2008 DWR/USBR Sacramento Valley Subsidence Project

Project Report




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PROJECT REPORT

2008 CALIFORNIA DEPARTMENT OF WATER RESOURCES and U.S. BUREAU OF RECLAMATION SACRAMENTO VALLEY GPS SUBSIDENCE PROJECT

September 30, 2008

Introduction

A. Purpose

The primary purpose of the project is to provide a comprehensive Sacramento Valley GPS subsidence network to serve as a framework for monitoring land subsidence resulting from underground water withdrawal. The California Department of Water Resources (DWR) is interested in monitoring land subsidence as part of its groundwater management activities.

The secondary purpose of the project is to extend high-accuracy geodetic control to facilities operated by the U.S. Bureau of Reclamation (USBR). Toward this end, the network encompasses portions of Shasta and Folsom Lakes.

B. Time Period

The observations began on March 17, 2008 and were concluded on June 17, 2008. The project consisted of three primary phases and two sub-phases. The first phase was the Primary Base Station observations. These were observed from March 17 through March 25. These observations were completed by California Department of Water Resources personnel from the Precise Unit, the Sacramento Office and the Red Bluff North Region.

The second phase was completed by a number of observers from numerous public and quasi-public agencies. A complete listing of observers is provided in **Appendix D.** The first portion of this phase was observed from April 1 through April 28 and included most

of the northern part of the Sacramento Valley. The second portion was observed from May 5 through May 22 and included the remainder of the Valley.

The two sub-phases included networks adjacent to the subsidence network. One of these was a network around Lake Oroville. There were 12 additional stations observed concurrently with the subsidence network observations by DWR Precise Unit personnel. The second was a small four station network in the vicinity of the proposed Sites Reservoir in Colusa County. The observations were also performed concurrently with the subsidence network observations.

The third phase was the re-observations performed to measure baselines not meeting the 2-centimenter guidelines or for other reasons explained in **Section F.** Re-observations were begun on May 28 and completed on June 17.

The Primary Base Station and Local Network Station schedules are included in **Appendix B.** Re-observation schedules for the Local Network Stations are included in **Appendix C.**

C. Points of Contact

Project Administrators – Chuck Owens
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D. Accuracy Standard

The project was conducted according to the National Geodetic Survey's "Guidelines for Establishing GPS-Derived Ellipsoid Heights" NOAA TM NOS NGS-58, July, 1997, Zilkoski, Frakes & D'Onofrio and "Guidelines for Establishing GPS-Derived Orthometric Heights" NOAA TM NOS NGS-59, Zilkoski, Carlson & Smith. The 2-centimeter standard was followed for the project. There were two variations from the Guidelines: local network sessions were observed for 60 minutes and **all** adjacent baselines were observed at least twice. Both variations exceeded the Guideline requirements. There were generally at least ten stations per Local Network Station observing session. Coupled with geographic issues which lengthened inter-station drive times we decided to increase session lengths in the event observers could not reach their respective stations on time. Several observers were late to their stations but usually managed to exceed the minimum Guideline requirements.

E. Location

The project included most of the Sacramento Valley from central Shasta County on the north to the south end of Yolo and Sacramento Counties. All existing Continuous GPS (CGPS) sites in the valley were included in the network. All stations in the valley that were part of the 2004 California Department of Transportation Height Modernization Project were included. The project also included all stations in Glenn and Yolo Counties that were part of the 2004 and 2005 (respectively) Height Modernization Projects.

F. Conditions Affecting Operations

All observations were obtained using fixed-height (constant height) poles. All poles were 2.000 meters. One of the Trimble integrated receiver/antennas used in the project required an adapter in order to mount properly on the fixed-height pole. The adapter length was carefully measured and added to the pole height to obtain the correct antenna height.

All receivers and antennas were used in the same pairings throughout the project with one exception. A different antenna was used in session M185-169-1. See **Appendix E** for a complete listing of all equipment used during the project.

On April 7 (JD98) the observer arrived at station MICHIGAN to find a GPS system over the station with no observer present. We were unable to occupy the stations but were later able to determine the owner of the equipment and obtain the data for the period of our session. Baseline processing using this data was successful. The equipment at station MICHIGAN is owned by a firm in southern California, Airborne One. The receiver and antenna types used at the station are included in **Appendix E.**

On April 24 (JD119) the observer was unable to locate the station due to construction at the site. The station was ultimately recovered but too late to save the session. In the same session another observer did not observe the planned station. All missed adjacent baseline observations were observed during the re-observation phase.

On May 19 (JD140) almost all baselines scheduled for session 2 failed the 2-centimeter criterion. We were unable to resolve the issue and scheduled all of the affected baselines for re-observation. Also on the same day a schedule error had two observers showing up at the same station in session 4. The resulting missed baseline was re-observed during the re-observation phase.

One new station (PUMP RESET) and one existing station (M 1078) replaced stations PUMP and LOGAN respectively in Glenn County. Station PUMP is at the downstream end of a spillway and the foundation under the mark is being eroded somewhat. Station LOGAN was replaced as it was deemed a little too difficult to occupy with a fixed-height pole. A double-run level tie was made between each pair of stations to perpetuate the elevation of the original stations.

Data downloading was accomplished at various locations throughout the project. Efforts were made to download data at locations as close to the ending station locations of the last session of the day.

No other significant conditions affected the operations.

G. Agency Participation

Numerous agencies participated in the project. The listing of these agencies and the personnel who participated in the project are included in **Appendix D.** The project included personnel from David Greenwell Associates and Veterans, a Disabled Veteran Business Enterprise (DVBE). The DWR contract requires a 3% DVBE component and Greenwell staff helped to meet that requirement.

Other than equipment provided by participating agencies, additional equipment was provided by the University of California Davis (UCD) and Caltrans. The UCD has provided equipment in support of almost all Height Modernization projects in the Sacramento Valley since 1999.

The California Department of Water Resources provided fully equipped observers for all Primary Base Station observations and some of the re-observations. The DWR also provided some support during the Local Network observations. The USBR provided one fully equipped observer for the second portion of the Local Network observations.

H. Field Work

Chronology – Reconnaissance for the project was begun in September. All stations that were part of earlier Height Modernization Projects in the valley were included in the network. New monuments were established as necessary to meet spacing requirements. USA tickets were obtained for all new stations requiring the establishment of driven rod monuments. Remaining new stations were established in existing concrete foundations. Primary Base Stations were observed beginning on April 17 and ending April 24. Local Network stations were observed beginning April 1 and ending May 22. There was a short break in observations from April 25 through May 4 to allow for training and transfer of equipment to the south portion personnel.

Re-observations were performed from May 28 through June 17. The schedule of re-observations is included in **Appendix C.**

Instrumentation – A complete listing of equipment used in the project included in **Appendix E.**

I. Data Processing

Baseline processing was performed by Frame Surveying & Mapping using Trimble Geomatics Office software. All project data will be processed and adjusted by Mike Potterfield of Geodetic Solutions. The results of this processing and adjustment will be forwarded to the National Geodetic Survey for review and publication.

J. Statistics

Stations Occupied – There were a total of 346 stations in the project. Of these, 330 stations were observed for the base subsidence project and 16 were observed by DWR as part of two supplemental surveys, the Sites Reservoir project (four stations) and the Lake Oroville project (12 stations). A complete listing of stations can be found in **Appendix A.**

NSRS stations (not including CGPS stations)		226
New stations set:		62
Disks in concrete	33	
Class B rod marks	29	
New stations recovered (not in NGS IDB):		17
CGPS stations:		14
CORS, PBO in NGSIDB	6	
PBO not in NGSIDB	9	
New DWR stations (Lake Oroville, Sites Reservoir)		16
Total Stations:		**335**

Total Observing Days and Sessions – There were a total of 43 observing days during the project: six days for Primary Base Station occupations; 28 days for Local Network Station occupations; and, nine days for re-observations. There were a total of 1250 station occupations: 48 for Primary Base Stations; 1090 for Local Network Stations; and, 112 for re-observations. 58 separate downloads were made for Continuous GPS stations.

The Lake Oroville and Sites Reservoir observations were performed by DWR personnel. The Sites Reservoir observations were performed as part of the ongoing project operations. The four Sites reservoir stations were observed in eight sessions of two receivers requiring 14 station occupations to ensure that all necessary adjacent station baselines were observed. The Lake Oroville observations were made separately from 12 stations over a two day period. DWR wanted to ensure the highest practical accuracy for these stations and they were occupied for eight hours on each of the two days (JD106 and JD108).

Re-observations – There were a total of 884 baselines measured in the project. Of these, 49 failed the 2 centimeter criterion, as follows:
11 baselines – 2.5 to 2.9cm
26 baselines – 3.0 to 3.9cm
8 baselines – 4.0 to 4.9cm
4 baselines - >5cm

It should be noted that eight of these baseline failures came from Session 4 on May 19 (JD140).

There were 20 additional baselines that were re-observed due to human error (6 for missed occupation) and 14 for baselines where the second set of observations would not process.

K. Comments and Recommendations

Observers were visited throughout the course of the observing phases to ensure that project guidelines and safety procedures were being followed. Guidelines and safety procedures were discussed in formal training sessions prior to the beginning of the Primary Base Stations observations in Sacramento, the north phase of Local Network observations in Red Bluff and the south phase of Local Network observations in Yuba City.

Data downloading was accomplished in various participants' offices or local motels nearby to the location of stations occupied at the end of each observing day.

We decided to opt for 60 minute sessions with a minimum of 75 minutes between sessions. There are several areas in the valley where a move between stations involved excessive drive times. This was a result of having to cross features like the Sutter Bypass or the Sacramento River where road crossings significantly lengthened distances and drive times. Several occupations were late starting due to this issue but all met or exceeded the minimum observing time required by the Guidelines.

This was the first time many observers had been exposed to these types of operations or to the GPS surveys. They all demonstrated exemplary attitude and professionalism throughout the project. Nine DWR personnel participated in the Primary Base Station

observations and 19 different personnel participated in each of the two Local Network Station observation phases (north and south).

The original Observation Logs were digitized and forwarded to Mike Potterfield at Geodetic Solutions. The NGS-format digital description file (D-File) for all stations was also submitted to Mike Potterfield. Data processing and adjustment will be performed by Geodetic Solutions and forwarded to NGS for final review and publication.

A digital file of the observation data and baseline comparison results will also be forwarded along with a digital copy of the free adjustment prepared by Frame Surveying & Mapping.

