



11/14/2017

Verizon Wireless Cell Site Necessity Case Hillsborough

Prepared by Verizon Wireless
RF Engineering



Introduction:

There are two main drivers that prompt the creation of a cell site project, coverage and/or capacity. Most sites provide a mixture of both, but increasingly some sites are pure capacity.

Coverage is the need for expanded service often requested by our customers or emergency services personnel. While this initially meant providing coverage in vehicles, as usage patterns have shifted this now means improving coverage inside of buildings.

Capacity is the need for more bandwidth of service. In the simplest form this means a cell site can handle a limited number of voice calls, data mega bites, or total number of active users. When any one of these limits are met the user experience within the coverage area of that cell quickly starts to degrade during the busier hours of use.



Coverage is best shown in coverage maps. We use tools that take into account terrain, vegetation, building types, and cell site specifics to show predictions of the existing coverage and what we expect to see with a given cell site. The prediction models make some assumptions such as that the antennas are above the nearby ground clutter (Buildings and vegetation). Once the antennas fall below the ground clutter the models become inaccurate and cannot tell that specific trees or buildings are blocking the RF signal. Due to this, modeling of tower height requirements is frequently not accurate.



Capacity is best shown in graphs of usage growth and projected exhaustion. We utilize sophisticated programs to model current usage growth and project it into the future to determine when additional capacity will be required. The algorithms that predict capacity growth output numbers that are not easily explained. Since it takes 2-3 years on average to complete a cell site project, we have to be looking about 3 years into the future to meet future customer demand.

While data capacity may not seem urgent, beginning in 2014 voice traffic will begin to migrate from the older 3G voice technology to 4G VoLTE (Voice over IP). This will add additional load to the 4G network. Since voice is delay sensitive, exhaustion of the data network can cause degradation of voice calls including 911 calls.



“Why do you need a site here???”

A good capacity cell will be close to the user population and have the traffic evenly spread around the site. When we cannot get a location that accomplishes being close to the customers and central to the usage, we end up having to build additional cells to meet the demands for service. Capacity sites are generally lower in height than a coverage site with a full cell needing to be above the ground clutter and a small cell being one that is at or below the ground clutter.

Where our customers use their wireless devices continues to evolve. While we once needed to cover highways and business districts, we are seeing increasing issues with high growth in residential areas. Current statistics show that about 1 of 3 American households no longer have a landline phone. To serve this need we have to increase the cells we have in or very near residential areas.



The attached capacity projection shows existing usage on the following macro sites.

SAN MATEO – Macro site is located in the City of San Mateo. Sector 3 covers part of Hillsborough area.

EL CAMINO HOWARD – Macro site is located in the City of Burlingame. Sectors 2 and 3 covers part of Hillsborough area.

HWY 101 & 3RD – Macro site is located in the City of San Mateo. All of its sectors covers part of Hillsborough area.

HILLSBOROUGH – Macro site is located in the City of Burlingame. The site is designed to provide coverage along HWY 280.

HWY 280 HILLSIDE - Macro site is located in the City of Burlingame. The site is designed to provide coverage along HWY 280.

EL CAMINO REAL & ADELINE - Macro site is located in the City of Burlingame. Sector 2 covers part of Hillsborough area.

The red lines show capacity limitations for each measure and the orange line is the projected line. The ASEU measure will be the first to exhaust. This indicates that based on the amount of data and the users distance from the cell we see the site is already experiencing degradation. This is due to the fact that the macro sites that provide coverage on the City of Hillsborough are located way outside of the City of Hillsborough. The proposed small cell nodes will improve cell coverage in the area and thus add capacity ensuring continued service quality.



SAN MATEO MACRO

Macro site is located in the City of San Mateo. Sector 3 covers part of Hillsborough area.

BRIEF DESCRIPTION:

FDV: Forward Data Volume (MB).

