

U. S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION



HORIZONTAL CONTROL MAP FOR
OREGON HIGHWAY 35
FEDERAL HIGHWAY ADMINISTRATION PROJECT ER 2007-11(1)
OREGON HIGHWAY 35
HOOD RIVER COUNTY, OREGON
NOVEMBER 2007

Hood River County
Surveyor's Office
Survey No. CS 2007 120
Filed December 3, 2007
By Kurt A. Luebke



SURVEY REPORT

This report is for the establishment of control for the Federal Highway Administration Project ER 2007-11(1) Highway 35 Betterment Survey, under the direction of Contract No. DTFH70-05-D-00001 and Task Order No. T-07-001. The project is located in Hood River County, Oregon along State Route 35 in Mount Hood National Forest. This survey took place from September 4-7, 2007, and all monuments were set on September 4, 2007 except CP 27107 which was previously set by the NGS in 1998 as station STOLLE.

The project extends approximately 4000 feet southwest and northeast from the White River Bridge. It is approximately 1.5 miles in length.

The purpose is to establish permanent control points, which are inter-visible ahead and behind, and are not to exceed an interval of 800 feet along the length of this project, and determine their horizontal position on the Oregon State Plane coordinate system in international feet units, and their vertical position relative to NAVD 88 datum in U.S. survey feet units. The control was to facilitate the cross-sectioning and mapping of the Highway 35 corridor and defining the existing road prism and the topography 150 feet each side of the highway.

Additionally, river bed cross-sections were performed across the valley floor at 500 foot intervals for 3,000 feet upstream and downstream of the White River Bridge.

Point pairs were set so as to be inter-visible along the highway. All points set were either a 24" long, 1/2" diameter rebar with a 1" Yellow Plastic Cap (YPC) stamped - FHWA CP or a 24" long, 5/8" diameter rebar with a 1 1/4" Orange Plastic Cap (OPC) stamped - FHWA GPS CONTROL, as supplied by Federal Highways. The point numbering started in the northeast and proceeded to the southwest. A 48" lath with the point number written on it was set near all points. Each control point has two reference tags with bearings and distances from the tag to the control point and are as described in this control document. Every effort was made to place each point outside the roadway prism and buried approximately 0.3 feet below the surface.