Appendix A. Station List

STATION NAME	SSN	4-Ch ID	PID	LATITUDE	LONGITUDE	ELEVATION
BUTTE COUNTY						
121 BB USGS	1001	121B	KS1029	39 23 07.7	121 32 43.1	37.727
2655 BB	1006	55BB	KS1187	39 34 51.8	121 37 10.1	
7 MILE	2001	7MIL		39 38 10.7	121 54 35.9	
BC 1090	2007	B109		39 32 16.9	121 54 29.9	
BC 1305	2008	B130		39 50 27.1	121 59 51.0	
BC 428	2009	B428		39 39 10.1	121 51 42.0	
BC 635	2010	B635		39 53 58.3	121 55 08.0	
BC 728	2011	B728		39 49 19.2	121 51 47.4	
BC 743	2012	B743		39 21 46.1	121 43 12.1	
BC EXTN 2	2013	BCEX		39 34 37.4	121 54 29.9	
BLOCK	2017	BLOC		39 19 08.2	121 43 19.8	
BUZ	2022	BUZZ		39 25 52.6	121 33 11.1	
C 1434	1035	C434	KS1937	39 40 56	121 45 51	63.152
CARRICO	2023	CRCO		39 25 14.3	121 49 38.6	
CREST RM 2	1053	CRST	DB7123	39 27 29.40155	121 34 37.33815	79.6
D 146 RESET	1055	D14R	KS1013	39 29 37.19840	121 39 36.31547	48.988
DURHAM	2033	DHAM		39 38 41.0	121 47 57.8	
EATON	2035	EATO		39 46 35.9	121 50 38.6	
F 853	1070	F853	KS0997	39 27 52.11192	121 47 57.49784	27.8
FAIRLEE	2041	FLEE	KS1863	39 19 19.6	121 48 45.4	
FARMLAND	2042	FARM		39 47 48.7	121 59 14.7	
FARRIS	2043	FARR		39 23 06.9	121 46 54.6	
FARWELL	2044	FREX		39 39 55.9	121 55 30.2	
FENN	2045	FENN		39 36 34.9	121 51 26.4	
G 1434	1082	G434	KS1939	39 39 22	121 43 53	55.73
GORRILL	2050	GORR		39 36 09.8	121 47 04.8	
GRAY	2052	GRAY		39 21 43.1	121 49 27.5	
HARRIS	2053	HARR		39 25 15.8	121 45 47.6	
HONCUT	1098	HONC	KS1035	39 19 30.36003	121 33 25.38509	28.039
HUMBOLT ROAD	1119	HMBT	KS1898	39 44 56.68029	121 45 44.95346	169.3
J 1434	1121	J143	KS1942	39 36 58.45	121 40 55.09	
J 847	1122	J847	KS1155	39 32 26.40299	121 41 19.92163	40.6
JOHNSON	2057	JOHN		39 29 35.0	121 48 03.8	
MERIDIAN	1142	MERI	DH6532	39 45 11.55598	121 56 18.44859	42.8

MOREHEAD	2063	MORE		39 43 01.1	121 51 47.9	
NELSON	2065	NELS		39 33 32.2	121 46 02.5	
NLD 127	2068	NLD7		39 21 43.7	121 52 05.1	
NLD 128	2069	NLD8		39 33 05.7	121 50 25.7	
NORD	1147	NORD	KS1918	39 47 52.36476	121 54 12.94494	55.081
P 1430	1155	P143	KS1922	39 50 25.16138	121 56 26.97724	58.684
PARK	1158	PARK	KS2045	39 32 03.17236	121 35 08.27986	
PENTZ RM 2	1159	PEN2	DB7511	39 38 50.12701	121 37 52.46635	96.3
S 381	1173	S381	KS1056	39 22 57.18199	121 36 05.92495	31.296
S 853	1174	S853	KS0895	39 24 18.45426	121 42 35.21821	28.381
SHEPPARD	2083	SHEP		39 31 09.1	121 45 09.2	
TALLOW	2088	TALL		39 35 18.2	121 41 21.3	
TOWNSHIP	1191	TWSP	DH6525	39 20 39.15123	121 41 14.03640	28.1
V 853	1196	V853	KS0890	39 27 52.90319	121 43 54.95176	31.584
WILLIAMS	2092	WLMS		39 30 13.0	121 51 23.5	
OROVPORT	8008	OROV	KS1952	39 29 44.95292	121 37 00.76443	59.854

(50 stations)

COLUSA COUNTY

COLIND	2026	COLI		39 11 06.5	121 59 40.6	
D 850 RESET 1971	1056	D850	KT0487	39 08 33.63006	122 13 02.10476	37.2
DELEVAN	2030	DELE		39 16 31.0	122 06 20.1	
DELPHOS RM 2	1058	DLP2	KT0310	39 11 28.05130	122 10 16.52848	23.8
DODGE	1059	DODG	DH6519	39 22 38.58663	122 01 14.53220	24.2
F 200	1069	F200	KT0329	39 19 09.12178	122 11 29.55030	26.3
FINKS	1073	FINK	DH6518	39 15 29.80322	122 11 29.32274	28.4
GORDON	1085	GORD	DH3656	39 24 34.42540	122 00 35.87826	26.27
GRAINO	2051	GRNO		39 03 23.9	121 58 08.9	
H 62 USGS	1091	H62U	KT0414	39 07 14.13691	122 17 27.38995	68.8
HAHN	1092	HAHN	DH6516	39 04 50.45269	122 05 54.15171	27.1
HARBISON	1095	HARB	DH6520	39 14 50.41643	122 01 52.59696	17.9
HOPKINS	2054	HPKN		39 13 03.8	122 05 19.8	
JIMENO RM 4	1124	JRM4	AI5047	38 55 39.86130	121 50 35.87435	12.3
LAUX	2058	LAUX		39 14 43.7	121 57 31.2	
LONESTAR	1137	LONE	DH6517	39 10 37.25468	122 04 42.66473	16.3
LUSA RM 2	1138	LUSA	JT0091	38 58 14	122 01 32	46.63
NLD 126	2067	NLD6		39 06 51.9	122 01 05.8	

PUTNAM	2078	PTNM		39 19 54.5	121 57 16.3	
SECO	1178	SECO	KT0274	39 01 43.79854	122 03 50.15218	39
SR 65	1182	SR65	DH6632	39 18 55.05085	122 02 02.41256	22.4
STEGEMAN	2086	STEG		39 20 29.4	122 05 03.3	
T 644	1188	T644	KT0293	39 07 54.60347	122 07 55.53112	27.5
W 850	1203	W850	KT0506	39 22 40	122 14 53	34.9
WAYNE	2091	WAYN		38 59 36.9	121 57 29.5	
WHEAT	1206	WHEA	DH6501	39 04 35.82711	121 53 39.35604	20.5
WILKENS	1208	WILK	DH6502	38 59 26.07953	121 52 01.52515	9
WILSON BEND	1212	WBND	DH6521	39 02 30.73376	121 50 12.69724	18.5

(28 stations)

GLENN

11 227 CADH	1004	1122	DH3655	39 30 54.05117	121 55 48.12986	29.84
1500	1003	1500	DH3654	39 27 50.60515	121 55 31.40277	26.59
208.56 USBR	1005	2085	DH3676	39 44 47.88751	122 07 21.69182	64.56
296.66 USBR	1007	2966	DH3671	39 47 25.23009	122 13 33.09142	91.11
60.64	1012	6064	DH3649	39 23 58.70593	122 17 16.91750	65.75
A 1079	1016	A107	KT0126	39 35 08.29629	122 24 17.70358	151.06
ADOBE	1018	ADOB	DH3657	39 23 26.69919	121 57 00.54559	21.87
AGUIAR	1019	AGUI	DH3669	39 43 33.88201	122 14 26.10054	83.65
ARTOIS	1023	ARTO	DH3672	39 37 27.53289	122 12 17.01165	59.07
B 1079	1024	B107	KT0737	39 36 40.90269	122 31 42.87259	215.44
BIG BUTTE	1028	BIGB	DH3658	39 27 51.24509	121 52 13.93581	26.31
BIG W	1029	BIGW	DH3670	39 40 21.14573	122 20 10.15729	139.51
C 200	1036	C200	KT0343	39 24 22.66349	122 11 32.19634	28.73
CAPAY	1040	CAPA	DH3675	39 46 56.78971	122 06 14.48483	60.87
CHEROKEE	1043	CHER	DH3673	39 40 05.34934	122 15 11.41713	70.13
CREEK	1052	CREE	DH3668	39 43 53.37337	122 24 47.93526	157.82
EXT1	1067	EXT1	DH3661	39 37 46.82529	122 06 07.90976	46.08
FRENCH	1077	FREN	DH3667	39 34 56.73960	122 14 58.85423	49.96
GLENN	1084	GLEN	KT0178	39 31 17.92685	122 00 53.29	29.64
H 285 USGS	1089	H285	KT0120	39 33 07.29767	122 21 26.02164	104.78
HAMILTON	1094	HAMI	KT1807	39 44 39.73296	122 01 14.04332	47.96
HOWARD	1099	HOWA	DH3659	39 25 12.40826	121 53 52.38358	22.82
JACINTO	1123	JACI	DH3660	39 34 56.70003	122 00 36.01111	34.05
K 852	1127	K852	KT0183	39 41 48.97195	122 11 42.87	70.32

