



LAND SURVEYING • CIVIL ENGINEERING • COMPACTION TESTING

# *Drainage Study*

*For:*

***Doug Aadland***  
***22351 Saint Mina Court***  
***Colton, Ca 92324***

***On a 13.81 Acre Parcel***

*Located at:*

***Nielson & Braceo***  
***Phelan***  
***San Bernardino County***  
***California***

***Tentative Parcel Map No. 19621***

***APN: 3064-231-28***  
***Job No. OH0260215***

**Purpose:**

The owner of APN 3064-231-28 is proposing to divide a 13.81 Acre site into four (4) parcels and a remainder. The purpose of this study is to determine whether this site is impacted by off-site drainage flows, and if so; how much and what measure may be necessary to protect the future structures from these flows. This study will also determine whether a drainage easement should be dedicated for any of these flows, and what size it should be.

**Background:**

This parcel lies on the Southeast corner of Braceo Street and Nielson Road in the Oak Hills Area. This parcel is the Remainder Parcel of Parcel Map No. 18754 PMB 242/7-8 and a portion of Parcel 1 of Parcel Map No. 10232 PMB 117/92-93. Parcel Map 10232 dedicated a 110 foot wide San Bernardino County Drainage Easement (SBCDE) through this portion of the site.

**Research Data:**

The topographical data that was obtained for this land division is shown on Tentative Parcel No. 19621. This topographic data shows that the overall slope of the site is to the North at approximately 3%. A ravine, approximately forty (40) foot in depth traverses the site in a northerly direction with a top width estimated to be 800 feet across. The 110 foot wide SBCDE is located in the bottom of this ravine.

It was found from a review of the Baldy Mesa and Cajon Quadrangle Map that the ravine's drainage originates from the ridgeline of the Cajon Pass, approximately five (5) miles to the south of this site. An area determination for the size of the ravine's watershed was measured with a digital planimeter of the quad maps. The approximate area was calculated to be 1,740 acres. See attached Quad Map.

Upon additional research of other adjoining parcel maps with a relationship to the existing 110 foot wide drainage easement on this site, it was found that other similarly sized easements were dedicated. Parcel Map 14249, PM 10634, PM10907, PM15993 and PM 13152 northerly of this site contain dedications for this SDCDE to Phelan Road where it increases in size and continues north. Additional dedications exist southerly of the site as well.

**Runoff Calculation:**

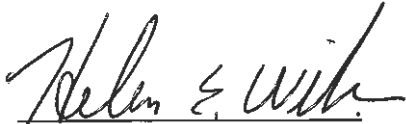
The catchment area for the ravine has a watershed of approximately 1,740 acres. The 100 year 1 Hour storm Isohyetals for this drainage area vary between 1.15 inches to 1.50 inches. This elongated watershed is approximately 5 miles in length and therefore has an anticipated time of concentration of less than 60 minutes. The runoff yield for this watershed is anticipated to be 1.2cfs/ac giving an anticipated runoff of less than 2, 088cfs.

