

**Oregon Department of Forestry (ODF)
2022 Private Forest Accords (PFA) LiDAR Project
Survey Control Report**

**Contract ODF-1109A-20
Task Order #4**

Prepared By



AERIAL IMAGERY | MAPPING | LIDAR | GIS | ORTHOPHOTOGRAPHY

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*Project Number 220333
October 2022*

SURVEY NARRATIVE

220333 ODF 2022 Private Forest Accords (PFA) LiDAR Project

Survey Control Report

Background Information

The [Oregon Department of Forestry \(ODF\)](#) contracted with [GeoTerra, Inc.](#) for an aerial LiDAR project encompassing approximately 943 square miles in North Central Oregon located in portions of Crook, Grant, Jefferson and Wheeler counties. The project required 18 Ground Control Point (GCP's). Final data was required to be output as NAD83(2011)(Epoch 2010.0), [Oregon Lambert System](#) with NAVD88 elevations with horizontal and vertical units of International Feet. (Oregon Lambert is recognized by the [European Petroleum Survey Group](#) (EPSG) which maintains and publishes an international coordinate reference system database. The EPSG spatial reference ID for Oregon Lambert is [6557](#)).

GNSS Control Network

Global Navigation Satellite System (GNSS) observations were made between 03-Oct-2022 and 14-Oct-2022 utilizing a Leica GS18i geodetic GNSS receiver. A total of 28 (discrete) points are included in the network; new control points at 18 locations, one of which had a separate horizontal and vertical point measured, five existing control points and four Continuously Operating Reference Stations (CORS).

All points were measured relative to the Oregon Real-time GNSS Network (ORGN) while receiving real time corrections from the ORGN with the following procedure: Observe each point with an occupation time varying between two and 13 minutes using a two-meter pole and pole tripod, and then re-observe the point for a second occupation immediately following the first observation using the same procedure. This resulted in a minimum of two observations on each point relative to the ORGN (PFA11 and PFA12 had four observations and PFA07 had five observations).

The collected data was quality checked and adjusted within Leica Infinity software Version 4.0.1, fixing the position of the four ORGN CORS "MDRS", "MTCL", "PNVL" and "SPRA" at the ORGN published NAD83(2011)(Epoch 2010.0) position.

The accuracy of the 24 adjusted points (relative to the CORS) was better than 0.013 meters (0.04 feet) in any direction horizontally and 0.022 meters (0.07 feet) vertically at 95% confidence.

NAVD88 orthometric heights were derived by applying the NGS geoid model GEOID18 to the adjusted NAD83(2011)(Epoch 2010.0) ellipsoid heights.

A comparison was made between the surveyed positions relative to the ORGN and the record positions for five points with the following results (measured minus record, units in meters):

Point Id	Difference (Measured - Record)		NAVD88
	Easting (m)	Northing (m)	
02-014-001 (1)(2)	-0.052	-0.055	-0.016
02-014-002 (1)	-0.004	-0.005	-0.040
02-014-003 (1)	-0.005	-0.003	0.009
TWICKENHAM (1)(3)	-0.009	-0.021	-0.088
18-144-CK015 (4)	-0.005	-0.008	-0.012
Average	-0.006	-0.009	-0.033
<small>(1) 2002 values based on FBN monuments NAD83(98) and updated to NAD83(2011) horizontally via NGS NCAT software</small>			
<small>(2) Monument has been disturbed and is not used in average calculation</small>			
<small>(3) Record value is NGS leveled height</small>			
<small>(4) 2018 value is based on ORGN</small>			

These results validate the ORGN methodology. For this project, reported positions are the surveyed values relative to the ORGN WITHOUT any adjustments to existing monuments.

Airborne GNSS (AGNSS) Survey

In addition to the GCP’s, the LiDAR flight utilized the Airborne GNSS (AGNSS) technique which entails obtaining a Smoothed Best Estimate of Trajectory (SBET) for each flight. The data collected during the flight was post-processed using the Precise Point Positioning (PPP) technique and used along with the GCP's in downstream processing of the LiDAR flight to create geo-referenced mapping products. This process greatly reduces the quantity of GCP’s required. Please see separate AGNSS reports for additional details.

Vertical QC Survey Points

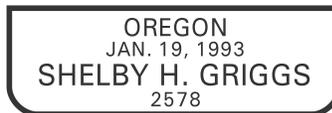
As a vertical Quality Control (QC) check on the ground surface, a continuous kinematic road survey was performed where a GNSS antenna was mounted to a vehicle and selected roads in the mapping

area were driven while collecting real time data from the ORGN at one second epochs. Tolerances were set to ignore data with a 3D coordinate quality larger than 0.1 feet and no closer than 50 feet for consecutively stored points. The tilt sensor feature of the GS18i was enabled so that these positions are corrected to vertical to compensate for a non-level moving vehicle. This data consists of 8902 points to be used in a statistical analysis of the vertical mapping accuracy.

