

# Commercial Wholesale Web Portal 2

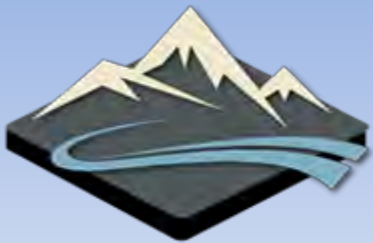
Providing Caltrans' Traveler Information Data  
to Third Party Developers

Sean Campbell

California Department of Transportation

Division of Research, Innovation and System Information

[sean.campbell@dot.ca.gov](mailto:sean.campbell@dot.ca.gov)



Western States

Rural Transportation  
Technology Implementers

Forum



# Western States Forum Presentations - 2006 to 2013

[2006 – Caltrans D9 Mountain Pass Signs](#)  
[2007 – Weather Warning Systems in Oregon](#)  
 2007 – Weigh-In-Motion Not Done on a WIM  
[2008 – A Tale of Two RWISs](#)  
[2008 – WSDOT Field Test of Wireless and Microwave VDS](#)  
 2008 - Hand Held Terminal Demo  
 2008 – Portable ITS Trailer Demon  
[2009 – Ground System Design and its Roll in ITS](#)  
[2009 – Automatic Traffic Data Collection Using CCTV](#)  
[2009 – Run-Away Truck Escape Ramp: A Trucker’s Safety Net](#)  
[2009 – Simple Network Contact Closure Demo](#)  
[2009 – Hand-Held Terminal Demo Part II](#)  
[2010 – Automated Safety Warning Controller](#)  
[2010 – Field Experiments with Bluetooth Devices](#)  
[2011 – Photovoltaic Power System for Rural ITS](#)  
[2011 – Antenna Characterization for Bluetooth](#)  
[2011 – MAC Address-based Delay Measurements](#)  
[2012 – Travel Times Using Bluetooth](#)  
[2012 – Mobile ITS Hotspot Trailers](#)  
[2012 – Using Wireless Data Collection Units](#)  
[2013 – Design and Implementation of Video for Rural ITS](#)  
[2013 – Automated Wind Warning Systems](#)  
[2013 – Bike Detection in California](#)

[2006 – Redding Responder Project](#)  
[2010 – ShakeCast](#)  
[2010 – Support and Asset Inventory Management of ITS Devices](#)  
[2010 – Mobile Inspection System](#)  
[2011 – Voice Communications in Rural Areas \(Voting Scan\)](#)  
[2011 – Redefining the Path to ITS Standards Training](#)  
[2012 – CHP Rapid Response Vehicle](#)  
[2013 – Procuring the ATC for ODOT](#)  
[2013 – Idaho’s Winter Performance Measures](#)  
[2013 – Error Assessment for Emerging Traffic Data Collection](#)

[2006 – Web-Based Field Element Control](#)  
 2007 – Improving Traffic Data Collection  
[2009 – Idaho Traffic Management System \(ITMS\) Demo](#)  
[2011 – IRIS Open Advanced Traffic Management System](#)  
[2011 – Avoiding the Remote Callout](#)  
[2011 – The Power of Information](#)  
[2012 – Field Element Network Design for TMCs, Part 1](#)  
[2012 – Field Element Network Design for TMCs, Part 2](#)  
[2013 – CCTV Image Relay](#)

[2008 – ODOT Traveler Information Systems](#)  
[2009 – Caltrans WeatherShare System](#)  
[2012 – Technical Development of the OSS](#)



[2006 – Fiber Optic Network / Topology Design](#)  
[2006 – Microwave Communications For Rural ITS](#)  
[2007 – Unlicensed Wireless Multipoint System](#)  
[2008 – TMC-TMS Communications: Overview and Demo](#)  
 2008 – Automated Radio Network Design Demo  
 2008 - Mesh Box Communications  
[2009 – Creation of Ethernet / IP Backbone System for Wyoming](#)  
[2010 – Passive Repeater Applications for Rural ITS : The Prequel](#)  
[2010 – Passive Repeater Applications for Rural ITS](#)  
[2011 – Wireless Communications for Rural ITS](#)  
[2013 – Wireless Point to Point and 3G / 4G Rural Networks](#)

[2013 – Field Element Data Quality](#)

# What are the limitations of the CWWP

- Three Big Ones

- Documentation

- What traveler information is there?
    - When is the traveler information updated?

- Data Integration

- How is traveler information going to be distributed?
    - Who is going to use this traveler information?
    - Why should this traveler information be used?

- Geospatial

- Where does the traveler information go on a map?

# What are the limitations of the CWWP

Caltrans :: Commerical WWP

www.dot.ca.gov/cwwp/PreEditPreferencesAction.do

CA .GOV CALIFORNIA DEPARTMENT OF TRANSPORTATION

Skip to: [Content](#) | [Footer](#) | [Accessibility](#)

Search Caltrans

Home Travel Business Engineering News Maps Jobs About Caltrans Contact Us

Caltrans... We're Here to Get You There

[Caltrans Home](#)

[CWWP Home](#)

[Information Page](#)

[District Map](#)

[Main Menu](#)

[Log off](#)

Logged in as:  
seandri

**Portal Manager:**  
Lawrence Wooster  
Chief, TMC Operations and  
Incident Management Branch  
1120 N Street, MS-36  
Sacramento, CA 95814  
Email:  
[larry\\_wooster@dot.ca.gov](mailto:larry_wooster@dot.ca.gov)  
Phone WK: 916-654-6104  
WCL: 916-214-8470  
Fax: 916-653-3055

## Commercial Wholesale Web Portal

### Add/Remove Favorites

**Instructions:**  
"Your Current Favorites List" shows items that are currently included in your favorites list.  
To add an item to your favorites list, enter search criteria in the Search box and click on Search.  
Information meeting your search criteria will display in the Search Results box. (You may need to scroll down.)  
Click on Add to add an item to your your favorites list.  
Return to the main menu and select "View/Access your Favorites" to display your favorites list.

Your Current Favorites List		
Description	District	Function
<a href="#">Remove</a> CMS Locations and Status	HQ	CMS
<a href="#">Remove</a> District 8 Lane Closure Data / Daily	08	LCS
<a href="#">Remove</a> Caltrans Highway Information Network Hourly Report	HQ	RDCON
<a href="#">Remove</a> District 3 Lane Closure Files	03	LCS
<a href="#">Remove</a> District 1 Lane Closure Files	01	LCS
<a href="#">Remove</a> District 2 Lane Closure Files	02	LCS
<a href="#">Remove</a> District 4 Lane Closure Files	04	LCS
<a href="#">Remove</a> District 5 Lane Closure Files	05	LCS
<a href="#">Remove</a> District 6 Lane Closure Files	06	LCS
<a href="#">Remove</a> District 9 Lane Closure Files	09	LCS
<a href="#">Remove</a> District 10 Lane Closure Files	10	LCS
<a href="#">Remove</a> District 11 Lane Closure Files	11	LCS
<a href="#">Remove</a> District 12 Lane Closure Files	12	LCS
<a href="#">Remove</a> CMS Current Status ASCII delineated file using character of 0x98 or y	02	CMS
<a href="#">Remove</a> CMS Current Status XML File	02	CMS
<a href="#">Remove</a> CMS Read Me directory files	02	CMS
<a href="#">Remove</a> CMS Status	02	CMS
<a href="#">Remove</a> CMS Status	03	CMS
<a href="#">Remove</a> CMS Status	04	CMS
<a href="#">Remove</a> CMS Status	05	CMS
<a href="#">Remove</a> CMS Status	06	CMS
<a href="#">Remove</a> CMS Status	07	CMS
<a href="#">Remove</a> CMS Status	08	CMS
<a href="#">Remove</a> CMS Status	09	CMS
<a href="#">Remove</a> CMS Status	10	CMS
<a href="#">Remove</a> CMS Status	11	CMS

# What are the limitations of the CWWP Documentation

- There is very little or no documentation to describe the data
- Not a good way to determine what information is available or not available
- There is not a good indication of when the data updates or when it was last updated

# What are the limitations of the CWWP Data Integration

- Location and status information is typically separated into two files
- Mix mash of data sets and links to images
- Data is not easily integrated into third party applications
- The data sets were not set up to provide easy “machine to machine” integration
- Data is spread out all over the Caltrans website
- Multiple formats for data sets

# Limitations of the CWWP

## Data Integration

- Changeable Message Signs
  - 12 District data sets
  - 5 different formats
    - ATMS – D3, D8, D11, D12
    - IRIS – D1, D2, D5, D10
    - SOCCS – D6, D9
    - ATMS D4 – D4
    - ATMS D7 via LA Metro – D7
  - 12 data sets available via the CWWP
    - D3, D8, D11, D12 via the ATMS
    - D1, D4, D5, D6, D7, D9, D10 via Sean and his efforts
    - D2 via Keith and his efforts

# What are the limitations of the CWWP Geospatial

- Not all of the field elements have geospatial information
- Some of the geospatial information is difficult to use
- What coordinate system is being used
- Not all of the geospatial information is correct



# Sidebar about Longitude and Latitude

- Accuracy
  - The measurement tolerance which defines the limits of the errors made when the device is used in normal operating conditions
  - Google Maps                      30+ feet or 10+ meters
  - Cell Phone                         30 feet or 10 meters
  - Commercial GPS                 3 feet or 1 meter
  - Surveying GPS                    sub foot or centimeter
- Precision
  - the degree to which repeated measurements under unchanged conditions show the same results

# Degrees to Distance Conversion

## At -122, 41

Degrees	Longitude			Latitude		
	inches	feet	miles	inches	feet	miles
1	3301753	275146	52.11	4374889.8	364574.2	69.05
0.1	330175	27515	5.21	437489.0	36457.4	6.90
0.01	33018	2751	0.52	43748.9	3645.7	0.69
0.001	3302	275	0.052	4374.9	364.6	0.069
0.0001	330	28	0.0052	437.5	36.5	0.0069
0.00001	33	2.8	0.00052	43.7	3.6	0.00069
0.000001	3.3	0.28	0.000052	4.4	0.36	0.000069
0.0000001	0.33	0.028	0.0000052	0.44	0.036	0.0000069
0.00000001	0.033	0.0028	0.00000052	0.044	0.0036	0.00000069
0.000000001	0.0033	0.00028	0.000000052	0.0044	0.00036	0.000000069
0.0000000001	0.00033	0.000028	0.0000000052	0.00044	0.000036	0.0000000069

Degrees	Longitude			Latitude		
	centimeters	meters	kilometers	centimeters	meters	kilometers
1	8386453	83864.5	83.86	11112220	111122.2	111.12
0.1	838645	8386.5	8.39	1111222	11112.2	11.11
0.01	83865	838.6	0.84	111122	1111.2	1.11
0.001	8386	83.9	0.084	11112	111.1	0.11
0.0001	839	8.4	0.0084	1111	11.1	0.011
0.00001	84	0.84	0.00084	111	1.1	0.0011
0.000001	8.4	0.084	0.000084	11	0.11	0.00011
0.0000001	0.84	0.0084	0.0000084	1.1	0.011	0.000011
0.00000001	0.084	0.00084	0.00000084	0.11	0.0011	0.0000011
0.000000001	0.0084	0.000084	0.000000084	0.011	0.00011	0.00000011
0.0000000001	0.00084	0.0000084	0.0000000084	0.0011	0.000011	0.000000011

# Longitude, Latitude Precision – 6 Decimal Places

41.738757, -122.626588

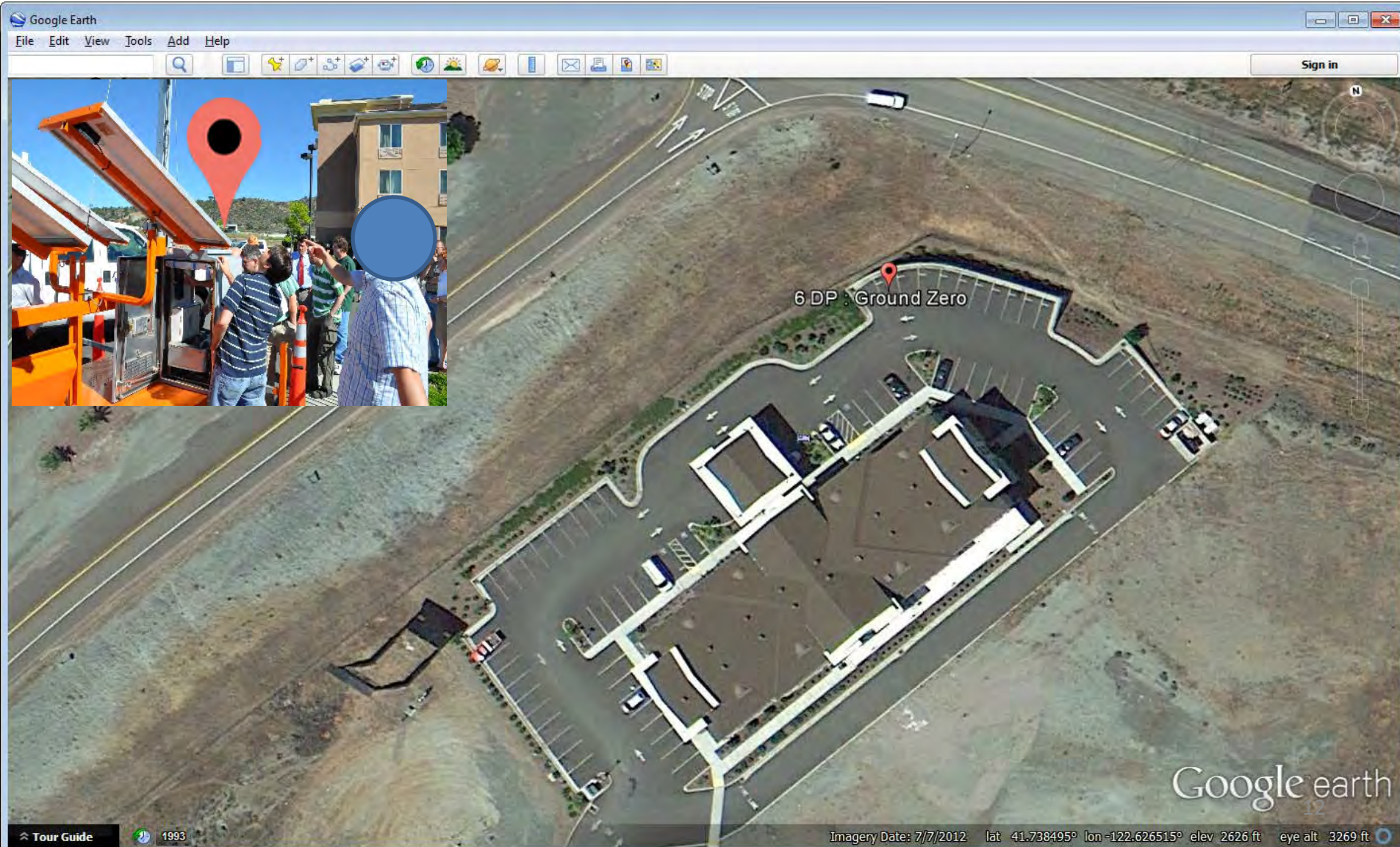
- $\pm 0.000001$  degree
- Longitude  $\pm 3.3$  in, 8.4 cm
- Latitude  $\pm 4.3$  in, 11.1 cm
- 0 in or 0 cm from ground zero



# Longitude, Latitude Precision – 6 Decimal Places

41.738757, -122.626588

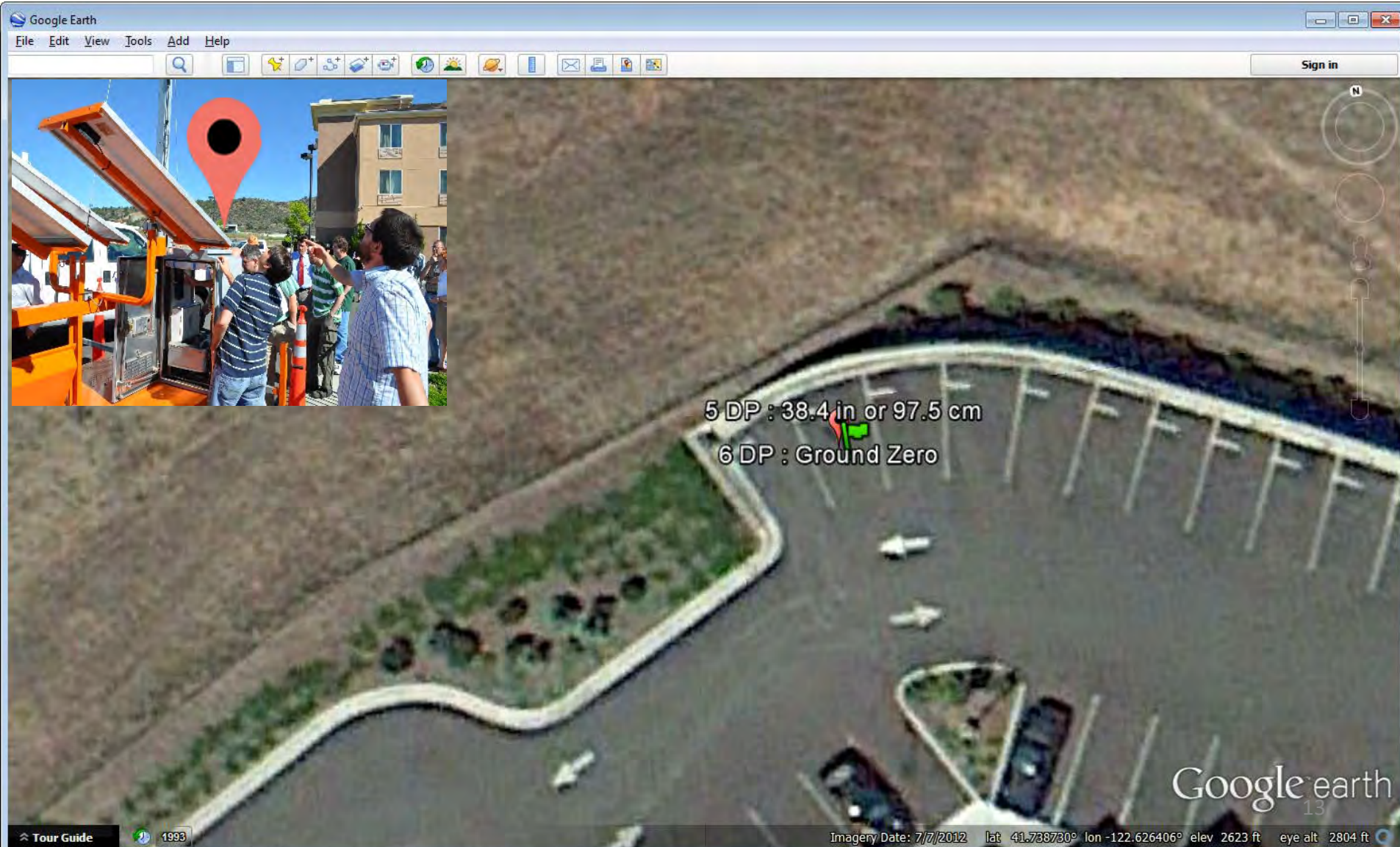
- $\pm 0.000001$  degree
- Longitude  $\pm 3.3$  in, 8.4 cm
- Latitude  $\pm 4.3$  in, 11.1 cm
- 0 in or 0 cm from ground zero