KAISER	1128	KAIS	DH3680	39 42 33.01005	122 02 14.80423	48.62
L191	1132	L191	DH3663	39 34 55.29444	122 07 20.25610	41.91
LARKINS	1133	LARK	DH3652	39 29 33.92838	122 05 15.35250	31.04
M 1078	1139	M107	KT0356	39 28 11.3	122 11 34.3	33.57
MI 11.18	1143	1118	DH3662	39 39 34.81830	122 01 36.97533	45.2
MINOR	1145	MINO	DH3651	39 27 51.90595	122 08 11.90272	30.64
NORMAN RM 1	1148	NORM	DB5555	39 24 27.02092	122 08 10.64965	24.2
ORDBEND	2071	BEND		39 37 47.5	121 59 53.9	
ORLAND SOUTH BASE	1149	ORLA	KT0189	39 46 06.53326	122 11 32.38423	81.56
OWENS	1151	OWEN	DH3648	39 27 56.35451	122 14 56.20685	44.36
P30W	1156	P30W	DH3674	39 39 09.85869	122 09 04.27055	54.68
PETER	1160	PETE	DH3677	39 41 44.95290	122 06 10.75190	55.36
PROVIDENT	1162	PROV	DH3665	39 31 18.60562	122 05 18.95473	30.05
PUMP RESET	2077	PMPR		39 47 03.5	122 02 45.5	49.55
Q 1078	1164	Q107	KT0155	39 31 27.18281	122 14 14.24862	45.45
S 1067	1170	S106	KT0814	39 43 11.19745	122 32 58.14211	276.14
U 1078	1193	U107	KT0116	39 31 51.03425	122 19 34.37085	94.01
V 380 RESET	1195	V380	KT0221	39 46 56.35785	122 17 41.94286	112.96
VIOLICH	1200	VIOL	DH3678	39 45 58.92839	122 04 39.34770	56.57
W 215 AZ MK	1202	W215	KT0827	39 47 44.85033	122 32 47.50215	207.1
WALKER	1204	WALK	DH3666	39 31 27.11458	122 09 53.88023	38.54
WILDLIFE	1207	WILD	DH3681	39 42 45.69673	121 57 52.89610	41.14
WILLOW	1209	WILL	DH3653	39 26 09.36203	122 04 34.02790	25.52
WILSON	1210	WILN	DH3664	39 34 15.03996	122 11 37.65164	43.91
WINSLOW	1213	WINS	KT0803	39 39 48.63502	122 31 33.45841	200.01
Y 380	1217	Y380	KT0225	39 45 45.77832	122 20 14.55393	141.03
Y 852	1218	Y852	KT0518	39 27 25.84476	122 01 03.38263	27.39

(51 STATIONS)

PLACER COUNTY

B 1446	1025	B144	JS4598	38 58 51.60288	121 22 38.16021	33.215
BASEWALE	2005	WALE		38 45 05.7	121 21 54.7	
BREWER	2019	BREW		38 45 22.8	121 27 04.1	
CITY OF LINC MON 109	2024	COLM		38 52 51.57	121 15 59.68	
COON	1048	COON	JS4144	38 56 33.44121	121 21 13.73560	50.194
DOWD	2032	DOWD		38 52 13.0	121 22 37.9	
G 1200	1079	G120	JS0755	38 47 09.87346	121 14 32.09509	77.38

HPGN CA 03 09	1105	0309	JS4669	38 43 40.44881	121 17 10.61451	52.3
INDUSTRIAL	1120	INDU	DH6533	38 47 22.39871	121 18 30.17431	42.3
MOORE	2062	MOOR		38 52 05.7	121 27 06.3	
NEWFIDDY	2066	FIDY		38 47 44.7	121 21 31.4	
P 1200	1154	120P	JS0768	38 49 43.37051	121 11 25.70317	127.675
PHILLIP	2075	PHLP		38 48 09	121 25 07	
T 1435	1186	T143	JS4600	38 54 48.09197	121 19 08.98884	44.565
W 1474	1201	W147	DG6522	38 50 20.9	121 19 03.5	38.79
WISE	2094	WISE		38 55 34.9	121 24 18.7	

(16 stations)

SACRAMENTO COUNTY

BRADSHAW	1032	BRAD	DH6483	38 33 42.05654	121 20 53.68120	17.6
BUREAU	2020	BURO	DK2884	38 37 22.9	121 13 53.1	
CAPITOL RESERVOIR	1041	CRES	DE9128	38 39 02.32516	121 30 26.67010	4.8
CONTROL MONUMENT LR 208	1047	R208	AC9237	38 39 18.54312	121 23 14.17816	23.39
DOUGLAS	2031	DOUG		38 33 39.7	121 14 40.1	
ELKHORN	1063	ELKH	DH6491	38 40 54.09676	121 29 03.49524	10.8
ELVERTA	1064	ELVT	DH6489	38 42 52.27573	121 32 27.54593	5.1
EXCELSIOR	1066	EXCL	DH6506	38 30 54.64180	121 17 03.89418	37.5
FAIR	2040	FAIO	DK2883	38 40 43.5	121 15 47.6	
GARFIELD	2048	GARF		38 37 54.6	121 20 13.8	
GIBSON	2049	GIBS		38 42 19.3	121 25 46.4	
GREENBACK	1086	GRBK	DH6485	38 41 31.13545	121 20 47.91721	46.6
HOWE	1100	HOWE	DH6484	38 36 47.57405	121 25 57.71853	14.7
HPGN D CA 03 AA	1112	03AA	AC9226	38 36 52.10409	121 30 52.07494	6.08
HPGN D CA CSUS	1222	CSUS	AC9218	38 33 14.56895	121 25 23.72001	13.31
LEROY	2059	LROY		38 34 59.8	121 11 09.7	
SHELDON	1179	SHEL	JS1177	38 29 36.45431	121 12 38.98999	59.49
ZINFANDEL	1221	ZINF	DH6482	38 35 23.60701	121 17 18.80164	30.5

(18 stations)

SHASTA COUNTY

44 SHA 15.59	1009	2HK3	DH6393	40 31 00.04638	122 05 41.25229	309.7
44 SHA 6.94	1010	2HJ2	DH6602	40 33 28.91529	122 14 22.18058	141.3
ASH	2004	ASHH		40 25 01.8	122 11 46.5	
G 1429	1080	G142	LU1871	40 34 56.64205	122 25 57.29345	218.563

HPGN D CA 02 GH	1108	02GH	AE9980	40 30 04.45170	122 22 34.14721	146.03
U 345	1194	U345	LU0205	40 26 17.61262	122 17 00.50632	139.963

(6 stations)

SUTTER COUNTY

BEAR	2014	BEAR		38 58 26.0	121 29 15.3	
BOGUE	2018	BOGE		39 05 54.8	121 44 42.9	
CANAL	1038	CANL	KS1836	39 08 28.88940	121 41 54.56820	16.3
DWR18	2034	WR18		39 15 10.8	121 53 30.0	
EAGER	1062	EAGR	DH6500	39 10 30.16150	121 38 05.30841	18.9
ENNIS	2037	ENNS		39 05 04.0	121 48 01.4	
F 114	1068	F114	KS0953	39 09 25.19342	121 46 36.67405	18.3
G 1175	1078	G117	KS1066	39 17 12.4	121 47 04.0	28.3
HOPPIN	2055	HPIN		39 05 01.8	121 41 22.0	
HPGN CA 03 04	1103	0304	KS2014	39 08 35.78963	121 54 06.26967	12.7
HPGN D CA 03 EH	1115	03EH	JS4847	38 51 59.61225	121 32 32.95659	10.73
K 1435	1125	K435	KS1971	39 07 48.26132	121 36 10.80790	18.843
KUSTER	1130	KUST	DH6493	38 54 58.56217	121 36 21.42083	11.2
LIVE OAK	1135	LOAK	DH6524	39 17 32.29344	121 40 03.10859	24.6
LOMO	1136	LOMO	KS1832	39 13 16.44991	121 38 30.20106	20.759
MORRISON	2064	MRSN		39 13 53.9	121 42 20.3	
OSWALD	1150	OSWD	DH6498	39 04 08.45028	121 38 35.20704	12.9
PASSBUTTE	2073	PASS		39 11 13.0	121 52 39.6	
PELGER	2074	PELG		38 57 10.5	121 45 11.6	
RIEGO RM 4	1166`	REGO	AC9218	38 45 05.18965	121 29 05.75088	14.34
RIO OSO	1167	ROSO	DH6488	38 57 41.12175	121 32 35.74809	13
SANKEY	1175	SNKY	DH6490	38 48 00.00769	121 32 38.49142	7.8
SAWTELLE	1176	SAWT	DH6495	38 57 08.19763	121 38 05.25825	10.8
SUTEXTN	2087	SUTX		38 49 24.2	121 32 34.8	
TARKE	1190	TARK	DH6499	39 08 35.48277	121 50 33.52674	18.7
TISDALE	2089	TSDL		39 01 17.3	121 44 28.5	
TROWBRIDGE	2090	TRBR		38 54 26.2	121 30 16.4	
VARNEY	1197	VARN	DH6494	38 53 09.54029	121 42 06.92178	7.3
VERNON	1198	VNON	DH6492	38 50 11.64766	121 37 00.84343	7.5
WASHINGTON	1205	WASH	DH6497	39 00 10.75983	121 40 17.31471	12.1

(31 stations)

TEHAMA COUNTY

36 TEH 48.89	1008	2EK4	DH6582	40 14 55.50432	122 08 57.52231	188.9
99 TEH 17.88	1013	2DK4	DH6619	40 06 26.6	122 06 34.3	74.2
99 TEH 22.63	1014	2EK3	DH6620	40 09 54.04106	122 09 16.26592	82.6
99 TEH 9.22	1015	2CK1	DH6621	39 59 08.54708	122 04 55.26423	62.5
BARHAM	1027	BRHM	DH6090	39 57 25.74374	122 12 10.79851	90.2
BEND BRIDGE	2015	BNBR		40 15 47.6	122 13 16.8	
BUTTE GAGE	2021	BUTG		39 49 05.7	122 19 32.2	
BOWMAN	1031	BOWM	DH6091	40 22 08.87125	122 16 55.59034	126
C 1430	1034	C430	LU2280	40 07 10.7	122 11 50.1	86.627
CORNBUTTE	2027	CORN		39 55 22.0	122 21 10.4	
EUCALYPTUS	2038	EUCA		39 53 34.6	122 18 13.4	
EVERGREEN	2039	EGRN		40 21 37.0	122 19 51.2	
FWS 271	2047	271F		39 50 02.2	122 05 06.5	
FLORES	1074	FLOR	DH6623	40 05 02.95277	122 13 08.47380	88.9
G 1430	1081	G143	LU2284	40 02 29.98057	122 08 34.41298	69.034
HESS	1097	HESS	LU1960	40 12 10.19710	122 14 38.93614	97.16
HPGN CA 02 22	1102	0222	LU2291	40 09 35.65424	122 13 26.31262	95.4
HPGN D CA 02 CJ	1106	02CJ	AE9295	39 54 23.48732	122 12 41.99237	89.1
HPGN D CA 02 FJ	1107	02FJ	AE9985	40 19 36.36692	122 16 48.62627	174.84
JELLYS	2056	JELL		40 19 10.8	122 11 19.1	
K 276	1126	K276	KT0091	39 51 20.1	122 21 17.7	153.4
L 1430	1131	L143	KS1919	39 53 58.25944	121 59 43.71676	63.606
LIBERAL	2060	LBRL		39 52 54.5	122 13 41.6	
M 185	1140	M185	LU0322	40 13 26.68599	122 20 15.38537	139.1
MCCLURE	2061	MCCL		40 00 03.5	122 17 55.0	
MICHIGAN	1144	MICH	DH6625	39 54 23.62087	122 06 51.25814	65.8
N 852	1146	N852	KT0195	39 48 34.52910	122 10 21.16347	75.35
OAK SL	2070	OKSL		40 22 19.0	122 09 39.8	
Q 1065	1163	Q106	KT0073	39 55 50.4	122 17 19.4	114.54
RAWSON	1118	RAWS	DH6540	40 01 44.82871	122 13 30.24340	94.8
REDBANK	2081	RBNK		40 07 44.0	122 16 16.3	
SCALE	1177	SCLE	LU1967	40 12 45.99403	122 10 47.96287	125.1
SOUR GRASS	1181	SRGS	DH6628	39 50 13.21155	122 11 51.22382	83.3
WILLOW	2093	WLOW		40 03 18.2	122 17 01.0	