Point Description Sheets

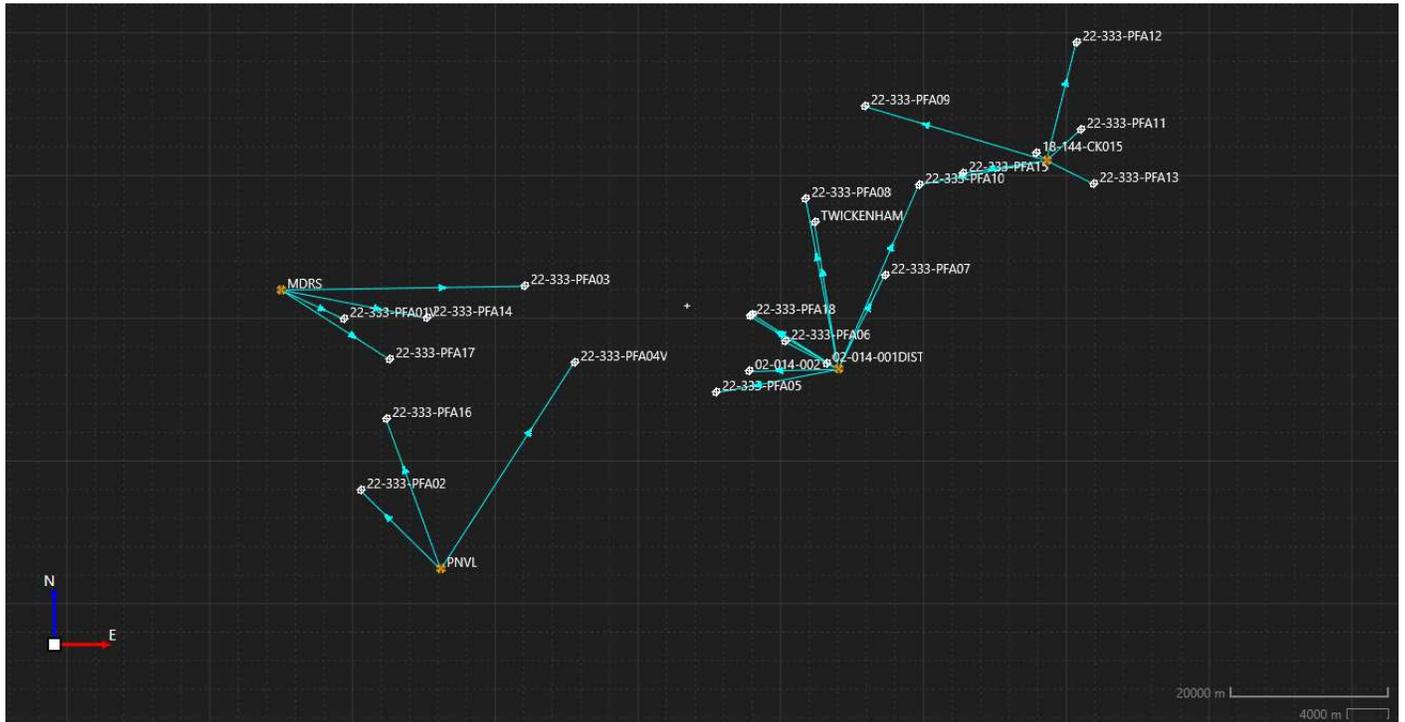
A Point Description Sheet was prepared for each of the points in the control network. Please consult these sheets for individual point data. ALL points have new position data published EXCEPT the CORS which was held fixed at the ORGN published position.

I hereby certify that this survey was conducted under my supervision during October 2022.

