The COSMOS/PEER-LL Geotechnical Virtual Data Center

Ohio Transportation Engineering Conference
October 28, 2008

Loren Turner, P.E.
Senior Transportation Engineer
California Department of Transportation

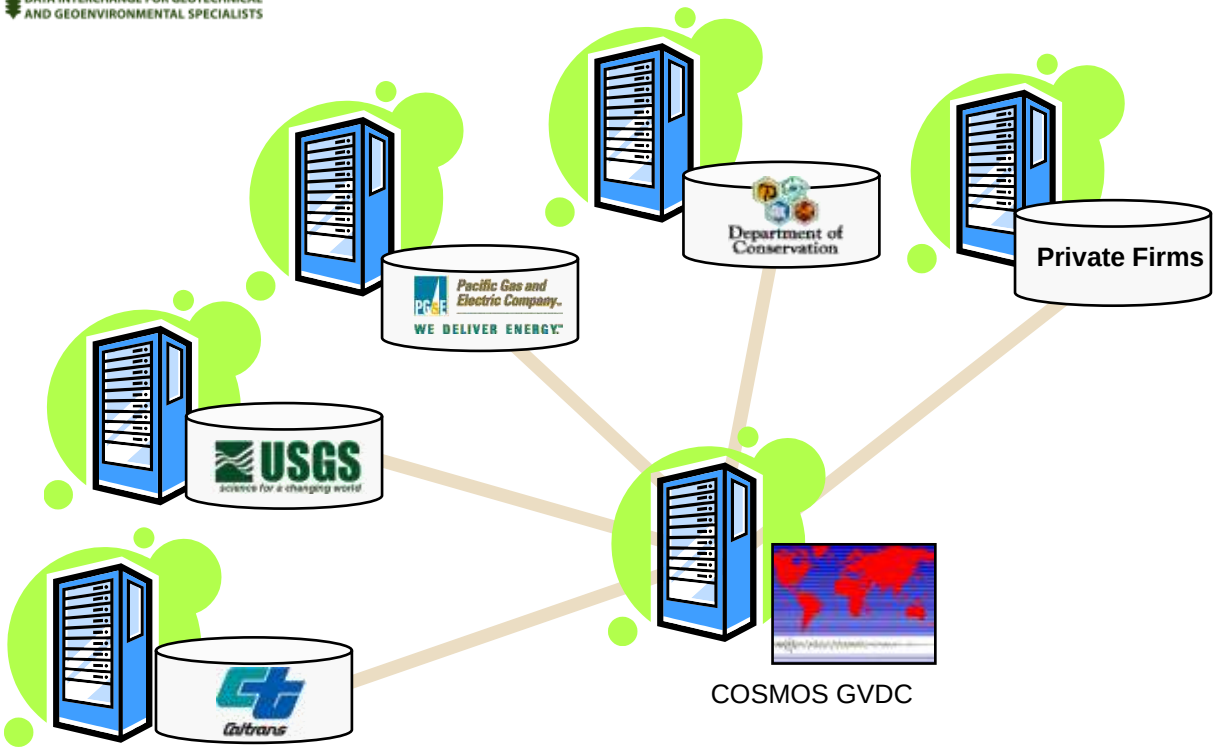
Overview

- The COSMOS/PEER-LL Geotechnical Virtual Data Center
- Project History
- End-user experience
- How it works

Geotechnical Virtual Data Center

- Virtual gateway to data repositories from multiple agencies.
- Relies on DiGGS for standardized data exchange.

DATA INTERCHANGE FOR GEOTECHNICAL AND GEOENVIRONMENTAL SPECIALISTS



Project History

1992	NSF/FHWA sponsors the National Geotechnical Experiment Sites.
1996	The ROSRINE project pioneers web dissemination of geotechnical data.
1998	USC Workshop highlights growing need for geotechnical data management and exchange.
1999	PEER Lifelines initiates Project 2L01.
2001	Project 2L01 – Held a workshop to assess user needs and build consensus to develop a Geotechnical Virtual Data Center (GVDC).
2004	Project 2L02 – Developed a pilot GVDC that demonstrated the feasibility of the technology.
2005	Project 2L03 – Initiated. Expanded to accommodate DIGGS, and significant upgrades to GVDC system architecture.

Project Team

- **Carl Stepp (PI),** Consortium of Organizations for Strong-Motion Observation Systems
- **Jean Benoit**, University of New Hampshire
- **John Bobbit**, Petrotechnical Open Standards Consortium
- **Sean Devlin**
- **Dan Ponti**, U.S. Geological Survey
- **Charles Real**, California Geological Survey
- **Toru Saito**, Saito Statistics
- **Jennifer Swift**, University of Southern California
- **Loren Turner**, Caltrans
- **Yang Zhu**, Caltrans

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Sponsored by:

- CalTrans
- California Energy Commission
- Pacific Gas & Electric
- PEER-Lifelines Program

In Partnership with:

- Pacific Earthquake Engineering Research Center
- United States Geological Survey
- California Geological Survey

Implemented by:

- University of Southern California
- Consortium of Organizations for Strong-Motion Observations Systems

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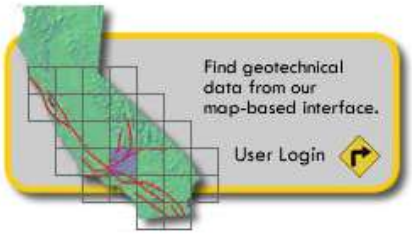
Geotechnical Virtual Data Center (GVDC)

The overall project is divided into a short-term and a long-term objective. The project we are now undertaking encompasses the short-term objective only, to develop a pilot web-based system linking the PG&E, Caltrans, CGS and USGS example geotechnical data sets. The long-term objective (a future project not yet funded) is to extend the pilot system and develop a web-based system linking multiple data sets... read more >>



Please see the Project Workshop agenda , June 21-23 '04 in Newport Beach, CA. The results of the user scenario survey more >>

The objective is to develop consensus recommendations for classifying, archiving, and web dissemination of geotechnical data... more >>

COSMOS and the PEER Lifelines Program are coordinating additional workshops and establishing a pilot project leading to... more >>

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Caltrans PG&E USGS science for a changing world

