

# Ground Control Survey Report



## Arizona LiDAR Ground Control

### **AZ Mohave 2021 D20**

Contract Number: G16PC00022  
Task Order Number: 140G0220F0290

Contractor: Woolpert, Inc.  
Woolpert Project # 82345

September 2021

# Ground Control Survey Report

UNITED STATES GEOLOGICAL SURVEY – AZ Mohave 2021 D20

## AZ Mohave 2021 D20

Contract Number: G16PC00022  
Task Order Number: 140G0220F0290

### Woolpert

4454 Idea Center Boulevard  
Dayton, OH 45430-1500  
Tel 937.461.5660

## Table of Contents

Section 1: Survey Report.....	1-1
Section 2: Ground Control /Geodetic Control Coordinate Listings.....	2-1
Section 3: Geodetic Control Information and Resources.....	3-1
Section 4: GPS Control Diagram.....	4-1

# Section 1: Overview

TASK ORDER NAME: AZ Mohave 2021 D20

Task Order: #140G0220F0290

## Introduction

This report contains a comprehensive outline of the Ground Control Survey that supported the LiDAR collection in Mohave County, AZ. All surveys were performed in such a way as to achieve ground control accuracies that meet or exceed the National Mapping Accuracy Standards.

## Project Area

The project area consists of approximately 3500 square kilometers within Mohave County in Arizona.

## Purpose

The purpose of this survey was to establish three-dimensional coordinates for 58 LiDAR control points, 58 NVA points, 47 VVA points, and 6 horizontal control points included in the NVA points. The points were collected per the flight layout and were uniformly dispersed over the project area.

## Date of Survey

Ground control field operations took place August 24<sup>th</sup> through September 1<sup>st</sup>.

## Monumentation

Prior to aerial imagery acquisition, Woolpert field crews performed a field reconnaissance to verify the existence and suitability of pre-selected existing National Geodetic Survey (NGS) control stations. These existing NSRS control stations were utilized as checks to ensure that quality x, y, and z coordinate values were computed for each of the newly established photogrammetric control stations. Recovery information sheets for the existing NGS control stations can be found in Section 3 of this report. A control diagram showing the ground control stations used to support this mapping project can be found in Section 4 of this report.

## Accuracy Standards

The relative vertical accuracy of the LiDAR data will be 10 cm RMSEz with swath overlap (between adjacent swaths) and an absolute vertical accuracy of 10 cm RMSE.

## GPS Equipment

Woolpert utilized two (2) Trimble R-10 receivers, two (2) Trimble R-8 model 4 receivers, and two (2) Trimble TSC7 controllers for this project.

## Methodology

### Real-Time Kinematic (RTK) GPS

The field crew utilized Real-Time Kinematic (RTK) GPS surveying throughout the ground control data collection process. Using RTK GPS techniques, observations were performed on a total of 58 LiDAR control points, 58 NVA points, and 47 VVA points. The survey was conducted using a 1-second epoch rate, in a fixed solution RTK mode, with each observation lasting between 60 to 180 seconds. Each station was occupied twice to insure the necessary horizontal and vertical accuracies were being met for this LiDAR / photogrammetric project.

### GPS Data Analysis and Processing

The field crew chief processed all session baselines each day using Trimble Navigation's Trimble Business Center (TBC) Version 5.50 baseline processor with the accompanying broadcast ephemeris. Daily processing ensured the integrity of the network as it was constructed and allowed the field crews to immediately reschedule observations of poor baselines.

### Datum Reference and Final Coordinates

The spatial reference system for the Mohave AOI is 11 North and 12 North. The datum shall be NAD83 (2011) horizontal and NAVD88 vertical. Orthometric heights referenced to Geoid 18. Units for both the horizontal and vertical datums will be expressed in meters to three (3) decimal places.

### Quality Assurance

Existing NGS published bench marks were surveyed to assure that there were no discrepancies in the field observation data. Close examinations of the residuals showed no distortions in orientation or scale. The ground control data meets positional accuracies necessary to support 1.0 point per 0.3 meters squared (1' GSD) data at 95% confidence level as outlined in the Geospatial Positioning Accuracy Standards, Part 3: National Standard for Spatial Data Accuracy (NSSDA), published by the Federal Geographic Data Committee (FGDC-STD-007.3-1998).

# Section 2: Ground Control / Geodetic Control

## Coordinate System: Grid

HORIZONTAL DATUM: NAD83(2011)

PROJECTION: 11 North

VERTICAL DATUM: NAVD88

GEOID MODEL: Geoid 12B

UNITS: Meters

### Geodetic Control

Point	Northing	Easting	Elevation	Code
BAR	3965098.476	722317.734	712.850	NGS MARK
DONELLI	3932275.636	741652.636	938.123	NGS MARK
M 254	3941577.698	746547.236	1014.549	NGS MARK
M 486	3949908.888	730226.035	767.318	NGS MARK
150_2021_AZ	3890844.439	723639.246	272.045	TSM
151_2021_AZ	3919535.138	797637.120	1094.439	TSM
152_2021_AZ	3845565.321	810264.566	608.246	TSM
153_2021_AZ	3868028.675	763056.800	645.301	TSM
154_2021_AZ	3846175.287	743311.994	276.751	TSM
155_2021_AZ	3977857.317	764535.352	1123.665	TSM
180_2021_AZ	3972568.063	763492.414	1231.602	TSM

### Ground Control

Point	Northing	Easting	Elevation	Code
1001_2021_AZ	3838715.761	749094.974	446.592	LCP
1002_2021_AZ	3841017.051	813861.491	576.088	LCP
1003_2021_AZ	3861345.636	760506.388	547.546	LCP
1004_2021_AZ	3862633.282	764825.562	650.302	LCP
1005_2021_AZ	3862157.227	768421.761	726.050	LCP
1006_2021_AZ	3862897.807	771257.660	794.634	LCP
1007_2021_AZ	3863037.929	775410.677	901.835	LCP
1008_2021_AZ	3886764.271	726363.342	416.170	LCP

Point	Northing	Easting	Elevation	Code
1009_2021_AZ	3887659.793	718840.001	183.712	LCP
1010_2021_AZ	3910819.265	789438.001	1236.702	LCP
1011_2021_AZ	3916354.457	788799.822	1214.738	LCP
1012_2021_AZ	3915179.510	797147.308	1281.400	LCP
1013_2021_AZ	3921179.579	795999.640	1081.331	LCP
1014_2021_AZ	3925447.374	794409.502	1031.751	LCP
1015_2021_AZ	3926897.796	794391.717	1044.948	LCP
1016_2021_AZ	3959651.152	757379.442	941.445	LCP
1017_2021_AZ	3954572.396	755972.057	966.434	LCP
1018_2021_AZ	3946365.994	752972.053	1163.342	LCP
1019_2021_AZ	3958318.717	746111.642	1280.582	LCP
1020_2021_AZ	3948423.821	750979.561	1078.282	LCP
1021_2021_AZ	3927820.931	752741.657	1323.424	LCP
1022_2021_AZ	3942366.840	747499.631	1046.759	LCP
1023_2021_AZ	3951446.236	744501.189	1168.331	LCP
1024_2021_AZ	3974579.335	763209.076	1191.818	LCP
1025_2021_AZ	3969341.080	719037.677	684.221	LCP
1026_2021_AZ	3939078.596	746067.809	1003.441	LCP
1027_2021_AZ	3980888.851	736934.533	684.652	LCP
1028_2021_AZ	3971625.715	716336.451	574.188	LCP
1029_2021_AZ	3969298.702	761868.619	1062.122	LCP
1030_2021_AZ	3926363.000	730489.733	1061.735	LCP
1031_2021_AZ	3928746.944	731070.227	1028.727	LCP
1032_2021_AZ	3939828.357	730911.411	975.657	LCP
1033_2021_AZ	3953832.630	728968.855	739.652	LCP
1034_2021_AZ	3960219.172	725353.352	731.665	LCP
1035_2021_AZ	3946264.463	732891.282	800.261	LCP
1036_2021_AZ	3928988.869	743646.304	981.526	LCP
1037_2021_AZ	3974636.856	772987.895	1285.357	LCP
1038_2021_AZ	3948924.260	731175.670	775.748	LCP
1039_2021_AZ	3975441.796	767031.808	1218.598	LCP
1040_2021_AZ	3975339.599	769985.903	1223.408	LCP
1041_2021_AZ	3938358.792	735758.788	857.801	LCP
1042_2021_AZ	3967396.084	737632.333	1040.405	LCP
1043_2021_AZ	3940196.399	744689.115	968.089	LCP
1044_2021_AZ	3916414.264	748737.762	1025.703	LCP

Point	Northing	Easting	Elevation	Code
1044_2021_AZ_A	3916414.259	748737.689	1025.592	LCP
1044_2021_AZ_B	3916414.281	748737.681	1025.616	LCP
1045_2021_AZ	3922729.315	740310.999	994.044	LCP
1046_2021_AZ	3935194.344	738753.997	886.878	LCP
1047_2021_AZ	3955718.648	733117.526	779.127	LCP
1048_2021_AZ	3936872.172	740773.942	907.922	LCP
1049_2021_AZ	3938443.855	739237.912	877.663	LCP
1050_2021_AZ	3954834.666	739207.524	985.711	LCP
1051_2021_AZ	3835725.096	749188.671	516.679	LCP
1052_2021_AZ	3845055.133	809204.582	652.155	LCP
1053_2021_AZ	3887722.396	723565.914	308.149	LCP
1054_2021_AZ	3967733.866	720379.584	693.146	LCP
1055_2021_AZ	3963708.981	723466.149	704.336	LCP
1056_2021_AZ	3852263.745	731921.420	218.798	LCP
2001_h_2021_AZ	3884541.600	723811.993	322.494	NVA/HOR
2002_2021_AZ	3836757.832	749152.611	488.501	NVA
2003_2021_AZ	3878534.549	756143.961	662.897	NVA
2006_2021_AZ	3842820.637	811996.775	597.681	NVA
2007_2021_AZ	3939125.342	734567.062	864.479	NVA
2008_2021_AZ	3958499.751	743074.369	1169.358	NVA
2009_2021_AZ	3957291.128	741416.871	1097.482	NVA
2010_2021_AZ	3919819.826	750074.579	1087.709	NVA
2011_2021_AZ	3881285.477	761812.923	750.257	NVA
2012_2021_AZ	3862546.589	767278.834	699.201	NVA
2013_2021_AZ	3941260.191	747011.041	1028.878	NVA
2015_2021_AZ	3948364.793	748832.796	1092.971	NVA
2016_2021_AZ	3949363.222	755752.326	1071.022	NVA
2018_2021_AZ	3978071.431	763340.633	1129.805	NVA
2021_2021_AZ	3976912.512	765190.943	1151.536	NVA
2022_2021_AZ	3973412.476	764896.039	1249.978	NVA
2024_2021_AZ	3977307.643	724762.836	551.999	NVA
2025_2021_AZ	3935333.779	747989.128	1045.419	NVA
2026_2021_AZ	3849608.356	810064.982	615.136	NVA
2027_2021_AZ	3958276.629	732572.385	793.716	NVA
2028_2021_AZ	3921704.097	748176.326	1080.371	NVA
2029_2021_AZ	3984795.602	764346.774	977.400	NVA

Point	Northing	Easting	Elevation	Code
2034_2021_AZ	3917224.615	798862.146	1130.404	NVA
2035_2021_AZ	3941685.409	740033.748	885.979	NVA
2036_2021_AZ	3975922.622	768485.795	1211.180	NVA
2038_h_2021_AZ	3888023.637	722720.509	278.456	NVA/HOR
2039_2021_AZ	3866385.914	761575.629	610.698	NVA
2040_2021_AZ	3918532.145	799136.992	1110.658	NVA
2041_2021_AZ	3931569.411	742148.448	948.538	NVA
2042_2021_AZ	3948466.794	752638.027	1084.470	NVA
2043_2021_AZ	3934281.143	747205.744	1037.110	NVA
2044_h_2021_AZ	3894467.191	722766.507	207.493	NVA/HOR
2045_2021_AZ	3933476.525	736760.114	896.186	NVA
2048_2021_AZ	3876932.145	761370.065	707.589	NVA
2050_2021_AZ	3943505.111	741108.875	921.510	NVA
2052_2021_AZ	3939333.338	742503.511	924.775	NVA
2054_2021_AZ	3933754.880	744692.344	987.148	NVA
2055_H_2021_AZ	3957559.345	740940.286	1080.580	NVA/HOR
2056_H_2021_AZ	3945884.264	748925.787	1092.683	NVA/HOR
2059_H_2021_AZ	3938133.140	738165.982	869.555	NVA/HOR
2060_2021_AZ	3837283.233	752171.080	529.816	NVA
2061_2021_AZ	3846952.398	810047.875	617.035	NVA
2063_2021_AZ	3850937.232	730389.417	190.969	NVA
2064_2021_AZ	3940086.275	737042.216	849.755	NVA
2065_2021_AZ	3838596.149	751442.225	484.518	NVA
2068_2021_AZ	3852417.730	730513.853	197.402	NVA
2069_2021_AZ	3921730.915	751485.856	1149.052	NVA
2070_2021_AZ	3925448.418	745830.616	1053.075	NVA
2071_2021_AZ	3922510.260	738844.531	992.334	NVA
2072_2021_AZ	3931155.235	732247.538	986.008	NVA
2073_2021_AZ	3956205.940	727291.488	737.343	NVA
2074_2021_AZ	3979859.561	725692.570	514.006	NVA
2075_2021_AZ	3984898.932	725153.522	524.092	NVA
2076_2021_AZ	3974213.257	724092.982	578.645	NVA
2077_2021_AZ	3971279.708	723204.555	613.260	NVA
2078_2021_AZ	3965909.755	721777.693	699.828	NVA
2079_2021_AZ	3943204.883	735147.132	823.893	NVA
2080_2021_AZ	3933494.932	735093.664	916.625	VVA