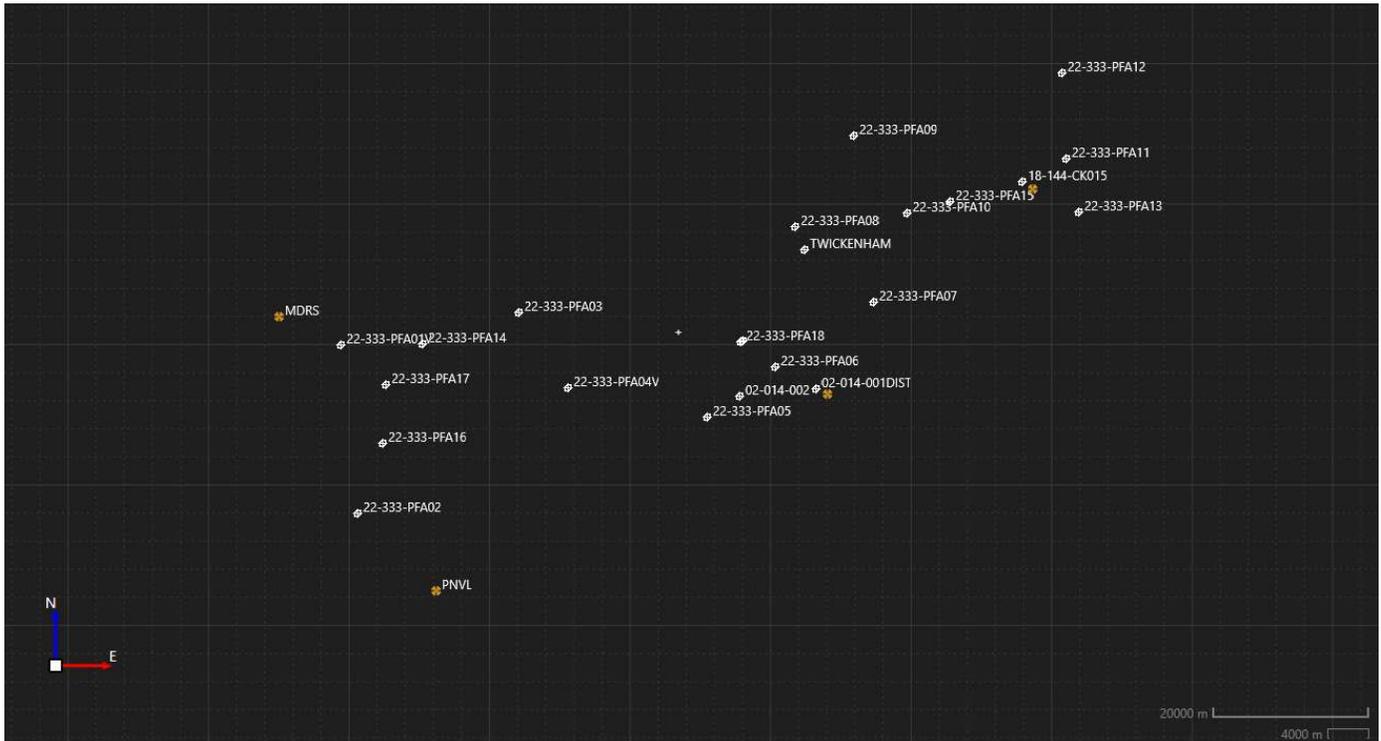


EXPIRATION: JUNE 30, 2023

Control Vector Diagram



Control Point Diagram



Point Description Sheet

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860 MCKINLEY STREET
EUGENE, OR 97402
(541) 343-8877
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Point Designation: 02-014-001

Horiz. Method: GNSS

Vert. Method: GNSS Derived

Error Ellipse Semi major axis
(95% Confidence Level)

± 0.008 Meters

NAD 83 (2011) Geodetic Coordinates

Latitude: 44°34'22.56485" N

Longitude: 120°10'06.86122" W

Ellipsoid Height: 853.193 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 313,682.770 Meters

Easting: 426,319.489 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 1,029,142.95 Int. Feet

Easting: 1,398,685.99 Int. Feet

θ: +0°13'52.628"

Scale Factor: 0.99977825

Elevation Factor: 0.99986624

Combined Factor: 0.99964452

NAVD 88 Orthometric Elevation

872.945 Meters 2,863.99 Int. Feet

Found 5/8" rebar with 2" diameter aluminum OrbiTech cap (**monument has been hit and disturbed**). Point is located in T11S, R21E, S35, on southwest side of State Highway 207 at approximately MP 23.9, 42 feet southwest of the double yellow centerline stripe on the highway. **NOT HELD this survey, check point only; differences with record; E -0.052 meters, N -0.055 meters and Z -0.016 meters.**



Point Description Sheet

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860 MCKINLEY STREET
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Point Designation: 02-014-002

Horiz. Method: GNSS
Vert. Method: GNSS Derived
Error Ellipse Semi major axis
(95% Confidence Level)
± 0.005 Meters

NAD 83 (2011) Geodetic Coordinates

Latitude: 44°33'46.18951" N
Longitude: 120°18'17.60912" W
Ellipsoid Height: 880.685 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 312,525.492 Meters
Easting: 415,496.759 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 1,025,346.10 Int. Feet
Easting: 1,363,178.34 Int. Feet
θ: +0°08'10.161"
Scale Factor: 0.99977729
Elevation Factor: 0.99986193
Combined Factor: 0.99963925

NAVD 88 Orthometric Elevation

900.546 Meters 2,954.55 Int. Feet

Found 5/8" rebar with 2" diameter aluminum OrbiTech cap, can be used for VVA (grasses 3 feet high), Point is located in T12S, R20E, S2, on northwest side of US Highway 26 at approximately MP 56.9, between current highway and old highway northwest of point. **NOT HELD** this survey, check point only; differences with record; E -0.004 meters, N -0.005 meters and Z -0.040 meters.



Point Description Sheet

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Point Designation: 02-014-003

Horiz. Method: GNSS

Vert. Method: GNSS Derived

Error Ellipse Semi major axis
(95% Confidence Level)

± 0.011 Meters

NAD 83 (2011) Geodetic Coordinates

Latitude: 44°38'05.59482" N

Longitude: 120°17'55.66330" W

Ellipsoid Height: 663.666 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 320,532.143 Meters

Easting: 415,961.328 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 1,051,614.64 Int. Feet

Easting: 1,364,702.52 Int. Feet

θ: +0°08'25.476"

Scale Factor: 0.99978484

Elevation Factor: 0.99989595

Combined Factor: 0.99968082

NAVD 88 Orthometric Elevation

683.929 Meters 2,243.86 Int. Feet

Found 5/8" rebar with 2" diameter aluminum OrbiTech cap, can be used for NVA ground. Point is located in T11S, R20E, S11, approximately 58 feet southeast of the center of Bear Creek Road. **NOT HELD this survey, check point only; differences with record; E -0.005 meters, N -0.003 meters and Z +0.009 meters.**



Point Description Sheet

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Point Designation: 18-144-CK015

Horiz. Method: GNSS
Vert. Method: GNSS Derived
Error Ellipse Semi major axis
(95% Confidence Level)
± 0.008 Meters

NAD 83 (2011) Geodetic Coordinates

Latitude: 44°50'12.04309" N
Longitude: 119°47'42.42492" W
Ellipsoid Height: 526.993 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 343,171.646 Meters
Easting: 455,724.350 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 1,125,891.23 Int. Feet
Easting: 1,495,158.63 Int. Feet
θ: +0°29'30.838"
Scale Factor: 0.99981444
Elevation Factor: 0.99991738
Combined Factor: 0.99973184

NAVD 88 Orthometric Elevation

546.936 Meters 1,794.41 Int. Feet

Found a MAG brand masonry nail ¼" diameter X 2 ½" long at SE tip of 10' long white painted traffic direction arrow. Point is located in T8S, R24E, S36, on southwest side of State Highway 19 at approximately MP 92.2, in Spray, OR, at exit road from the City of Spray RV Dump Station, 27 feet southwest of the center of State Highway 19, approximately in the center of the exit road and across the highway (southwest) from a building housing Wheeler County Emergency Operations Center and Wheeler County Community Transportation. **NOT HELD** this survey, check point only; differences with record; E -0.005 meters, N -0.008 meters and Z -0.012 meters.