(34 stations)

YUBA COUNTY

ALGONDON	1020	ALGO	DH6487	39 01 34.25531	121 32 52.74356	14.7
BLAIR	2016	BLAI		39 07 45.8	121 27 19.5	
H 380	1090	H380	KS0752	39 00 49.80100	121 25 46.20379	24.907
HALLWOOD	1093	HALL	DH6522	39 10 28.68777	121 32 57.31460	28.1
HPGN D CA 03 FH	1116	03FH	KS2035	39 02 32.12082	121 28 33.65920	22.73
HPGN D CA 03 HJ	1117	03HJ	KS2038	39 13 28.63289	121 26 07.89575	59.4
OSTROM	2072	OSTR		39 04 32.5	121 23 47.8	
POWER LINE	2076	PWRL		39 05 53.1	121 32 44.8	
R276	2079	R276		39 16 59.8	121 28 28.8	
RAMIREZ	1165	RAMZ	DH6539	39 15 52.80318	121 34 32.90976	25
S 214	1171	S214	KS0774	39 12 51.33858	121 29 39.08819	28.569
WOODRUFF	1215	WDRF	DH6523	39 13 12.50553	121 33 27.22561	23.9

(12 stations)

YOLO

169	1002	1699	JS2170	38 44 12.69568	121 57 15.85660	52.5
ABUT	1017	ABUT	AI5050	38 38 05.70584	121 57 06.70255	53.01
ALHAMBRA	1021	ALHA	AI5051	38 33 31.09757	121 42 26.68762	12.97
ANDREW	1022	ANDR	AE9864	38 23 12.17743	121 38 18.71969	3.68
B 849	1026	B849	JS2151	38 32 01.29090	121 58 15.18331	39.68
BIRD	1030	BIRD	AI5052	38 50 54.73498	122 02 37.47696	94.11
BRIDGE	1033	BRID	AI5053	38 42 41.39518	122 02 50.18340	64.2
CALDWELL	1037	CALD	AE9863	38 27 33.51280	121 39 24.21307	5.42
CANAL	1039	CANA	AI5054	38 37 02.05407	121 51 30.11560	29.79
CASTRO AZ MK RESET	1042	CAST	JS4556	38 33 50.77536	121 38 37.80288	5.27
CHURCH	1044	CHUR	AI5055	38 39 48.00509	121 48 09.05752	24.12
CODY	1045	CODY	AI5056	38 47 30.59722	121 46 29.01978	12.75
CONAWAY	1046	CONA	AI5057	38 37 05.49414	121 38 40.42822	7.71
COTTON	1049	COTT	AI5058	38 38 20.24426	122 02 08.12167	91.52
COURTLAND	1050	COUR	JS4311	38 20 24.75925	121 33 40.05033	8.06
COY DUMP	1051	COY1	AI5059	38 35 28.05097	121 41 31.83411	8.55
CVAP 02	1054	CVAP	AI5060	38 50 19.76338	121 50 39.17593	8.01
DAVEPORT	1057	DAVE	JS4617	38 31 59.46429	121 47 14.17621	19.39
DRAIN	1060	DRAI	AI5061	38 55 31.04473	121 54 52.46219	12.97
DUFOUR	1061	DUFO	JS2238	38 45 48.09569	121 50 39.06776	20.25
EX 1	1065	EX11	AI5073	38 38 46.40916	121 40 03.02450	7.86

F 859 RESET	1071	F859	AI5062	38 47 34.20043	121 43 36.01698	14.21
FERRY	1072	FERR	JS2338	38 40 32.00674	121 37 49.18003	12.13
FORD RM 2	1075	FORD	AI5046	38 43 33.23507	121 43 47.39158	17.53
FREMONT	1076	FREM	AI5063	38 45 52.89327	121 38 08.00521	12.56
GAFFNEY	1083	GAFF	AE9851	38 24 25.68438	121 34 56.13556	1
GWM 17	1087	GW17	JT0105	38 46 52.25771	122 02 38.10735	84.79
GWM 32	1088	GW32	JT0026	38 44 21.97065	122 09 59.02755	112.58
HERSHEY	1096	HERS	AI5064	38 52 28.84718	121 54 51.96511	13.97
HPGN CA 03 08	1104	0308	JS4668	38 43 01.99778	121 48 07.54090	23.73
HPGN D CA 03 BG	1113	03BG	AC9219	38 30 20.00860	121 34 55.09118	9.91
HPGN D CA 03 DG	1114	03DG	AC9223	38 38 27.43690	121 45 39.59540	24.09
KEATON	1129	KEAT	AI5065	38 42 33.52245	121 53 11.08244	35.83
LIBRARY	1134	LIBR	AI5066	38 40 44.18419	121 46 28.10008	19.9
MADISON	1141	MADI	JS2364	38 41 00.22740	121 58 36.36010	47
P 1031	1152	1031	JS2344	38 40 38.14441	121 42 34.07731	10.26
P 1075	1153	1075	JS2130	38 50 51.29489	121 56 00.25761	14.87
PALA	1157	PALA	DH6510	38 33 38.01407	121 32 19.52129	13
PLAINFIELD	1161	PLAI	AI5068	38 35 05.49717	121 48 11.62107	19.96
RD2068	2080	2068	DK4488	38 24 54.2	121 43 48.6	12.4
RIVER	1168	RIVE	AI5069	38 38 50.46071	121 34 20.06216	12.02
RUSSELL RANCH 2	1169	RUSS	AC9893	38 32 38.06502	121 52 33.83768	29.37
RWF1	2082	RWF1	DK4487	38 35 10	121 45 05.1	14.6
SM NO 15	1180	SM15	AI5070	38 43 51.60375	121 37 59.39187	7.33
SURVEYOR	1183	SURV	AE9862	38 27 08.54400	121 44 56.17263	13.54
SYCAMORE	1184	SYCA	AI5071	38 50 19.12265	121 45 06.38892	7.66
T 1069	1185	1069	JS2157	38 35 09.99936	121 58 17.45546	54.71
T 462	1187	T462	JS1556	38 26 25.99174	121 30 17.76157	9.14
T 849	1189	T849	JS2177	38 47 24.93233	121 54 56.34425	36.17
TYNDALL	1192	TYND	AI5072	38 52 26.17670	121 49 03.81149	9.08
VINCOR	1199	VINC	DE9127	38 48 08.11883	121 59 00.32187	48.28
WILSON	1211	WILS	AE9857	38 29 41.85081	121 41 31.51403	9.6
WOODPORT	1214	WOOD	JS3886	38 40 17.76114	121 52 20.38066	39.74
X 200 RESET	1216	X200	JS2144	38 54 20.73108	121 58 59.79141	29.88
YOLO CO AP BASE LINE POINT 6	1219	YCAP	DE9129	38 34 20.34417	121 51 18.37282	29.61
ZAMX	1220	ZAMX	AI5074	38 46 45.78460	121 48 44.62949	13.03

(56 STATIONS)

LAKE SHASTA USBR
(to be observed)

5 SHA 40.65	7001	2LH2	DH6395	40 53 11.57549	122 23 02.73969	332.6
BUTCHER	7002	BUTR		40 45 17.3	122 26 48.9	
FOWLER	7003	FOWL		40 50 05.0	122 09 09.6	
HIRZ	7004	HIRZ		40 51 49.4	122 15 17.8	
HPGN CA 02 12	1101	0212	LU2288	40 57 25.62074	122 26 05.71210	428
HPGN D CA 02 JH	1109	02JH	AE9983	40 39 42.34289	122 21 24.42949	206.24
HPGN D CA 02 JK	1110	02JK	AF8158	40 41 20.86805	122 07 26.10096	328.9
HPGN D CA 02 KJ	1111	02KJ	AF8159	40 48 26.66267	122 19 18.42941	419.68
JONES	7005	JONE		40 44 21.0	122 12 58.8	
MCCLOUD	7006	CLOD		40 56 25.6	122 14 44.6	
P349	7007	P349		40 53 51.8	122 19 09.5	
SHASTA	7008	SHAS		40 42 58.4	122 24 59.1	
SUGARLOAF	7009	LOAF		40 50 51.2	122 24 59.8	
SUGARPINE	7010	PINE		40 44 27.1	122 05 32.8	

(14 stations)

CGPS SITES

CHICO 6 CORS ARP	9001	CHO6	DK2666	39 25 58.35462	121 39 53.52837	
LINCOLN 1 CORS ARP	9002	LNC1	DF7465	38 50 47.42500	121 21 00.79097	36.47
ORVB OROVILLE DAM CORS GRM	9003	ORVB	AI4496	39 33 16.64301	121 30 00.99282	368
P208	9004	P208		39 06 33.5	122 18 13.9	
P265	9005	P265		38 31 48.7	121 57 15.1	
P267	9006	P267		38 22 49.21	121 49 23.64	
P268	9007	P268		38 28 24.69	121 38 47.08	
P270	9009	P270		39 14 37.6	122 03 18.8	
WOODLAND1 CA2004 CORS ARP	9010	P271	DG8213	38 39 26.44614	121 42 52.32300	
P272	9011	P272		39 08 43.7	121 56 35.0	
P344	9012	P344		39 55 44.8	122 01 40.6	
P345	9013	P345		40 16 16.4	122 16 14.9	
SUTTER BUTTES CORS POINT	9014	SUTB	AF9713	39 12 20.99460	121 49 14.10094	645.9
UCD1 UC DAVIS GEOL 1 CORS ARP	9015	UCD1	AI4467	38 32 10.44759	121 45 04.37720	31.44

(14 stations)

DWR STATIONS

(A - OROVILLE)

