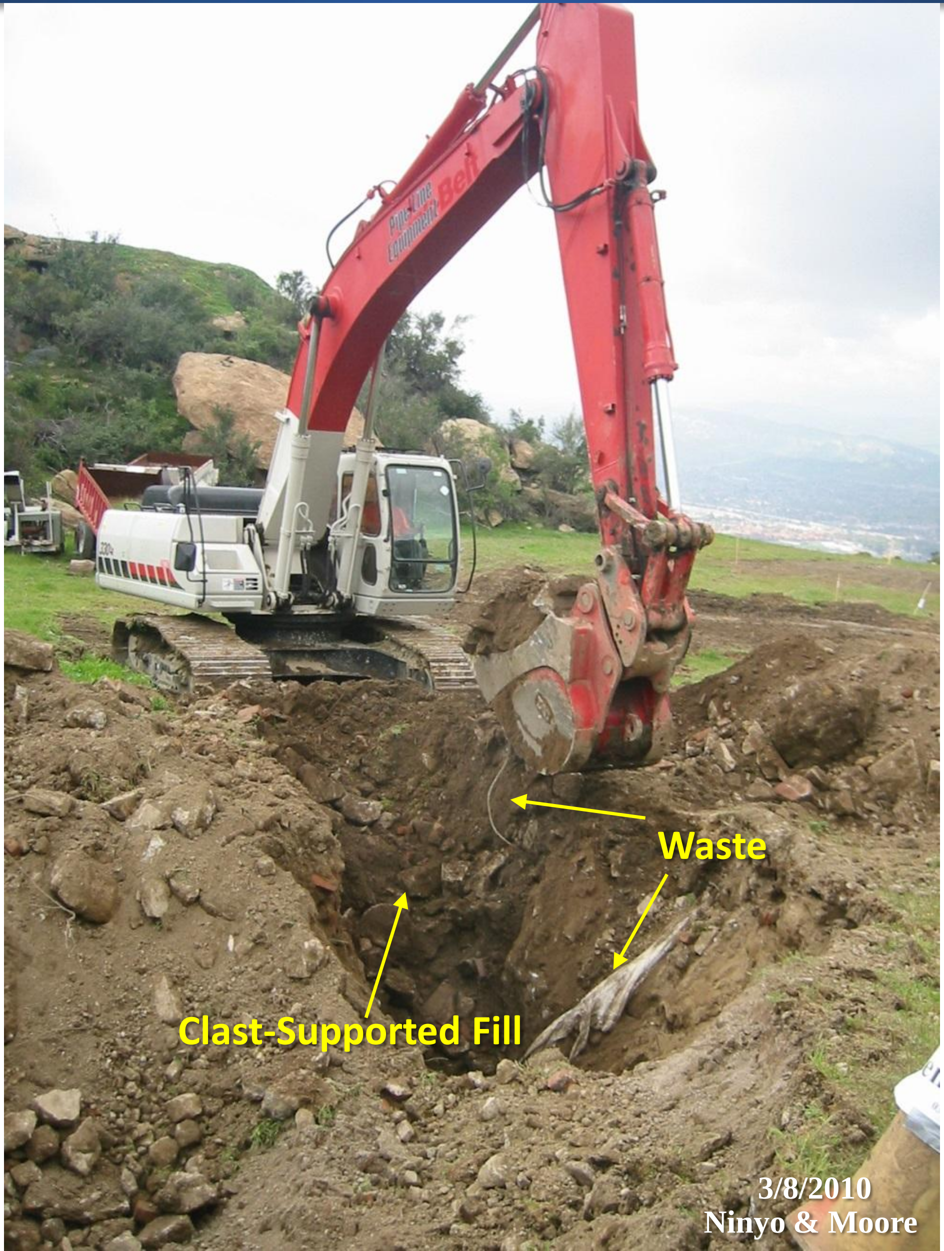
Poor Quality Fill and Waste - Trench T-2



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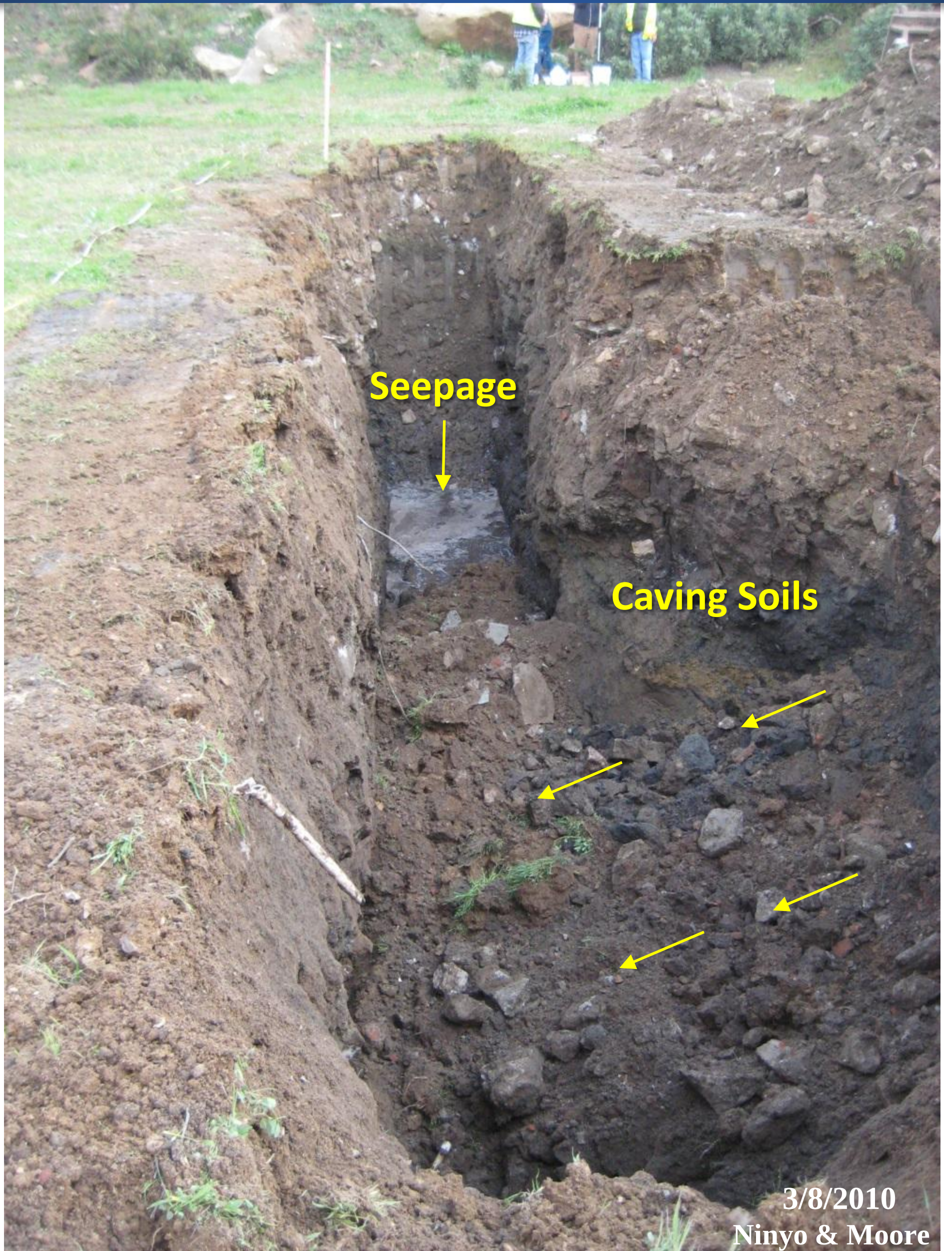
Poor Quality Fill - Trench T-2