# Longitude, Latitude Precision – 5 Decimal Places

## 41.73875, -122.62658

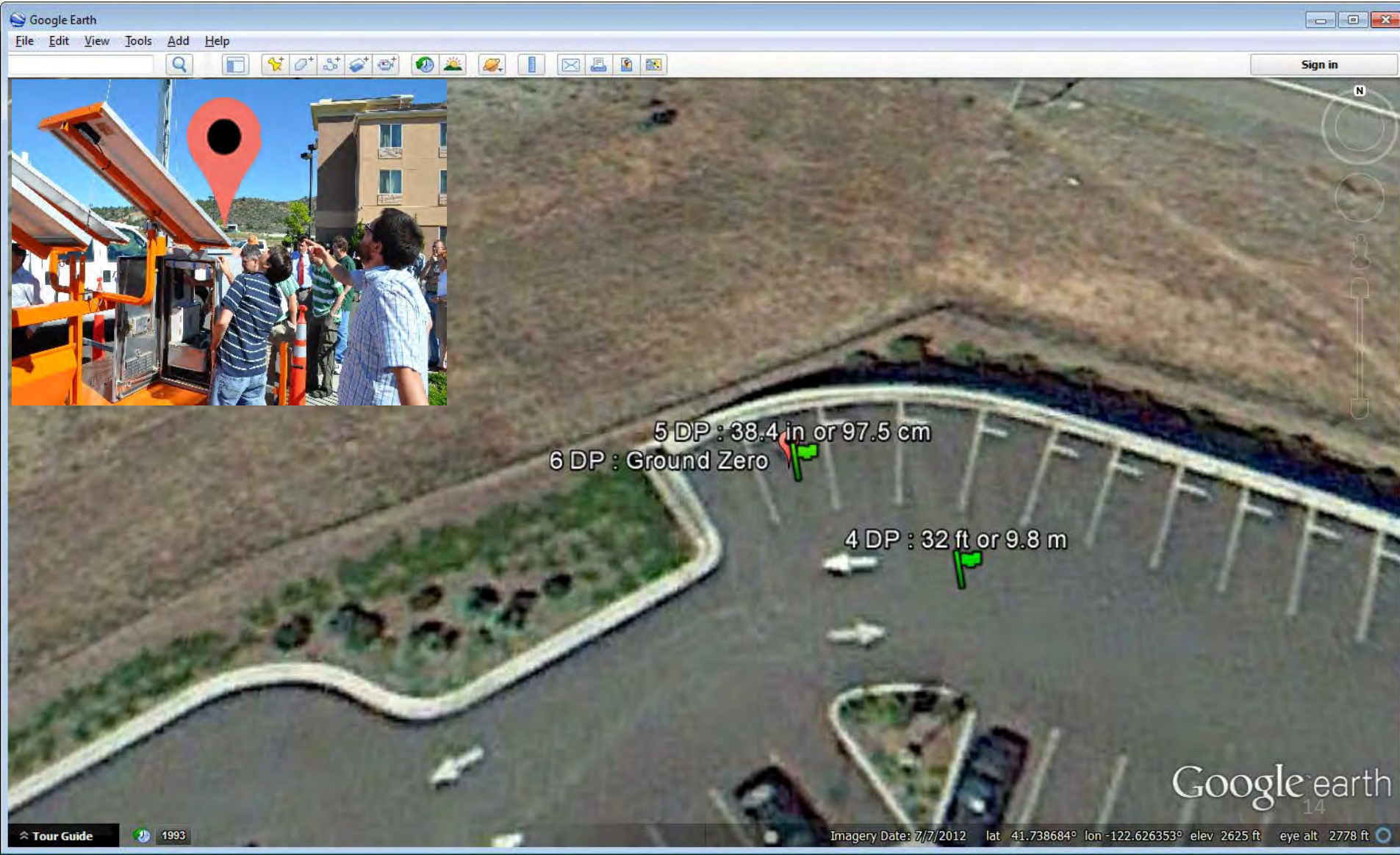
- $\pm 0.00001$  degree
- Longitude  $\pm 33.0$  in or 83.9 cm
- Latitude  $\pm 43.7$  in or 111 cm
- 38.4 in or 97.5cm away from ground zero



# Longitude, Latitude Precision – 4 Decimal Places

41.7387, -122.6265

- $\pm 0.0001$  degree
- Longitude  $\pm 27.5$  ft, 8.39 m
- Latitude  $\pm 36.5$  ft, 11.1 m
- 32 ft or 9.8 m away from ground zero



# Longitude, Latitude Precision – 3 Decimal Places

41.738, -122.626

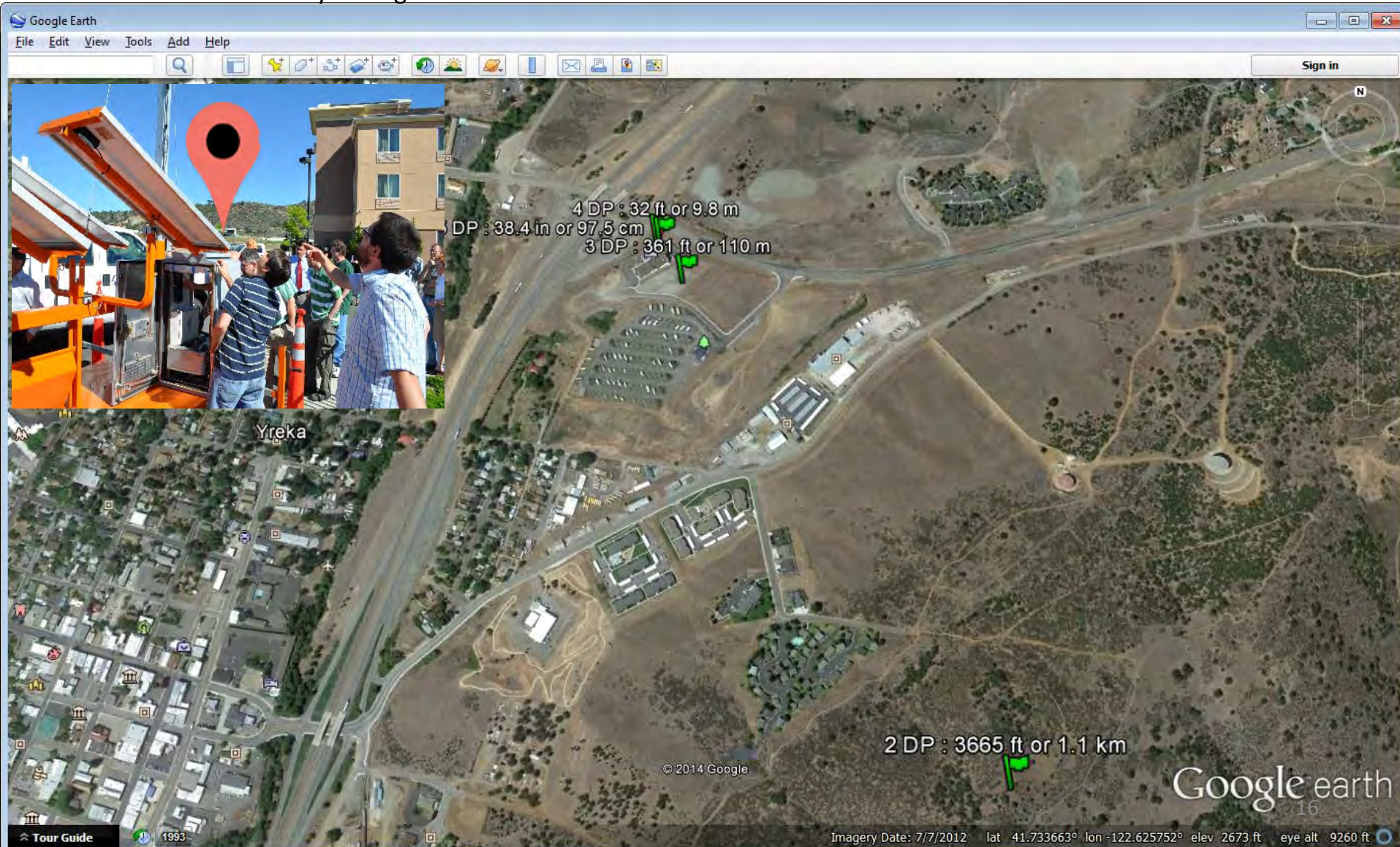
- $\pm 0.001$  degree
- Longitude  $\pm 275$  ft, 83.9 m
- Latitude  $\pm 364$  ft, 111 m
- 320 ft or 97.5 m away from ground zero



# Longitude, Latitude Precision – 2 Decimal Places

41.73, -122.62

- $\pm 0.01$  degree
- Longitude  $\pm 2751$  ft, 838 m
- Latitude  $\pm 3645$  ft, 1111 m
- 3665 ft or 1117 m away from ground zero

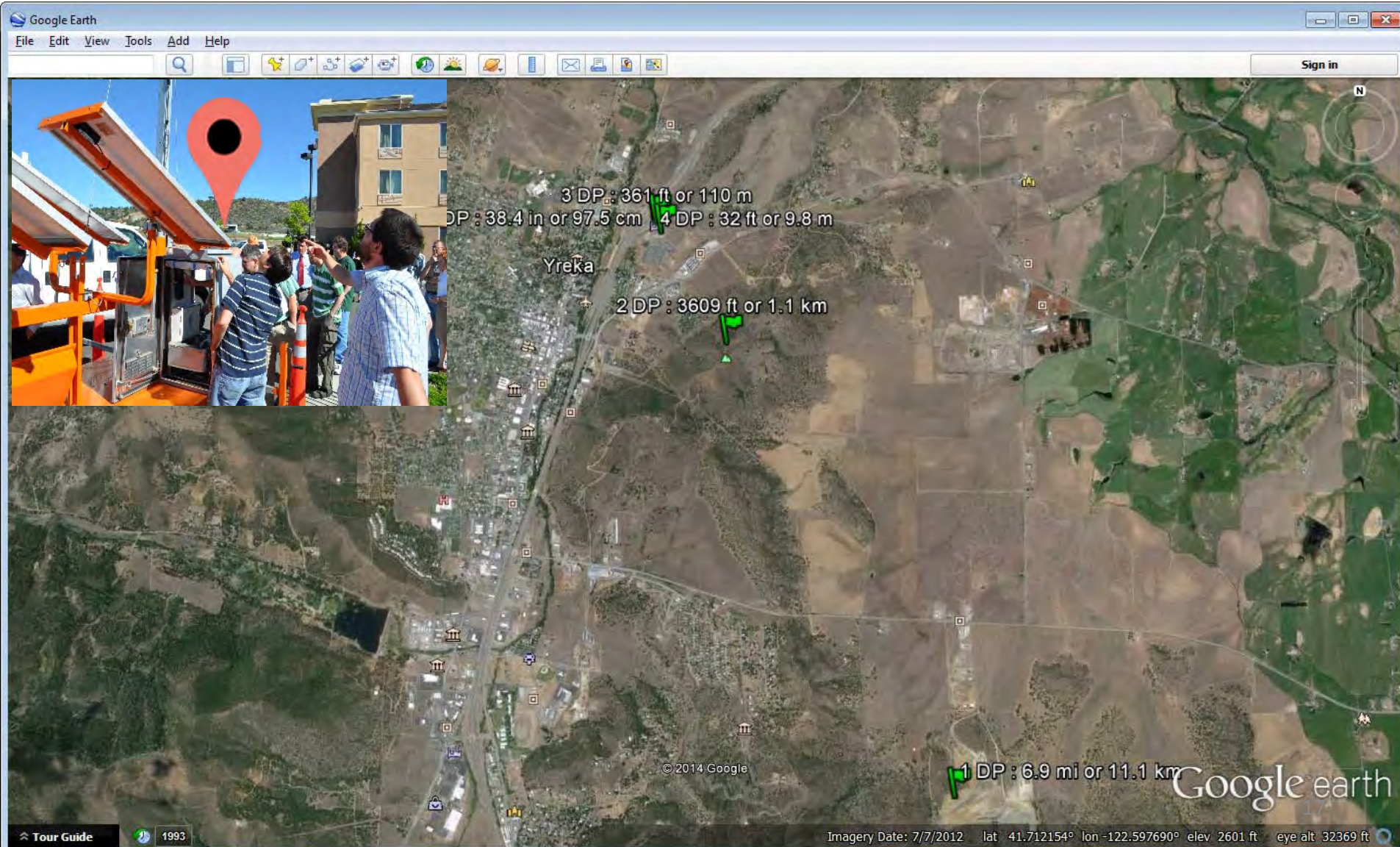




# Longitude, Latitude Precision – 1 Decimal Places

41.7, -122.6

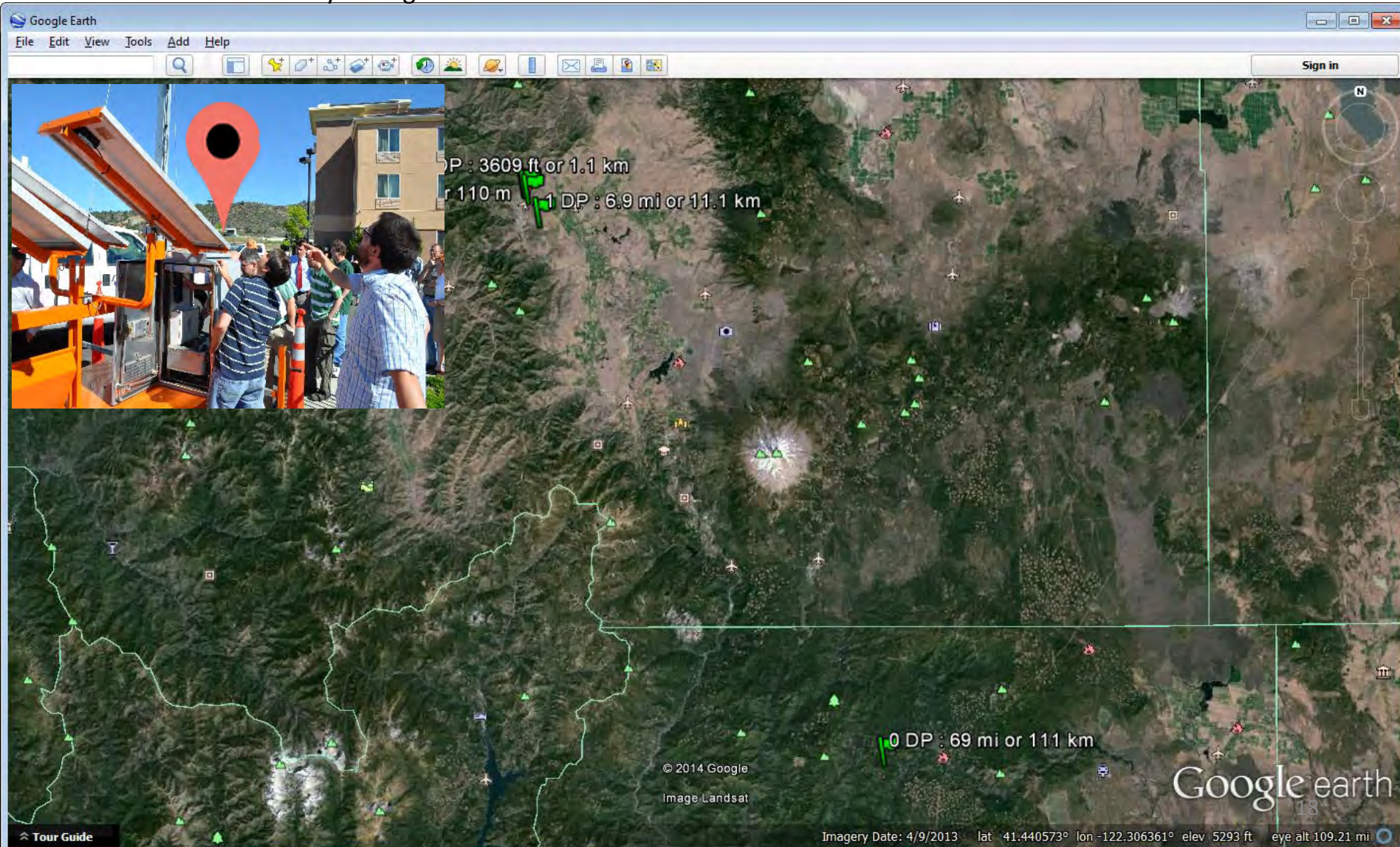
- $\pm 0.1$  degree
- Longitude  $\pm 5.21$  mi or 8.39km
- Latitude  $\pm 6.90$  mi or 11.10 km
- 3.01 mi or 4.84 km away from ground zero



# Longitude, Latitude Precision – 0 Decimal Places

## 41, -122

- $\pm 1$  degree
- Longitude  $\pm 52.1$  mi or 83.9km
- Latitude  $\pm 69.1$  mi or 111 km
- 60.5 mi or 97.4 km away from ground zero



# 41.738757, -122.626588 vs 41.738757, 122.626588

- 28,439,294 ft away from ground zero
- 5386.23 mi away from ground zero



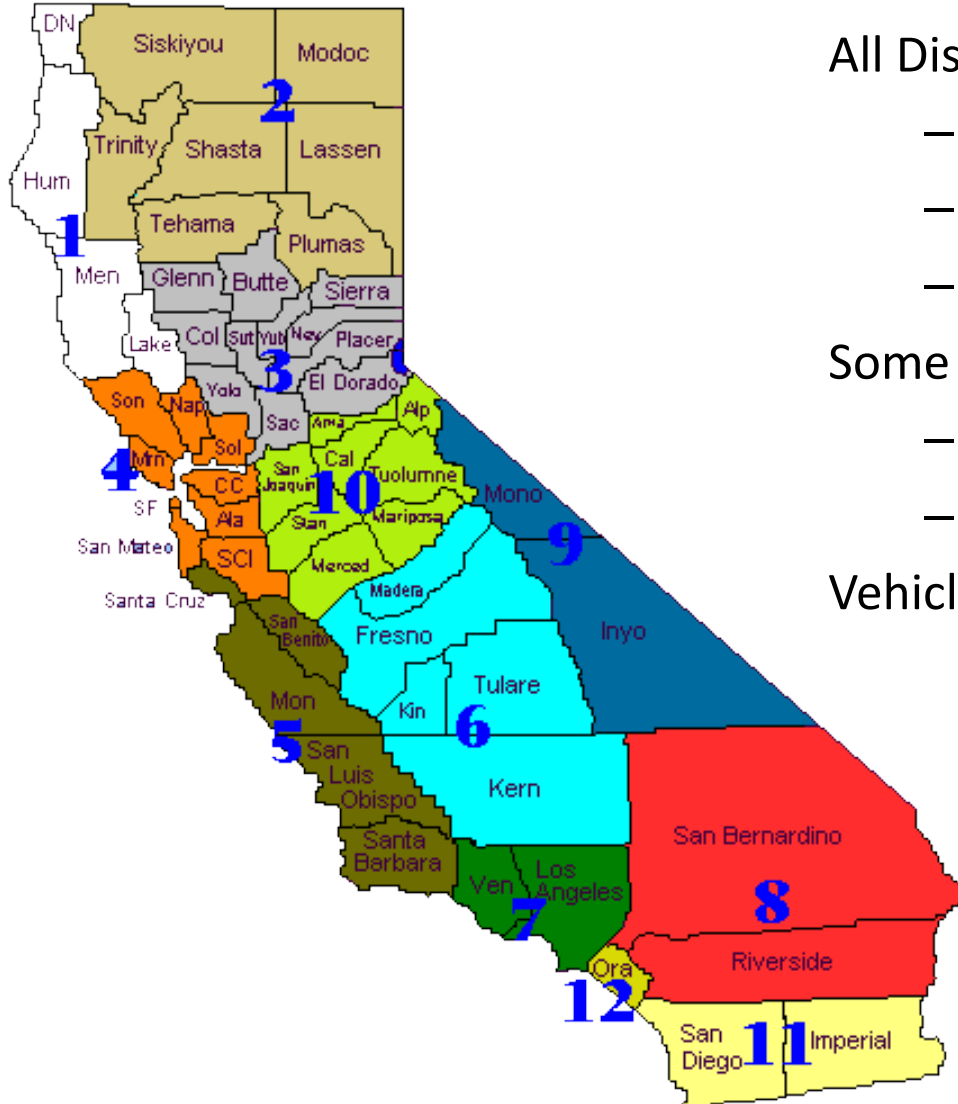
# Philosophy of the CWWP2

- Eliminate the CWWP limitations
  - Documentation, Data Integration, Geospatial
- Retrieve the District status data as close to the source as possible
- Provide accurate geospatial information
- Standardize the output of the CWWP2 to useful formats so that others can integrate this data into their applications
- Simplify data retrieval by third parties as much as possible
- Minimize or eliminate the use of private data sets
- Convert current applications to use CWWP2 data

# Designing the CWWP2

- Which data sets should we consider?
- Where does the traveler information come from?
- One massive all traveler information data set or individual field elements?
- One massive statewide file or individual District files?
- What information should be included in each dataset?
- What formats should the datasets be in?
- How often to update the datasets?
- Where to put the finished products?

