

Blue Lake Springs Water Rehabilitation Program Survey Control Component

High Precision GPS Control Network

Horizontal and vertical control has been acquired from several sources around the Blue Lake Springs Area of Influence (BLSAI). National Geodetic Survey (NGS) was consulted to obtain vertical and horizontal datum and marks around the BLAI.

A days effort was expended without success in locating any NGS marks, to include JS0188, JS0192, JS0193, and JS3988. After contacting local agencies and firms it was determined all data marks had been destroyed by construction efforts along Highway 4. Calaveras County Water Agency was able to provide several vertical points to use in verifying datum brought in from California High Precision Network points located well outside of the BLAI.

HPGN/OPUS/SOPAC – Static GPS Horizontal Network Solution.

2-hour static sessions were conducted at control points GLI GPS 101, 102, 103, 104, 105, 106 and 107. All static sessions computed against OPUS CORS Stations;

- DN7372 P310 ALDERRIDGECN2006
- DN7563 P245 YOSTURTLEDCN
- DN7366 P306 WILDCATCRKCN
- DM7533 P140 SLATEMTN__CN
- DN4179 P143 INDIANCRK_CN
- DK6399 P305 PLANADA___CN
- DE6246 CMOD MODESTO
- DH8725 SACR SACRAMENTO
- DH8860 DOT1 CARSON CITY

OPUS CORS Stations held as fixed for horizontal values.

California Surveying and Drafting Real Time Network (RTN) Calibration.

Utilizing CSDS RTN and Sprint Cellular Network a calibration was performed on all GLI GPS control points listed above. Additionally, several California HPGN and Height Modernization Stations (HMS) where collected and compared against

static control, and added into Blue Lake Springs Site Calibration (BLSSC). Site Calibration residual results = 0.09 Horizontal and 0.07 Vertical over a 10 mile network (See Attachment map and calibration report).

Calaveras Water District Control Checks.

Utilizing 3 separate control points provided by CWD consultants, verified Blue Lake Springs Control Network (BLSCN) is well within $\pm 0.07'$ Horizontal and Vertical tolerance.

Tertiary Control

A conventional survey control network consisting of approximately 200 control points has been established along 12-miles of future pipeline alignment. All control is semi-permanent and inter-visible for use in future design collection needs. Points are pk nail in pavement or capped rebar at pavement edge. Both horizontal and vertical values have been established.

Blue Lake Springs is not a GPS friendly environment based on narrow corridors and towering trees. These factors limit the use of GPS technology to almost nil along alignments. Several tertiary RTK-GPS points were set along alignments and used as check in stations for work.

Right-Of-Way Corridors

Record map right-of-way for the 12 miles \pm has been input into a digital format for use in preliminary alignment layout. The following Record Maps have been evaluated for right-of-way.

- Blue Lake Springs Unit #1 Bk 2 Maps 60
- Blue Lake Springs Unit #2 Bk 2 Maps 66
- Blue Lake Springs Unit #3 Bk 2 Maps 72
- Blue Lake Springs Unit #4 Bk 4 Maps 77
- Blue Lake Springs Unit #5 Bk 5 Maps 79
- Blue Lake Springs Unit #7 Bk 7 Maps 83
- Blue Lake Springs Unit #10 Bk 2 Maps 108
- Blue Lake Springs Unit #11 Bk 2 Maps 109

- Blue Lake Springs Unit #12 Bk 2 Maps 113

Several Maps have been found to contain mathematical errors and will need to be resolved prior to final establishment of right-of-way. Individual lot lines have not been evaluated or input in this phase.

Street Profile Cross-sections – Monument Ties

pproximately 12 miles of street profiling at 150-200' intervals has been undertaken to accommodate preliminary design of new waterlines. Utilities, driveways, property features, drainage areas, and vertical obstructions, where not included in initial profiling.

Monument ties have been made where practical for use in geo-referencing record map right-of-way into the control/profile base map.

Drawing sheets have been set up for profile delivery in AutoCad format. Individual sheets will show geo-referenced right-of-way where practical, with contours and spot shots along pavement sections.