Poor Quality Fill and Seepage - Trench T-2B



Exponent

Poor Quality Fill - Trench T-3

Poor Quality Fill - Trench T-4

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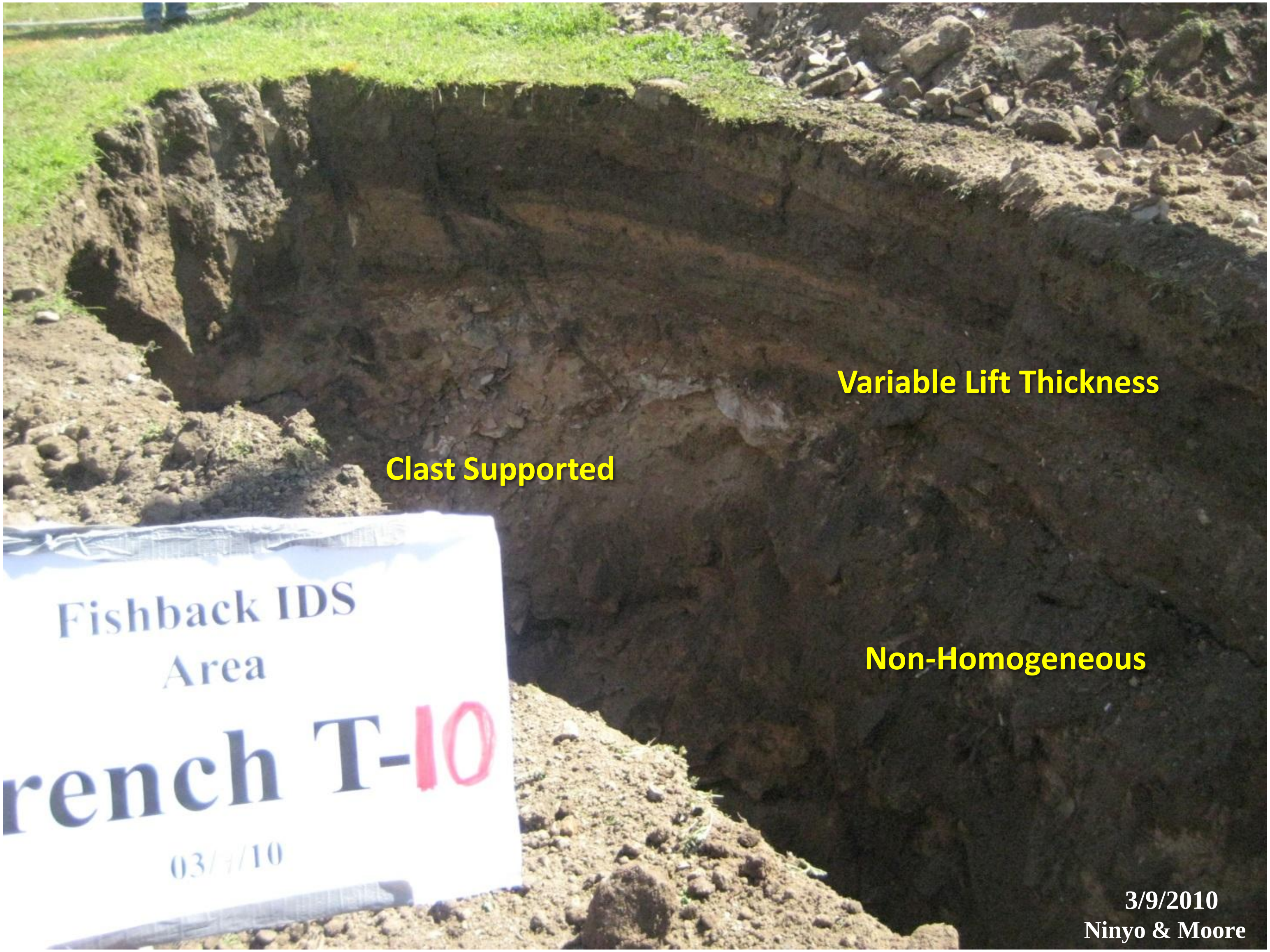
Poor Quality Fill - Trench T-10



