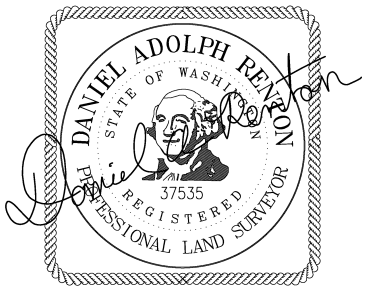
GEODETIC SURVEY

QUILLAYUTE RIVER SECTOR LIGHT 3 (LLNR 16090)
LA PUSH, WA

Survey conducted 6/23/2022

07/12/2022



Daniel A. Renton, P.L.S., C.W.R.E
Vice President
Minister & Glaeser Surveying, Inc.

MGS Job: 22-264

NARRATIVE

This survey was performed at the request of Quigg Bros., Inc., of Aberdeen, Wa. The purpose of this survey was to determine the horizontal and vertical position of one (1) newly constructed aid-to-navigation structures **(ATON) QUILLAYUTE RIVER SECTOR LIGHT 3 (LLNR 16090)** located at the mouth of the Quillayute River in La Push, Wa. NOAA Chart 18480 (Destruction Island to Amphitrite Point).

(ATON) QUILLAYUTE RIVER SECTOR LIGHT 3 (LLNR 16090)

The position of the navigation structure was determined by the use of the Global Positioning System **(GPS)** operating in a static data collection mode (4 plus hours). The following National Geodetic Survey Online Positioning User Service Data Base **(NGS-OPUS-SHARED-SOLUTION)** control monuments were used for this survey:

NGS-OPUS-SHARED-SOLUTION: "944 2396 TIDAL 7 (PID: SD0158)"
NGS-OPUS-SHARED-SOLUTION: "11+00 25+00 F. LT TOE (PID: BBDR10)"

A 1-person survey crew consisting of August "AUG-DOG" Karlsen performed the fieldwork on June 23, 2022. A Trimble R8s GNSS dual frequency receiver was set on **NGS-OPUS-SHARED-SOLUTION** control station **"944 2396 TIDAL 7 (PID: SD0158)",** a Trimble R8 GNSS dual frequency receiver was set on **NGS-OPUS-SHARED-SOLUTION** control station **"11+00 25+00 F. LT TOE (PID: BBDR10)",** a Trimble R8 GNSS dual frequency receiver was set on aid-to-navigation structures **(ATON) QUILLAYUTE RIVER SECTOR LIGHT 3 (LLNR 16090).** A baseline was measured to the focal point of the center light of the 3 light sector light structure of the **(ATON) QUILLAYUTE RIVER SECTOR LIGHT 3 (LLNR 16090)** from the two (2) **NGS-OPUS-SHARED SOLUTION** control stations.

The focal focal point of the center light of the 3 light sector light structure of the **(ATON) QUILLAYUTE RIVER SECTOR LIGHT 3 (LLNR 16090)** were tied from **NGS-OPUS-SHARED-SOLUTION** control station **"944 2396 TIDAL 7 (PID: SD0158)"** and **NGS-OPUS-SHARED-SOLUTION** control station **"11+00 25+00 F. LT TOE (PID: BBDR10)".** The following baselines were measured simultaneously using the **NGS-OPUS-SHARED-SOLUTION** control stations.

NGS-OPUS-SHARED-SOLUTION: "944 2396 TIDAL 7 (PID: SD0158)"
To
(ATON) QUILLAYUTE RIVER SECTOR LIGHT 3 (LLNR 16090)

NGS-OPUS-SHARED-SOLUTION: "11+00 25+00 F. LT TOE (PID: BBDR10)"
To
(ATON) QUILLAYUTE RIVER SECTOR LIGHT 3 (LLNR 16090)

The position of the aid to navigation **(ATON) QUILLAYUTE RIVER SECTOR LIGHT 3 (LLNR 16090)** was computed by processing the 4 hours of Static data using the **National Geodetic Survey Online Positioning User Service (NGS-OPUS)** and cross checked using Static GPS Data Collection that was processed with **Trimble Business Center (TBC)** software and also cross checked using **Real Time Kinematic GPS** (**RTK-GPS**) with the **RTK-GPS (**Trimble R8s GNSS dual frequency receiver) base set on **NGS-OPUS-SHARED-SOLUTION** control station **"944 2396 TIDAL 7 (PID: SD0158)"** and the **RTK-GPS (**Trimble R10-2 GNSS dual frequency receiver) rover set on **(ATON) QUILLAYUTE RIVER SECTOR LIGHT 3 (LLNR 16090)**

LISTED BELOW ARE THE QA/QC RESULTS

RTK GPS DATA COLLECTION	NORTHING (1)	EASTING (1)	ELEVATION (2)	ELEVATION (3)
QUILLAYUTE RIVER SECTOR LIGHT 3 (LLNR 16090)	354176.46	706053.50	32.74	26.38
STATIC GPS DATA COLLECTION (TBC*)	**NORTHING (1)**	**EASTING (1)**	**ELEVATION (2)**	**ELEVATION (3)**
QUILLAYUTE RIVER SECTOR LIGHT 3 (LLNR 16090)	354176.45	706053.49	32.71	26.35
STATIC GPS DATA COLLECTION (OPUS)**	**NORTHING (1)**	**EASTING (1)**	**ELEVATION (2)**	**ELEVATION (3)**

