



Final Project Report

PROJECT INFORMATION

Title	Reconnaissance static occupation of Tidal Benchmarks in Western Alaska
Project ID	WA2013-3
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Key words	Western Alaska, geodesy, tectonic vertical velocity, benchmark survey, GPS, sea level



ABSTRACT

Static occupations of tidal and geodetic benchmarks in Western Alaska were undertaken in the summers of 2013 and 2014. Project accomplishments far exceeded the proposed project objective of obtaining and sharing data for benchmarks in 8 different communities; in total, this work has resulted in the occupation of 44 benchmarks in 15 different communities. 32 of these datasets met National Geodetic Survey (NGS) minimum criteria for ‘shared solutions’ and have been uploaded to the Online Positioning User Service (OPUS) shared public database. This data has also been used to augment the tidal datum conversion database at the Alaska Division of Geological & Geophysical Surveys (DGGS) and the scientific geodetic database at the University of Alaska Fairbanks – Geophysical Institute (UAF-GI). At this time, the results from this project are already in use to support geodetic research at UAF-GI and a preliminary model for tectonic vertical velocity in Western Alaska is now available.

CITATION

DeGrandpre, K., Kinsman, N., and Freymueller, J., 2014, Reconnaissance Static Occupation of Tidal Benchmarks in Western Alaska: Western Alaska Landscape Conservation Cooperative Project WA2013-3, Final Report, 45 p., 1 sheet.

INTRODUCTION

Relative sea level (RSL), as measured by a tide gauge, is the height of the ocean surface (mean sea level, or MSL) relative to the height of the land surface. Knowledge of both land and sea level change is needed to understand the causes of RSL changes, particularly in Alaska where uplift or subsidence rates of the land surface can be several times greater than the rate of MSL rise. For example, along much of the southern Alaska coast emergence or submergence of the shoreline is dominantly controlled by uplift or subsidence of the land surface (Freymueller et al., 2008; Elliott et al., 2010). Understanding the variability in both land and sea components can enable more accurate prediction of future RSL changes in areas where tidal measurements are sparse.

Measurements of coastal uplift or subsidence are very sparse in western Alaska. Land level change is best measured through repeated, ultraprecise GPS surveys. The measurement precision of GPS with a few days of 24-hour-per-day data collection is on the order of 1–2 mm horizontal and 3–5 mm vertical. Measurements repeated over years can produce estimates of vertical rates of motion with an accuracy of 1 mm/year or better. This project targeted sites along the western Alaska coast where precise surveys have been made in the past, allowing a multi-year measurement of change with a single contemporary survey. Priority was given to sites with precise surveys 5 or more years ago, which have the potential to yield ~1 mm/yr velocity accuracy or better.

Occupation of benchmarks also improves the network of published tidal benchmark elevations, allowing for tidal datum conversions in more places (DGGS, 2014). An additional impact from this work was the reestablishment or validation of the existing record of local tidal datums, which has improved the overall western Alaska network of vertical datum control.

Primary project objectives included:

1. Completion of static occupations for at least eight (8) primary or secondary tidal benchmarks in western Alaska coastal communities.
2. Preparation of benchmark data to be distributed through NOAA NGS for publication as OPUS 'shared' solutions.

METHODS

Tidal and geodetic benchmarks are typically a brass disk installed in bedrock, or a steel rod driven to refusal (may extend to depths of >30 m). These benchmarks, when properly installed to remain stable, are fixed points on the tectonic plate. Therefore, any measured movement of a fixed benchmark is inferred to correspond to the movement of the underlying tectonic plate.

In western Alaska, the tectonic motion is smaller than in other locations around the state. Very high accuracy measurements are therefore crucial to precisely capture the movement of the plate in these low-motion areas. To accomplish this, GPS equipment is set up for multiple days of continuous collection on a benchmark. When these multiple-day occupations are repeated at intervals of a few years, a rate of motion can be constructed (Figure 1).

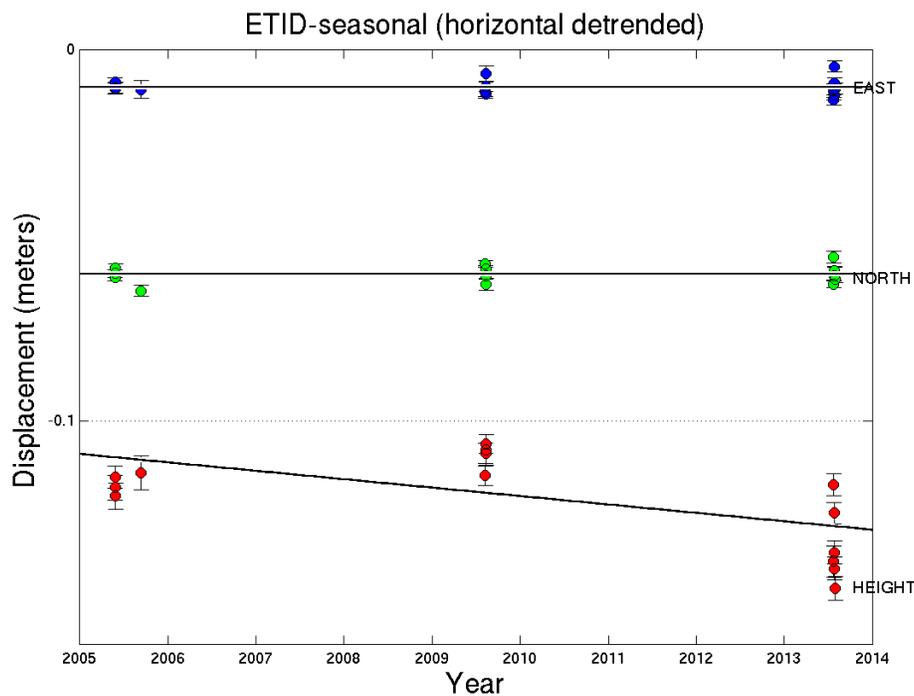


Figure 1. GPS velocity time series for the station ETID in Elim, AK. The top line is east velocity, middle line is north velocity and bottom line is vertical velocity. Each dot indicates one day of observations. At ETID there are three occupations, including one from this study in 2013. The trend shows an apparent negative vertical velocity (-1.45 mm/yr), or subsidence, in this area. The significance of including a third time-step is apparent, as the trend of the first two data points appears to be slightly positive (indicating uplift).

Many benchmarks in western Alaska have only one, or sometimes two, surveys. With one survey a rate cannot be calculated and with two surveys the calculated rate could potentially be biased,

as any setup error cannot be distinguished from the real motion of the benchmark. Thus sites with at least 3 surveys have a greater confidence level for the estimated vertical motion rates. This project funded the collection of second or third occupation on many benchmarks. The significance of a third data point can be seen in Figure 1; the first two occupations show apparent positive velocity, or uplift, but with the data collected in 2013 during this project the overall rate is actually a negative trend, or subsidence (note that the uncertainty of the rate derived from just the first two measurements was fairly large, so the additional measurement results in a much more precise estimate of the rate).

To establish relative sea level trends, this rate of vertical motion can be added to measurements of absolute sea level change derived from satellite altimetry (radar-based measurements of ocean surface height; see Figure 2) and compared to rates of sea level change recorded at repeat or continuous tide gauge sites. Fully-levveled tide gauges directly record rates of relative sea level change, but records of this type are extremely sparse (temporally and spatially) in western Alaska. Where long-term or repeat tide gauges do exist, these records can provide verification of the rates calculated with tectonic vertical velocities. By combining different sets of data we can construct a more complete and accurate description of relative sea level changes in this region.

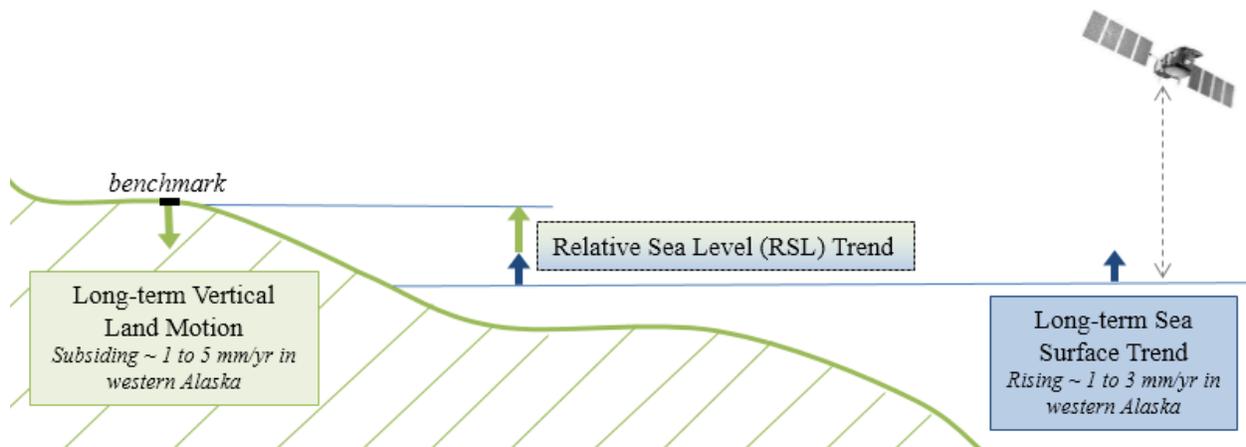


Figure 2. GPS occupations of benchmarks yield long-term vertical land motion (shown in green), which can be coupled with regional, altimetry-derived sea surface trends (shown in blue; SLRG, 2013) to calculate the relative sea level trend at the location of the benchmark.

Static GPS equipment to collect the measurements was provided by the University of Alaska Fairbanks – Geophysical Institute (UAF-GI). The equipment consisted of multiple Trimble 5700 receivers, Zephyr Geodetic antennae, Sokkia and Wilde optical centering and tribrachs, and Dutch Hill tripods (Figure 3). This equipment was set up to collect precise position measurements at each benchmark for 3–10 days (duration dependent on trip logistics), and data was recorded every 30 seconds. The data were post-processed at the UAF-GI with scripts created by Dr. Jeffrey Freymueller and the GIPSY/OASIS II software goa-5.0, developed by the Jet Propulsion Laboratory (JPL) in Pasadena, California. These data, in a time-series format, are incorporated into a tectonic velocity model to construct vertical velocities of the measured benchmarks. The raw GPS data were also processed using the National Geodetic Survey (NGS) program OPUS in order to create a publicly-shared data product.



Figure 3. GPS receiver set up on the site ‘MELS’ outside of the village of Council, AK, on the Seward Peninsula, during the 2013 summer field season.

RESULTS

A primary objective of this work was to occupy at least eight primary or secondary tidal benchmarks in western Alaska coastal communities. Not only was this primary objective achieved, but with strategic logistical planning and opportunistic leveraging of complementary field projects, we were able to complete static GPS occupations of 44 tidal and geodetic benchmarks in 15 different communities across western Alaska (see Table 1 and Figure 4).

The secondary objective of this project was to distribute the positional benchmark data through NOAA NGS as OPUS ‘shared’ solutions. Of the 44 occupied benchmarks, 32 have been shared publicly as NGS OPUS solutions and are available online (see links in Table 2; each of these OPUS shared solutions are included in Appendix 1).

Beyond the data collection aspect of this project, additional work to interpret the measurements has been undertaken as part of a graduate research project at UAF. A preliminary vertical velocity of the tectonic regime in western Alaska is included in this report (Figure 5). A more robust interpretation of this velocity model will be included in Kimberly DeGrandpre’s M.Sc. graduate thesis and any related peer-review papers.

Table 1. List of all benchmarks occupied during the summers of 2013 and 2014. Tidal benchmarks are reoccupations of NOS- or NOAA-established tidal benchmarks. Geodetic benchmarks are those used in the tectonic velocity model. Where possible all located benchmarks in a community were occupied, thus, to our knowledge some have not yet been used as a tidal or geodetic benchmark. NGS PID allows them to be located online; shared solutions are through NGS OPUS and are available both online at sites listed in Table 2, and as hard copies in Appendix 1 of this report.

Station ID	Community	Station Name	NGS PID	Tidal Benchmark	Geodetic Benchmark	Shared
3651	Golovin	GOLOVIN	BBDJ67		X	X
8756	Nome	8756 K NOME	DF3653	X	X	X
2BAD	Nome	2 BAD	DF3650		X	X
833E	Unalakleet	UNK TIDAL E	BBDH09	X		X
833G	Unalakleet	UNK TIDAL G	BBDH10	X		X
833H	Unalakleet	UNK TIDAL H	BBCK34	X		X
875B	Nome	8756 B NOME	BBDP98	X		X
875G	Nome	8756 NOME	BBBD24	X		
875H	Nome	8756 H		X		
875L	Nome	8756 L NOME		X		
886J	Elim	ELIM TIDAL J		X		
923B	Teller	TELLER TIDAL		X	X	
AKNA	King Salmon	AKN A 2001	DF3662		X	X
AKNB	King Salmon	AKN B 2001	DF3663		X	X
BETB	Bethel	BET B	DF3623		X	X
BETC	Bethel	BET C	DF3624		X	X
BM6_	Bethel	BM 6 1970	DF3625	X	X	X
CABN	Bethel	CABIN RESET	BBDP88		X	X
ELCR	Elim	ELIM AIR C RESET	BBDQ51		X	X
ELIB	Elim	ELIM AIR B	DF3655		X	X
ENMA	Emmonak	ENM A	DI8247		X	X
ENMB	Emmonak	ENM B	DJ2634		X	X
ENMC	Emmonak	ENM C	DJ2633		X	X
ESKI	King Salmon	ESKIMO	UW8054		X	
ETID	Elim	ELIM TIDAL GPS	DF3657	X	X	X
GAMB	Gambell	GAMBELL AIRPORT	UW3556		X	X
HEID	Port Heiden	PORT HEIDEN	UW1428		X	
HOOP	Hooper Bay	HOOPER BAY	UW8061		X	X
HPBB	Hooper Bay	HPB B	DF3630		X	X
JIMM	Port Heiden	JIMMY'S PLACE	UW1430		X	
KALS	Kalskag	KALSKAG	UW8066		X	X
KMJV	Nome	NOME PORT				
MELS	Council	MELSING (COUNCIL)	CA4540		X	X
MESH	Port Heiden	MESHIK	UW1432		X	X
MKAZ	Port Heiden	MESHIK AZ MK	UW1437		X	
MMKT	Serpentine	MIDNIGHT MTN	BBDH13		X	X
NOME	Nome	NOME	TT4629		X	X
OMEA	Nome	OME A	DF3651		X	X
OMEB	Nome	OME B	DF3652		X	X
SVAC	Savoonga	SAVOONGA AIRPT C	DJ2781		X	X
TLTA	Tuluksak	TLT A	DL3335		X	X
UNK1	Unalakleet	UNK NO. 1				
UNKA	Unalakleet	UNK A 2010	DM4448		X	X
UNKB	Unalakleet	UNK AIR B	DM4449		X	X