# Designing the CWWP2



All Districts have at least one:

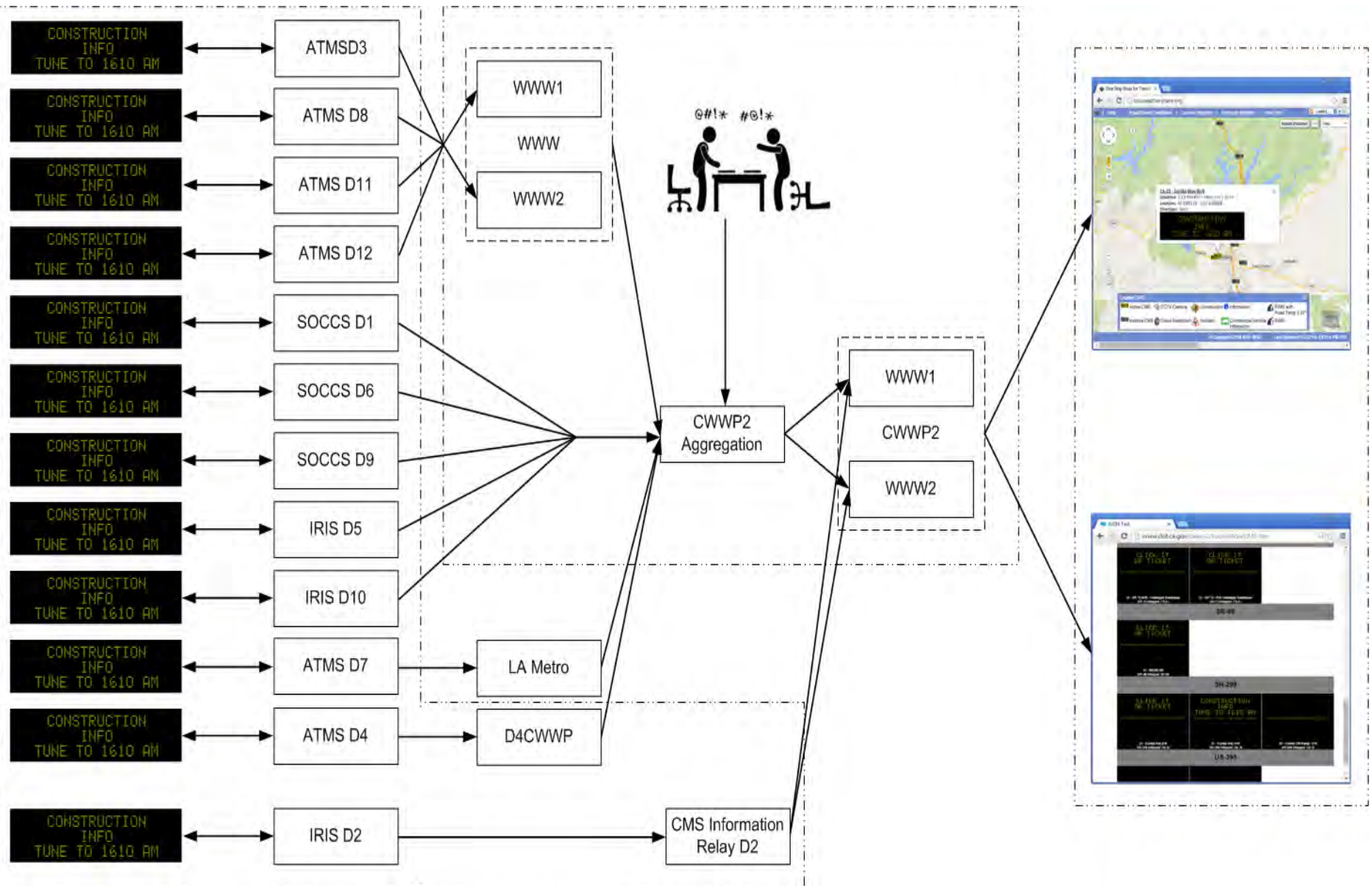
- CCTV
- CMS
- Lane Closure

Some Districts have:

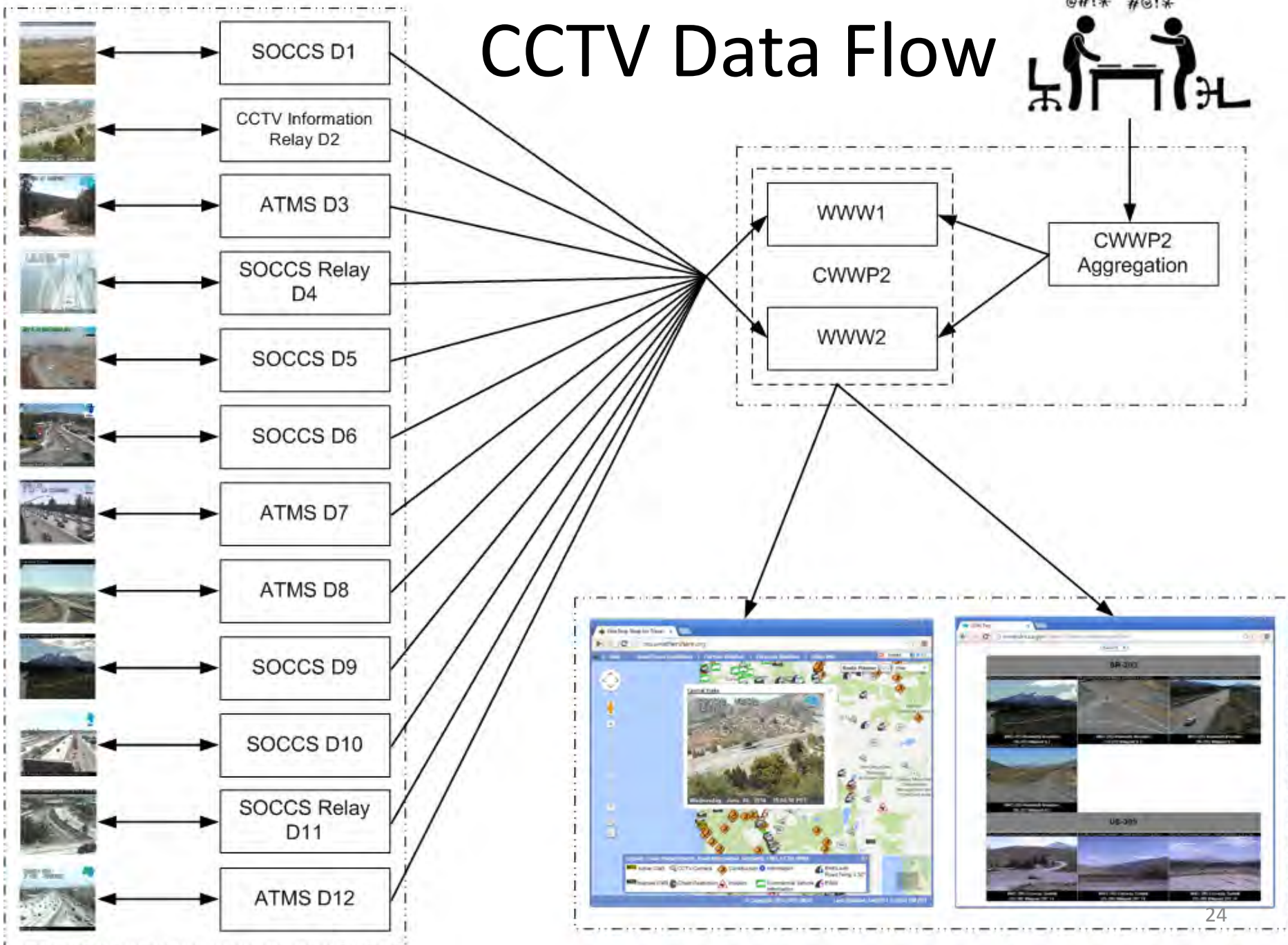
- RWIS (All but 4, 5, 11, 12)
- Chain Controls (All but 4, 5, 12)

Vehicle detection handled by PeMS

# CMS Data Flow

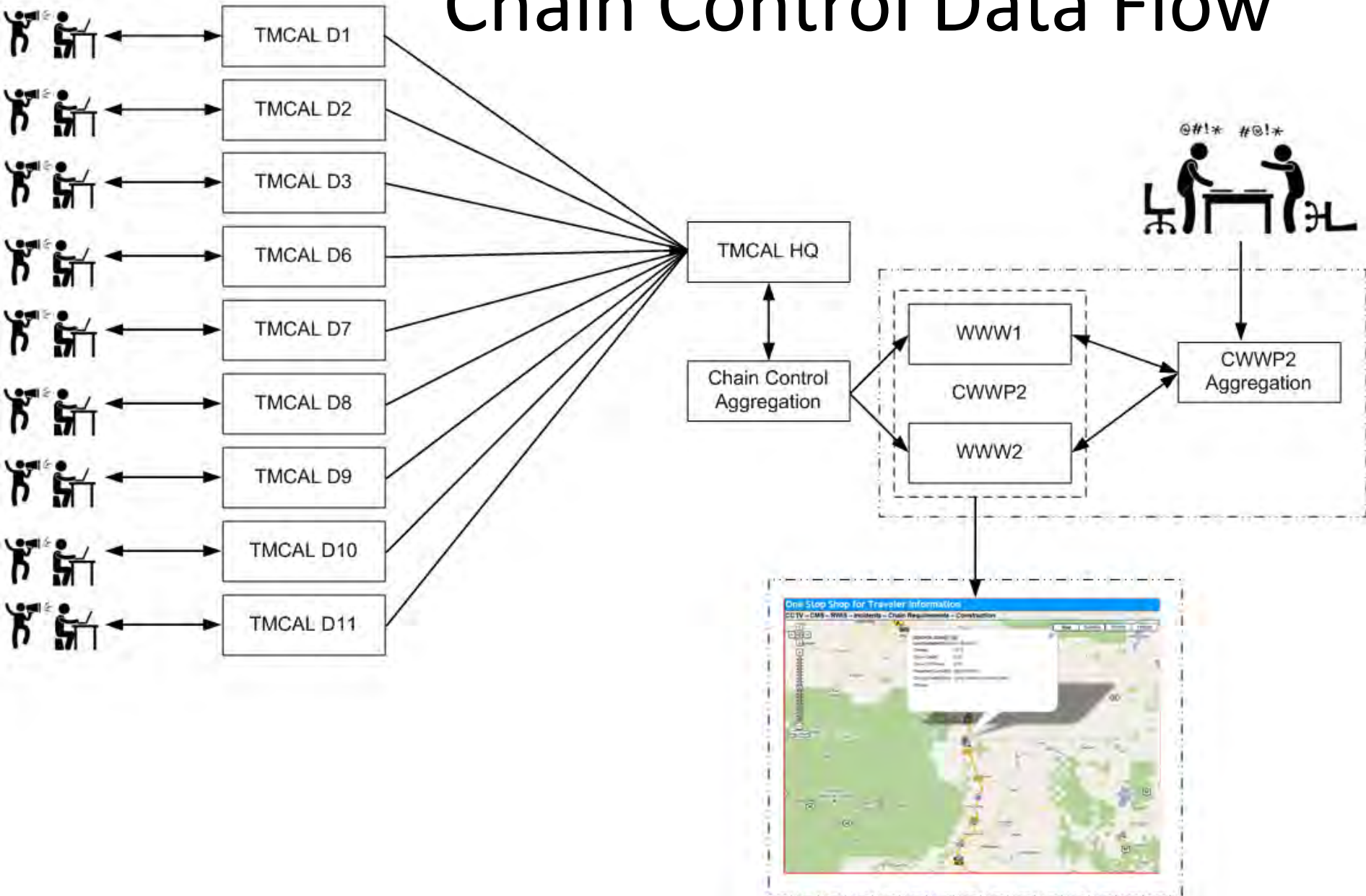


# CCTV Data Flow

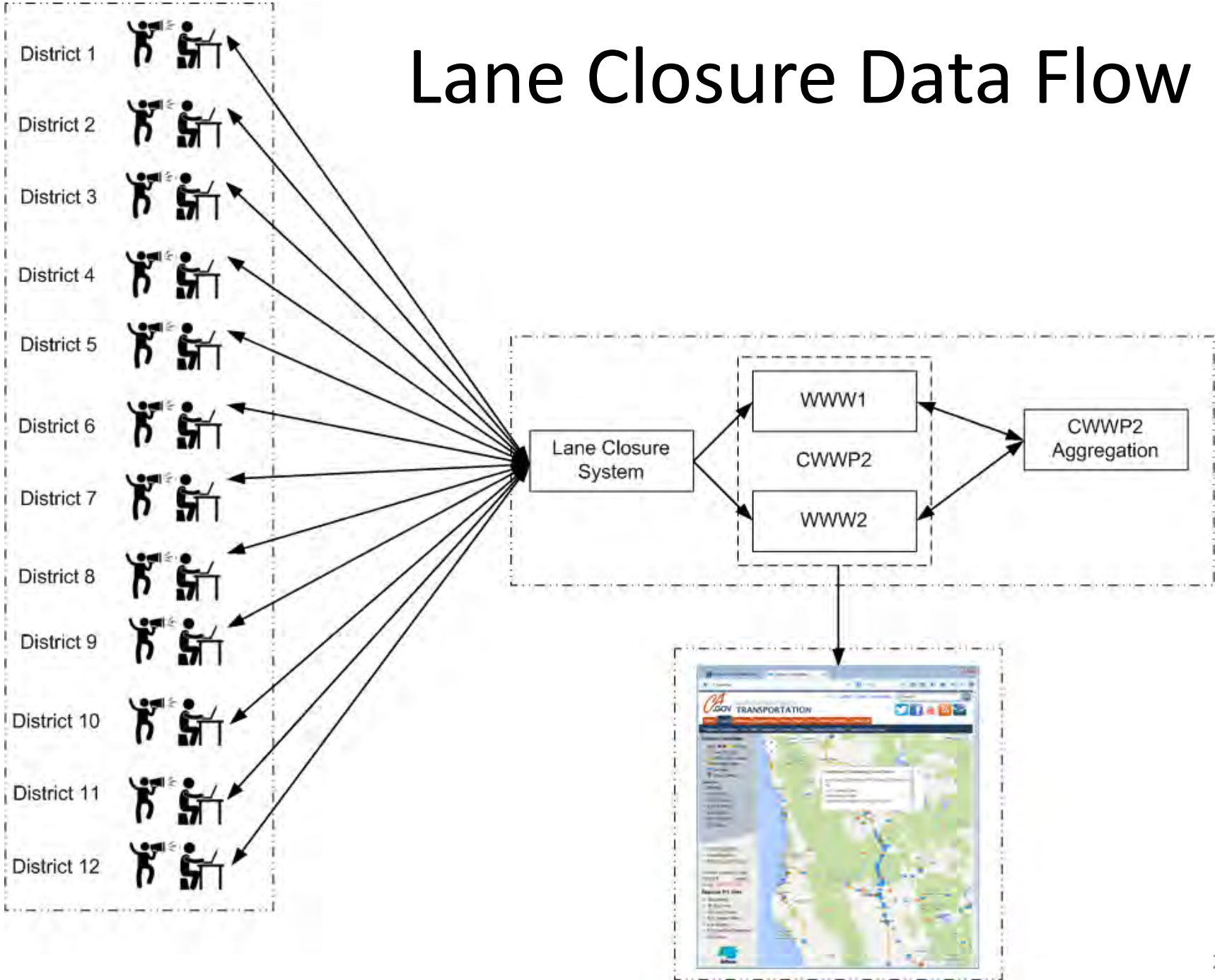


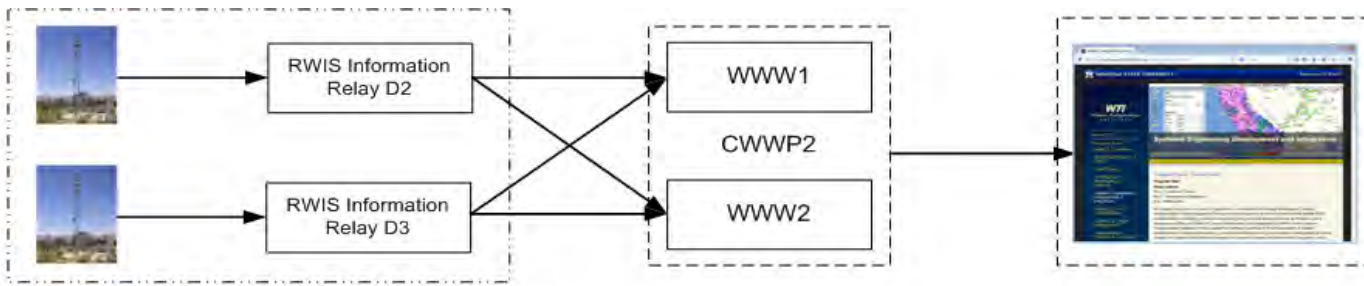


# Chain Control Data Flow

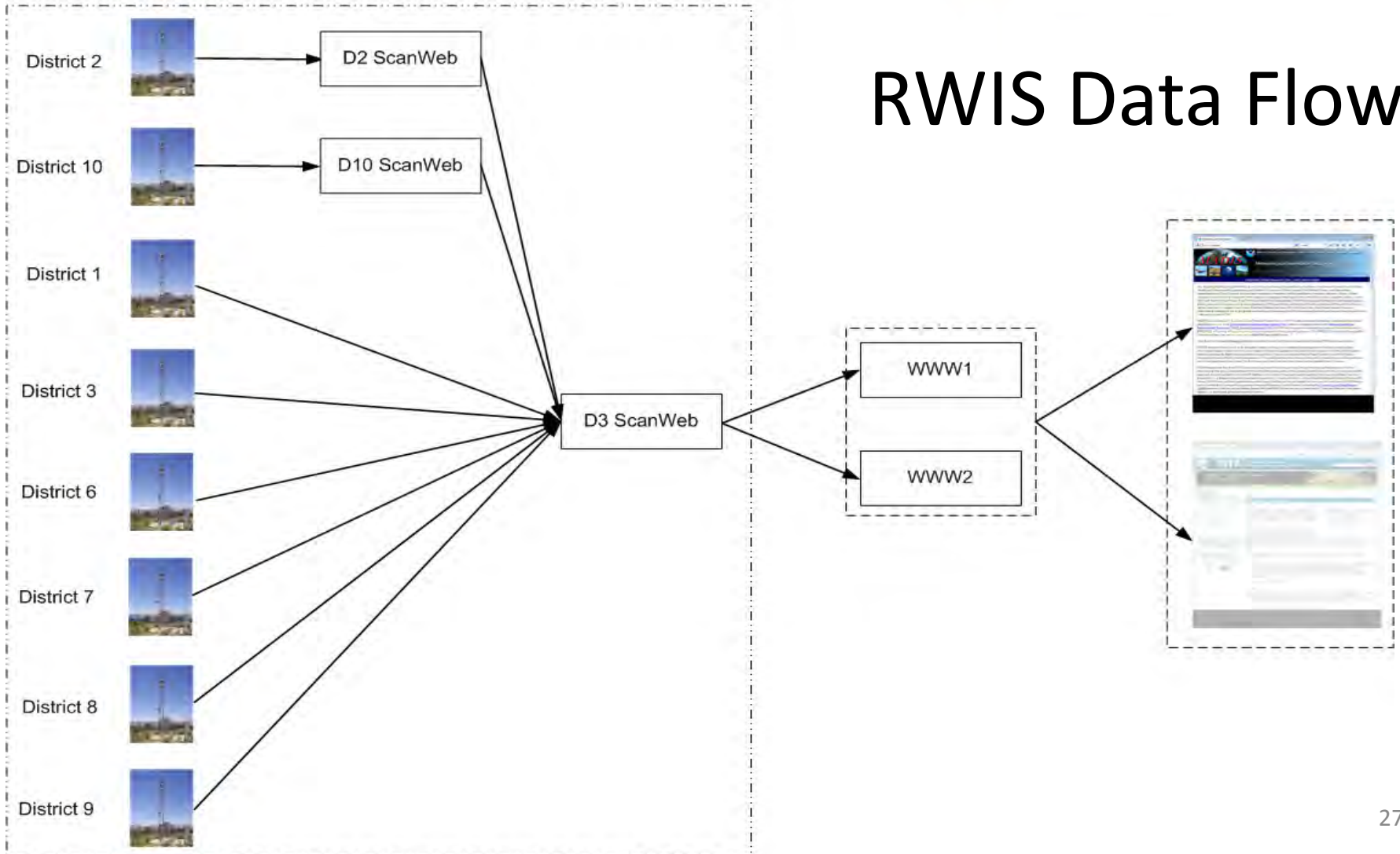


# Lane Closure Data Flow





# RWIS Data Flow



# Designing the CWWP2

- Each type of traveler information should have its own unique data set
- Keep information separated by Districts
- Data sets should contain the following subsets of information in each record:
  - Record Data
  - Location Data
  - Status Data

**Record Data**

index  
recordDate  
recordTime

+

**Location Data**

district  
locationName  
nearbyPlace  
longitude  
latitude  
elevation  
direction  
county  
route  
routeSuffix  
postmilePrefix  
postmile  
alignment  
milepost

+

**Status Data**

CCTV	CMS	RWIS	CHAIN CONTROL	LANE CLOSURES
inService	inService	inService	inService	closureID
imageData	messageDate	essReferenceHeight	statusTimestamp	logNumber
imageDescription	messageTime	essPressureHeight	statusDate	closureRequestDate
streamingVideoURL	display	essWindSensorHeight	statusTime	closureRequestTime
currentImageUpdateFrequency	displayTime	essAtmosphericPressure	status	closureStartDate
currentImageURL	phase1Font	essAvgWindDirection	statusDescription	closureStartTime
referenceImageUpdateFrequency	phase1Line1	essAvgWindSpeed		closureEndDate
referenceImage1UpdateAgoURL	phase1Line2	essSpotWindDirection		closureEndTime
referenceImage2UpdatesAgoURL	phase1Line3	essSpotWindSpeed		facility
referenceImage3UpdatesAgoURL	phase2Font	essWindSituation		typeOfClosure
referenceImage4UpdatesAgoURL	phase2Line1	essMaxWindGustSpeed		typeOfWork
referenceImage5UpdatesAgoURL	phase2Line2	essMaxWindGustDir		estimatedDelay
referenceImage6UpdatesAgoURL	phase2Line3	essNumTemperatureSensors		lanesClosed
referenceImage7UpdatesAgoURL		essTemperatureSensorIndex		totalExistingLanes
referenceImage8UpdatesAgoURL		essAirTemperature		code1097YorN
referenceImage9UpdatesAgoURL				code1097Timestamp
referenceImage10UpdatesAgoURL				code1097Date
referenceImage11UpdatesAgoURL				code1097Time
referenceImage12UpdatesAgoURL				code1098YorN
				code1098Timestamp
				code1098Date
				code1098Time
				code1022YorN
				code1022Timestamp
				code1022Date
				code1022Time

# Designing the CWWP2

- Four output formats were chosen:
  - CSV      Comma-Separated Values
  - TXT      Text Delimited
  - JSON     JavaScript Object Notation
  - XML      Extensible Markup Language
- Each format contains the exactly the same traveler information
- Simplifies the integration into third party applications
- Simplified access to data set via third parties access via HTTP, with no authentication required

# Designing the CWWP2

- Simplified access to data sets to third parties via HTTP GET Request, with no authentication required
- Uses existing Caltrans website
- Current CWWP2 Traveler Information can be found here:
  - CMS
    - <http://www.dot.ca.gov/cwwp2/documentation/cms/cms.htm>
  - CCTV
    - <http://www.dot.ca.gov/cwwp2/documentation/cctv/cctv.htm>
  - RWIS
    - <http://www.dot.ca.gov/cwwp2/documentation/rwis/rwis.htm>
  - CC
    - <http://www.dot.ca.gov/cwwp2/documentation/cc/cc.htm>
  - LCS
    - <http://www.dot.ca.gov/cwwp2/documentation/lcs/lcs.htm>

# Introducing the CWWP2

The screenshot shows a web browser window with the address bar displaying [www.dot.ca.gov/cwwp2/documentation/cms/cms.htm](http://www.dot.ca.gov/cwwp2/documentation/cms/cms.htm). The page title is "Changeable Message Signs".