Exponent

Poor Quality Fill - Trench T-12

Exponent

Poor Quality Fill - Trench T-21

Exponent®

Poor Quality Fill - Trench T-24

Exponent

Poor Quality Fill - Trench T-28

Exponent®

Waste and Seepage - Trench T-1

Waste - Trench T-3

Oversize Material and Waste - Trench T-8

Exponent

Waste - Trench T-10

Exponent®

Waste - Trench T-12

Exponent

Waste - Trench T-15

Exponent

Waste - Trench T-16

Exponent

Waste - Trench T-17

Waste - Trench T-18

Waste - Trench T-20


3/10/2010
Ninyo & Moore

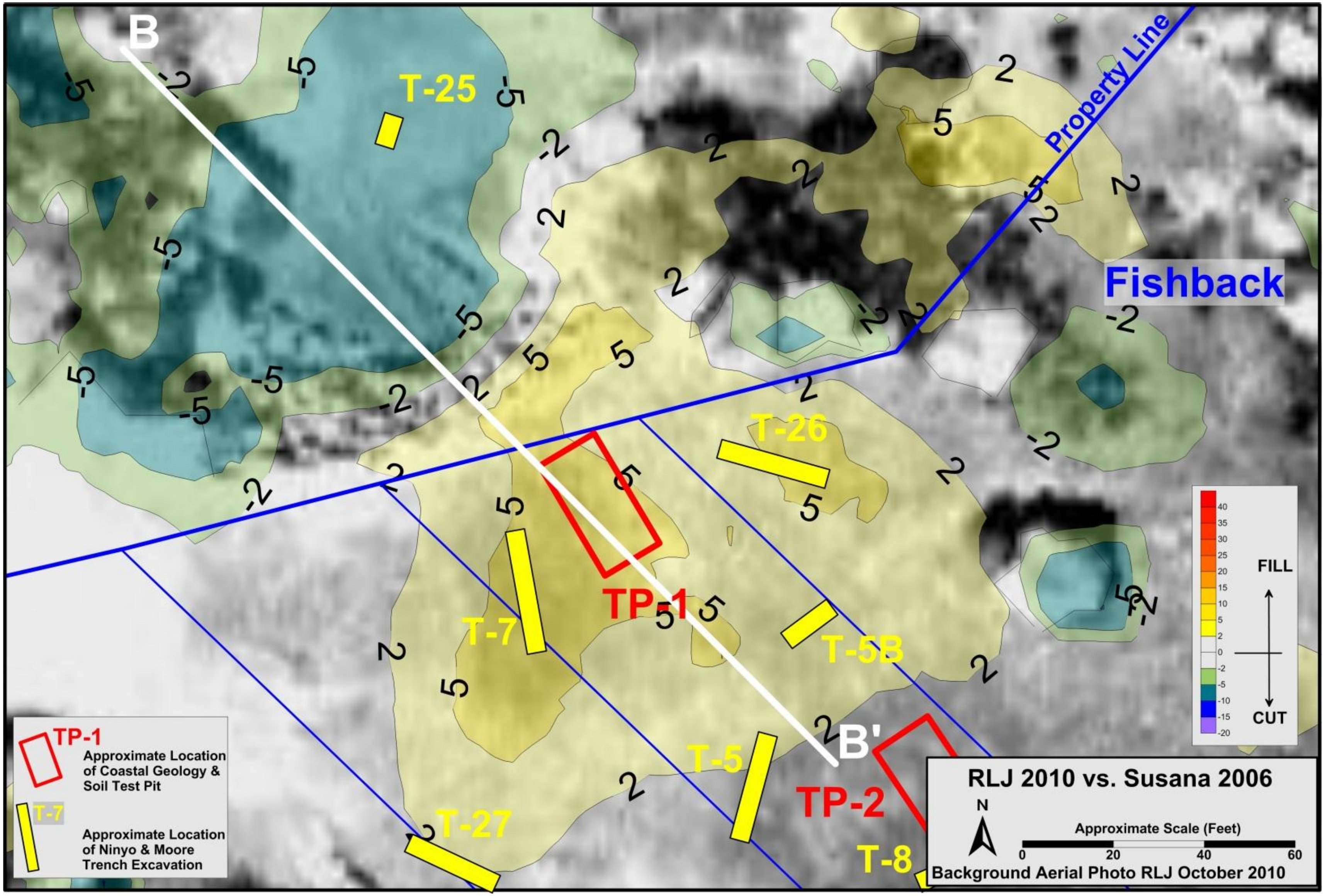
Exponent

Waste - Trench T-27

Waste - Trench T-27

Chemical Pollutants – Toluene

Cut = Fill = 1,850 yd^3



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Appearance of Toluene Area in 2006

Appearance of Toluene Area in 2010

Chemical Pollutants – Coastal Geology & Soils

Table 1

Chemical Analytical Results of Soil Samples
Fishback Ranch
North American Cutoff, Simi Hills
Ventura County California

Table 1

Chemical Analytical Results of Soil Samples
Fishback Ranch
North American Cutoff, Simi Hills
Ventura County California

Compound	PQL (mg/Kg)	TP-1-8.5 (mg/Kg)	TP-1-8.5 Retest (mg/Kg)	TP (mg
1,3-Dichloropropane	5.0	BQL	BQL	BQL
2,2-Dichloropropane	5.0	BQL	BQL	BQL
1,1-Dichloropropene	5.0	BQL	BQL	BQL
Ethylbenzene	5.0	BQL	BQL	BQL
Hexachlorobutadiene	5.0	BQL	BQL	BQL
Isopropylbenzene	5.0	BQL	BQL	BQL
p-Isopropyltoluene	5.0	BQL	BQL	BQL
Methylene Chloride	5.0	BQL	BQL	BQL
Tetrachloroethene	5.0	BQL	BQL	BQL
Toluene	5.0	9.2	5.6	BQL
1,2,3-Trichlorobenzene	5.0	BQL	BQL	BQL
1,2,4-Trichlorobenzene	5.0	BQL	BQL	BQL
1,1,1-Trichloroethane	5.0	BQL	BQL	BQL
1,1,2-Trichloroethane	5.0	BQL	BQL	BQL
Trichloroethene	5.0	BQL	BQL	BQL
Trichlorofluoromethane	5.0	BQL	BQL	BQL
1,2,3-Trichloropropane	5.0	BQL	BQL	BQL
1,2,4-Trimethylbenzene	5.0	BQL	BQL	BQL
1,3,5-Trimetheylbenzene	5.0	BQL	BQL	BQL
Vinyle Chloride	5.0	BQL	BQL	BQL
Total Xylenes	5.0	BQL	BQL	BQL

Toluene 5.0 9.2 5.6 BQL

TPH - Total Petroleum Hydrocarbon
PQL - Practical Quantitation Limit
BQL - Below Practical Quantitation Limit

Construction Assessment

- Grading recommendations provided by Coastal Geology & Soil, Inc. on 1/9/07, after the cessation of fill import.
- “Intended to document the standards to which work conducted to date has been performed”
- NOT accepted standard of practice in the industry
- 15 specific recommendations
- Items specifically out of compliance include recommendations #3, 4, 5, 6, 7, 8, 12, 13, and 14

Construction Assessment - Shortcomings

#4: Unsuitable waste material (rebar, bags) not separated from fill during placement

#5: Fill not benched into firm native material

#6: Failure to place rubble fill in loose lifts with consistent moisture conditioning and compactive effort

#7: Oversize blocks not broken or segregated

#8: Failure to place cover fill at 90% relative compaction as verified by soils engineer

#12: Fill slopes constructed at inclinations greater than 2:1 (horizontal: vertical)

#13: Cut and fill slopes not vegetated after grading

#14: Surface water allowed to pond in graded area

Construction Assessment – Shortcomings

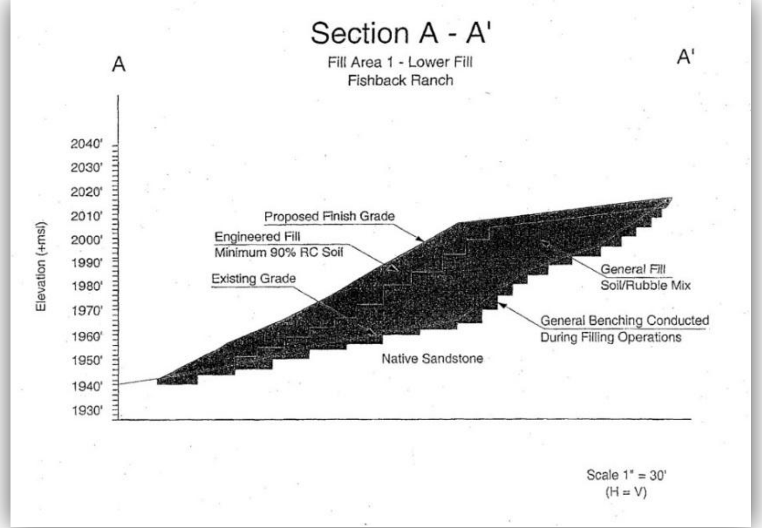
- Unsuitable waste material (rebar, bags) not separated from fill during placement

> 4) All cut or fill areas to be graded shall be cleared of surface vegetation, including roots and root structures, and other unsuitable material for an agricultural fill. All unsuitable material shall be removed from the fill area and transported to a suitable disposal area. Prior to placing any fill material, the fill area shall be inspected by the civil engineer or soil engineer.