8+44	8001	8+44		39 30 31.85	121 41 01.85	
ALFA	8002	ALFA		39 31 49.68	121 29 33.27	
BM 2	8003	BM-2		39 31 41.40	121 35 23.43	
DP 9	8004	DP-9		39 31 43.17	121 32 45.42	
FB 4	8005	FB-4		39 30 48.26	121 37 30.84	
OM 27	8006	OM27	KS0846	39 29 34.57	121 23 00.42	
OM33	8007	OM33		39 30 42.77	121 27 43.59	
OROVPORT	8008	OROV	KS1952	39 29 44.95400	121 37 00.76525	59.854
PALERMO REC	8009	PLRC		39 31 58.21	121 28 58.80	
R. O. REC	8010	RORC		39 27 21.68	121 38 11.75	
SBO REC U/S	8011	SBRC		39 27 03.66	121 39 30.30	
SPILL 1	8012	SPL1		39 32 33.01	121 29 29.31	
1 W	8017	1WXX		39 31 43.17	121 32 45.42	

(B - SITES RESERVOIR)

SITES 10	8015	SITE		39 18 45.03	122 20 17.52	
CANAL 1	8013	CNL1		39 16 45.92	122 16 54.50	
CANAL 2	8014	CNL2		39 12 28.26	122 17 58.34	
STGL	8016	STGL		39 21 24.51	122 20 32.17	

Appendix B. Project Observation Schedule

Appendix B

2008 CADWR/USBR Sacramento Valley Subsidence Project

PRIMARY BASE STATION OCCUPATION SCHEDULE

SCENARIO #1 (NORTH)

MONDAY, MARCH 17 (JD 77)
START: 12:00PM (UTC 1900) STOP 5:00PM (UTC 2400)
TUESDAY, MARCH 18 (JD 78)
START: 9:00AM (UTC 1600) STOP: 2:00PM (UTC 2100)
WEDNESDAY, MARCH 19 (JD 79)
START: 9:00AM (UTC 1600) STOP: 2:00PM (UTC 2100)

SCENARIO #2 (SOUTH)

THURSDAY, MARCH 20 (JD 80)
START: 9:00AM (UTC 1600) STOP: 2:00PM (UTC 2100)
MONDAY, MARCH 24 (JD 84)
START: 12:00PM (UTC 1900) STOP 5:00PM (UTC 2400)
TUESDAY, MARCH 25 (JD 85
START: 9:00AM (UTC 1600) STOP: 2:00PM (UTC 2100)

SCENARIO # 1 (North)

RECEIVER	STATION
PRECISE 1	GLEN
PRECISE 2	B107
PRECISE 3	HMBT
PRECISE 4	ORLA
NORTH 1	0212
CENTRAL 1	U345
CENTRAL 2	02JK
CENTRAL 3	02JH
CENTRAL 4	CORN
CGPS	P345, P344, CHO1

SCENARIO # 2 (South)

RECEIVER	STATION
PRECISE 1	KUST
PRECISE 2	BIRD
PRECISE 3	COUR
PRECISE 4	BLAI
NORTH 1	GLEN
CENTRAL 1	B107
CENTRAL 2	C200
CENTRAL 3	SHEL
CGPS	CHO1, P270, P272, P208, LNC1, P271, P265

LOCAL NETWORK STATION OCCUPATION SCHEDULE

SESSION NUMBER	START TIME PDT (UTC)	STOP TIME PDT (UTC)
1	8:00AM (1500)	9:00AM (1600)
2	10:15AM (1715)	11:15AM (1815)
3	12:45PM (1945)	1:45PM (2045)
4	3:00PM (2200)	4:00PM (2300)

NOTE: RE-OBSERVATIONS WILL BE SCHEDULED AS APPROPRIATE.

Observations are scheduled Monday through Thursday.

DAY 1 TUESDAY, APRIL 1 (JD 92)

OBSERVER	SESSION 1	SESSION 2	SESSION 3	SESSION 4
Glenn 1	BOWM	BOWM	RBNK	RBNK
Glenn 2	02FJ	02FJ	G143	G143
DWR 1	G142	JELL	2EK3	WLOW
Green 1	2HJ2	OPEN	0222	RAWS
Butte 1	2HK3	M185	C430	MCCL
Butte 2	02GH	HESS	HESS	BRHM
Butte 3	U345	SCLE	SCLE	02CJ
Tehama 1	ASHH	2EK4	2EK4	MICH
Tehama 2	OKSL	OKSL	2DK4	2CK1
Tehama 3	EGRN	BNBR	FLOR	FLOR
CGPS		P345		P344

DAY 2 WEDNESDAY, APRIL 2 (JD 93)

OBSERVER	SESSION 1	SESSION 2	SESSION 3	SESSION 4
Glenn 1	RBNK	RBNK	BOWM	BOWM
Glenn 2	G143	G143	02FJ	02FJ
DWR 1	2EK3	WLOW	G142	JELL
Green 1	0222	RAWS	2HJ2	OPEN
Butte 1	C430	MCCL	2HK3	M185
Butte 2	HESS	BRHM	02GH	HESS
Butte 3	SCLE	02CJ	U345	SCLE
Tehama 1	2EK4	MICH	ASHH	2EK4
Tehama 2	2DK4	2CK1	OKSL	OKSL
Tehama 3	FLOR	FLOR	EGRN	BNBR
CGPS		P344		P345

DAY 3 THURSDAY, APRIL 3 (JD 94)

OBSERVER	SESSION 1	SESSION 2	SESSION 3	SESSION 4
Glenn 1	SRGS	SRGS	NORD	ORLA
Glenn 2	LBRL	LBRL	VIOL	CREE
DWR 1	Q106	L143	PMPR	V380
Green 1	CORN	MICH	CAPA	W215
Butte 1	MCCL	P143	P143	SRGS
Butte 2	BRHM	B635	N852	N852
Butte 3	02CJ	02CJ	FARM	Y380
Tehama 1	K276	271F	271F	K276
Tehama 2	BUTG	B130	B130	BUTG
Tehama 3	EUCA	B728	B728	2966
CGPS		P344		

DAY 4 MONDAY, APRIL 7 (JD 98)

OBSERVER	SESSION 1	SESSION 2	SESSION 3	SESSION 4
Glenn 1	NORD	ORLA	SRGS	SRGS
Glenn 2	VIOL	CREE	LBRL	LBRL
DWR 1	PMPR	V380	Q106	L143
Green 1	CAPA	W215	CORN	MICH
Butte 1	P143	SRGS	MCCL	P143
Butte 2	N852	N852	BRHM	B635
Butte 3	FARM	Y380	02CJ	02CJ
Tehama 1	271F	K276	K276	271F
Tehama 2	B130	BUTG	BUTG	B130
Tehama 3	B728	2966	EUCA	B728
CGPS				P344

DAY 5 TUESDAY, APRIL 8 (JD 99)

OBSERVER	SESSION 1	SESSION 2	SESSION 3	SESSION 4
Glenn 1	V380	2085	WALK	PUMP
Glenn 2	W215	ORLA	Q107	FARM
Glenn 3	S106	CHER	CHER	WILD
Glenn 4	WINS	H285	H285	KAIS
Butte 1	Y380	FREN	FREN	2085
Butte 2	B107	K852	K852	K852
Butte 3	A107	A107	U107	PETE
Tehama 1	BIGW	BIGW	WILN	HAMI
Tehama 2	AGUI	AGUI	ARTO	VIOL
Tehama 3	CREE	CAPA	P30W	P30W

DAY 6 WEDNESDAY, APRIL 9 (JD 100)

OBSERVER	SESSION 1	SESSION 2	SESSION 3	SESSION 4
Glenn 1	WALK	PUMP	V380	2085
Glenn 2	Q107	FARM	W215	ORLA
Glenn 3	CHER	WILD	S106	CHER
Glenn 4	H285	KAIS	WINS	H285
Butte 1	FREN	2085	Y380	FREN
Butte 2	K852	K852	B107	K852
Butte 3	U107	PETE	A107	A107
Tehama 1	WILN	HAMI	BIGW	BIGW
Tehama 2	ARTO	VIOL	AGUI	AGUI
Tehama 3	P30W	P30W	CREE	CAPA

DAY 7 THURSDAY, APRIL 10 (JD 101)

OBSERVER	SESSION 1	SESSION 2	SESSION 3	SESSION 4
Glenn 1	NORD	FREX	FREX	GLEN
Glenn 2	FARM	DHAM	L191	L191
Glenn 3	WILD	WILD	WILD	JACI
Glenn 4	MERI	G434	KAIS	WILN
Butte 1	HMBT	HMBT	1118	PROV
Butte 2	C434	C434	BEND	BEND
Butte 3	MORE	MORE	PETE	WALK
Tehama 1	HAMI	7MIL	7MIL	7MIL
Tehama 2	B 728	PEN2	EXT1	EXT1
Tehama 3	EATO	B428	P30W	BCEX
Frame			JACI	P30W

DAY 8 MONDAY, APRIL 14 (JD 105)

OBSERVER	SESSION 1	SESSION 2	SESSION 3	SESSION 4
Glenn 1	FREX	GLEN	NORD	FREX
Glenn 2	L191	L191	FARM	DHAM
Glenn 3	WILD	JACI	WILD	WILD
Glenn 4	KAIS	WILN	MERI	G434
Butte 1	1118	PROV	HMBT	HMBT
Butte 2	BEND	BEND	C434	C434
Butte 3	PETE	WALK	MORE	MORE
Tehama 1	7MIL	7MIL	HAMI	7MIL
Tehama 2	EXT1	EXT1	B 728	PEN2
Tehama 3	P30W	BCEX	EATO	B428
Frame	JACI	P30W		

DAY 9 TUESDAY, APRIL 15 (JD 106)

OBSERVER	SESSION 1	SESSION 2	SESSION 3	SESSION 4
Glenn 1	7MIL	GLEN	JOHN	JOHN
Glenn 2	DHAM	1122	D14R	D14R
DWR 1	PEN2	NELS	NELS	BIGB
Green 1	J143	JACI	SHEP	SHEP
Butte 1	G434	NLD8	NLD8	CRST
Butte 2	TALL	B109	TALL	F853
Butte 3	55BB	WLMS	WLMS	WLMS
Tehama 1	GORR	GORR	J847	BUZZ
Tehama 2	FENN	FENN	PARK	PARK
Colusa 1	B428	BCEX	55BB	V853
CGPS			ORVB	ORVB
CGPS			CHO1	CHO1

DAY 10 WEDNESDAY, APRIL 16 (JD 107)