MGS Job: 22-264

QUILLAYUTE RIVER SECTOR LIGHT 3 (LLNR 16090)	354176.41	706053.57	32.85	26.49
RTK/STATIC GPS (TBC*) CHECKS	**Δ NORTHING (1)**	**Δ EASTING (1)**	**Δ ELEVATION (2)**	**Δ ELEVATION (3)**
QUILLAYUTE RIVER SECTOR LIGHT 3 (LLNR 16090)	0.01	0.01	0.03	0.03
RTK/STATIC GPS (OPUS) CHECKS**	**Δ NORTHING (1)**	**Δ EASTING (1)**	**Δ ELEVATION (2)**	**Δ ELEVATION (3)**
QUILLAYUTE RIVER SECTOR LIGHT 3 (LLNR 16090)	0.05	-0.07	-0.11	-0.11
STATIC GPS (TBC*)/STATIC GPS (OPUS) CHECKS**	**Δ NORTHING (1)**	**Δ EASTING (1)**	**Δ ELEVATION (2)**	**Δ ELEVATION (3)**
QUILLAYUTE RIVER SECTOR LIGHT 3 (LLNR 16090)	0.04	-0.08	-0.14	-0.14
(1) NAD 83_(2011) (EPOCH:2010.0000), WASHINGTON STATE PLANE COORDINATE SYSTEM, NORTH ZONE, US-FEET				
(2) NAVD 88				
(3) MHW (MEAN HIGH WATER)				
(TBC*) PROCESSED WITH TRIMBLE BUSINESS CENTER SOFTWARE				
(OPUS) PROCESSED USING THE NATIONAL GEODETIC SURVEY ONLINE POSITIONING USER SERVICE**				

ASBUILT COMPARISON RESULTS

	NORTHING (1)	**EASTING (1)**	**ELEVATION (2)**	**ELEVATION (3)**
ASBUILT POSITION				
QUILLAYUTE RIVER SECTOR LIGHT 3 (LLNR 16090)	354176.41	706053.57	32.85	26.49
DESIGN POSITION				
QUILLAYUTE RIVER SECTOR LIGHT 3 (LLNR 16090)	354176.76	706053.05	33.36	27.00
DELTAS	**Δ NORTHING (1)**	**Δ EASTING (1)**	**Δ ELEVATION (2)**	**Δ ELEVATION (3)**
QUILLAYUTE RIVER SECTOR LIGHT 3 (LLNR 16090)	-0.35	0.52	-0.51	-0.51
ASBUILT POSITION OF THE QUILLAYUTE RIVER SECTOR LIGHT 3 (LLNR 16090) IS 0.55 FEET LEFT OF RANGE LINE				
(1) NAD 83_(2011) (EPOCH:2010.0000), WASHINGTON STATE PLANE COORDINATE SYSTEM, NORTH ZONE, US-FEET				
(2) NAVD 88				
(3)MHW (MEAN HIGH WATER)				

The Mean High-Water Datum (**MHW**) elevation was computed from the NOAA Tides and Currents Tables for 9442396 La Push, Quillayute River, Washington. The **STATIC (OPUS)-GPS** derived elevation was held for the NAVD 88 (GEOID18 CONUS) elevation for **(ATON) QUILLAYUTE RIVER SECTOR LIGHT 3 (LLNR 16090)**

See attachment “A” for the network control drawing.

MGS Job: 22-264

NAVIGATION AIDS AND CONTROL POINT POSITIONS
(NAD 83_ (2011) (EPOCH: 2010.0000) - GEODETIC)

NAVIGATION AID	LATITUDE	LONGITUDE	ELEVATION
QUILLAYUTE RIVER SECTOR LIGHT 3 (LLNR 16090)	*47° 54' 27.06563"N	*124° 38' 40.57728"W	**32.85’ ***26.49’

NAVIGATION AIDS AND CONTROL POINT POSITIONS
(WGS_84 - GEODETIC)

NAVIGATION AID	LATITUDE	LONGITUDE	ELEVATION
QUILLAYUTE RIVER SECTOR LIGHT 3 (LLNR 16090)	*47° 54' 27.0850"N	*124° 38' 40.6320"W	**32.85’ ***26.49’

GEODETIC POSITION FROM NGS OPUS-SHARED SOLUTION SHEETS AND CONVERTED TO WGS 84 USING ESRI ARCGIS PRO, SEE ATTACHMENT “C”
****NORTH AMERICAN VERTICAL DATUM 1988 (GEOID18_CONUS) (NAVD 88) ELEVATION AT FOCAL POINT OF LIGHT***
*****MEAN HIGH WATER DATUM (MHW) ELEVATION AT FOCAL POINT OF LIGHT***

CONTROL POINTS USED

NGS-OPUS-SHARED-SOLUTION: “944 2396 TIDAL 7 (PID: SD0158)”	* 47° 54' 31.08944"N	* 124° 38' 16.65938"W	**17.20’ ***10.33’
NGS-OPUS-SHARED-SOLUTION: “11+00 25+00 F. LT TOE (PID: BBDR10)”	* 47° 54' 44.68725"N	* 124° 38' 06.14266"W	**27.57’ ***21.22’

GEODETIC POSITION FROM NGS OPUS-SHARED SOLUTION SHEETS, SEE ATTACHMENT “D”
****NORTH AMERICAN VERTICAL DATUM 1988 (GEOID18_CONUS) (NAVD 88)***
***** MEAN HIGH WATER DATUM (MWH)***
……

NAVIGATION AID POSITION
(NAD 83_ (2011) (EPOCH: 2010.0000) WASHINGTON NORTH ZONE,)
(STATE PLANE, US-FEET)

NAVIGATION AID	NORTHING	EASTING	ELEVATION
QUILLAYUTE RIVER SECTOR LIGHT 3 (LLNR 16090)	*354176.41	*706053.57	**32.85’ ***26.49’

MGS Job: 22-264

NAVIGATION AID POSITION
(NAD 83_ (2011) (EPOCH: 2010.0000) WASHINGTON NORTH ZONE,)
(STATE PLANE, METERS)

NAVIGATION AID	NORTHING	EASTING	ELEVATION
QUILLAYUTE RIVER SECTOR LIGHT 3 (LLNR 16090)	* 107953.186	* 215205.560	**10.012' ***8.073'