Point	Northing	Easting	Elevation	Code
3001_2021_AZ	3891014.957	725299.711	359.560	VVA
3002_2021_AZ	3935161.943	744375.895	972.922	VVA
3003_2021_AZ	3977682.330	765173.466	1137.128	VVA
3004_2021_AZ	3940310.413	747656.713	1071.819	VVA
3005_2021_AZ	3922588.495	751841.470	1180.326	VVA
3006_2021_AZ	3920129.103	749193.581	1077.447	VVA
3007_2021_AZ	3866005.393	769598.469	819.939	VVA
3008_2021_AZ	3929855.836	739826.211	917.799	VVA
3009_2021_AZ	3927363.538	738971.520	932.379	VVA
3010_2021_AZ	3924033.084	735924.756	969.352	VVA
3011_2021_AZ	3949716.221	749600.720	1094.285	VVA
3013_2021_AZ	3931590.371	735471.407	927.748	VVA
3015_2021_AZ	3947239.092	746831.366	1136.658	VVA
3016_2021_AZ	3958215.712	756227.307	980.136	VVA
3017_2021_AZ	3865643.620	761509.218	602.998	VVA
3019_2021_AZ	3942385.509	741881.367	928.905	VVA
3020_2021_AZ	3848844.721	730717.032	159.690	VVA
3021_2021_AZ	3984922.135	762981.816	996.814	VVA
3022_2021_AZ	3944570.518	747896.978	1073.204	VVA
3024_2021_AZ	3938268.095	747720.044	1056.852	VVA
3025_2021_AZ	3956220.244	740849.328	1056.655	VVA
3026_2021_AZ	3966284.629	736863.437	1005.676	VVA
3027_2021_AZ	3971346.848	763376.801	1172.841	VVA
3028_2021_AZ	3837350.067	749151.802	474.758	VVA
3029_2021_AZ	3952458.666	726127.758	793.369	VVA
3030_2021_AZ	3975749.006	736468.002	834.165	VVA
3032_2021_AZ	3839518.832	813920.969	554.505	VVA
3034_2021_AZ	3910110.175	804098.952	1204.348	VVA
3035_2021_AZ	3959241.675	730614.129	753.649	VVA
3036_2021_AZ	3938432.081	745296.740	985.911	VVA
3038_2021_AZ	3945028.365	748042.799	1076.643	VVA
3039_2021_AZ	3868075.829	763575.682	649.136	VVA
3040_2021_AZ	3844094.580	811059.761	596.768	VVA
3041_2021_AZ	3949563.384	748407.091	1107.996	VVA
3042_2021_AZ	3913083.152	790973.490	1348.975	VVA
3045_2021_AZ	3939316.788	733987.796	875.392	VVA

Point	Northing	Easting	Elevation	Code
3047_2021_AZ	3949014.562	749830.902	1079.861	VVA
3048_2021_AZ	3839010.823	751069.846	469.155	VVA
3050_2021_AZ	3935243.458	740975.630	919.260	VVA
3051_2021_AZ	3949664.148	752055.886	1054.394	VVA
3052_2021_AZ	3894510.500	726184.015	378.654	VVA
3054_2021_AZ	3927574.796	756010.145	1680.632	VVA
3055_2021_AZ	3966360.063	738303.306	1057.939	VVA
3056_2021_AZ	3959382.171	739829.876	1074.274	VVA
3057_2021_AZ	3974740.259	736421.226	863.107	VVA
3058_2021_AZ	3971546.849	723337.811	607.388	VVA
3059_2021_AZ	3974304.004	724144.466	575.881	VVA

## Coordinate System: Geodetic

HORIZONTAL DATUM: NAD83(2011)

VERTICAL DATUM: NAVD88

UNITS: Meters

## Geodetic Control

Point	Latitude	Longitude	Ellipsoid Height	Code
BAR	35d48'17.49509"	-114d32'22.52125"	684.607	NGS MARK
DONELLI	35d30'16.80379"	-114d20'08.34489"	909.615	NGS MARK
M 254	35d35'14.07371"	-114d16'44.07116"	986.448	NGS MARK
M 486	35d39'58.38568"	-114d27'23.40323"	738.899	NGS MARK
150_2021_AZ	35d08'08.34556"	-114d32'43.44283"	241.912	TSM
151_2021_AZ	35d22'29.19830"	-113d43'25.91569"	1067.093	TSM
152_2021_AZ	34d42'18.34132"	-113d36'45.76253"	579.190	TSM
153_2021_AZ	34d55'14.31570"	-114d07'13.57294"	615.763	TSM
154_2021_AZ	34d43'43.38420"	-114d20'33.69828"	246.228	TSM
155_2021_AZ	35d54'33.40899"	-114d04'07.09304"	1096.794	TSM
180_2021_AZ	35d51'42.96703"	-114d04'54.94690"	1204.659	TSM

## Ground Control

Point	Latitude	Longitude	Ellipsoid Height	Code
1001_2021_AZ	34d39'36.47112"	-114d16'54.47057"	416.213	LCP
1002_2021_AZ	34d39'46.99787"	-113d34'30.69398"	546.969	LCP
1003_2021_AZ	34d51'40.00049"	-114d09'01.45802"	517.674	LCP
1004_2021_AZ	34d52'17.73109"	-114d06'10.09812"	620.681	LCP
1005_2021_AZ	34d51'58.90049"	-114d03'49.17821"	696.618	LCP
1006_2021_AZ	34d52'20.19976"	-114d01'56.76534"	765.402	LCP
1007_2021_AZ	34d52'20.72117"	-113d59'13.23571"	872.869	LCP
1008_2021_AZ	35d05'53.82647"	-114d30'59.91503"	385.990	LCP
1009_2021_AZ	35d06'28.85516"	-114d35'55.95679"	153.465	LCP
1010_2021_AZ	35d17'55.39546"	-113d49'01.45125"	1209.042	LCP
1011_2021_AZ	35d20'55.46059"	-113d49'19.65638"	1187.112	LCP
1012_2021_AZ	35d20'08.56726"	-113d43'50.99301"	1254.003	LCP
1013_2021_AZ	35d23'24.24527"	-113d44'28.56293"	1053.957	LCP
1014_2021_AZ	35d25'44.25279"	-113d45'25.95006"	1004.407	LCP
1015_2021_AZ	35d26'31.27745"	-113d45'24.76751"	1017.646	LCP
1016_2021_AZ	35d44'50.07265"	-114d09'13.35113"	913.815	LCP
1017_2021_AZ	35d42'06.74512"	-114d10'15.14764"	938.744	LCP
1018_2021_AZ	35d37'43.47800"	-114d12'23.66609"	1135.576	LCP
1019_2021_AZ	35d44'17.25101"	-114d16'42.94617"	1252.804	LCP
1020_2021_AZ	35d38'52.02427"	-114d13'40.48434"	1050.469	LCP
1021_2021_AZ	35d27'42.43470"	-114d12'53.64264"	1295.383	LCP
1022_2021_AZ	35d35'38.80403"	-114d16'05.39875"	1018.723	LCP
1023_2021_AZ	35d40'35.87103"	-114d17'54.51665"	1140.402	LCP
1024_2021_AZ	35d52'48.43848"	-114d05'03.83973"	1164.874	LCP
1025_2021_AZ	35d50'37.73355"	-114d34'28.91095"	656.001	LCP
1026_2021_AZ	35d33'53.47451"	-114d17'05.83760"	975.257	LCP
1027_2021_AZ	35d56'37.17540"	-114d22'23.79980"	656.759	LCP
1028_2021_AZ	35d51'53.98290"	-114d36'14.26967"	545.961	LCP
1029_2021_AZ	35d49'58.55267"	-114d06'03.47177"	1034.987	LCP
1030_2021_AZ	35d27'14.62469"	-114d27'37.05992"	1032.925	LCP
1031_2021_AZ	35d28'31.44663"	-114d27'11.61520"	999.986	LCP

Point	Latitude	Longitude	Ellipsoid Height	Code
1032_2021_AZ	35d34'30.92554"	-114d27'06.55111"	947.180	LCP
1033_2021_AZ	35d42'06.67532"	-114d28'09.34038"	711.283	LCP
1034_2021_AZ	35d45'36.77875"	-114d30'26.62349"	703.385	LCP
1035_2021_AZ	35d37'57.95833"	-114d25'41.28676"	771.827	LCP
1036_2021_AZ	35d28'28.47804"	-114d18'52.83856"	953.039	LCP
1037_2021_AZ	35d52'40.66557"	-113d58'34.29117"	1258.961	LCP
1038_2021_AZ	35d39'25.65801"	-114d26'46.68503"	747.326	LCP
1039_2021_AZ	35d53'12.66913"	-114d02'30.53872"	1191.874	LCP
1040_2021_AZ	35d53'06.43991"	-114d00'32.99479"	1196.858	LCP
1041_2021_AZ	35d33'39.16079"	-114d23'55.69573"	829.271	LCP
1042_2021_AZ	35d49'19.08003"	-114d22'10.46366"	1012.509	LCP
1043_2021_AZ	35d34'30.94721"	-114d17'59.32989"	939.863	LCP
1044_2021_AZ	35d21'36.22689"	-114d15'44.83990"	997.085	LCP
1044_2021_AZ_A	35d21'36.22679"	-114d15'44.84279"	996.975	LCP
1044_2021_AZ_B	35d21'36.22754"	-114d15'44.84311"	996.999	LCP
1045_2021_AZ	35d25'08.43164"	-114d21'11.69865"	965.324	LCP
1046_2021_AZ	35d31'53.96973"	-114d22'00.19566"	858.335	LCP
1047_2021_AZ	35d43'04.33018"	-114d25'22.44349"	750.882	LCP
1048_2021_AZ	35d32'46.61512"	-114d20'38.27517"	879.465	LCP
1049_2021_AZ	35d33'38.91635"	-114d21'37.54508"	849.188	LCP
1050_2021_AZ	35d42'30.41121"	-114d21'21.25088"	957.658	LCP
1051_2021_AZ	34d37'59.40772"	-114d16'53.96157"	486.346	LCP
1052_2021_AZ	34d42'02.96286"	-113d37'28.03101"	623.098	LCP
1053_2021_AZ	35d06'27.14922"	-114d32'49.37582"	277.926	LCP
1054_2021_AZ	35d49'44.53094"	-114d33'37.06123"	664.918	LCP
1055_2021_AZ	35d47'31.49774"	-114d31'38.20195"	676.089	LCP
1056_2021_AZ	34d47'10.38548"	-114d27'55.10828"	188.079	LCP
2001_h_2021_AZ	35d04'43.79164"	-114d32'42.75791"	292.194	NVA/HOR
2002_2021_AZ	34d38'32.92892"	-114d16'54.28289"	458.152	NVA
2003_2021_AZ	35d01'01.32645"	-114d11'34.07450"	633.331	NVA
2006_2021_AZ	34d40'47.49755"	-113d35'41.43576"	568.598	NVA
2007_2021_AZ	35d34'05.03576"	-114d24'42.18784"	835.962	NVA
2008_2021_AZ	35d44'25.83786"	-114d18'43.53458"	1141.483	NVA
2009_2021_AZ	35d43'48.11878"	-114d19'50.76179"	1069.534	NVA
2010_2021_AZ	35d23'25.44351"	-114d14'48.17591"	1059.253	NVA

Point	Latitude	Longitude	Ellipsoid Height	Code
2011_2021_AZ	35d02'25.28767"	-114d07'47.53750"	721.007	NVA
2012_2021_AZ	34d52'12.60827"	-114d04'33.68898"	669.716	NVA
2013_2021_AZ	35d35'03.36295"	-114d16'26.01090"	1000.791	NVA
2015_2021_AZ	35d38'52.06617"	-114d15'05.82188"	1065.103	NVA
2016_2021_AZ	35d39'18.07138"	-114d10'29.83978"	1043.312	NVA
2018_2021_AZ	35d54'41.51011"	-114d04'54.44233"	1102.871	NVA
2021_2021_AZ	35d54'02.14399"	-114d03'42.10410"	1124.703	NVA
2022_2021_AZ	35d52'08.97671"	-114d03'58.04241"	1223.129	NVA
2024_2021_AZ	35d54'51.40307"	-114d30'32.80128"	523.891	NVA
2025_2021_AZ	35d31'50.33235"	-114d15'53.72475"	1017.258	NVA
2026_2021_AZ	34d44'29.58359"	-113d36'48.24659"	586.135	NVA
2027_2021_AZ	35d44'27.73943"	-114d25'41.45144"	765.507	NVA
2028_2021_AZ	35d24'28.24611"	-114d16'01.27435"	1051.903	NVA
2029_2021_AZ	35d58'18.49808"	-114d04'06.29721"	950.459	NVA
2034_2021_AZ	35d21'13.00242"	-113d42'40.48486"	1103.055	NVA
2035_2021_AZ	35d35'23.33044"	-114d21'02.50215"	857.598	NVA
2036_2021_AZ	35d53'26.82315"	-114d01'32.03899"	1184.543	NVA
2038_h_2021_AZ	35d06'37.59347"	-114d33'22.44956"	248.226	NVA/HOR
2039_2021_AZ	34d54'22.43201"	-114d08'13.72825"	581.039	NVA
2040_2021_AZ	35d21'55.07944"	-113d42'27.89098"	1083.340	NVA
2041_2021_AZ	35d29'53.46968"	-114d19'49.44251"	920.037	NVA
2042_2021_AZ	35d38'51.89515"	-114d12'34.56126"	1056.698	NVA
2043_2021_AZ	35d31'16.90664"	-114d16'25.95225"	1008.891	NVA
2044_h_2021_AZ	35d10'06.53678"	-114d33'14.38129"	177.471	NVA/HOR
2045_2021_AZ	35d30'59.98830"	-114d23'21.09514"	867.586	NVA
2048_2021_AZ	35d00'04.55694"	-114d08'09.92237"	678.206	NVA
2050_2021_AZ	35d36'21.39239"	-114d20'17.86947"	893.220	NVA
2052_2021_AZ	35d34'04.89884"	-114d19'27.00270"	896.433	NVA
2054_2021_AZ	35d31'02.08626"	-114d18'06.20613"	958.801	NVA
2055_H_2021_AZ	35d43'57.23565"	-114d20'09.42331"	1052.621	NVA/HOR
2056_H_2021_AZ	35d37'31.55833"	-114d15'04.88433"	1064.779	NVA/HOR
2059_H_2021_AZ	35d33'29.77107"	-114d22'20.41075"	841.051	NVA/HOR
2060_2021_AZ	34d38'47.30842"	-114d14'55.28646"	499.534	NVA
2061_2021_AZ	34d43'03.52961"	-113d36'52.43233"	587.993	NVA
2063_2021_AZ	34d46'28.61404"	-114d28'56.64077"	160.248	NVA