OBSERVER	SESSION 1	SESSION 2	SESSION 3	SESSION 4
Glenn 1	JOHN	JOHN	7MIL	GLEN
Glenn 2	D14R	D14R	DHAM	1122
DWR 1	NELS	BIGB	PEN2	NELS
Green 1	SHEP	SHEP	J143	JACI
Butte 1	NLD8	CRST	G434	NLD8
Butte 2	TALL	F853	TALL	B109
Butte 3	WLMS	WLMS	55BB	WLMS
Tehama 1	J847	BUZZ	GORR	GORR
Tehama 2	PARK	PARK	FENN	FENN
Colusa 1	55BB	V853	B428	BCEX
CGPS	ORVB	ORVB		
CGPS	CHO1	CHO1		

DAY 11 THURSDAY, APRIL 17 (JD 108)

OBSERVER	SESSION 1	SESSION 2	SESSION 3	SESSION 4
Glenn 1	WALK	GLEN	STEG	GRAY
Glenn 2	Q107	1122	DODG	DODG
Glenn 3	OWEN	Y852	NORM	HOWA
Glenn 4	6064	WILL	WILL	F853
Butte 1	W850	1500	W850	1500
Butte 2	C200	BIGB	C200	BIGB
Butte 3	U107	PROV	F200	NLD7
Tehama 1	MINO	MINO	FINK	ADOB
Tehama 2	NORM	GORD	GORD	GORD
Colusa 1	M107	LARK	DELE	CRCO
Frame			SR65	
CGPS			P270	

DAY 12 MONDAY, APRIL 21 (JD 112)

OBSERVER	SESSION 1	SESSION 2	SESSION 3	SESSION 4
Glenn 1	STEG	GRAY	WALK	GLEN
Glenn 2	DODG	DODG	Q107	1122
Glenn 3	NORM	HOWA	OWEN	Y852
Glenn 4	WILL	F853	6064	WILL
Butte 1	W850	1500	W850	1500
Butte 2	C200	BIGB	C200	BIGB
Butte 3	F200	NLD7	U107	PROV
Tehama 1	FINK	ADOB	MINO	MINO
Tehama 2	GORD	GORD	NORM	GORD
Colusa 1	DELE	CRCO	M107	LARK
Frame	SR65			
CGPS	P270			

DAY 13 TUESDAY, APRIL 22 (JD 113)

OBSERVER	SESSION 1	SESSION 2	SESSION 3	SESSION 4
Glenn 1	121B	GRAY	STEG	H62U
Glenn 2	HONC	FARR	DODG	D850
Glenn 3	S381	CRCO	PTNM	HPKN
Glenn 4	CRST	F853	HARB	HARB
Butte 1	S853	S853	SR65	T644
Butte 2	B743	B743	NLD7	LONE
Butte 3	TWSP	FLEE	FLEE	FINK
Tehama 1	BUZZ	HARR	LAUX	DELE
Tehama 2	BLOC	BLOC	WR18	HAHN
Colusa 1	V853	V853	ADOB	DLP2
Frame			PASS	
CGPS	CHO1		P270	P270
CGPS				P208

DAY 14 WEDNESDAY, APRIL 23 (JD 114)

OBSERVER	SESSION 1	SESSION 2	SESSION 3	SESSION 4
Glenn 1	STEG	H62U	121B	GRAY
Glenn 2	DODG	D850	HONC	FARR
Glenn 3	PTNM	HPKN	S381	CRCO
Glenn 4	HARB	HARB	CRST	F853
Butte 1	SR65	T644	S853	S853
Butte 2	NLD7	LONE	B743	B743
Butte 3	FLEE	FINK	TWSP	FLEE
Tehama 1	LAUX	DELE	BUZZ	HARR
Tehama 2	WR18	HAHN	BLOC	BLOC
Colusa 1	ADOB	DLP2	V853	V853
Frame	PASS			
CGPS	P270	P270	CHO1	
CGPS		P208		

DAY 15 THURSDAY, APRIL 24 (JD 115)

OBSERVER	SESSION 1	SESSION 2	SESSION 3	SESSION 4
Glenn 1	SECO	0304	MRSN	WDRF
Glenn 2	WBND	TARK	HONC	BLAI
Glenn 3	WAYN	G117	G117	EAGR
Glenn 4	HARB	WR18	LOAK	03HJ
Butte 1	GRNO	SUTA	SUTA	HALL
Butte 2	LONE	WHEA	LOMO	LOMO
Butte 3	NLD6	FLEE	TWSP	CANL
Tehama 1	LAUX	BLOC	BLOC	S214
Tehama 2	HAHN	PASS	RAMZ	RAMZ
Colusa 1	COLI	COLI	R276	R276
Frame	WHEA			
CGPS	P272	P272		
CGPS		SUTB		

DAY 16 MONDAY, APRIL 28 (JD 119)

OBSERVER	SESSION 1	SESSION 2	SESSION 3	SESSION 4
Glenn 1	MRSN	WDRF	SECO	0304
Glenn 2	HONC	BLAI	WBND	TARK
Glenn 3	G117	EAGR	WAYN	G117
Glenn 4	LOAK	03HJ	HARB	WR18
Butte 1	SUTA	HALL	GRNO	SUTA
Butte 2	LOMO	LOMO	LONE	WHEA
Butte 3	TWSP	CANL	NLD6	FLEE
Tehama 1	BLOC	S214	LAUX	BLOC
Tehama 2	RAMZ	RAMZ	HAHN	PASS
Colusa 1	R276	R276	COLI	COLI
Frame			WHEA	
CGPS			P272	P272
CGPS				SUTB

NOTE: NO OBSERVATIONS THROUGH MAY 5, 2008

DAY 17 MONDAY, MAY 5 (JD 126)

OBSERVER	SESSION 1	SESSION 2	SESSION 3	SESSION 4
UCD	MRSN	PWRL	PWRL	WBND
PCWA	TARK	K435	WISE	PELG
DAVIS	F114	EAGR	ALGO	ALGO
SACTO	ENNS	OSTR	OSTR	ENNS
SUTTER	SUTA	HALL	BEAR	WASH
YCWA	WHEA	OSWD	B144	OSWD
ROSE1	CANL	CANL	ROSO	TSDL
USBR	BOGE	BLAI	COON	BOGE
RD108	HPIN	HPIN	H380	HPIN
YCFCWCD	WBND	03FH	03FH	WILK

DAY 18 TUESDAY, MAY 6 (JD 127)

OBSERVER	SESSION 1	SESSION 2	SESSION 3	SESSION 4
UCD	PWRL	WBND	MRSN	PWRL
PCWA	WISE	PELG	TARK	K435
DAVIS	ALGO	ALGO	F114	EAGR
SACTO	OSTR	ENNS	ENNS	OSTR
SUTTER	BEAR	WASH	SUTA	HALL
YCWA	B144	OSWD	WHEA	OSWD
ROSE1	ROSO	TSDL	CANL	CANL
USBR	COON	BOGE	BOGE	BLAI
RD108	H380	HPIN	HPIN	HPIN
YCFCWCD	03FH	WILK	WBND	03FH

DAY 19 WEDNESDAY, MAY 7 (JD 128)

OBSERVER	SESSION 1	SESSION 2	SESSION 3	SESSION 4
UCD	T143	SUTX	SUTX	SUTX
PCWA	WISE	FIDY	WISE	VARN
DAVIS	DOWD	WALE	BEAR	VNON
SACTO	MOOR	MOOR	MOOR	TYND
SUTTER	W147	W147	SAWT	SAWT
YCWA	COLM	PHLP	WASH	WASH
ROSE1	120P	0309	TRBR	JRM4
USBR	COON	BREW	ROSO	PELG
RD108	G120	G120	03EH	03EH
YCFCWCD	INDU	INDU	KUST	KUST
CGPS	LNC1	LNC1		

DAY 20 THURSDAY, MAY 8 (JD 129)

OBSERVER	SESSION 1	SESSION 2	SESSION 3	SESSION 4
UCD	SUTX	SUTX	T143	SUTX
PCWA	WISE	VARN	WISE	FIDY
DAVIS	BEAR	VNON	DOWD	WALE
SACTO	MOOR	TYND	MOOR	MOOR
SUTTER	SAWT	SAWT	W147	W147
YCWA	WASH	WASH	COLM	PHLP
ROSE1	TRBR	JRM4	120P	0309
USBR	ROSO	PELG	COON	BREW
RD108	03EH	03EH	G120	G120
YCFCWCD	KUST	KUST	INDU	INDU
CGPS			LNC1	LNC1

DAY 21 MONDAY, MAY 12 (JD 133)

OBSERVER	SESSION 1	SESSION 2	SESSION 3	SESSION 4
UCD	REGO	CSUS	CSUS	FERR
PCWA	BREW	ZINF	ELKH	FREM
DAVIS	WALE	BURO	CRES	CRES
SACTO	0309	LROY	HOWE	SUTX
SUTTER	GRBK	SHEL	03AA	VNON
YCWA	GIBS	EXCL	ELVT	ELVT
ROSE1	ELKH	BRAD	BRAD	RIVE
USBR	R208	DOUG	R208	SM15
ROSE2	FAIO	FAIO	REGO	REGO
WOODLND	GARF	GARF	GARF	SNKY
FRAME				PHLP

DAY 22 TUESDAY, MAY 13 (JD 134)

OBSERVER	SESSION 1	SESSION 2	SESSION 3	SESSION 4
UCD	CSUS	FERR	REGO	CSUS
PCWA	ELKH	FREM	BREW	ZINF
DAVIS	CRES	CRES	WALE	BURO
SACTO	HOWE	SUTX	0309	LROY
SUTTER	03AA	VNON	GRBK	SHEL
YCWA	ELVT	ELVT	GIBS	EXCL
ROSE1	BRAD	RIVE	ELKH	BRAD
USBR	R208	SM15	R208	DOUG
ROSE2	REGO	REGO	FAIO	FAIO
WOODLND	GARF	SNKY	GARF	GARF
FRAME		PHLP		

DAY 23 WEDNESDAY, MAY 14 (JD 135)

OBSERVER	SESSION 1	SESSION 2	SESSION 3	SESSION 4
UCD	SECO	1075	MADI	MADI
PCWA	LUSA	GW17	GW17	B849
DAVIS	WAYN	T849	T849	YCAP
SACTO	TYND	TYND	WOOD	WOOD
SUTTER	DRAI	VINC	VINC	CANA
YCWA	X200	X200	BRID	RUSS
ROSE1	JRM4	CODY	COTT	COTT
USBR	HERS	HERS	1699	ABUT
ROSE2	BIRD	BIRD	GW32	1069
WOODLND	WILK	CVAP	KEAT	DAVE
CGPS				P265
CGPS				UCD1