## Changeable Message Signs

### Description

The Changeable Message Sign (CMS) files provided below describe the location and status of each Caltrans' CMS located on the State Highway Network.

File formats include CSV, JSON, TXT and XML. Each file format contains the same data set. These files are available for integration into your application and are available via the HTTP protocol. There is no charge for the use of this data.

### Conditions of Use

Please read the [Conditions Of Use](#) before using these data sets.

### Data Format and File Layout

Data is available in four file formats that contain the same information to allow easy integration into your application. Included below are the file format layouts:

- [CSV](#) - Comma Separated Values
- [JSON](#) - JavaScript Object Notation
- [TXT](#) - Text file with delimiter value of "y" or 0xFF
- [XML](#) - Extensible Markup Language

### Data Description

Data in each of these file formats are defined in the following documents:

- [Field description](#) - Describes field number, field name, description, type, nominal value, example value and which file format field is used
- [District Reporting Matrix](#) - Describes which Districts are reporting data in each field
- [District Map and County Chart](#) - Shows the relationship of Districts to counties
- [Route Chart](#) - Lists the state highway routes
- [Postmile Prefix / Route Suffix / Alignment Charts](#) - Decodes the values reported in the Postmile Prefix, Route Suffix and Alignment fields

### Data Validation

An XML schema document is provided to validate the data in the XML file:

- [XML Schema](#)

### File Locations

Data sets are broken up by Caltrans Districts. A map of the Caltrans Districts can be found [here](#).

- **CSV Format**

District	File Update Frequency	File Last Updated	File URL	Comments
		05/26/14 04:06:03		



Back to the beginning...

Now that the data requirements for the CWWP2 have been defined, what data is coming in from the Districts?

Lets use the CMS datasets as a case study...

- CMS are controlled by the following systems
  - ATMS : Advanced Traffic Management System
  - IRIS : Intelligent Roadway Information System
  - SOCCS : Satellite Operation Center Command System
- The districts that use each system

District	ATMS	IRIS	SOCCS	D4 ATMS	D7 ATMS
1			X		
2		X			
3	X				
4				X	
5		X			
6			X		
7					X
8	X				
9			X		
10		X			
11	X				
12	X				

- Each system produces a uniquely formatted data set

# The ATMS data set consists of two files

- webinit.txt file provides location data
- webupdate.txt file provides status data

## webinit.txt has the following format:

```
CMS 318286 Twin Cities Rd 5 N 1.552 6717.90804 1862.86798 -121.45576 38.27618
```

## webupdate.txt has the following format:

```
CMS 318286 "EAST 50 TRAFFIC " " EXPECT DELAYS " " USE ALT ROUTE " " " " "
```

Record Data -> Green

Location Data -> Red

Status Data -> Blue

# The IRIS data set consists of one file

- cmsfeed.xml file provides both location and status data

## cmsfeed.xml has the following format:

```
<?xml version="1.0" encoding="UTF-8"?>
<data>
  <list>
    <CMS
      ID="V65"
      LOCATION="NB I5 S of Eight Mile Rd"
      DATE="2014-05-10"
      TIME="19:30:14"
      STATUS="Deployed"
      FONT_1="Single Stroke"
      PAGE_1A="EAST 50 SAC"
      PAGE_1B="EXPECT DELAY"
      PAGE_1C="USE 99 NORTH"
      FONT_2="Single Stroke"
      PAGE_2A=" "
      PAGE_2B=" "
      PAGE_2C=" "
      FLASH_RATE="0.0"
      COM_TYPE="Network"
      MODEL="500"
      LATITUDE="38.031683"
      LONGITUDE="-121.363628"
    />
  </list>
  <TIMESTAMP TIMESTAMP_DATE="2014-05-15" TIMESTAMP_TIME="11:34:06" />
</data>
```

Record Data -> Green  
Location Data -> Red  
Status Data -> Blue

# The SOCCS data set consists of one file

- cmsdata.txt file provides location data
- cmsnow.txt file provides status data

## cmsdata.txt has the following format:

```
15 15 - SR 203 EB - Mammoth 15 Model 500 Dial Up 917605551212  
60 -118.936612 37.638458 20 True True
```

## cmsnow.txt has the following format:

```
15 15 - SR 203 EB - Mammoth 5/12/2014 11:08:36 192.168.0.1 1 Page (Normal)  
Single Stroke SHARE THE ROAD LOOK TWICE FOR MOTORCYCLISTS 0.0 Single Stroke TMC
```

Record Data -> Green

Location Data -> Red

Status Data -> Blue

# The D4 ATMS data set consists of two files

- cmscfg.xml file provides location data
- cms.xml file provides status data

cmscfg.xml has the following format:

```
<?xml version = '1.0' ?>
<cmss xmlns:xsi='http://www.w3.org/...'>
  <datetime>Thu May 15 12:28:31 PDT 2014</datetime>
  <agency>Caltrans-District-4</agency>
  <cms>
    <elementType>CMS</elementType>
    <Id>15</Id>
    <location>
      <route>US101 S</route>
      <crossStreet>BRITTAN AVE</crossStreet>
      <logmile>7.65</logmile>
      <county>SAN MATEO</county>
      <geoLocation>
        <latitude>37.5052</latitude>
        <longitude>-122.2467</longitude>
        <statePlaneX>6055.0176</statePlaneX>
        <statePlaneY>2011.1656</statePlaneY>
      </geoLocation>
    </location>
  </cms>
</cmss>
```

cms.xml has the following format:

```
<?xml version = '1.0' ?>
<dms xmlns:xsi='http://www.w3.org/...'>
  <datetime>Thu May 15 11:37:31 PDT 2014</datetime>
  <agency>Caltrans-District-4</agency>
  <cms>
    <dotId>15</dotId>
    <messageActive>2</messageActive>
    <message>
      <Phase1Line1>PALO ALTO 8 MIN</Phase1Line1>
      <Phase1Line2>RTE 237 13 MIN</Phase1Line2>
      <Phase1Line3>FREMONT 20 MIN</Phase1Line3>
      <Phase2Line1></Phase2Line1>
      <Phase2Line2></Phase2Line2>
      <Phase2Line3></Phase2Line3>
    </message>
  </cms>
</dms>
```

Record Data -> Green  
Location Data -> Red  
Status Data -> Blue

# The D7 ATMS data set consists of two files

- inventory.xml file provides location data
- realtime.xml file provides status data

inventory.xml has the following format:

```
<?xml version="1.0" encoding="UTF-8"?>
<informationResponse xmlns:xsi="http://...">
  <messageHeader>
    <sender>
      <agencyName>Caltrans-D7</agencyName>
    </sender>
    <messageID>1400186572460</messageID>
    <responseTo>87654321</responseTo>
    <timeStamp>
      <date>20140515</date>
      <time>13425200</time>
    </timeStamp>
  </messageHeader>
  <responseGroups>
    <responseGroup>
      <head>
        <updateTime>
          <date>20140513</date>
          <time>11163700</time>
        </updateTime>
      </head>
    </responseGroup>
    <localResponseGroup>
      <dmsListInventory>
        <dmsInventory>
          <head>
            <id>8</id>
          </head>
```

Record Data -> Green

Location Data -> Red

Status Data -> Blue

realtime.xml has the following format:

```
<?xml version="1.0" encoding="UTF-8"?>
<informationResponse xmlns:xsi="http://www.w3.org...">
  <messageHeader>
    <sender>
      <agencyName>Caltrans-D7</agencyName>
    </sender>
    <messageID>1400179143326</messageID>
    <responseTo>87654321</responseTo>
    <timeStamp>
      <date>20140515</date>
      <time>11390300</time>
    </timeStamp>
  </messageHeader>
  <responseGroups>
    <responseGroup>
      <head>
        <updateTime>
          <date>20140515</date>
          <time>11380200</time>
        </updateTime>
      </head>
    </responseGroup>
    <localResponseGroup>
      <dmsListDeviceStatus>
        <dmsDeviceStatus>
          <head>
            <id>8</id>
          </head>
```

# The D7 ATMS data set consists of two files - Continued

inventory.xml has the following format:

```
<location>
  <crossStreets>
    <crossStreetsLink>
      <onStreetInfo>
        <name>101</name>
      </onStreetInfo>
      <fromStreetInfo>
        <name>WOODMAN AVE</name>
      </fromStreetInfo>
      <toStreetInfo>
        <name></name>
      </toStreetInfo>
      <startGeoLocation>
        <latitude>34155734</latitude>
        <longitude>-118433820</longitude>
      </startGeoLocation>
      <direction>0</direction>
      <adminAreal>
        <city>LOS ANGELES</city>
      </adminAreal>
      <postmile>15.03</postmile>
    </crossStreetsLink>
  </crossStreets>
</location>
</dmsInventory>
</dmsListInventory>
</localResponseGroup>
</responseGroups>
</informationResponse>
```

realtime.xml has the following format:

```
<dms-device-status>OK</dms-device-status>
<dmsState>Sign Display</dmsState>
<dmsCurrentMessage>
  <dmsMessageTimestamp>
    <date>20140515</date>
    <time>11252000</time>
  </dmsMessageTimestamp>
  <phase1Line1>MINUTES TO</phase1Line1>
  <phase1Line2>TOPANGA CYN. 13</phase1Line2>
  <phase1Line3>RTE 23..... 30</phase1Line3>
  <phase2Line1></phase2Line1>
  <phase2Line2></phase2Line2>
  <phase2Line3></phase2Line3>
</dmsCurrentMessage>
</dmsDeviceStatus>
</dmsListDeviceStatus>
</localResponseGroup>
</responseGroups>
</informationResponse>
```

Record Data -> Green

Location Data -> Red

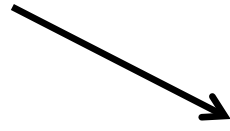
Status Data -> Blue



```

<?xml version = '1.0' ?>
<cmss xmlns:xsi='http://www.w3.org/...'>
  <datetime>Thu May 15 12:28:31 PDT 2014</datetime>
  <agency>Caltrans-District-4</agency>
  <cms>
    <elementType>CMS</elementType>
    <Id>15</Id>
    <location>
      <route>US101 S</route>
      <crossStreet>BRITTAN AVE</crossStreet>
      <logmile>7.65</logmile>
      <county>SAN MATEO</county>
      <geoLocation>
        <latitude>37.5052</latitude>
        <longitude>-122.2467</longitude>
        <statePlaneX>6055.0176</statePlaneX>
        <statePlaneY>2011.1656</statePlaneY>
      </geoLocation>
    </location>
  </cms>
</cmss>

```



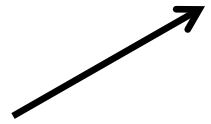
FIELD	ATMS	IRIS	SOCCS	D4	D7
index	X	X	X	X	X
recordDate	X	X		X	X
recordTime	X	X		X	X
district				X	X
locationName	X	X	X	X	X
nearbyPlace					
longitude	X	X	X	X	X
latitude	X	X	X	X	X
elevation					
direction	X				X
county					
route	X			X	X
routeSuffix					
postmilePrefix					
postmile	X			X	X
alignment					
milepost					
inService					X
messageDate		X	X		X
messageTime		X	X		X
Display			X		
displayTime		X	X		
phase1Font		X	X		
phase1Line1	X	X	X	X	X
phase1Line2	X	X	X	X	X
phase1Line3	X	X	X	X	X
phase2Font		X	X		
phase2Line1	X	X	X	X	X
phase2Line2	X	X	X	X	X
phase2Line3	X	X	X	X	X

By working through each District location and status Dataset, the following matrix is established

```

<?xml version = '1.0' ?>
<dms xmlns:xsi='http://www.w3.org/...'>
  <datetime>Thu May 15 11:37:31 PDT 2014</datetime>
  <agency>Caltrans-District-4</agency>
  <cms>
    <dotId>15</dotId>
    <messageActive>2</messageActive>
    <message>
      <Phase1Line1>PALO ALTO 8 MIN</Phase1Line1>
      <Phase1Line2>RTE 237 13 MIN</Phase1Line2>
      <Phase1Line3>FREMONT 20 MIN</Phase1Line3>
      <Phase2Line1></Phase2Line1>
      <Phase2Line2></Phase2Line2>
      <Phase2Line3></Phase2Line3>
    </message>
  </cms>
</dms>

```



Record Data -> Green  
 Location Data -> Red  
 Status Data -> Blue

After looking at the data from the districts, it is obvious that we have location data holes for every district.

In order to fill in the location data holes, we need to develop for each District a master location list that can be used to merge into the status data.

Again, lets use the CMS datasets as a case study...

- Each District has a District Master Location CSV File
  - There are 12 Districts in California
- Each Field Element Type has a District Master Location CSV File
  - Field Element Types include CCTV, CMS, CC, RWIS and LCS
- District Master Location CSV Files contains verified Location Data from the District, Caltrans GIS and other geospatial webservices
- The District Master Location CSV File is first populated by the District Location Data as much as possible...but there are holes

index	district	location name	confirmed		longitude	latitude	elevation	direction	county	route	suffix	postmile		alignment	milepost
			google earth	nearby place								prefix	postmile		
1		1 - SR 58 At Cache Creek			-118.21093	35.1176					58				
2		2 - SR 14 At California City			-118.11434	35.13663					14				
3		3 - US 395 At Bradys Junction			-117.8686	35.72337					395				
10		10 - US 395 At Bishop			-118.39515	37.35669					395				
14		14 - US 395 NB Crowley Lake			-118.73202	37.57427					395				
15		15 - SR203 EB Mammoth Lakes			-118.94309	37.64181					203				
17		17 - US 395 NB Lee Vining			-119.12101	37.95929					395				
20		20 - US 395 At Bridgeport			-119.22458	38.23411					395				
25		25 - US 395 At Topaz			-119.54826	38.68144					395				
95		95 - SR 120 At YATI			-119.1137	37.94876					120				

- We matrixed available District Location Data
- Great, but how do we fill in the blank fields?
- Need to look at available tools as examples

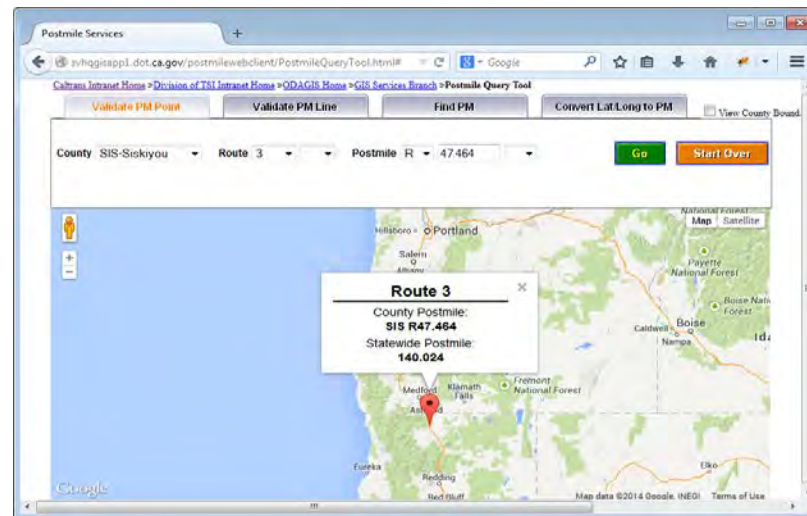
FIELD	ATMS	IRIS	SOCCS	D4	D7
index	X	X	X	X	X
recordDate	X	X		X	X
recordTime	X	X		X	X
district				X	X
locationName	X	X	X	X	X
nearbyPlace					
longitude	X	X	X	X	X
latitude	X	X	X	X	X
elevation					
direction	X				X
county					
route	X			X	X
routeSuffix					
postmilePrefix					
postmile	X			X	X
alignment					
milepost					



F(longitude, latitude) => nearbyPlace

F(longitude, latitude) => elevation

<http://www.geonames.org/export/ws-overview.html>



F(longitude, latitude) => county, route, routeSuffix, postmilePrefix, postmile, alignment, milepost

F(county, route, routeSuffix, postmilePrefix, postmile, alignment) => milepost

<http://svhgisapp1.dot.ca.gov/postmilewebclient/PostmileQueryTool.html>

# Using the geonames.org interface - Elevation



WebService	XML	JSON	RDF	CSV	TXT	RSS	KML
1 asterqdem	XML	JSON			TXT		
2 children	XML	JSON					
3 cities	XML	JSON					
4 contains	XML	JSON					
5 countryCode	XML	JSON			TXT		
6 countrInfo	XML	JSON		CSV			
7 countrSubdivision	XML	JSON					
8 earthquakes	XML	JSON					
9 extendedFindNearby	XML						
10 findNearby	XML	JSON					
11 findNearbyPlaceName	XML	JSON					
12 findNearbyPostalCodes	XML	JSON					
13 findNearbyStreets	XML	JSON					
14 findNearbyStreetsOSM	XML	JSON					
15 findNearByWeather	XML	JSON					
16 findNearbyWikipedia	XML	JSON				RSS	
17 findNearestAddress	XML	JSON					
18 findNearestIntersection	XML	JSON					
19 findNearestIntersectionOSM	XML	JSON					
20 findNearbyPOIsOSM	XML	JSON					
21 get	XML	JSON					
22 gtopo30	XML	JSON			TXT		
23 hierarchy	XML	JSON					
24 neighbourhood	XML	JSON					
25 neighbours	XML	JSON					
26 ocean	XML	JSON					
27 postalCodeCountryInfo	XML	JSON					
28 postalCodeLookup		JSON					
29 postalCodeSearch	XML	JSON					
30 rssToGeo						RSS	KML
31 search	XML	JSON	RDF				
32 siblings	XML	JSON					
33 srtm3	XML	JSON			TXT		
34 timezone	XML	JSON					
35 weather	XML	JSON					
36 weatherIcao	XML	JSON					
37 wikipediaBoundingBox	XML	JSON					
38 wikipediaSearch	XML	JSON					
Total	36	36	1	1	4	2	1

## Elevation - SRTM3

<http://www.geonames.org/export/web-services.html#srtm3>

- Shuttle Radar Topography Mission (SRTM) elevation data. SRTM consisted of a specially modified radar system that flew onboard the Space Shuttle Endeavour during an 11-day mission in February of 2000.
- The dataset covers land areas between 60 degrees north and 56 degrees south.
- This web service is using SRTM3 data with data points located every 3-arc-second (approximately 90 meters) on a latitude/longitude grid.