GEODETIC POSITION FROM NGS OPUS-SHARED SOLUTION SHEETS, SEE ATTACHMENT "C"
****NORTH AMERICAN VERTICAL DATUM 1988 (GEOID18_CONUS) (NAVD 88) ELEVATION AT FOCAL POINT OF LIGHT***
****** MEAN HIGH WATER DATUM (MWH) ELEVATION AT FOCAL POINT OF LIGHT***

……

NAVIGATION AID DESCRIPTION REPORT

DATE: 06-23-2022

ATON NAME: QUILLAYUTE RIVER SECTOR LIGHT 3 (LLNR 16090)

NUMBER OF PILES: 4

TYPE OF PILES: STEEL

MISC.: STEEL FRAMED STRUCTURE

QUILLAYUTE RIVER SECTOR LIGHT 3 (LLNR 16090)

SHAPE OF DAY BOARD: GREEN BOARD WITH BLACK LIGHT NUMBER 3

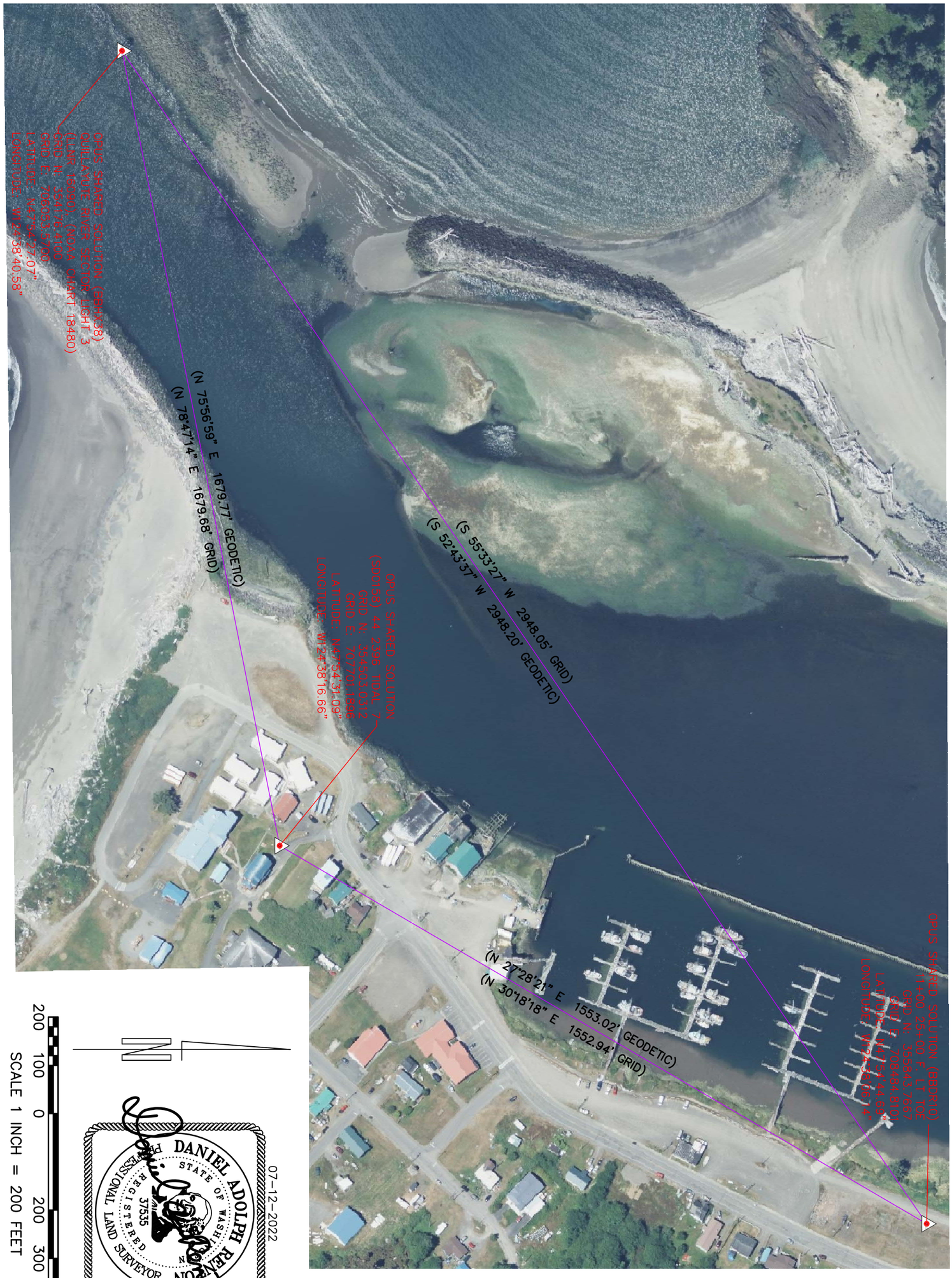
TYPE OF LIGHT: 3 LIGHT SECTOR LIGHT MODEL NUMBER VLS-46

HEIGHT OF LIGHT FOCAL POINT FROM WATER SURFACE: 29.5 FT **TIME** 11:00 AM PDT

ADDITIONAL INFORMATION:
QUILLAYUTE RIVER SECTOR LIGHT 3 (LLNR 16090) HAS A SOLAR PANEL AND BATTERY PACK LOCATED ON THE PLATFORM THAT SUPPLIES POWER TO THE LIGHT.