DAY 24 THURSDAY, MAY 15 (JD 136)

OBSERVER	SESSION 1	SESSION 2	SESSION 3	SESSION 4
UCD	MADI	MADI	SECO	1075
PCWA	GW17	B849	LUSA	GW17
DAVIS	T849	YCAP	WAYN	T849
SACTO	WOOD	WOOD	TYND	TYND
SUTTER	VINC	CANA	DRAI	VINC
YCWA	BRID	RUSS	X200	X200
ROSE1	COTT	COTT	JRM4	CODY
USBR	1699	ABUT	HERS	HERS
ROSE2	GW32	1069	BIRD	BIRD
WOODLND	KEAT	DAVE	WILK	CVAP
CGPS		P265		
CGPS		UCD1		

DAY 25 MONDAY, MAY 19 (JD 140)

OBSERVER	SESSION 1	SESSION 2	SESSION 3	SESSION 4
UCD	SYCA	KEAT	FERR	PLAI
PCWA	VARN	DUFO	EX11	EX11
DAVIS	F859	T849	03DG	03DG
SACTO	TYND	ZAMX	WOOD	CONA
SUTTER	VNON	CODY	CANA	CANA
YCWA	FREM	0308	0308	RWF1
ROSE1	CODY	1031	1031	YCAP
USBR	FORD	FORD	FORD	DAVE
GREEN	SM15	SM15	CHUR	COY1
WOODLND	CVAP	CVAP	LIBR	RIVE
CGPS		P271	P271	P271
CGPS				UCD1

DAY 26 TUESDAY, MAY 20 (JD 141)

OBSERVER	SESSION 1	SESSION 2	SESSION 3	SESSION 4
UCD	FERR	PLAI	SYCA	KEAT
PCWA	EX11	EX11	VARN	DUFO
DAVIS	03DG	03DG	F859	T849
SACTO	WOOD	CONA	TYND	ZAMX
SUTTER	CANA	CANA	VNON	CODY
YCWA	0308	RWF1	FREM	0308
ROSE1	1031	YCAP	CODY	1031
USBR	FORD	DAVE	FORD	FORD
GREEN	CHUR	COY1	SM15	SM15
WOODLND	LIBR	RIVE	CVAP	CVAP
CGPS	P271	P271		P271
CGPS		UCD1		

DAY 27 WEDNESDAY, MAY 21 (JD 142)

OBSERVER	SESSION 1	SESSION 2	SESSION 3	SESSION 4
UCD	CSUS	GAFF	GAFF	CAST
PCWA	PALA	PALA	ANDR	DAVE
DAVIS	RIVE	CAST	2068	ALHA
SACTO	CONA	CONA	SURV	SURV
SUTTER	03AA	03BG	MILL	RWF1
YCWA	T462	T462	COUR	WILS
GREEN	COY1	COY1	CALD	CALD
FRAME				COY1
CGPS		P268	P268	P268
CGPS				UCD1
CGPS			P267	P267

DAY 28 THURSDAY, MAY 22 (JD 143)

OBSERVER	SESSION 1	SESSION 2	SESSION 3	SESSION 4
UCD	GAFF	CAST	CSUS	GAFF
PCWA	ANDR	DAVE	PALA	PALA
DAVIS	2068	ALHA	RIVE	CAST
SACTO	SURV	SURV	CONA	CONA
SUTTER	MILL	RWF1	03AA	03BG
YCWA	COUR	WILS	T462	T462
GREEN	CALD	CALD	COY1	COY1
FRAME		COY1		
CGPS	P268	P268		P268
CGPS		UCD1		
CGPS	P267	P267		

Appendix C. Project Re-observation Schedule

Appendix C

Re-observation Schedules

Day 1, Wednesday, May 28 (JD 149)

Observer	8:30 – 9:30	10:00 – 11:00	11:30 – 12:30	1:00 – 2:00
Frame	CANA	PLAI	PLAI	PLAI
D'Onofrio	YCAP	YCAP	03DG	RWF1

Day 2, Thursday, May 29 (JD 150)

Observer	TBD	TBD	TBD	TBD	TBD
Frame	SM15	ELVT	BREW	0309	W147
D'Onofrio	FERR	FERR	WALE	G120	G120

Day 3, Tuesday, June 3 (JD 155)

	9:00 to 10:00am	11:30 to 12:30pm	2:00 to 3:00pm
Observer	Session 1	Session 2	Session 3
Frame	Open	WILK	HAHN
D'Onofrio	LUSA	TSDL	NLD6
DWR 1	TARK	BOGE	COLI
DWR 2	WHEA	ENNS	LONE
DWR 3	GRNO	PELG	GRNO
DWR 4	SECO	WBND	SECO

Day 4, Wednesday, June 4 (JD156)

	9:00 to 10:00	11:30 to 12:30	2:00 to 3:00	4:00 to 5:00
Observer	Session 1	Session 2	Session 3	Session 4
Frame	FINK	FREM	T849	JRM4
D'Onofrio	H62U	FORD	CVAP	PELG
DWR 1	HPKN	CODY	DUFO	
DWR 2	D850	ZAMX	ZAMX	
DWR 3	03FH	F859	KEAT	
DWR 4	BEAR	SNKY	0308	

Day 5, Thursday, June 5 (JD 157)*

Observer	Session 1	Session 2	Session 3	Session 4	Session 5
D'Onofrio	HALL	S214	S214	R276	HONC
GREEN	BLAI	BLAI	03HJ	03HJ	R276

Day 6, MONDAY, JUNE 9 (JD 161)

	8:00 to 9:00	10:00 to 11:00	12:00 to 1:00	2:00 to 3:00
RECEIVER	**SESSION 1**	**SESSION 2**	**SESSION 3**	**SESSION 4**
D'ONOFRIO	**BIGB**	**BCEX**	**B109**	**C434**
GREEN	**HOWA**	**HARR**	**WLMS**	**PEN2**
GLENN	**ADOB**	**CRCO**	**1500**	**G434**
FRAME	**1122**	**7MIL**		

Day 7, TUESDAY, JUNE 10 (JD 162)

	7:30 to 8:30	9:15 to 10:15	11:00 to 12:00	12:45 to 1:45	2:15 to 3:15
RECEIVER	**SESSION 1**	**SESSION 2**	**SESSION 3**	**SESSION 4**	**SESSION 5**
D'ONOFRIO	**S106**	**V380**	**SRGS**	**SRGS**	**PMPR**
GREEN	**CREE**	**2966**	**2966**	**271F**	**B130**
GLENN		**ORLA**	**N852**		

Day 8, WEDNESDAY, JUNE 11 (JD 163)

	7:30 to 8:30	9:15 to 10:15	11:00 to 12:00	12:30 to 1:30	2:15 to 3:15
RECEIVER	**SESSION 1**	**SESSION 2**	**SESSION 3**	**SESSION 4**	**SESSION 5**
D'ONOFRIO	**MCCL**	**BRHM**	**0222**	**0222**	**M185**
GREEN	**WLOW**	**G143**	**2EK3**	**SCLE**	**HESS**
DWR/WEST	**RAWS**	**2CK1**	**C430**		

Day 9, Tuesday, June 17 (JD 169)

RECEIVER	**SESSION 1**	**SESSION 2**
Observing period	**9:00am to 10:00am**	**11:00am to 12:00 noon**
D'ONOFRIO	**C434**	**B109**
GLENN 1/Kline	**G434**	**1500**
GLENN2/Hubbard	**PEN2**	**WLMS**

Day 9, Tuesday, June 17 (JD 169)

RECEIVER	**SESSION 1**
Observing period	**11:00am to 12:00 noon**
DWR/West	**M185**
DWR/Hummer	**HESS**

Appendix D. Participating Observers

Jim Frame, Frame Surveying & Mapping

Don D'Onofrio, Project Coordinator

Appendix D

2008 CADWR/USBR Sacramento Valley Subsidence Project

Observing Personnel and Agency

I. Cooperating Agencies

Personnel	Agency
Ron Almeida	Sacramento County Survey
Reed Bekins	UC Davis
Chris Burdick	David Greenwell Associates & Veterans
Norman Cote	Sutter County
Tom Dixon	Yuba County Water Agency
Todd DiAngelo	RD 108
Brad Elliot	Tehama County Public Works
Jordana Ellis	Glenn County Dept. of Agriculture
Todd Estes	Butte County Public Works
Allan Fulton	UCD Coop Extension
Tim Gomes	Colusa County Public Works
David Greenwell	David Greenwell Associates & Veterans
Kristen Hard (McKillop)	Butte County Water & Resource Conservation
Larry Hatch	City of Woodland
Jon Heisler	City of Roseville Engineering
Carrie Hubbard	Glenn County Dept. of Agriculture
Wyatt Jenkins	Butte County Public Works
Jarvis Jones	Sutter County
Robert Keller	U.S. Bureau of Reclamation
Jennifer Kline	Glenn County Dept. of Agriculture
Dottie Lacroix	Glenn County Dept. of Agriculture
Dave Landon	Butte County Public Works
Tomas Loera	Glenn-Colusa Irrigation District
Jennifer Masters	Colusa County RCD
Leslie Morgan	Yuba County Water Agency/Yuba RCD
Jerry Orr	Sutter County
Gerald Peatross	Placer County Water Agency
Jon Picou	Glenn-Colusa Irrigation District

Clint Raimer	Tehama County Public Works
Rosie Salas	City of Woodland
Bob Schoech	City of Davis Public Works
Ron Scott	City of Woodland
Gary Simpson	City of Roseville Engineering
John Stotts	Yolo County Flood Control & Water Cons. District
Brad Wiggins	Tehama County Public Works

II. California Department of Water Resources

Observing Personnel

Precise Unit	**Sacramento Office**	**Red Bluff Office**
Jim Harlan	Wayne Blackburn	Sean Hummer
Joe Mello	David Bradley	Jim West
Charles Mussett	Russell Brunkhorst	
James Santos	Tim Johnston	
Forrest Smith	Abe Magdaleno	
	Scott Rebelo	
	Greg SanFillipo	

Appendix E. Equipment

Appendix E

Observing Equipment

Instrumentation – There was a large number of instrumentation used during the project. The equipment is listed by project segment. There were four segments: Primary Base Station observations; local network observations; re-observations; and, DWR observations at Lake Oroville and the proposed Sites Reservoir.