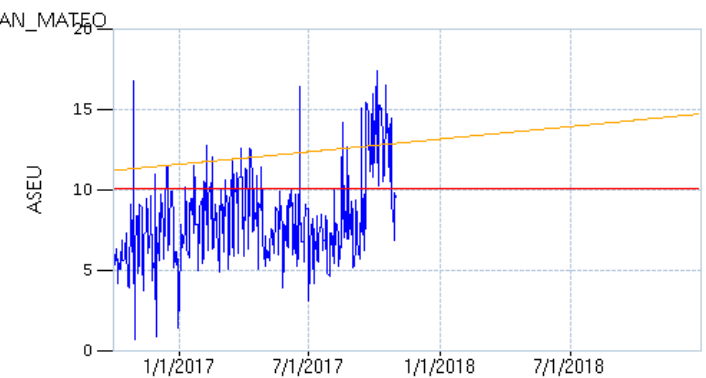
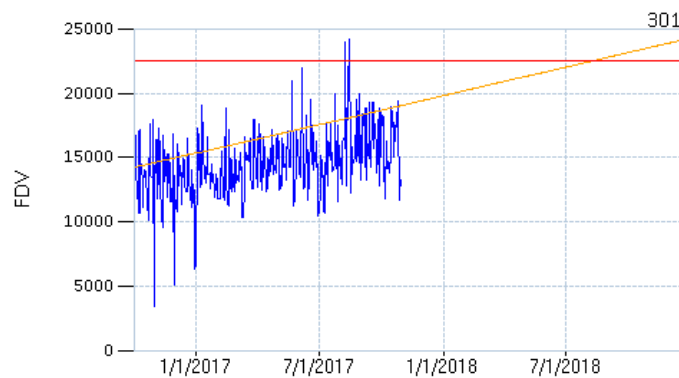
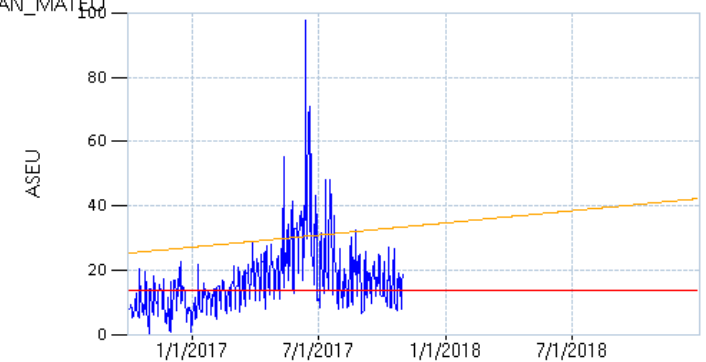
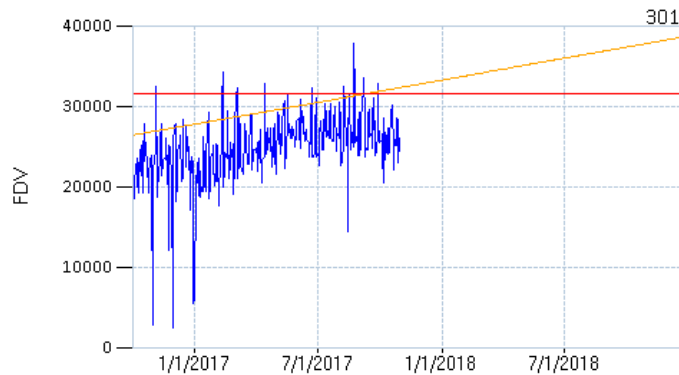
This metric show the amount of data the site carries.

ASEU: Average Eligible Users per TTI.

This means if this metric goes above the threshold the user will experience data throughput of less than 5Mbps.

The Red Line shows capacity limitations for each measure.

The Orange Line is the projected line.





EL CAMINO HOWARD MACRO

Macro site is located in the City of Burlingame. Sectors 2 and 3 covers part of Hillsborough area.

BRIEF DESCRIPTION:

FDV: Forward Data Volume (MB).