**Channel/Right of Way Sizing:**

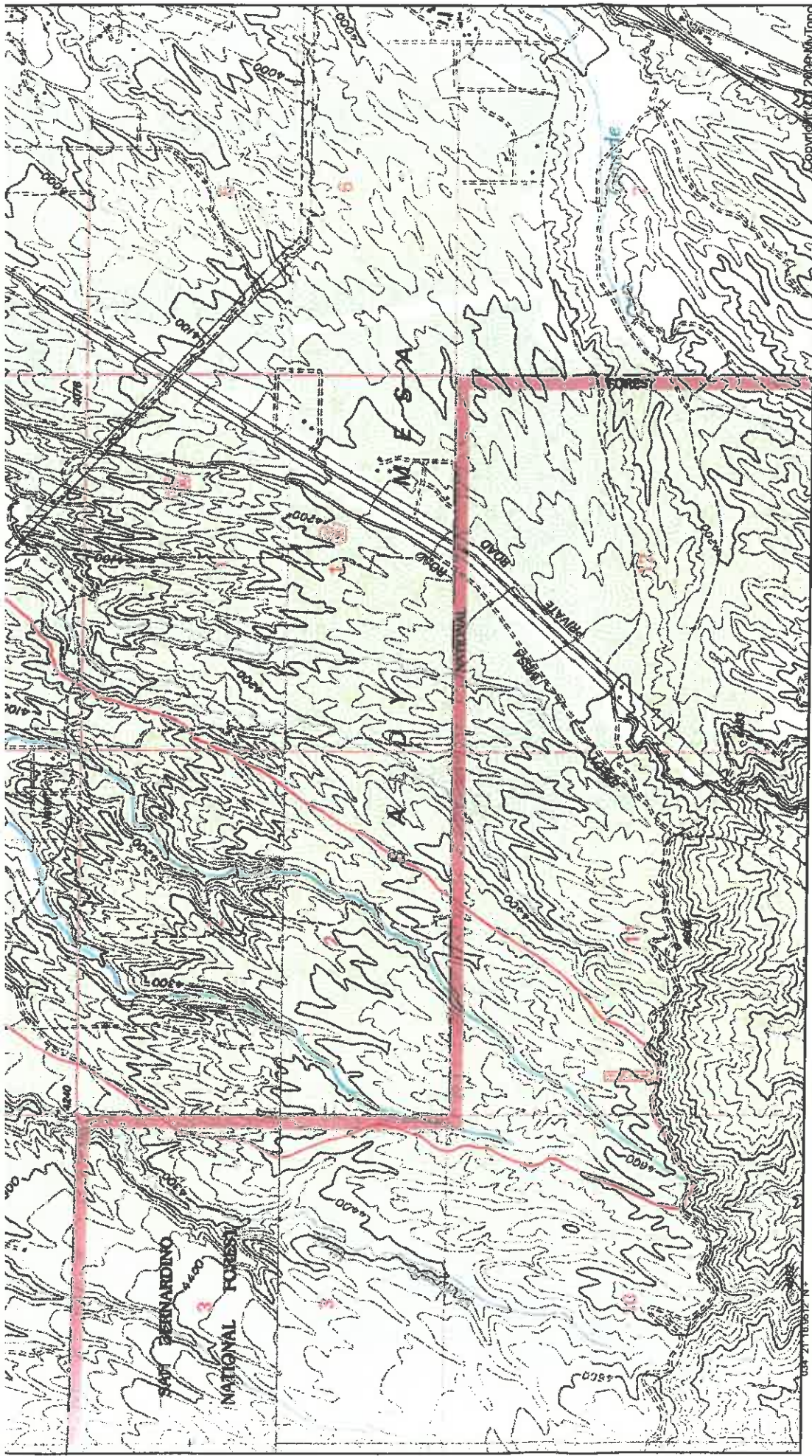
Using a 12 foot wide trapazodial channel with 3:1 side slopes, the anticipated flow requires a right-of-way of 110 feet. See attached calculations.

**Recommendations:**

The site has sufficient room to create the five parcels that have building areas outside the natural flow path. The existing 110 foot wide drainage easement is sufficient to construct a future channel and additional right-of-way is not necessary.

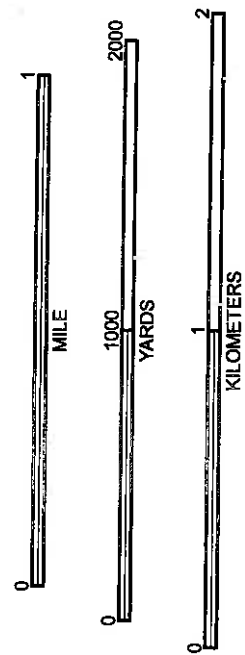
  
Helen E. Wilson, PE 46907





(TELEGRAPH PEAK) (SILVERWOOD LAKE)  
 Printed: Mar Apr 15, 2015 Copyright (C) 2008 MyTopo  
 117° 30' 5.0068" W 117° 28' 1.5507" W