SKETCH: SEE ATTACHMENT "B"

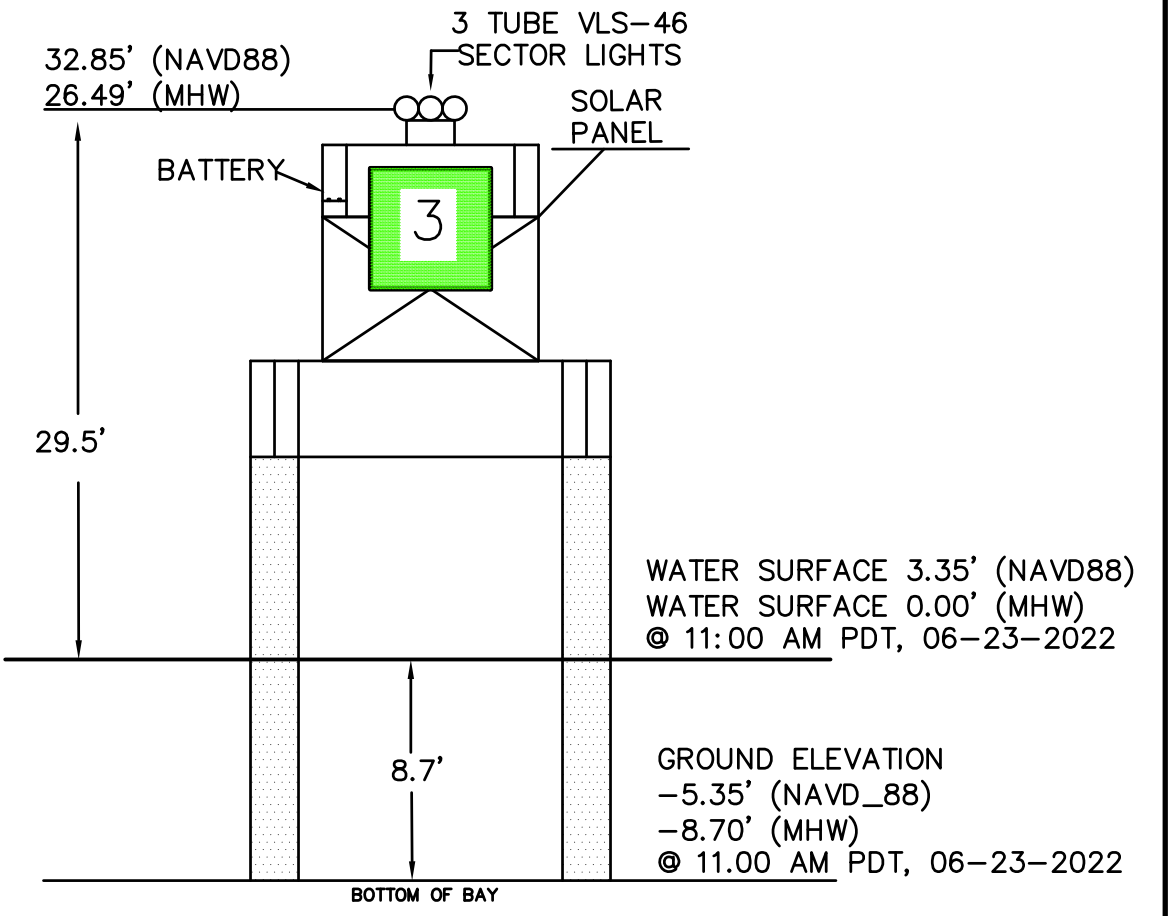
MGS Job: 22-264



PREPARED BY:
MINISTER-GLAESER
SURVEYING INC.
2200 E. EVERGREEN BLVD.
VANCOUVER, WA 98661
(360) 694-3313

ATTACHMENT "A"
NETWORK MAP
QUILLAYUTE RIVER SECTOR
LIGHT 3 (LLNR 16090), (NOAA CHART 18480)

SCALE: 1"=200'
JOB NO. 22-264
DATE: 07-11-2022
DWG FILE: 22264_RANGE
DRAWN BY: DAR



07-11-2022

DANIEL ADOLPH RENTON
STATE OF WASHINGTON
37535
REGISTERED
PROFESSIONAL LAND SURVEYOR

PREPARED BY:
MINISTER-GLAESER
SURVEYING INC.
2200 E. EVERGREEN BLVD.
VANCOUVER, WA 98661
(360) 694-3313

ATTACHMENT "B"
QUILLAYUTE RIVER SECTOR
LIGHT 3 (LLNR 16090)
(NOAA CHART 18480)

SCALE: N/A
JOB NO. 22-264
DATE: 07-11-2022
DWG FILE: 22264_TOWER
DRAWN BY: DAR

Shared Solution

ATTACHMENT "C"

PID: BBHX38
Designation: QUILLAYUTE RIVER DIRECTIONAL LIGHT 3 LLNR 16090
Stamping: NONE
Stability: Monuments of questionable or unknown reliability
Setting: Light structures (other than listed below)
Description: FOCAL POINT OF THE CENTER TUBE OF A 3 LIGHT SECTOR LIGHT (MODEL VLS-46).
THE LIGHT IS MOUNTED ON THE UNITED STATES COAST GUARD (USCG) AID TO NAVIGATION (ATON) LLNR 16090 ON THE QUILLAYUTE RIVER DIRECTIONAL LIGHT 3. A 4 PILE STEEL STRUCTURE WITH A 10 FOOT SQUARE PLATFORM WITH A GREEN BOARD AND BLACK NUMBER 3 ATTACHED.
TO OBTAIN MEAN HIGH WATER, SUBTRACT 6.36 FEET FROM THE NAVD88 (GEOID 18 CONUS) ELEVATION. TO OBTAIN MEAN LOWER LOW WATER, ADD 1.45 FEET TO THE NAVD88 (GEOID 18 CONUS) ELEVATION.
Observed: 2022-06-23T16:50:00Z
Source: OPUS - page5 2008.25

Close-up View

REF_FRAME:	EPOCH:	SOURCE:	UNITS:	SET PROFILE	DETAILS
NAD_83(2011)	2010.0000	NAVD88 (Computed using GEOID18)	m		

LAT:	47° 54' 27.06563"	± 0.004 m
LON:	-124° 38' 40.57728"	± 0.005 m
ELL HT:	-13.390	± 0.021 m
X:	-2435014.763	± 0.013 m
Y:	-3523882.477	± 0.012 m
Z:	4709979.563	± 0.013 m
ORTHO HT:	10.012	± 0.076 m

	UTM 10	**SPC** 4601(WA N)
NORTHING:	5307330.375m	107953.186m
EASTING:	377102.466m	215205.560m
CONVERGENCE:	-1.22055278°	-2.83756944°
POINT SCALE:	0.99978559	0.99994897
COMBINED FACTOR:	0.99978769	0.99995107

CONTRIBUTED BY

dar
Minister and Glaeser Surveying Incorporated

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.