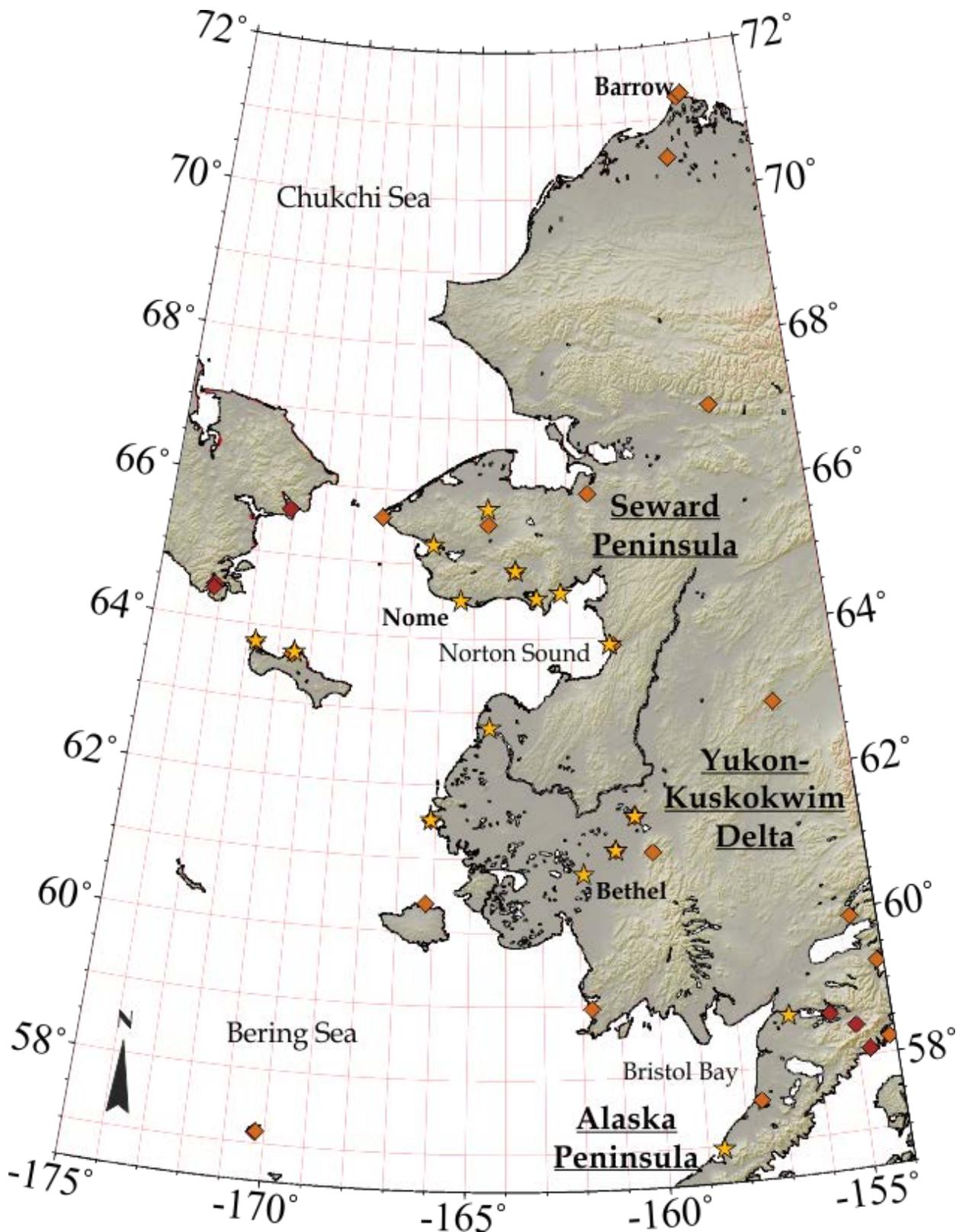


Figure 4. Locations of GPS receivers in western Alaska. Orange diamonds are sites of continuously operating GPS. Red diamonds are campaign sites where repeat static observations are made. Yellow stars are campaign locations that were visited in 2013 and 2014 as part of this study.

Table 2. The online locations for the NGS OPUS solution for each of the shared benchmarks listed in Table 1. These solutions are also included in this report as Appendix 1.

Station ID	Community	OPUS Solution Location
3651	Golovin	http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=BBDJ67
8756	Nome	http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=DF3653
2BAD	Nome	http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=DF3650
833E	Unalakleet	http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=BBDH09
833G	Unalakleet	http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=BBDH10
833H	Unalakleet	http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=BBCK34
875B	Nome	http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=BBDP98
AKNA	King Salmon	http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=DF3662
AKNB	King Salmon	http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=DF3663
BETB	Bethel	http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=DF3623
BETC	Bethel	http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=DF3624
BM6	Bethel	http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=DF3625
CABN	Bethel	http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=BBDP88
ELIB	Elim	http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=DF3655
ENMA	Emmonak	http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=DI8247
ENMB	Emmonak	http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=DJ2634
ENMC	Emmonak	http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=DJ2633
ETID	Elim	http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=DF3657
GAMB	Gambell	http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=UW3556
HOOP	Hooper Bay	http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=UW8061
HPBB	Hooper Bay	http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=UW8061
KALS	Kalskag	http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=UW8066
MELS	Council	http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=CA4540
MESH	Port Heiden	http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=UW1432
MMKT	Serpentine	http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=BBDH13
NOME	Nome	http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=TT4629
OMEA	Nome	http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=DF3651
OMEB	Nome	http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=DF3652
SVAC	Savoonga	http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=DJ2781
TLTA	Tuluksak	http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=DL3335
UNKA	Unalakleet	http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=DM4448
UNKB	Unalakleet	http://www.ngs.noaa.gov/OPUS/getDatashet.jsp?PID=DM4449

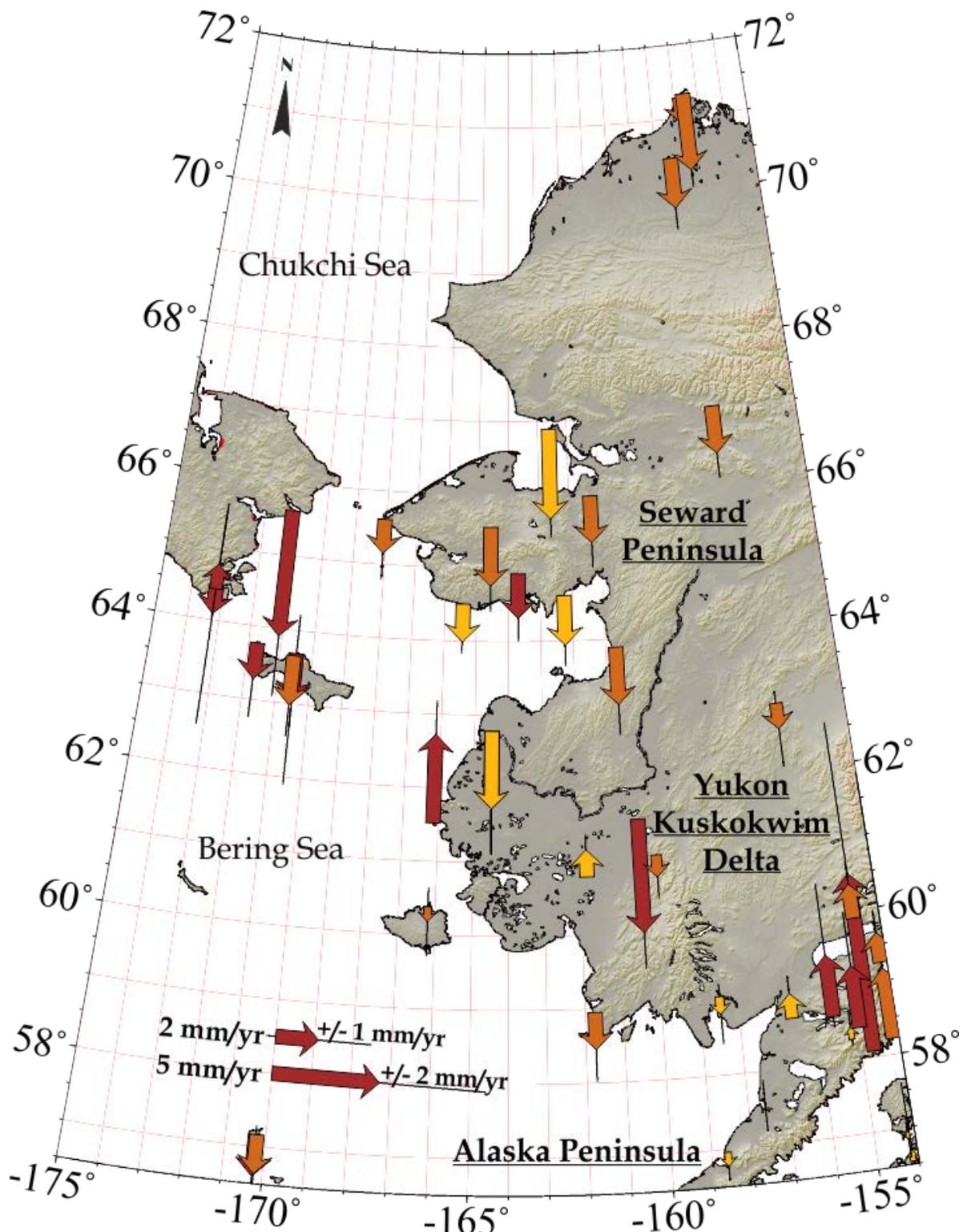


Figure 5. Vertical velocity model for western Alaska. Arrow bases are on the locations of the GPS sites. Error is expressed as a vertical bar off the end of the arrow. Arrows pointing up signify positive vertical velocities (uplift), while arrows pointing down indicate negative velocities (subsidence). Orange arrows are velocities calculated from continuous GPS stations, red arrows represent velocities calculated at campaign GPS sites, and yellow arrows are velocities where a weighted mean was calculated between various combinations of campaign and continuous stations. The data for Tuluksak has not been included due to severe frost-jacking.

DISCUSSION/CONCLUSIONS AND RECOMMENDATIONS

The data obtained here is available for public use, and may particularly benefit those with interests in tectonic velocities, sea level change, sea level or storm inundation, mapping, and erosion studies in western Alaska. These measurements have helped to increase the spatial and temporal resolution for the UAF-GI geodetic database, and have also increased the number of tidal datum offset conversion values available at the DGGS tidal datum conversion tool (<http://dggs.alaska.gov/sections/engineering/ak-tidal-datum-portal/>). This work has also supported UAF graduate research, and contributed significantly to the data used in ongoing relative sea level change research at UAF-GI and DGGS.

We recommend that future work include repeat static observations at the sites occupied in this study, after a few more years have passed. This would help to improve the accuracies of the reported tectonic velocity trends. More data could also help to isolate the component tectonic and non-tectonic processes affecting the measured velocities. It would also be of great benefit to both scientific stakeholders and local community residents if a network of tide gauges were installed and leveled-in to some of the existing tidal benchmarks. Relative sea level trends recorded at these gauges could be used in conjunction with the measured vertical velocities of the benchmarks to give a more reliable description of the relative sea level change in the region. Based on identified data gaps, the subregions of western Alaska that are of highest priority for additional water level instrumentation are the Yukon–Kuskokwim Delta and the communities north of Kotzebue. While the Seward Peninsula does not have a lot of data compared with other areas in the United States, it does have a solid foundation for future work that is still lacking in these other areas.

ACKNOWLEDGMENTS

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This project was also funded, in part, with qualified outer continental shelf oil and gas revenues through the Coastal Impact Assistance Program, U.S. Fish and Wildlife Service, U.S. Department of the Interior. The views and conclusions contained in this document are those of the authors and should not be interpreted as representing the opinions or policies of the U.S. Government. Mention of trade names or commercial products does not constitute their endorsement by the U.S. Government.

PRODUCTS TO DATE

Published materials:

WALCC-customized progress figure on uplift/subsidence rates in Western Alaska

Kinsman, N.E.M., and Gould, A.I., 2014, Coastal vulnerability mapping in Alaska: Strategies for small populations in data-sparse regions [poster]: Ocean Sciences Meeting, Honolulu, Hawaii, February 23–28, 2014: Alaska Division of Geological & Geophysical Surveys, 1 sheet. doi:[10.14509/27202](https://doi.org/10.14509/27202)

Any additional products directly stemming from this work will be provided to WALCC upon publication.

Presentations:

Relative Sea Level Change in Western Alaska as Constructed from Repeat Tide Gauge and GPS Measurements

Kimberly DeGrandpre [poster] (Sheet 1)
February 22, 2014 Ocean Sciences Meeting 2014, Honolulu, HI
March 4, 2014 2014 UNAVCO Science Workshop, Broomfield, CO
May 15, 2014 Alaska Geological Society Technical Conference, Anchorage, AK

Relative Sea Level Change in Western Alaska as Constructed from Repeat Tide Gauge and GPS Measurements

Kimberly DeGrandpre [oral presentation]
March 27, 2014 2014 Alaska Surveying and Mapping Conference, Fairbanks, AK
Nicole Kinsman [oral presentation]
May 15, 2014 Western Alaska Landscape Conservation Cooperative (WALCC)
Monthly Webinar

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- Elliott, J.L., Larsen, C.F., Freymueller, J.T., and Motyka, R.J., 2010, Tectonic block motion and glacial isostatic adjustment in southeast Alaska and adjacent Canada constrained by GPS measurements: *Journal of Geophysical Research*, v. 155, no. 9, doi:[10.1029/2009JB007139](https://doi.org/10.1029/2009JB007139)
- Freymueller, J.T., Woodard, H., Cohen, S., Cross, R., Elliott, J., Larsen, C., Hreinsdottir, S., and Zweck, C., 2008, Active deformation processes in Alaska, based on 15 years of GPS measurements, *in* Freymueller, J.T., Haeussler, P.J., Wesson, R., and Ekstrom, G., eds., *Active Tectonics and Seismic Potential of Alaska*: Washington, D.C., American Geophysical Union Geophysical Monograph, v. 179, p. 1–42.
- Sea Level Research Group (SLRG), 2013, Regional sea level time series: University of Colorado [website], last accessed March 2014: <http://sealevel.colorado.edu/content/regional-sea-level-time-series>

Appendix 1

Appendix 1. – NGS OPUS solutions for the 32 shared benchmarks. These data sheets are also available online at the sites listed in Table 2.

Shared Solution



Close-up View

PID: BBDJ67
Designation: USLM 3651 1970
Stamping: USLM 3651 1970
Stability: Most reliable; expected to hold position well
Setting: Object driven into ground
Description: Mark is on the NE cliff edge above Golovin, AK in a ground level rock outcrop that is a part of a small cemetery.
Observed: 2013-07-27T00:00:00Z
Source: OPUS - page5 1209.04

REF FRAME: NAD_83(2011)	EPOCH: 2010.0000	SOURCE: NAVD88 (Computed using GEOID12A)	UNITS: m	SET PROFILE	DETAILS
LAT: 64° 32' 41.11138" ± 0.015 m LON: -163° 1' 49.41552" ± 0.007 m ELL HT: 33.346 ± 0.006 m X: -2629199.858 ± 0.010 m Y: -802302.259 ± 0.010 m Z: 5736107.403 ± 0.011 m ORTHO HT: 27.465 ± 0.012 m		UTM 3 SPC 5007(AK 7) NORTHING: 7159185.742m 1174951.852m EASTING: 594446.067m 450571.570m CONVERGENCE: 1.77852977° -0.93038254° POINT SCALE: 0.99970922 0.99992991 COMBINED FACTOR: 0.99970400 0.99992469			

CONTRIBUTED BY

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Horizon View



The numerical values for this position solution have satisfied the quality control criteria of the National Geodetic Survey. The contributor has verified that the information submitted is accurate and complete.