COVERAGE MAP



GPS Calibration Report

Project : Cali

User name	CJohnson	Date & Time	5:06:32 PM 3/13/2017
Coordinate System	US State Plane 1983(at ground)	Zone	California Zone 3 0403
Project Datum	(WGS 84)	Geoid Model	Not selected
Vertical Datum			
Coordinate Units	US survey feet		
Distance Units	US survey feet		
Height Units	US survey feet		

Contents

 [Datum Transformation Parameters](#)

 [Updated Default Projection Definition](#)

 [Horizontal Adjustment Parameters](#)

 [Vertical Adjustment Parameters](#)

 [Geoid Model Definition](#)

 [Residual Differences Between GPS And Known Coordinates](#)

Datum Transformation Parameters

Datum Transformation computation not requested

[Back to top](#)

Updated Default Projection (Transverse Mercator) Definition

Updated default projection not requested

[Back to top](#)

Horizontal Adjustment Parameters

Northing coordinate of rotation center	2278138.222sft
Easting coordinate of rotation center	6607308.047sft
Rotation about the center point	0°00'00"
Translation north	10.360sft
Translation east	-11.869sft
Scale factor	0.99993940

[Back to top](#)

Vertical Adjustment Parameters

Northing coordinate of origin point	2283125.676sft
Easting coordinate of origin point	6609454.367sft
Vertical separation at origin	86.182sft
Slope north	-64.871ppm
Slope east	-55.512ppm

[Back to top](#)

Geoid Model Definition

No geoid model used

[Back to top](#)

Residual Differences Between GPS And Known Coordinates

Summary

	Maximum error	Root Mean Square error	Point
Horizontal	0.094sft	0.021	109
Vertical	0.072sft	0.016	101
Three-dimensional	0.116sft	0.025	101

Point Residuals

GPS point		Calculated point		Control point	
Point	101	Northing	2283125.676sft	Point	1001
Latitude	38°15'53.97067"N	Easting	6609454.367sft	Northing	2283125.740sft
Longitude	120°20'00.81439"W	Elevation	4249.198sft	Easting	6609454.431sft
Height	4163.016sft	Horizontal error	0.091sft	Elevation	4249.270sft
		Vertical error	0.072sft	Type	Horz and Vert
		3D error	0.116sft	Point quality	Control quality
Point	102	Northing	2274517.422sft	Point	1002
Latitude	38°14'29.00315"N	Easting	6601354.689sft	Northing	2274517.396sft
Longitude	120°21'42.53158"W	Elevation	3864.649sft	Easting	6601354.648sft
Height	3777.459sft	Horizontal error	0.049sft	Elevation	3864.650sft
		Vertical error	0.001sft	Type	Horz and Vert
		3D error	0.049sft	Point quality	Control quality
Point	105	Northing	2276932.136sft	Point	1005
Latitude	38°14'52.75053"N	Easting	6609072.962sft	Northing	2276932.119sft
Longitude	120°20'05.73358"W	Elevation	3887.161sft	Easting	6609072.937sft
Height	3800.556sft	Horizontal error	0.030sft	Elevation	3887.130sft
		Vertical error	0.031sft	Type	Horz and Vert

		3D error	0.043sft	Point quality	Control quality
Point	106		2286384.267sft	Point	1006
Latitude	38° 16' 25.98913"N		6619468.877sft	Northing	2286384.263sft
Longitude	120° 17' 55.15967"W		4879.399sft	Easting	6619468.838sft
Height	4793.984sft		0.039sft	Elevation	4879.360sft
			0.039sft	Type	Horz and Vert
			0.055sft	Point quality	Control quality
Point	107		2272570.083sft	Point	1007
Latitude	38° 14' 09.66784"N		6606780.717sft	Northing	2272570.130sft
Longitude	120° 20' 34.56003"W		3728.158sft	Easting	6606780.660sft
Height	3641.143sft		0.074sft	Elevation	3728.220sft
			0.062sft	Type	Horz and Vert
			0.096sft	Point quality	Control quality
Point	108		2274008.108sft	Point	1008
Latitude	38° 14' 23.97268"N		6601050.246sft	Northing	2274008.036sft
Longitude	120° 21' 46.35696"W		3845.530sft	Easting	6601050.250sft
Height	3758.290sft		0.072sft	Elevation	3845.465sft
			0.065sft	Type	Horz and Vert
			0.097sft	Point quality	Control quality
Point	109		2279502.377sft	Point	1009
Latitude	38° 15' 18.24433"N		6603891.387sft	Northing	2279502.386sft
Longitude	120° 21' 10.63720"W		3986.714sft	Easting	6603891.480sft
Height	3899.988sft		0.094sft	Elevation	3986.420sft
			?	Type	Horizontal
			0.094sft	Point quality	Control quality

[Back to top](#)