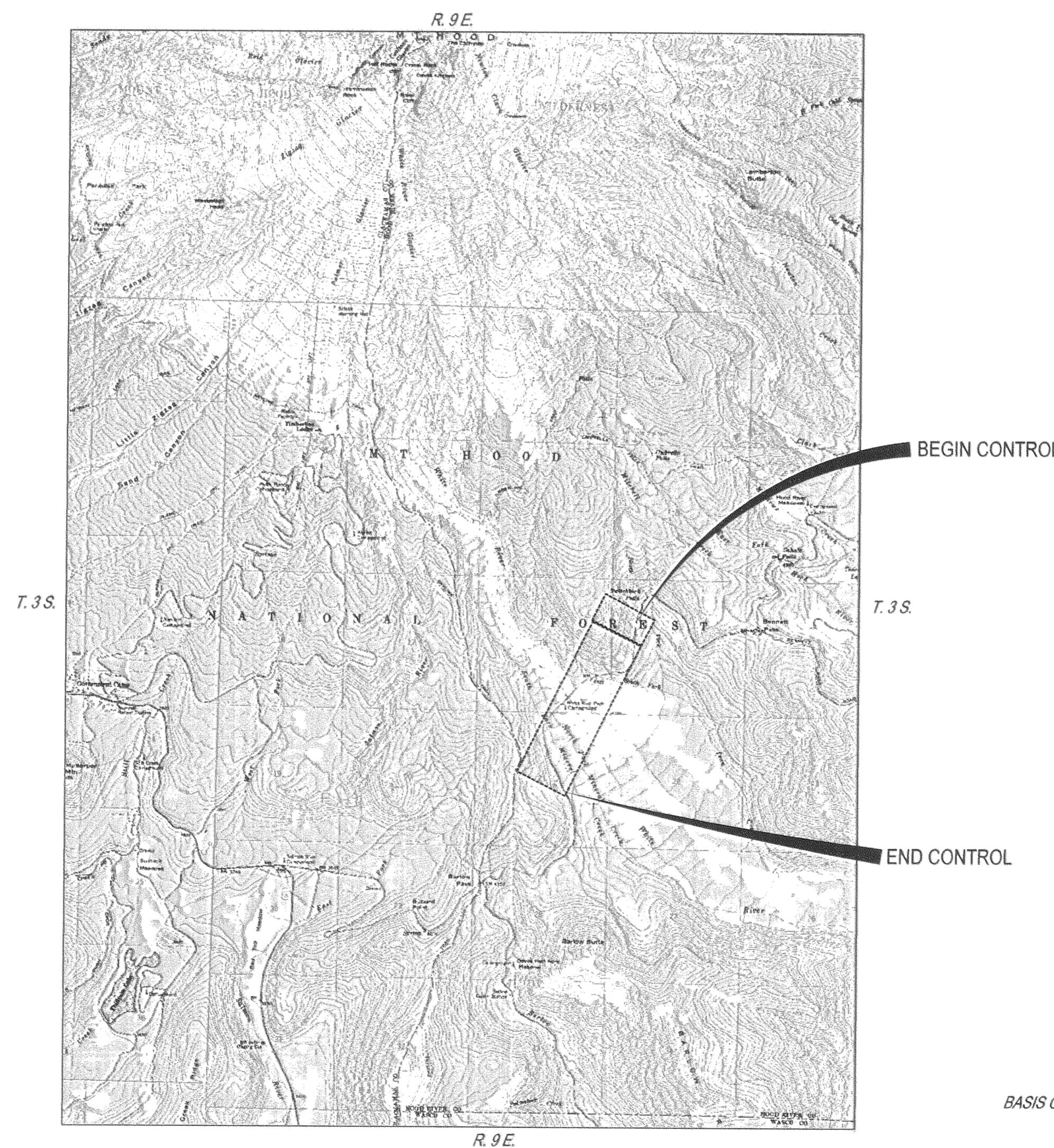
Horizontal Control

The GPS positions for the primary control points were determined by redundant static GPS methods using Trimble 4400 & 4700 GPS receivers in accordance with the accuracy standards and survey specifications set forth by the FHWA. The latitude and longitude for control stations 27107 & 27114 were established using the National Geodetic Survey (NGS) On-Line Positioning Service (OPUS). The files were processed with respect to Continuously Operating Reference Stations (CORS) P698, GWEN and GOBS. The positions for control stations 27107 & 27114 are estimated to be within 0.088 feet, at a 95% confidence relative to the National Spatial Reference System (NSRS). The computed latitude and longitude NAD83 values for control stations 27107 & 27114 were held fixed in a least squares network adjustment to produce the coordinate values for all GPS derived control positions. The error estimates for the remaining four individual GPS derived control positions fell within 0.048 feet at the 95% confidence level for the control network. The six GPS derived control points were held fixed and used to adjust the conventional control traverse. The post processing of the GPS & conventional control network was performed with Trimble Geomatics Office Software V1.61. The GEOID03 model was used in the adjustment. In all cases the closures exceeded the FHWA Second Order, Class II survey standards.

Conventional measurements on this project were made using a Leica TC 1800 total station theodolite in conjunction with Tripod Data Systems data collection software in a Ranger data collector. The theodolite calibration was checked on the EDM Baseline in Missoula, Montana; and all tribrachs had recently been adjusted.

Vertical Control

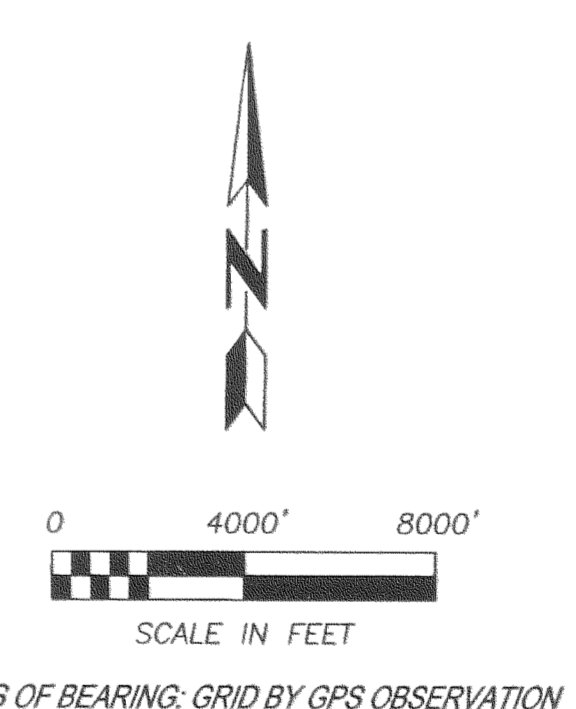
Elevations were established using closed differential level loops through all FHWA control points and using NGS station STOLLE (PID A12008) as the project benchmark with the OPUS derived NAVD 88 elevation in accordance with the accuracy standards and survey specifications set forth by the FHWA. NGS bench mark station STOLLE (PID A12008) was used as the project benchmark for all differential levels. All of the level loops closed at under 0.01 feet and required very little adjustment.