Shared Solution

PID: DF3653
Designation: 8756 K
Stamping: 8756 K 1992
Stability: Monument will probably hold position well
Setting: Stainless steel rod without sleeve (10FT+ or 3.048M+)
Mark Condition: G
Description:
Observed: 2013-08-06T00:00:00Z See Also 2011-07-27
Source: OPUS - page5 1209.04



Close-up View

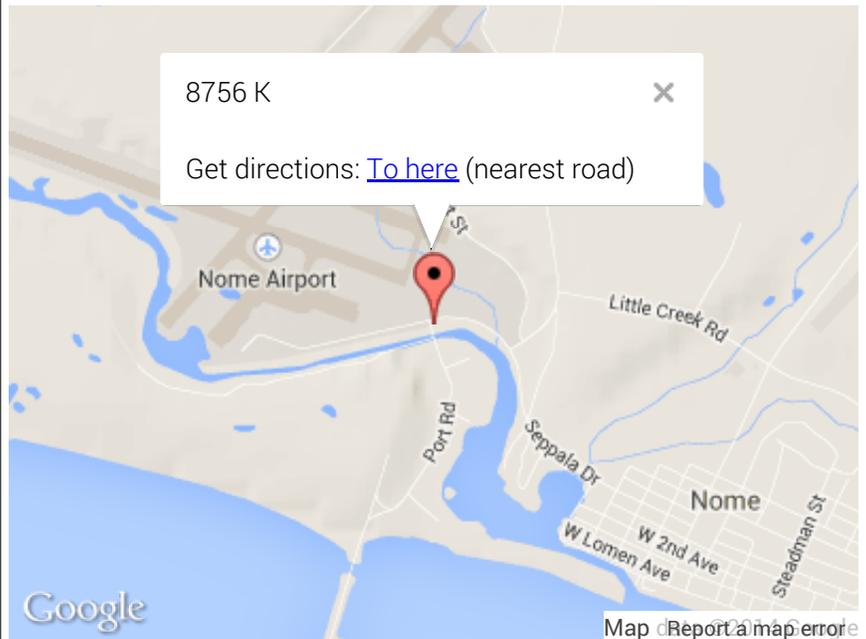
REF FRAME: NAD_83(2011)	EPOCH: 2010.0000	SOURCE: NAVD88 (Computed using GEOID12A)	UNITS: m	SET PROFILE	DETAILS
LAT: 64° 30' 26.13417" ± 0.005 m LON: -165° 25' 48.10441" ± 0.002 m ELL HT: 10.189 ± 0.013 m X: -2664128.778 ± 0.009 m Y: -692462.750 ± 0.002 m Z: 5734288.669 ± 0.010 m ORTHO HT: 4.937 ± 0.024 m		UTM 3 SPC 5008(AK 8) NORTHING: 7153611.419m 1170493.878m EASTING: 479348.612m 527379.948m CONVERGENCE: -0.38816266° 0.51448168° POINT SCALE: 0.99960522 0.99990918 COMBINED FACTOR: 0.99960363 0.99990759			

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Horizon View



The numerical values for this position solution have satisfied the quality control criteria of the National Geodetic Survey. The contributor has verified that the information submitted is accurate and complete.

Shared Solution

PID: DF3650
Designation: 2 BAD
Stamping:
Stability: Monument will probably hold position well
Setting: Stainless steel rod without sleeve (10FT+ or 3.048M+)
Mark Condition: P
Description: Rod is very loose and leans on inner PVC tube
Observed: 2013-08-07T00:00:00Z See Also [2012-07-17](#)
Source: OPUS - page5 1209.04



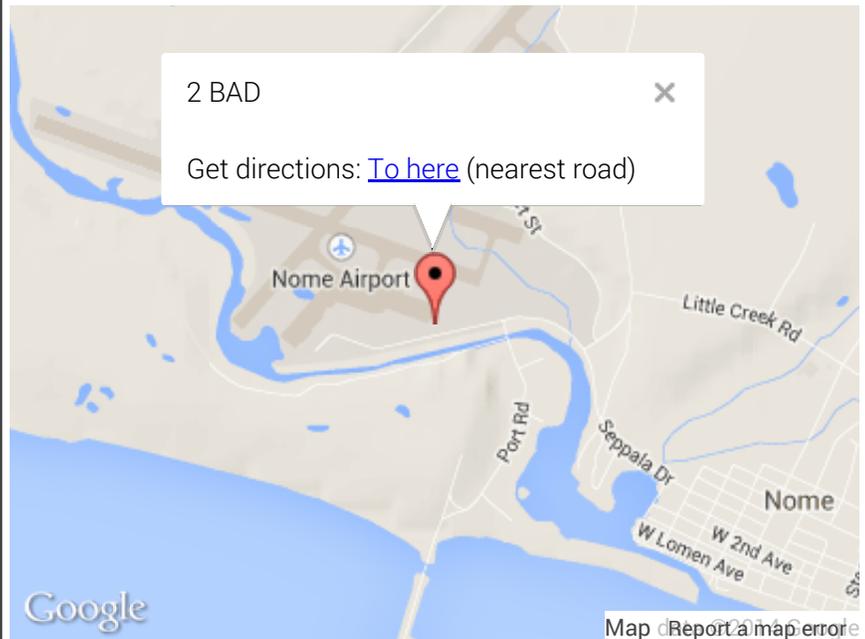
Close-up View

REF FRAME: NAD_83(2011)	EPOCH: 2010.0000	SOURCE: NAVD88 (Computed using GEOID12A)	UNITS: m	SET PROFILE	DETAILS
LAT: 64° 30' 26.08177" ± 0.006 m LON: -165° 26' 9.13838" ± 0.003 m ELL HT: 10.711 ± 0.009 m X: -2664201.013 ± 0.002 m Y: -692191.495 ± 0.003 m Z: 5734288.441 ± 0.011 m ORTHO HT: 5.462 ± 0.016 m		UTM 3 SPC 5008(AK 8) NORTHING: 7153611.711m 1170489.749m EASTING: 479068.016m 527099.297m CONVERGENCE: -0.39343658° 0.50920760° POINT SCALE: 0.99960536 0.99990899 COMBINED FACTOR: 0.99960368 0.99990731			

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Horizon View



The numerical values for this position solution have satisfied the quality control criteria of the National Geodetic Survey. The contributor has verified that the information submitted is accurate and complete.

Shared Solution

PID: BBDH09
Designation: UNALAKLEET 8333 E
Stamping: 8333 E 2011
Stability: Most reliable; expected to hold position well
Setting: Unspecified setting
Description: Mark can be found in the cement pad on the west edge of the Norton Seafood Plant loading dock at the north end of the rip rap wall that borders the dock
Observed: 2013-08-02T06:09:00Z
Source: OPUS - page5 1209.04



Close-up View

REF_FRAME: NAD_83(2011)	EPOCH: 2010.0000	SOURCE: H = h-N (N = GEOID12A HGT)	UNITS: m	SET PROFILE	DETAILS
LAT: 63° 52' 17.17839" ± 0.007 m					
LON: -160° 47' 2.32348" ± 0.004 m					
ELL HT: 11.133 ± 0.007 m					
X: -2659540.365 ± 0.008 m					
Y: -926983.879 ± 0.007 m					
Z: 5703427.936 ± 0.003 m					
ORTHO HT: 3.368 ± 0.013 m					
		UTM 4 SPC 00)			
		NORTHING: 7083913.567m 0.000m			
		EASTING: 412349.707m 0.000m			
		CONVERGENCE: -1.60177144° 0.0°			
		POINT SCALE: 0.99969408 0.0			
		COMBINED FACTOR: 0.99969234 0.00000000			

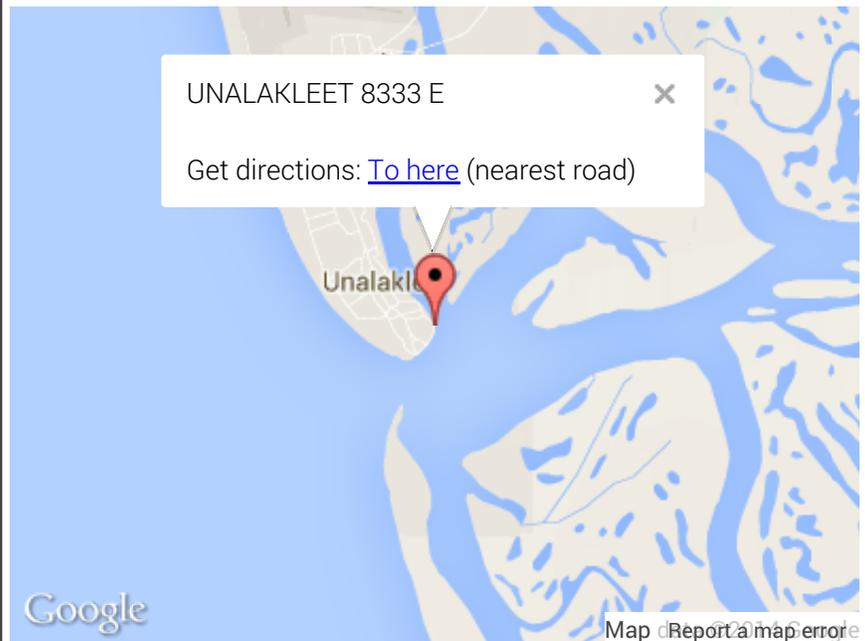
CONTRIBUTED BY

[kimberdgp](#)

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Horizon View



The numerical values for this position solution have satisfied the quality control criteria of the National Geodetic Survey. The contributor has verified that the information submitted is accurate and complete.

Shared Solution

PID: BBDH10
Designation: UNALAKLEET 8333 G 2011
Stamping: 8333 G 2011
Stability: Monument will probably hold position well
Setting: Unspecified setting
Description: Disk is set in cement base of the flag pole out front of the Unalakleet post office, 100 Main St. Unalakleet, AK
Observed: 2013-08-03T05:17:00Z
Source: OPUS - page5 1209.04



Close-up View

REF_FRAME: NAD_83(2011)	EPOCH: 2010.0000	SOURCE: H = h-N (N = GEOID12A HGT)	UNITS: m	SET PROFILE	DETAILS
LAT: 63° 52' 28.69673" ± 0.011 m		UTM 4 SPC 00			
LON: -160° 47' 23.14378" ± 0.002 m		NORTHING: 7084277.944m 0.000m			
ELL HT: 13.925 ± 0.011 m		EASTING: 412075.612m 0.000m			
X: -2659332.687 ± 0.007 m		CONVERGENCE: -1.60700881° 0.0°			
Y: -926610.460 ± 0.005 m		POINT SCALE: 0.99969467 0.0			
Z: 5703587.507 ± 0.012 m		COMBINED FACTOR: 0.99969249 0.00000000			
ORTHO HT: 6.165 ± 0.018 m					

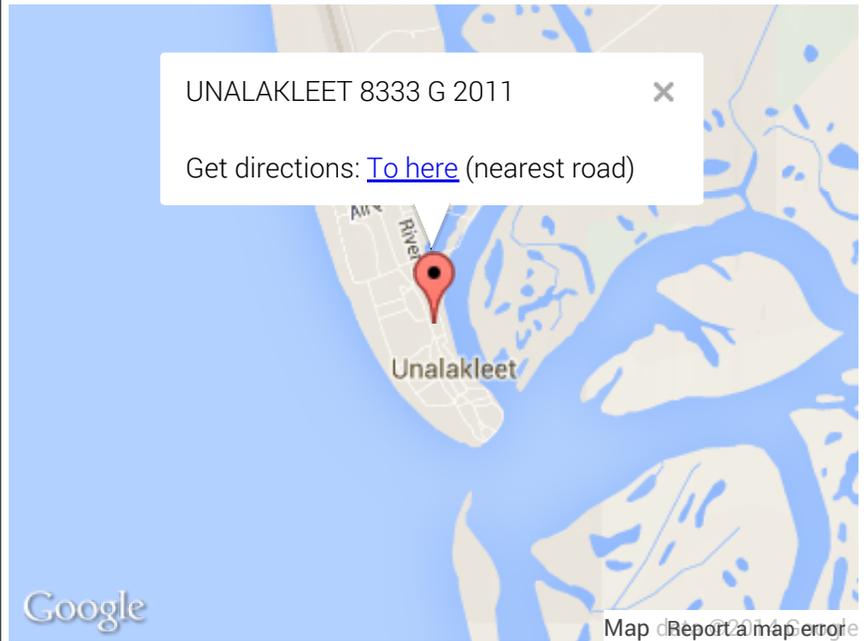
CONTRIBUTED BY

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Horizon View



The numerical values for this position solution have satisfied the quality control criteria of the National Geodetic Survey. The contributor has verified that the information submitted is accurate and complete.

Shared Solution

PID: BBCK34
Designation: 9468333 H
Stamping: 8333 H 2011
Stability: Most reliable; expected to hold position well
Setting: A metal rod driven into ground. Describe below.
Mark Condition: G
Description:
Observed: 2013-08-02T17:20:00Z See Also [2011-07-13](#)
Source: OPUS - page5 1209.04



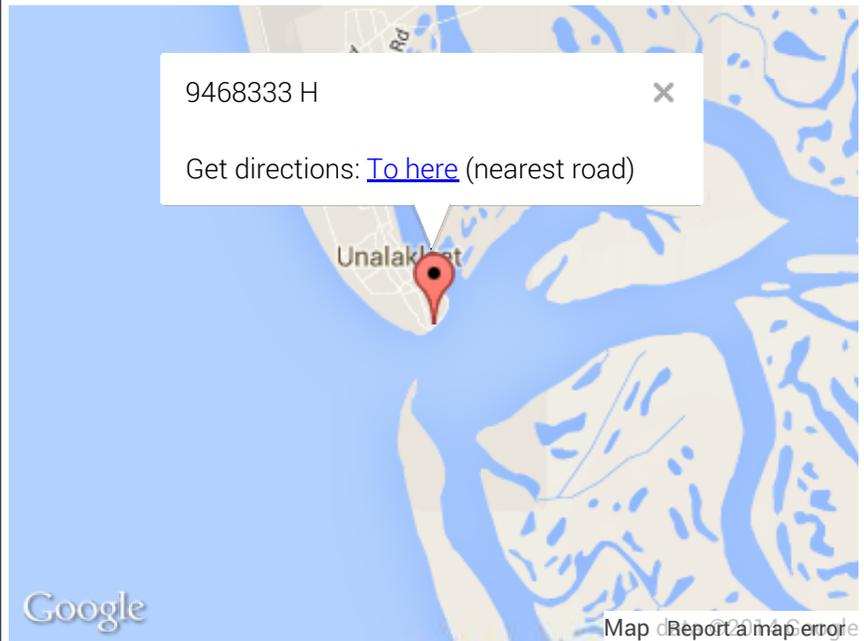
Close-up View

REF FRAME: NAD_83(2011)	EPOCH: 2010.0000	SOURCE: NAVD88 (Computed using GEOID12A)	UNITS: m	SET PROFILE	DETAILS
LAT: 63° 52' 14.13095" ± 0.007 m LON: -160° 47' 7.04067" ± 0.005 m ELL HT: 12.431 ± 0.009 m X: -2659642.106 ± 0.007 m Y: -926951.127 ± 0.005 m Z: 5703387.544 ± 0.007 m ORTHO HT: 4.666 ± 0.016 m		UTM 4 SPC 5007(AK 7) NORTHING: 7083821.068m 1099970.420m EASTING: 412282.702m 559703.949m CONVERGENCE: -1.60293647° 1.09060129° POINT SCALE: 0.99969422 0.99994364 COMBINED FACTOR: 0.99969228 0.99994170			

CONTRIBUTED BY

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Horizon View



The numerical values for this position solution have satisfied the quality control criteria of the National Geodetic Survey. The contributor has verified that the information submitted is accurate and complete.

Shared Solution

PID: BBDP98
Designation: 875B
Stamping: 316
Stability: Monument will probably hold position well
Setting: Abutment or pier of large bridges
Description: Drive down Seppala and cross one of the port bridges. Continue through the port past the harbor and boat launch towards West Beach. At the entrance to West Beach turn left and cross the bridge past the restricted signs. You will need harbor master approval/escort to continue across the bridge and past the first sheet pile dock to the second, southern sheet pile. Bolt is welded to the inside edge of the sheet pile where it curls in on the east side of the fire hydrants by the fuel storage.
Observed: 2013-08-06T00:00:00Z
Source: OPUS - page5 1209.04



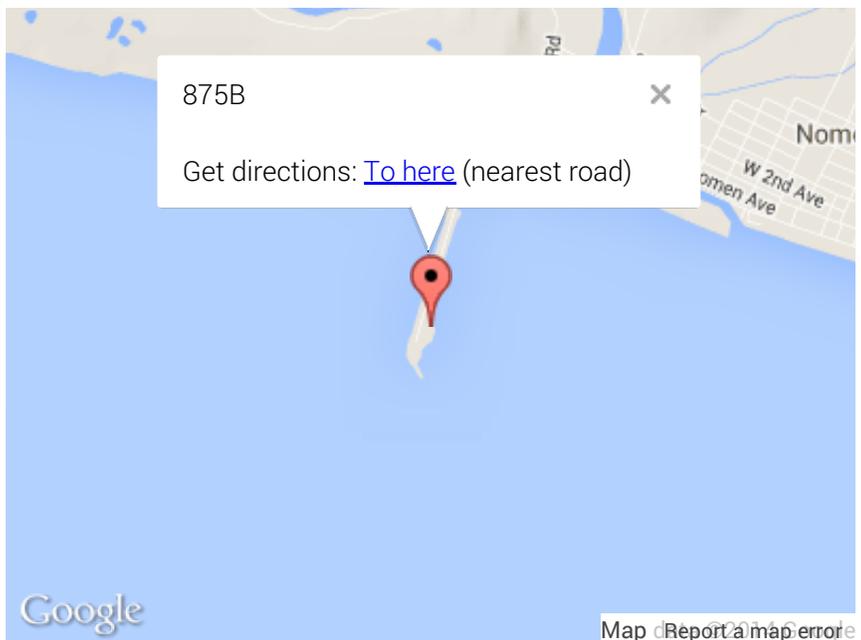
Close-up View

REF FRAME: NAD_83(2011)	EPOCH: 2010.0000	SOURCE: NAVD88 (Computed using GEOID12A)	UNITS: m	SET PROFILE	DETAILS
LAT: 64° 29' 39.68506" ± 0.006 m LON: -165° 26' 19.51471" ± 0.003 m ELL HT: 10.969 ± 0.006 m X: -2665491.143 ± 0.007 m Y: -692383.547 ± 0.004 m Z: 5733670.126 ± 0.005 m ORTHO HT: 5.735 ± 0.012 m		UTM 3 SPC 5008(AK 8) NORTHING: 7152176.450m 1169051.892m EASTING: 478919.673m 526973.543m CONVERGENCE: -0.39599582° 0.50655152° POINT SCALE: 0.99960544 0.99990891 COMBINED FACTOR: 0.99960372 0.99990719			

CONTRIBUTED BY

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Horizon View



The numerical values for this position solution have satisfied the quality control criteria of the National Geodetic Survey. The contributor has verified that the information submitted is accurate and complete.