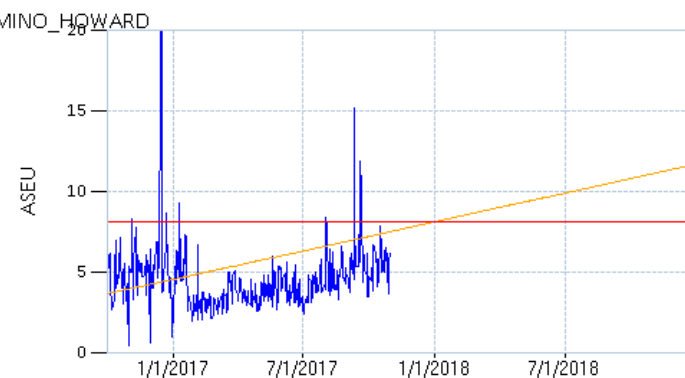
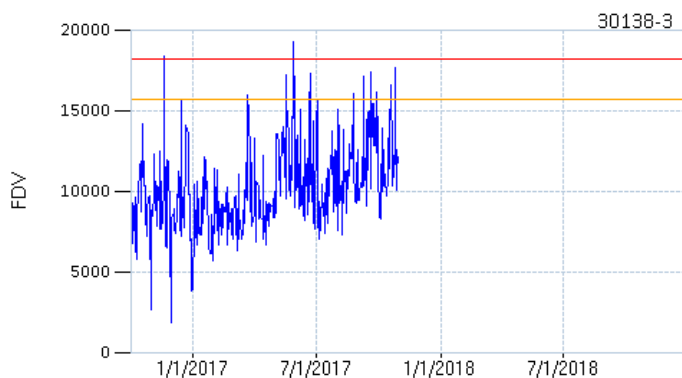
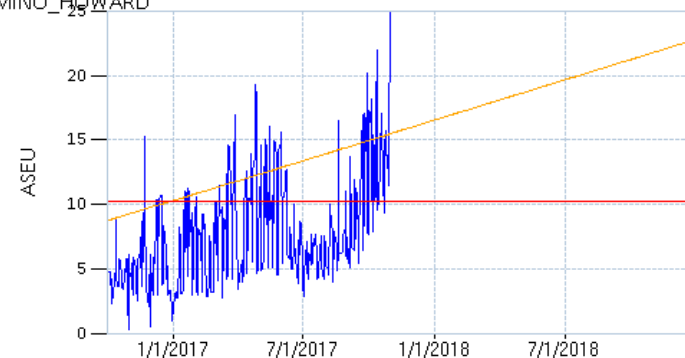
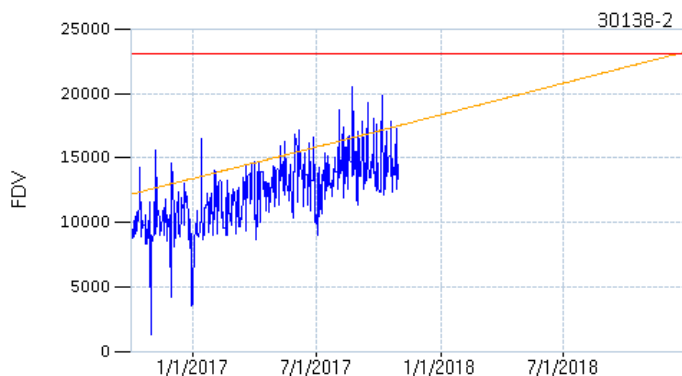
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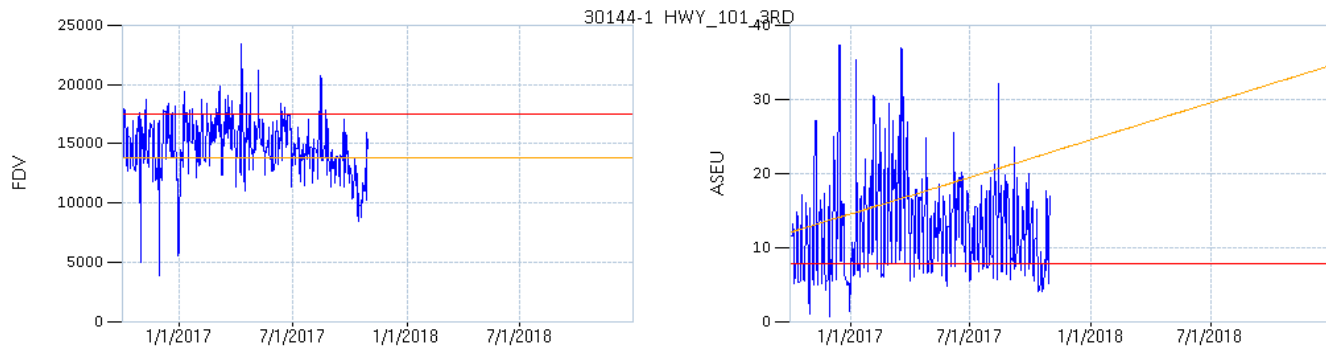
The Orange Line is the projected line.