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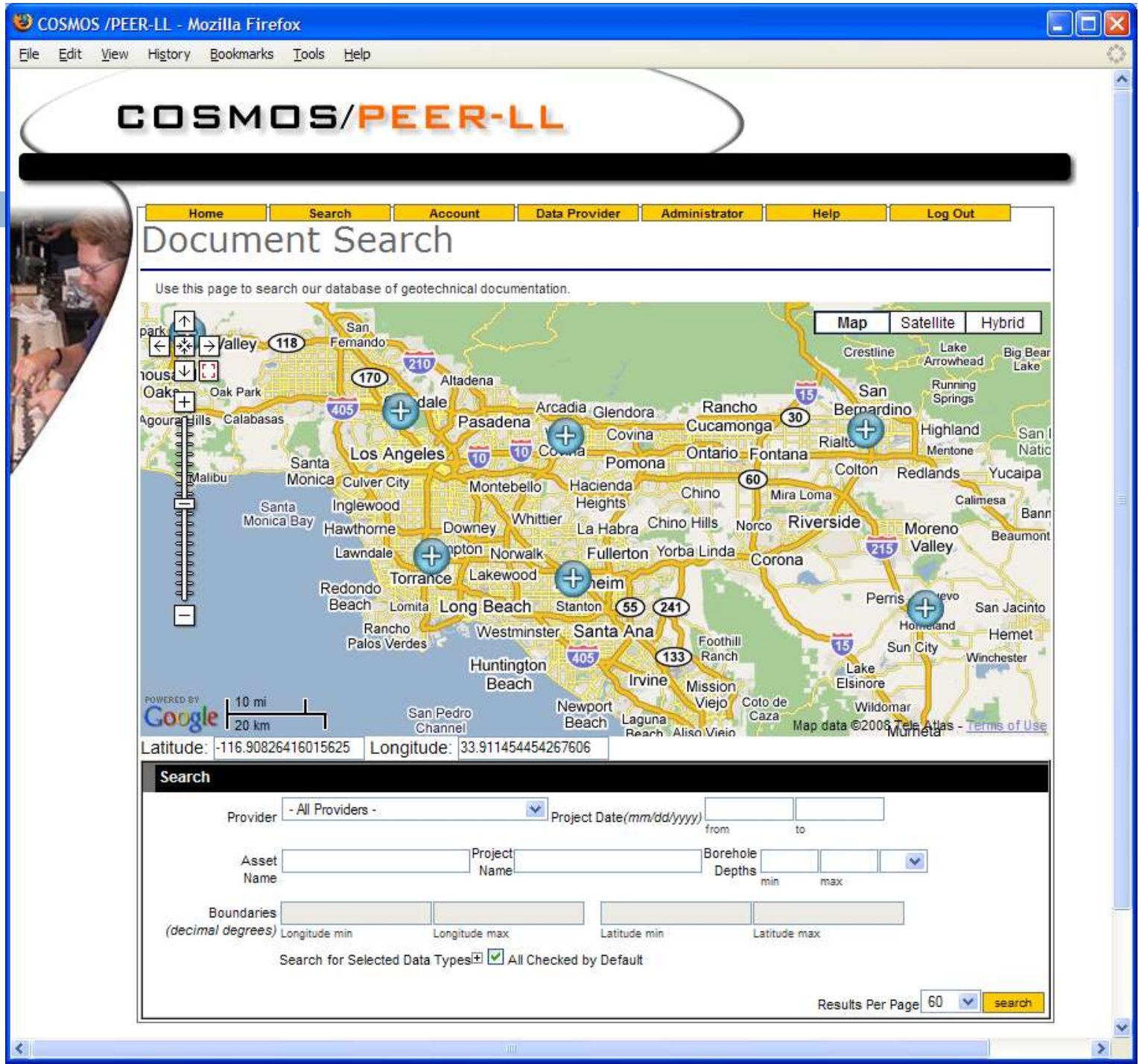
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Asset Name Project Name Borehole Depths min max
Boundaries (decimal degrees) Longitude min Longitude max Latitude min Latitude max
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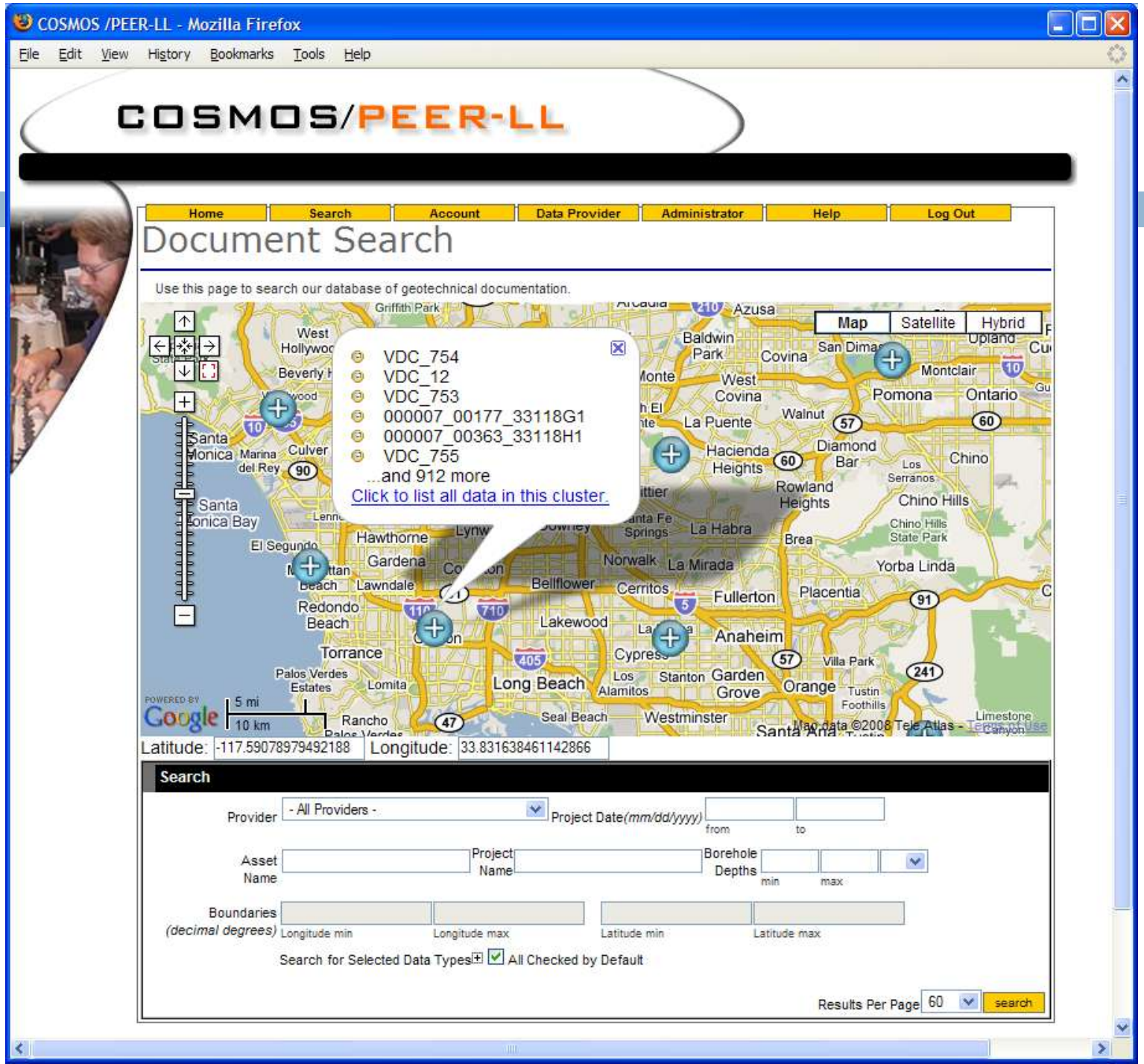
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VDC_753
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000007_00363_33118H1
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...and 912 more
Click to list all data in this cluster.
Latitude: -117.59078979492188 Longitude: 33.831638461142866
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Boundaries (decimal degrees) Longitude min Longitude max Latitude min Latitude max
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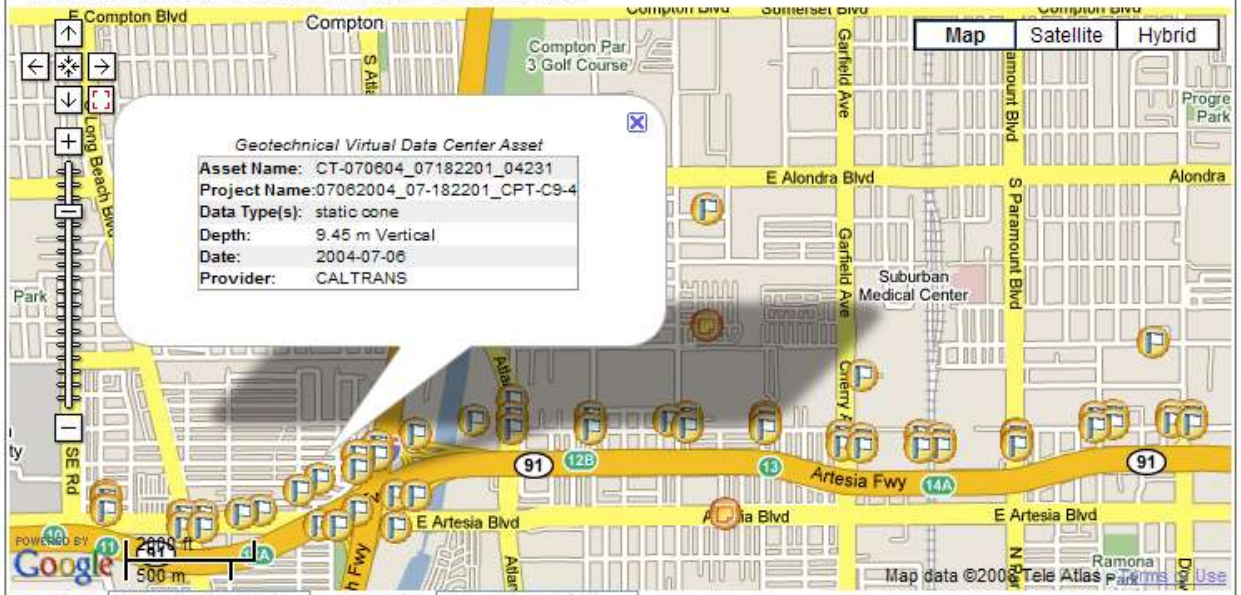