Shared Solution

PID: DF3662
Designation: AKN A
Stamping: AKN A 2001
Stability: Monument will probably hold position well
Setting: Unspecified deep unsleeved setting (10FT+ or 3.048M+)
Mark Condition: G
Description:
Observed: 2013-07-14T00:00:00Z See Also [2001-09-12](#)
Source: OPUS - page5 1209.04



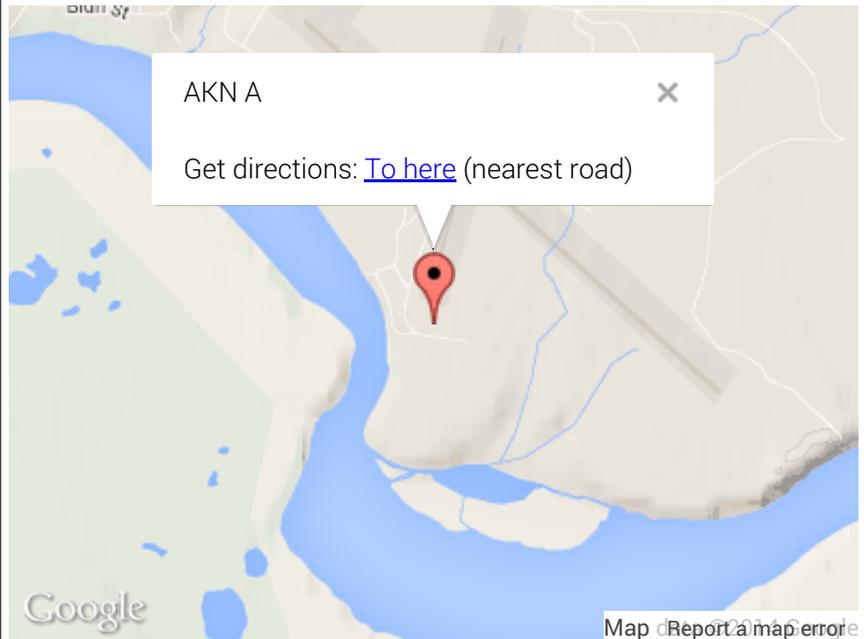
Close-up View

REF FRAME: NAD_83(2011)	EPOCH: 2010.0000	SOURCE: NAVD88 (Computed using GEOID12A)	UNITS: m	SET PROFILE	DETAILS
LAT: 58° 40' 16.35194" ± 0.002 m LON: -156° 39' 15.98584" ± 0.010 m ELL HT: 30.730 ± 0.007 m X: -3052280.052 ± 0.005 m Y: -1317397.672 ± 0.009 m Z: 5425009.320 ± 0.008 m ORTHO HT: 16.984 ± 0.014 m		UTM 4 SPC 5006(AK 6) NORTHING: 6505820.674m 520859.277m EASTING: 636022.813m 578061.320m CONVERGENCE: 2.00387566° 1.14943121° POINT SCALE: 0.99982681 0.99997467 COMBINED FACTOR: 0.99982200 0.99996986			

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Horizon View



The numerical values for this position solution have satisfied the quality control criteria of the National Geodetic Survey. The contributor has verified that the information submitted is accurate and complete.

Shared Solution

PID: DF3663

Designation: AKN B

Stamping: AKN B 2001

Stability: May hold commonly subject to ground movement

Setting: Set into or on top of metal pipe driven into ground

Mark Condition: G

Description:

Observed: 2013-07-12T00:00:00Z See Also [2001-09-12](#)

Source: OPUS - page5 1209.04



Close-up View

REF FRAME:	EPOCH:	SOURCE:	UNITS:	SET PROFILE	DETAILS
NAD_83(2011)	2010.0000	NAVD88 (Computed using GEOID12A)	m		
LAT: 58° 40' 41.52086" ± 0.006 m LON: -156° 39' 0.30358" ± 0.006 m ELL HT: 33.255 ± 0.006 m X: -3051570.323 ± 0.005 m Y: -1317366.585 ± 0.008 m Z: 5425416.356 ± 0.004 m ORTHO HT: 19.512 ± 0.011 m		UTM 4 SPC 5006(AK 6) NORTHING: 6506607.672m 521642.943m EASTING: 636248.092m 578298.346m CONVERGENCE: 2.00774738° 1.15323843° POINT SCALE: 0.99982756 0.99997513 COMBINED FACTOR: 0.99982236 0.99996992			

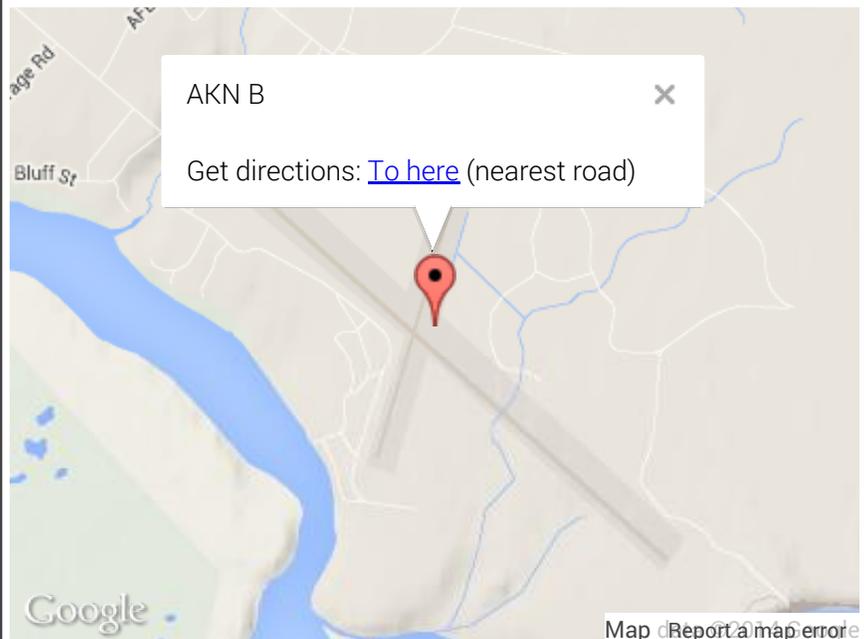
CONTRIBUTED BY

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Horizon View



The numerical values for this position solution have satisfied the quality control criteria of the National Geodetic Survey. The contributor has verified that the information submitted is accurate and complete.

Shared Solution

PID: DF3623
Designation: BET B
Stamping: BET B 2001
Stability: May hold commonly subject to ground movement
Setting: Set into or on top of metal pipe driven into ground
Mark Condition: G
Description:
Observed: 2014-07-27T00:00:00Z See Also [2001-07-19](#)
Source: OPUS - page5 1209.04



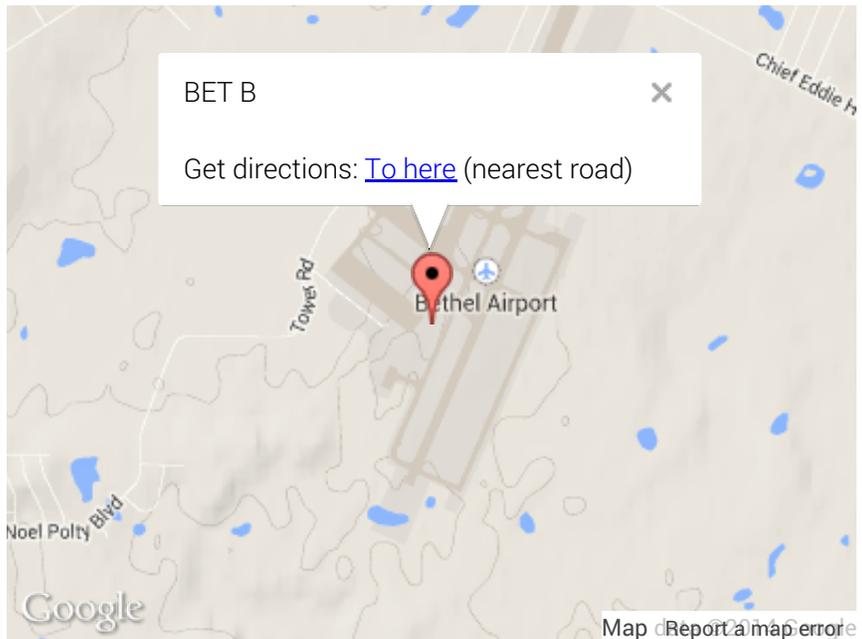
Close-up View

REF FRAME: NAD_83(2011)	EPOCH: 2010.0000	SOURCE: NAVD88 (Computed using GEOID12A)	UNITS: m	SET PROFILE	DETAILS
LAT: 60° 46' 39.39641" ± 0.012 m LON: -161° 50' 31.72339" ± 0.009 m ELL HT: 50.046 ± 0.009 m X: -2966343.481 ± 0.010 m Y: -972866.859 ± 0.012 m Z: 5543330.528 ± 0.009 m ORTHO HT: 39.428 ± 0.017 m		UTM 4 SPC 5007(AK 7) NORTHING: 6741367.895m 754732.084m EASTING: 345239.896m 508599.897m CONVERGENCE: -2.48091659° 0.13776476° POINT SCALE: 0.99989347 0.99990091 COMBINED FACTOR: 0.99988564 0.99989308			

CONTRIBUTED BY

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Horizon View



The numerical values for this position solution have satisfied the quality control criteria of the National Geodetic Survey. The contributor has verified that the information submitted is accurate and complete.

Shared Solution

PID: DF3624
Designation: BET C
Stamping: BET C 2001
Stability: Monument will probably hold position well
Setting: Unspecified deep unsleeved setting (10FT+ or 3.048M+)
Mark Condition: G
Description:
Observed: 2014-07-14T00:00:00Z See Also [2001-07-19](#)
Source: OPUS - page5 1209.04



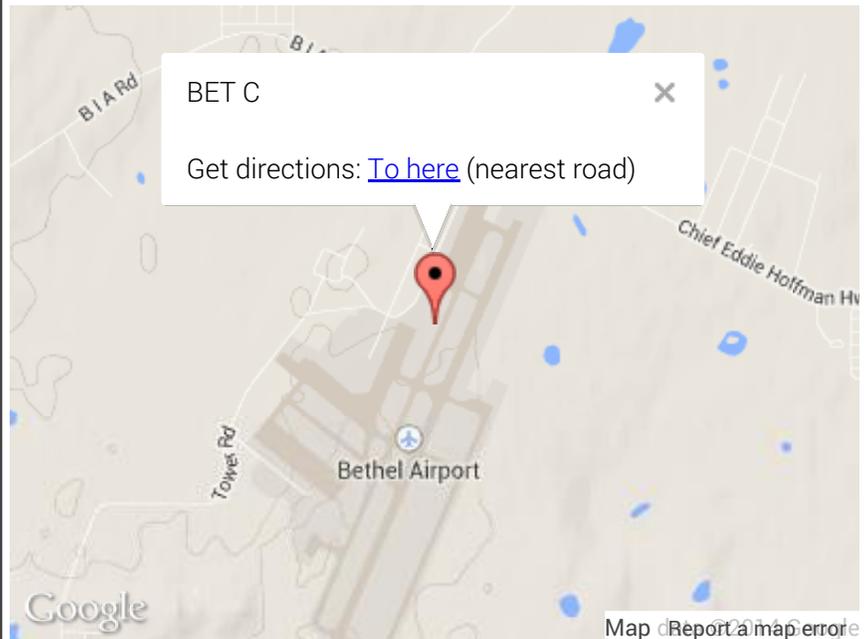
Close-up View

REF FRAME: NAD_83(2011)	EPOCH: 2010.0000	SOURCE: NAVD88 (Computed using GEOID12A)	UNITS: m	SET PROFILE	DETAILS
LAT: 60° 47' 3.11164" ± 0.012 m LON: -161° 50' 8.36588" ± 0.009 m ELL HT: 42.492 ± 0.006 m X: -2965621.086 ± 0.011 m Y: -973001.901 ± 0.013 m Z: 5543682.251 ± 0.002 m ORTHO HT: 31.877 ± 0.012 m		UTM 4 SPC 5007(AK 7) NORTHING: 6742085.869m 755466.898m EASTING: 345624.738m 508951.535m CONVERGENCE: -2.47540979° 0.14343644° POINT SCALE: 0.99989202 0.99990098 COMBINED FACTOR: 0.99988537 0.99989433			

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Horizon View



The numerical values for this position solution have satisfied the quality control criteria of the National Geodetic Survey. The contributor has verified that the information submitted is accurate and complete.

Shared Solution



Close-up View

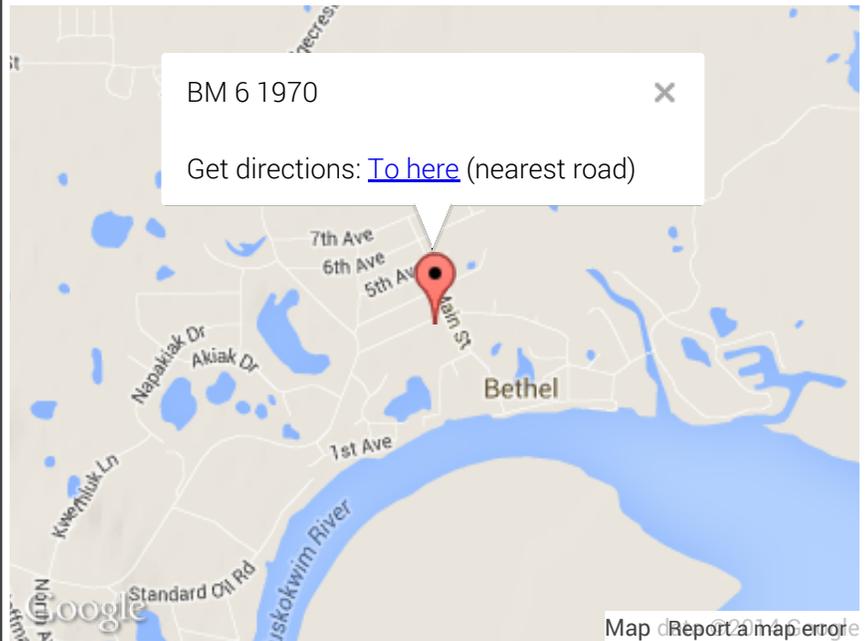
PID: DF3625
Designation: BM 6 1970
Stamping: BM 6 1970
Stability: Monument will probably hold position well
Setting: Copper-clad steel rod without sleeve (10FT+ or 3.048M+)
Mark Condition: P
Description: Potential frost jacking
Observed: 2014-07-14T00:00:00Z See Also [2001-10-16](#)
Source: OPUS - page5 1209.04

REF FRAME: NAD_83(2011)	EPOCH: 2010.0000	SOURCE: NAVD88 (Computed using GEOID12A)	UNITS: m	SET PROFILE	DETAILS
LAT: 60° 47' 41.03657" ± 0.014 m LON: -161° 45' 46.50092" ± 0.004 m ELL HT: 19.257 ± 0.003 m X: -2963399.543 ± 0.012 m Y: -976441.955 ± 0.004 m Z: 5544234.829 ± 0.008 m ORTHO HT: 8.627 ± 0.009 m		UTM 4 SPC 5007(AK 7) NORTHING: 6743089.594m 756652.725m EASTING: 349632.537m 512909.352m CONVERGENCE: -2.41213439° 0.20694470° POINT SCALE: 0.99987705 0.99990204 COMBINED FACTOR: 0.99987404 0.99989903			

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Horizon View



The numerical values for this position solution have satisfied the quality control criteria of the National Geodetic Survey. The contributor has verified that the information submitted is accurate and complete.

