Washington Coastal Geodetic Control Network: Report and Station Index

Developed in Support of the Southwest Washington Coastal Erosion Study

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SECTION 1: THE WASHINGTON COASTAL GEODE蒂C CONTROL PROJECT

1. Background Information

The Southwest Washington Coastal Erosion Study is a multidisciplinary effort aimed at measuring, describing, and modeling the natural and human factors that impact the shorelines of the Columbia River littoral cell (Kaminsky et al. 1997). The littoral cell is 165 km in length and extends from Point Grenville, Washington in the north, to Tillamook Head, Oregon in the south (Figure 1).

To measure temporal and regional variations within this highly dynamic system, a beach morphology monitoring program has been implemented to document short- to medium-term shoreline variability (event – seasonal – annual scale) within the littoral cell (Ruggiero et al. 1998; Ruggiero et al. 1999). The monitoring program utilizes Global Positioning System (GPS) technologies to obtain sub-decimeter measurements of beach change at sampling sites distributed throughout the study area.

To obtain the sub-decimeter accuracy’s required by this monitoring effort, a high precision vertical and horizontal control network was developed (Kaminsky et al. 1998). This geodetic network supports the use of both real-time-kinematic (RTK) and geodetic GPS survey technologies.

The network has been designed to support data collection and provide a common reference datum and coordinate system for the multiple agencies involved in the study. The geodetic control network supports quantitative shoreline mapping, topographic and bathymetric surveying, surface elevation modeling, aerial photo orthorectification, ground-truthing of remote sensing operations, and a multitude of local uses, including point positioning and feature delineation.

Figure 1. The Columbia River littoral cell extends 165 km from Tillamook Head, Oregon, to Point Grenville, Washington and includes portions of Grays Harbor, Pacific, and Clatsop counties.
The geodetic control network described here, was developed by the Washington Department of Ecology (Ecology) with assistance from the National Geodetic Survey (NGS), US Geological Survey (USGS), Washington Department of Transportation (WS DOT) and the US Army Corps of Engineers (COE). The design process involved the identification, description, retrieval, and field recovery of over 140 survey markers within the region. Of the existing survey markers, 62 were selected for inclusion in the network and 14 new survey markers were installed. The seventy-six stations shown in Figure 2 comprise the Washington Coastal Geodetic Control (WCGC) Network.

![Image of map showing the Washington Coastal Geodetic Control Network with primary and local network stations identified.](image)

**Figure 2.** Regional overview of the Washington Coastal Geodetic Control Network with primary and local network stations identified. Names shown in this figure are for the nine High Accuracy Reference Network stations within the network.
2. Existing Vertical and Horizontal Control

Background investigation for developing the network started in early 1996 and involved the identification of suitable vertical and horizontal control stations within the study area. Stations considered for inclusion in the network were not limited to stations currently in the NGS database. Stations installed by the COE, WS DOT, Oregon Department of Transportation (OR DOT), Pacific County, the City of Ocean Shores, and National Ocean Service (NOS) were all considered.

The description of each station was reviewed and the station selected or rejected for possible inclusion in the network based on its accessibility, GPS visibility, and the distance between adjacent stations. The desired spacing of stations along the ocean coast was driven by the requirements of the RTK-GPS survey system being used by the study for the beach morphology monitoring program. The RTK-GPS system required stations along the coast with published NAVD 88 elevations that were less than 7 kilometers apart.

Vertical stability factors (e.g., stainless steel rod vs. surface mark), and station order and class, were also considered in the selection process. During the initial review approximately 140 markers were identified as potential candidates for the network. This review identified three areas on the coast, Pacific Beach to Ocean Shores, WA; North Cove to Westport, WA; and Hammond to Seaside, OR, where new monuments would be needed to achieve the desired station spacing.

In the case of the Pacific Beach-Ocean Shores area, a distance of 35 kilometers, there were no benchmarks referenced to the NAVD 88 datum. In the North Cove-Westport (20 km) and Hammond-Seaside (30 km) areas, the only NAVD 88 benchmarks available were located from three to five kilometers inland. The lack of vertical control near the coast in 52% of the study area was a driving factor that compelled the Department of Ecology to enter into a cooperative agreement with the NGS to design and implement the Washington Coastal Geodetic Control Network.
3. Network Design and Implementation

The goals for establishing a GPS-derived vertical control network along the southwest Washington and northwest Oregon coast include the following:

1. Establish a GPS derived 2-cm-level local horizontal and vertical control network based on NGS guidelines.
2. Develop a base datum to which all coastal change data could be referenced.
3. Document the network to NGS standards.
4. Publish the survey in the NGS National Spatial Reference System database.

The network was designed to support of the Southwest Washington Coastal Erosion Study as well as to enhance the National Spatial Reference System (NSRS) along the coast of Washington and northern Oregon.