Point Description Sheet

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860 MCKINLEY STREET
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Point Designation: 22-333-PFA01H

Horiz. Method: GNSS
Vert. Method: GNSS Derived
Error Ellipse Semi major axis
(95% Confidence Level)
± 0.006 Meters

NAD 83 (2011) Geodetic Coordinates

Latitude: 44°37'40.47180" N
Longitude: 121°01'10.08912" W
Ellipsoid Height: 887.699 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 319,867.636 Meters
Easting: 358,786.446 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 1,049,434.50 Int. Feet
Easting: 1,177,120.89 Int. Feet
θ: -0°21'45.035"
Scale Factor: 0.99978404
Elevation Factor: 0.99986083
Combined Factor: 0.99964491

NAVD 88 Orthometric Elevation

908.644 Meters 2,981.12 Int. Feet

Angle point in steel pipe corral fence, no monument set. Point is located in T11S, R14E, S11, on south side of Ashwood Road NE, at Fox Corral, at the northeasterly angle point of a steel pipe fence at the northwest corner of the corral. Direct occupied the angle point in the corral fence, 5.5 feet above ground level.



Point Description Sheet

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Point Designation: 22-333-PFA01V

Horiz. Method: GNSS
Vert. Method: GNSS Derived
Error Ellipse Semi major axis
(95% Confidence Level)
± 0.007 Meters

NAD 83 (2011) Geodetic Coordinates

Latitude: 44°37'40.95358" N
Longitude: 121°01'11.25953" W
Ellipsoid Height: 886.480 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 319,882.668 Meters
Easting: 358,760.747 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 1,049,483.82 Int. Feet
Easting: 1,177,036.57 Int. Feet
θ: -0°21'45.852"
Scale Factor: 0.99978406
Elevation Factor: 0.99986103
Combined Factor: 0.99964511

NAVD 88 Orthometric Elevation

907.427 Meters 2,977.12 Int. Feet

Ground point, no monument set. Point is located in T11S, R14E, S11, on south shoulder of Ashwood Road NE, at Fox Corral, approximately 10 feet south of the center of the gravel road.



Point Description Sheet

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Point Designation: 22-333-PFA02

Horiz. Method: GNSS

Vert. Method: GNSS Derived

Error Ellipse Semi major axis
(95% Confidence Level)

± 0.009 Meters

NAD 83 (2011) Geodetic Coordinates

Latitude: 44°24'44.08544" N

Longitude: 120°59'19.69610" W

Ellipsoid Height: 1,008.296 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 295,893.558 Meters

Easting: 361,076.647 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 970,779.39 Int. Feet

Easting: 1,184,634.67 Int. Feet

θ: -0°20'27.998"

Scale Factor: 0.99976662

Elevation Factor: 0.99984193

Combined Factor: 0.99960858

NAVD 88 Orthometric Elevation

1,029.013 Meters 3,376.03 Int. Feet

Ground point, no monument set. Point is located in T13S, R14E, S25 (near line between R14E and R15E and the Crook-Jefferson County line between Prineville and Madras), on northeast side of US Highway 26, approximately at MP 16.2, on paved shoulder, opposite (southwest) of Crooked River National Grassland sign on concrete and stone base, 3 feet southwest of northeast edge of pavement and 18 feet northeast of the highway centerline stripe.



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03-Oct-2022 14:51

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Point Designation: 22-333-PFA03

Horiz. Method: GNSS
Vert. Method: GNSS Derived
Error Ellipse Semi major axis
(95% Confidence Level)
± 0.007 Meters

NAD 83 (2011) Geodetic Coordinates

Latitude: 44°40'13.22740" N
Longitude: 120°42'00.95193" W
Ellipsoid Height: 839.289 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 324,470.879 Meters
Easting: 384,122.866 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 1,064,537.00 Int. Feet
Easting: 1,260,245.62 Int. Feet
θ: -0°08'23.114"
Scale Factor: 0.99978914
Elevation Factor: 0.99986842
Combined Factor: 0.99965759

NAVD 88 Orthometric Elevation

859.641 Meters 2,820.34 Int. Feet

Ground point, no monument set. Point is located in T10S, R17E, S28, on northeast side of Trout Creek Road, at intersection with centerline projection west of 2 track field road and approximately 4 feet northeast of the center of Trout Creek Road.



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Point Designation: 22-333-PFA04V

Horiz. Method: GNSS

Vert. Method: GNSS Derived

Error Ellipse Semi major axis
(95% Confidence Level)

± 0.010 Meters

NAD 83 (2011) Geodetic Coordinates

Latitude: 44°34'28.77349" N

Longitude: 120°36'44.82613" W

Ellipsoid Height: 1,051.934 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 313,827.367 Meters

Easting: 391,070.168 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 1,029,617.35 Int. Feet

Easting: 1,283,038.61 Int. Feet

θ: -0°04'42.507"

Scale Factor: 0.99977842

Elevation Factor: 0.99983509

Combined Factor: 0.99961355

NAVD 88 Orthometric Elevation

1,072.000 Meters 3,517.06 Int. Feet

Ground point, no monument set. Point is located in T11S, R18E, S31, at intersection of Trout Creek Road and Opal Creek Road (gated private road), approximately 22 feet northeast of the center of Trout Creek Road and approximately 5 feet north of the center of Opal Creek Road.