Shared Solution

PID: BBDP88

Designation: CABIN RESET 1994

Stamping: CABIN RESET 1994

Stability: May hold, commonly subject to ground movement

Setting: A metal rod driven into ground. Describe below.

Description: Mark is located in the vicinity of CABIN and CABIN 1975 both of which appear to have been destroyed. Potential ambiguity as to if this mark is actually one of those. Mark is located approximately 20 m E of the BIA road which is the first left as you leave the airport. If you reach the residential area you have gone too far. Mark is on tundra surrounded by brush.

Observed: 2014-07-14T00:00:00Z

Source: OPUS - page5 1209.04



Close-up View

REF FRAME:	EPOCH:	SOURCE:	UNITS:	SET PROFILE	DETAILS
NAD_83(2011)	2010.0000	NAVD88 (Computed using GEOID12A)	m		
LAT: 60° 47' 40.21401" ± 0.011 m LON: -161° 50' 43.78947" ± 0.008 m ELL HT: 47.029 ± 0.012 m X: -2964837.799 ± 0.018 m Y: -972180.954 ± 0.003 m Z: 5544246.647 ± 0.006 m ORTHO HT: 36.427 ± 0.022 m		UTM 4 SPC 5007(AK 7) NORTHING: 6743256.233m 756613.855m EASTING: 345139.046m 508412.867m CONVERGENCE: -2.48425250° 0.13486186° POINT SCALE: 0.99989386 0.99990087 COMBINED FACTOR: 0.99988650 0.99989351			

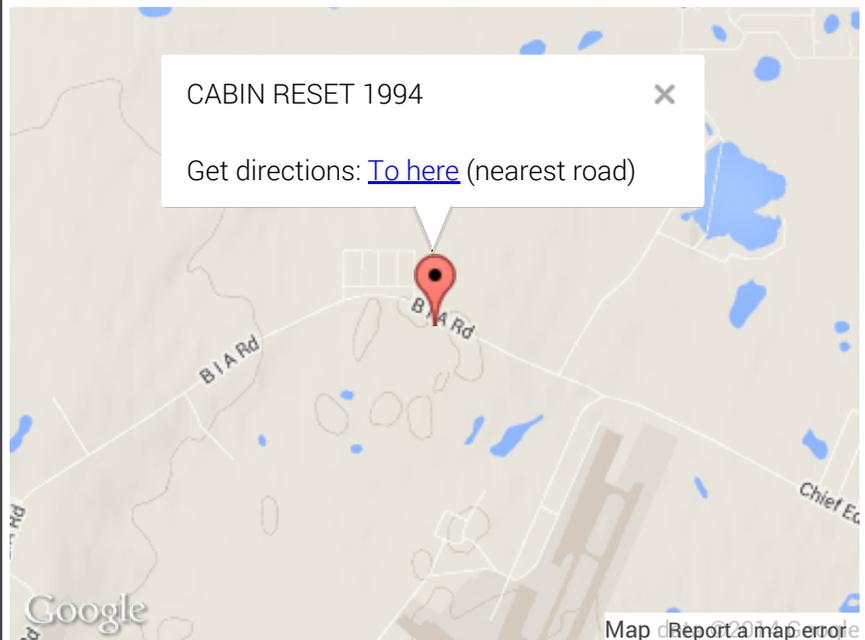
CONTRIBUTED BY

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Horizon View



The numerical values for this position solution have satisfied the quality control criteria of the National Geodetic Survey. The contributor has verified that the information submitted is accurate and complete.

Shared Solution

PID: DF3655
Designation: ELI B
Stamping: ELI B 2001
Stability: May hold commonly subject to ground movement
Setting: Set into or on top of metal pipe driven into ground
Mark Condition: G
Description:
Observed: 2013-07-25T00:00:00Z See Also [2001-08-22](#)
Source: OPUS - page5 1209.04



Close-up View

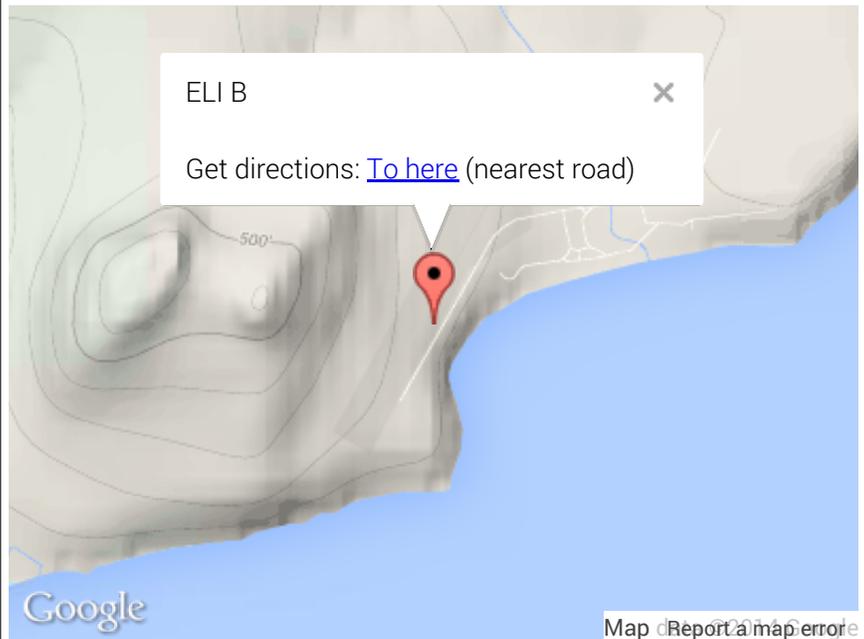
REF FRAME: NAD_83(2011)	EPOCH: 2010.0000	SOURCE: NAVD88 (Computed using GEOID12A)	UNITS: m	SET PROFILE	DETAILS
LAT: 64° 36' 50.32407" ± 0.013 m LON: -162° 16' 15.55256" ± 0.010 m ELL HT: 48.949 ± 0.007 m X: -2611702.296 ± 0.007 m Y: -834957.959 ± 0.012 m Z: 5739434.428 ± 0.010 m ORTHO HT: 42.663 ± 0.014 m		UTM 3 SPC 5007(AK 7) NORTHING: 7168243.231m 1182295.180m EASTING: 630514.083m 487033.192m CONVERGENCE: 2.46584332° -0.24482065° POINT SCALE: 0.99980857 0.99990206 COMBINED FACTOR: 0.99980091 0.99989440			

CONTRIBUTED BY

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Horizon View



The numerical values for this position solution have satisfied the quality control criteria of the National Geodetic Survey. The contributor has verified that the information submitted is accurate and complete.

Shared Solution

PID: DI8247
Designation: ENMA
Stamping:
Stability: Monument will probably hold position well
Setting: Stainless steel rod in sleeve (10FT+ or 3.048M+)
Mark Condition: G
Description:
Observed: 2014-07-17T00:00:00Z See Also [2005-10-01](#)
Source: OPUS - page5 1209.04



Close-up View

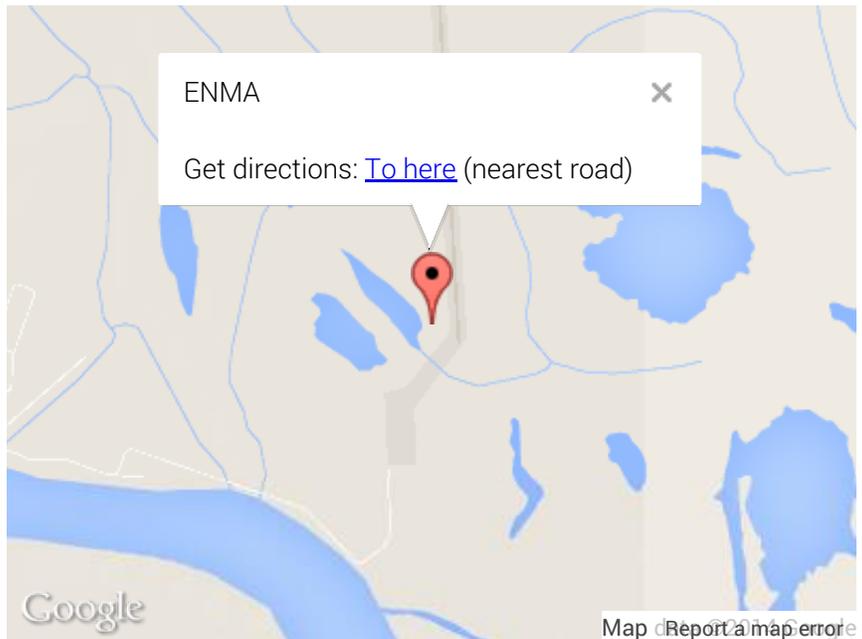
REF FRAME: NAD_83(2011)	EPOCH: 2010.0000	SOURCE: NAVD88 (Computed using GEOID12A)	UNITS: m	SET PROFILE	DETAILS
LAT: 62° 46' 49.70541" ± 0.013 m LON: -164° 29' 31.84607" ± 0.014 m ELL HT: 12.319 ± 0.018 m X: -2818632.553 ± 0.018 m Y: -782090.319 ± 0.012 m Z: 5648838.929 ± 0.017 m ORTHO HT: 5.218 ± 0.031 m		UTM 3 SPC 5008(AK 8) NORTHING: 6961232.751m 978803.019m EASTING: 525915.174m 576965.838m CONVERGENCE: 0.45158725° 1.34091034° POINT SCALE: 0.99960823 0.99997253 COMBINED FACTOR: 0.99960630 0.99997060			

CONTRIBUTED BY

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Horizon View



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Shared Solution

PID: DJ2634
Designation: ENMB
Stamping:
Stability: Monument will probably hold position well
Setting: Stainless steel rod in sleeve (10FT+ or 3.048M+)
Mark Condition: G
Description:
Observed: 2014-07-17T00:00:00Z See Also [2005-10-01](#)
Source: OPUS - page5 1209.04



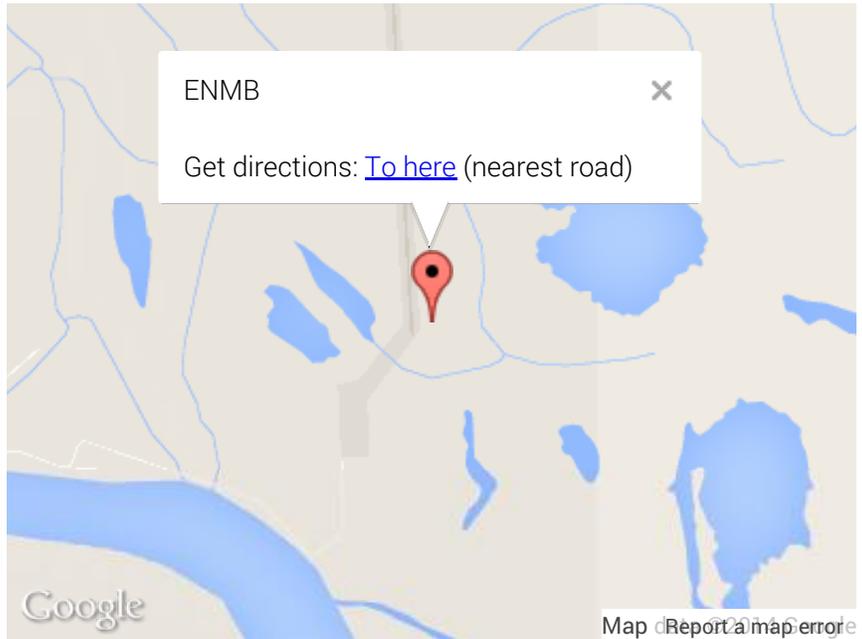
Close-up View

REF FRAME: NAD_83(2011)	EPOCH: 2010.0000	SOURCE: NAVD88 (Computed using GEOID12A)	UNITS: m	SET PROFILE	DETAILS
LAT: 62° 46' 49.00835" ± 0.016 m LON: -164° 29' 18.10696" ± 0.008 m ELL HT: 11.328 ± 0.012 m X: -2818598.508 ± 0.015 m Y: -782283.075 ± 0.008 m Z: 5648828.176 ± 0.012 m ORTHO HT: 4.224 ± 0.021 m		UTM 3 SPC 5008(AK 8) NORTHING: 6961212.720m 978786.009m EASTING: 526110.102m 577161.125m CONVERGENCE: 0.45498031° 1.34430229° POINT SCALE: 0.99960835 0.99997290 COMBINED FACTOR: 0.99960658 0.99997113			

CONTRIBUTED BY

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Horizon View



The numerical values for this position solution have satisfied the quality control criteria of the National Geodetic Survey. The contributor has verified that the information submitted is accurate and complete.

Shared Solution

PID: DJ2633
Designation: ENMC
Stamping:
Stability: Monument will probably hold position well
Setting: Stainless steel rod in sleeve (10FT+ or 3.048M+)
Mark Condition: G
Description:
Observed: 2014-07-17T00:00:00Z See Also [2005-10-01](#)
Source: OPUS - page5 1209.04



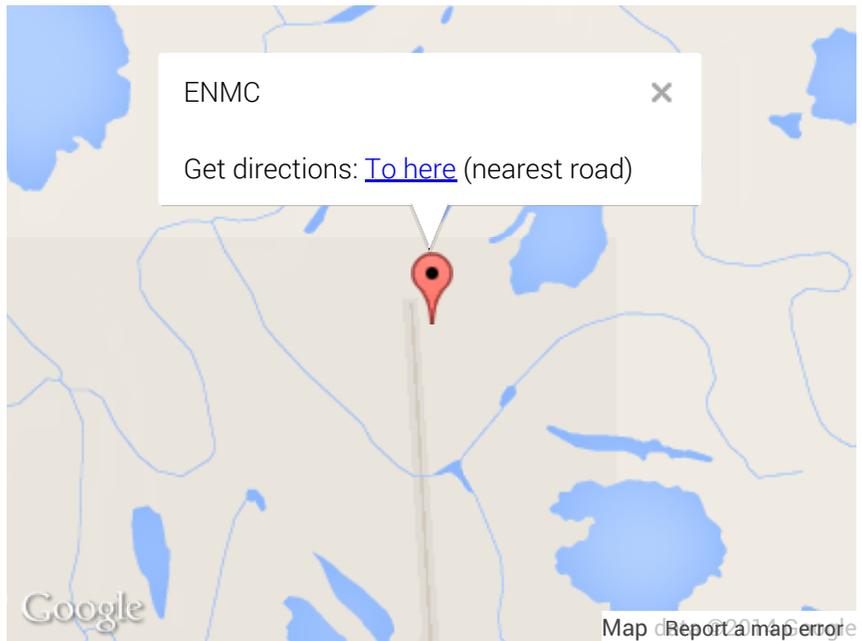
Close-up View

REF FRAME: NAD_83(2011)	EPOCH: 2010.0000	SOURCE: NAVD88 (Computed using GEOID12A)	UNITS: m	SET PROFILE	DETAILS
LAT: 62° 47' 30.31943" ± 0.012 m LON: -164° 29' 23.46524" ± 0.013 m ELL HT: 12.220 ± 0.016 m X: -2817523.206 ± 0.016 m Y: -781905.802 ± 0.012 m Z: 5649413.884 ± 0.016 m ORTHO HT: 5.141 ± 0.028 m		UTM 3 SPC 5008(AK 8) NORTHING: 6962490.593m 980062.858m EASTING: 526024.023m 577055.182m CONVERGENCE: 0.45370343° 1.34311679° POINT SCALE: 0.99960829 0.99997270 COMBINED FACTOR: 0.99960638 0.99997079			

CONTRIBUTED BY

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Horizon View



The numerical values for this position solution have satisfied the quality control criteria of the National Geodetic Survey. The contributor has verified that the information submitted is accurate and complete.