HWY 101 & 3rd MACRO

Macro site is located in the City of San Mateo. All of its sectors covers part of Hillsborough area.



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FDV: Forward Data Volume (MB).

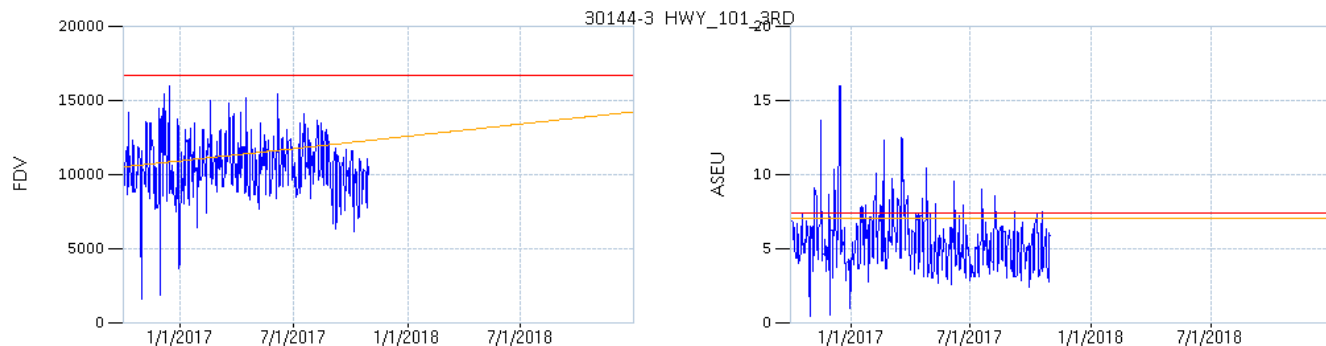
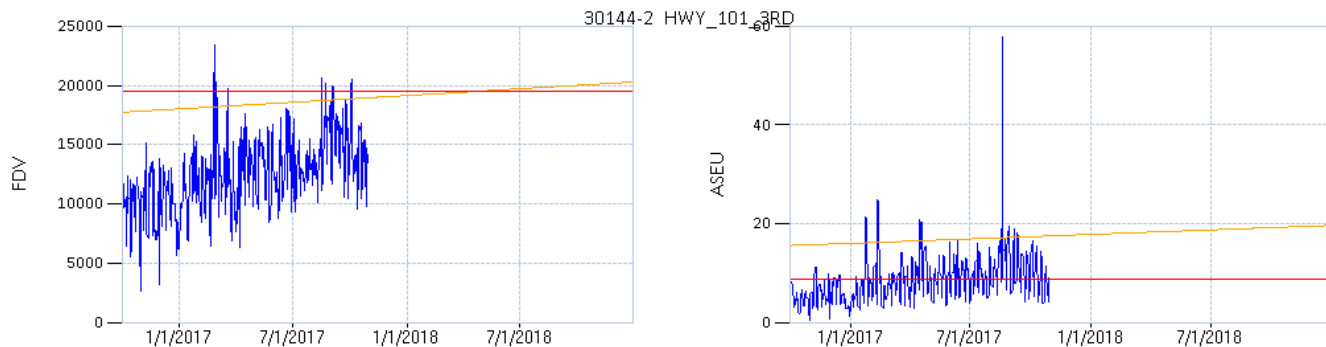
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HILLSBOROUGH MACRO

Macro site is located in the City of Burlingame. The site is designed to provide coverage along HWY 280.

BRIEF DESCRIPTION:

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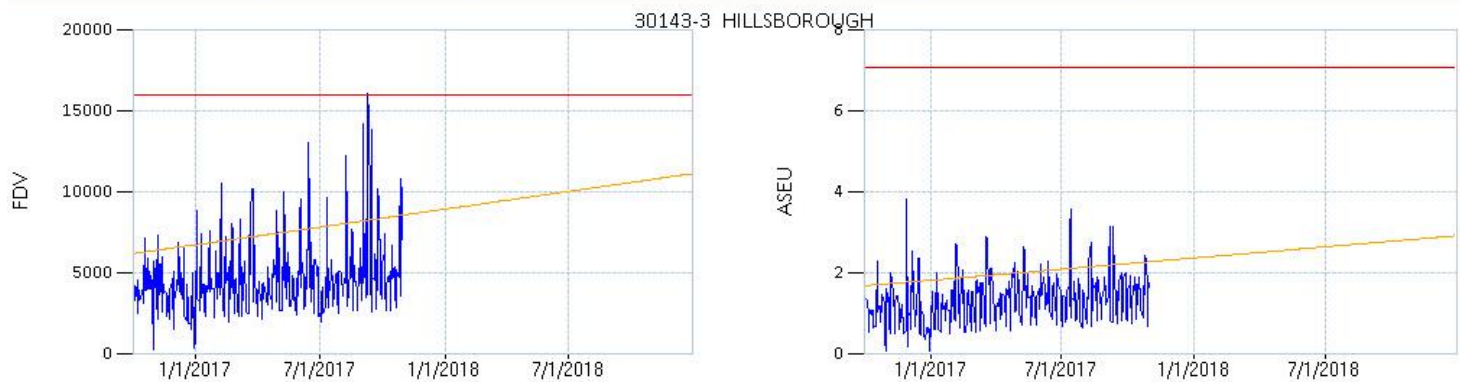
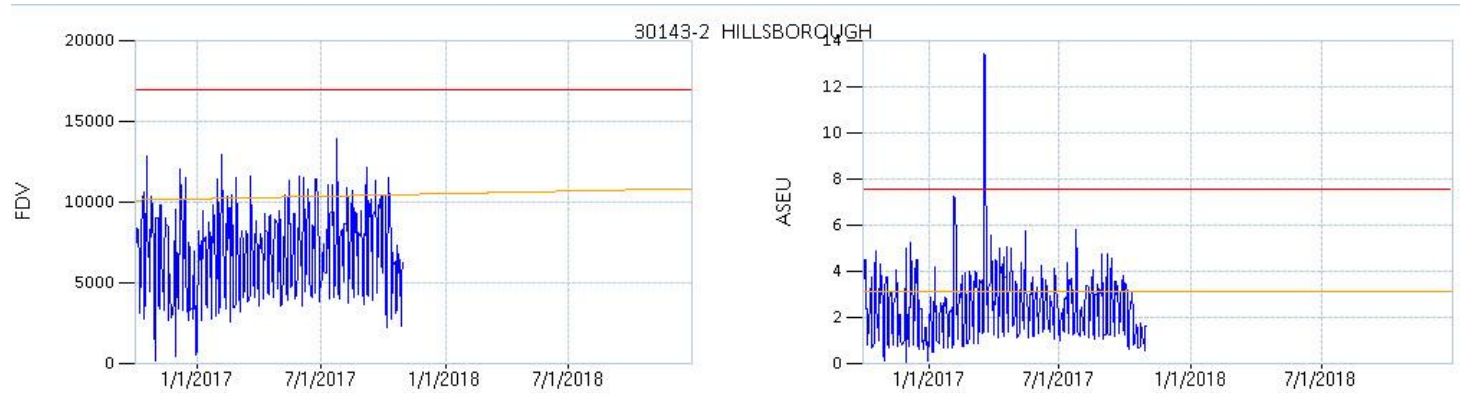
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HWY 280 HILLSIDE MACRO