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Point Designation: 22-333-PFA05

Horiz. Method: GNSS

Vert. Method: GNSS Derived

Error Ellipse Semi major axis
(95% Confidence Level)

± 0.012 Meters

NAD 83 (2011) Geodetic Coordinates

Latitude: 44°32'09.22632" N

Longitude: 120°21'44.51001" W

Ellipsoid Height: 1,223.539 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 309,523.905 Meters

Easting: 410,936.953 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 1,015,498.38 Int. Feet

Easting: 1,348,218.35 Int. Feet

θ: +0°05'45.776"

Scale Factor: 0.99977487

Elevation Factor: 0.99980819

Combined Factor: 0.99958311

NAVD 88 Orthometric Elevation

1,243.262 Meters 4,078.94 Int. Feet

Ground point, no monument set. Point is located in T12S, R20E, S8, on northwest side of US Highway 26 at approximately MP 53.2, at gravel pullout, the center of a plastic vault cover 30"X48" for an underground fiber optic line, 52 feet northwest of the double yellow centerline stripe on the highway.



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Point Designation: 22-333-PFA06

Horiz. Method: GNSS

Vert. Method: GNSS Derived

Error Ellipse Semi major axis
(95% Confidence Level)

± 0.007 Meters

NAD 83 (2011) Geodetic Coordinates

Latitude: 44°36'01.17869" N

Longitude: 120°14'29.40459" W

Ellipsoid Height: 731.403 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 316,705.260 Meters

Easting: 420,518.476 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 1,039,059.25 Int. Feet

Easting: 1,379,653.79 Int. Feet

θ: +0°10'49.413"

Scale Factor: 0.99978102

Elevation Factor: 0.99988533

Combined Factor: 0.99966638

NAVD 88 Orthometric Elevation

751.438 Meters 2,465.35 Int. Feet

Ground point, no monument set. Point is located in T11S, R21E, S20, on northwest shoulder of US Highway 26 at approximately MP 61.1, at paved driveway approach to address 16089 Highway 26, approximately centered in the driveway approach, 30 feet northwest of the yellow centerline stripe on the highway and 4 feet southeast of the northwest edge of pavement on the driveway approach.



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Point Designation: 22-333-PFA07

Horiz. Method: GNSS
Vert. Method: GNSS Derived
Error Ellipse Semi major axis
(95% Confidence Level)
± 0.007 Meters

NAD 83 (2011) Geodetic Coordinates

Latitude: 44°41'01.62417" N
Longitude: 120°03'50.67556" W
Ellipsoid Height: 943.520 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 326,036.849 Meters
Easting: 434,552.325 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 1,069,674.70 Int. Feet
Easting: 1,425,696.60 Int. Feet
θ: +0°18'15.148"
Scale Factor: 0.99979087
Elevation Factor: 0.99985209
Combined Factor: 0.99964299

NAVD 88 Orthometric Elevation

963.407 Meters 3,160.79 Int. Feet

Ground point, no monument set. Point is located in T10S, R22E, S22, on southeast side of State Highway 207 at approximately MP 11.3, at intersection with gravel road to southeast, 18 feet southeast of the double yellow centerline stripe on the highway, 5 feet southeast of the southeast edge of pavement and 18 feet northeast of the center of the gravel road.



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Point Designation: 22-333-PFA08

Horiz. Method: GNSS
Vert. Method: GNSS Derived
Error Ellipse Semi major axis
(95% Confidence Level)
± 0.012 Meters

NAD 83 (2011) Geodetic Coordinates

Latitude: 44°46'46.94627" N
Longitude: 120°12'11.45209" W
Ellipsoid Height: 532.683 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 336,644.991 Meters
Easting: 423,488.097 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 1,104,478.32 Int. Feet
Easting: 1,389,396.64 Int. Feet
θ: +0°12'25.683"
Scale Factor: 0.99980482
Elevation Factor: 0.99991649
Combined Factor: 0.99972133

NAVD 88 Orthometric Elevation

553.160 Meters 1,814.83 Int. Feet

Ground point, no monument set. Point is located in T9S, R21E, S22, on northwest shoulder of Rowe Creek Road, approximately 11.1 road miles from State Highway 19, on outside of curve, southeast of feed lot and 4 feet southeast of the northwest edge of pavement.



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Point Designation: 22-333-PFA09

Horiz. Method: GNSS

Vert. Method: GNSS Derived

Error Ellipse Semi major axis
(95% Confidence Level)

± 0.008 Meters

NAD 83 (2011) Geodetic Coordinates

Latitude: 44°53'48.16563" N

Longitude: 120°05'55.65134" W

Ellipsoid Height: 1,061.354 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 349,680.189 Meters

Easting: 431,685.110 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 1,147,244.71 Int. Feet

Easting: 1,416,289.73 Int. Feet

θ: +0°16'47.934"

Scale Factor: 0.99982566

Elevation Factor: 0.99983362

Combined Factor: 0.99965931

NAVD 88 Orthometric Elevation

1,081.381 Meters 3,547.84 Int. Feet

Set MAG brand masonry nail 1/4" diameter X 2 1/2" long at southwest corner of white painted bent stop bar 12" X 24'. Point is located in T8S, R22E, S4, at intersection of State Highway 19 (at approximately MP 69.1) and Rowe Creek Road, approximately 32 feet southwest of the yellow centerline stripe on State Highway 19 and 6 feet northwest of the southeast edge of pavement on Rowe Creek Road.