Point	Latitude	Longitude	Ellipsoid Height	Code
2064_2021_AZ	35d34'34.07328"	-114d23'02.94375"	821.266	NVA
2065_2021_AZ	34d39'30.52757"	-114d15'22.48139"	454.195	NVA
2068_2021_AZ	34d47'16.52902"	-114d28'50.28913"	166.673	NVA
2069_2021_AZ	35d24'26.12801"	-114d13'50.17712"	1120.732	NVA
2070_2021_AZ	35d26'31.74621"	-114d17'30.10868"	1024.613	NVA
2071_2021_AZ	35d25'02.59860"	-114d22'10.02007"	963.580	NVA
2072_2021_AZ	35d29'48.55393"	-114d26'22.46520"	957.339	NVA
2073_2021_AZ	35d43'25.03401"	-114d29'13.60798"	709.006	NVA
2074_2021_AZ	35d56'13.38268"	-114d29'53.13211"	485.918	NVA
2075_2021_AZ	35d58'57.24065"	-114d30'09.47955"	496.053	NVA
2076_2021_AZ	35d53'11.61369"	-114d31'02.63940"	550.497	NVA
2077_2021_AZ	35d51'37.21596"	-114d31'40.99960"	585.072	NVA
2078_2021_AZ	35d48'44.24342"	-114d32'43.20955"	671.590	NVA
2079_2021_AZ	35d36'16.82477"	-114d24'14.89497"	795.438	NVA
2080_2021_AZ	35d31'02.01159"	-114d24'27.16993"	888.013	VVA
3001_2021_AZ	35d08'12.54226"	-114d31'37.72048"	329.468	VVA
3002_2021_AZ	35d31'47.98955"	-114d18'17.22974"	944.583	VVA
3003_2021_AZ	35d54'27.11478"	-114d03'41.87718"	1110.292	VVA
3004_2021_AZ	35d34'31.98783"	-114d16'01.43081"	1043.745	VVA
3005_2021_AZ	35d24'53.60950"	-114d13'35.14066"	1152.058	VVA
3006_2021_AZ	35d23'36.26548"	-114d15'22.71902"	1048.967	VVA
3007_2021_AZ	34d54'02.53796"	-114d02'58.43036"	790.726	VVA
3008_2021_AZ	35d28'59.93514"	-114d21'23.34231"	889.191	VVA
3009_2021_AZ	35d27'39.86164"	-114d21'59.86281"	903.709	VVA
3010_2021_AZ	35d25'54.48478"	-114d24'04.09263"	940.568	VVA
3011_2021_AZ	35d39'35.18399"	-114d14'33.81209"	1066.458	VVA
3013_2021_AZ	35d29'59.93062"	-114d24'14.17723"	899.106	VVA
3015_2021_AZ	35d38'17.37635"	-114d16'26.56317"	1108.713	VVA
3016_2021_AZ	35d44'04.61959"	-114d10'00.81908"	952.478	VVA
3017_2021_AZ	34d53'58.42644"	-114d08'17.17767"	573.312	VVA
3019_2021_AZ	35d35'44.41115"	-114d19'48.40563"	900.613	VVA
3020_2021_AZ	34d45'20.48193"	-114d28'45.82821"	128.993	VVA
3021_2021_AZ	35d58'23.92721"	-114d05'00.57679"	969.805	VVA
3022_2021_AZ	35d36'49.89454"	-114d15'47.19140"	1045.234	VVA
3024_2021_AZ	35d33'25.71331"	-114d16'01.16792"	1028.734	VVA

Point	Latitude	Longitude	Ellipsoid Height	Code
3025_2021_AZ	35d43'13.89712"	-114d20'14.48645"	1028.672	VVA
3026_2021_AZ	35d48'43.71115"	-114d22'42.26065"	977.735	VVA
3027_2021_AZ	35d51'03.49200"	-114d05'01.00209"	1145.869	VVA
3028_2021_AZ	34d38'52.13466"	-114d16'53.68741"	444.400	VVA
3029_2021_AZ	35d41'24.48189"	-114d30'03.68160"	764.954	VVA
3030_2021_AZ	35d53'50.92915"	-114d22'47.90367"	806.296	VVA
3032_2021_AZ	34d38'58.38028"	-113d34'30.36099"	525.343	VVA
3034_2021_AZ	35d17'16.76270"	-113d39'22.84528"	1177.045	VVA
3035_2021_AZ	35d45'00.69153"	-114d26'58.33997"	725.409	VVA
3036_2021_AZ	35d33'33.20075"	-114d17'37.14024"	957.676	VVA
3038_2021_AZ	35d37'04.60734"	-114d15'40.89521"	1048.690	VVA
3039_2021_AZ	34d55'15.35963"	-114d06'53.09447"	619.625	VVA
3040_2021_AZ	34d41'29.80913"	-113d36'16.50700"	567.702	VVA
3041_2021_AZ	35d39'31.31266"	-114d15'21.40146"	1080.138	VVA
3042_2021_AZ	35d19'07.16545"	-113d47'57.85445"	1321.415	VVA
3045_2021_AZ	35d34'11.73701"	-114d25'04.97805"	846.880	VVA
3047_2021_AZ	35d39'12.22550"	-114d14'25.45089"	1052.028	VVA
3048_2021_AZ	34d39'44.30321"	-114d15'36.65205"	438.816	VVA
3050_2021_AZ	35d31'53.62785"	-114d20'32.01690"	890.779	VVA
3051_2021_AZ	35d39'31.24986"	-114d12'56.33576"	1026.616	VVA
3052_2021_AZ	35d10'05.19340"	-114d30'59.36180"	348.704	VVA
3054_2021_AZ	35d27'31.44466"	-114d10'44.39877"	1652.739	VVA
3055_2021_AZ	35d48'44.90238"	-114d21'44.86300"	1030.050	VVA
3056_2021_AZ	35d44'57.31493"	-114d20'51.61895"	1046.313	VVA
3057_2021_AZ	35d53'18.26228"	-114d22'50.84580"	835.234	VVA
3058_2021_AZ	35d51'45.76943"	-114d31'35.42196"	579.203	VVA
3059_2021_AZ	35d53'14.51395"	-114d31'00.49592"	547.733	VVA

## Coordinate System: Grid

HORIZONTAL DATUM: NAD83(2011)

PROJECTION: 12 North

VERTICAL DATUM: NAVD88

GEOID MODEL: Geoid 12B

UNITS: Meters

### Geodetic Control

Point	Northing	Easting	Elevation	Code
BAR	3968089.365	180136.465	712.850	NGS MARK
DONELLI	3934129.480	197440.879	938.123	NGS MARK
M 254	3943119.659	202894.749	1014.549	NGS MARK
M 486	3952435.092	187105.111	767.318	NGS MARK
150_2021_AZ	3893843.227	176941.005	272.045	TSM
151_2021_AZ	3918012.418	252550.402	1094.439	TSM
152_2021_AZ	3843447.659	260704.109	608.246	TSM
153_2021_AZ	3868689.045	214931.383	645.301	TSM
154_2021_AZ	3848049.681	193908.963	276.751	TSM
155_2021_AZ	3978238.207	223072.981	1123.665	TSM
180_2021_AZ	3973022.472	221707.219	1231.602	TSM

### Ground Control

Point	Northing	Easting	Elevation	Code
1001_2021_AZ	3840255.678	199239.065	446.592	LCP
1002_2021_AZ	3838695.512	264021.914	576.088	LCP
1003_2021_AZ	3862169.694	211984.725	547.546	LCP
1004_2021_AZ	3863196.618	216373.925	650.302	LCP
1005_2021_AZ	3862506.041	219935.539	726.050	LCP
1006_2021_AZ	3863075.540	222810.860	794.634	LCP
1007_2021_AZ	3862966.747	226964.865	901.835	LCP
1008_2021_AZ	3889603.595	179415.961	416.170	LCP
1009_2021_AZ	3890951.500	171955.095	183.712	LCP
1010_2021_AZ	3909811.459	243840.869	1236.702	LCP



Point	Northing	Easting	Elevation	Code
1011_2021_AZ	3915373.910	243539.078	1214.738	LCP
1012_2021_AZ	3913695.913	251797.804	1281.400	LCP
1013_2021_AZ	3919752.558	251016.150	1081.331	LCP
1014_2021_AZ	3924107.642	249688.306	1031.751	LCP
1015_2021_AZ	3925556.039	249758.596	1044.948	LCP
1016_2021_AZ	3960502.538	214813.426	941.445	LCP
1017_2021_AZ	3955518.359	213097.800	966.434	LCP
1018_2021_AZ	3947508.607	209601.539	1163.342	LCP
1019_2021_AZ	3959861.697	203482.258	1280.582	LCP
1020_2021_AZ	3949684.748	207737.830	1078.282	LCP
1021_2021_AZ	3929007.229	208242.224	1323.424	LCP
1022_2021_AZ	3943849.531	203893.800	1046.759	LCP
1023_2021_AZ	3953098.133	201454.066	1168.331	LCP
1024_2021_AZ	3975047.543	221547.812	1191.818	LCP
1025_2021_AZ	3972528.028	177120.601	684.221	LCP
1026_2021_AZ	3940653.564	202263.739	1003.441	LCP
1027_2021_AZ	3982961.156	195703.302	684.652	LCP
1028_2021_AZ	3974975.794	174562.784	574.188	LCP
1029_2021_AZ	3969858.496	219885.784	1062.122	LCP
1030_2021_AZ	3928903.751	185933.658	1061.735	LCP
1031_2021_AZ	3931249.323	186658.334	1028.727	LCP
1032_2021_AZ	3942325.958	187174.411	975.657	LCP
1033_2021_AZ	3956430.542	186089.398	739.652	LCP
1034_2021_AZ	3963030.139	182869.339	731.665	LCP
1035_2021_AZ	3948632.750	189544.259	800.261	LCP
1036_2021_AZ	3930726.237	199231.742	981.526	LCP
1037_2021_AZ	3974504.785	231312.085	1285.357	LCP
1038_2021_AZ	3951393.753	187993.346	775.748	LCP
1039_2021_AZ	3975673.790	225416.568	1218.598	LCP
1040_2021_AZ	3975390.446	228358.910	1223.408	LCP
1041_2021_AZ	3940562.938	191925.723	857.801	LCP
1042_2021_AZ	3969444.951	195571.545	1040.405	LCP
1043_2021_AZ	3941853.703	200955.232	968.089	LCP
1044_2021_AZ	3917861.290	203552.195	1025.703	LCP
1044_2021_AZ_A	3917861.289	203552.122	1025.592	LCP
1044_2021_AZ_B	3917861.312	203552.114	1025.616	LCP

Point	Northing	Easting	Elevation	Code
1045_2021_AZ	3924678.342	195520.922	994.044	LCP
1046_2021_AZ	3937220.453	194724.022	886.878	LCP
1047_2021_AZ	3958060.328	190347.892	779.127	LCP
1048_2021_AZ	3938772.885	196843.266	907.922	LCP
1049_2021_AZ	3940435.895	195405.174	877.663	LCP
1050_2021_AZ	3956805.132	196375.304	985.711	LCP
1051_2021_AZ	3837263.693	199154.509	516.679	LCP
1052_2021_AZ	3843001.789	259616.107	652.155	LCP
1053_2021_AZ	3890729.186	176679.524	308.149	LCP
1054_2021_AZ	3970840.406	178362.289	693.146	LCP
1055_2021_AZ	3966631.193	181198.291	704.336	LCP
1056_2021_AZ	3854810.737	182896.708	218.798	LCP
2001_h_2021_AZ	3887537.203	176733.681	322.494	NVA/HOR
2002_2021_AZ	3838297.106	199179.995	488.501	NVA
2003_2021_AZ	3879592.990	208660.356	662.897	NVA
2006_2021_AZ	3840606.002	262268.865	597.681	NVA
2007_2021_AZ	3941401.063	190782.336	864.479	NVA
2008_2021_AZ	3960228.304	200460.667	1169.358	NVA
2009_2021_AZ	3959122.888	198731.679	1097.482	NVA
2010_2021_AZ	3921180.573	205093.498	1087.709	NVA
2011_2021_AZ	3881998.665	214485.580	750.257	NVA
2012_2021_AZ	3862963.170	218817.875	699.201	NVA
2013_2021_AZ	3942774.363	203338.492	1028.878	NVA
2015_2021_AZ	3949756.869	205590.841	1092.971	NVA
2016_2021_AZ	3950331.244	212560.211	1071.022	NVA
2018_2021_AZ	3978525.321	221893.561	1129.805	NVA
2021_2021_AZ	3977254.848	223669.359	1151.536	NVA
2022_2021_AZ	3973779.246	223160.136	1249.978	NVA
2024_2021_AZ	3980133.149	183327.976	551.999	NVA
2025_2021_AZ	3936797.431	203954.063	1045.419	NVA
2026_2021_AZ	3847493.458	260746.043	615.136	NVA
2027_2021_AZ	3960648.190	189960.001	793.716	NVA
2028_2021_AZ	3923177.150	203312.486	1080.371	NVA
2029_2021_AZ	3985175.537	223311.230	977.400	NVA
2034_2021_AZ	3915632.716	253632.762	1130.404	NVA
2035_2021_AZ	3943624.318	196397.450	885.979	NVA

Point	Northing	Easting	Elevation	Code
2036_2021_AZ	3976064.469	226897.390	1211.180	NVA
2038_h_2021_AZ	3891081.039	175853.238	278.456	NVA/HOR
2039_2021_AZ	3867137.767	213354.163	610.698	NVA
2040_2021_AZ	3916920.729	253986.217	1110.658	NVA
2041_2021_AZ	3933394.112	197893.008	948.538	NVA
2042_2021_AZ	3949626.408	209396.267	1084.470	NVA
2043_2021_AZ	3935794.086	203107.802	1037.110	NVA
2044_h_2021_AZ	3897514.488	176287.854	207.493	NVA/HOR
2045_2021_AZ	3935626.409	192628.343	896.186	NVA
2048_2021_AZ	3877679.109	213781.784	707.589	NVA
2050_2021_AZ	3945375.831	197581.997	921.510	NVA
2052_2021_AZ	3941125.112	198720.265	924.775	NVA
2054_2021_AZ	3935421.585	200566.150	987.148	NVA
2055_H_2021_AZ	3959419.868	198272.204	1080.580	NVA/HOR
2056_H_2021_AZ	3947274.531	205532.292	1092.683	NVA/HOR
2059_H_2021_AZ	3940190.929	194315.827	869.555	NVA/HOR
2060_2021_AZ	3838641.986	202225.393	529.816	NVA
2061_2021_AZ	3844844.521	260570.587	617.035	NVA
2063_2021_AZ	3853577.392	181287.251	190.969	NVA
2064_2021_AZ	3942209.816	193312.656	849.755	NVA
2065_2021_AZ	3839996.398	201575.806	484.518	NVA
2068_2021_AZ	3855048.688	181500.039	197.402	NVA
2069_2021_AZ	3923003.063	206618.549	1149.052	NVA
2070_2021_AZ	3927058.274	201197.663	1053.075	NVA
2071_2021_AZ	3924548.635	194043.212	992.334	NVA
2072_2021_AZ	3933582.855	187980.592	986.008	NVA
2073_2021_AZ	3958903.380	184559.361	737.343	NVA
2074_2021_AZ	3982624.629	184413.413	514.006	NVA
2075_2021_AZ	3987690.658	184185.143	524.092	NVA
2076_2021_AZ	3977083.852	182468.837	578.645	NVA
2077_2021_AZ	3974208.542	181401.387	613.260	NVA
2078_2021_AZ	3968932.762	179646.826	699.828	NVA
2079_2021_AZ	3945439.671	191610.351	823.893	NVA
2080_2021_AZ	3935746.223	190965.295	916.625	VVA
3001_2021_AZ	3893913.400	178609.827	359.560	VVA
3002_2021_AZ	3936845.821	200335.818	972.922	VVA