Shared Solution

PID: DF3657
Designation: ELI TIDAL GPS
Stamping: ELI TIDAL GPS 2001
Stability: Most reliable; expected to hold position well
Setting: In rock outcrop or ledge
Mark Condition: G
Description: null
Observed: 2013-07-27T00:00:00Z See Also [2012-11-13](#)
Source: OPUS - page5 1209.04



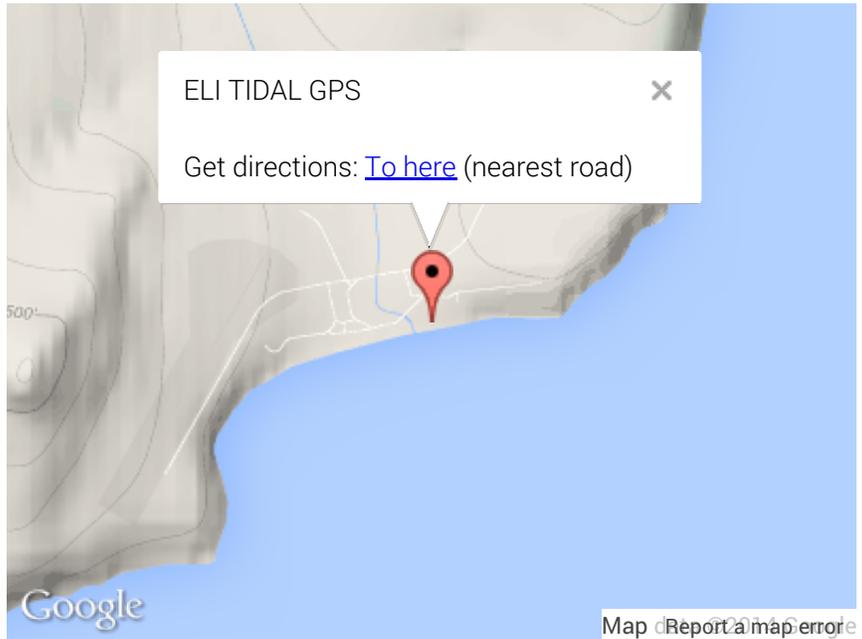
Close-up View

REF FRAME: NAD_83(2011)	EPOCH: 2010.0000	SOURCE: NAVD88 (Computed using GEOID12A)	UNITS: m	SET PROFILE	DETAILS
LAT: 64° 36' 59.46052" ± 0.006 m LON: -162° 15' 7.57112" ± 0.003 m ELL HT: 12.142 ± 0.006 m X: -2611168.478 ± 0.008 m Y: -835735.955 ± 0.002 m Z: 5739522.471 ± 0.003 m ORTHO HT: 5.851 ± 0.012 m		UTM 3 SPC 5007(AK 7) NORTHING: 7168564.862m 1182574.366m EASTING: 631404.499m 487937.906m CONVERGENCE: 2.48296295° -0.22776505° POINT SCALE: 0.99981142 0.99990178 COMBINED FACTOR: 0.99980952 0.99989988			

CONTRIBUTED BY

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Horizon View



The numerical values for this position solution have satisfied the quality control criteria of the National Geodetic Survey. The contributor has verified that the information submitted is accurate and complete.

Shared Solution

PID: UW3556
Designation: GEO STA 50391
Stamping: 50391
Stability: Monuments of questionable or unknown reliability
Setting: Unspecified setting
Mark Condition: G
Description:
Observed: 2013-07-12T00:00:00Z See Also [2012-10-12](#)
Source: OPUS - page5 1209.04



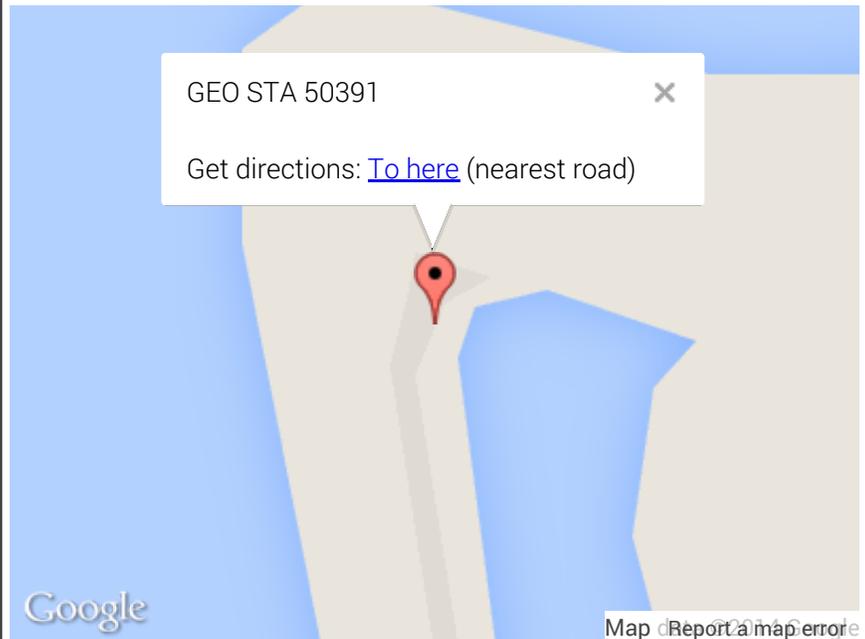
Close-up View

REF FRAME: NAD_83(2011)	EPOCH: 2010.0000	SOURCE: NAVD88 (Computed using GEOID12A)	UNITS: m	SET PROFILE	DETAILS
LAT: 63° 46' 28.08850" ± 0.010 m LON: -171° 43' 55.13773" ± 0.008 m ELL HT: 6.749 ± 0.009 m X: -2796785.782 ± 0.011 m Y: -406412.650 ± 0.010 m Z: 5698655.369 ± 0.004 m ORTHO HT: 2.553 ± 0.016 m		UTM 2 SPC 5009(AK 9) NORTHING: 7072089.830m 1089846.221m EASTING: 463909.445m 414585.124m CONVERGENCE: -0.65664054° -1.55378785° POINT SCALE: 0.99961595 0.99998931 COMBINED FACTOR: 0.99961489 0.99998825			

CONTRIBUTED BY

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Horizon View



The numerical values for this position solution have satisfied the quality control criteria of the National Geodetic Survey. The contributor has verified that the information submitted is accurate and complete.

Shared Solution

PID: UW8061
Designation: HOOP
Stamping: HOOP GPS 1991
Stability: Monument will probably hold position well
Setting: Stainless steel rod without sleeve (10FT+ or 3.048M+)
Mark Condition: G
Description:
Observed: 2014-07-23T00:00:00Z See Also [2013-06-07](#)
Source: OPUS - page5 1209.04



Close-up View

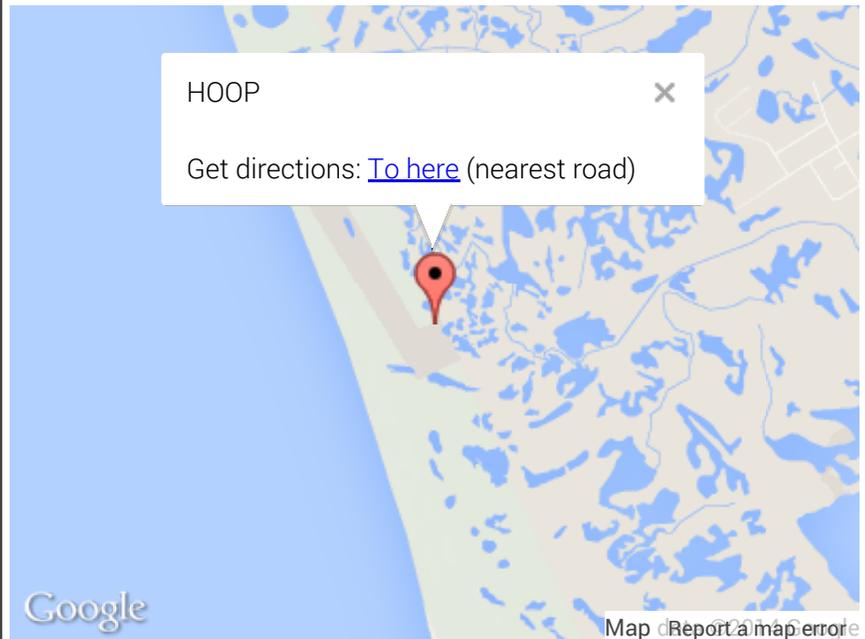
REF FRAME: NAD_83(2011)	EPOCH: 2010.0000	SOURCE: NAVD88 (Computed using GEOID12A)	UNITS: m	SET PROFILE	DETAILS
LAT: 61° 31' 16.18865" ± 0.011 m LON: -166° 8' 24.13742" ± 0.002 m ELL HT: 11.337 ± 0.009 m X: -2960434.041 ± 0.010 m Y: -730438.293 ± 0.003 m Z: 5583276.511 ± 0.010 m ORTHO HT: 3.175 ± 0.017 m		UTM 3 SPC 5008(AK 8) NORTHING: 6821369.515m 837576.797m EASTING: 439355.054m 492548.094m CONVERGENCE: -1.00211612° -0.12309267° POINT SCALE: 0.99964506 0.99990068 COMBINED FACTOR: 0.99964329 0.99989891			

CONTRIBUTED BY

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Horizon View



The numerical values for this position solution have satisfied the quality control criteria of the National Geodetic Survey. The contributor has verified that the information submitted is accurate and complete.

Shared Solution

PID: DF3630

Designation: HPB B

Stamping: HPB B 2001

Stability: May hold commonly subject to ground movement

Setting: Set into or on top of metal pipe driven into ground

Mark Condition: G

Description:

Observed: 2014-07-23T00:00:00Z See Also [2001-07-22](#)

Source: OPUS - page5 1209.04



Close-up View

REF FRAME:	EPOCH:	SOURCE:	UNITS:	SET PROFILE	DETAILS
NAD_83(2011)	2010.0000	NAVD88 (Computed using GEOID12A)	m		
LAT: 61° 31' 28.05849" ± 0.004 m LON: -166° 8' 43.12567" ± 0.010 m ELL HT: 13.466 ± 0.009 m X: -2960188.679 ± 0.005 m Y: -730088.663 ± 0.011 m Z: 5583453.577 ± 0.007 m ORTHO HT: 5.309 ± 0.016 m		UTM 3 SPC 5008(AK 8) NORTHING: 6821741.677m 837944.804m EASTING: 439080.947m 492268.239m CONVERGENCE: -1.00678423° -0.12773293° POINT SCALE: 0.99964547 0.99990073 COMBINED FACTOR: 0.99964336 0.99989862			

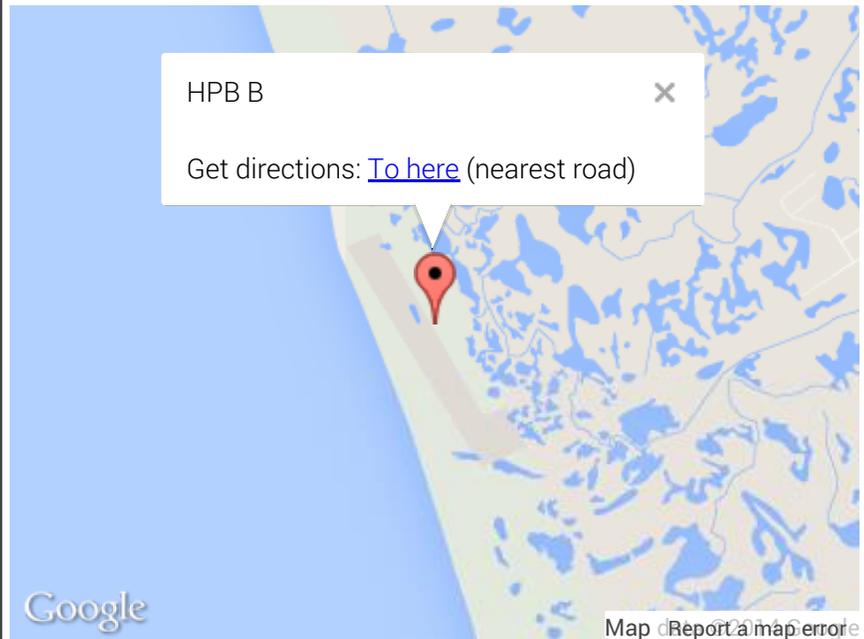
CONTRIBUTED BY

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Horizon View



The numerical values for this position solution have satisfied the quality control criteria of the National Geodetic Survey. The contributor has verified that the information submitted is accurate and complete.

Shared Solution

PID: UW8066
Designation: KALSKAG
Stamping: KALSKAG GPS 1991
Stability: Monument will probably hold position well
Setting: Stainless steel rod without sleeve (10FT+ or 3.048M+)
Mark Condition: G
Description:
Observed: 2014-07-15T00:00:00Z See Also [1991](#)
Source: OPUS - page5 1209.04



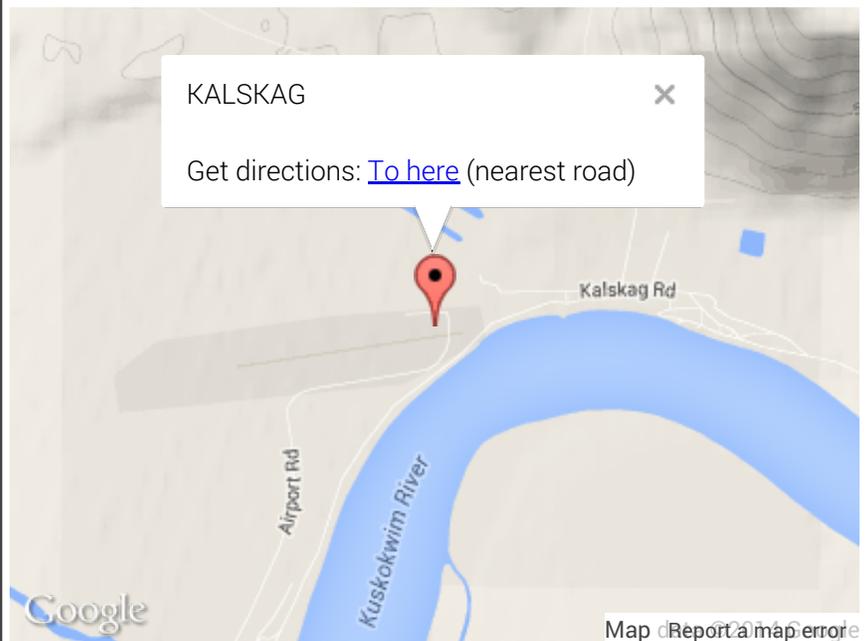
Close-up View

REF FRAME: NAD_83(2011)	EPOCH: 2010.0000	SOURCE: NAVD88 (Computed using GEOID12A)	UNITS: m	SET PROFILE	DETAILS
LAT: 61° 32' 13.91768" ± 0.010 m LON: -160° 20' 4.23912" ± 0.011 m ELL HT: 28.426 ± 0.008 m X: -2869892.760 ± 0.007 m Y: -1025620.568 ± 0.011 m Z: 5584143.419 ± 0.010 m ORTHO HT: 18.014 ± 0.015 m		UTM 4 SPC 5007(AK 7) NORTHING: 6823351.913m 840487.469m EASTING: 429047.494m 588573.908m CONVERGENCE: -1.17325257° 1.46427010° POINT SCALE: 0.99966167 0.99999608 COMBINED FACTOR: 0.99965722 0.99999163			