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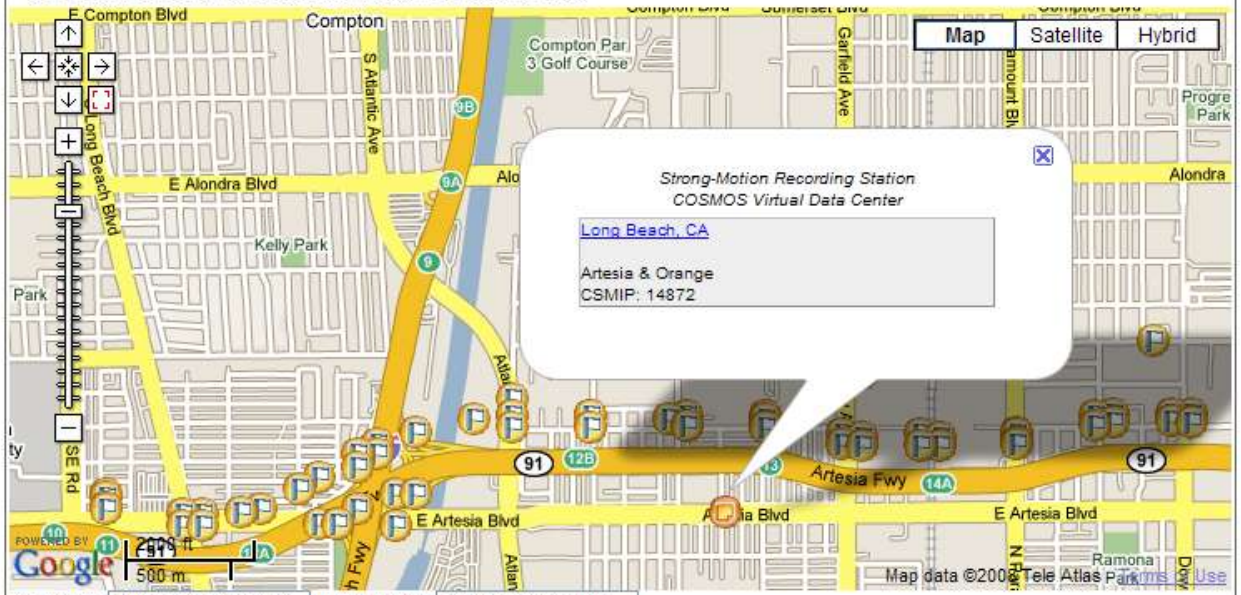

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Asset Name Project Name Borehole Depths min max

Boundaries (decimal degrees) Longitude min Longitude max Latitude min Latitude max

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USC: Long Beach, CA
Long Beach LDS Church
6979 Orange Ave

Agency Number: 5380
Latitude: 33.8810
Longitude: -118.1760
Site Geology: Alluvium QYM Q
Owner: University of Southern California
References

Structure: 1-Story Bldg
Instrument: Ground Level

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Whittier Narrows, California 1987-10-01 14:42:20 UTC

Summary page for this earthquake

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Component: Up	**PGA (cm/s/s):** 132.70	**PGV (cm**
Component: 10	**PGA (cm/s/s):** 221.50	**PGV (cm**
Component: 280	**PGA (cm/s/s):** 152.50	**PGV (cm**

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Landers, California 1992-06-28 11:57:34 UTC

Summary page for this earthquake

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Component: Up	**PGA (cm/s/s):** 19.70	**PGV (cm**
Component: 10	**PGA (cm/s/s):** 48.40	**PGV (cm**
Component: 280	**PGA (cm/s/s):** 58.70	**PGV (cm/s):** -

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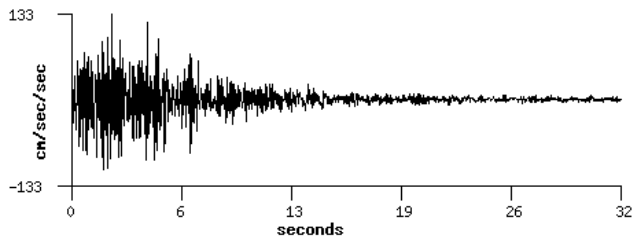
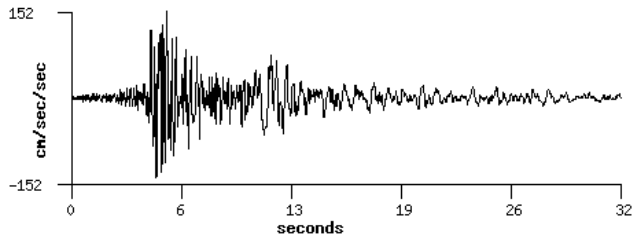
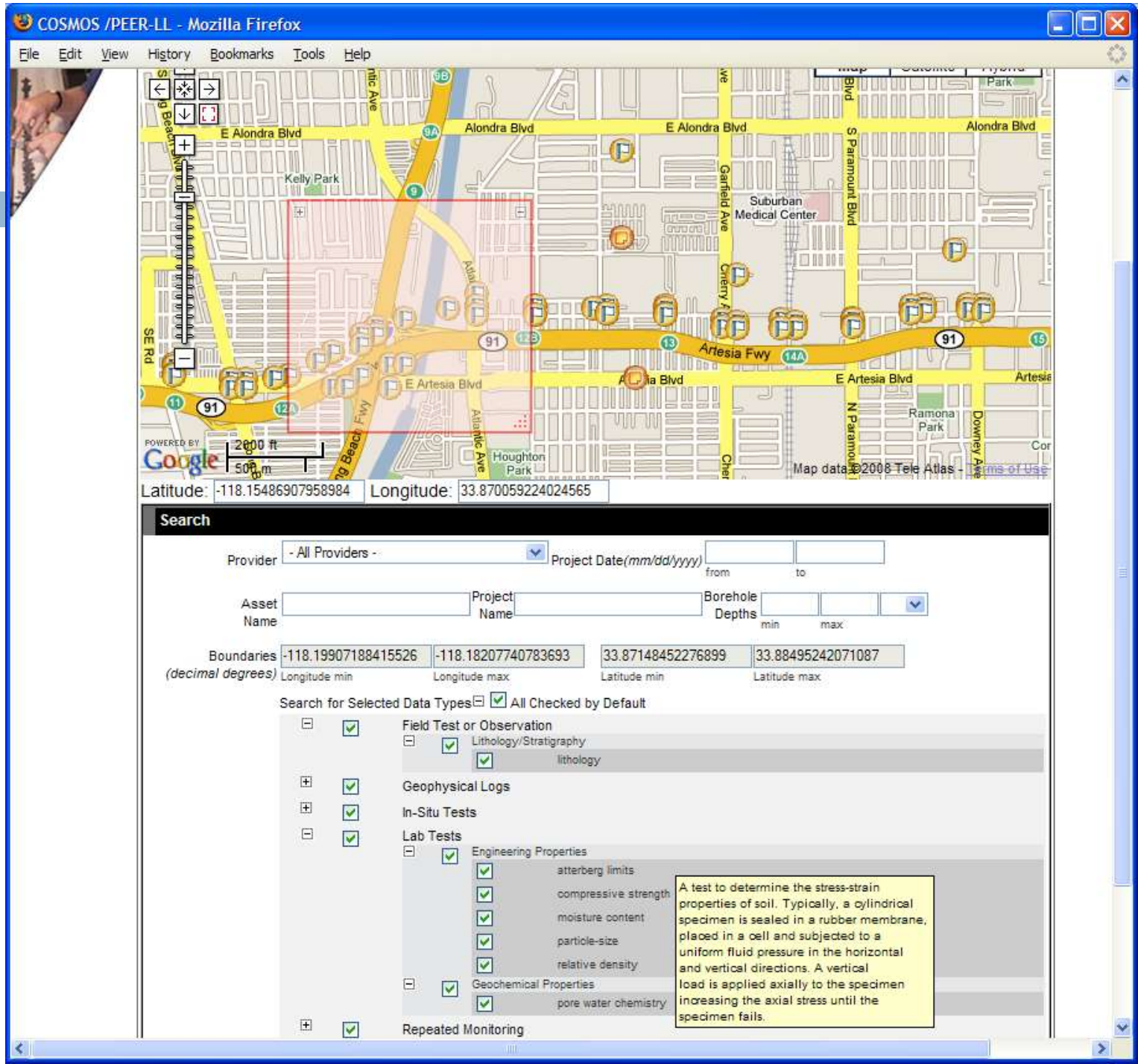
http://db.cosmos-eq.org/scripts/plot.plx?st