ATTACHMENT 'C"

From: opus
To: Daniel Renton
Subject: OPUS solution : 73191740.T01 OP1657551296907
Date: Monday, July 11, 2022 7:56:35 AM

FILE: 73191740.T01 OP1657551296907

NGS OPUS SOLUTION REPORT
==========

All computed coordinate accuracies are listed as peak-to-peak values.
For additional information: https://www.ngs.noaa.gov/OPUS/about.jsp#accuracy

USER: dar@mgsurvey.com DATE: July 11, 2022
RINEX FILE: 7319174q.22o TIME: 14:56:07 UTC

SOFTWARE: page5 2008.25 master278.pl 160321 START: 2022/06/23 16:50:00
EPHEMERIS: igs22154.eph [precise] STOP: 2022/06/23 20:51:00
NAV FILE: brdc1740.22n OBS USED: 8711 / 10219 : 85%
ANT NAME: TRM5800 NONE # FIXED AMB: 71 / 74 : 96%
ARP HEIGHT: 0.237744 OVERALL RMS: 0.017(m)

REF FRAME: NAD_83(2011)(EPOCH:2010.0000) ITRF2014 (EPOCH:2022.4761)

X: -2435014.763(m) 0.013(m) -2435015.578(m) 0.013(m)
Y: -3523882.477(m) 0.012(m) -3523881.315(m) 0.012(m)
Z: 4709979.563(m) 0.013(m) 4709979.639(m) 0.013(m)

LAT: 47 54 27.06563 0.004(m) 47 54 27.07913 0.004(m)
E LON: 235 21 19.42272 0.005(m) 235 21 19.35860 0.005(m)
W LON: 124 38 40.57728 0.005(m) 124 38 40.64140 0.005(m)
EL HGT: -13.390(m) 0.021(m) -13.664(m) 0.021(m)
ORTHO HGT: 10.012(m) 0.076(m) [NAVD88 (Computed using GEOID18)]

	UTM COORDINATES UTM (Zone 10)	STATE PLANE COORDINATES SPC (4601 WA N)
Northing (Y) [meters]	5307330.375	107953.186
Easting (X) [meters]	377102.466	215205.560
Convergence [degrees]	-1.22055278	-2.83756944
Point Scale	0.99978559	0.99994897
Combined Factor	0.99978769	0.99995107

US NATIONAL GRID DESIGNATOR: 10TCU7710207330(NAD 83)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE(m)
PTRF				72863.8
AF9668	PABH PACIFIC BEACH CORS ARP	N471246.064	W1241216.431	84039.4
DN5849	PTAA PORT ANGELES CORS ARP	N480700.571	W1232939.634	88916.8

NEAREST NGS PUBLISHED CONTROL POINT

SD0161	944 2396 TIDAL 3	N475426.000	W1243845.000	97.6

BASE STATION INFORMATION

STATION NAME: ptrf a 3 (Port Renfrew; Port Renfrew, British Columbia Cana
MONUMENT: NO DOMES NUMBER
XYZ -2390981.8393 -3490234.1201 4757287.5792 MON @ 2010.0000 (M)
XYZ -0.0091 -0.0038 -0.0019 VEL (M/YR)
NEU 0.0000 0.0000 0.0000 MON TO ARP (M)
NEU -0.0000 -0.0004 0.1274 ARP TO L1 PHASE CENTER (M)
NEU -0.0001 0.0003 0.1411 ARP TO L2 PHASE CENTER (M)
XYZ -0.1133 -0.0480 -0.0236 VEL TIMES 12.4760 YRS
XYZ 0.0000 0.0000 0.0000 MON TO ARP
XYZ -0.0481 -0.0694 0.0955 ARP TO L1 PHASE CENTER
XYZ -2390982.0007 -3490234.2375 4757287.6511 L1 PHS CEN @ 2022.4761
XYZ -0.0000 0.0000 0.0000 + XYZ ADJUSTMENTS
XYZ -2390982.0007 -3490234.2375 4757287.6511 NEW L1 PHS CEN @ 2022.4761
XYZ -2390981.9526 -3490234.1682 4757287.5556 NEW ARP @ 2022.4761
XYZ -2390981.9526 -3490234.1682 4757287.5556 NEW MON @ 2022.4761
LLH 48 32 39.36302 235 35 12.98368 172.9989 NEW L1 PHS CEN @ 2022.4761
LLH 48 32 39.36303 235 35 12.98370 172.8714 NEW ARP @ 2022.4761
LLH 48 32 39.36303 235 35 12.98370 172.8714 NEW MON @ 2022.4761

STATION NAME: pabh a 3 (Pacific Beach; Pacific Beach, Washington USA)
MONUMENT: 49768M001
XYZ -2439933.8269 -3589636.0686 4657876.4912 MON @ 2010.0000 (M)
XYZ 0.0003 -0.0011 -0.0008 VEL (M/YR)
NEU -0.0000 0.0000 0.0813 MON TO ARP (M)
NEU -0.0017 0.0017 0.0857 ARP TO L1 PHASE CENTER (M)
NEU -0.0022 0.0008 0.1166 ARP TO L2 PHASE CENTER (M)
XYZ 0.0043 -0.0139 -0.0102 VEL TIMES 12.4761 YRS
XYZ -0.0310 -0.0457 0.0597 MON TO ARP
XYZ -0.0320 -0.0501 0.0617 ARP TO L1 PHASE CENTER
XYZ -2439933.8856 -3589636.1783 4657876.6025 L1 PHS CEN @ 2022.4761
XYZ 0.0000 -0.0000 -0.0000 + XYZ ADJUSTMENTS
XYZ -2439933.8856 -3589636.1783 4657876.6025 NEW L1 PHS CEN @ 2022.4761
XYZ -2439933.8536 -3589636.1282 4657876.5407 NEW ARP @ 2022.4761
XYZ -2439933.8226 -3589636.0825 4657876.4811 NEW MON @ 2022.4761
LLH 47 12 46.07762 235 47 43.50538 13.0666 NEW L1 PHS CEN @ 2022.4761
LLH 47 12 46.07767 235 47 43.50530 12.9810 NEW ARP @ 2022.4761
LLH 47 12 46.07767 235 47 43.50530 12.8997 NEW MON @ 2022.4761