- Example
- <http://api.geonames.org/srtm3XML?lat=41.738757&lng=-122.626588&username=demo>
- Result is an xml formatted number giving the elevation in **meters** according to srtm3, ocean areas have been masked as "no data" and have been assigned a value of -32768

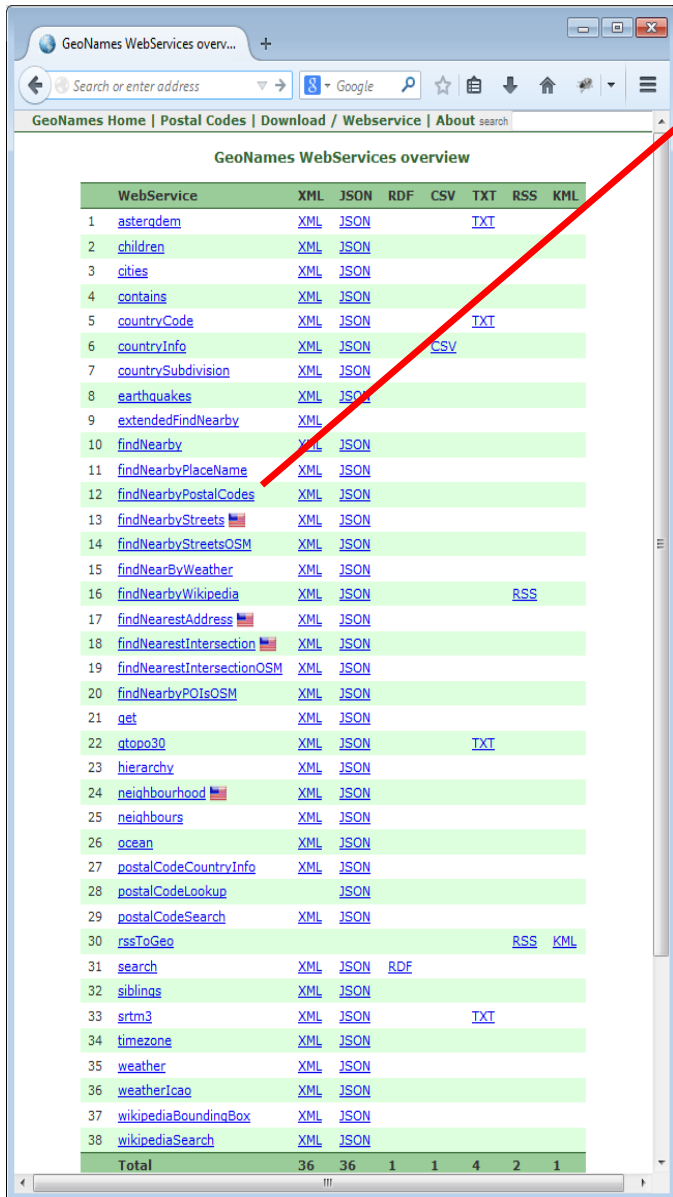
```
<geonames>  
  <srtm3>796</srtm3>  
  <lat>41.73875</lat>  
  <lng>-122.62658</lng>  
</geonames>
```

Conversion from meters to feet:  
1 Meter = 3.28 Feet  
796 Meters \* 3.28 Feet /Meter = 2612 Feet

F(longitude, latitude) => elevation

<http://www.geonames.org/export/ws-overview.html>

# Using the geonames.org interface - nearbyPlace



WebService	XML	JSON	RDF	CSV	TXT	RSS	KML
1 asterqdem	XML	JSON			TXT		
2 children	XML	JSON					
3 cities	XML	JSON					
4 contains	XML	JSON					
5 countryCode	XML	JSON			TXT		
6 countrInfo	XML	JSON		CSV			
7 countrSubdivision	XML	JSON					
8 earthquakes	XML	JSON					
9 extendedFindNearby	XML	JSON					
10 findNearby	XML	JSON					
11 findNearbyPlaceName	XML	JSON					
12 findNearbyPostalCodes	XML	JSON					
13 findNearbyStreets	XML	JSON					
14 findNearbyStreetsOSM	XML	JSON					
15 findNearByWeather	XML	JSON					
16 findNearbyWikipedia	XML	JSON				RSS	
17 findNearestAddress	XML	JSON					
18 findNearestIntersection	XML	JSON					
19 findNearestIntersectionOSM	XML	JSON					
20 findNearbyPOIsOSM	XML	JSON					
21 get	XML	JSON					
22 gtopo30	XML	JSON			TXT		
23 hierarchy	XML	JSON					
24 neighbourhood	XML	JSON					
25 neighbours	XML	JSON					
26 ocean	XML	JSON					
27 postalCodeCountryInfo	XML	JSON					
28 postalCodeLookup		JSON					
29 postalCodeSearch	XML	JSON					
30 rssToGeo						RSS	KML
31 search	XML	JSON	RDF				
32 siblings	XML	JSON					
33 srtm3	XML	JSON			TXT		
34 timezone	XML	JSON					
35 weather	XML	JSON					
36 weatherIcao	XML	JSON					
37 wikipediaBoundingBox	XML	JSON					
38 wikipediaSearch	XML	JSON					
Total	36	36	1	1	4	2	1

## nearbyPlace - Find nearby postal codes / reverse geocoding <http://www.geonames.org/export/web-services.html#findNearbyPostalCodes>

• Given a longitude latitude pair, returns list of places for the given postal code -> ZIP code

### • Example

<http://api.geonames.org/findNearbyPostalCodes?lat=41.73875&lng=-122.62658&username=demo>

• Result is an xml formatted list of places for the given postalcode, sorted by postalcode, placename

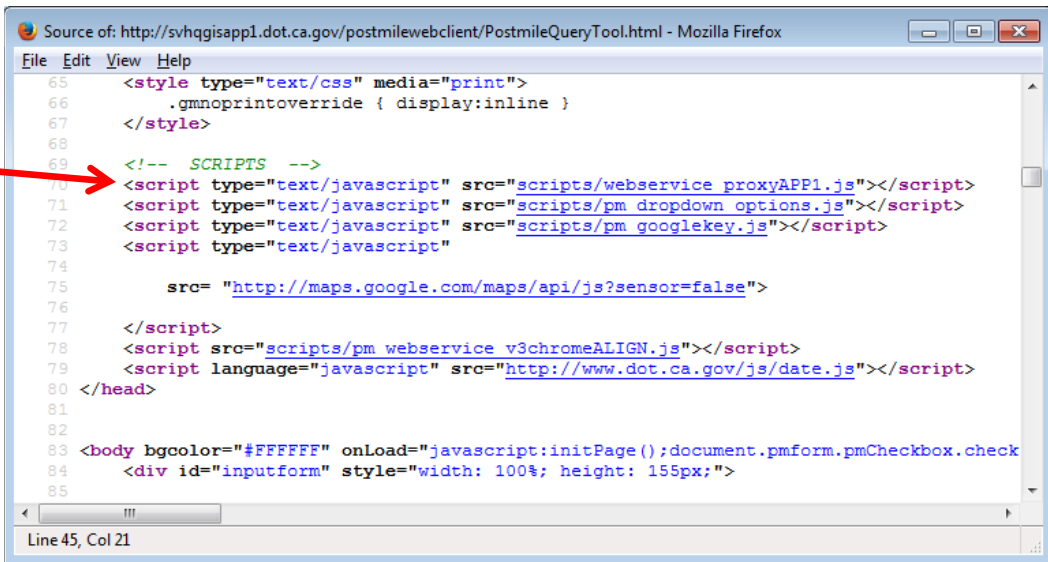
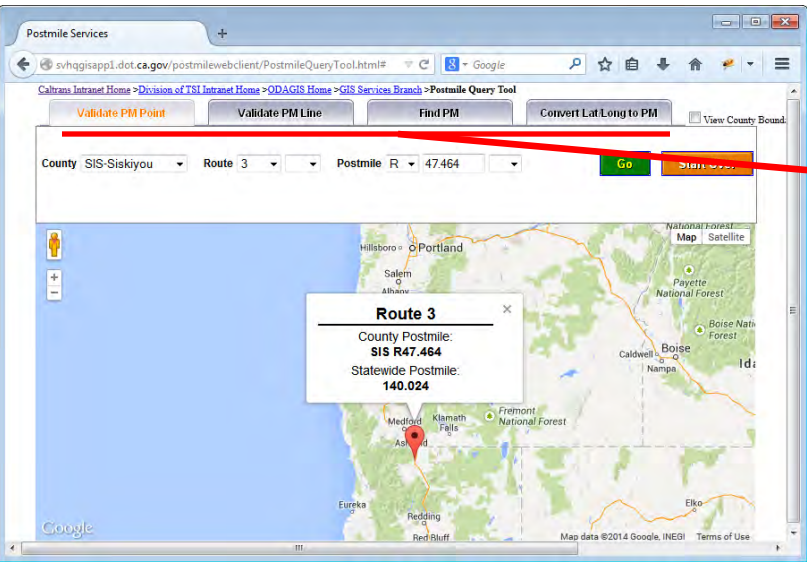


```
<geonames>
  <code>
    <postalcode>96097</postalcode>
    <name>Yreka</name>
    <countryCode>US</countryCode>
    <lat>41.73875</lat>
    <lng>-122.62658</lng>
    <adminCode1>CA</adminCode1>
    <adminName1>California</adminName1>
    <adminCode2>093</adminCode2>
    <adminName2>Siskiyou</adminName2>
    <adminCode3/><adminName3/>
    <distance>0</distance>
  </code>
</geonames>
```

F(longitude, latitude) => nearbyPlace

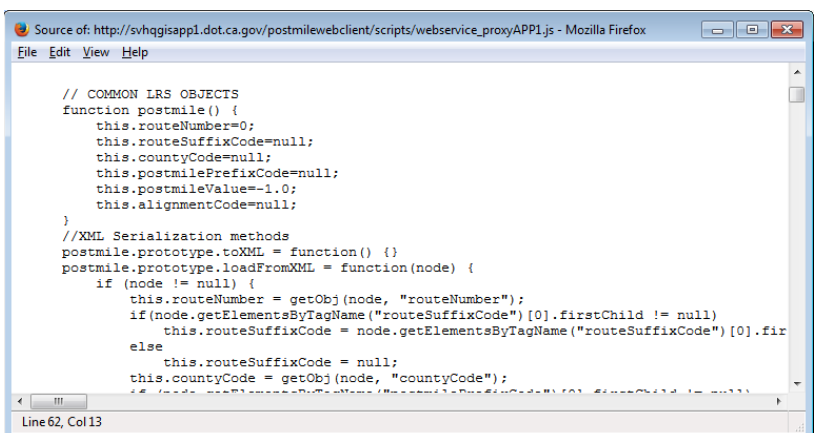
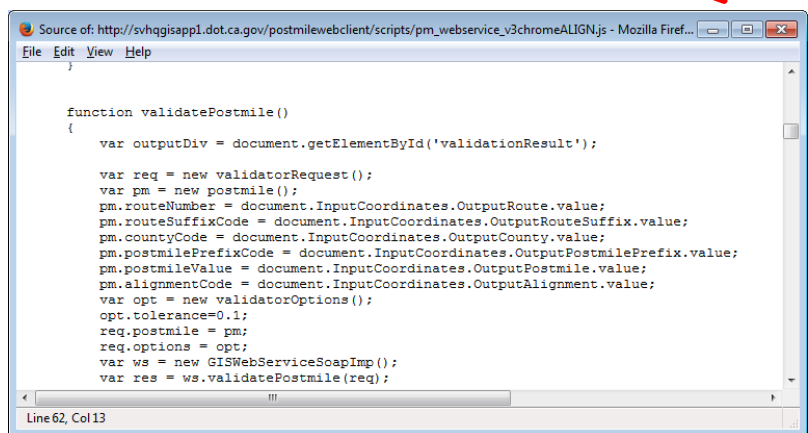
<http://www.geonames.org/export/ws-overview.html>

# Reverse Engineering the Caltrans' GIS Postmile Services Website



F(longitude, latitude) => [ county, route, routeSuffix, postmilePrefix, postmile, alignment, milepost ]  
<http://svhqgisapp1.dot.ca.gov/postmilewebclient/PostmileQueryTool.html>

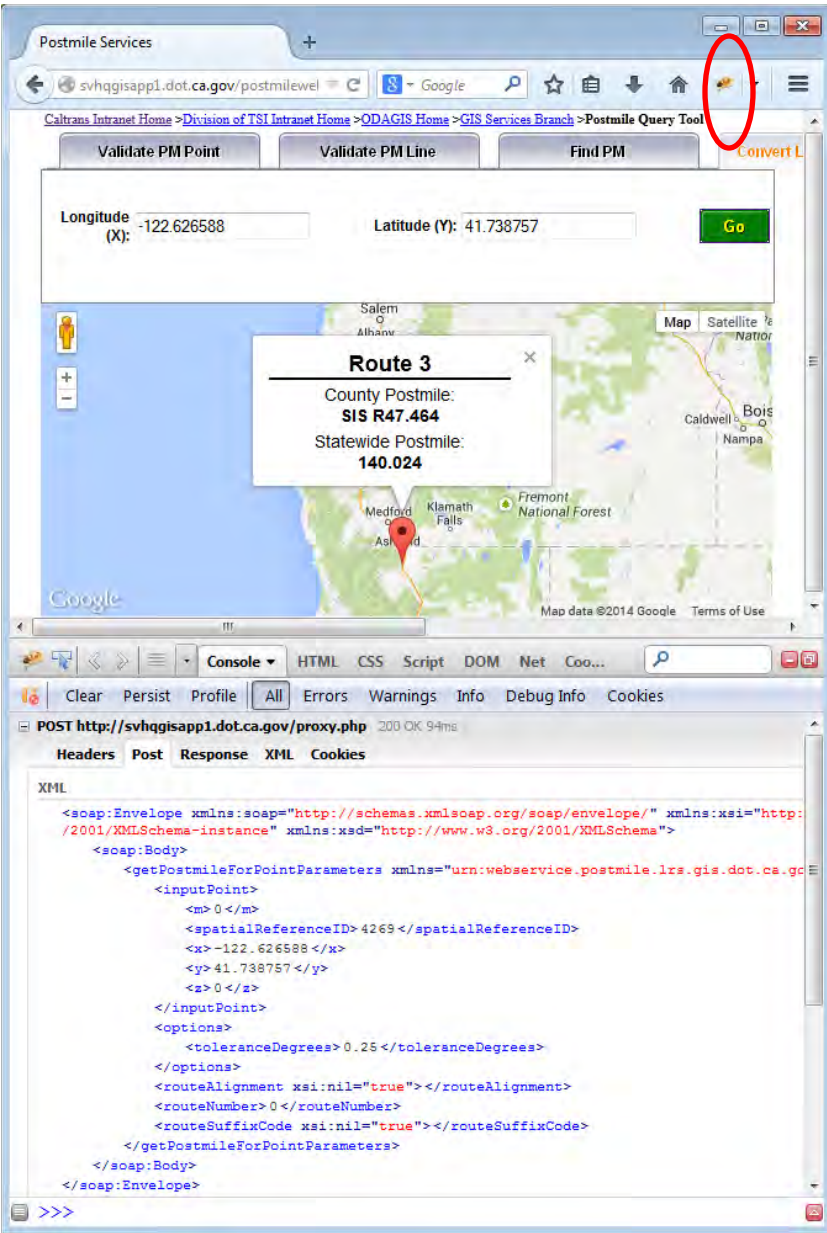
Looking at the HTML source code yields these two javascripts



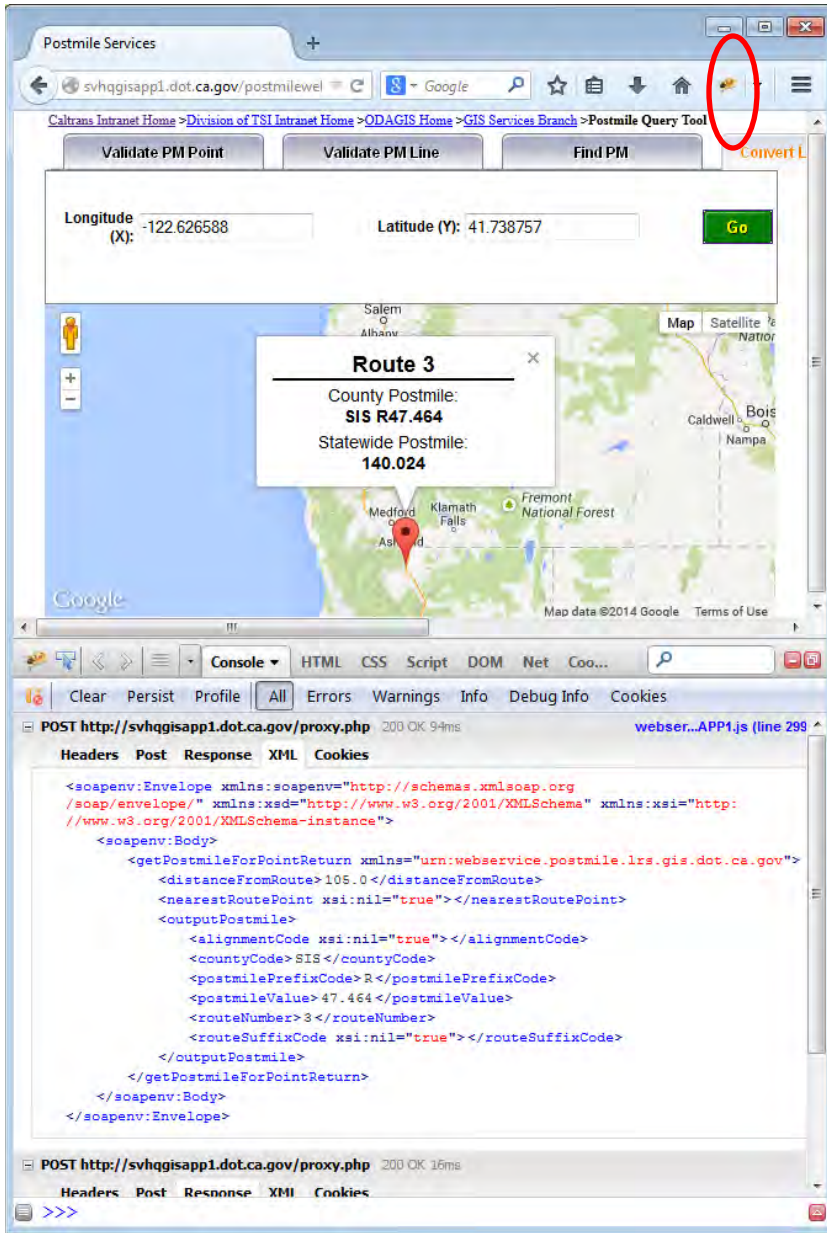
What data is needed for each tab and what data will be returned

How to send and receive the request from the Postmile webservice

# Reverse Engineering the Caltrans' GIS Postmile Services Website



How to format SOAP Request



What data comes back from the SOAP request



# Using the geo.dot.ca.gov interface – getPostmileForPointParameters

Given a longitude, latitude pair, returns county, route, routeSuffix, postmile, postmilePrefix and alignment

## •Example

```
<soap:Envelope xmlns:soap="http://...">
  <soap:Body>
    <getPostmileForPointParameters xmlns="urn:webservice.postmile.lrs.gis.dot.ca.gov">
      <inputPoint>
        <m>0</m>
        <spatialReferenceID>4269</spatialReferenceID>
        <x> -122.626588</x>
        <y> 41.738757</y>
        <z>0</z>
      </inputPoint>
      <options>
        <toleranceDegrees>0.25</toleranceDegrees>
      </options>
      <routeAlignment xsi:nil="true"></routeAlignment>
      <routeNumber>0</routeNumber>
      <routeSuffixCode xsi:nil="true"></routeSuffixCode>
    </getPostmileForPointParameters>
  </soap:Body>
</soap:Envelope>
```



•Result is an XML formatted SOAP response containing county, route, routeSuffix, postmile, postmilePrefix and alignment

```
<soapenv:Envelope xmlns:soapenv="http://...">
  <soapenv:Body>
    <getPostmileForPointReturn xmlns="urn:webservice.postmile.lrs.gis.dot.ca.gov">
      <distanceFromRoute>105.0</distanceFromRoute>
      <nearestRoutePoint xsi:nil="true"></nearestRoutePoint>
      <outputPostmile>
        <alignmentCode xsi:nil="true"></alignmentCode>
        <countyCode>SIS</countyCode>
        <postmilePrefixCode>R</postmilePrefixCode>
        <postmileValue>47.464</postmileValue>
        <routeNumber>3</routeNumber>
        <routeSuffixCode xsi:nil="true"></routeSuffixCode>
      </outputPostmile>
    </getPostmileForPointReturn>
  </soapenv:Body>
</soapenv:Envelope>
```

WebService	Output
getCoordinatesForPostmileParameters	XML
getCoordinatesForPostmilePairParameters	XML
getPostmileForPointParameters	XML
getOdometerForPostmileParameters	XML
validatePostmilePairParameters	XML

F(longitude, latitude) => county, route, routeSuffix, postmile, postmilePrefix, alignment

<http://geo.dot.ca.gov/pmws/services/PostmileWebService>

# Using the geo.dot.ca.gov interface – getOdometerForPostmileParameters

Given county, route, routeSuffix, postmile, postmilePrefix and alignment, returns milePost

## •Example

```
<soap:Envelope xmlns:soap="http://...">
  <soapenv:Body>
    <q0:getOdometerForPostmileParameters>
      <q0:alignment>R</q0:alignment>
      <q0:postmile>
        <q0:countyCode>SIS</q0:countyCode>
        <q0:postmilePrefixCode>R</q0:postmilePrefixCode>
        <q0:postmileValue>47.464</q0:postmileValue>
        <q0:routeNumber>3</q0:routeNumber>
      </q0:postmile>
    </q0:getOdometerForPostmileParameters>
  </soapenv:Body>
</soap:Envelope>
```

WebService	Output
getCoordinatesForPostmileParameters	XML
getCoordinatesForPostmilePairParameters	XML
getPostmileForPointParameters	XML
getOdometerForPostmileParameters	XML
validatePostmilePairParameters	XML

F(county, route, routeSuffix, postmile, postmilePrefix, alignment) => milePost

<http://geo.dot.ca.gov/pmws/services/PostmileWebService>



•Result is an XML formatted SOAP response containing county, route, routeSuffix, postmile, postmilePrefix and alignment

```
<soapenv:Envelope xmlns:soapenv="http://...">
  <soapenv:Body>
    <getOdometerForPostmileReturn xmlns="urn:webservice.postmile.lrs.gis.dot.ca.gov">
      <odometer>140.024</odometer>
    </getOdometerForPostmileReturn>
  </soapenv:Body>
</soapenv:Envelope>
```

There are tools available to fill in the missing location data fields. However, by themselves they are cumbersome and can be tedious to use manually.