Component: 280 Ground Level

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Garfield Ave
S Paramount Blvd
Artesia Fwy
E Artesia Blvd
Ramona Park
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SE Rd
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Latitude: -118.15486907958984
Longitude: 33.870059224024565
Search
Provider - All Providers -
Project Date(mm/dd/yyyy) from to
Asset Name
Project Name
Borehole Depths min max
Boundaries (decimal degrees)
-118.19907188415526 Longitude min
-118.18207740783693 Longitude max
33.87148452276899 Latitude min
33.88495242071087 Latitude max
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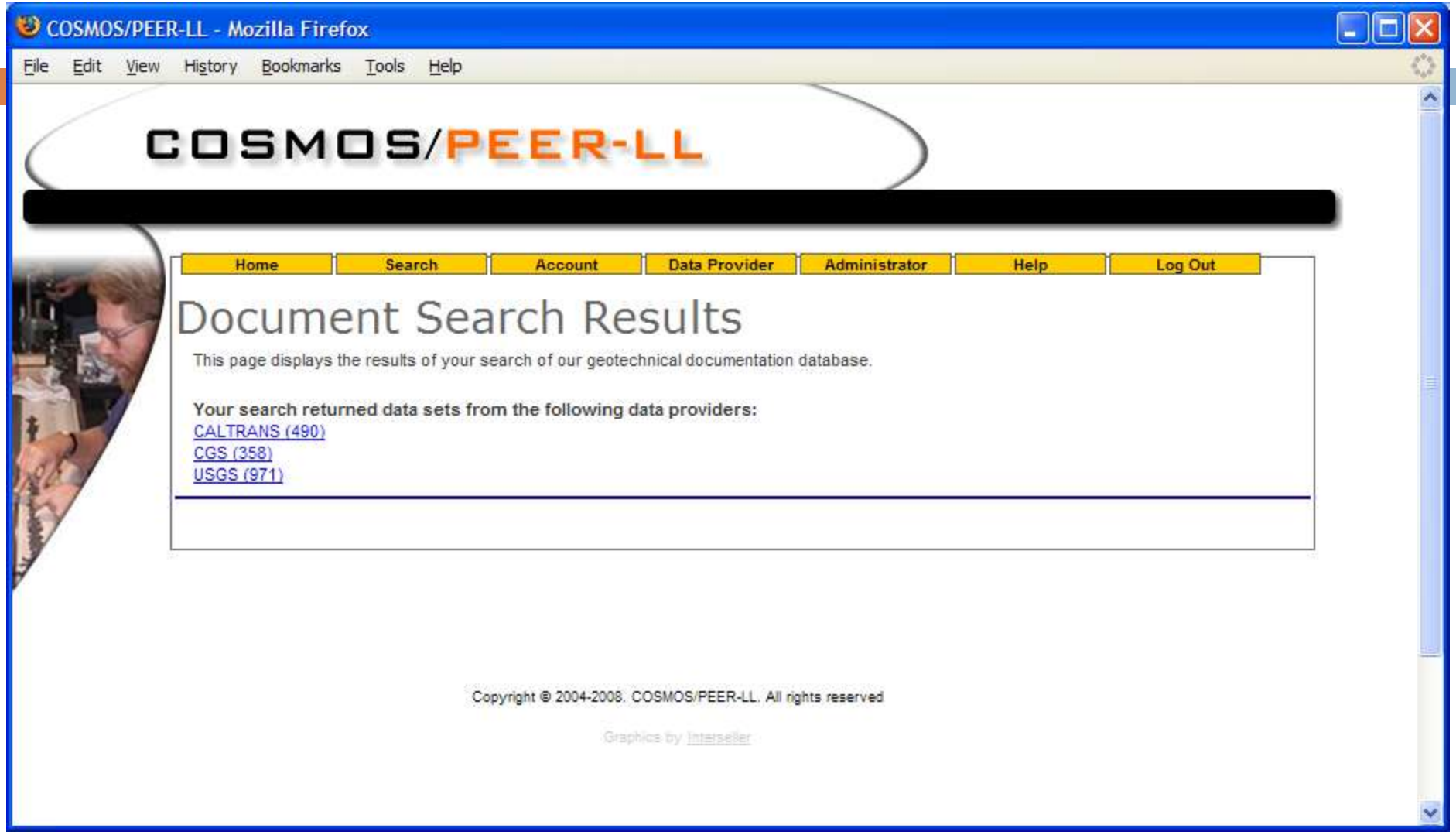
Field Test or Observation
Lithology/Stratigraphy
lithology
Geophysical Logs
In-Situ Tests
Lab Tests
Engineering Properties
atterberg limits
compressive strength
moisture content
particle-size
relative density
Geochemical Properties
pore water chemistry
Repeated Monitoring
A test to determine the stress-strain properties of soil. Typically, a cylindrical specimen is sealed in a rubber membrane, placed in a cell and subjected to a uniform fluid pressure in the horizontal and vertical directions. A vertical load is applied axially to the specimen increasing the axial stress until the specimen fails.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Records shown 1 - 60 of 358