Point	Northing	Easting	Elevation	Code
3003_2021_AZ	3978024.343	223699.192	1137.128	VVA
3004_2021_AZ	3941786.684	203925.286	1071.819	VVA
3005_2021_AZ	3923837.717	207025.658	1180.326	VVA
3006_2021_AZ	3921542.824	204232.615	1077.447	VVA
3007_2021_AZ	3866277.088	221340.706	819.939	VVA
3008_2021_AZ	3931824.240	195469.872	917.799	VVA
3009_2021_AZ	3929387.416	194464.857	932.379	VVA
3010_2021_AZ	3926246.681	191219.931	969.352	VVA
3011_2021_AZ	3951059.294	206440.078	1094.285	VVA
3013_2021_AZ	3933821.262	191226.621	927.748	VVA
3015_2021_AZ	3948755.082	203523.788	1136.658	VVA
3016_2021_AZ	3959139.996	213575.404	980.136	VVA
3017_2021_AZ	3866400.661	213243.374	602.998	VVA
3019_2021_AZ	3944210.746	198285.085	928.905	VVA
3020_2021_AZ	3851467.793	181489.443	159.690	VVA
3021_2021_AZ	3985385.809	221956.516	996.814	VVA
3022_2021_AZ	3946025.587	204424.929	1073.204	VVA
3024_2021_AZ	3939743.638	203864.082	1056.852	VVA
3025_2021_AZ	3958088.293	198099.462	1056.655	VVA
3026_2021_AZ	3968382.225	194735.604	1005.676	VVA
3027_2021_AZ	3971810.527	221516.896	1172.841	VVA
3028_2021_AZ	3838888.546	199214.458	474.758	VVA
3029_2021_AZ	3955232.046	183167.938	793.369	VVA
3030_2021_AZ	3977857.368	194921.528	834.165	VVA
3032_2021_AZ	3837197.201	263992.079	554.505	VVA
3034_2021_AZ	3908217.128	258427.359	1204.348	VVA
3035_2021_AZ	3961731.805	188063.446	753.649	VVA
3036_2021_AZ	3940055.001	201454.442	985.911	VVA
3038_2021_AZ	3946473.832	204598.455	1076.643	VVA
3039_2021_AZ	3868705.010	215452.235	649.136	VVA
3040_2021_AZ	3841932.864	261409.867	596.768	VVA
3041_2021_AZ	3950979.586	205238.982	1107.996	VVA
3042_2021_AZ	3911977.749	245510.177	1348.975	VVA
3045_2021_AZ	3941627.553	190215.523	875.392	VVA
3047_2021_AZ	3950344.682	206627.053	1079.861	VVA
3048_2021_AZ	3840432.654	201228.674	469.155	VVA

Point	Northing	Easting	Elevation	Code
3050_2021_AZ	3937134.231	196945.483	919.260	VVA
3051_2021_AZ	3950857.379	208888.166	1054.394	VVA
3052_2021_AZ	3897351.464	179703.994	378.654	VVA
3054_2021_AZ	3928562.874	211490.501	1680.632	VVA
3055_2021_AZ	3968369.282	196178.034	1057.939	VVA
3056_2021_AZ	3961307.984	197274.962	1074.274	VVA
3057_2021_AZ	3976852.936	194812.859	863.107	VVA
3058_2021_AZ	3974467.169	181550.876	607.388	VVA
3059_2021_AZ	3977171.322	182525.830	575.881	VVA

## Coordinate System: Geodetic

HORIZONTAL DATUM: NAD83(2011)

VERTICAL DATUM: NAVD88

UNITS: Meters

## Geodetic Control

Point	Latitude	Longitude	Ellipsoid Height	Code
BAR	35d48'17.49509"	-114d32'22.52125"	684.607	NGS MARK
DONELLI	35d30'16.80379"	-114d20'08.34489"	909.615	NGS MARK
M 254	35d35'14.07371"	-114d16'44.07116"	986.448	NGS MARK
M 486	35d39'58.38568"	-114d27'23.40323"	738.899	NGS MARK
150_2021_AZ	35d08'08.34556"	-114d32'43.44283"	241.912	TSM
151_2021_AZ	35d22'29.19830"	-113d43'25.91569"	1067.093	TSM
152_2021_AZ	34d42'18.34132"	-113d36'45.76253"	579.190	TSM
153_2021_AZ	34d55'14.31570"	-114d07'13.57294"	615.763	TSM
154_2021_AZ	34d43'43.38420"	-114d20'33.69828"	246.228	TSM
155_2021_AZ	35d54'33.40899"	-114d04'07.09304"	1096.794	TSM
180_2021_AZ	35d51'42.96703"	-114d04'54.94690"	1204.659	TSM

## Ground Control

Point	Latitude	Longitude	Ellipsoid Height	Code
1001_2021_AZ	34d39'36.47112"	-114d16'54.47057"	416.213	LCP
1002_2021_AZ	34d39'46.99787"	-113d34'30.69398"	546.969	LCP
1003_2021_AZ	34d51'40.00049"	-114d09'01.45802"	517.674	LCP
1004_2021_AZ	34d52'17.73109"	-114d06'10.09812"	620.681	LCP
1005_2021_AZ	34d51'58.90049"	-114d03'49.17821"	696.618	LCP
1006_2021_AZ	34d52'20.19976"	-114d01'56.76534"	765.402	LCP
1007_2021_AZ	34d52'20.72117"	-113d59'13.23571"	872.869	LCP
1008_2021_AZ	35d05'53.82647"	-114d30'59.91503"	385.990	LCP
1009_2021_AZ	35d06'28.85516"	-114d35'55.95679"	153.465	LCP
1010_2021_AZ	35d17'55.39546"	-113d49'01.45125"	1209.042	LCP
1011_2021_AZ	35d20'55.46059"	-113d49'19.65638"	1187.112	LCP
1012_2021_AZ	35d20'08.56726"	-113d43'50.99301"	1254.003	LCP
1013_2021_AZ	35d23'24.24527"	-113d44'28.56293"	1053.957	LCP
1014_2021_AZ	35d25'44.25279"	-113d45'25.95006"	1004.407	LCP
1015_2021_AZ	35d26'31.27745"	-113d45'24.76751"	1017.646	LCP
1016_2021_AZ	35d44'50.07265"	-114d09'13.35113"	913.815	LCP
1017_2021_AZ	35d42'06.74512"	-114d10'15.14764"	938.744	LCP
1018_2021_AZ	35d37'43.47800"	-114d12'23.66609"	1135.576	LCP
1019_2021_AZ	35d44'17.25101"	-114d16'42.94617"	1252.804	LCP
1020_2021_AZ	35d38'52.02427"	-114d13'40.48434"	1050.469	LCP
1021_2021_AZ	35d27'42.43470"	-114d12'53.64264"	1295.383	LCP
1022_2021_AZ	35d35'38.80403"	-114d16'05.39875"	1018.723	LCP
1023_2021_AZ	35d40'35.87103"	-114d17'54.51665"	1140.402	LCP
1024_2021_AZ	35d52'48.43848"	-114d05'03.83973"	1164.874	LCP
1025_2021_AZ	35d50'37.73355"	-114d34'28.91095"	656.001	LCP
1026_2021_AZ	35d33'53.47451"	-114d17'05.83760"	975.257	LCP
1027_2021_AZ	35d56'37.17540"	-114d22'23.79980"	656.759	LCP
1028_2021_AZ	35d51'53.98290"	-114d36'14.26967"	545.961	LCP
1029_2021_AZ	35d49'58.55267"	-114d06'03.47177"	1034.987	LCP

Point	Latitude	Longitude	Ellipsoid Height	Code
1030_2021_AZ	35d27'14.62469"	-114d27'37.05992"	1032.925	LCP
1031_2021_AZ	35d28'31.44663"	-114d27'11.61520"	999.986	LCP
1032_2021_AZ	35d34'30.92554"	-114d27'06.55111"	947.180	LCP
1033_2021_AZ	35d42'06.67532"	-114d28'09.34038"	711.283	LCP
1034_2021_AZ	35d45'36.77875"	-114d30'26.62349"	703.385	LCP
1035_2021_AZ	35d37'57.95833"	-114d25'41.28676"	771.827	LCP
1036_2021_AZ	35d28'28.47804"	-114d18'52.83856"	953.039	LCP
1037_2021_AZ	35d52'40.66557"	-113d58'34.29117"	1258.961	LCP
1038_2021_AZ	35d39'25.65801"	-114d26'46.68503"	747.326	LCP
1039_2021_AZ	35d53'12.66913"	-114d02'30.53872"	1191.874	LCP
1040_2021_AZ	35d53'06.43991"	-114d00'32.99479"	1196.858	LCP
1041_2021_AZ	35d33'39.16079"	-114d23'55.69573"	829.271	LCP
1042_2021_AZ	35d49'19.08003"	-114d22'10.46366"	1012.509	LCP
1043_2021_AZ	35d34'30.94721"	-114d17'59.32989"	939.863	LCP
1044_2021_AZ	35d21'36.22689"	-114d15'44.83990"	997.085	LCP
1044_2021_AZ_A	35d21'36.22679"	-114d15'44.84279"	996.975	LCP
1044_2021_AZ_B	35d21'36.22754"	-114d15'44.84311"	996.999	LCP
1045_2021_AZ	35d25'08.43164"	-114d21'11.69865"	965.324	LCP
1046_2021_AZ	35d31'53.96973"	-114d22'00.19566"	858.335	LCP
1047_2021_AZ	35d43'04.33018"	-114d25'22.44349"	750.882	LCP
1048_2021_AZ	35d32'46.61512"	-114d20'38.27517"	879.465	LCP
1049_2021_AZ	35d33'38.91635"	-114d21'37.54508"	849.188	LCP
1050_2021_AZ	35d42'30.41121"	-114d21'21.25088"	957.658	LCP
1051_2021_AZ	34d37'59.40772"	-114d16'53.96157"	486.346	LCP
1052_2021_AZ	34d42'02.96286"	-113d37'28.03101"	623.098	LCP
1053_2021_AZ	35d06'27.14922"	-114d32'49.37582"	277.926	LCP
1054_2021_AZ	35d49'44.53094"	-114d33'37.06123"	664.918	LCP
1055_2021_AZ	35d47'31.49774"	-114d31'38.20195"	676.089	LCP
1056_2021_AZ	34d47'10.38548"	-114d27'55.10828"	188.079	LCP
2001_h_2021_AZ	35d04'43.79164"	-114d32'42.75791"	292.194	NVA/HOR
2002_2021_AZ	34d38'32.92892"	-114d16'54.28289"	458.152	NVA
2003_2021_AZ	35d01'01.32645"	-114d11'34.07450"	633.331	NVA
2006_2021_AZ	34d40'47.49755"	-113d35'41.43576"	568.598	NVA
2007_2021_AZ	35d34'05.03576"	-114d24'42.18784"	835.962	NVA
2008_2021_AZ	35d44'25.83786"	-114d18'43.53458"	1141.483	NVA

Point	Latitude	Longitude	Ellipsoid Height	Code
2009_2021_AZ	35d43'48.11878"	-114d19'50.76179"	1069.534	NVA
2010_2021_AZ	35d23'25.44351"	-114d14'48.17591"	1059.253	NVA
2011_2021_AZ	35d02'25.28767"	-114d07'47.53750"	721.007	NVA
2012_2021_AZ	34d52'12.60827"	-114d04'33.68898"	669.716	NVA
2013_2021_AZ	35d35'03.36295"	-114d16'26.01090"	1000.791	NVA
2015_2021_AZ	35d38'52.06617"	-114d15'05.82188"	1065.103	NVA
2016_2021_AZ	35d39'18.07138"	-114d10'29.83978"	1043.312	NVA
2018_2021_AZ	35d54'41.51011"	-114d04'54.44233"	1102.871	NVA
2021_2021_AZ	35d54'02.14399"	-114d03'42.10410"	1124.703	NVA
2022_2021_AZ	35d52'08.97671"	-114d03'58.04241"	1223.129	NVA
2024_2021_AZ	35d54'51.40307"	-114d30'32.80128"	523.891	NVA
2025_2021_AZ	35d31'50.33235"	-114d15'53.72475"	1017.258	NVA
2026_2021_AZ	34d44'29.58359"	-113d36'48.24659"	586.135	NVA
2027_2021_AZ	35d44'27.73943"	-114d25'41.45144"	765.507	NVA
2028_2021_AZ	35d24'28.24611"	-114d16'01.27435"	1051.903	NVA
2029_2021_AZ	35d58'18.49808"	-114d04'06.29721"	950.459	NVA
2034_2021_AZ	35d21'13.00242"	-113d42'40.48486"	1103.055	NVA
2035_2021_AZ	35d35'23.33044"	-114d21'02.50215"	857.598	NVA
2036_2021_AZ	35d53'26.82315"	-114d01'32.03899"	1184.543	NVA
2038_h_2021_AZ	35d06'37.59347"	-114d33'22.44956"	248.226	NVA/HOR
2039_2021_AZ	34d54'22.43201"	-114d08'13.72825"	581.039	NVA
2040_2021_AZ	35d21'55.07944"	-113d42'27.89098"	1083.340	NVA
2041_2021_AZ	35d29'53.46968"	-114d19'49.44251"	920.037	NVA
2042_2021_AZ	35d38'51.89515"	-114d12'34.56126"	1056.698	NVA
2043_2021_AZ	35d31'16.90664"	-114d16'25.95225"	1008.891	NVA
2044_h_2021_AZ	35d10'06.53678"	-114d33'14.38129"	177.471	NVA/HOR
2045_2021_AZ	35d30'59.98830"	-114d23'21.09514"	867.586	NVA
2048_2021_AZ	35d00'04.55694"	-114d08'09.92237"	678.206	NVA
2050_2021_AZ	35d36'21.39239"	-114d20'17.86947"	893.220	NVA
2052_2021_AZ	35d34'04.89884"	-114d19'27.00270"	896.433	NVA
2054_2021_AZ	35d31'02.08626"	-114d18'06.20613"	958.801	NVA
2055_H_2021_AZ	35d43'57.23565"	-114d20'09.42331"	1052.621	NVA/HOR
2056_H_2021_AZ	35d37'31.55833"	-114d15'04.88433"	1064.779	NVA/HOR
2059_H_2021_AZ	35d33'29.77107"	-114d22'20.41075"	841.051	NVA/HOR
2060_2021_AZ	34d38'47.30842"	-114d14'55.28646"	499.534	NVA