Point Description Sheet

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860 MCKINLEY STREET
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Point Designation: 22-333-PFA10

Horiz. Method: GNSS
Vert. Method: GNSS Derived
Error Ellipse Semi major axis
(95% Confidence Level)
± 0.011 Meters

NAD 83 (2011) Geodetic Coordinates

Latitude: 44°47'50.67068" N
Longitude: 120°00'11.36658" W
Ellipsoid Height: 490.466 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 338,688.172 Meters
Easting: 439,304.473 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 1,111,181.67 Int. Feet
Easting: 1,441,287.64 Int. Feet
θ: +0°20'48.192"
Scale Factor: 0.99980771
Elevation Factor: 0.99992311
Combined Factor: 0.99973083

NAVD 88 Orthometric Elevation

510.663 Meters 1,675.40 Int. Feet

Set MAG brand masonry nail 1/4" diameter X 2 1/2" long at southwest corner of white painted stop bar 12" X 15'. Point is located in T9S, R23E, S7, at intersection of State Highway 19 (at approximately MP 78.6) and State Highway 207 (at MP 0), 23 feet south of the double yellow centerline stripe on State Highway 19 and 2 feet east of the double yellow centerline stripe on State Highway 207.



Point Description Sheet

Prepared By:



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860 MCKINLEY STREET
EUGENE, OR 97402
(541) 343-8877
WWW.GEOTERRA.US

Point Designation: 22-333-PFA11

Horiz. Method: GNSS

Vert. Method: GNSS Derived

Error Ellipse Semi major axis
(95% Confidence Level)

± 0.008 Meters

NAD 83 (2011) Geodetic Coordinates

Latitude: 44°51'53.87902" N

Longitude: 119°42'57.56518" W

Ellipsoid Height: 771.945 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 346,371.233 Meters

Easting: 461,949.588 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 1,136,388.56 Int. Feet

Easting: 1,515,582.64 Int. Feet

θ: +0°32'49.627"

Scale Factor: 0.99981959

Elevation Factor: 0.99987898

Combined Factor: 0.99969860

NAVD 88 Orthometric Elevation

791.649 Meters 2,597.28 Int. Feet

Set MAG brand masonry nail 1/4" diameter X 2 1/2" long at southwest end of solid yellow centerline stripe. Point is located in T8S, R25E, S22, at approximate centerline of State Highway 207 (at approximately MP 37.2C).



Point Description Sheet

Prepared By:



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Point Designation: 22-333-PFA12

Horiz. Method: GNSS

Vert. Method: GNSS Derived

Error Ellipse Semi major axis
(95% Confidence Level)

± 0.013 Meters

NAD 83 (2011) Geodetic Coordinates

Latitude: 44°58'31.98282" N

Longitude: 119°43'18.60424" W

Ellipsoid Height: 1,380.197 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 358,653.472 Meters

Easting: 461,371.361 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 1,176,684.62 Int. Feet

Easting: 1,513,685.57 Int. Feet

θ: +0°32'34.944"

Scale Factor: 0.99984207

Elevation Factor: 0.99978365

Combined Factor: 0.99962575

NAVD 88 Orthometric Elevation

1,399.760 Meters 4,592.39 Int. Feet

Set MAG brand masonry nail 1/4" diameter X 2 1/2" long at southwest end of solid yellow centerline stripe. Point is located in T7S, R25E, S10, at intersection of State Highway 207 (at approximately MP 26.5C) and USFS Road 350, in the approximate center of the highway and approximately 40 feet northeast of the center of USFS Road 350.



Point Description Sheet

Prepared By:



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Point Designation: 22-333-PFA13

Horiz. Method: GNSS

Vert. Method: GNSS Derived

Error Ellipse Semi major axis
(95% Confidence Level)

± 0.007 Meters

NAD 83 (2011) Geodetic Coordinates

Latitude: 44°47'48.80406" N

Longitude: 119°41'39.37025" W

Ellipsoid Height: 533.969 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 338,824.400 Meters

Easting: 463,740.060 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 1,111,628.61 Int. Feet

Easting: 1,521,456.89 Int. Feet

θ: +0°33'44.195"

Scale Factor: 0.99980762

Elevation Factor: 0.99991629

Combined Factor: 0.99972392

NAVD 88 Orthometric Elevation

553.653 Meters 1,816.45 Int. Feet

Ground point, no monument set. Point is located in T9S, R25E, S15, on south shoulder of State Highway 19 at approximately MP 101.3, 18 feet south of the double yellow centerline stripe on the highway, approximately centered in a field entrance and 24 feet west of the west end of a guardrail.



Point Description Sheet

Prepared By:



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Point Designation: 22-333-PFA14

Horiz. Method: GNSS

Vert. Method: GNSS Derived

Error Ellipse Semi major axis
(95% Confidence Level)

± 0.007 Meters

NAD 83 (2011) Geodetic Coordinates

Latitude: 44°37'46.59611" N

Longitude: 120°52'21.02526" W

Ellipsoid Height: 965.517 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 319,993.303 Meters

Easting: 370,446.867 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 1,049,846.79 Int. Feet

Easting: 1,215,376.86 Int. Feet

θ: -0°15'35.830"

Scale Factor: 0.99978424

Elevation Factor: 0.99984864

Combined Factor: 0.99963290

NAVD 88 Orthometric Elevation

985.997 Meters 3,234.90 Int. Feet

Ground point, no monument set. Point is located in T11S, R15E, S12, on southeast side of Ashwood Road NE, at northwest end of dam for Little Willow Creek Reservoir, approximately centered on projection northwest of dam centerline and 6 feet southeast of the center of Ashwood Road NE.