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Data From CGS

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000002_00050_33117G8	Exxon Station 7-2314			
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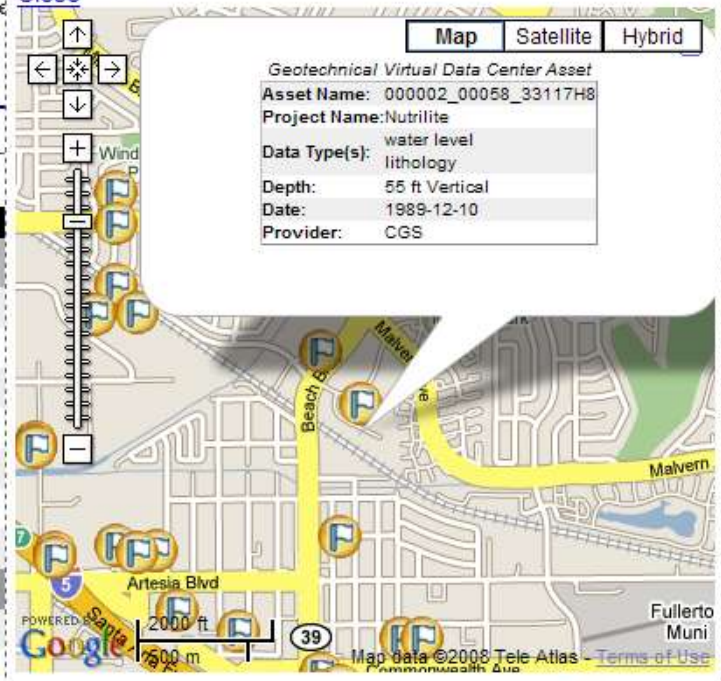
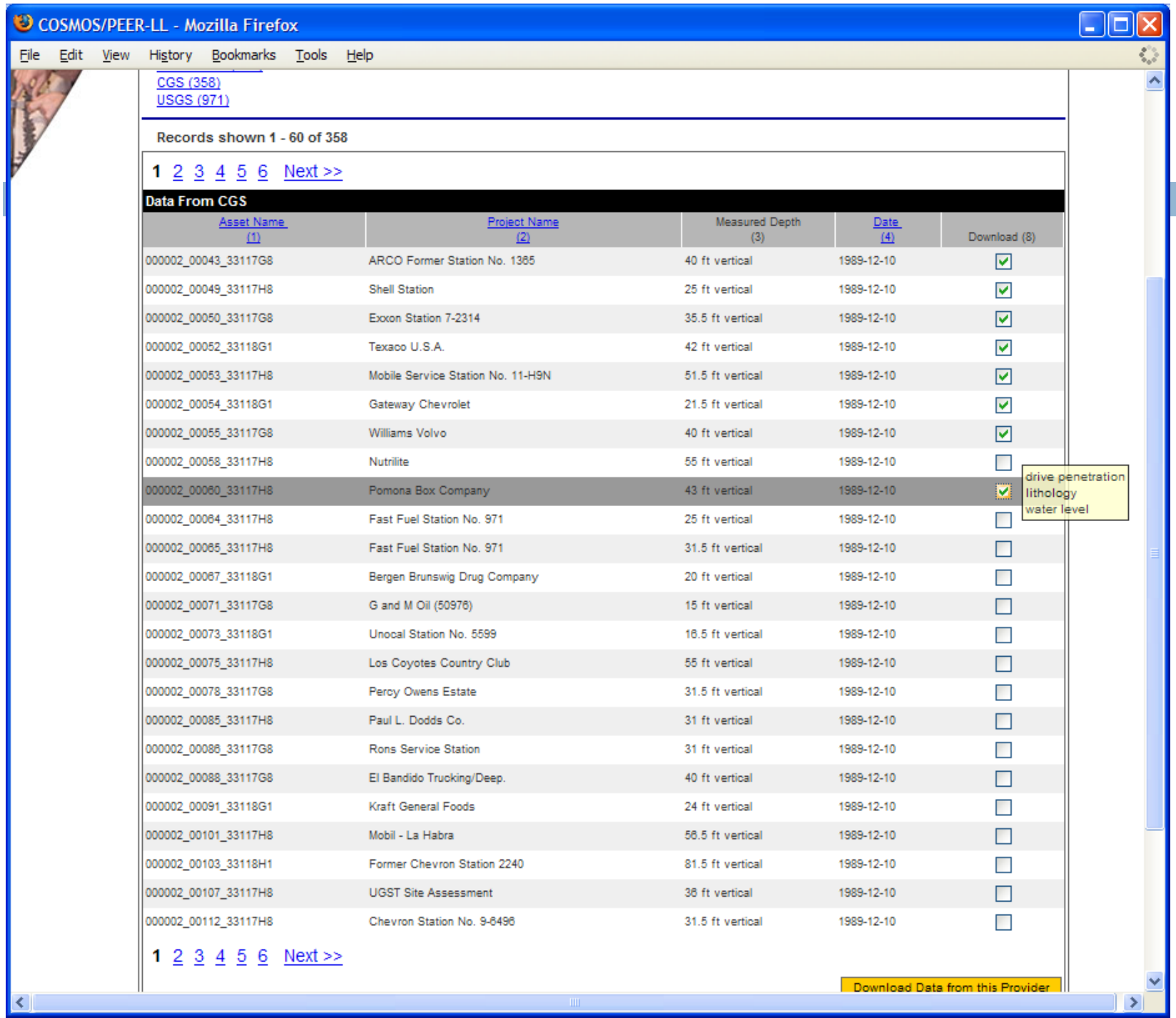
000002_00053_33117H8	Mobile Service Station No. 11-H9N			
000002_00054_33118G1	Gateway Chevrolet			
000002_00055_33117G8	Williams Volvo			
000002_00058_33117H8	Nutrilite	water level lithology		
000002_00060_33117H8	Pomona Box Company			
000002_00064_33117H8	Fast Fuel Station No. 971			
000002_00065_33117H8	Fast Fuel Station No. 971	31.5 ft vertical	1989-12-10	
000002_00067_33118G1	Bergen Brunswig Drug Company	20 ft vertical	1989-12-10	
000002_00071_33117G8	G and M Oil (50976)	15 ft vertical	1989-12-10	
000002_00073_33118G1	Unocal Station No. 5599	16.5 ft vertical	1989-12-10	
000002_00075_33117H8	Los Coyotes Country Club	55 ft vertical	1989-12-10	
000002_00078_33117G8	Percy Owens Estate	31.5 ft vertical	1989-12-10	

Close

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CGS (358)
USGS (971)
Records shown 1 - 60 of 358
1 2 3 4 5 6 Next >>
Data From CGS
Asset Name (1)
Project Name (2)
Measured Depth (3)
Date (4)
Download (8)
000002_00043_33117G8 ARCO Former Station No. 1365 40 ft vertical 1989-12-10
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000002_00058_33117H8 Nutrilite 55 ft vertical 1989-12-10
000002_00060_33117H8 Pomona Box Company 43 ft vertical 1989-12-10
drive penetration
lithology
water level
000002_00064_33117H8 Fast Fuel Station No. 971 25 ft vertical 1989-12-10
000002_00065_33117H8 Fast Fuel Station No. 971 31.5 ft vertical 1989-12-10
000002_00067_33118G1 Bergen Brunswig Drug Company 20 ft vertical 1989-12-10
000002_00071_33117G8 G and M Oil (50976) 15 ft vertical 1989-12-10
000002_00073_33118G1 Unocal Station No. 5599 16.5 ft vertical 1989-12-10
000002_00075_33117H8 Los Coyotes Country Club 55 ft vertical 1989-12-10
000002_00078_33117G8 Percy Owens Estate 31.5 ft vertical 1989-12-10
000002_00085_33117H8 Paul L. Dodds Co. 31 ft vertical 1989-12-10
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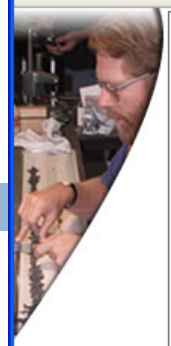