Surveyor's Notes:

NGS station STOLLE (PID A12008) was used in this control traverse; it is a stainless rod in a NGS monument can. The mark is solid in the ground, but is missing the lid from site disturbance. The GPS observation OPUS results for this mark fit within 0.15 feet of the NGS data sheet position. Since an OPUS position was used for the other static GPS base, for consistency, the OPUS position and the NAVD 88 elevation were used for station STOLLE.

Two existing NGS bench marks were tied into the GPS network with unsatisfactory results and were not used to establish the NAVD 88 elevations. Both bench marks fell well outside of the project area and were not differentially leveled.



BASIS OF BEARING: GRID BY GPS OBSERVATION

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Expires: 12/31/2008

HORIZONTAL CONTROL FOR
OREGON HIGHWAY 35 SHEET 1 OF 2

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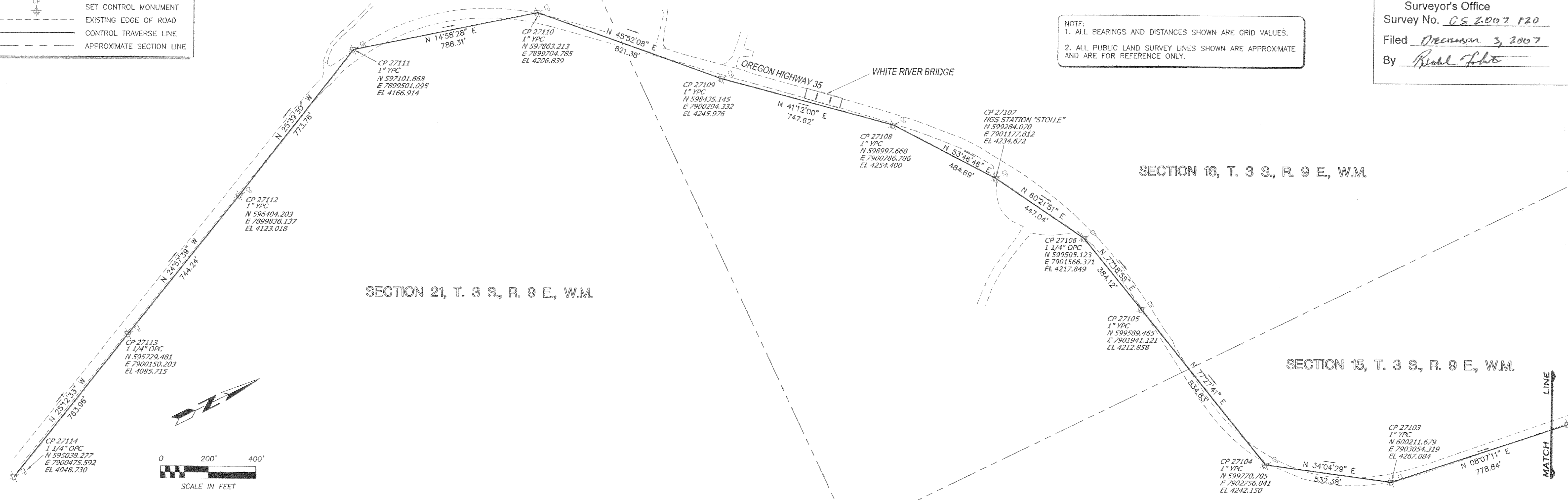
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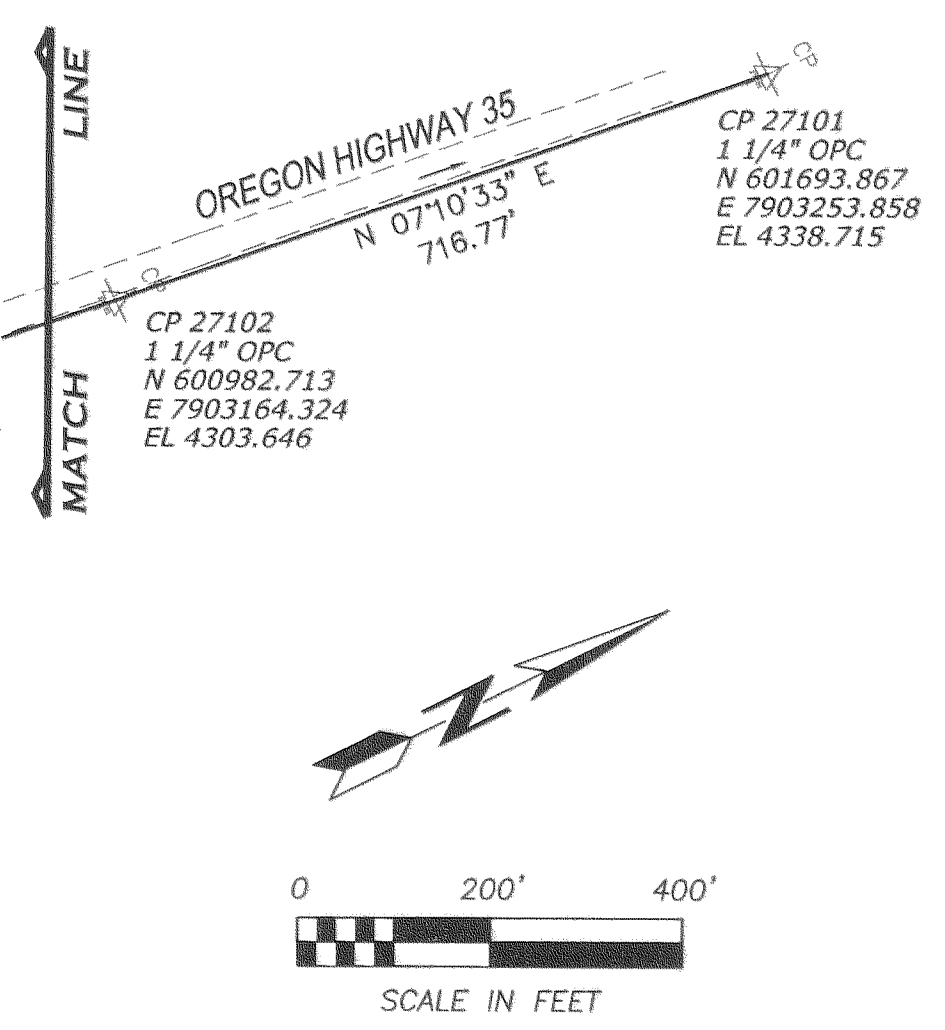
Hood River County
 Surveyor's Office
 Survey No. CS 2007 120
 Filed December 3, 2007
 By Ronald L. Loebe

NOTE:
 1. ALL BEARINGS AND DISTANCES SHOWN ARE GRID VALUES.
 2. ALL PUBLIC LAND SURVEY LINES SHOWN ARE APPROXIMATE AND ARE FOR REFERENCE ONLY.

LEGEND	
	SET CONTROL MONUMENT
	EXISTING EDGE OF ROAD
	CONTROL TRAVERSE LINE
	APPROXIMATE SECTION LINE



SECTION 15, T. 3 S., R. 9 E., W.M.