STATION NAME: ptaa a 2 (PORT ANGELES; Port Angeles, Washington USA)
MONUMENT: NO DOMES NUMBER
XYZ -2354268.1320 -3557671.8640 4725608.5490 MON @ 2010.0000 (M)
XYZ -0.0088 -0.0008 -0.0048 VEL (M/YR)
NEU -0.0000 0.0000 0.0083 MON TO ARP (M)
NEU -0.0001 0.0011 0.0655 ARP TO L1 PHASE CENTER (M)
NEU 0.0002 0.0005 0.0557 ARP TO L2 PHASE CENTER (M)
XYZ -0.1096 -0.0106 -0.0604 VEL TIMES 12.4760 YRS
XYZ -0.0031 -0.0046 0.0062 MON TO ARP
XYZ -0.0233 -0.0371 0.0486 ARP TO L1 PHASE CENTER
XYZ -2354268.2680 -3557671.9163 4725608.5434 L1 PHS CEN @ 2022.4761
XYZ -0.0000 -0.0000 -0.0000 + XYZ ADJUSTMENTS
XYZ -2354268.2680 -3557671.9163 4725608.5434 NEW L1 PHS CEN @ 2022.4761

XYZ -2354268.2447 -3557671.8792 4725608.4948 NEW ARP @ 2022.4761
XYZ -2354268.2416 -3557671.8746 4725608.4886 NEW MON @ 2022.4761
LLH 48 7 0.58298 236 30 20.29636 66.9240 NEW L1 PHS CEN @ 2022.4761
LLH 48 7 0.58299 236 30 20.29631 66.8586 NEW ARP @ 2022.4761
LLH 48 7 0.58299 236 30 20.29631 66.8503 NEW MON @ 2022.4761

REMOTE STATION INFORMATION

STATION NAME: 7319 1
MONUMENT: NO DOMES NUMBER
XYZ -2435016.0136 -3523881.5346 4709979.8005 MON @ 2022.4759 (M)
NEU -0.0009 -0.0010 0.2378 MON TO ARP (M)
NEU 0.0009 0.0010 0.0748 ARP TO L1 PHASE CENTER (M)
NEU -0.0001 -0.0023 0.0772 ARP TO L2 PHASE CENTER (M)
XYZ -0.0918 -0.1311 0.1759 MON TO ARP
XYZ -0.0274 -0.0413 0.0561 ARP TO L1 PHASE CENTER
XYZ -2435016.1327 -3523881.7070 4709980.0325 L1 PHS CEN @ 2022.4761

BASELINE NAME: ptrf 7319
XYZ 0.4356 0.2223 -0.1644 + XYZ ADJUSTMENTS
XYZ -2435015.6971 -3523881.4847 4709979.8681 NEW L1 PHS CEN @ 2022.4761
XYZ -2435015.6698 -3523881.4434 4709979.8120 NEW ARP @ 2022.4761
XYZ -2435015.5780 -3523881.3123 4709979.6361 NEW MON @ 2022.4761
LLH 47 54 27.07912 235 21 19.35855 -13.3551 NEW L1 PHS CEN @ 2022.4761
LLH 47 54 27.07909 235 21 19.35850 -13.4300 NEW ARP @ 2022.4761
LLH 47 54 27.07912 235 21 19.35855 -13.6677 NEW MON @ 2022.4761

BASELINE NAME: pabh 7319
XYZ 0.4429 0.2242 -0.1658 + XYZ ADJUSTMENTS
XYZ -2435015.6899 -3523881.4828 4709979.8667 NEW L1 PHS CEN @ 2022.4761
XYZ -2435015.6625 -3523881.4415 4709979.8105 NEW ARP @ 2022.4761
XYZ -2435015.5707 -3523881.3104 4709979.6347 NEW MON @ 2022.4761
LLH 47 54 27.07922 235 21 19.35878 -13.3601 NEW L1 PHS CEN @ 2022.4761
LLH 47 54 27.07919 235 21 19.35874 -13.4349 NEW ARP @ 2022.4761
LLH 47 54 27.07922 235 21 19.35878 -13.6727 NEW MON @ 2022.4761

BASELINE NAME: ptaa 7319
XYZ 0.4297 0.2124 -0.1532 + XYZ ADJUSTMENTS
XYZ -2435015.7030 -3523881.4946 4709979.8792 NEW L1 PHS CEN @ 2022.4761
XYZ -2435015.6756 -3523881.4533 4709979.8231 NEW ARP @ 2022.4761
XYZ -2435015.5839 -3523881.3222 4709979.6473 NEW MON @ 2022.4761
LLH 47 54 27.07908 235 21 19.35859 -13.3392 NEW L1 PHS CEN @ 2022.4761
LLH 47 54 27.07906 235 21 19.35854 -13.4141 NEW ARP @ 2022.4761
LLH 47 54 27.07908 235 21 19.35859 -13.6518 NEW MON @ 2022.4761

G-FILES

Axx2022 623 22 623
B2022 6231649 22 6232051 1 page5 v2008.25IGS 132 1 2 27NGS 2022 711IFDDPX
IITRF2014_2215 IGS 20220619
C00090002 440336254 15 336471442 25 473079194 36 X1742A7319X1742APTRF
D 1 2 9019586 1 3 -7437886 2 3 -8514407