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000002_00050_33117G8	Excel	
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000002_00053_33117H8	Excel	
000002_00054_33118G1	Excel	
000002_00055_33117G8	Excel	
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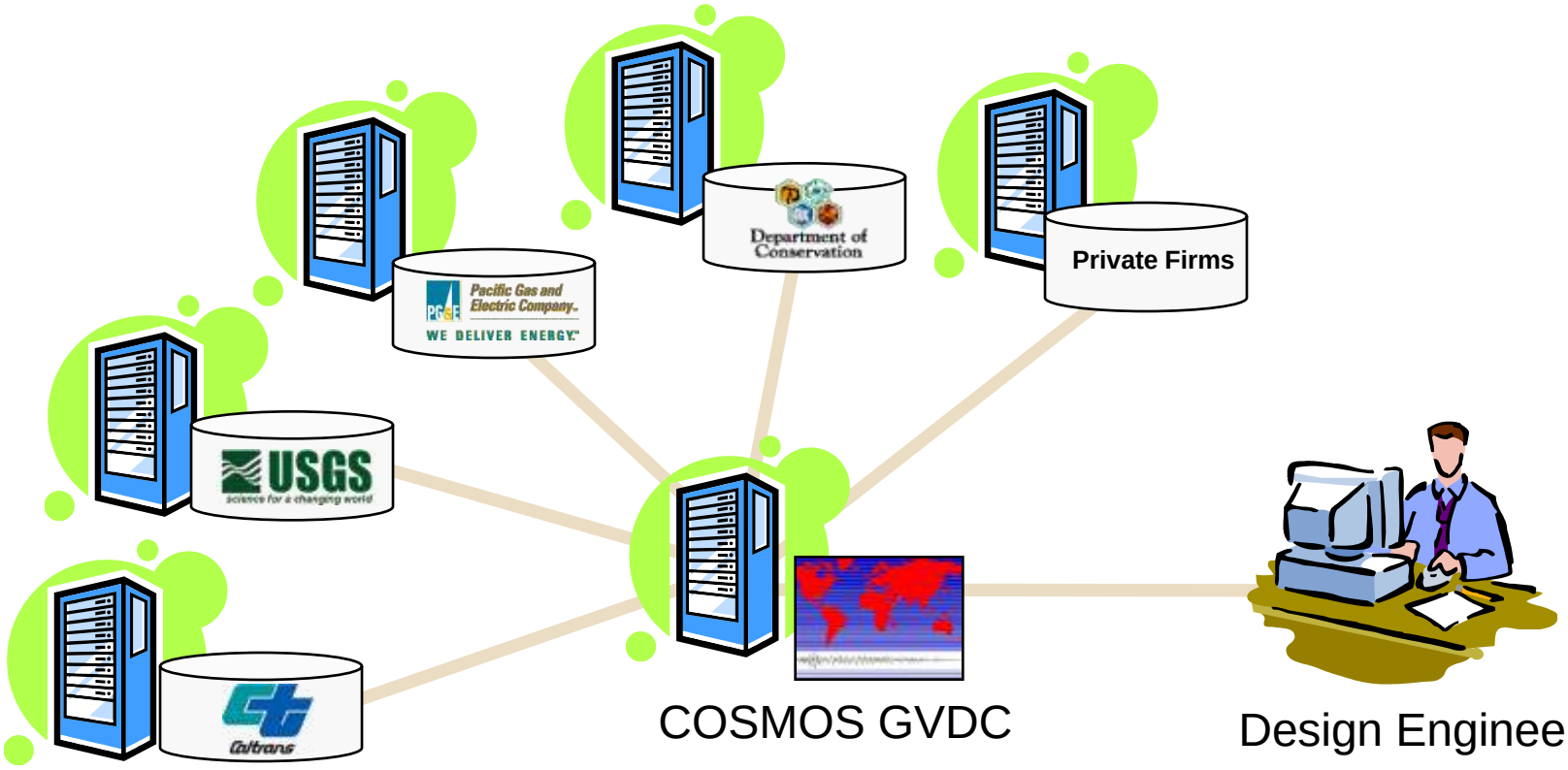
GVDC – How Does It Work?

- The GVDC is a data "broker," not a data repository.
- Translation-based system using DIGGS.



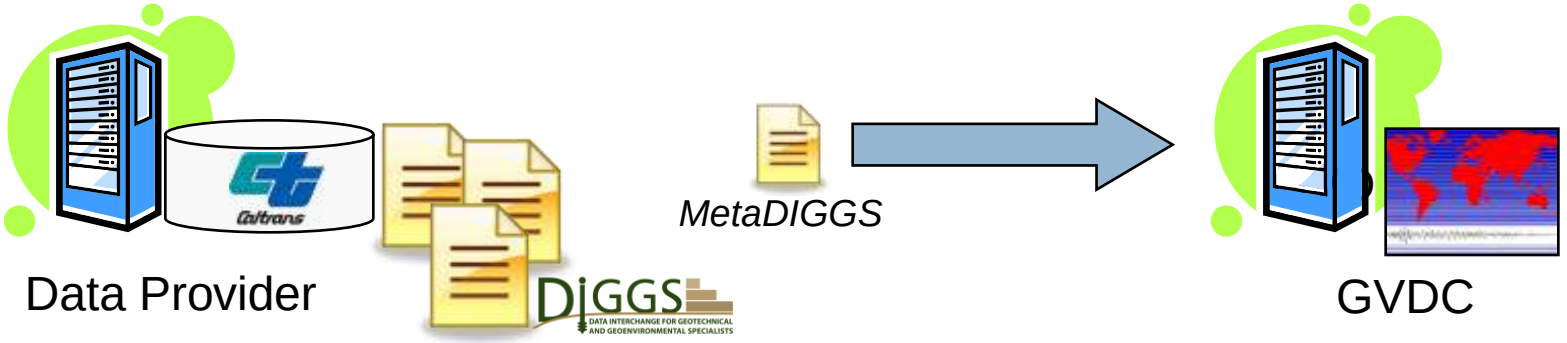
GVDC – How Does It Work?

- The data provider needs to have a digital repository of their data.
- The data repository can take on many forms, however, the simplest implementation is to have a collection of DIGGS files on a web server.

Data Provider

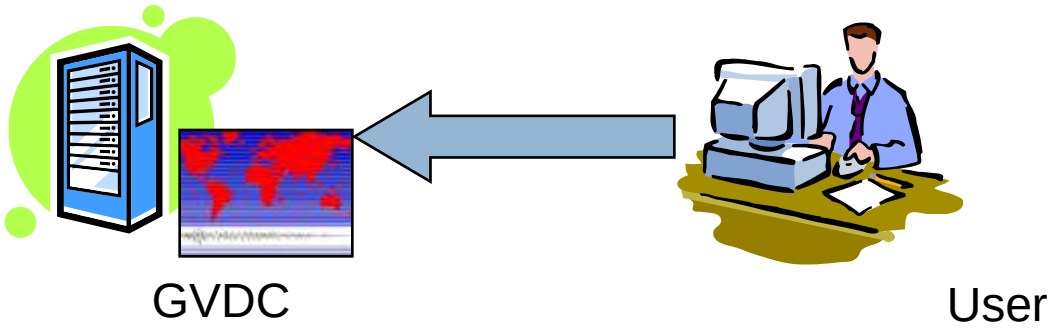
GVDC – How Does It Work?

- The Data Provider generates a MetaDIGGS XML file to reflect their available data sets.
- The GVDC "harvests" the MetaDIGGS file and stores this information in it's database.



GVDC – How Does It Work?

- A user goes the GVDC to search for data.