Point	Latitude	Longitude	Ellipsoid Height	Code
2061_2021_AZ	34d43'03.52961"	-113d36'52.43233"	587.993	NVA
2063_2021_AZ	34d46'28.61404"	-114d28'56.64077"	160.248	NVA
2064_2021_AZ	35d34'34.07328"	-114d23'02.94375"	821.266	NVA
2065_2021_AZ	34d39'30.52757"	-114d15'22.48139"	454.195	NVA
2068_2021_AZ	34d47'16.52902"	-114d28'50.28913"	166.673	NVA
2069_2021_AZ	35d24'26.12801"	-114d13'50.17712"	1120.732	NVA
2070_2021_AZ	35d26'31.74621"	-114d17'30.10868"	1024.613	NVA
2071_2021_AZ	35d25'02.59860"	-114d22'10.02007"	963.580	NVA
2072_2021_AZ	35d29'48.55393"	-114d26'22.46520"	957.339	NVA
2073_2021_AZ	35d43'25.03401"	-114d29'13.60798"	709.006	NVA
2074_2021_AZ	35d56'13.38268"	-114d29'53.13211"	485.918	NVA
2075_2021_AZ	35d58'57.24065"	-114d30'09.47955"	496.053	NVA
2076_2021_AZ	35d53'11.61369"	-114d31'02.63940"	550.497	NVA
2077_2021_AZ	35d51'37.21596"	-114d31'40.99960"	585.072	NVA
2078_2021_AZ	35d48'44.24342"	-114d32'43.20955"	671.590	NVA
2079_2021_AZ	35d36'16.82477"	-114d24'14.89497"	795.438	NVA
2080_2021_AZ	35d31'02.01159"	-114d24'27.16993"	888.013	VVA
3001_2021_AZ	35d08'12.54226"	-114d31'37.72048"	329.468	VVA
3002_2021_AZ	35d31'47.98955"	-114d18'17.22974"	944.583	VVA
3003_2021_AZ	35d54'27.11478"	-114d03'41.87718"	1110.292	VVA
3004_2021_AZ	35d34'31.98783"	-114d16'01.43081"	1043.745	VVA
3005_2021_AZ	35d24'53.60950"	-114d13'35.14066"	1152.058	VVA
3006_2021_AZ	35d23'36.26548"	-114d15'22.71902"	1048.967	VVA
3007_2021_AZ	34d54'02.53796"	-114d02'58.43036"	790.726	VVA
3008_2021_AZ	35d28'59.93514"	-114d21'23.34231"	889.191	VVA
3009_2021_AZ	35d27'39.86164"	-114d21'59.86281"	903.709	VVA
3010_2021_AZ	35d25'54.48478"	-114d24'04.09263"	940.568	VVA
3011_2021_AZ	35d39'35.18399"	-114d14'33.81209"	1066.458	VVA
3013_2021_AZ	35d29'59.93062"	-114d24'14.17723"	899.106	VVA
3015_2021_AZ	35d38'17.37635"	-114d16'26.56317"	1108.713	VVA
3016_2021_AZ	35d44'04.61959"	-114d10'00.81908"	952.478	VVA
3017_2021_AZ	34d53'58.42644"	-114d08'17.17767"	573.312	VVA
3019_2021_AZ	35d35'44.41115"	-114d19'48.40563"	900.613	VVA
3020_2021_AZ	34d45'20.48193"	-114d28'45.82821"	128.993	VVA
3021_2021_AZ	35d58'23.92721"	-114d05'00.57679"	969.805	VVA

Point	Latitude	Longitude	Ellipsoid Height	Code
3022_2021_AZ	35d36'49.89454"	-114d15'47.19140"	1045.234	VVA
3024_2021_AZ	35d33'25.71331"	-114d16'01.16792"	1028.734	VVA
3025_2021_AZ	35d43'13.89712"	-114d20'14.48645"	1028.672	VVA
3026_2021_AZ	35d48'43.71115"	-114d22'42.26065"	977.735	VVA
3027_2021_AZ	35d51'03.49200"	-114d05'01.00209"	1145.869	VVA
3028_2021_AZ	34d38'52.13466"	-114d16'53.68741"	444.400	VVA
3029_2021_AZ	35d41'24.48189"	-114d30'03.68160"	764.954	VVA
3030_2021_AZ	35d53'50.92915"	-114d22'47.90367"	806.296	VVA
3032_2021_AZ	34d38'58.38028"	-113d34'30.36099"	525.343	VVA
3034_2021_AZ	35d17'16.76270"	-113d39'22.84528"	1177.045	VVA
3035_2021_AZ	35d45'00.69153"	-114d26'58.33997"	725.409	VVA
3036_2021_AZ	35d33'33.20075"	-114d17'37.14024"	957.676	VVA
3038_2021_AZ	35d37'04.60734"	-114d15'40.89521"	1048.690	VVA
3039_2021_AZ	34d55'15.35963"	-114d06'53.09447"	619.625	VVA
3040_2021_AZ	34d41'29.80913"	-113d36'16.50700"	567.702	VVA
3041_2021_AZ	35d39'31.31266"	-114d15'21.40146"	1080.138	VVA
3042_2021_AZ	35d19'07.16545"	-113d47'57.85445"	1321.415	VVA
3045_2021_AZ	35d34'11.73701"	-114d25'04.97805"	846.880	VVA
3047_2021_AZ	35d39'12.22550"	-114d14'25.45089"	1052.028	VVA
3048_2021_AZ	34d39'44.30321"	-114d15'36.65205"	438.816	VVA
3050_2021_AZ	35d31'53.62785"	-114d20'32.01690"	890.779	VVA
3051_2021_AZ	35d39'31.24986"	-114d12'56.33576"	1026.616	VVA
3052_2021_AZ	35d10'05.19340"	-114d30'59.36180"	348.704	VVA
3054_2021_AZ	35d27'31.44466"	-114d10'44.39877"	1652.739	VVA
3055_2021_AZ	35d48'44.90238"	-114d21'44.86300"	1030.050	VVA
3056_2021_AZ	35d44'57.31493"	-114d20'51.61895"	1046.313	VVA
3057_2021_AZ	35d53'18.26228"	-114d22'50.84580"	835.234	VVA
3058_2021_AZ	35d51'45.76943"	-114d31'35.42196"	579.203	VVA
3059_2021_AZ	35d53'14.51395"	-114d31'00.49592"	547.733	VVA

# Section 3: Geodetic Control Information and Resources

This section contains the published National Geodetic Survey (NGS) datasheets for those existing monumented control stations that were used to establish 3-dimensional coordinates for each of the newly established ground control survey points for the project.

The existing NGS datasheets used for this survey are assembled on the following pages.

1 National Geodetic Survey, Retrieval Date = AUGUST 24, 2021  
 FS0950 \*\*\*\*\*  
 FS0950 DESIGNATION - BAR  
 FS0950 PID - FS0950  
 FS0950 STATE/COUNTY- AZ/MOHAVE  
 FS0950 COUNTRY - US  
 FS0950 USGS QUAD - HOUSHOLDER PASS (2018)  
 FS0950  
 FS0950 \*CURRENT SURVEY CONTROL  
 FS0950  
 FS0950\* NAD 83(1992) POSITION- 35 48 17.49414(N) 114 32 22.52234(W) ADJUSTED  
 FS0950\* [NAVD 88](#) ORTHO HEIGHT - 712.834 (meters) 2338.69 (feet) ADJUSTED  
 FS0950  
 FS0950 GEOID HEIGHT - -28.243 (meters) GEOID18  
 FS0950 LAPLACE CORR - 0.34 (seconds) DEFLEC18  
 FS0950 DYNAMIC HEIGHT - 712.093 (meters) 2336.26 (feet) COMP  
 FS0950 MODELED GRAVITY - 979,571.1 (mgal) NAVD 88  
 FS0950  
 FS0950 HORZ ORDER - SECOND  
 FS0950 VERT ORDER - FIRST CLASS II  
 FS0950  
 FS0950.The horizontal coordinates were established by classical geodetic methods  
 FS0950.and adjusted by the National Geodetic Survey in August 1993.  
 FS0950.  
 FS0950.The orthometric height was determined by differential leveling and  
 FS0950.adjusted by the NATIONAL GEODETIC SURVEY  
 FS0950.in June 1991.  
 FS0950  
 FS0950.Significant digits in the geoid height do not necessarily reflect accuracy.  
 FS0950.GEOID18 height accuracy estimate available [here](#).  
 FS0950  
 FS0950.Click [photographs](#) - Photos may exist for this station.  
 FS0950  
 FS0950.The Laplace correction was computed from DEFLEC18 derived deflections.  
 FS0950  
 FS0950.The dynamic height is computed by dividing the NAVD 88  
 FS0950.geopotential number by the normal gravity value computed on the  
 FS0950.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45  
 FS0950.degrees latitude (g = 980.6199 gals.).  
 FS0950  
 FS0950.The modeled gravity was interpolated from observed gravity values.  
 FS0950  
 FS0950. The following values were computed from the NAD 83(1992) position.  
 FS0950  
 FS0950;  

	North	East	Units	Scale Factor	Converg.
FS0950;SPC AZ W	- 533,168.259	141,996.757	MT	0.99999607	-0 27 43.0
FS0950;SPC AZ W	- 1,749,239.69	465,868.63	iFT	0.99999607	-0 27 43.0
FS0950;UTM 11	- 3,965,098.446	722,317.707	MT	1.00020908	+1 26 24.0

 FS0950  
 FS0950!  

FS0950!SPC AZ W	- 0.99989256	x	0.99999607	=	0.99988863
FS0950!UTM 11	- 0.99989256	x	1.00020908	=	1.00010162

 FS0950  
 FS0950:  

FS0950:SPC AZ W	- BUILDER 2	Primary Azimuth Mark	Grid Az
			324 25 49.7

```

FS0950:UTM 11 - BUILDER 2 322 31 42.7
FS0950
FS0950_U.S. NATIONAL GRID SPATIAL ADDRESS: 11SQV2231765098 (NAD 83)
FS0950
FS0950|-----|
FS0950| PID Reference Object Distance Geod. Az |
FS0950| | | | dddmmss.s |
FS0950| FS0949 BAR RM 1 10.728 METERS 14441 |
FS0950| FS0954 BUILDER 2 APPROX. 4.1 KM 3235806.7 |
FS0950| FS0951 BAR RM 2 10.658 METERS 32557 |
FS0950| FS1344 1285 5 5.095 METERS 35323 |
FS0950|-----|
FS0950
FS0950 SUPERSEDED SURVEY CONTROL
FS0950
FS0950 NAD 83(1986)- 35 48 17.48490(N) 114 32 22.51292(W) AD( ) 2
FS0950 NGVD 29 712.28 (m) 2336.9 (f) LEVELING 3
FS0950
FS0950.Superseded values are not recommended for survey control.
FS0950
FS0950.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
FS0950.See file dsdata.pdf to determine how the superseded data were derived.
FS0950
FS0950_MARKER: DD = SURVEY DISK
FS0950_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
FS0950_STAMPING: BAR 1981
FS0950_MARK LOGO: AZDT
FS0950_PROJECTION: FLUSH
FS0950_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
FS0950+STABILITY: SURFACE MOTION
FS0950_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
FS0950+SATELLITE: SATELLITE OBSERVATIONS - October 08, 2012
FS0950
FS0950 HISTORY - Date Condition Report By
FS0950 HISTORY - 1981 MONUMENTED AZDT
FS0950 HISTORY - 1982 GOOD NGS
FS0950 HISTORY - 20121008 GOOD COMSUR
FS0950
FS0950 STATION DESCRIPTION
FS0950
FS0950'DESCRIBED BY ARIZONA DEPARTMENT OF TRANSPORTATION 1981 (GH)
FS0950'THE STATION IS LOCATED 19 MILES SOUTHEAST OF HOVER DAM, 1.75 MILES
FS0950'SOUTHEAST OF THE JUNCTION OF US HIGHWAY 93 AND TEMPLE BAR ROAD AND
FS0950'ALONG THE SOUTHWEST SIDE OF US 93.
FS0950'
FS0950'THE STATION MARK IS AN ADOT DISK STAMPED, BAR 1981. IT IS SET IN TOP
FS0950'OF A 10 INCH CONCRETE MONUMENT. 93 FEET SOUTHWEST OF THE CENTERLINE
FS0950'OF THE HIGHWAY AND 4 FEET SOUTHWEST OF THE WITNESS POST.
FS0950'
FS0950'REFERENCE MARK 1 IS AN ADOT DISK STAMPED, BAR RM 1 1981. IT IS SET IN
FS0950'TOP OF A 10 INCH CONCRETE MONUMENT.
FS0950'
FS0950'REFERENCE MARK 2 IS AN ADOT DISK STAMPED, BAR RM 2 1981. IT IS SET IN
FS0950'TOP A 10 INCH CONCRETE MONUMENT.
FS0950'

```

FS0950'TO REACH THE STATION FROM THE POST OFFICE IN KINGMAN, TRAVEL SOUTH 0.1  
 FS0950'MILE ALONG STOCKTON ROAD TO US HIGHWAY 66. TURN RIGHT ALONG US 66 FOR  
 FS0950'2.3 MILES TO THE US HIGHWAY 93 AND I 40 TRAFFIC INTERCHANGE. TRAVEL  
 FS0950'NORTH ALONG US 93 FOR 35.2 MILES TO THE BRIDGE OVER DETRITAL WASH,  
 FS0950'CONTINUE NORTH ALONG US 93 FOR 9.1 MILES TO AN EXXON SERVICE STATION  
 FS0950'ON THE RIGHT, CONTINUE NORTH FOR 6.25 MILES TO THE STATION ON LEFT  
 FS0950'ABOVE A LOW HIGHWAY CUT.

FS0950

FS0950 STATION RECOVERY (1982)

FS0950

FS0950'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1982

FS0950'32.0 KM (19.9 MI) SE FROM HOOVER DAM.

FS0950'32.0 KM (19.9 MI) SOUTHEAST ALONG US HIGHWAY 93 FROM THE SOUTHEAST END

FS0950'OF HOOVER DAM, 0.7 KM (0.45 MI) SOUTHEAST OF MILEPOST 20, 27.7 METERS

FS0950'(91 FT) SOUTHWEST OF THE CENTERLINE OF THE HIGHWAY, 13.2 METERS (43.5

FS0950'FT) SOUTHWEST OF BENCH MARK 2338.24 BPR, 3.4 METERS (11.0 FT)

FS0950'NORTHEAST OF A FENCE, 10.7 METERS (35 FT) SOUTHEAST OF RM 2, 10.7

FS0950'METERS (35 FT) NORTHWEST OF RM 1.

FS0950'THE MARK IS 0.9 METERS SW FROM A WITNESS POST.

FS0950'THE MARK IS 1.8 M ABOVE THE OLD HIGHWAY.

FS0950

FS0950 STATION RECOVERY (2012)

FS0950

FS0950'RECOVERY NOTE BY COMPASS SURVEYING AND MAPPING LLC 2012 (MSJ)

FS0950'RECOVERED IN GOOD CONDITION.

1 National Geodetic Survey, Retrieval Date = AUGUST 30, 2021  
 FS0357 \*\*\*\*\*  
 FS0357 DESIGNATION - DONELLI  
 FS0357 PID - FS0357  
 FS0357 STATE/COUNTY- AZ/MOHAVE  
 FS0357 COUNTRY - US  
 FS0357 USGS QUAD - DOLAN SPRINGS (2018)  
 FS0357  
 FS0357 \*CURRENT SURVEY CONTROL  
 FS0357  
 FS0357\* NAD 83(1992) POSITION- 35 30 16.80348(N) 114 20 08.34183(W) ADJUSTED  
 FS0357\* [NAVD 88](#) ORTHO HEIGHT - 938.221 (meters) 3078.15 (feet) ADJUSTED  
 FS0357  
 FS0357 GEOID HEIGHT - -28.508 (meters) GEOID18  
 FS0357 LAPLACE CORR - 5.88 (seconds) DEFLEC18  
 FS0357 DYNAMIC HEIGHT - 937.143 (meters) 3074.61 (feet) COMP  
 FS0357 MODELED GRAVITY - 979,453.5 (mgal) NAVD 88  
 FS0357  
 FS0357 HORZ ORDER - SECOND  
 FS0357 VERT ORDER - FIRST CLASS I  
 FS0357  
 FS0357.The horizontal coordinates were established by classical geodetic methods  
 FS0357.and adjusted by the National Geodetic Survey in August 1993.  
 FS0357.  
 FS0357.The orthometric height was determined by differential leveling and  
 FS0357.adjusted by the NATIONAL GEODETIC SURVEY  
 FS0357.in June 1991.  
 FS0357  
 FS0357.Significant digits in the geoid height do not necessarily reflect accuracy.  
 FS0357.GEOID18 height accuracy estimate available [here](#).  
 FS0357  
 FS0357.Click [photographs](#) - Photos may exist for this station.  
 FS0357  
 FS0357.The Laplace correction was computed from DEFLEC18 derived deflections.  
 FS0357  
 FS0357.The dynamic height is computed by dividing the NAVD 88  
 FS0357.geopotential number by the normal gravity value computed on the  
 FS0357.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45  
 FS0357.degrees latitude (g = 980.6199 gals.).  
 FS0357  
 FS0357.The modeled gravity was interpolated from observed gravity values.  
 FS0357  
 FS0357. The following values were computed from the NAD 83(1992) position.  
 FS0357  
 FS0357;  

	North	East	Units	Scale Factor	Converg.
FS0357;SPC AZ W	- 499,733.426	160,230.598	MT	0.99996811	-0 20 24.5
FS0357;SPC AZ W	- 1,639,545.36	525,690.94	iFT	0.99996811	-0 20 24.5
FS0357;UTM 11	- 3,932,275.629	741,652.713	MT	1.00031969	+1 32 53.2

 FS0357  
 FS0357!  