Axx2022 623 22 623
B2022 6231649 22 6232051 1 page5 v2008.25IGS 132 1 2 27NGS 2022 711IFDDPX
IITRF2014_2215 IGS 20220619
C00090003 -49182518 15 -657547721 24 -521031536 30 X1742A7319X1742APABH

D 1 2 8649523 1 3 -8941426 2 3 -7518691

Axx2022 623 22 623
B2022 6231649 22 6232051 1 page5 v2008.25IGS 132 1 2 27NGS 2022 711IFDDPX
IITRF2014_2215 IGS 20220619
C00090005 807473422 14 -337905524 20 156288413 26 X1742A7319X1742APTAA
D 1 2 7237556 1 3 -7992157 2 3 -9181176

POST-FIT RMS BY SATELLITE VS. BASELINE

	OVERALL	02	05	06	11	12	13	15	16
ptrf-7319|	0.019	0.018	0.024	0.013	0.016	0.020	...	...	...
	18	19	20	23	24	25	26	29	31
ptrf-7319|	0.026	0.026	0.019	...	0.017	...	0.026	0.016	0.023

	OVERALL	02	05	06	11	12	13	15	16
pabh-7319|	0.015	0.014	0.018	0.010	0.014	0.016	...	...	...
	18	19	20	23	24	25	26	29	31
pabh-7319|	0.017	0.012	0.015	...	0.016	0.017	0.018	0.015	0.017

	OVERALL	02	05	06	11	12	13	15	16
ptaa-7319|	0.015	0.014	0.018	0.011	0.020	0.015	...	...	...
	18	19	20	23	24	25	26	29	31
ptaa-7319|	0.020	0.012	0.016	...	0.020	0.015	0.019	0.015	0.015

OBS BY SATELLITE VS. BASELINE

	OVERALL	02	05	06	11	12	13	15	16
ptrf-7319|	2961	387	307	209	371	267	...	...	...
	18	19	20	23	24	25	26	29	31
ptrf-7319|	156	78	449	...	101	...	106	364	166
	OVERALL	02	05	06	11	12	13	15	16
pabh-7319|	2666	376	288	90	349	178	...	...	...
	18	19	20	23	24	25	26	29	31
pabh-7319|	177	41	387	...	62	387	149	35	147
	OVERALL	02	05	06	11	12	13	15	16
ptaa-7319|	3084	397	310	215	65	254	...	...	...
	18	19	20	23	24	25	26	29	31
ptaa-7319|	185	87	461	...	98	445	116	302	149

ITRF position of 7319 as determined by individual baselines

	X	Y	Z
ptrf	-2435015.578	-3523881.312	4709979.636
pabh	-2435015.571	-3523881.310	4709979.635
ptaa	-2435015.584	-3523881.322	4709979.647

Residuals of position determined by individual baselines from the final position

	X	Y	Z	East	North	Up
ptrf	-0.000	0.003	-0.003	-0.002	-0.001	-0.004
pabh	0.007	0.005	-0.005	0.003	0.003	-0.009
ptaa	-0.006	-0.007	0.008	-0.001	-0.002	0.012

Covariance Matrix for the xyz OPUS Position (meters^2).

0.0000032756	0.0000004464	-0.0000007411
0.0000004464	0.0000073711	-0.0000010233
-0.0000007411	-0.0000010233	0.0000201889

Covariance Matrix for the enu OPUS Position (meters^2).

0.0000041816	-0.0000013191	0.0000011618
-0.0000013191	0.0000114199	0.0000067115
0.0000011618	0.0000067115	0.0000152341

Horizontal network accuracy = 0.00708 meters.
Vertical network accuracy = 0.00765 meters.

Derivation of NAD 83 vector components

Position of reference station ARP in NAD_83(2011)(EPOCH:2010.0000).

	Xa(m)	Ya(m)	Za(m)	
PTRF	0.00000	0.00000	0.00000	
PABH	-2439933.03423	-3589637.29056	4657876.48201	2010.00
PTAA	-2354267.30942	-3557673.04071	4725608.48182	2010.00

Position of reference station monument in NAD_83(2011)(EPOCH:2010.0000).

	Xr(m)	Yr(m)	Zr(m)	
PTRF	0.00000	0.00000	0.00000	
PABH	-2439933.00323	-3589637.24486	4657876.42231	2010.00
PTAA	-2354267.30632	-3557673.03611	4725608.47562	2010.00

Velocity of reference station monument in NAD_83(2011)(EPOCH:2010.0000).

	Vx (m/yr)	Vy (m/yr)	Vz (m/yr)
PTRF	0.01020	-0.00321	0.00623
PABH	0.01926	-0.00054	0.00754
PTAA	0.01040	-0.00020	0.00321

Vectors from unknown station monument to reference station monument
in NAD_83(2011)(EPOCH:2010.0000).

	Xr-X= DX(m)	Yr-Y= DY(m)	Zr-Z= DZ(m)	
PTRF	2435014.76300	3523882.47700	-4709979.56300	
PABH	-4918.24023	-65754.76786	-52103.14069	2010.00
PTAA	80747.45668	-33790.55911	15628.91262	2010.00

STATE PLANE COORDINATES - U.S. Survey Foot
SPC (4601 WA N)

Northing (Y) [feet]	354176.411
Easting (X) [feet]	706053.575
Convergence [degrees]	-2.83756944
Point Scale	0.99994897
Combined Factor	0.99995107

********** New Reference Frame Preview **********

We are replacing the nation's NAD 83 and NAVD 88 datums, to improve access and accuracy of the National Spatial Reference System. More at https://geodesy.noaa.gov/datums/newdatums/

Below are approximate coordinates for this solution in the new frames:

APPROX ORTHO HGT: 9.159 (m) [PROTOTYPE (Computed using xGeoid19B,GRS80,ITRF2014)]