Point Description Sheet

Prepared By:



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Point Designation: 22-333-PFA15

Horiz. Method: GNSS
Vert. Method: GNSS Derived
Error Ellipse Semi major axis
(95% Confidence Level)
± 0.008 Meters

NAD 83 (2011) Geodetic Coordinates

Latitude: 44°48'41.06381" N
Longitude: 119°55'27.52120" W
Ellipsoid Height: 500.315 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 340,284.156 Meters
Easting: 445,530.856 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 1,116,417.83 Int. Feet
Easting: 1,461,715.41 Int. Feet
θ: +0°24'06.272"
Scale Factor: 0.99981005
Elevation Factor: 0.99992156
Combined Factor: 0.99973163

NAVD 88 Orthometric Elevation

520.391 Meters 1,707.32 Int. Feet

Ground point, no monument set. Point is located in T9S, R23E, S2, on southeast shoulder of State Highway 19 at approximately MP 82.8, at northeast end of a guardrail, 16 feet southeast of the yellow centerline stripe on the highway and 16 feet northeast of the end of the guardrail.



Point Description Sheet

Prepared By:



AERIAL IMAGERY | MAPPING | LIDAR | GIS | ORTHOPHOTOGRAPHY

860 MCKINLEY STREET
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Point Designation: 22-333-PFA16

Horiz. Method: GNSS
Vert. Method: GNSS Derived
Error Ellipse Semi major axis
(95% Confidence Level)
± 0.007 Meters

NAD 83 (2011) Geodetic Coordinates

Latitude: 44°30'08.46599" N
Longitude: 120°56'39.18111" W
Ellipsoid Height: 1,099.659 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 305,883.579 Meters
Easting: 364,681.260 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 1,003,555.05 Int. Feet
Easting: 1,196,460.83 Int. Feet
θ: -0°18'35.983"
Scale Factor: 0.99977217
Elevation Factor: 0.99982761
Combined Factor: 0.99959982

NAVD 88 Orthometric Elevation

1,120.158 Meters 3,675.06 Int. Feet

Set MAG brand masonry nail 1/4" diameter X 2 1/2" long at northeast end of double yellow centerline paint stripes (midway between the two stripes). Point is located in T12S, R15E, S28, at intersection of Ramms Road SE and Hay Creek Road, approximately centered in Ramms Road SE and approximately 15 feet southwest of the center of pavement on Hay Creek Road. Note that sign at intersection has Hay Creek Road as SE Grizzly Road.



Point Description Sheet

Prepared By:



AERIAL IMAGERY | MAPPING | LIDAR | GIS | ORTHOPHOTOGRAPHY

860 MCKINLEY STREET
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Point Designation: 22-333-PFA17

Horiz. Method: GNSS
Vert. Method: GNSS Derived
Error Ellipse Semi major axis
(95% Confidence Level)
± 0.007 Meters

NAD 83 (2011) Geodetic Coordinates

Latitude: 44°34'38.18846" N
Longitude: 120°56'17.86988" W
Ellipsoid Height: 952.796 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 314,204.702 Meters
Easting: 365,196.359 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 1,030,855.32 Int. Feet
Easting: 1,198,150.79 Int. Feet
θ: -0°18'21.111"
Scale Factor: 0.99977868
Elevation Factor: 0.99985063
Combined Factor: 0.99962934

NAVD 88 Orthometric Elevation

973.336 Meters 3,193.36 Int. Feet

Ground point, no monument set. Point is located in T11S, R15E, S28 (just north of section line between Sections 28 and 33), at the approximate centerline-centerline intersection of Hay Creek Road and Frank Forest Road. NOTE: Roads recently graded, use with caution.



Point Description Sheet

Prepared By:



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860 MCKINLEY STREET
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Point Designation: 22-333-PFA18

Horiz. Method: GNSS
Vert. Method: GNSS Derived
Error Ellipse Semi major axis
(95% Confidence Level)
± 0.008 Meters

NAD 83 (2011) Geodetic Coordinates

Latitude: 44°37'56.98643" N
Longitude: 120°18'08.44290" W
Ellipsoid Height: 675.879 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 320,265.794 Meters
Easting: 415,680.359 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 1,050,740.79 Int. Feet
Easting: 1,363,780.71 Int. Feet
θ: +0°08'16.558"
Scale Factor: 0.99978457
Elevation Factor: 0.99989404
Combined Factor: 0.99967863

NAVD 88 Orthometric Elevation

696.133 Meters 2,283.90 Int. Feet

Ground point, no monument set. Point is located in T11S, R20E, S11, approximately 90 feet (scaled distance) southeast of Bear Creek Road in a turn around area.



Point Description Sheet

Prepared By:



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860 MCKINLEY STREET
EUGENE, OR 97402
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Point Designation: MDRS

Horiz. Method: ORGN Fixed CORS

Vert. Method: GNSS Derived

Error Ellipse Semi major axis
(95% Confidence Level)

± 0.000 Meters

NAD 83 (2011) Geodetic Coordinates

Latitude: 44°39'50.49280" N

Longitude: 121°07'49.44945" W

Ellipsoid Height: 736.344 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 323,941.781 Meters

Easting: 350,016.197 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 1,062,801.12 Int. Feet

Easting: 1,148,347.10 Int. Feet

θ: -0°26'23.728"

Scale Factor: 0.99978835

Elevation Factor: 0.99988456

Combined Factor: 0.99967293

NAVD 88 Orthometric Elevation

757.753 Meters 2,486.07 Int. Feet

Point is the Antenna Reference Point (ARP) of a Continuously Operating Reference Station (CORS) located in Madras, OR and is a part of the Oregon Department of Transportation (ODOT) Oregon Real-time GNSS Network (ORGN). Raw GNSS observation data and real-time positioning is available from: <https://www.oregon.gov/ODOT/ORGN/Pages/index.aspx>
Point held fixed at ORGN published Latitude, Longitude and Ellipsoid Height for this survey.