- Unsuitable waste material encountered in **75%** of N&M trench excavations (T-1, T-3, T-4, T-5, T-7, T-8, T-9, T-10, T-11, T-12, T-14, T-15, T-16, T-17, T-18, T-19, T-20, T-22, T-23, T-24, T-26, T-27, T-30 and T-32).

Construction Assessment – Shortcomings

- Fill not benched into bedrock per 8-3-06 and 1-8-07 Coastal Geology & Soil Recommendations
- Colluvium or buried former slope surface encountered in **34%** of N&M trench excavations (T-3, T-4, T-6, T-10, T-11, T-12, T-18, T-20,T-21, T-29, T-31).



5) Prior to placement of HECO plan agricultural fill materials, loose native soils shall be completely removed down to competent material, as approved by the civil engineer or soil engineer.

Construction Assessment – Shortcomings

- Failure to place rubble fill in loose lifts with consistent moisture conditioning and compactive effort

> 6) HECO plan interior agricultural fill material shall be placed in 6 to 18-inch lifts, and shall be compacted by track walking or wheel rolling. Compaction testing on interior HECO plan agricultural fills shall not be required. However, compaction testing on HECO plan exterior earthen materials shall be performed, as defined below.

- Poorly compacted and/or discontinuously layered fill noted in **63%** of N & M trench excavations (T-1, T-2, T-3, T-4, T-7, T-8, T-9, T-10, T-11, T-12, T-13, T-15, T-16, T-17, T-18, T-21, T-22, T-24, T-27 and T-28).

Construction Assessment – Shortcomings

- Oversize blocks not broken or segregated

> 7) HECO plan interior agricultural fill material may utilize earthen fill materials consisting of soil and inert materials such as concrete, bricks, natural rocks, ceramics, etc. Inert materials shall generally be crushed or broken up to particle sizes less than three feet in their largest diameter. Particle sizes larger than three feet in diameter may be placed within the fill, with the approval of the project civil engineer or soil engineer.

- Oversize material (3 feet or larger) noted in **28%** of N & M trench excavations (T-6, T-7, T-9, T-10, T-16, T-18, T-19, T-22 and T-27)

Construction Assessment – Shortcomings

- Failure to place cover fill at 90% relative compaction as verified by soils engineer

> 8) HECO plan exterior earthen fill materials placed within 36-inches of finish grade and/or adjacent to slopes with inclines greater than 3 to 1, horizontal to vertical, shall be placed at or near optimum moisture content in 6 to 8-inch lifts, and shall be compacted to a minimum of 90% of the material's maximum dry density. Compaction testing shall be performed at a minimum rate of one (1) test per 18-inches of fill material placed. The soil engineer may increase compaction testing as necessary to insure compliance with the plans and specifications. Compaction shall be achieved by an acceptable method approved by the civil engineer or soil engineer.

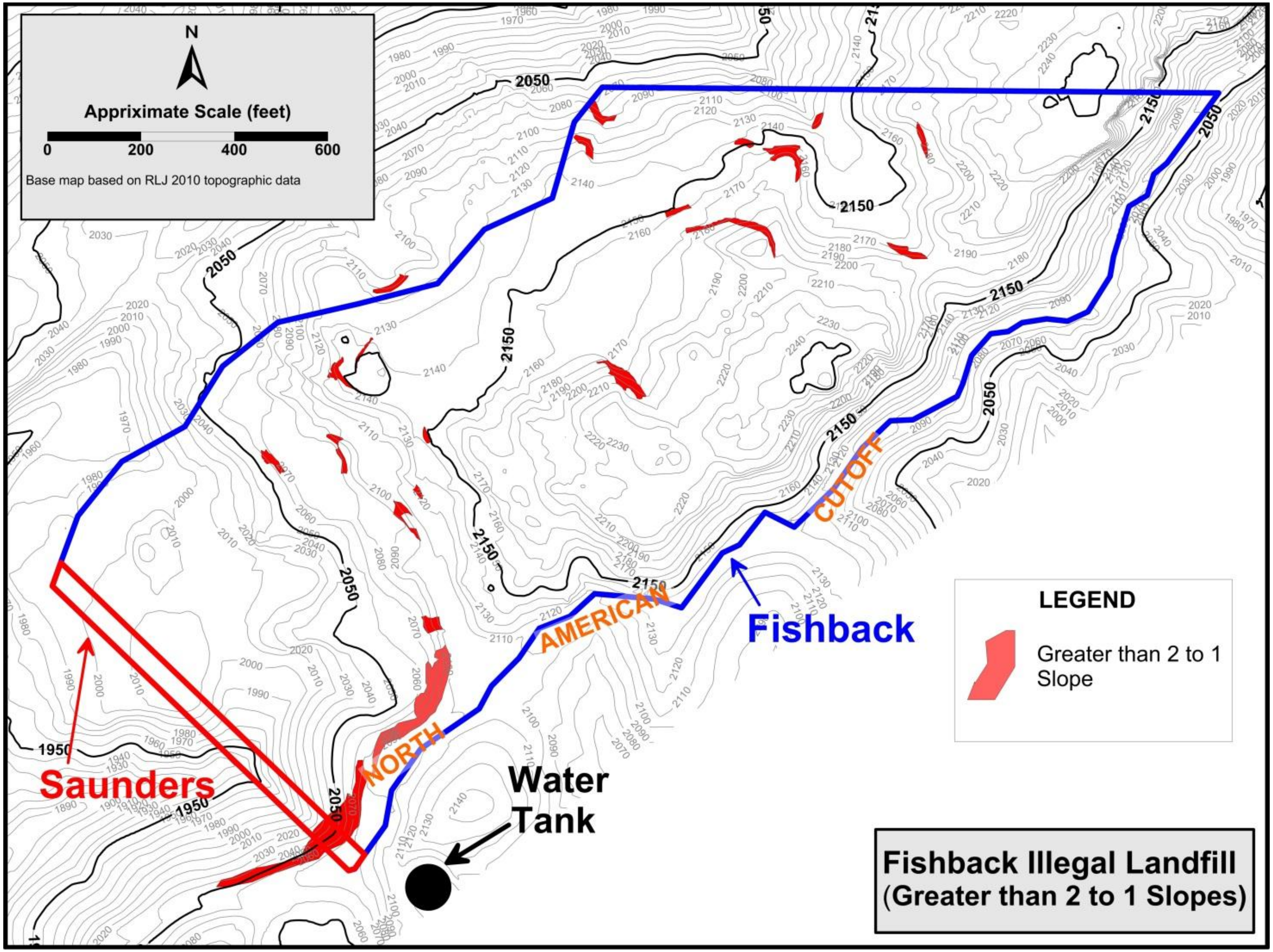
- No compaction testing performed. Debris in upper 3 feet in **50%** of N & M trench excavations (T-3, T-6, T-11, T-12, T-16, T-17, T-18, T-19, T-20, T-21, T-23, T-24, T-25, T-26, T-31 and T-32)

Construction Assessment – Shortcomings
Fill Area 1

- Construction of fill slopes at inclinations greater than 2:1 (horizontal: vertical)

12) Any cut and fill slopes constructed during final grading operations shall have a maximum slope angle of two (2) horizontal to one (1) vertical. Any slopes steeper than 2:1 (H:V) shall be evaluated for geotechnical parameters and slope stability by the civil engineer or soil engineer prior to construction.