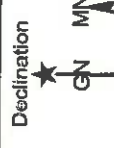
(CAJON)  
 SCALE 1:24000



CONTOUR INTERVAL 20 FEET  
 NATIONAL GEODETIC VERTICAL DATUM 1929

Produced by MyTopo Terrain Navigator  
 Topography based on USGS 1:24,000 Maps  
 North American 1983 Datum (NAD83)  
 Lambert Conformal Conic Projection

To place on the predicted North American 1927 move the  
 projection lines 0MN and 81M W



GN 0° 16' W  
 MN 12° 10' E

7.0

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Future Flood Channel  
Doug Aadland  
PM 19621  
OH0260215  
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Program License Serial Number 4057  
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\*\*\* Improved Channel Analysis \*\*\*

Upstream (headworks) Elevation = 100.000(Ft.)  
Downstream (outlet) Elevation = 97.500(Ft.)  
Runoff/Flow Distance = 100.000(Ft.)  
Maximum flow rate in channel(s) = 2088.000(CFS)  
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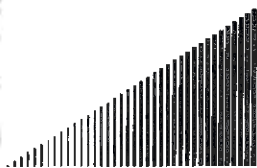
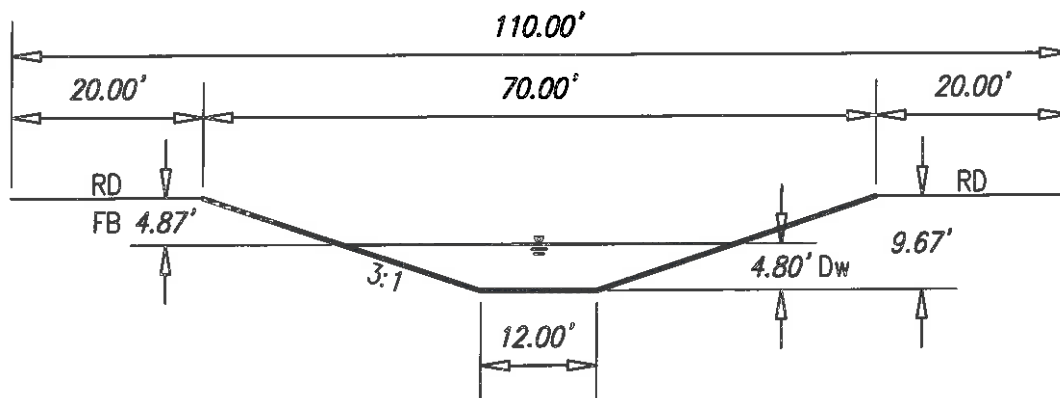
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\*\*\* CALCULATED DEPTH DATA AT FLOW = 2088.00(CFS) \*\*\*

Channel base width = 12.000(Ft.)  
Slope or 'Z' of left channel bank = 3.000  
Slope or 'Z' of right channel bank = 3.000  
Manning's 'N' = 0.030  
Maximum depth of channel = 10.000(Ft.)  
Flow(q) thru channel = 2088.000(CFS)  
Depth of flow = 4.830(Ft.)  
Average velocity = 16.318(Ft/s)  
Total flow rate in 1/2 street = 2088.000(CFS)  
Channel flow top width = 40.982(Ft.)  
Depth of flow in channel = 4.83(Ft.)

Total number of channels (same dimensions) = 1  
Flow Velocity = 16.32(Ft/s)  
Individual channel flow = 2088.000(CFS)  
Total capacity of channel(s) = 2088.000(CFS)

Sub-Channel No. 1 Critical depth = 6.188(Ft.)  
' ' ' Critical flow top width = 49.125(Ft.)  
' ' ' Critical flow velocity= 11.041(Ft/s)  
' ' ' Critical flow area = 189.105(Sq.Ft)



**CUBIT  
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**CHANNEL DETAIL  
 PM 19621**

**APN 3064-231-28**

**OH0260215**

**DETAIL - 1**