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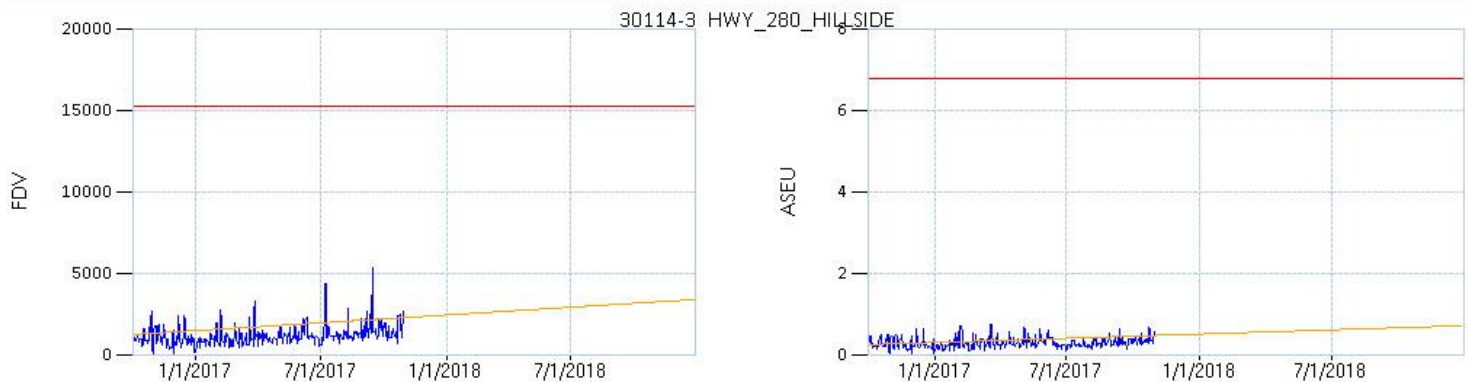
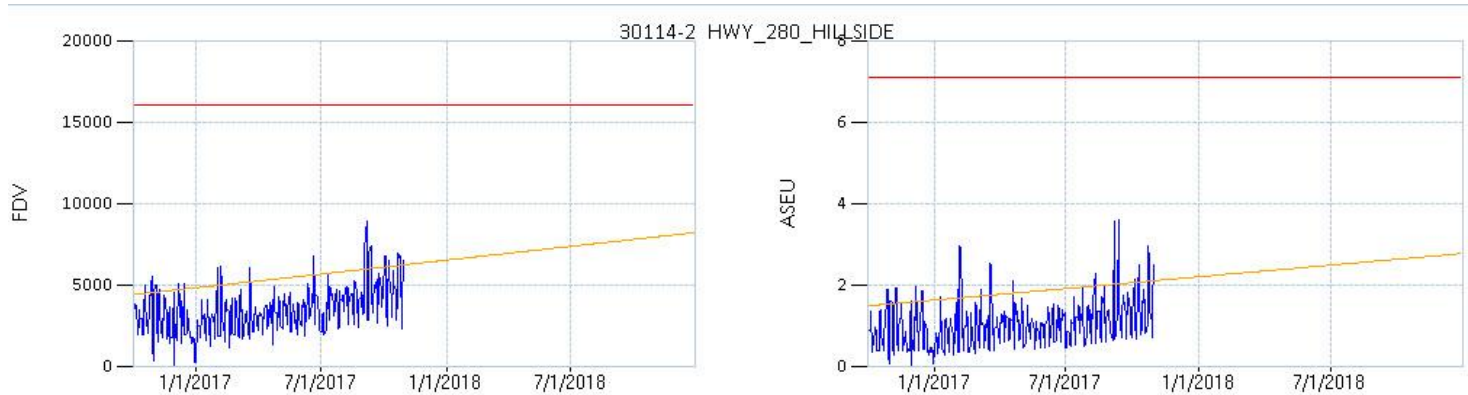
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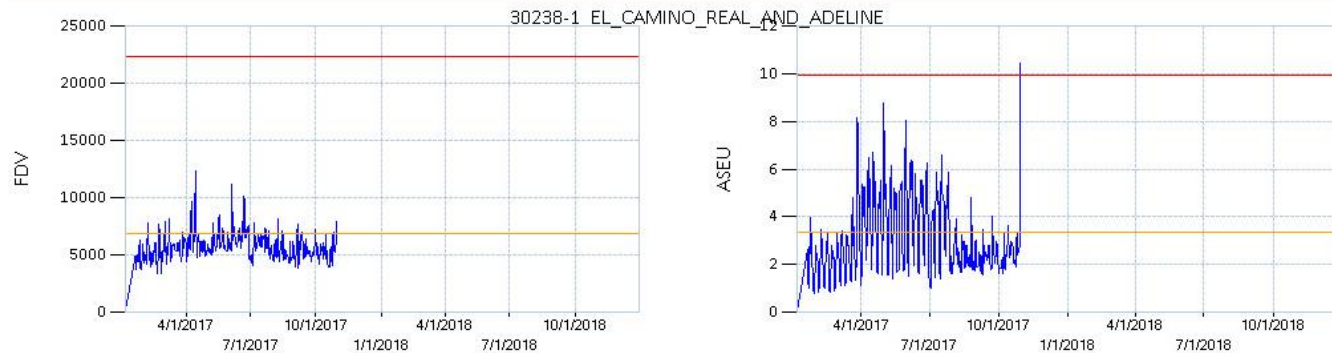
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EL CAMINO REAL & ADELINE MACRO

Macro site is located in the City of Burlingame. Sector 2 covers part of Hillsborough area.



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