Construction Assessment – Shortcomings
Fill Area 1



Construction Assessment – Shortcomings

- Failure to establish and maintain vegetation on fill slopes

13) Cut and fill slope faces shall be prepared and maintained to control against erosion. Cut and fill slopes shall be planted with deep-rooting, lightweight, low-water-demanding, fire resistant, ground cover. The ground cover shall be maintained with proper irrigation practices.

Construction Assessment – Shortcomings

Exponent

Construction Assessment – Shortcomings

- Water allowed to pond on graded surfaces

14) Final grading shall provide positive surface drainage away from the slopes. Surface water shall be collected and transferred away from the slopes via non-erosive drainage devices to an approved drainage collection and disposal facility. Surface water shall not be allowed to pond on final grade surfaces.

Construction Assessment – Shortcomings

Construction Assessment – Additional Shortcomings

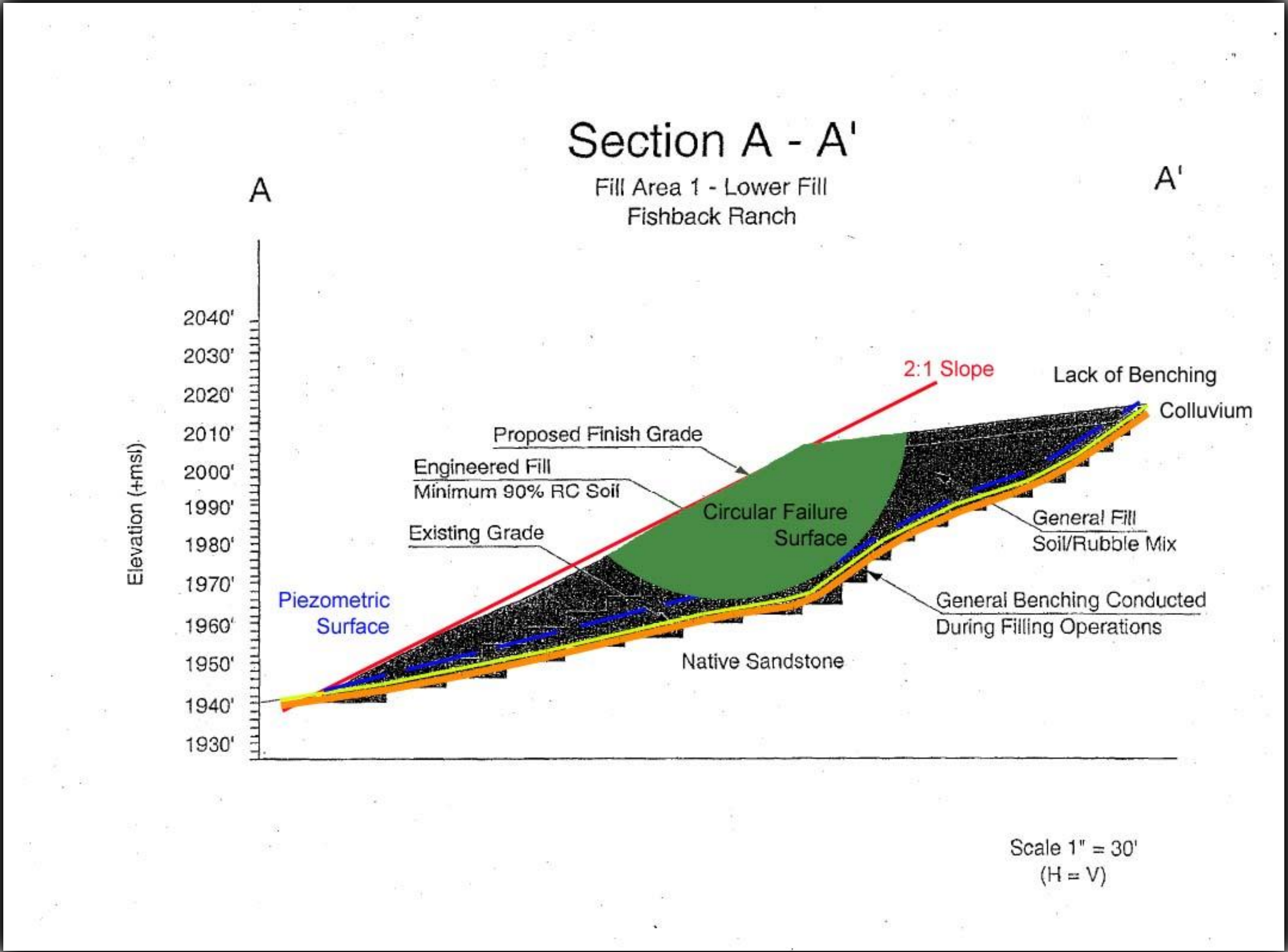
- Soil and concrete not well mixed, resulting in voids and nested (clast supported) rubble
- Failure to perform appropriate slope stability analysis for field condition
- No toe key constructed for the fill slopes
- No final soils report documenting that as-built conditions meet criteria set forth in recommendations

Construction Assessment – Shortcomings

- Water allowed to pond on graded surfaces

14) Final grading shall provide positive surface drainage away from the slopes. Surface water shall be collected and transferred away from the slopes via non-erosive drainage devices to an approved drainage collection and disposal facility. Surface water shall not be allowed to pond on final grade surfaces.