FS0357!SPC AZ W	- 0.99985723	x	0.99996811	=	0.99982535
FS0357!UTM 11	- 0.99985723	x	1.00031969	=	1.00017688

 FS0357  
 FS0357:  

FS0357:SPC AZ W	- DONELLI AZ MK	Primary Azimuth Mark	Grid Az
			143 09 53.4

FS0357:UTM 11 - DONELLI AZ MK 141 16 35.7

FS0357

FS0357\_U.S. NATIONAL GRID SPATIAL ADDRESS: 11SQV4165232275 (NAD 83)

FS0357

PID	Reference Object	Distance	Geod. Az
			dddmmss.s
FS0359	DONELLI RM 1	8.222 METERS	08504
FS0362	DONELLI AZ MK		1424928.9
FS1071	LOST CABIN CAIRN NW	APPROX.16.4 KM	2591143.5
FS0358	Z 121	11.020 METERS	33522
CS4801	Z 121	11.024 METERS	33522

FS0357

SUPERSEDED SURVEY CONTROL

FS0357

NAD 83(1986)-	35 30 16.80133(N)	114 20 08.33606(W)	AD( )	2
NAD 27	- 35 30 16.82800(N)	114 20 05.48300(W)	AD( )	2
NGVD 29 (??/??/92)	937.434 (m)	3075.56 (f)	ADJ UNCH	1 1
NGVD 29	937.43 (m)	3075.6 (f)	LEVELING	3

FS0357

FS0357.Superseded values are not recommended for survey control.

FS0357

FS0357.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.

FS0357.See file [dsdata.pdf](#) to determine how the superseded data were derived.

FS0357

FS0357\_MARKER: DS = TRIANGULATION STATION DISK

FS0357\_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT

FS0357\_STAMPING: DONELLI 1947

FS0357\_MARK LOGO: CGS

FS0357\_PROJECTION: PROJECTING 12 CENTIMETERS

FS0357\_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO

FS0357+STABILITY: SURFACE MOTION

FS0357\_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR

FS0357+SATELLITE: SATELLITE OBSERVATIONS - June 11, 2017

FS0357

HISTORY	- Date	Condition	Report By
HISTORY	- 1948	MONUMENTED	CGS
HISTORY	- 1949	GOOD	CGS
HISTORY	- 1950	GOOD	CGS
HISTORY	- 1955	GOOD	CGS
HISTORY	- 1968	GOOD	AZHD
HISTORY	- 1981	GOOD	AZDT
HISTORY	- 1982	GOOD	NGS
HISTORY	- 20170611	GOOD	AZDT

FS0357

STATION DESCRIPTION

FS0357

FS0357'DESCRIBED BY COAST AND GEODETIC SURVEY 1948 (FAR)

FS0357'THE STATION IS IN THE BROAD VALLEY ON THE EASTERN SIDE OF THE

FS0357'BLACK MOUNTAINS, ON THE WESTERN SIDE OF U.S. HIGHWAY 93 AND 466.

FS0357'IT IS ABOUT 26 MILES, AIRLINE, NORTHWEST OF KINGMAN, AND 10

FS0357'MILES NORTHWEST OF CHLORIDE.

FS0357'

FS0357'THE STATION MARK, A STANDARD DISK SET IN THE TOP OF A 12 INCH

UNITED STATES GEOLOGICAL SURVEY

AZ Mohave 2021 D20

Ground Control Survey Report

September 2021



FS0357'SQUARE CONCRETE POST PROJECTING 4 INCHES ABOVE THE SURFACE OF  
 FS0357'THE GROUND, IS STAMPED DONELLI 1947. IT IS 25 FEET WEST OF THE  
 FS0357'NORTH AND SOUTH RIGHT-OF-WAY FENCE, AND ABOUT 60 FEET WEST OF THE  
 FS0357'CENTERLINE OF THE HIGHWAY.

FS0357'

FS0357'REFERENCE MARK NO. 1, A STANDARD DISK SET IN THE TOP OF A 12  
 FS0357'INCH SQUARE CONCRETE POST, PROJECTING 4 INCHES ABOVE THE GROUND,  
 FS0357'IS STAMPED DONELLI NO 1 1947. IT IS 1/2 FOOT WEST OF THE  
 FS0357'RIGHT-OF-WAY FENCE AND APPROXIMATELY THE SAME ELEVATION AS THE  
 FS0357'STATION MARK.

FS0357'

FS0357'REFERENCE MARK NO. 2, A STANDARD USC AND GS BENCH MARK DISK SET  
 FS0357'IN THE TOP OF A 12 INCH SQUARE CONCRETE POST, PROJECTING 10  
 FS0357'INCHES ABOVE THE GROUND, IS STAMPED Z 121 1935. IT IS 1-1/2 FOOT  
 FS0357'EAST OF A 4 INCH SQUARE WHITE WOODEN WITNESS POST, AND 22-1/2  
 FS0357'FEET WEST OF THE RIGHT-OF-WAY FENCE.

FS0357'

FS0357'THE AZIMUTH MARK, A STANDARD DISK SET IN THE TOP OF A 12 INCH  
 FS0357'SQUARE CONCRETE POST PROJECTING 4 INCHES ABOVE THE GROUND, IS  
 FS0357'STAMPED DONELLI 1947. IT IS ON THE EAST SIDE OF U.S. HIGHWAY  
 FS0357'93 AND 466, 1 FOOT WEST OF THE RIGHT-OF-WAY FENCE, AND ABOUT  
 FS0357'100 FEET EAST OF THE CENTERLINE OF THE HIGHWAY.

FS0357'

FS0357'TO REACH THE STATION FROM THE ATCHISON, TOPEKA, AND SANTA FE  
 FS0357'RAILROAD DEPOT IN KINGMAN GO NORTH AND WEST ON U.S. HIGHWAY 93  
 FS0357'AND 466 FOR 27.7 MILES TO THE STATION ON THE LEFT. A DRIVE  
 FS0357'STATION.

FS0357

FS0357 STATION RECOVERY (1949)

FS0357

FS0357'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1949

FS0357'8.5 MI NW FROM GRASSHOPPER JUNCTION.

FS0357'8.5 MILES NORTHWEST ALONG U.S. HIGHWAY 93 FROM THE JUNCTION OF  
 FS0357'STATE HIGHWAY 62 AT GRASSHOPPER JUNCTION, 0.15 MILE SOUTHEAST  
 FS0357'OF MILEPOST 44, 74 FEET SOUTHWEST OF THE CENTER LINE OF THE  
 FS0357'HIGHWAY, 25.3 FEET SOUTHWEST OF A FENCE, ABOUT 1 FOOT LOWER  
 FS0357'THAN THE HIGHWAY, AND SET IN THE TOP OF A CONCRETE POST  
 FS0357'PROJECTING 0.4 FOOT ABOVE THE GROUND.

FS0357

FS0357 STATION RECOVERY (1950)

FS0357

FS0357'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1950 (JCE)

FS0357'STATION RECOVERED AS DESCRIBED AND ALL MARKS WERE FOUND IN  
 FS0357'GOOD CONDITION. THE DISTANCES AND DIRECTIONS TO REFERENCE  
 FS0357'MARKS AND THE AZIMUTH MARK WERE MEASURED AND FOUND TO BE CORRECT.  
 FS0357'THE DESCRIPTION OF THE STATION IS ADEQUATE WITH THE FOLLOWING  
 FS0357'ADDITION--THE STATION IS 1.2 MILES NORTHWEST OF A T- JUNCTION  
 FS0357'WHICH IS AT OLD RUINS OF ABANDONED BUILDINGS.

FS0357

FS0357 STATION RECOVERY (1955)

FS0357

FS0357'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1955 (FN)

FS0357'RECOVERED - THE STATION, BOTH REFERENCE MARKS AND THE AZIMUTH MARK  
 FS0357'WERE RECOVERED AS DESCRIBED. THE DESCRIPTION IS ADEQUATE AND  
 FS0357'CORRECT.

FS0357

FS0357

STATION RECOVERY (1968)

FS0357

FS0357'RECOVERY NOTE BY ARIZONA HIGHWAY DEPARTMENT (NOW AZDT) 1968 (EHT)

FS0357'GENERAL LOCATION THE STATION, BOTH REFERENCE MARKS AND THE

FS0357'AZIMUTH MARK WERE RECOVERED AS DESCRIBED. THE DESCRIPTION

FS0357'IS ADEQUATE AND CORRECT

FS0357

FS0357

STATION RECOVERY (1981)

FS0357

FS0357'RECOVERY NOTE BY ARIZONA DEPARTMENT OF TRANSPORTATION 1981 (GH)

FS0357'THE STATION MARK, REFERENCE MARKS AND AZIMUTH MARK WERE RECOVERED IN

FS0357'GOOD CONDITION AND AS PREVIOUSLY DESCRIBED. A NEW ROUTE TO THE

FS0357'STATION FOLLOWS.

FS0357'

FS0357'TO REACH THE STATION FROM THE POST OFFICE IN KINGMAN, TRAVEL SOUTH ON

FS0357'STOCKTON HILL ROAD FOR 0.1 MILE TO US HIGHWAY 66. TURN RIGHT ALONG

FS0357'US 66 FOR 2.3 MILES TO US HIGHWAY 93 AND I 40 TRAFFIC INTERCHANGE

FS0357'CONTINUE NORTH ALONG US 93 FOR 18.35 MILES TO GRASSHOPPER JUNCTION,

FS0357'CONTINUE NORTH FOR 7.85 MILES TO COTTONWOOD ROAD ON THE LEFT, CONTINUE

FS0357'NORTH FOR 1.15 MILES TO THE STATION ON THE LEFT, 75 FEET WEST OF THE

FS0357'HIGHWAY AND 25 FEET EAST OF THE RIGHT OF WAY FENCELINE AND 3 FEET EAST

FS0357'OF THE WITNESS POST.

FS0357

FS0357

STATION RECOVERY (1982)

FS0357

FS0357'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1982

FS0357'RECOVERED IN GOOD CONDITION.

FS0357

FS0357

STATION RECOVERY (2017)

FS0357

FS0357'RECOVERY NOTE BY ARIZONA DEPARTMENT OF TRANSPORTATION 2017 (RSB)

FS0357'TO REACH FROM THE INTERSECTION OF I-40 AND HIGHWAY 93, TRAVEL

FS0357'NORTHWEST ON HIGHWAY 93 FOR 28.2 MI (45.4 KM) TO A PAVED CROSS-OVER

FS0357'WHICH IS FIRST STREET. MAKE A U-TURN AND HEAD SOUTHEAST FOR 1.0 MI

FS0357'(1.6 KM).

FS0357'

FS0357'THE STATION IS LOCATED ON THE RIGHT SIDE OF THE SOUTH BOUND LANES OF

FS0357'HIGHWAY 93 AND 70 FT (21.3 M) FROM THE CENTERLINE OF THE HIGHWAY.

1 National Geodetic Survey, Retrieval Date = AUGUST 26, 2021

FS0369 \*\*\*\*\*

FS0369 DESIGNATION - M 254

FS0369 PID - FS0369

FS0369 STATE/COUNTY- AZ/MOHAVE

FS0369 COUNTRY - US

FS0369 USGS QUAD - DOLAN SPRINGS (2018)

FS0369

FS0369 \*CURRENT SURVEY CONTROL

FS0369

FS0369*	NAD 83(2011) POSITION-	35 35 14.07399(N)	114 16 44.07046(W)	ADJUSTED
FS0369*	NAD 83(2011) ELLIP HT-	986.428 (meters)	(06/27/12)	ADJUSTED
FS0369*	NAD 83(2011) EPOCH	- 2010.00		
FS0369*	<a href="#">NAVD 88</a> ORTHO HEIGHT -	1014.525 (meters)	3328.49 (feet)	POSTED

FS0369

FS0369	GEOID HEIGHT	- -28.102 (meters)		GEOID18
FS0369	NAD 83(2011) X	- -2,135,492.772 (meters)		COMP
FS0369	NAD 83(2011) Y	- -4,734,238.102 (meters)		COMP
FS0369	NAD 83(2011) Z	- 3,691,618.081 (meters)		COMP
FS0369	LAPLACE CORR	- 7.56 (seconds)		DEFLEC18
FS0369	DYNAMIC HEIGHT	- 1013.36 (meters)	3324.7 (feet)	COMP
FS0369	MODELED GRAVITY	- 979,455.0 (mgal)		NAVD 88

FS0369

FS0369 VERT ORDER - \* POSTED, SEE BELOW

FS0369

FS0369 Network accuracy estimates per FGDC Geospatial Positioning Accuracy Standards:

FS0369	FGDC (95% conf, cm)		Standard deviation (cm)			CorrNE (unitless)	
	Horiz	Ellip	SD_N	SD_E	SD_h		
FS0369	-----						
FS0369	NETWORK	0.49	1.06	0.22	0.17	0.54	0.07102099
FS0369	-----						

FS0369 Click [here](#) for local accuracies and other accuracy information.

FS0369

FS0369

FS0369.The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in June 2012.

FS0369

FS0369.NAD 83(2011) refers to NAD 83 coordinates where the reference frame has been affixed to the stable North American tectonic plate. See [NA2011](#) for more information.

FS0369

FS0369.The horizontal coordinates are valid at the epoch date displayed above which is a decimal equivalence of Year/Month/Day.

FS0369

FS0369.The orthometric height was determined by differential leveling and adjusted by the NATIONAL GEODETIC SURVEY in 1992.

FS0369

FS0369.\* This is a POSTED BENCH MARK height.

FS0369

FS0369.Significant digits in the geoid height do not necessarily reflect accuracy. GEOID18 height accuracy estimate available [here](#).

FS0369

FS0369.Click [photographs](#) - Photos may exist for this station.

FS0369

FS0369.The X, Y, and Z were computed from the position and the ellipsoidal ht.  
FS0369

FS0369.The Laplace correction was computed from DEFLEC18 derived deflections.  
FS0369

FS0369.The ellipsoidal height was determined by GPS observations  
FS0369.and is referenced to NAD 83.