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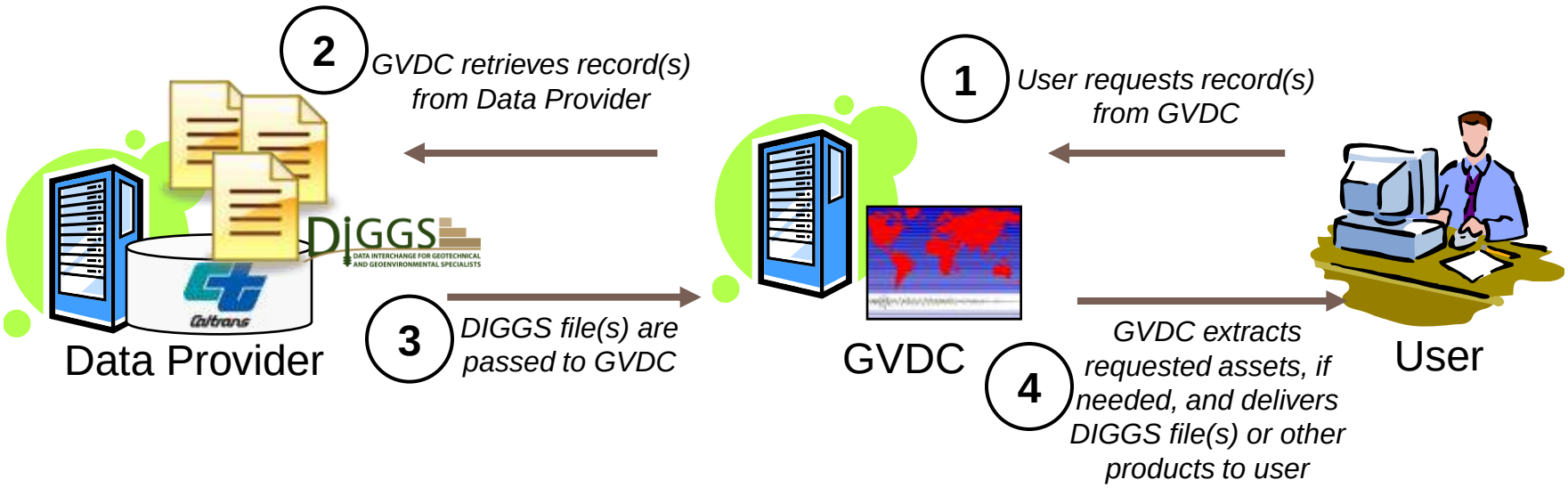
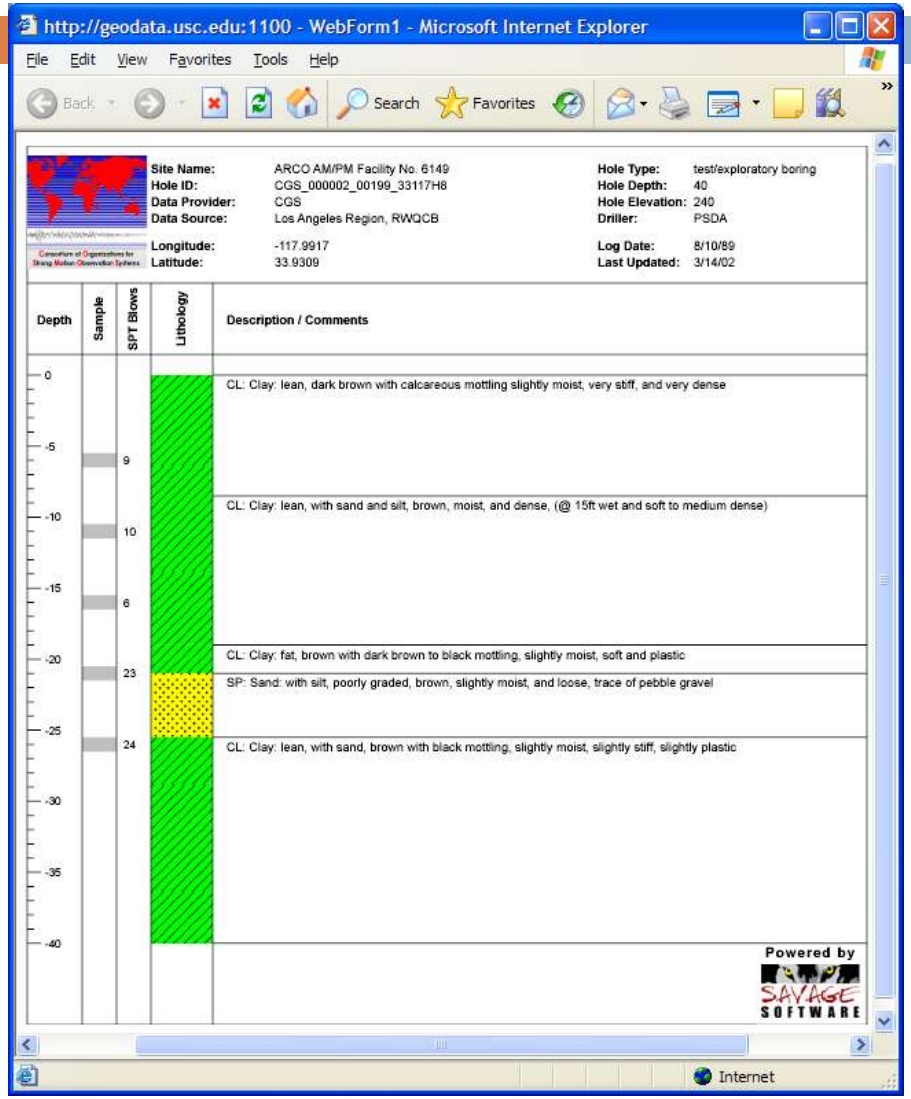
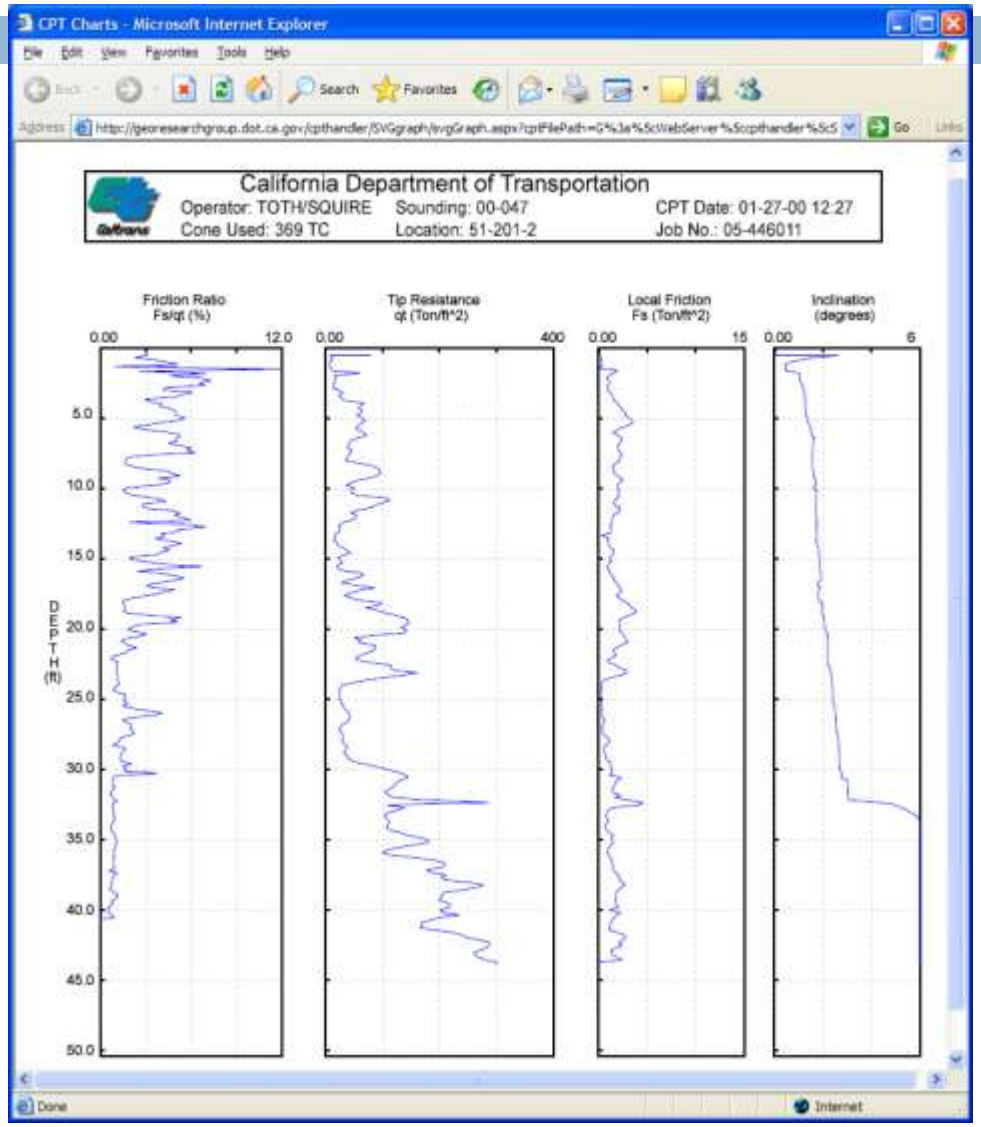
- The user requests to download and/or preview the record(s) returned by the search process.