Construction Assessment – Shortcomings
Fill Area 1



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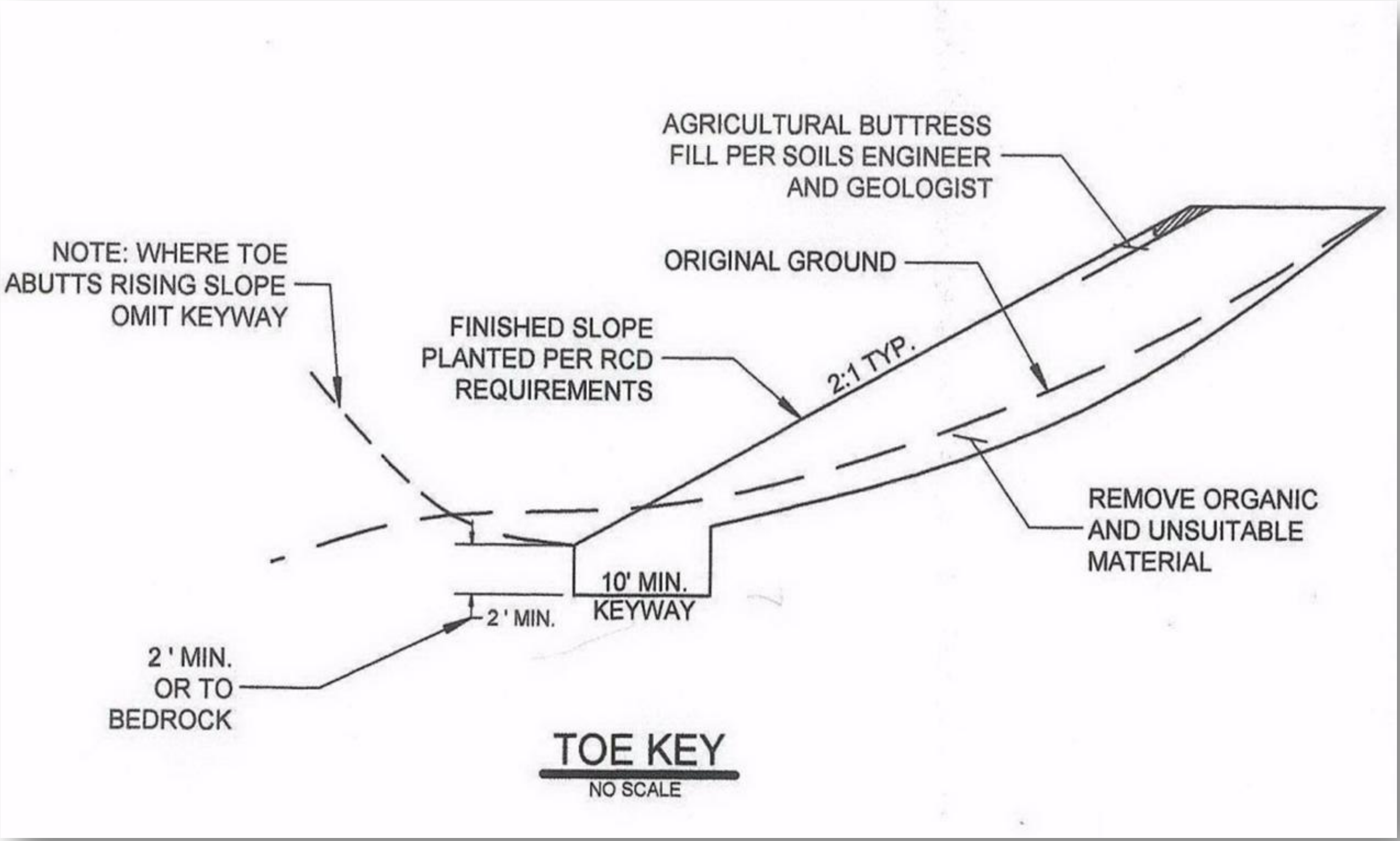
Construction Assessment – Examples
Hawkes and Associates Recommendations



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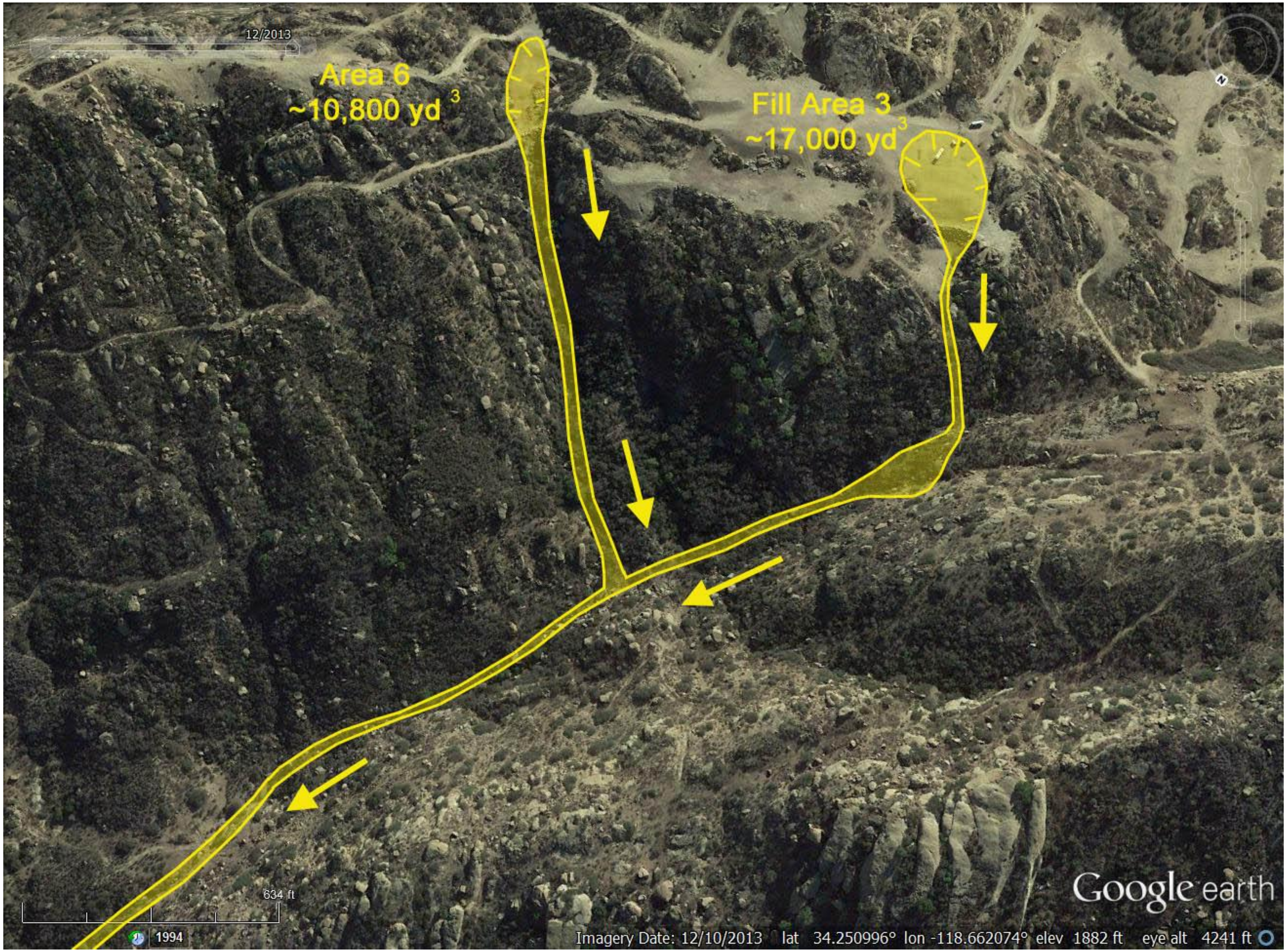
Future Impacts