FS0369

FS0369.The dynamic height is computed by dividing the NAVD 88  
FS0369.geopotential number by the normal gravity value computed on the  
FS0369.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45  
FS0369.degrees latitude (g = 980.6199 gals.).

FS0369

FS0369.The modeled gravity was interpolated from observed gravity values.

FS0369

FS0369. The following values were computed from the NAD 83(2011) position.

FS0369

FS0369;	North	East	Units	Scale Factor	Converg.
FS0369;SPC AZ W	- 508,865.626	165,427.375	MT	0.99996164	-0 18 28.1
FS0369;SPC AZ W	- 1,669,506.65	542,740.73	iFT	0.99996164	-0 18 28.1
FS0369;UTM 11	- 3,941,577.707	746,547.254	MT	1.00034913	+1 35 03.5

FS0369

FS0369!  
- Elev Factor x Scale Factor = Combined Factor

FS0369!SPC AZ W - 0.99984520 x 0.99996164 = 0.99980684

FS0369!UTM 11 - 0.99984520 x 1.00034913 = 1.00019427

FS0369

FS0369\_U.S. NATIONAL GRID SPATIAL ADDRESS: 11SQV4654741577(NAD 83)

FS0369

FS0369 SUPERSEDED SURVEY CONTROL

FS0369

FS0369	NAD 83(2007)-	35 35 14.07379(N)	114 16 44.07038(W)	AD(2007.00)	A
FS0369	ELLIP H (03/02/09)	986.442 (m)		GP(2007.00)	4 1
FS0369	NAVD 88	1014.52 (m)	3328.5 (f)	LEVELING	3
FS0369	NGVD 29 (??/??/92)	1013.745 (m)	3325.93 (f)	ADJ UNCH	1 1

FS0369

FS0369.Superseded values are not recommended for survey control.

FS0369

FS0369.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.

FS0369.See file [dsdata.pdf](#) to determine how the superseded data were derived.

FS0369

FS0369\_MARKER: DB = BENCH MARK DISK

FS0369\_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT

FS0369\_STAMPING: M 254 1941

FS0369\_MARK LOGO: CGS

FS0369\_PROJECTION: PROJECTING 20 CENTIMETERS

FS0369\_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO

FS0369+STABILITY: SURFACE MOTION

FS0369\_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR

FS0369+SATELLITE: SATELLITE OBSERVATIONS - June 11, 2017

FS0369

FS0369	HISTORY	- Date	Condition	Report By
FS0369	HISTORY	- 1941	MONUMENTED	CGS
FS0369	HISTORY	- 1950	GOOD	CGS
FS0369	HISTORY	- 1978	GOOD	LOCSUR
FS0369	HISTORY	- 19870112	GOOD	USPSQD
FS0369	HISTORY	- 20050424	GOOD	INDIV

UNITED STATES GEOLOGICAL SURVEY

AZ Mohave 2021 D20

Ground Control Survey Report

September 2021

FS0369 HISTORY - 20081114 GOOD GEOANA  
 FS0369 HISTORY - 20170611 GOOD AZDT

FS0369

FS0369 STATION DESCRIPTION

FS0369

FS0369'DESCRIBED BY COAST AND GEODETIC SURVEY 1950

FS0369'16.8 MI NW FROM GRASSHOPPER JUNCTION.

FS0369'11.0 MILES NORTHWEST ALONG U.S. HIGHWAY 93 FROM THE JUNCTION OF

FS0369'STATE HIGHWAY 62 AT GRASSHOPPER JUNCTION, THENCE 5.8 MILES

FS0369'NORTHEAST ALONG A DIRT ROAD LEADING TO PIERCES FERRY, 0.45 MILE

FS0369'SOUTHWEST OF THE AREJAY BAR RANCHHOUSE, ABOUT 40 YARDS NORTH OF

FS0369'THE APPROXIMATE CENTER OF A WASH, 83 FEET NORTHWEST OF THE CENTER

FS0369'LINE OF THE ROAD, 38.7 FEET NORTHWEST OF A WIRE FENCE, 3.5 FEET

FS0369'SOUTHEAST OF A WITNESS POST, ABOUT LEVEL WITH THE ROAD, AND SET

FS0369'IN THE TOP OF A CONCRETE POST PROJECTING 0.8 FOOT ABOVE THE

FS0369'GROUND.

FS0369

FS0369 STATION RECOVERY (1978)

FS0369

FS0369'RECOVERY NOTE BY LOCAL SURVEYOR (INDIVIDUAL OR FIRM) 1978

FS0369'RECOVERED IN GOOD CONDITION.

FS0369

FS0369 STATION RECOVERY (1987)

FS0369

FS0369'RECOVERY NOTE BY US POWER SQUADRON 1987 (TGO)

FS0369'RECOVERED IN GOOD CONDITION.

FS0369

FS0369 STATION RECOVERY (2005)

FS0369

FS0369'RECOVERY NOTE BY INDIVIDUAL CONTRIBUTORS 2005 (JJH)

FS0369'PIERCE FERRY RD, A PAVED TWO LANE ROAD, IS 29.2 MILES NW ALONG US 93

FS0369'FROM THE INTERSECTION OF US 93 AND I-40. THE MARK IS 5.8 MILES NE

FS0369'ALONG PIERCE FERRY RD. NO WIRE FENCE. THE MARK IS APPROXIMATELY 327

FS0369'FEET SW OF THE SW CORNER OF THE DOLAN SPRINGS POST OFFICE.

FS0369

FS0369 STATION RECOVERY (2008)

FS0369

FS0369'RECOVERY NOTE BY GEODETIC ANALYSIS LLC 2008 (MLD)

FS0369'RECOVERED AS DESCRIBED.

FS0369

FS0369 STATION RECOVERY (2017)

FS0369

FS0369'RECOVERY NOTE BY ARIZONA DEPARTMENT OF TRANSPORTATION 2017 (RSB)

FS0369'TO REACH FROM THE INTERSECTION OF I-40 AND HIGHWAY 93, TRAVEL

FS0369'NORTHWEST ON HIGHWAY 93 FOR 29.2 MI (47.0 KM) TO PIERCE FERRY ROAD.

FS0369'TURN RIGHT AND HEAD NORTHEAST ON PIERCE FERRY ROAD FOR 5.8 MI (9.3

FS0369'KM) .

FS0369'

FS0369'THE STATION IS LOCATED ON THE LEFT SIDE OF THE PIERCE FERRY ROAD,

FS0369'196.2 FT (59.8 M) NORTHWEST FROM LLOYD STREET AND 75 FT (22.9 M) LEFT

FS0369'OF THE CENTERLINE OF THE ROAD.

```

1      National Geodetic Survey,   Retrieval Date = AUGUST 25, 2021
FS0939 *****
FS0939 DESIGNATION - M 486
FS0939 PID - FS0939
FS0939 STATE/COUNTY- AZ/MOHAVE
FS0939 COUNTRY - US
FS0939 USGS QUAD - WHITE HILLS WEST (2018)
FS0939
FS0939 *CURRENT SURVEY CONTROL
FS0939
FS0939* NAD 83(2011) POSITION- 35 39 58.38599(N) 114 27 23.40295(W) ADJUSTED
FS0939* NAD 83(2011) ELLIP HT- 738.886 (meters) (06/27/12) ADJUSTED
FS0939* NAD 83(2011) EPOCH - 2010.00
FS0939* NAVD 88 ORTHO HEIGHT - 767.278 (meters) 2517.31 (feet) ADJUSTED
FS0939
FS0939 GEOID HEIGHT - -28.419 (meters) GEOID18
FS0939 NAD 83(2011) X - -2,147,959.870 (meters) COMP
FS0939 NAD 83(2011) Y - -4,722,766.263 (meters) COMP
FS0939 NAD 83(2011) Z - 3,698,597.271 (meters) COMP
FS0939 LAPLACE CORR - 1.85 (seconds) DEFLEC18
FS0939 DYNAMIC HEIGHT - 766.437 (meters) 2514.55 (feet) COMP
FS0939 MODELED GRAVITY - 979,512.6 (mgal) NAVD 88
FS0939
FS0939 VERT ORDER - FIRST CLASS II
FS0939
FS0939 Network accuracy estimates per FGDC Geospatial Positioning Accuracy
FS0939 Standards:
FS0939 FGDC (95% conf, cm) Standard deviation (cm) CorrNE
FS0939 Horiz Ellip SD_N SD_E SD_h (unitless)
FS0939 -----
FS0939 NETWORK 0.33 0.67 0.15 0.12 0.34 0.03234137
FS0939 -----
FS0939 Click here for local accuracies and other accuracy information.
FS0939
FS0939
FS0939.The horizontal coordinates were established by GPS observations
FS0939.and adjusted by the National Geodetic Survey in June 2012.
FS0939
FS0939.NAD 83(2011) refers to NAD 83 coordinates where the reference frame has
FS0939.been affixed to the stable North American tectonic plate. See
FS0939.NA2011 for more information.
FS0939
FS0939.The horizontal coordinates are valid at the epoch date displayed above
FS0939.which is a decimal equivalence of Year/Month/Day.
FS0939
FS0939.The orthometric height was determined by differential leveling and
FS0939.adjusted by the NATIONAL GEODETIC SURVEY
FS0939.in June 1991.
FS0939
FS0939.Significant digits in the geoid height do not necessarily reflect accuracy.
FS0939.GEOID18 height accuracy estimate available here.
FS0939
FS0939.Click photographs - Photos may exist for this station.
FS0939
FS0939.The X, Y, and Z were computed from the position and the ellipsoidal ht.

```

FS0939

FS0939.The Laplace correction was computed from DEFLEC18 derived deflections.

FS0939

FS0939.The ellipsoidal height was determined by GPS observations

FS0939.and is referenced to NAD 83.

FS0939

FS0939.The dynamic height is computed by dividing the NAVD 88

FS0939.geopotential number by the normal gravity value computed on the

FS0939.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45

FS0939.degrees latitude (g = 980.6199 gals.).

FS0939

FS0939.The modeled gravity was interpolated from observed gravity values.

FS0939

FS0939. The following values were computed from the NAD 83(2011) position.

FS0939

FS0939;		North	East	Units	Scale	Factor	Converg.
FS0939;SPC AZ W	-	517,728.741	149,395.675	MT	0.99998373	-0 24 43.0	
FS0939;SPC AZ W	-	1,698,585.11	490,143.29	iFT	0.99998373	-0 24 43.0	
FS0939;UTM 11	-	3,949,908.898	730,226.042	MT	1.00025320	+1 29 01.2	

FS0939

FS0939! - Elev Factor x Scale Factor = Combined Factor

FS0939!SPC AZ W - 0.99988404 x 0.99998373 = 0.99986777

FS0939!UTM 11 - 0.99988404 x 1.00025320 = 1.00013721

FS0939

FS0939\_U.S. NATIONAL GRID SPATIAL ADDRESS: 11SQV3022649908(NAD 83)

FS0939

FS0939 SUPERSEDED SURVEY CONTROL

FS0939

FS0939	NAD 83(2007)-	35 39 58.38561(N)	114 27 23.40331(W)	AD(2007.00)	0
FS0939	ELLIP H (02/10/07)	738.905 (m)		GP(2007.00)	
FS0939	NAD 83(1992)-	35 39 58.38519(N)	114 27 23.40254(W)	AD( )	B
FS0939	ELLIP H (08/22/05)	738.907 (m)		GP( )	3 1
FS0939	NAVD 88	767.28 (m)	2517.3	(f) LEVELING	3

FS0939

FS0939.Superseded values are not recommended for survey control.

FS0939

FS0939.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.

FS0939.See file [dsdata.pdf](#) to determine how the superseded data were derived.

FS0939

FS0939\_MARKER: F = FLANGE-ENCASED ROD

FS0939\_SETTING: 59 = STAINLESS STEEL ROD IN SLEEVE (10 FT.+)

FS0939\_STAMPING: M 486 1982

FS0939\_MARK LOGO: NGS

FS0939\_PROJECTION: FLUSH

FS0939\_MAGNETIC: O = OTHER; SEE DESCRIPTION

FS0939\_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL

FS0939\_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR

FS0939+SATELLITE: SATELLITE OBSERVATIONS - November 14, 2008

FS0939\_ROD/PIPE-DEPTH: 8.5 meters

FS0939\_SLEEVE-DEPTH : 6.1 meters

FS0939

FS0939	HISTORY	- Date	Condition	Report By
FS0939	HISTORY	- 1982	MONUMENTED	NGS
FS0939	HISTORY	- 20050401	GOOD	NGS
FS0939	HISTORY	- 20081114	GOOD	GEOANA

UNITED STATES GEOLOGICAL SURVEY

AZ Mohave 2021 D20

Ground Control Survey Report

September 2021

FS0939

FS0939

## STATION DESCRIPTION

FS0939

FS0939'DESCRIBED BY NATIONAL GEODETIC SURVEY 1982

FS0939'35.1 KM (21.8 MI) NW FROM GRASSHOPPER JUNCTION.

FS0939'35.1 KM (21.8 MI) NORTHWEST ALONG US HIGHWAY 93 FROM THE JUNCTION OF

FS0939'STATE HIGHWAY 62 IN GRASSHOPPER JUNCTION, 106.7 METERS (350 FT)

FS0939'SOUTHEAST OF MILEPOST 31, 20.7 METERS (68 FT) SOUTHWEST OF THE

FS0939'CENTERLINE OF THE HIGHWAY, 13.1 METERS (43 FT) NORTHEAST OF A FENCE.

FS0939'THE MARK IS 0.6 METERS NW FROM A WITNESS POST.

FS0939'THE MARK IS 0.6 M ABOVE THE HIGHWAY.

FS0939

FS0939

## STATION RECOVERY (2005)

FS0939

FS0939'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 2005

FS0939'RECOVERED AS DESCRIBED.

FS0939

FS0939

## STATION RECOVERY (2008)

FS0939

FS0939'RECOVERY NOTE BY GEODETIC ANALYSIS LLC 2008 (MLD)

FS0939'RECOVERED AS DESCRIBED.

FS0939'

FS0939'NOTE--A DIMPLE WAS DRILLED INTO THE TOP OF THE ROD TO ACCEPT THE TIP

FS0939'OF A FIXED HEIGHT POLE.



# Section 4: GPS Control Diagram

This section contains a graphical representation of the new and existing control stations used for the project.