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

Shared Solution

ATTACHMENT "C"

PID: BBDR10
Designation: 11+00 25+00 F. LT TOE
Stamping: 11+00-25+00 F. LT TOE
Stability: Monument will probably hold position well
Setting: Object surrounded by mass of concrete
Description: 3.5 INCH BRASS DISK - TO REACH THE STATION FROM THE JUNCTION OF SR101 AND SR110 (LAPUSH ROAD) NORTH OF FORKS; GO SOUTHWESTERLY 13.8 MI WHERE THE ROAD TURNS RIGHT AND BECOMES ALDER STREET; THEN LEFT ON RIVER STREET TO A THREE WAY INTERSECTION WITH MAIN STREET; TURN RIGHT ON MAIN STREET TURN RIGHT ON MAIN STREET, GO 0.2 MI TO A GRAVEL DRIVE ENTRANCE TO THE QUILEUTE MARINA BOAT RAMP. FROM THE BENCHMARK IS APPROXIMATELY 250.00 FT N35E ON THE EAST EDGE OF GRAVEL DRIVE THRU THE BOAT TRAILER PARK.
Observed: 2014-08-23T15:42:00Z
Source: OPUS - page5 1209.04

Close-up View

REF_FRAME: NAD_83(2011)	EPOCH: 2010.0000	SOURCE: NAVD88 (Computed using GEOID18)	UNITS: m	SET PROFILE	DETAILS

LAT:	47° 54' 44.68725" ± 0.011 m	
LON:	-124° 38' 6.14266" ± 0.008 m	
ELL HT:	-19.598 ± 0.014 m	
X:	-2434194.526 ± 0.012 m	
Y:	-3523953.201 ± 0.004 m	
Z:	4710339.769 ± 0.013 m	
ORTHO HT:	3.771 ± 0.073 m	

	UTM 10	**SPC** 4601(WA N)
NORTHING:	5307859.207m	108461.397m
EASTING:	377828.754m	215946.602m
CONVERGENCE:	-1.21354669°	-2.83044761°
POINT SCALE:	0.99978341	0.99994866
COMBINED FACTOR:	0.99978648	0.99995173

CONTRIBUTED BY

tylers
US Army Corps Of Engineers

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

ATTACHMENT "C"

PID: SD0158
Designation: 944 2396 TIDAL 7
Stamping: 7 1955
Stability: Monuments of questionable or unknown reliability
Setting: Light structures (other than listed below)
Mark Condition: G
Description: TO REACH THE STATION FROM THE JUNCTION OF SR101 AND SR110 (LAPUSH RD.) NORTH OF FORKS; GO SOUTHWESTERLY 13.8 MILES WHERE THE ROAD TURNS RIGHT AND BECOMES ALDER STREET; THEN LEFT ON RIVER STREET TO A THREE WAY INTERSECTION AT MAIN STREET; THEN TURN LEFT ON MAIN STREET; GO APPROXIMATELY 200 FEET TO A ASPHALT DRIVE LEADING TO A TWO STORY WOODEN BUILDING MADE OF CEDAR SHAKES AND BLUE METAL ROOF (FORMERLY THE COAST GUARD ADMINISTRATION BUILDING), QUILEUTE TRIBAL SCHOOL.
Observed: 2014-08-22T20:23:00Z more obs 1977
Source: OPUS - page5 1209.04

Close-up View

REF_FRAME: NAD_83(2011)	EPOCH: 2010.0000	SOURCE: NAVD88 (Computed using GEOID18)	UNITS: m	SET PROFILE	DETAILS

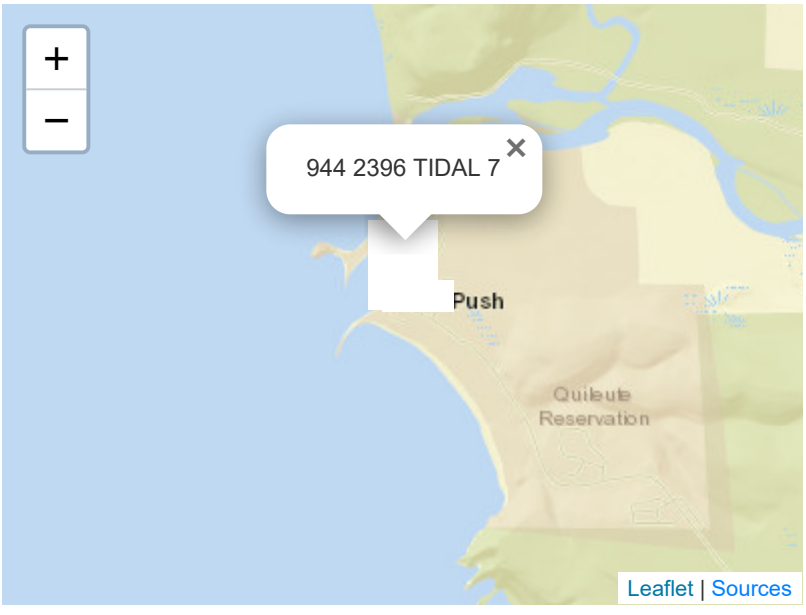
LAT:	47° 54' 31.08944" ± 0.003 m	
LON:	-124° 38' 16.65938" ± 0.008 m	
ELL HT:	-14.982 ± 0.003 m	
X:	-2434553.102 ± 0.007 m	
Y:	-3524088.056 ± 0.005 m	
Z:	4710061.688 ± 0.001 m	
ORTHO HT:	8.405 ± 0.070 m	

	UTM 10	**SPC** 4601(WA N)
NORTHING:	5307444.042m	108052.740m
EASTING:	377601.569m	215707.754m
CONVERGENCE:	-1.21564309°	-2.83262259°
POINT SCALE:	0.99978409	0.99994889
COMBINED FACTOR:	0.99978644	0.99995124

CONTRIBUTED BY

tylers
US Army Corps Of Engineers

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.