- Erosion
- Settlement
- Slope Instability
- Earthquake-induced settlement, slope failure
- Visual Impacts
- Internal erosion/piping
- Downstream Impacts
    - Debris Flow, Flooding

Debris Flow Potential



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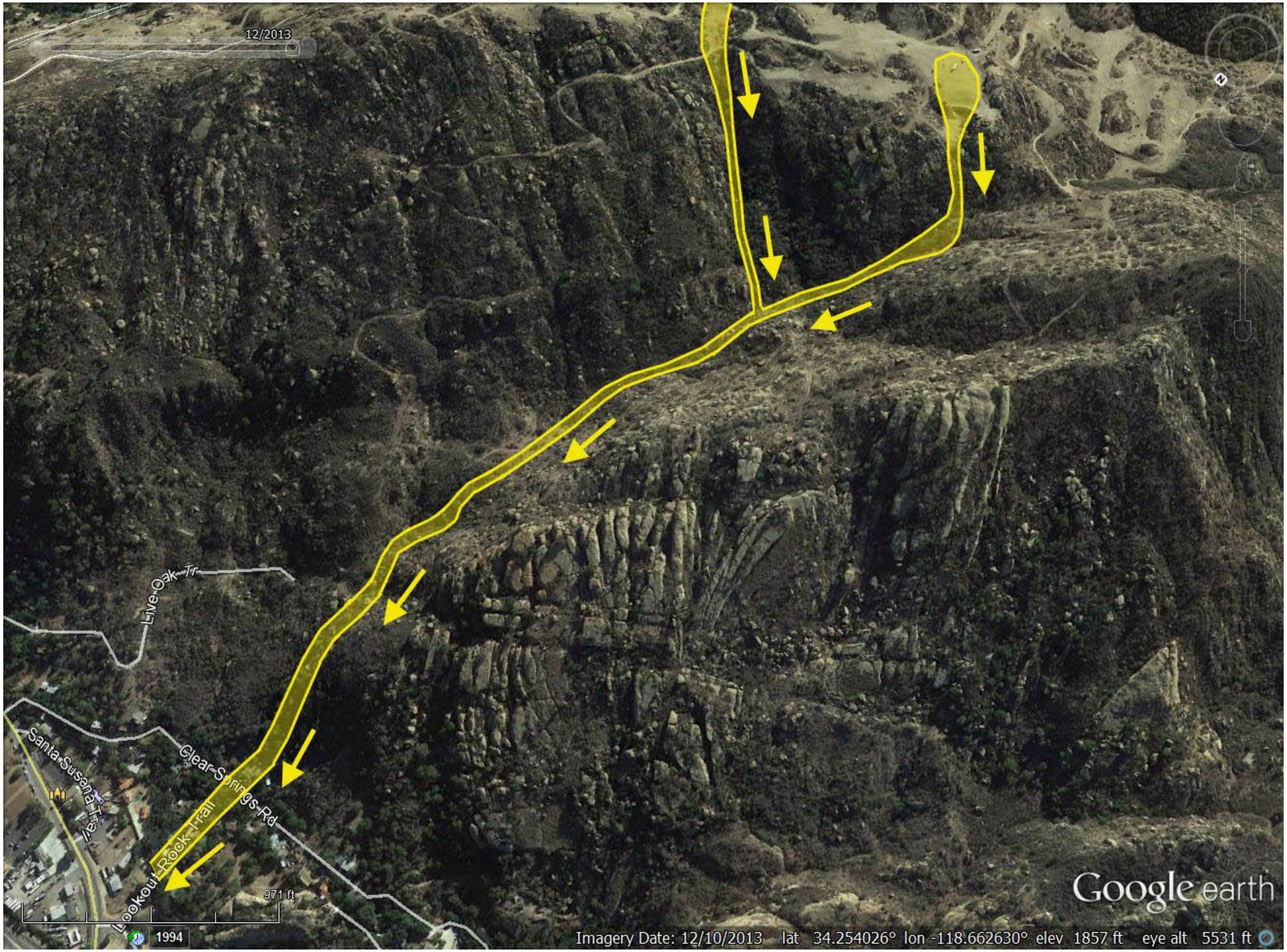
Debris Flow Potential



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Debris Flow Potential
Clear Springs Road

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Debris Flow Potential
Clear Springs Road