Is there a way to integrate these tools into an interface that a user can easily use?

# Tool Built for Augmenting Location Data

- geospatialTools.pm
  - perl module that calls geospatial webservice
    - <http://www.geonames.org>
    - <http://geo.dot.ca.gov/pmws/services/PostmileWebService>
  - Contains the methods to do the following:

Method	Inputs	Outputs
validateCRP	county, route, routeSuffix, postmile, postmilePrefix, alignment	validated county, route, routeSuffix, postmile, postmilePrefix, alignment
crpToLongLat	validated county, route, routeSuffix, postmile, postmilePrefix, alignment	longitude, latitude
crpToMP	validated county, route, routeSuffix, postmile, postmilePrefix, alignment	milepost
get90MElevation	longitude, latitude	elevation
getNearbyPopulatedPlace	longitude, latitude	nearbyPlace

# Tools Built for Augmenting Location Data

Field Element List :: At 13:08:05 On 6/16/2014

Showing 1 to 11 of 11 entries

Search:

Index	District	Description	Google Maps Verified?	Nearest Place	Longitude	Latitude	Elevation	Direction	County	Route	Route Suffix	Postmile Prefix	Postmile	Alignment	Milepost
1	9	<a href="#">1 - SR 58 At Cache Creek</a>	true	Mojave	-118.210926	35.117597	3405	E	KER	58		R	107.08		163.29
2	9	<a href="#">2 - SR 14 At California City</a>	true	Mojave	-118.11437	35.136644	2765	E	KER	14			22.23		75.68
3	9	<a href="#">3 - US 395 At Bradys Junction</a>	true	Inyokern	-117.868595	35.72337	2516	N	KER	395		R	31.65		100.06
10	9	<a href="#">10 - US 395 At Bishop</a>	true	Bishop	-118.395061	37.356771	4146	N	INY	395			115.07		219.78
12	2	<a href="#">Yreka Demo Site</a>													
14	9	<a href="#">14 - US 395 NB Crowley Lake</a>	true	Mammoth Lakes	-118.731954	37.574281	6899	N	MNO	395		R	13.54		247.79
15	9	<a href="#">15 - SR203 EB Mammoth Lakes</a>	false	Mammoth Lakes	-118.943086	37.641805	7657	E	MNO	203			7.05		7.73
17	9	<a href="#">17 - US 395 NB Lee Vining</a>	true	Lee Vining	-119.121025	37.959277	6774	N	MNO	395			51.56		285.17
20	9	<a href="#">20 - US 395 At Bridgeport</a>	true	Bridgeport	-119.224516	38.234126	6496	S	MNO	395			74.83		308.4
25	9	<a href="#">25 - US 395 At Topaz</a>	true	Topaz	-119.548218	38.681441	5065	S	MNO	395			120.08		353.64
95	9	<a href="#">95 - SR 120 At YATI</a>	true	Lee Vining	-119.113698	37.948762	6863	E	MNO	120		R	11.94		106.85

# Tools Built for Augmenting Location Data

Field Element Geospatial F x

Field Element List | 20 - US 395 At Bridgeport Geospatial Parameter Input

Parameter	Value
On Google Maps?	TRUE
Direction	S
Nearby Place	Bridgeport
Longitude	-119.224516
Latitude	38.234126
Elevation	6496
County	MNO
Route	395
Route Suffix	
Postmile Prefix	
Postmile	74.83
Alignment	
Milepost	308.4

Save Geospatial Parameters    Map Update and Save Geospatial Parameters

© 2014 Google | Terms of Use | Report a problem

```

D4 Static Data
<?xml version="1.0" ?>
<cmss xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="TrafficInformation.xml">
<datetime>Thu May 15 12:28:31 PDT 2014</datetime>
<agency>Caltrans-District-4</agency>
<cmss>
<elementType>CMS</elementType>
<id>15</id>
<location>
<route>US101 S</route>
<crossStreets>BRITTAN AVE</crossStreet>
<logmiles>7.65</logmiles>
<county>SAN MATEO</county>
<geoLocation>
<latitude>37.5052</latitude>
<longitude>-122.2467</longitude>
<statePlaneX>6055.0176</statePlaneX>
<statePlaneY>2011.1656</statePlaneY>
</geoLocation>
</location>
</cmss>
</cmss>

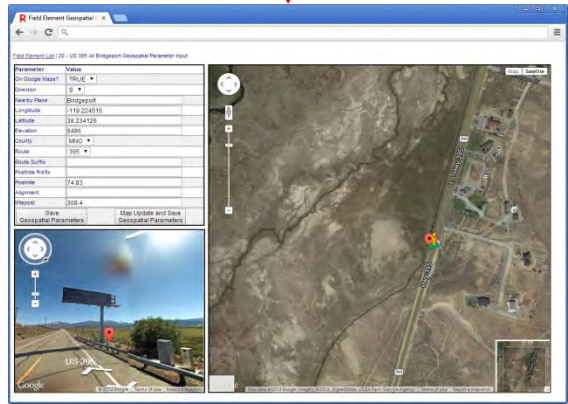
```

+

+

WebService	Output
getCoordinatesForPostmileParameters	XML
getCoordinatesForPostmilePairParameters	XML
getPostmileForPointParameters	XML
getOdometerForPostmileParameters	XML
validatePostmilePairParameters	XML

- district
- locationName
- nearbyPlace
- longitude
- latitude
- elevation
- direction
- county
- route
- routeSuffix
- postmilePrefix
- postmile
- alignment
- milepost



### The CWWP2 Master Location CSV File – 1 for each District, 1 for each Field Element Type

index	district	locationName	confirmedGoogleEarth	nearbyPlace	longitude	latitude	elevation	direction	county	route	routeSuffix	postmilePrefix	postmile	alignment	milepost
1	91	SR 58 At Cache Creek	TRUE	Mojave	-118.210926	35.117597	3405 E	KER	58		R	107.08			163.29
2	92	SR 14 At California City	TRUE	Mojave	-118.114344	35.136633	2765 E	KER	14			22.21			75.67
3	93	US 395 At Bradys Junction	TRUE	Inyokern	-117.868595	35.72337	2516 N	KER	395		R	31.65			100.06
10	910	US 395 At Bishop	TRUE	Bishop	-118.395148	37.356687	4146 N	INY	395			115.05			219.78
14	914	US 395 NB Crowley Lake	TRUE	Mammoth Lakes	-118.73202	37.574268	6899 N	MNO	395		R	13.55			247.79
15	915	SR203 EB Mammoth Lakes	TRUE	Mammoth Lakes	-118.943086	37.641805	7657 E	MNO	203			7.05			7.74
17	917	US 395 NB Lee Vining	TRUE	Lee Vining	-119.121013	37.959293	6774 N	MNO	395			51.56			285.17
20	920	US 395 At Bridgeport	TRUE	Bridgeport	-119.22458	38.234112	6496 S	MNO	395			74.8			308.42
25	925	US 395 At Topaz	TRUE	Topaz	-119.548258	38.68144	5065 S	MNO	395			120.08			353.65
95	995	SR 120 At YATI	TRUE	Lee Vining	-119.113698	37.948762	6863 E	MNO	120		R	11.94			106.85

Now each District has a fully populated master location list.

How are the different district status data formats converted into the CWWP2 format?

Again, lets use the CMS datasets as a case study...



**Record Data**

index  
recordDate  
recordTime

+

**Location Data**

district  
locationName  
nearbyPlace  
longitude  
latitude  
elevation  
direction  
county  
route  
routeSuffix  
postmilePrefix  
postmile  
alignment  
milepost

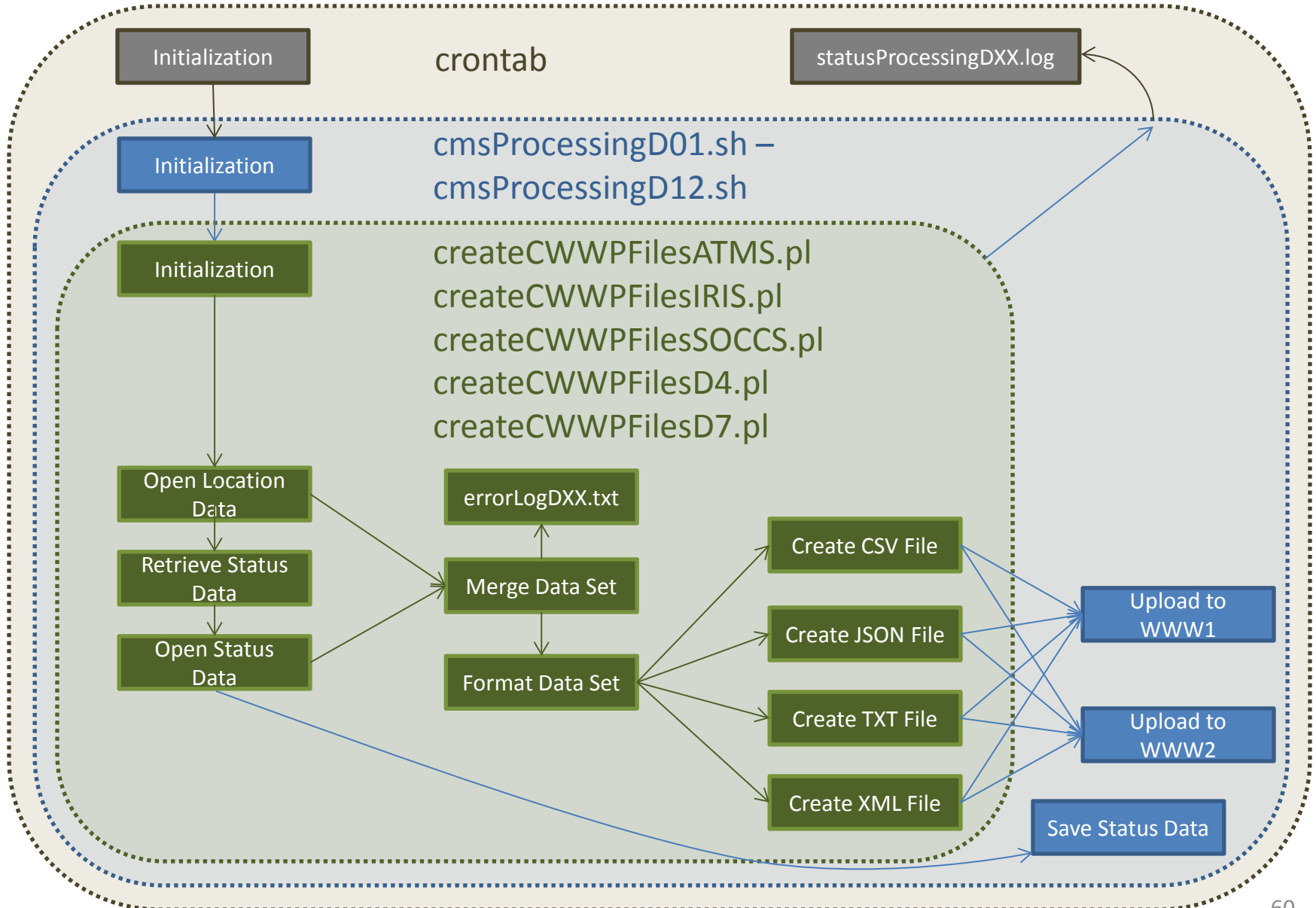
**Status Data**

CCTV	CMS	RWIS	CHAIN CONTROL	LANE CLOSURES
inService	inService	inService	inService	closureID
imageData	messageDate	essReferenceHeight	statusTimestamp	logNumber
imageDescription	messageTime	essPressureHeight	statusDate	closureRequestDate
streamingVideoURL	display	essWindSensorHeight	statusTime	closureRequestTime
currentImageUpdateFrequency	displayTime	essAtmosphericPressure	status	closureStartDate
currentImageURL	phase1Font	essAvgWindDirection	statusDescription	closureStartTime
referenceImageUpdateFrequency	phase1Line1	essAvgWindSpeed		closureEndDate
referenceImage1UpdateAgoURL	phase1Line2	essSpotWindDirection		closureEndTime
referenceImage2UpdatesAgoURL	phase1Line3	essSpotWindSpeed		facility
referenceImage3UpdatesAgoURL	phase2Font	essWindSituation		typeOfClosure
referenceImage4UpdatesAgoURL	phase2Line1	essMaxWindGustSpeed		typeOfWork
referenceImage5UpdatesAgoURL	phase2Line2	essMaxWindGustDir		estimatedDelay
referenceImage6UpdatesAgoURL	phase2Line3	essNumTemperatureSensors		lanesClosed
referenceImage7UpdatesAgoURL		essTemperatureSensorIndex		totalExistingLanes
referenceImage8UpdatesAgoURL		essAirTemperature		code1097YorN
referenceImage9UpdatesAgoURL				code1097Timestamp
referenceImage10UpdatesAgoURL				code1097Date
referenceImage11UpdatesAgoURL				code1097Time
referenceImage12UpdatesAgoURL				code1098YorN
				code1098Timestamp
				code1098Date
				code1098Time
				code1022YorN
				code1022Timestamp
				code1022Date
				code1022Time



- Algorithm used to build the CMS CWWP2
  - Initialization
  - Open district master location data set
  - Download status data set
  - Open status data set
  - Bind master location data set to status data set
  - Format combined data sets
  - Create CSV file
  - Create JSON, TXT and XML
  - Upload the four data formats to the CWWP2 on WWW1 and WWW2

# Algorithm used build the CMS CWWP2



# crontab

Initialization

statusProcessingDXX.log

```
* * * * * /var/cms/cmsProcessingD01.sh >> /var/cms/log/cmsProcessingD01.log
* * * * * /var/cms/cmsProcessingD03.sh >> /var/cms/log/cmsProcessingD03.log
* * * * * /var/cms/cmsProcessingD04.sh >> /var/cms/log/cmsProcessingD04.log
* * * * * /var/cms/cmsProcessingD05.sh >> /var/cms/log/cmsProcessingD05.log
* * * * * /var/cms/cmsProcessingD06.sh >> /var/cms/log/cmsProcessingD06.log
* * * * * /var/cms/cmsProcessingD07.sh >> /var/cms/log/cmsProcessingD07.log
* * * * * /var/cms/cmsProcessingD08.sh >> /var/cms/log/cmsProcessingD08.log
* * * * * /var/cms/cmsProcessingD09.sh >> /var/cms/log/cmsProcessingD09.log
* * * * * /var/cms/cmsProcessingD10.sh >> /var/cms/log/cmsProcessingD10.log
* * * * * /var/cms/cmsProcessingD11.sh >> /var/cms/log/cmsProcessingD11.log
* * * * * /var/cms/cmsProcessingD12.sh >> /var/cms/log/cmsProcessingD12.log
```

## cmsProcessingD09.sh

```
#!/bin/bash
MAILTO=dev/null
#####
# Cron for retrieving and processing CMS status files for D9
#####
#
##-----change to CMS Data processing directory
cd /var/cms/
#
##-----make CMS Output Status files : CSV, JSON, TXT and XML-----
perl ./scripts/createCWWPFilesSOCCS.pl
"http://XXXXXXX/cmsnow.txt"
"./raw/cmsStatusD09.txt"
"./static/cmsD09.csv"
"./errorFiles/errorLogD09.txt"
"./output/d9/cms/cmsStatusD09.csv"
"./output/d9/cms/cmsStatusD09.json"
"./output/d9/cms/cmsStatusD09.txt"
"./output/d9/cms/cmsStatusD09.xml"
#
##-----export CMS Status files to external web servers-----
spawn scp -p -r /cms/output/d9/ XXXXXX@www1.dot.ca.gov:/cwwp2/data/
#
spawn scp -p -r /cms/output/d9/ XXXXXX@www2.dot.ca.gov:/cwwp2/data/
#
##-----file housekeeping
mv ./raw/cmsStatusD09.txt ./raw/old/cmsStatusD09.txt
#
##-----quit-----
exit 0
```

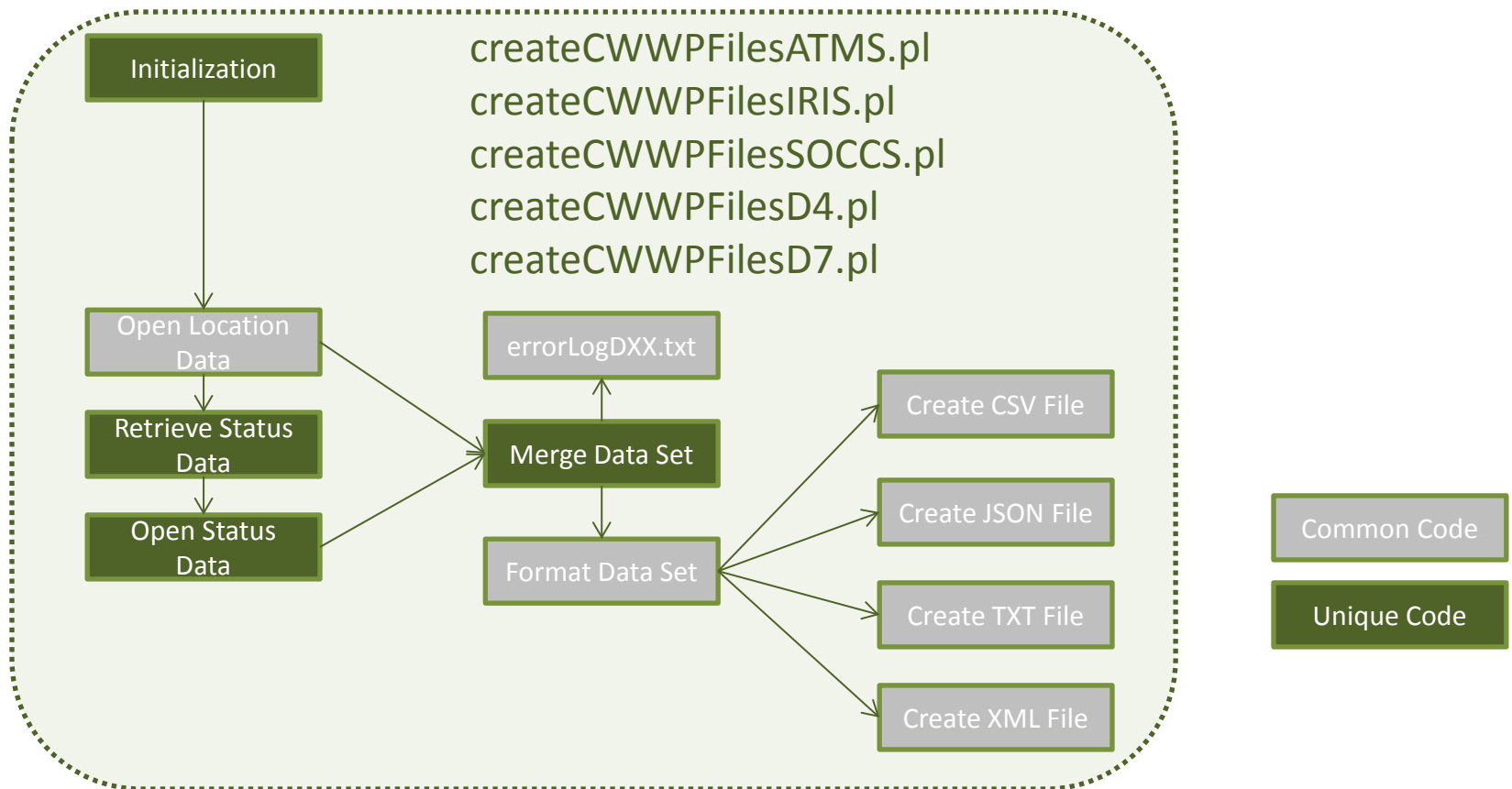
Initialization

Upload to  
WWW1

Upload to  
WWW2

Save Status Data

- Differences in createCWWPFilesXXXX.pl
  - Where possible, tried to use common building blocks of code for each data set