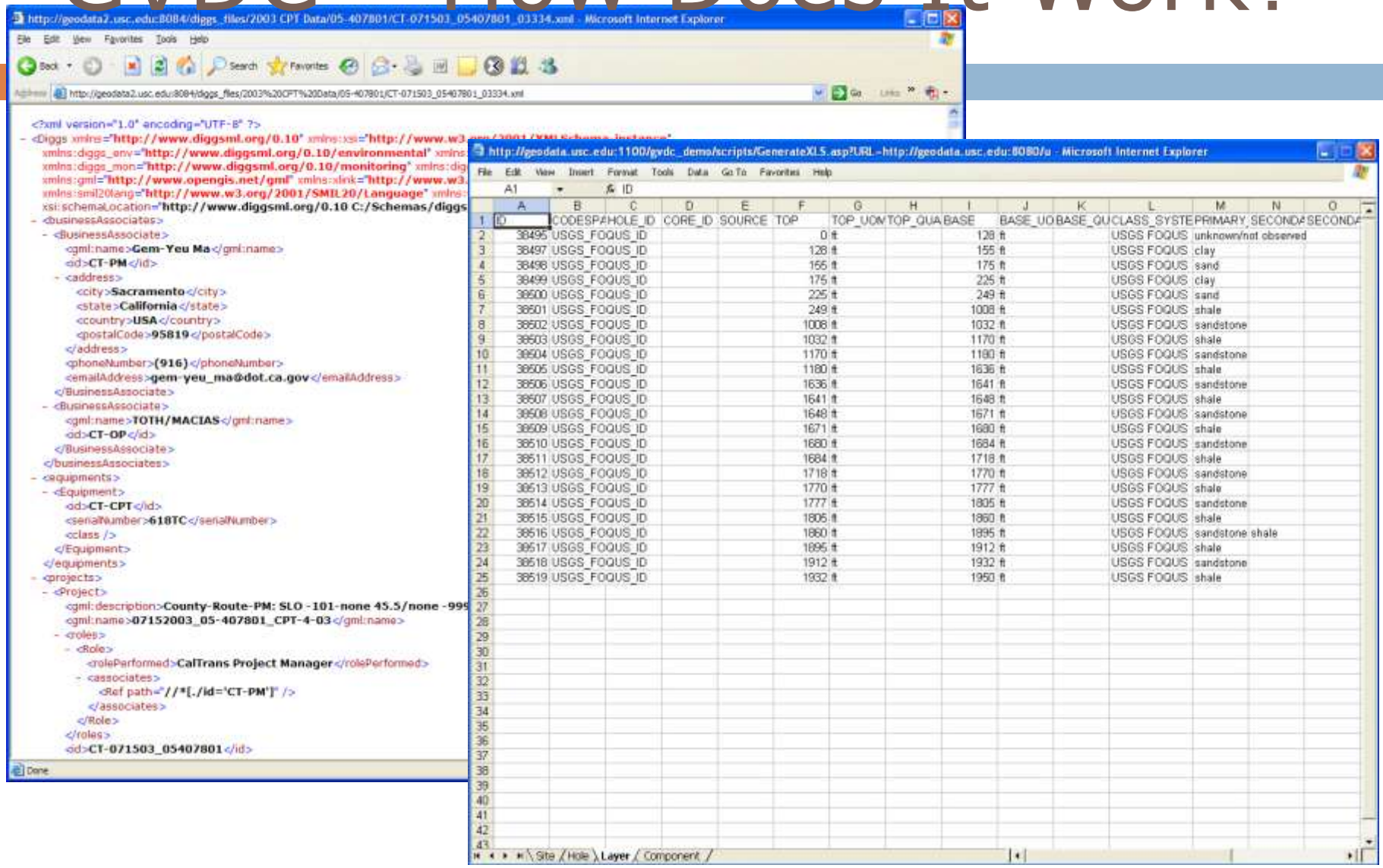


GVDC – How Does It Work?





GVDC – How Does It Work?



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38498	USGS_FOQUS	_ID			155	ft		175	ft		USGS FOQUS	sand		
38499	USGS_FOQUS	_ID			175	ft		225	ft		USGS FOQUS	clay		
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38503	USGS_FOQUS	_ID			1032	ft		1170	ft		USGS FOQUS	shale		
38504	USGS_FOQUS	_ID			1170	ft		1180	ft		USGS FOQUS	sandstone		
38505	USGS_FOQUS	_ID			1180	ft		1636	ft		USGS FOQUS	shale		
38506	USGS_FOQUS	_ID			1636	ft		1641	ft		USGS FOQUS	sandstone		
38507	USGS_FOQUS	_ID			1641	ft		1648	ft		USGS FOQUS	shale		
38508	USGS_FOQUS	_ID			1648	ft		1671	ft		USGS FOQUS	sandstone		
38509	USGS_FOQUS	_ID			1671	ft		1680	ft		USGS FOQUS	shale		
38510	USGS_FOQUS	_ID			1680	ft		1684	ft		USGS FOQUS	sandstone		
38511	USGS_FOQUS	_ID			1684	ft		1718	ft		USGS FOQUS	shale		
38512	USGS_FOQUS	_ID			1718	ft		1770	ft		USGS FOQUS	sandstone		
38513	USGS_FOQUS	_ID			1770	ft		1777	ft		USGS FOQUS	shale		
38514	USGS_FOQUS	_ID			1777	ft		1805	ft		USGS FOQUS	sandstone		
38515	USGS_FOQUS	_ID			1805	ft		1860	ft		USGS FOQUS	shale		
38516	USGS_FOQUS	_ID			1860	ft		1895	ft		USGS FOQUS	sandstone	shale	
38517	USGS_FOQUS	_ID			1895	ft		1912	ft		USGS FOQUS	shale		
38518	USGS_FOQUS	_ID			1912	ft		1932	ft		USGS FOQUS	sandstone		
38519	USGS_FOQUS	_ID			1932	ft		1950	ft		USGS FOQUS	shale		

GVDC Technologies

- WAMP framework
  - **W**indows (Server 2003)
  - **A**pache
  - **M**ySQL (PostgreSQL/PostGIS for GVDC)
  - **P**HP
- GoogleMaps
  - Clustering
  - Selection box tool
  - Map overlays
- Other Technologies
  - Java Applets
  - Javascript & AJAX

The COSMOS/PEER-LL Geotechnical Virtual Data Center

Ohio Transportation Engineering Conference
October 28, 2008

Loren Turner, P.E.
Senior Transportation Engineer
California Department of Transportation