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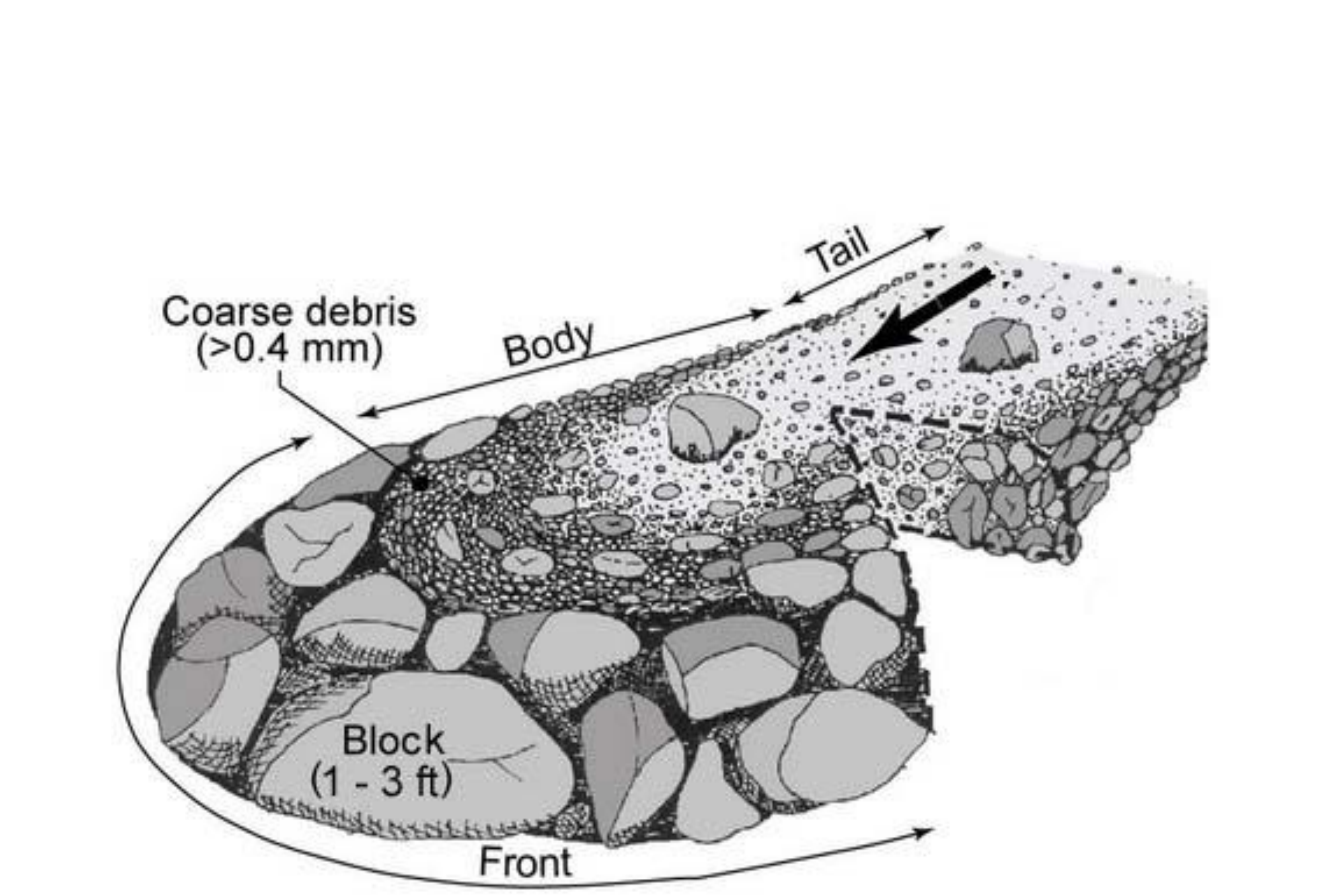
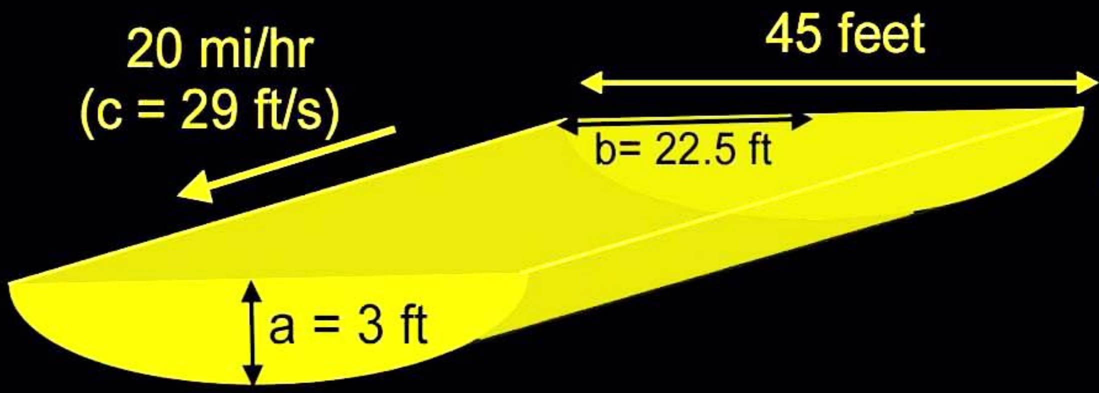
Debris Flow Potential
Lookout Rock Trail

Debris Flow Potential - Character of Debris Flow



Debris Flow Potential
Debris Flow Velocity and Dimensions



$$\text{Volume/sec} = \frac{\pi a b c}{2}$$

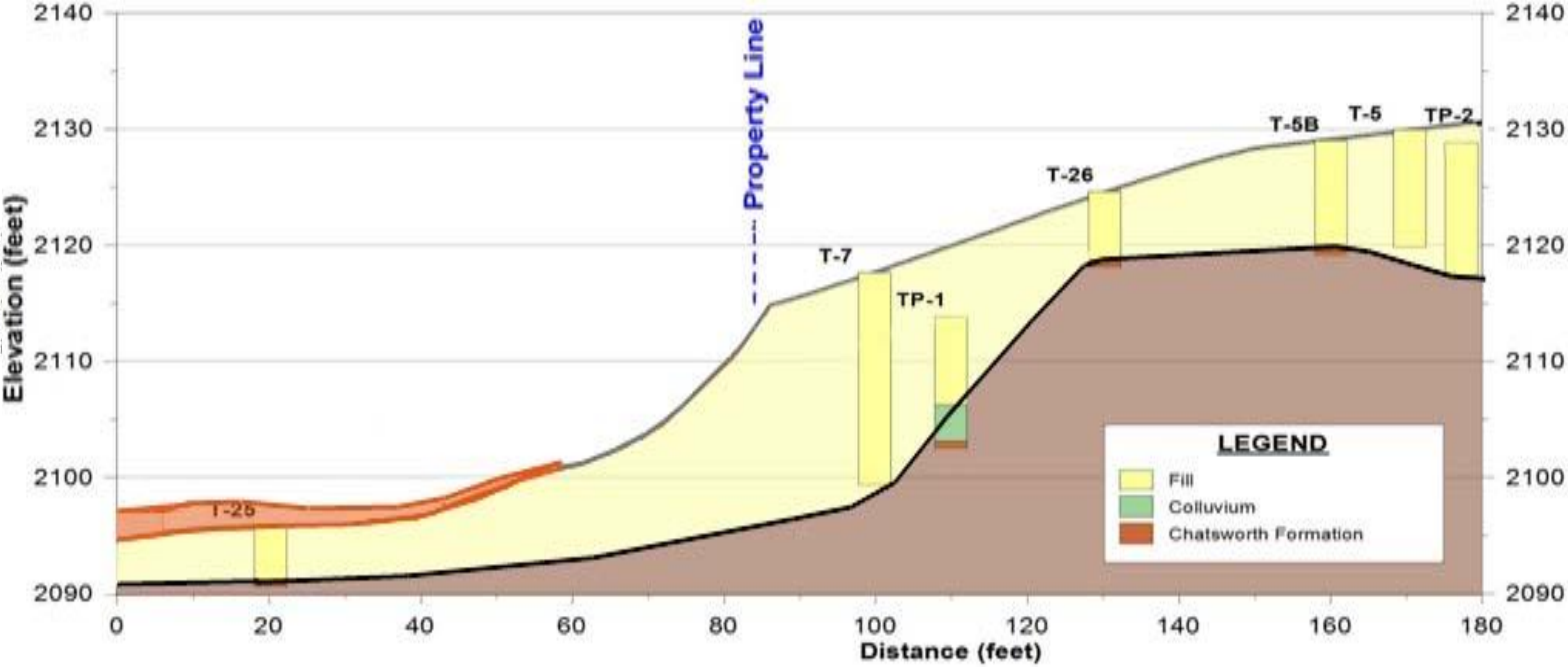
$= \sim 3{,}000\ ft^3/s$

$= \sim 400{,}000\ lb/s$

Debris Flow Potential - Debris Flow Velocity and Dimensions

80,000 lb. x 5 = 400,000 lb. *per second*

Debris Flow Potential
Debris Flow Initiation via Regressive Failure



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Conclusion

- The objective of construction guidelines and specifications is to "establish the minimum requirements to safeguard the public health, safety and general welfare through structural strength…and to provide safety to fire fighters and emergency responders during emergency operations."

  - California Building Standards Code