Primary Base Station observation equipment:

Receiver S/N	Manufacture/Model	Antenna S/N	Manufacture/Model
3335A03908	Trimble/4000SSi	0220058981	Trimble/Comp. L1/L2 w/GP
3335A03912	Trimble/4000SSi	0220059298	Trimble/Comp. L1/L2 w/GP
3435A07618	Trimble/4000SSi	0220004072	Trimble/Comp. L1/L2 w/GP
0220247401	Trimble/5700	12214629	Trimble/Zephyr
0440104047	Trimble/5700	11885846	Trimble/Zephyr
0220247428	Trimble/5700	12236998	Trimble/Zephyr
0220247429	Trimble/5700	12214607	Trimble/Zephyr
4347129359	Trimble/5800	(internal)	
4550103919	Trimble/R8	(internal)	

Local Network Station observation equipment (other than listed above):

Receiver S/N	Manufacture/Model	Antenna S/N	Manufacture/Model
3518A10659	Trimble/4000SSi	0220018946	Trimble/Comp. L1/L2 w/GP
3608A14632	Trimble/4000SSi	0220050361	Trimble/Comp. L1/L2 w/GP
3535A12148	Trimble/4000SSi	0220030718	Trimble/Comp. L1/L2 w/GP
3325A03396	Trimble/4000SSi	0220012123	Trimble/Comp. L1/L2 w/GP
3335A03908	Trimble/4000SSi	0220058981	Trimble/Comp. L1/L2 w/GP
3325A03397	Trimble/4000SSi	0080094425	Trimble/Comp. L1/L2 w/GP
3335A03912	Trimble/4000SSi	0220059298	Trimble/Comp. L1/L2 w/GP
3719A19275	Trimble/4000SSi	0220133316	Trimble/Comp. L1/L2 w/GP
3608A14594	Trimble/4000SSi	0220050501	Trimble/Comp. L1/L2 w/GP
3724A19609	Trimble/4000SSi	0220050362	Trimble/Comp. L1/L2 w/GP
3608A14631	Trimble/4000SSi	0220050490	Trimble/Comp. L1/L2 w/GP
3637A16905	Trimble/4000SSi	0220068632	Trimble/Comp. L1/L2 w/GP
3647A17633	Trimble/4000SSi	0220166597	Trimble/Comp. L1/L2 w/GP
4526152560	Trimble/R8	(internal)	
0220161902	Trimble/4700	0220166597	Trimble/microcentered L1/L2

Re-observation equipment (other than listed above);

Receiver S/N		Manufacture/Model	Antenna S/N	Manufacture/Model
45145-46		Trimble/5800	(internal)	
4602105531		Trimble/R8	(internal)	
200695		Trimble/R8	(internal)	
3335A03827		Trimble/4000SSi	0220058985	Trimble/Comp. L1/L2 w/GP
3435A07613		Trimble/4000SSi	0220004054	Trimble/Comp. L1/L2 w/GP
3435A07618	**(1)**	Trimble/4000SSi	0220003263	Trimble/Comp. L1/L2 w/GP

(1) Note: Antenna not previously paired with another receiver. This receiver previously paired with Compact L1/L2 0220004072. This pair, 7618 and 3263, only used for session M185-169-1.

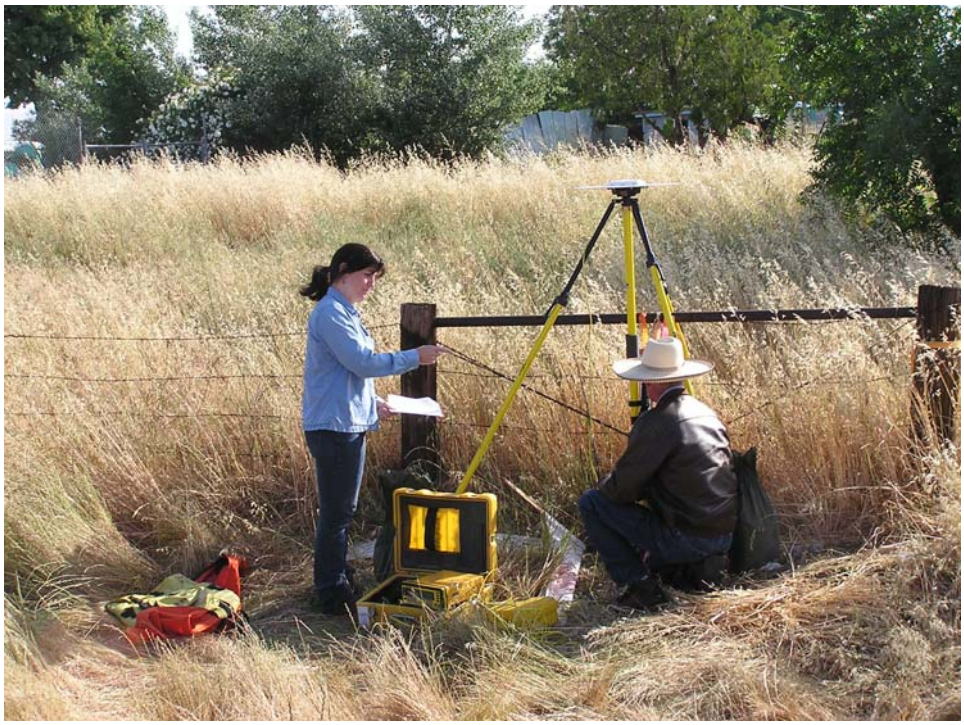
DWR Oroville and Sites Reservoir equipment (other than listed above):

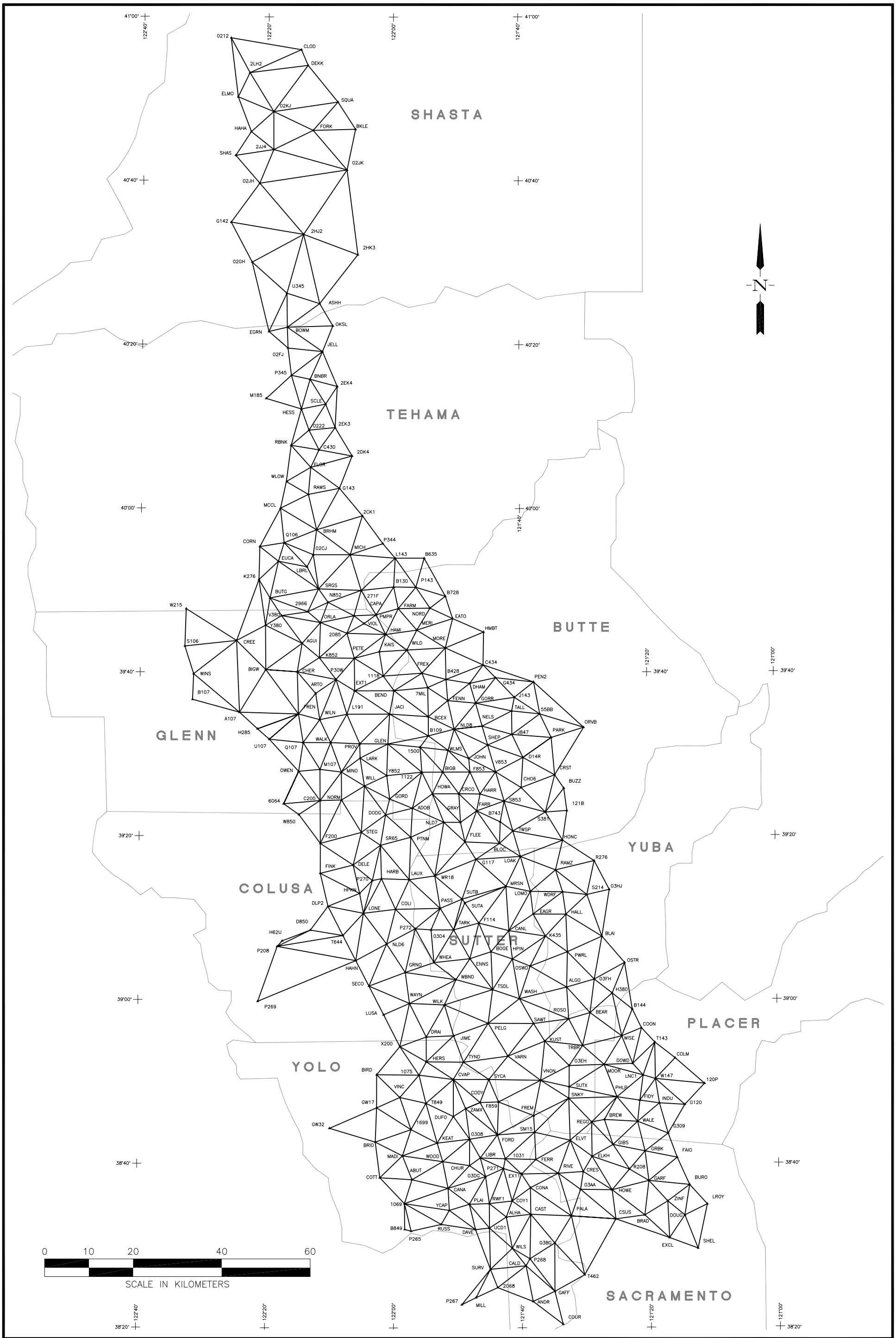
Receiver S/N	Manufacture/Model	Antenna S/N	Manufacture/Model
4312119115	Trimble/5800	(internal)	
4451141825	Trimble/5800	(internal)	
4346128749	Trimble/5800	(internal)	
4450141470	Trimble/5800	(internal)	
0220208590	Trimble/4700	0220202377	Trimble/choke ring
0220209147	Trimble/4700	0220202385	Trimble/choke ring
0220208999	Trimble/4700	0220214129	Trimble/choke ring
0220208300	Trimble/4700	0220214128	Trimble/choke ring

Equipment at station MICHIGAN on Session 4, April 7 (JD98):

Novatel receiver – P/N 01016551 REC BP2 CNS00180387
Sokkia Pinwheel Antenna – SK-600, P/N 500-0-0005, S/N NRK00420265

Appendix F. Project Map





FRAME SURVEYING & MAPPING
609 A Street Davis, CA 95616
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NETWORK DIAGRAM
SACRAMENTO VALLEY HEIGHT MODERNIZATION PROJECT
CALIFORNIA DEPARTMENT OF WATER RESOURCES
U.S. BUREAU OF RECLAMATION
OCTOBER, 2008 SCALE: 1"= 5KM