Overview of Control Network:



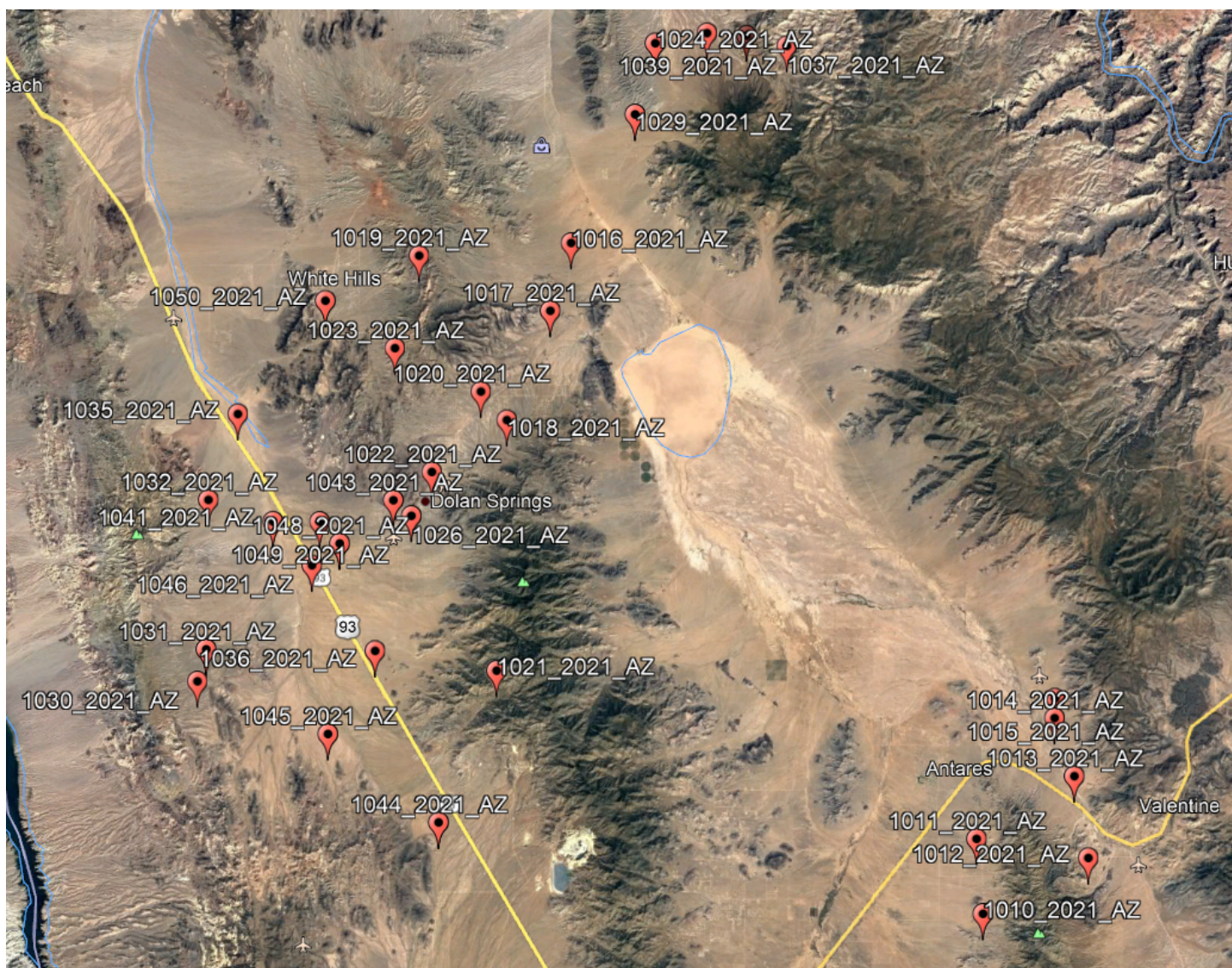
Not to Scale



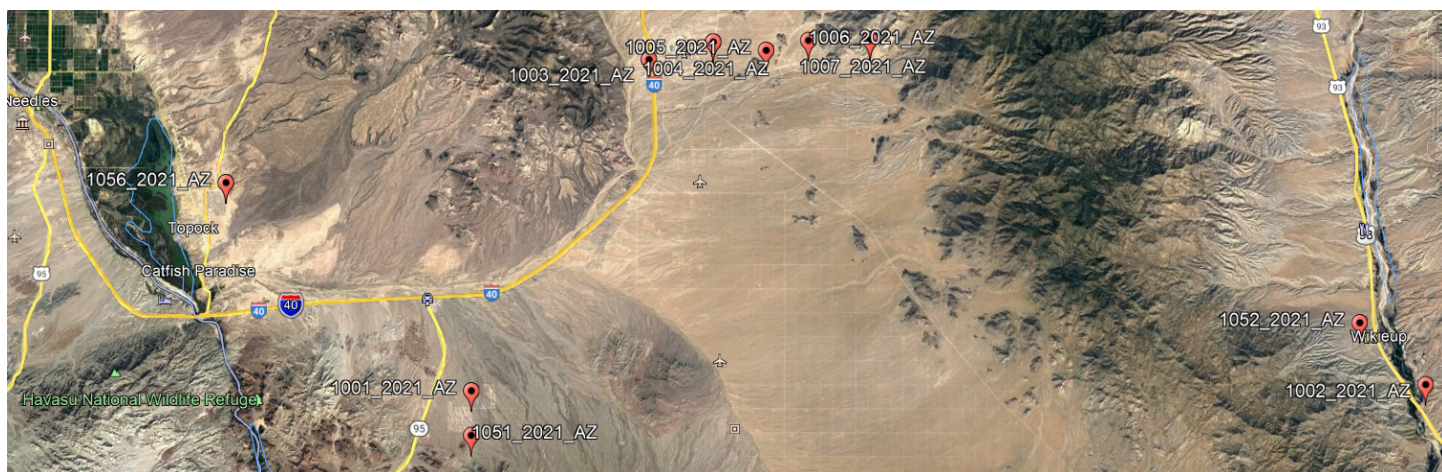
Not to Scale



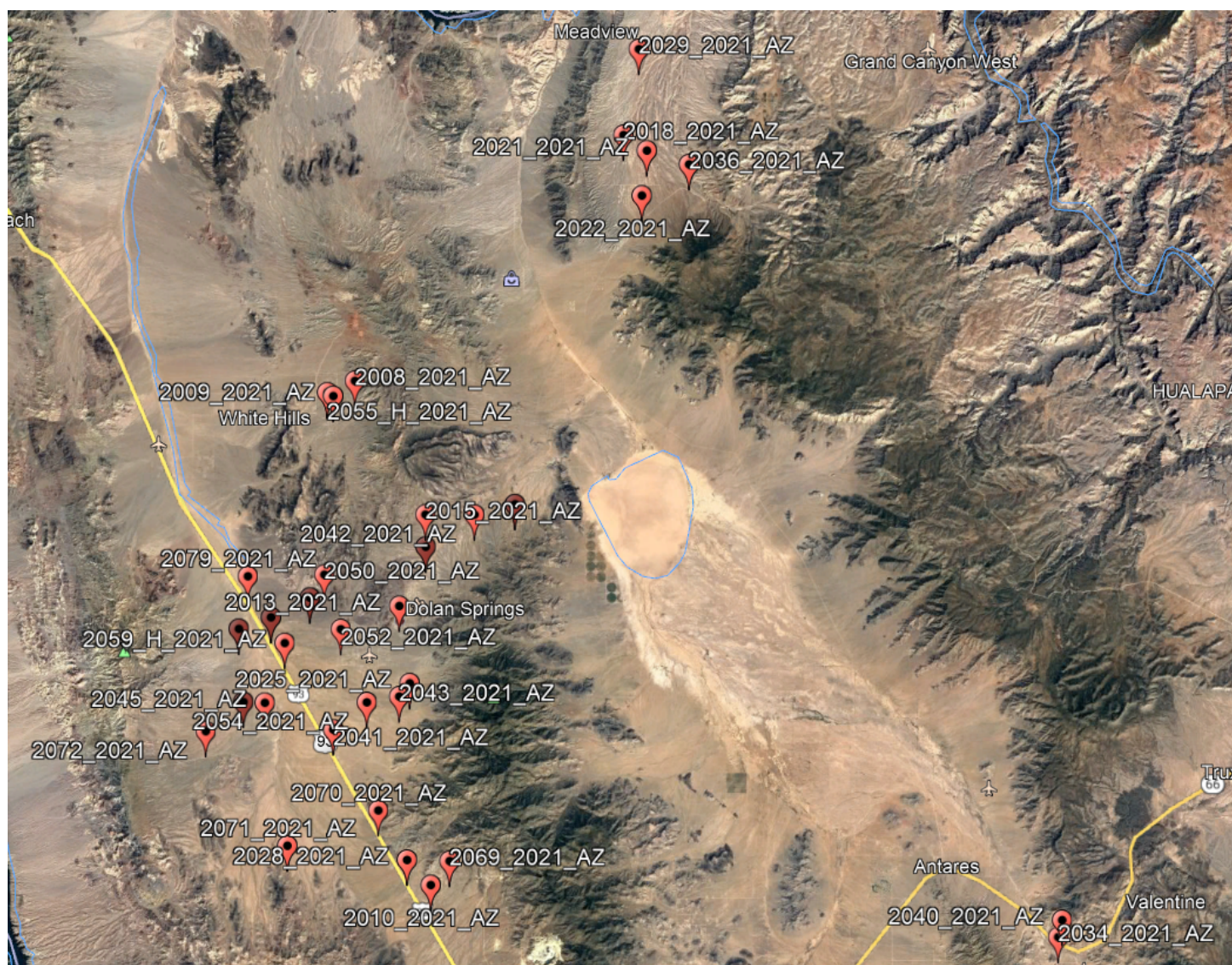
Not to Scale



Not to Scale



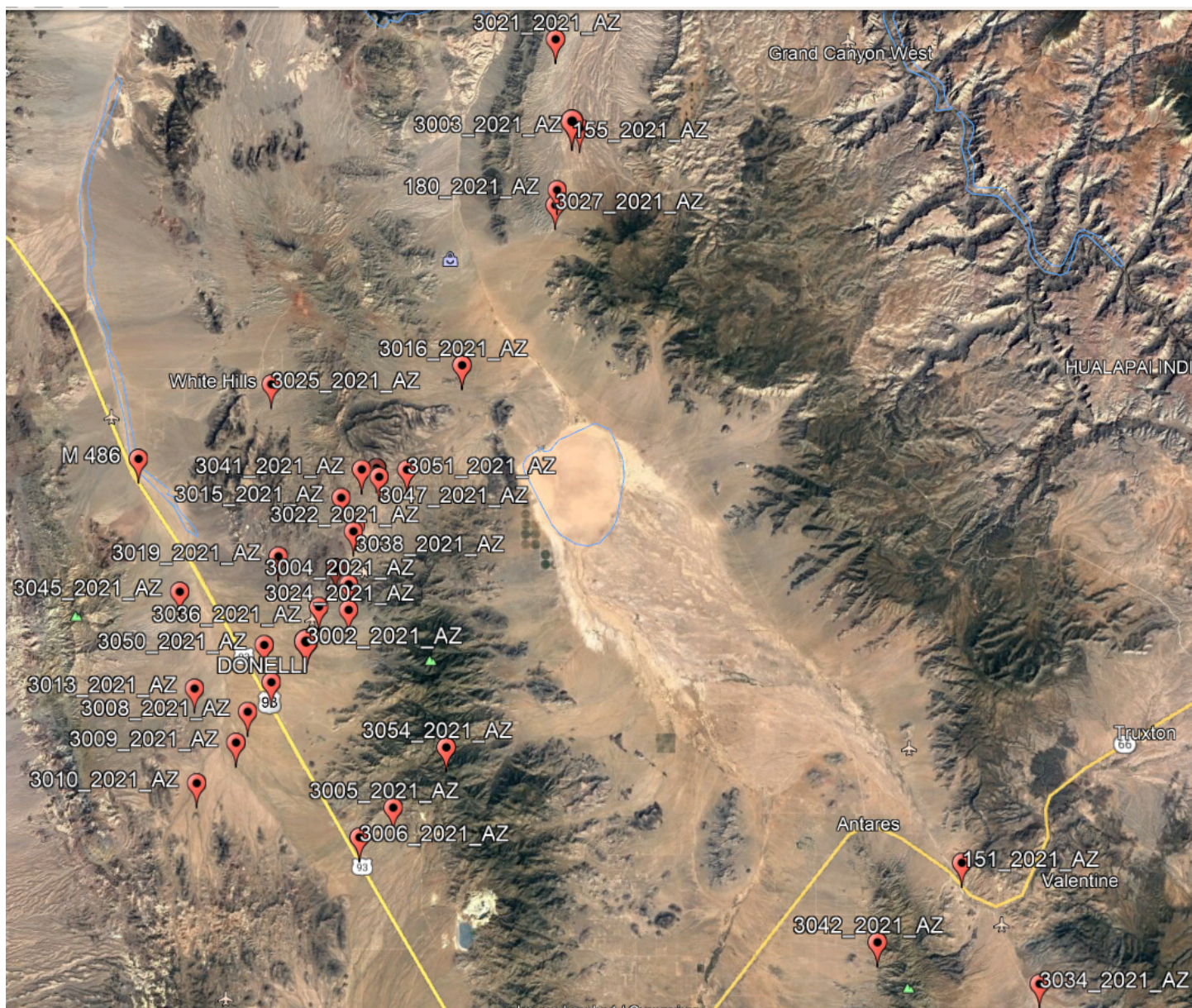
Not to Scale



Not to Scale

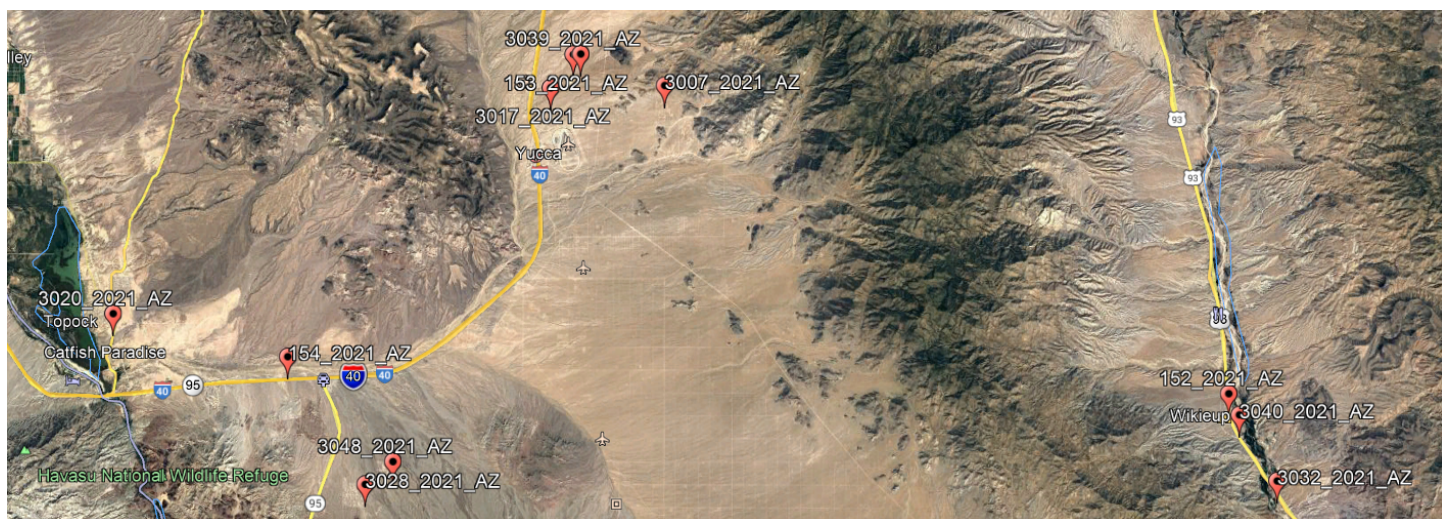


Not to Scale



Not to Scale





Not to Scale