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Horizon View



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Shared Solution

PID: CA4540
Designation: MELSING RM 1
Stamping: MELSING NO 1 1944
Stability: Monument will probably hold position well
Setting: Unspecified rock or boulder
Mark Condition: G
Description: null
Observed: 2013-08-10T00:00:00Z See Also [2013-08-10](#)
Source: OPUS - page5 1209.04



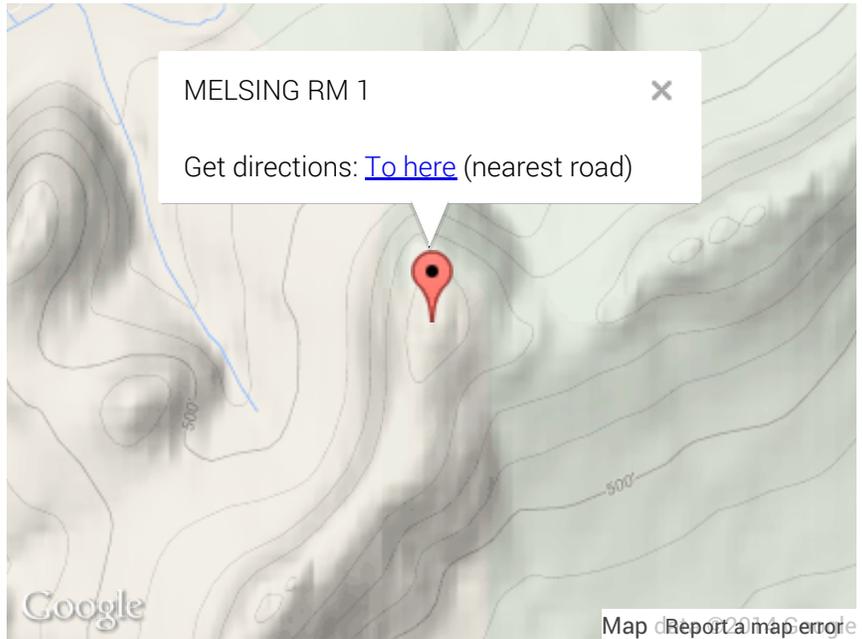
Close-up View

REF FRAME: NAD_83(2011)	EPOCH: 2010.0000	SOURCE: NAVD88 (Computed using GEOID12A)	UNITS: m	SET PROFILE	DETAILS
LAT: 64° 55' 20.43595" ± 0.009 m LON: -163° 41' 32.04107" ± 0.005 m ELL HT: 298.512 ± 0.007 m X: -2601861.582 ± 0.008 m Y: -761220.423 ± 0.005 m Z: 5754315.826 ± 0.008 m ORTHO HT: 292.941 ± 0.014 m		UTM 3 SPC 5007(AK 7) NORTHING: 7200439.254m 1217714.099m EASTING: 561845.431m 419951.756m CONVERGENCE: 1.18452575° -1.53279414° POINT SCALE: 0.99964683 0.99997843 COMBINED FACTOR: 0.99960015 0.99993173			

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Horizon View



The numerical values for this position solution have satisfied the quality control criteria of the National Geodetic Survey. The contributor has verified that the information submitted is accurate and complete.

Shared Solution

PID: UW1432
Designation: MESHIK
Stamping:
Stability: Monuments of questionable or unknown reliability
Setting: Set into or on top of metal pipe driven into ground
Mark Condition: G
Description:
Observed: 2013-09-07T00:00:00Z See Also [1978](#)
Source: OPUS - page5 1209.04



Close-up View

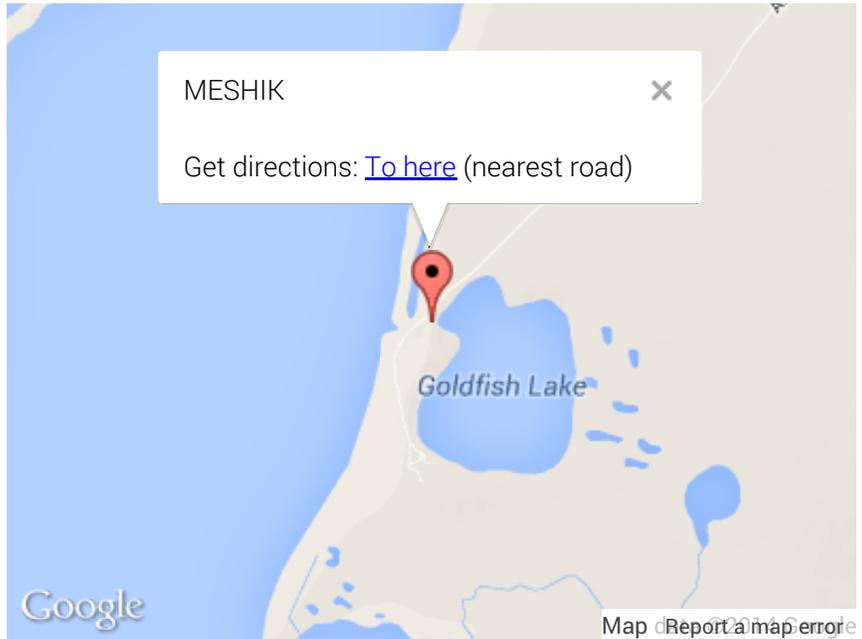
REF FRAME: NAD_83(2011)	EPOCH: 2010.0000	SOURCE: NAVD88 (Computed using GEOID12A)	UNITS: m	SET PROFILE	DETAILS
LAT: 56° 54' 56.76145" ± 0.006 m LON: -158° 40' 56.13129" ± 0.002 m ELL HT: 20.685 ± 0.008 m X: -3251083.057 ± 0.007 m Y: -1268704.161 ± 0.004 m Z: 5320802.879 ± 0.007 m ORTHO HT: 7.257 ± 0.015 m		UTM 4 SPC 5006(AK 6) NORTHING: 6308054.513m 324792.575m EASTING: 519345.658m 458448.570m CONVERGENCE: 0.26622640° -0.57165148° POINT SCALE: 0.99960459 0.99992117 COMBINED FACTOR: 0.99960135 0.99991793			

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Horizon View



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Shared Solution

PID: BBDH13
Designation: MIDNIGHT MTN
Stamping: NONE
Stability: Most reliable; expected to hold position well
Setting: A metal rod driven into ground. Describe below.
Description: 10 miles NE of Taylor AK, faint 4 wheeler trail available most of the way. Contact the Tweets to access from the ground (907 209 7911). Travel by 4 wheeler to Midnight Mountain. Pin is set on top of the tallest outcrop on NNW summit. There is a weak spot between the two points of this outcrop that you can crawl up to access the pin.
Observed: 2013-08-13T00:00:00Z
Source: OPUS - page5 1209.04



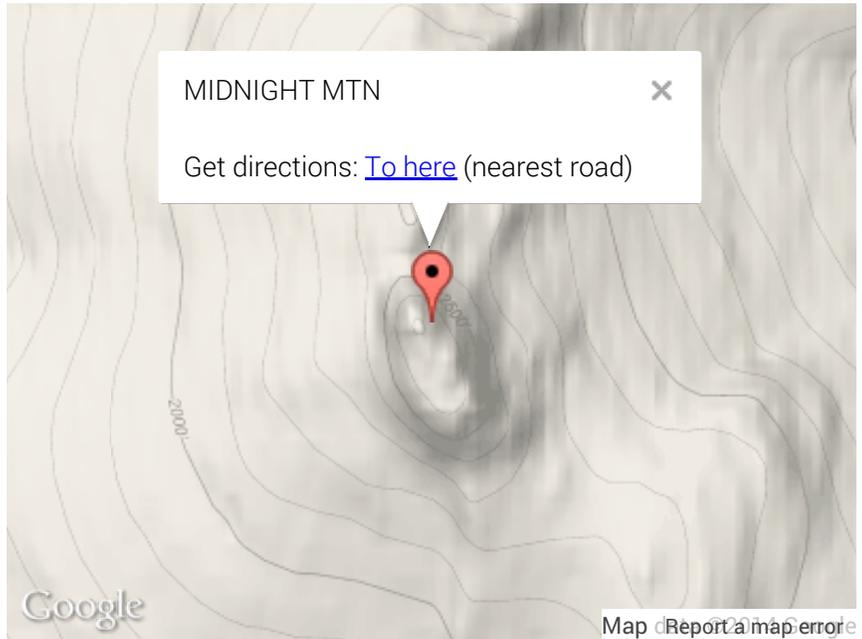
Close-up View

REF FRAME: NAD_83(2011)	EPOCH: 2010.0000	SOURCE: NAVD88 (Computed using GEOID12A)	UNITS: m	SET PROFILE	DETAILS
LAT: 65° 45' 52.90748" ± 0.007 m LON: -164° 35' 35.76223" ± 0.002 m ELL HT: 833.427 ± 0.007 m X: -2531428.970 ± 0.005 m Y: -697591.750 ± 0.001 m Z: 5793986.517 ± 0.008 m ORTHO HT: 829.128 ± 0.013 m		UTM 3 SPC 5008(AK 8) NORTHING: 7293743.154m 1311275.905m EASTING: 518630.028m 564449.538m CONVERGENCE: 0.37088734° 1.28279723° POINT SCALE: 0.99960425 0.99995083 COMBINED FACTOR: 0.99947394 0.99982047			

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Horizon View



The numerical values for this position solution have satisfied the quality control criteria of the National Geodetic Survey. The contributor has verified that the information submitted is accurate and complete.

Shared Solution

PID: TT4629
Designation: NOME MON 7279
Stamping:
Stability: Monument will probably hold position well
Setting: Stainless steel rod without sleeve (10FT+ or 3.048M+)
Mark Condition: G
Description:
Observed: 2013-08-08T00:00:00Z See Also [1991-08-05](#)
Source: OPUS - page5 1209.04



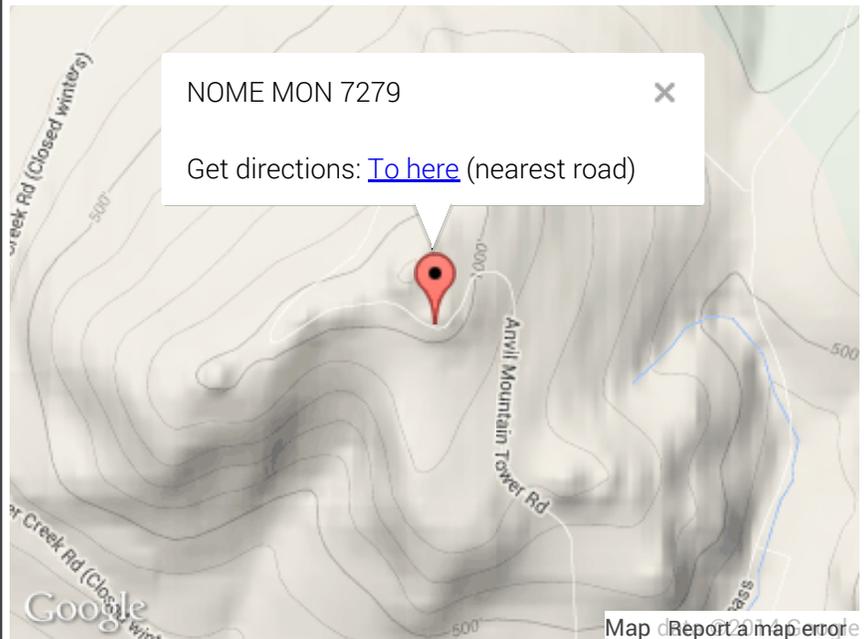
Close-up View

REF FRAME:	EPOCH:	SOURCE:	UNITS:	SET PROFILE	DETAILS
NAD_83(2011)	2010.0000	NAVD88 (Computed using GEOID12A)	m		
LAT: 64° 33' 45.73324" ± 0.004 m LON: -165° 22' 16.32892" ± 0.006 m ELL HT: 330.881 ± 0.005 m X: -2658149.887 ± 0.004 m Y: -693823.036 ± 0.005 m Z: 5737235.955 ± 0.005 m ORTHO HT: 325.532 ± 0.010 m		UTM 3 SPC 5008(AK 8) NORTHING: 7159772.262m 1176700.937m EASTING: 482209.768m 530144.516m CONVERGENCE: -0.33521745° 0.56784353° POINT SCALE: 0.99960388 0.99991112 COMBINED FACTOR: 0.99955214 0.99985936			

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Horizon View



The numerical values for this position solution have satisfied the quality control criteria of the National Geodetic Survey. The contributor has verified that the information submitted is accurate and complete.

Shared Solution

PID: DF3651
Designation: OME A
Stamping: OME A 2001
Stability: May hold commonly subject to ground movement
Setting: Set into or on top of metal pipe driven into ground
Mark Condition: G
Description:
Observed: 2013-08-08T00:00:00Z See Also [2001-08-20](#)
Source: OPUS - page5 1209.04



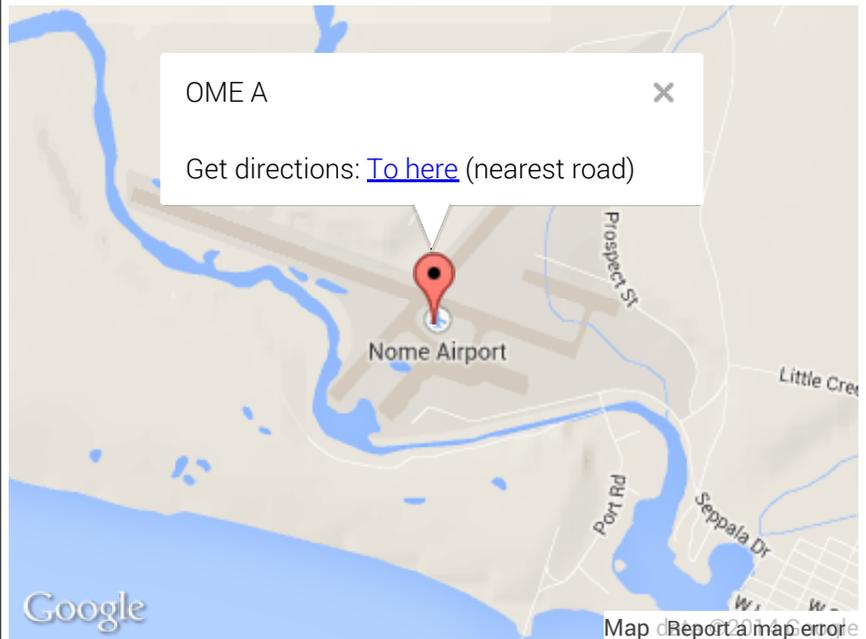
Close-up View

REF FRAME: NAD_83(2011)	EPOCH: 2010.0000	SOURCE: NAVD88 (Computed using GEOID12A)	UNITS: m	SET PROFILE	DETAILS
LAT: 64° 30' 35.19546" ± 0.007 m LON: -165° 26' 37.60504" ± 0.004 m ELL HT: 9.481 ± 0.004 m X: -2664049.424 ± 0.007 m Y: -691759.640 ± 0.005 m Z: 5734408.798 ± 0.005 m ORTHO HT: 4.232 ± 0.010 m		UTM 3 SPC 5008(AK 8) NORTHING: 7153896.458m 1170768.593m EASTING: 478690.254m 526716.980m CONVERGENCE: -0.40058264° 0.50208051° POINT SCALE: 0.99960556 0.99990874 COMBINED FACTOR: 0.99960408 0.99990726			

CONTRIBUTED BY

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Horizon View



The numerical values for this position solution have satisfied the quality control criteria of the National Geodetic Survey. The contributor has verified that the information submitted is accurate and complete.