MONUMENT
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Point Description Sheet

Prepared By:



AERIAL IMAGERY | MAPPING | LIDAR | GIS | ORTHOPHOTOGRAPHY

860 MCKINLEY STREET
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Point Designation: MTCL

Horiz. Method: ORGN Fixed CORS

Vert. Method: GNSS Derived

Error Ellipse Semi major axis
(95% Confidence Level)

± 0.000 Meters

NAD 83 (2011) Geodetic Coordinates

Latitude: 44°33'54.73236" N

Longitude: 120°08'47.57968" W

Ellipsoid Height: 878.279 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 312,831.141 Meters

Easting: 428,072.050 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 1,026,348.89 Int. Feet

Easting: 1,404,435.86 Int. Feet

θ: +0°14'47.954"

Scale Factor: 0.99977751

Elevation Factor: 0.99986231

Combined Factor: 0.99963985

NAVD 88 Orthometric Elevation

897.932 Meters 2,945.97 Int. Feet

Point is the Antenna Reference Point (ARP) of a Continuously Operating Reference Station (CORS) located in Mitchell, OR and is a part of the Oregon Department of Transportation (ODOT) Oregon Real-time GNSS Network (ORGN). Raw GNSS observation data and real-time positioning is available from: <https://www.oregon.gov/ODOT/ORGN/Pages/index.aspx>
Point held fixed at ORGN published Latitude, Longitude and Ellipsoid Height for this survey.

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Point Description Sheet

Prepared By:



AERIAL IMAGERY | MAPPING | LIDAR | GIS | ORTHOPHOTOGRAPHY

860 MCKINLEY STREET
EUGENE, OR 97402
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Point Designation: PNVL

Horiz. Method: ORGN Fixed CORS

Vert. Method: GNSS Derived

Error Ellipse Semi major axis
(95% Confidence Level)

± 0.000 Meters

NAD 83 (2011) Geodetic Coordinates

Latitude: 44°18'46.50626" N

Longitude: 120°50'47.40899" W

Ellipsoid Height: 873.695 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 284,801.401 Meters

Easting: 372,361.460 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 934,387.80 Int. Feet

Easting: 1,221,658.33 Int. Feet

θ: -0°14'30.500"

Scale Factor: 0.99976335

Elevation Factor: 0.99986302

Combined Factor: 0.99962641

NAVD 88 Orthometric Elevation

894.265 Meters 2,933.94 Int. Feet

Point is the Antenna Reference Point (ARP) of a Continuously Operating Reference Station (CORS) located in Prineville, OR and is a part of the Oregon Department of Transportation (ODOT) Oregon Real-time GNSS Network (ORGN). Raw GNSS observation data and real-time positioning is available from: <https://www.oregon.gov/ODOT/ORGN/Pages/index.aspx>
Point held fixed at ORGN published Latitude, Longitude and Ellipsoid Height for this survey.

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Point Description Sheet

Prepared By:



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860 MCKINLEY STREET
EUGENE, OR 97402
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Point Designation: SPRA

Horiz. Method: ORGN Fixed CORS

Vert. Method: GNSS Derived

Error Ellipse Semi major axis
(95% Confidence Level)

± 0.000 Meters

NAD 83 (2011) Geodetic Coordinates

Latitude: 44°49'36.07476" N

Longitude: 119°46'34.64026" W

Ellipsoid Height: 567.247 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 342,074.539 Meters

Easting: 457,222.627 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 1,122,291.80 Int. Feet

Easting: 1,500,074.23 Int. Feet

θ: +0°30'18.141"

Scale Factor: 0.99981269

Elevation Factor: 0.99991107

Combined Factor: 0.99972377

NAVD 88 Orthometric Elevation

587.151 Meters 1,926.35 Int. Feet

Point is the Antenna Reference Point (ARP) of a Continuously Operating Reference Station (CORS) located in Spray, OR and is a part of the Oregon Department of Transportation (ODOT) Oregon Real-time GNSS Network (ORGN). Raw GNSS observation data and real-time positioning is available from: <https://www.oregon.gov/ODOT/ORGN/Pages/index.aspx>
Point held fixed at ORGN published Latitude, Longitude and Ellipsoid Height for this survey.

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Point Description Sheet

Prepared By:



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860 MCKINLEY STREET
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Point Designation: TWICKENHAM

Horiz. Method: GNSS
Vert. Method: GNSS Derived
Error Ellipse Semi major axis
(95% Confidence Level)
± 0.013 Meters

NAD 83 (2011) Geodetic Coordinates

Latitude: 44°45'00.36579" N
Longitude: 120°11'17.01244" W
Ellipsoid Height: 456.230 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 333,360.104 Meters
Easting: 424,697.244 Meters

NAD 83 (2011) Grid Coordinates Oregon Statewide Lambert

Northing: 1,093,701.13 Int. Feet
Easting: 1,393,363.66 Int. Feet
θ: +0°13'03.673"
Scale Factor: 0.99980022
Elevation Factor: 0.99992847
Combined Factor: 0.99972870

NAVD 88 Orthometric Elevation

476.753 Meters 1,564.15 Int. Feet

Found 3 1/2" diameter USC&GS brass disk in 10" square concrete post. Point is located in T9S, R21E, S34, on northeast side of Twickenham Road.

This point is in the NGS database with a PID of QD0104. See the NGS datasheet for more detailed information. **NOT HELD this survey; differences with record (measured-record): X = -0.009 meters, Y = -0.021 meters, Z = -0.088 meters.** Note that record horizontal position is NAD83(98) from OrbiTech GNSS observations in 2002 and record vertical position is from NGS leveling.