## createCWWPFilesXXXX.pl

- Include directories not in perl library path
- Include libraries
- Read and initialize external variables
- Initialize internal variables

Process	Common	ATMS	IRIS	SOCCS	D4	D7
Initialization	No					
Push @INC	Yes					
Libraries	Yes					
use strict	Yes					
use warnings	Yes					
use caltransConversions	Yes					
use cmsLocationDataCSV	Yes					
use cmsToolsCWWP	Yes					
use commonFunctions	Yes					
use LWP::Simple	No	X	X	X		
use Socket	No	X				
use XML::Simple	No		X		X	X
use DateTime::Format::DateParse	No				X	
use Net::FTP	No				X	
use cms_riits	No					X
External Variables	No					
\$cmsStatusURLPath	Yes					
\$cmsStatusFile	No	X	X	X		X
\$cmsLocationFile	Yes					
\$errorLog	Yes					
\$csvFile	Yes					
\$jsonFile	Yes					
\$txtFile	Yes					
\$xmlFile	Yes					
\$cmsServerAddress	No					X
\$cmsStatusURLFilename	No					X
\$user	No					X
\$pass	No					X
Internal Variables	No					
@statusArray	No	X		X		
%statusHash	No		X		X	X
\$formattedTime	Yes					
\$formattedDate	Yes					



- Makes a call to the cmsLocationDataCSV library to open District master location file

index	district	locationName	confirmedGoogleEarth	nearbyPlace	longitude	latitude	elevation	direction	county	route	routeSuffix	postmilePrefix	postmile	alignment	milepost
1		91 - SR 58 At Cache Creek	TRUE	Mojave	-118.210926	35.117597	3405E		KER	58			107.08		163.29
2		92 - SR 14 At California City	TRUE	Mojave	-118.114344	35.136633	2765E		KER	14			22.21		75.67
3		93 - US 395 At Bradys Junction	TRUE	Inyokern	-117.868595	35.72337	2516N		KER	395	R		31.65		100.06
10		910 - US 395 At Bishop	TRUE	Bishop	-118.395148	37.356687	4146N		INY	395			115.05		219.78
14		914 - US 395 NB Crowley Lake	TRUE	Mammoth Lakes	-118.73202	37.574268	6899N		MNO	395	R		13.55		247.79
15		915 - SR203 EB Mammoth Lakes	TRUE	Mammoth Lakes	-118.943086	37.641805	7657E		MNO	203			7.05		7.74
17		917 - US 395 NB Lee Vining	TRUE	Lee Vining	-119.121013	37.959293	6774N		MNO	395			51.56		285.17
20		920 - US 395 At Bridgeport	TRUE	Bridgeport	-119.22458	38.234112	6496S		MNO	395			74.8		308.42
25		925 - US 395 At Topaz	TRUE	Topaz	-119.548258	38.68144	5065S		MNO	395			120.08		353.65
95		995 - SR 120 At YATI	TRUE	Lee Vining	-119.113698	37.948762	6863E		MNO	120	R		11.94		106.85

- Converts CSV file into a hash reference object so that it can be merged into incoming status data set

Retrieve Status  
Data

createCWWPFilesXXXX.pl

Open Status Data

- Makes a call to the retrieveAndOpenStatusFile subroutine to retrieve District status file

System	Retrieval Method	Authentication	Status Format
ATMS	HTTP GET Request	No	text, fixed width, no delimiter
IRIS	HTTP GET Request	No	XML
SOCCS	HTTP GET Request	Yes	text, ý (0xFF) delimiter
D4	FTP Request	Yes	XML
D7	HTTP POST SOAP Request	Yes	XML

- Converts District status file into a hash reference object so that it can be merged with the District master location data set

Merge Data Set

createCWWPFilesXXXX.pl

Format Data Set

- Makes a call to the mergeStaticFileWithStatusFile subroutine to merge the District master location data set with the District status data set

index	district	locationName	confirmedGoogleEarth	nearbyPlace	longitude	latitude	elevation	direction	county	route	routeSuffix	postmilePrefix	postmile	alignment	milepost
V70		570 - EB RTE 41 AT CHOLAME (PM 54.4)	TRUE	Shandon	-120.29438	35.72746	1151E	SLO		46			54.3		46.36
V71		5 NB 101 at 154 in Santa Barbara	TRUE	Santa Barbara	-119.75414	34.43982	196N	SB		101			18.02		100.9

```
<?xml version="1.0" encoding="UTF-8"?>
```

```
<data>
```

```
<list>
```

```
<CMS
```

```
  ID="V70"
```

```
  LOCATION="EB SR41 @ Cholame"
```

```
  DATE="2014-05-27"
```

```
  TIME="03:05:07"
```

```
  STATUS="Blank"
```

```
  FONT_1="Single Stroke"
```

```
  PAGE_1A=""
```

```
  PAGE_1B=""
```

```
  PAGE_1C=""
```

```
  FONT_2="Single Stroke"
```

```
  PAGE_2A=""
```

```
  PAGE_2B=""
```

```
  PAGE_2C=""
```

```
  FLASH_RATE="0.0"
```

```
  COM_TYPE="Network"
```

```
  MODEL="500"
```

```
  LATITUDE="35.724272"
```

```
  LONGITUDE="-120.296461"
```

```
...
```

```
...
```

```
...
```

```
</list>
```

```
<TIMESTAMP TIMESTAMP_DATE="2014-05-27" TIMESTAMP_TIME="11:30:01" />
```

```
</data>
```

Merge Data Set

createCWWPFilesXXXX.pl

Format Data Set

- Method of merging the two data sets depends on what the District status format is in

System	Retrieval Method	Authentication	Status Format
ATMS	HTTP GET Request	No	text, fixed width, no delimiter
IRIS	HTTP GET Request	No	XML
SOCCS	HTTP GET Request	Yes	text, ª (0xFF) delimiter
D4	FTP Request	Yes	XML
D7	HTTP POST SOAP Request	Yes	XML

- Format the direction, county and route to public context

index	recordDate	recordTime	district	locationName	nearbyPlace	longitude	latitude	elevation	direction	county	route	routeSuffix	postmilePrefix	postmile	alignment	milepost
V70	5/27/2014	11:30:01	570	EB RTE 41 AT CHOLAME (PM 54.4)	Shandon	-120.294378	35.72746	1151	East	San Luis Obispo	SR-46			54.3		46.36
V71	5/27/2014	11:30:01	5NB	101 at 154 in Santa Barbara	Santa Barbara	-119.754137	34.439817	196	North	Santa Barbara	US-101			18.02		100.9
	inService	messageDate	messageTime	display	displayTime	phase1Font	phase1Line1	phase1Line2	phase1Line3	phase2Font	phase2Line1	phase2Line2	phase2Line3			
	TRUE	5/27/2014	03:05:07	Blank		0 Single Stroke				Single Stroke						
	TRUE	5/22/2014	14:35:09	Blank		0 Single Stroke				Single Stroke						

- Log those records in the District master location hash that do not have a matching record in the District status hash
- Log those records in the District status hash that do not have a matching record in the District master location hash

```
2014-05-22ÿ09:05:02ÿCMS not found in raw status file : 89 89 - EB RTE 180 AT MILLBROOK (PM 59.5)
2014-05-22ÿ09:06:01ÿFound non-matching cms : 98 :: 98 - Test-DATA REMOTE
2014-05-22ÿ09:06:01ÿFound non-matching cms : 99 :: 99 - Test
2014-05-22ÿ09:06:01ÿFound non-matching cms : 103 :: 103- TEST CDMA
2014-05-22ÿ09:06:01ÿFound non-matching cms : 104 :: TEST GX440
2014-05-22ÿ09:06:01ÿCMS not found in raw status file : 89 89 - EB RTE 180 AT MILLBROOK (PM 59.5)
2014-05-22ÿ09:07:01ÿFound non-matching cms : 98 :: 98 - Test-DATA REMOTE
2014-05-22ÿ09:07:01ÿFound non-matching cms : 99 :: 99 - Test
2014-05-22ÿ09:07:01ÿFound non-matching cms : 103 :: 103- TEST CDMA
2014-05-22ÿ09:07:01ÿFound non-matching cms : 104 :: TEST GX440
2014-05-22ÿ09:07:01ÿCMS not found in raw status file : 89 89 - EB RTE 180 AT MILLBROOK (PM 59.5)
2014-05-22ÿ09:08:02ÿFound non-matching cms : 98 :: 98 - Test-DATA REMOTE
2014-05-22ÿ09:08:02ÿFound non-matching cms : 99 :: 99 - Test
2014-05-22ÿ09:08:02ÿFound non-matching cms : 103 :: 103- TEST CDMA
2014-05-22ÿ09:08:02ÿFound non-matching cms : 104 :: TEST GX440
```

Create CSV File

Create JSON File

Create TXT File

Create XML File

## createCWWPFilesXXXX.pl

<b>CSV</b>	<b>JSON</b>	<b>TXT</b>	<b>XML</b>
use Text::CSV library	Escape \ " \f \n \r \t Characters	Use ý (0xFF) as a field delimiter	Escape & < > " ' Characters
Add header for reference		Add header for reference	
Format merged hash for CSV output	Format merged hash for JSON output	Format merged hash for TXT output	Format merged hash for XML output
Log to statusProcessingDXX.log	Log to statusProcessingDXX.log	Log to statusProcessingDXX.log	Log to statusProcessingDXX.log
Print CSV output to file	Print JSON output to file	Print TXT output to file	Print XML output to file
Save CSV file to disk	Save JSON file to disk	Save TXT file to disk	Save XML file to disk

# In the CSV file, the records look like this...yikes 5 pt font...

<http://www.dot.ca.gov/cwwp2/documentation/cms/cms-csv-layout-example.htm>

index,recordDate,recordTime,district,locationName,nearbyPlace,longitude,latitude,elevation,direction,county,route,routeSuffix,postmilePrefix,postmile,alignment,milepost,inService,messageDate,messageTime,display,displayTime,phase1Font,phase1Line1,phase1Line2,phase1Line3,phase2Font,phase2Line1,phase2Line2,phase2Line3  
 5,2012-01-12,16:08:00,2,"5 - Walters Lane N/B - Yreka",Yreka,-122.635373,41.685655,2805,North,Siskiyou,I-5,,R,44.31,,771.54,true,2012-01-12,06:27:47,"Two Pages",3.5,"Single Stroke","CLICK IT",OR,TICKET,"Single Stroke",SLOW,"FOR THE","CONE ZONE"

## Magnified so we can examine the CSV file...

### Header

index,recordDate,recordTime,district,locationName,nearbyPlace,longitude,latitude,elevation,direction,  
 county,route,routeSuffix,postmilePrefix,postmile,alignment,milepost,  
 inService,messageDate,messageTime,display,displayTime,phase1Font,phase1Line1,phase1Line2,phase1Line3,  
 phase2Font,phase2Line1,phase2Line2,phase2Line3

### Data

5,2012-01-12,16:08:00,2,"5 - Walters Lane N/B - Yreka",Yreka,-122.635373,41.685655,2805,North,  
 Siskiyou,I-5,,R,44.31,,771.54,  
 true,2012-01-12,06:27:47,"Two Pages",3.5,"Single Stroke","CLICK IT",OR,TICKET,  
 "Single Stroke",SLOW,"FOR THE","CONE ZONE"

Record Data -> Green

Location Data -> Red

Status Data -> Blue

### Layout

CSV Column	Header	Data	CSV Column	Header	Data
1	index	5	18	inService	TRUE
2	recordDate	1/12/2012	19	messageDate	1/12/2012
3	recordTime	16:08:00	20	messageTime	6:27:47
4	district	2	21	Display	"Two Pages"
5	locationName	"5 - Walters Lane N/B - Yreka"	22	displayTime	3.5
6	nearbyPlace	Yreka	23	phase1Font	"Single Stroke"
7	longitude	-122.635373	24	phase1Line1	"CLICK IT"
8	latitude	41.685655	25	phase1Line2	OR
9	elevation	2805	26	phase1Line3	TICKET
10	direction	North	27	phase2Font	"Single Stroke"
11	county	Siskiyou	28	phase2Line1	SLOW
12	route	I-5	29	phase2Line2	"FOR THE"
13	routeSuffix		30	phase2Line3	"CONE ZONE"
14	postmilePrefix	R			
15	postmile	44.31			
16	alignment				
17	milepost	771.54			

In the JSON file, the records look like this....yikes 5 pt font...

<http://www.dot.ca.gov/cwwp2/documentation/cms/cms-json-layout-example.htm>

```

{
  "data":
  [
    {
      "cms":
      {
        "index": "5",
        "recordTimestamp":
        {
          "recordDate": "2012-01-12",
          "recordTime": "16:08:00"
        },
        "location":
        {
          "district": "2",
          "locationName": "5 - Walters Lane N/B - Yreka",
          "nearbyPlace": "Yreka",
          "longitude": "-122.635373",
          "latitude": "41.685655",
          "elevation": "2805",
          "direction": "North",
          "county": "Siskiyou",
          "route": "I-5",
          "routeSuffix": "",
          "postmilePrefix": "R",
          "postmile": "44.31",
          "alignment": "",
          "milepost": "771.54"
        },
        "inService": "true",
        "message":
        {
          "messageTimestamp":
          {
            "messageDate": "2012-01-12",
            "messageTime": "06:27:47"
          },
          "display": "Two Pages",
          "displayTime": "3.5",
          "phase1":
          {
            "phase1Font": "Single Stroke",
            "phase1Line1": "CLICK IT",
            "phase1Line2": "OR",
            "phase1Line3": "TICKET"
          },
          "phase2":
          {
            "phase2Line1": "SLOW",
            "phase2Line2": "FOR THE",
            "phase2Line3": "CONE ZONE"
          }
        }
      }
    }
  ]
}

```

Record Data -> Green  
 Location Data -> Red  
 Status Data -> Blue

Magnified so we can examine the JSON file...

Layout

```

{
  "data":
  [
    {
      "cms":
      {
        "index": "5",
        "recordTimestamp":
        {
          "recordDate": "2012-01-12",
          "recordTime": "16:08:00"
        },
        "location":
        {
          "district": "2",
          "locationName": "5 - Walters Lane N/B - Yreka",
          "nearbyPlace": "Yreka",
          "longitude": "-122.635373",
          "latitude": "41.685655",
          "elevation": "2805",
          "direction": "North",
          "county": "Siskiyou",
          "route": "I-5",
          "routeSuffix": "",
          "postmilePrefix": "R",
          "postmile": "44.31",
          "alignment": "",
          "milepost": "771.54"
        },

```

```

        "inService": "true",
        "message":
        {
          "messageTimestamp":
          {
            "messageDate": "2012-01-12",
            "messageTime": "06:27:47"
          },
          "display": "Two Pages",
          "displayTime": "3.5",
          "phase1":
          {
            "phase1Font": "Single Stroke",
            "phase1Line1": "CLICK IT",
            "phase1Line2": "OR",
            "phase1Line3": "TICKET"
          },
          "phase2":
          {
            "phase2Line1": "SLOW",
            "phase2Line2": "FOR THE",
            "phase2Line3": "CONE ZONE"
          }
        }
      }
    }
  ]
}

```



# In the TXT file, the records look like this....yikes 5 pt font...

<http://www.dot.ca.gov/cwwp2/documentation/cms/cms-txt-layout-example.htm>

indexrecordDaterecordTimeädistrictlocationNameänearbyPlaceälongitudeälatitudeäelevationädirectioncountyrouteärouteSuffixpostmilePrefixpostmileäalignmentämilepostäinServiceämessageDateämessageTimeädisplayädisplayTimeäphase1Fontäphase1Line1äphase1Line2äphase1Line3äphase2Fontäphase2Line1äphase2Line2äphase2Line3  
5y2012-01-12y16:08:00y2y5 - Walters Lane N/B – YrekaYrekaY-122.635373y41.685655y2805yNorthySiskiyouyI-5yyRy44.31yy771.54ytruey2012-01-12y06:27:47yTwo Pagesy3.5ySingle StrokeyCLICK ITyORyTICKETySingle StrokeySLOWyFOR THEyCONE ZONE

## Magnified so we can examine the TXT file...

### Header

indexrecordDateärecordTimeädistrictlocationNameänearbyPlaceälongitudeälatitudeäelevationädirectionäcountyrouteärouteSuffixpostmilePrefixpostmileäalignmentämilepostäinServiceämessageDateämessageTimeädisplayädisplayTimeäphase1Fontäphase1Line1äphase1Line2äphase1Line3äphase2Fontäphase2Line1äphase2Line2äphase2Line3

### Data

5y2012-01-12y16:08:00y2y5 - Walters Lane N/B – YrekaYrekaY-122.635373y41.685655y2805yNorthySiskiyouyI-5yyRy44.31yy771.54ytruey2012-01-12y06:27:47yTwo Pagesy3.5ySingle StrokeyCLICK ITyORyTICKETySingle StrokeySLOWyFOR THEyCONE ZONE

Record Data -> Green

Location Data -> Red

Status Data -> Blue

### Layout

TXT Column	Header	Data	TXT Column	Header	Data
1	index	5	18	inService	TRUE
2	recordDate	1/12/2012	19	messageDate	1/12/2012
3	recordTime	16:08:00	20	messageTime	6:27:47
4	district	2	21	Display	Two Pages
5	locationName	5 - Walters Lane N/B – Yreka	22	displayTime	3.5
6	nearbyPlace	Yreka	23	phase1Font	Single Stroke
7	longitude	-122.635373	24	phase1Line1	CLICK IT
8	latitude	41.685655	25	phase1Line2	OR
9	elevation	2805	26	phase1Line3	TICKET
10	direction	North	27	phase2Font	Single Stroke
11	county	Siskiyou	28	phase2Line1	SLOW
12	route	I-5	29	phase2Line2	FOR THE
13	routeSuffix		30	phase2Line3	CONE ZONE
14	postmilePrefix	R			
15	postmile	44.31			
16	alignment				
17	milepost	771.54			

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<data>
  <cms>
    <index>5</index>
    <recordTimestamp>
      <recordDate>2012-01-12</recordDate>
      <recordTime>16:08:00</recordTime>
    </recordTimestamp>
    <location>
      <district>2</district>
      <locationName>5 - Walters Lane N/B - Yreka</locationName>
      <nearbyPlace>Yreka</nearbyPlace>
      <longitude>-122.635373</longitude>
      <latitude>41.685655</latitude>
      <elevation>2805</elevation>
      <direction>North</direction>
      <county>Siskiyou</county>
      <route>I-5</route>
      <routeSuffix></routeSuffix>
      <postmilePrefix>R</postmilePrefix>
      <postmile>44.31</postmile>
      <alignment></alignment>
      <milepost>771.54</milepost>
    </location>
    <inService>true</inService>
    <message>
      <messageTimestamp>
        <messageDate>2012-01-12</messageDate>
        <messageTime>06:27:47</messageTime>
      </messageTimestamp>
      <messageTimestamp>
        <display>Two Pages</display>
        <displayTime>3.5</displayTime>
      </messageTimestamp>
      <phase1>
        <phase1Font>Single Stroke</phase1Font>
        <phase1Line1>CLICK IT</phase1Line1>
        <phase1Line2>OR</phase1Line2>
        <phase1Line3>TICKET</phase1Line3>
      </phase1>
      <phase2>
        <phase2Font>Single Stroke</phase2Font>
        <phase2Line1>SLOW</phase2Line1>
        <phase2Line2>FOR THE</phase2Line2>
        <phase2Line3>CONE ZONE</phase2Line3>
      </phase2>
    </message>
  </cms>
</data>
```

## Magnified so we can examine the XML file...

### Layout

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<data>
  <cms>
    <index>5</index>
    <recordTimestamp>
      <recordDate>2012-01-12</recordDate>
      <recordTime>16:08:00</recordTime>
    </recordTimestamp>
    <location>
      <district>2</district>
      <locationName>5 - Walters Lane N/B - Yreka</locationName>
      <nearbyPlace>Yreka</nearbyPlace>
      <longitude>-122.635373</longitude>
      <latitude>41.685655</latitude>
      <elevation>2805</elevation>
      <direction>North</direction>
      <county>Siskiyou</county>
      <route>I-5</route>
      <routeSuffix></routeSuffix>
      <postmilePrefix>R</postmilePrefix>
      <postmile>44.31</postmile>
      <alignment></alignment>
      <milepost>771.54</milepost>
    </location>
```