Shared Solution

PID: DF3652
Designation: OME B
Stamping: OME B 2001
Stability: May hold commonly subject to ground movement
Setting: Set into or on top of metal pipe driven into ground
Mark Condition: G
Description:
Observed: 2013-08-09T00:00:00Z See Also [2001-08-20](#)
Source: OPUS - page5 1209.04



Close-up View

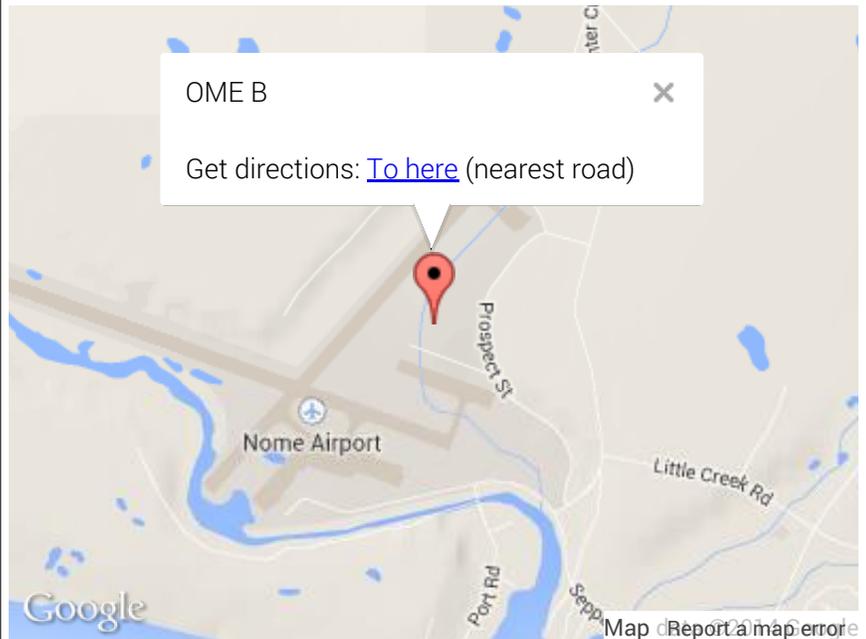
REF FRAME: NAD_83(2011)	EPOCH: 2010.0000	SOURCE: NAVD88 (Computed using GEOID12A)	UNITS: m	SET PROFILE	DETAILS
LAT: 64° 30' 46.55426" ± 0.006 m LON: -165° 26' 1.02943" ± 0.003 m ELL HT: 22.426 ± 0.010 m X: -2663624.790 ± 0.004 m Y: -692153.571 ± 0.003 m Z: 5734571.858 ± 0.010 m ORTHO HT: 17.170 ± 0.018 m		UTM 3 SPC 5008(AK 8) NORTHING: 7154244.700m 1171124.624m EASTING: 479180.516m 527201.842m CONVERGENCE: -0.39142190° 0.51126501° POINT SCALE: 0.99960531 0.99990906 COMBINED FACTOR: 0.99960180 0.99990555			

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Horizon View



The numerical values for this position solution have satisfied the quality control criteria of the National Geodetic Survey. The contributor has verified that the information submitted is accurate and complete.

Shared Solution

PID: DJ2781
Designation: SVAC
Stamping: SVA-C 2006
Stability: Monument will probably hold position well
Setting: A metal rod driven into ground. Describe below.
Mark p
Condition:
Description: Area has undergone permafrost thaw and frost jacking, pvc collar is now above ground.
Observed: 2013-07-19T03:53:00Z See Also [2012-04-03](#)
Source: OPUS - page5 1209.04



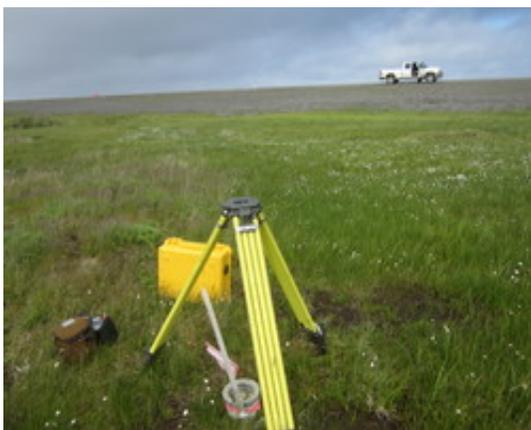
Close-up View

REF FRAME: NAD_83(2011)	EPOCH: 2010.0000	SOURCE: NAVD88 (Computed using GEOID12A)	UNITS: m	SET PROFILE	DETAILS
LAT: 63° 41' 4.90897" ± 0.006 m	LON: -170° 29' 47.73271" ± 0.003 m	ELL HT: 19.124 ± 0.008 m	X: -2796229.300 ± 0.008 m	Y: -468099.267 ± 0.002 m	Z: 5694237.198 ± 0.005 m
ORTHO HT: 14.509 ± 0.015 m	UTM 2 SPC 5009(AK 9)		NORTHING: 7061977.896m 1078777.263m	EASTING: 524899.641m 475430.075m	CONVERGENCE: 0.45124077° -0.44513178°
			POINT SCALE: 0.99960759 0.99990739	COMBINED FACTOR: 0.99960460 0.99990440	

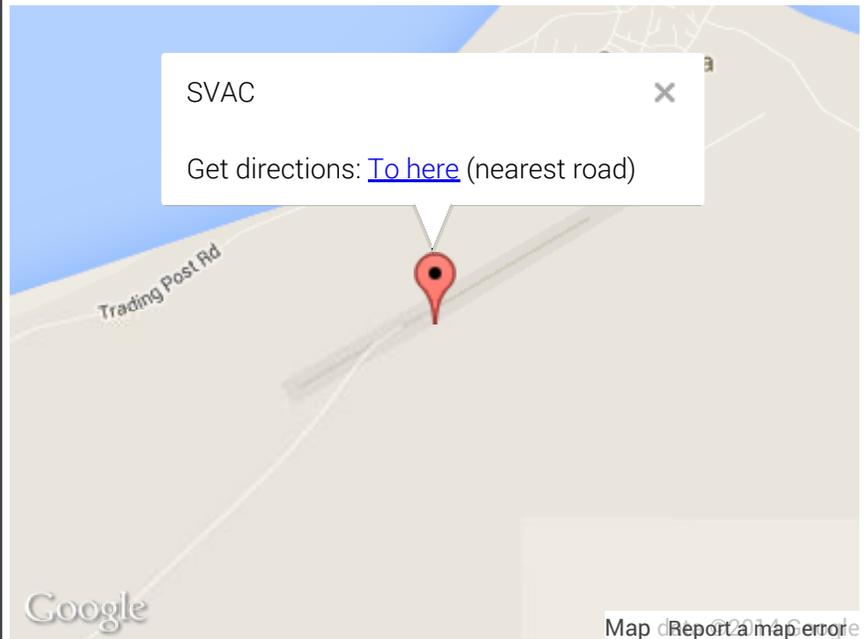
CONTRIBUTED BY

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Horizon View



The numerical values for this position solution have satisfied the quality control criteria of the National Geodetic Survey. The contributor has verified that the information submitted is accurate and complete.

Shared Solution

PID: DL3335
Designation: TLT A
Stamping: TLT A - LS 8852 - 2006
Stability: May hold commonly subject to ground movement
Setting: A metal rod with base plate buried/screwed into ground
Mark P
Condition:
Description: Probably frost jacked, mark is now approx. 6 in above ground surface
Observed: 2014-07-15T00:00:00Z See Also [2006-06-01](#)
Source: OPUS - page5 1209.04



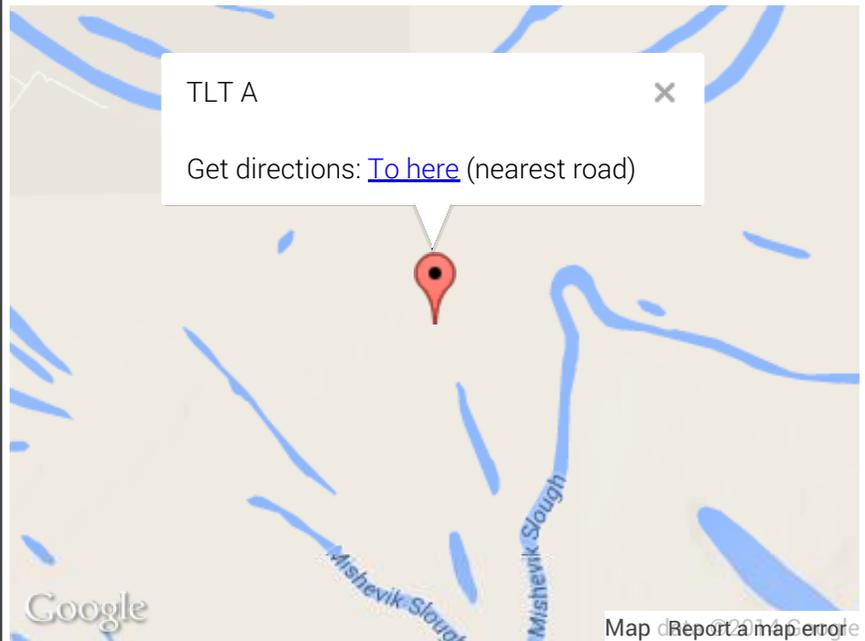
Close-up View

REF FRAME: NAD_83(2011)	EPOCH: 2010.0000	SOURCE: NAVD88 (Computed using GEOID12A)	UNITS: m	SET PROFILE	DETAILS
LAT: 61° 5' 18.56684" ± 0.015 m LON: -160° 55' 17.49670" ± 0.013 m ELL HT: 20.069 ± 0.004 m X: -2921700.724 ± 0.013 m Y: -1010500.392 ± 0.012 m Z: 5560133.986 ± 0.011 m ORTHO HT: 9.470 ± 0.010 m		UTM 4 SPC 5007(AK 7) NORTHING: 6774165.240m 789838.454m EASTING: 396372.194m 558183.412m CONVERGENCE: -1.68219011° 0.94408644° POINT SCALE: 0.99973157 0.99994146 COMBINED FACTOR: 0.99972843 0.99993832			

CONTRIBUTED BY

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Horizon View



The numerical values for this position solution have satisfied the quality control criteria of the National Geodetic Survey. The contributor has verified that the information submitted is accurate and complete.

Shared Solution

PID: DM4448
Designation: UNK A
Stamping: UNK A
Stability: Monument will probably hold position well
Setting: Stainless steel rod in sleeve (10FT+ or 3.048M+)
Mark Condition: G
Description: null
Observed: 2013-08-03T00:00:00Z See Also [2010-06-07](#)
Source: OPUS - page5 1209.04



Close-up View

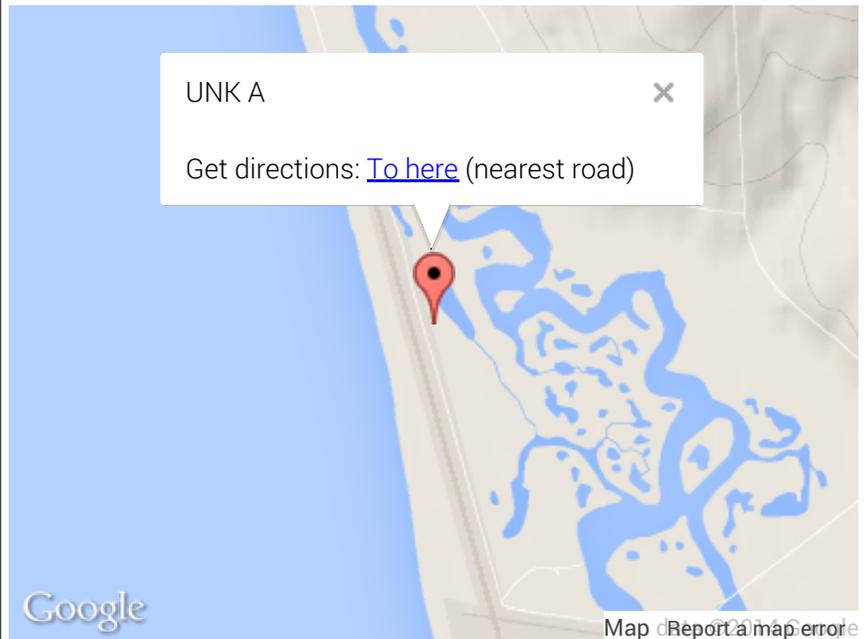
REF FRAME: NAD_83(2011)	EPOCH: 2010.0000	SOURCE: NAVD88 (Computed using GEOID12A)	UNITS: m	SET PROFILE	DETAILS
LAT: 63° 53' 37.55927" ± 0.009 m LON: -160° 48' 5.23869" ± 0.003 m ELL HT: 14.294 ± 0.008 m X: -2657713.712 ± 0.008 m Y: -925438.150 ± 0.004 m Z: 5704526.476 ± 0.008 m ORTHO HT: 6.548 ± 0.015 m		UTM 4 SPC 5007(AK 7) NORTHING: 7086424.969m 1102538.184m EASTING: 411561.469m 558860.925m CONVERGENCE: -1.61777382° 1.07629943° POINT SCALE: 0.99969578 0.99994241 COMBINED FACTOR: 0.99969354 0.99994017			

CONTRIBUTED BY

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Horizon View



The numerical values for this position solution have satisfied the quality control criteria of the National Geodetic Survey. The contributor has verified that the information submitted is accurate and complete.

Shared Solution

PID: DM4449
Designation: UNK B
Stamping: UNK B
Stability: Monument will probably hold position well
Setting: Stainless steel rod in sleeve (10FT+ or 3.048M+)
Mark Condition: G
Description:
Observed: 2013-08-01T00:00:00Z See Also [2010-06-07](#)
Source: OPUS - page5 1209.04



Close-up View

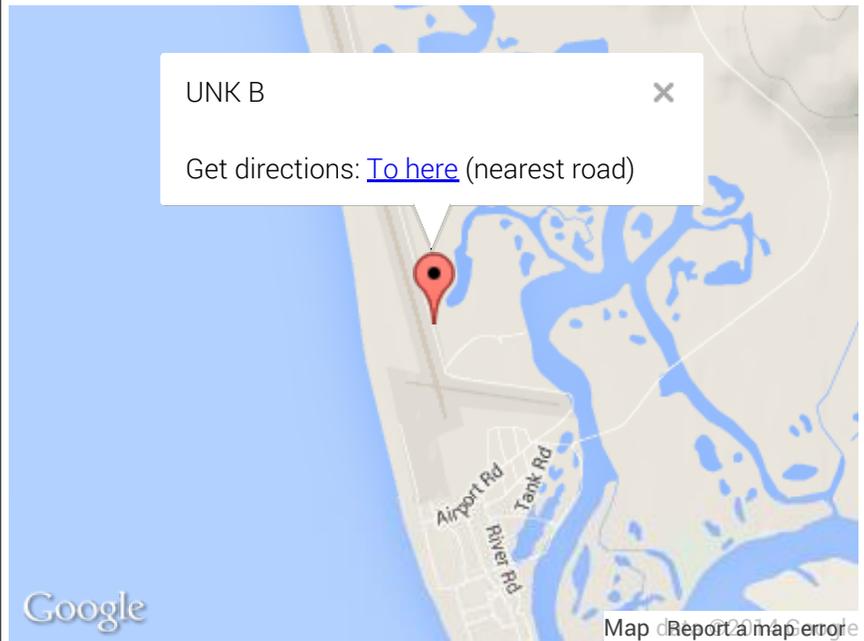
REF FRAME: NAD_83(2011)	EPOCH: 2010.0000	SOURCE: NAVD88 (Computed using GEOID12A)	UNITS: m	SET PROFILE	DETAILS
LAT: 63° 53' 7.86576" ± 0.006 m LON: -160° 47' 48.32903" ± 0.005 m ELL HT: 13.837 ± 0.007 m X: -2658417.346 ± 0.008 m Y: -925927.531 ± 0.005 m Z: 5704121.404 ± 0.003 m ORTHO HT: 6.086 ± 0.013 m		UTM 4 SPC 5007(AK 7) NORTHING: 7085499.638m 1101623.269m EASTING: 411766.136m 559108.919m CONVERGENCE: -1.61344130° 1.08044150° POINT SCALE: 0.99969533 0.99994277 COMBINED FACTOR: 0.99969317 0.99994061			

CONTRIBUTED BY

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Horizon View



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