OREGON STATE PLANE NAD83(CORS) NORTH ZONE (3602)			NAVD 88	SURVEY CONTROL REPORT TABLE										NOTE: The orientation of the semi-major axis is the angle measured counter-clockwise from the positive-east bar scale.				
NAME	NORTHING SI FEET	EASTING SI FEET	ELEVATION US FEET	NAD83 LATITUDE	NAD83 LONGITUDE	ELLIPSOID HEIGHT	GRID SCALE FACTOR	ELEVATION SCALE FACTOR	COMBINED SCALE FACTOR	CONVERGENCE	DESCRIPTION	STANDARD DEVIATIONS		STANDARD ERROR ELLIPSE				
												NORTH	EAST	SEMI-MAJOR	SEMI-MINOR	ORIENTATION		
27101	601693.867	7903253.858	4338.715	45°18'40.26204"N	121°39'42.18799"W	4271.040	0.999898	0.999796	0.999694	-0°49'26"	1 1/4" OPC - FHWA GPS CONTROL	0.010	0.011	0.036	0.031	-29°21'22"		
27102	600982.713	7903164.324	4303.646	45°18'33.22800"N	121°39'43.29767"W	4235.972	0.999898	0.999798	0.999696	-0°49'27"	1 1/4" OPC - FHWA GPS CONTROL	0.010	0.010	0.036	0.029	-50°14'09"		
27103	600211.679	7903054.319	4267.084	45°18'25.59986"N	121°39'44.68163"W	4199.399	0.999897	0.999800	0.999697	-0°49'28"	1" YPC - FHWA CP	0.012	0.012	0.045	0.034	-47°50'05"		
27104	599770.705	7902756.041	4242.150	45°18'21.20367"N	121°39'48.76614"W	4174.453	0.999897	0.999801	0.999698	-0°49'31"	1" YPC - FHWA CP	0.013	0.012	0.046	0.034	-56°58'11"		
27105	599589.465	7901941.121	4212.858	45°18'19.29822"N	121°40'00.13124"W	4145.145	0.999897	0.999802	0.999700	-0°49'39"	1" YPC - FHWA CP	0.011	0.010	0.037	0.028	-55°32'49"		
27106	599505.123	7901566.371	4217.849	45°18'18.41203"N	121°40'05.35733"W	4150.143	0.999897	0.999802	0.999699	-0°49'42"	1 1/4" OPC - FHWA GPS CONTROL	0.007	0.006	0.023	0.019	-53°05'35"		
27107	599284.070	7901177.812	4234.672	45°18'16.17403"N	121°40'10.74889"W	4166.977	0.999897	0.999801	0.999699	-0°49'46"	NGS STATION STOLLE - STAINLESS ROD IN CAN	0.000	0.000	0.000	0.000	0°00'00"		
27108	598997.668	7900786.786	4254.400	45°18'13.29041"N	121°40'16.16159"W	4186.655	0.999897	0.999800	0.999698	-0°49'50"	1" YPC - FHWA CP	0.008	0.008	0.029	0.024	-44°24'58"		
27109	598435.145	7900294.332	4245.976	45°18'07.66601"N	121°40'22.93708"W	4178.210	0.999897	0.999801	0.999698	-0°49'55"	1" YPC - FHWA CP	0.011	0.012	0.044	0.032	-32°39'44"		
27110	597863.213	7899704.785	4206.839	45°18'01.93464"N	121°40'31.06860"W	4139.046	0.999897	0.999803	0.999702	-0°50'01"	1" YPC - FHWA CP	0.012	0.014	0.048	0.037	-20°33'23"		
27111	597101.668	7899501.095	4166.914	45°17'54.38655"N	121°40'33.76311"W	4099.100	0.999897	0.999804	0.999701	-0°50'03"	1" YPC - FHWA CP	0.011	0.014	0.047	0.037	-3°10'24"		
27112	596404.203	7899836.137	4123.018	45°17'47.54850"N	121°40'28.93420"W	4055.199	0.999897	0.999807	0.999704	-0°49'59"	1" YPC - FHWA CP	0.010	0.013	0.042	0.032	9°27'34"		
27113	595729.481	7900150.203	4085.715	45°17'40.93194"N	121°40'24.40365"W	4017.896	0.999897	0.999808	0.999705	-0°49'56"	1 1/4" OPC - FHWA GPS CONTROL	0.007	0.008	0.028	0.024	16°03'15"		
27114	595038.277	7900475.592	4048.730	45°17'34.15422"N	121°40'19.71167"W	3980.879	0.999897	0.999810	0.999707	-0°49'53"	1 1/4" OPC - FHWA GPS CONTROL	0.000	0.000	0.000	0.000	0°00'00"		

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