Record Data -> Green  
 Location Data -> Red  
 Status Data -> Blue

```
<inService>true</inService>
<message>
  <messageTimestamp>
    <messageDate>2012-01-12</messageDate>
    <messageTime>06:27:47</messageTime>
  </messageTimestamp>
  <display>Two Pages</display>
  <displayTime>3.5</displayTime>
  <phase1>
    <phase1Font>Single Stroke</phase1Font>
    <phase1Line1>CLICK IT</phase1Line1>
    <phase1Line2>OR</phase1Line2>
    <phase1Line3>TICKET</phase1Line3>
  </phase1>
  <phase2>
    <phase2Font>Single Stroke</phase2Font>
    <phase2Line1>SLOW</phase2Line1>
    <phase2Line2>FOR THE</phase2Line2>
    <phase2Line3>CONE ZONE</phase2Line3>
  </phase2>
</message>
</cms>
</data>
```

## crontab

```
2014-05-22 08:36:02 -----
2014-05-22 08:36:02 -----
2014-05-22 08:36:02 -----
2014-05-22 08:36:02 Retrieving District CMS status file from District server => http://XXXXXXXX/cmsnow.txt
                        Saving here => ./raw/cmsStatusD09.txt
2014-05-22 08:36:03 Response Code from District Server: 200
2014-05-22 08:36:03 District CMS status file filesize => 1508 bytes
2014-05-22 08:36:03 Opening District CMS status file => ./raw/cmsStatusD09.txt
2014-05-22 08:36:03 District CMS Status Data Is Ready To Use
2014-05-22 08:36:03 -----
2014-05-22 08:36:03 -----
2014-05-22 08:36:03 Opening District CMS CSV File -> ./output/d9/cms/cmsStatusD09.csv
2014-05-22 08:36:03 Creating District CMS CSV Header
2014-05-22 08:36:03 Processing District CMS CSV file
2014-05-22 08:36:03 Completed processing District CMS CSV file
2014-05-22 08:36:03 Closing District CMS File -> ./output/d9/cms/cmsStatusD09.csv
2014-05-22 08:36:03 -----
2014-05-22 08:36:03 -----
2014-05-22 08:36:03 Opening District CMS JSON File -> ./output/d9/cms/cmsStatusD09.json
2014-05-22 08:36:03 Creating District CMS JSON Header
2014-05-22 08:36:03 Processing District CMS JSON file
2014-05-22 08:36:03 Creating District CMS JSON Footer
2014-05-22 08:36:03 Completed processing District CMS JSON file
2014-05-22 08:36:03 Closing District CMS JSON File -> ./output/d9/cms/cmsStatusD09.json
2014-05-22 08:36:03 -----
2014-05-22 08:36:03 -----
2014-05-22 08:36:03 Opening District CMS TXT File -> ./output/d9/cms/cmsStatusD09.txt
2014-05-22 08:36:03 Processing District CMS TXT file
2014-05-22 08:36:03 Completed processing District CMS TXT file
2014-05-22 08:36:03 Closing District CMS TXT File -> ./output/d9/cms/cmsStatusD09.txt
2014-05-22 08:36:03 -----
2014-05-22 08:36:03 -----
2014-05-22 08:36:03 Opening District CMS XML File -> ./output/d9/cms/cmsStatusD09.xml
2014-05-22 08:36:03 Creating District CMS XML Header
2014-05-22 08:36:03 Processing District CMS XML file
2014-05-22 08:36:03 Creating District CMS XML Footer
2014-05-22 08:36:03 Completed processing District CMS XML file
2014-05-22 08:36:03 Closing District CMS XML File -> ./output/d9/cms/cmsStatusD09.xml
2014-05-22 08:36:03 -----
```

# crontab

```
spawn scp -p -r /cms/output/d9/ XXXXXX@www1.dot.ca.gov:/cwwp2/data/
Password:
```

cmsStatusD09.txt	0%	0	0.0KB/s	--:--	ETA
cmsStatusD09.txt	100%	2614	2.6KB/s	00:00	
cmsStatusD09.csv	0%	0	0.0KB/s	--:--	ETA
cmsStatusD09.csv	100%	2760	2.7KB/s	00:00	
cmsStatusD09.xml	0%	0	0.0KB/s	--:--	ETA
cmsStatusD09.xml	100%	12KB	12.3KB/s	00:00	
cmsStatusD09.json	0%	0	0.0KB/s	--:--	ETA
cmsStatusD09.json	100%	11KB	11.5KB/s	00:00	

```
spawn scp -p -r /cms/output/d9/ XXXXXX@www2.dot.ca.gov:/cwwp2/data/
Password:
```

cmsStatusD09.txt	0%	0	0.0KB/s	--:--	ETA
cmsStatusD09.txt	100%	2614	2.6KB/s	00:00	
cmsStatusD09.csv	0%	0	0.0KB/s	--:--	ETA
cmsStatusD09.csv	100%	2760	2.7KB/s	00:00	
cmsStatusD09.xml	0%	0	0.0KB/s	--:--	ETA
cmsStatusD09.xml	100%	12KB	12.3KB/s	00:00	
cmsStatusD09.json	0%	0	0.0KB/s	--:--	ETA
cmsStatusD09.json	100%	11KB	11.5KB/s	00:00	

# Tools used to build the CWWP2

- Google Maps
- Caltrans LRS Webservice
  - <http://geo.dot.ca.gov/pmws/services/PostmileWebService>
- Geonames.org – placenames and elevation
  - <http://api.geonames.org>
- Cron – script scheduler
- Perl – Ancient (1987) scripting language
- Bash – command line terminal for Linux
- Expect – Scripting agent for Bash
- SCP – Secure Copy Program for transferring files
- HTTP - Coding for web browsers
- Notepad++ - Text editor

# Who is using the CWWP2 Formats?

The screenshot shows the Caltrans QuickMap website interface. The browser address bar displays "quickmap.dot.ca.gov". The page header includes the "CALIFORNIA DEPARTMENT OF TRANSPORTATION" logo and navigation links for Home, Travel, Business, Engineering, News, Maps, Jobs, About Caltrans, and Contact Us. A search bar is located in the top right corner. The main content area features a map of California with various traffic alerts represented by colored icons. A pop-up window titled "Northbound US-395 - 17 - US 395 NB Lee Vining" is overlaid on the map, displaying the following information:

**DEER MIGRATION  
USE CAUTION**

SR 120 - OPEN  
SR 108 - OPEN  
SR 89 - OPEN

Last updated: 2014-05-26 09:29:59

The left sidebar contains a "Caltrans QuickMap" section with checkboxes for Slow, Fast, Lane Closures, CHP/CHIN Incidents, Message Signs, Cameras, and Chain Controls. Below this is a "Zoom to..." section with a list of regions including Redding, Sacramento, San Francisco, Central Valley, Los Angeles, San Bernardino, and San Diego. At the bottom left, there is a "Regional 511 Sites" section with a list of regions including Sacramento, SF Bay Area, San Luis Obispo, San Joaquin Valley, Los Angeles, Riverside/San Bernardino, and San Diego. The Caltrans logo is visible in the bottom left corner of the map area.

# Who is using the CWWP2 Formats?

511 Traffic

traffic.511.org

511 SF Bay

511.ORG TRANSIT TRAFFIC RIDESHARE BICYCLING PARKING

MY 511 Login | Register

Traffic Home Latest News & Traffic Info Driver Resources Smart Driving FasTrak® and Tolls About 511 Traffic

Latest News & Construction Collapse

05/27/14 5:41 am Sacramento Area Traffic Advisory - US-50 between I-5 and CA-99

05/27/14 5:40 am MacArthur Maze I-580 / I-80 Construction in Oakland

05/27/14 5:43 am CA-4 Widening Project Continues in East Contra Costa County

There are 12 more construction messages.

511 Driving Times™ ? Collapse

Step 1 of 3: Now Specific Day and Time

Step 2 of 3: Select Start

Step 3 of 3: Select End

511 Parking Get SF real-time info. Find Bay Area lots & garages. >>

511SFBay Follow 511SFBay on Twitter for breaking traffic news >>

Current Traffic Conditions as of 5/27/14 11:08 am

Expand Map

Calculate Drive Times LIVE Traffic

CM063-SF 80 WB ON SFOBB ANCHORAGE

SF S-280 KING TO MARIPOSA NOW OPEN

4 mi 4 km

Speed: Standard Colors

Display: More

In This Section 511.org 511 Tools Languages About This Site

# Who is using the CWWP2 Formats?

The screenshot displays the Aviation WeatherShare website interface. At the top, the browser address bar shows 'aviation.weathershare.org'. The main content area features a map of California with various cities and highways labeled. A video player window is overlaid on the map, titled 'Crystal Springs Road' and 'I-80 AT CRYSTAL SPRINGS'. The video shows a road view with a timestamp of '2014-05-27 11:06:04'. In the bottom left corner, there is a legend for 'Caltrans CCTV' with a 'CCTV Camera' icon. The bottom right corner shows the copyright information '© Copyright 2014 WTI / MSU' and the last update time 'Last Updated: 5/27/2014, 10:58:19 AM PDT'.

<http://aviation.weathershare.org/>



# Who is using the CWWP2 Formats?

The screenshot displays the OSS WeatherShare website interface. At the top, there is a navigation bar with tabs for "Road/Travel Conditions", "Current Weather", "Forecast Weather", and "Other Info". A sidebar on the left contains a "Check/Uncheck All" section with checkboxes for "Chain Requirements", "Incidents", "CMS", "CCTV", "RWS", "Road Information", and "Traffic Conditions". The main area is a map of the Pacific Northwest, showing parts of Washington, Oregon, Idaho, and Nevada. The map is overlaid with numerous icons representing different types of weather and traffic data. A pop-up window is visible over the map, displaying the following information:

CA-25 - Eureka Way W/B  
Updated: 10:55 AM PDT - Tue, May 27 2014  
Location: 40.585319, -122.419698  
Direction: West

The pop-up window also contains a black box with white text that reads: "CONSTRUCTION INFO TUNE TO 1610 AM".

At the bottom left, there is a legend for "CMS, CCTV" with various icons and labels: "Active CMS", "CCTV Camera", "Construction", "Information", "RWS with Road Temp ≤ 32°", "Inactive CMS", "Chain Restriction", "Incident", "Commercial Vehicle Information", and "RWS".

The bottom right corner of the map area shows the copyright information: "© Copyright 2014 WTI/MSU" and the last update time: "Last Updated: 5/27/2014, 10:55:03 AM PDT".

# Who is using the CWWP2 Formats?

The image is a screenshot of a web browser displaying the 511 San Diego traffic map. The browser's address bar shows the URL [http://traffic.511sd.com/traffic\\_map.asp?refresh=300](http://traffic.511sd.com/traffic_map.asp?refresh=300). The page title is "SANDAG 511 -- Traffic: Real Time ...". The main content is a map of San Diego with various traffic conditions indicated by colored lines. A pop-up window titled "Cameras" is open, showing a camera feed for "805 SB 805 SO Kearny Villa Rd" with a timestamp of "05-27-14 10:59:37". The map includes a sidebar with navigation and information options, and several advertisements on the right side.

**REAL TIME TRAFFIC CONDITIONS**

**Legend**

- Incidents
- Construction
- Events
- Cameras
- Driving Times
- Traffic

**Traffic Congestion**

Standard Colors

- No congestion
- Moderate
- Heavy
- Stop and go
- No data

**Links to neighboring 511 partners**

- LA area
- Inland Empire
- Caltrans / CA State
- ADOT / AZ State

**Links**

- Traffic Map
- With Driving Times
- Driving Times (Next Version)
- Traffic Information (Next Version)
- Breaking News & Construction
- Driving Times Coverage

Select Language

Powered by Google Trans

FAQ

**511**  
Click, Call, Connect

**Cameras**

805 SB 805 SO Kearny Villa Rd

C69 SB 805 SO KEARNY VILLA 05-27-14 10:59:37

511 cameras are currently undergoing changes. Thank you for your patience while we make improvements to the system. Thank you, 511 Staff

Put traffic information in the palm of your hand

511 SAN DIEGO

POSTPONED: Friday, May 30

let's ride!

BikeToWork

May is Bike to Work Month

Bike to Work Day is Friday, May 30 - register today!

iCommuteSD.com

Who's waiting for you?

Get there faster with FasTrak - free tolls now!

FasTrak

**TransNet**  
Your tax dollars at work

**PROJECT UPDATES**

SANDAG

KeepSanDiegoMoving.com

About 511 Traffic | Suggestions | Tell a Friend | Traffic Site Directory | FAQ | Contact Us

©2014 SANDAG | 511 Home | Traffic | Transit | iCommute | Bicycling | Privacy | Accessibility

[http://traffic.511sd.com/traffic\\_map.asp?refresh=300](http://traffic.511sd.com/traffic_map.asp?refresh=300)

# Who is using the CWWP2 Formats?

The screenshot shows a web browser window displaying the Caltrans District 3 Traffic Cameras page. The browser's address bar shows the URL [www.dot.ca.gov/dist3/departments/traffic/cameras/](http://www.dot.ca.gov/dist3/departments/traffic/cameras/). The page header includes the Caltrans logo and navigation links for Home, Travel, Business, Engineering, News, Maps, Jobs, About Caltrans, and Contact Us. The main content area is titled "DISTRICT 3 - BUTTE, COLUSA, EL DORADO, GLENN, NEVADA, PLACER, SACRAMENTO, SIERRA, SUTTER, YOLO AND YUBA COUNTIES" and provides instructions for viewing live traffic videos. A map of the region is shown with a red camera icon selected, which has opened a video window. The video window displays a live feed of a road intersection and includes the following information:

**SR299-SR89 PRESET 1**

Tuesday, May 27, 2014 10:49:05 PDT

**SR-89 - Burney : SR299-SR89**  
Weather Forecast as of 09:50:00 PDT on 2014-05-27:  
High: 78°F Today: Mostly Sunny  
Low: 41°F Tonight: Mostly Clear  
Sunrise: 05:39 PDT Elevation: 3188 feet  
Sunset: 20:29 PDT

The map shows the region with various highways and landmarks. The video window also includes a close button (X) and a search bar.


# Application Using CWWP2 JSON Data

JSON Test

www.dot.ca.gov/cwwp2/tools/showImages.htm

SR-203 Milepost 9.2

Looking SE At SB US 395 On 05/27/2014 10:42:05




MNO-203-Mammoth Mountain  
SR-203 Milepost 9.2

SR-203 Milepost 9.2

SR-203 Milepost 9.2


US-395

US 395 At Conway Summit Virginia Lakes Rd 05/27/2014 10:42:05




MNO-395-Conway Summit  
US-395 Milepost 297.14

US 395 At Conway Summit - South 05/27/2014 10:40:16



MNO-395-Conway Summit  
US-395 Milepost 297.14

US 395 At Conway Summit - North 05/27/2014 10:42:25



MNO-395-Conway Summit  
US-395 Milepost 297.14

```
1 <!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN" "http://www.w3.org/TR/html4/loose.dtd">
2 <html>
3   <head>
4     <meta http-equiv="Content-type" content="text/html; charset=iso-8859-1">
5     <title>JSON Test</title>
6     <link rel="stylesheet" type="text/css" href="css/cwwp2.css">
7     <script type="text/javascript" src="js/jquery-1.7.2.js"></script>
8     <script type="text/javascript" src="js/cctv.js"></script>
9   </head>
10  <body onload="loadCCTVImages ()">
11    <div align="center">
12      <select id="district" onchange="loadCCTVImages ();">
13        <option selected value="../../data/d1/cctv/cctvStatusD01.json">District 1</option>
14        <option value="../../data/d2/cctv/cctvStatusD02.json">District 2</option>
15        <option value="../../data/d3/cctv/cctvStatusD03.json">District 3</option>
16        <option value="../../data/d4/cctv/cctvStatusD04.json">District 4</option>
17        <option value="../../data/d5/cctv/cctvStatusD05.json">District 5</option>
18        <option value="../../data/d6/cctv/cctvStatusD06.json">District 6</option>
19        <option value="../../data/d7/cctv/cctvStatusD07.json">District 7</option>
20        <option value="../../data/d8/cctv/cctvStatusD08.json">District 8</option>
21        <option value="../../data/d9/cctv/cctvStatusD09.json">District 9</option>
22        <option value="../../data/d10/cctv/cctvStatusD10.json">District 10</option>
23        <option value="../../data/d11/cctv/cctvStatusD11.json">District 11</option>
24        <option value="../../data/d12/cctv/cctvStatusD12.json">District 12</option>
25        <option value="/hq/research/its/nv/cctv/cctvStatusNV.json">Nevada</option>
26      </select>
27      <div id="test" style="position:absolute;top:50px;"></div>
28    </div>
29  </body>
30 </html>
```

# Application Using CWWP2 JSON Data

SR-120 Milepost 106.85

**SR-203**

DEER MIGRATION  
USE CAUTION

-----

SR 120 - OPEN  
SR 108 - OPEN  
SR 89 - OPEN

15 - SR203 EB Mammoth Lakes  
SR-203 Milepost 7.74

**US-395**

REPORT DRUNK  
DRIVERS  
CALL 911

DEER MIGRATION  
USE CAUTION

DEER MIGRATION  
USE CAUTION

-----

SR 120 - OPEN  
SR 108 - OPEN

SR 120 - OPEN  
SR 108 - OPEN

SR 120 - OPEN  
SR 108 - OPEN

```
1 <!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN" "http://www.w3.org/TR/html4/loose.dtd">
2 <html>
3   <head>
4     <meta http-equiv="Content-type" content="text/html; charset=iso-8859-1">
5     <title>JSON Test</title>
6     <link rel="stylesheet" type="text/css" href="css/cwwp2.css">
7     <script type="text/javascript" src="js/jquery-1.7.2.js"></script>
8     <script type="text/javascript" src="js/cms.js"></script>
9   </head>
10  <body onload="loadCMSData()">
11    <div align="center">
12      <select onchange="loadCMSData( this.options[ this.selectedIndex ].value );">
13        <option selected value="../data/d1/cms/cmsStatusD01.json">District 1</option>
14        <option value="../data/d2/cms/cmsStatusD02.json">District 2</option>
15        <option value="../data/d3/cms/cmsStatusD03.json">District 3</option>
16        <option value="../data/d4/cms/cmsStatusD04.json">District 4</option>
17        <option value="../data/d5/cms/cmsStatusD05.json">District 5</option>
18        <option value="../data/d6/cms/cmsStatusD06.json">District 6</option>
19        <option value="../data/d7/cms/cmsStatusD07.json">District 7</option>
20        <option value="../data/d8/cms/cmsStatusD08.json">District 8</option>
21        <option value="../data/d9/cms/cmsStatusD09.json">District 9</option>
22        <option value="../data/d10/cms/cmsStatusD10.json">District 10</option>
23        <option value="../data/d11/cms/cmsStatusD11.json">District 11</option>
24        <option value="../data/d12/cms/cmsStatusD12.json">District 12</option>
25        <option value="/hq/research/its/nv/cms/cmsStatusNVD01.json">Nevada District 1</option>
26        <option value="/hq/research/its/nv/cms/cmsStatusNVD02.json">Nevada District 2</option>
27        <option value="/hq/research/its/nv/cms/cmsStatusNVD03.json">Nevada District 3</option>
28      </select>
29      <div id="test" style="position:absolute;top:50px;"></div>
30    </div>
31  </body>
32 </html>
```

# Limitations of the CWWP2

- Keeping the District master location data current and relevant
- Uses external data sources that Caltrans has no control over



# Lessons Learned From the CWWP2

- When District status data goes down, so does the CWWP2 for that District
- Malformed data sets cause a lot of problems for third parties
- Simplifying the codebase by using reusable libraries eliminates a lot of problems
- Combining Location and Status data is a really useful thing
- Simple HTTP access to data induces application development
- There is a real need for a traveler information data czar that is constantly on top of changing data conditions

# Next Steps of the CWWP2

- VDS data – CWWP2 output from PeMS
- Statewide field element datasets
- Maintenance and code improvements
- Log improvements
- Polish the external facing site
- Publishing Point – moving the CWWP2 generation and management to each District



There are  $10_2$  types of people in the world:  
Those who understand binary and those who don't



Any Questions?