Ecology employed NGS approved procedures for the survey, explained in Guidelines for Establishing GPS-Derived Ellipsoid Heights (Zilkoski et al. 1997). As part of the cooperative agreement with the NGS, Ecology performed all field reconnaissance and provided station descriptions, sketches, maps, and other information to the NGS for their approval. Ecology, with the assistance of the USGS, provided field personnel and performed all GPS observations using dual-frequency full-wavelength GPS receivers.

This project consisted of four parts: first, site reconnaissance and the selection and/or installation of suitable stations for inclusion in the network; second, planning, scheduling, and coordinating equipment and personnel for the field phase of the project; third, conducting the field observations; and fourth, data processing, “blue-booking”; and lastly, submission of the data to the NGS for final adjustment.

The following subsections describe the first three parts of this project. The fourth part of the project is described in further detail in Section 4. Section 4 contains a reprint of the NGS Report of Horizontal Control & Vertical Computations and describes the procedures followed by the NGS during the final adjustment of the data.

3.1 Site Reconnaissance

During January 1997 through June 1997 over 100 stations were visited in conjunction with beach topographic surveys conducted by Ecology. In addition, four field trips were conducted to recover survey stations that were candidates for inclusion in the network and to identify locations where new monuments were required.

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1 The NGS guidelines used by the survey required that the primary base stations be within 40 km of their neighboring base stations. The spacing between secondary and primary base stations in the primary base network could not exceed 15 km. Within the local network, the distance between adjacent stations could not exceed 10 km, with an average spacing of less than or equal to 7 km (Zilkoski et al. 1997).
Based on these site visits and the needs of the Southwest Washington Coastal Erosion Study (i.e., maximum distance between adjacent stations along the coast) it was determined that a total of seventy-six stations would be needed to cover the study area. This number included fourteen new stations as well as 33 NGS or NOS stations, 5 COE stations, 15 Pacific County stations, 4 WS DOT stations, 2 OR DOT stations, 2 USGS stations, and 1 City of Ocean Shores station.

Nine of the NGS stations included in the network, shown in Figure 2, are part of the Washington or Oregon High Accuracy Reference Network (HARN). The HARN was developed by the NGS with the collaboration of state agencies, counties, cities, utilities, tribes, and private entities. HARN stations have internally consistent horizontal coordinates that are of B order (1 cm, +1:1,000,000) or higher.

### 3.2 Preliminary Field Operations

Several new geodetic quality vertical control monuments were sited along the coast where existing station spacing did not meet either NGS or the study requirements. Thirteen stations were sited and described by Ecology and installed by a team of NGS and Ecology personnel in June 1997. A fourteenth station, MCKENZIE HEAD RM 3, was installed in November 1997 by Ecology in Fort Canby State Park for better GPS visibility. This station replaced station MCKENZIE HEAD in the network.

Thus, a total of fourteen new stations were installed in 1997. Seven stations were installed in Grays Harbor County, Washington, three in Pacific County, Washington, and four in Clatsop County, Oregon. One NGS station was reset (MEADOW RESET). The location and names of the stations included in the network are shown in Figures 3, 4, and 5.
Figure 3. Map showing the location of network stations within Grays Harbor County, Washington.
Figure 4. Map showing the location of network stations within Pacific and Wahkiakum County, Washington.
Figure 5. Map showing the location of network stations within Clatsop County, Oregon.
3.3 Survey Operations

The size of the project area (about 165-km in length) and the desire to complete the field phase of this project during the summer of 1997 required that the GPS observations be conducted in an organized field campaign over two weeks. The observation plan involved two phases. Phase 1 involved the observation of each station in the primary base network with six-hour sessions over two or three days. Phase 2 involved observing the local network. The local network included the fourteen secondary base stations and the fifty-seven local network stations. Each station in the local network was observed on two different days with forty-five minute sessions.

Personnel
Ecology contributed four operators and provided the field coordination for the project. The USGS provided four operators and, in the second week, a dedicated data coordinator who was involved with the transfer and analysis of the Ashtech GPS data into RINEX for use by GPSurvey (Trimble Ltd.)—the data analysis software utilized by Ecology for this project. GPS observations were conducted by Tom Reiss, Ann Gibbs, Jennifer Horsman, and Eric Hansen (USGS); Richard Daniels, Peter Ruggiero, Bob Huxford, Diana McCandless, George Kaminsky and Brian Voigt (Ecology); Dale Barrett and Russell Barrett (HLB & Associates, Seaside, Oregon).

Coordination
To insure coordination between the Department of Ecology, USGS, HLB & Associates, Grays Harbor County, Pacific County, and the NGS during the field phase, a meeting was held July 20, 1997 in Hoquiam, Washington. This meeting covered all aspects of the project and included discussion of the NGS standards and specifications for documenting the GPS observations, as well as a discussion of the field instructions and procedures developed by Ecology for this project.

Equipment
The size of the project area required the use of dual-frequency, full-wavelength GPS receivers. This campaign utilized eight GPS receivers with 2-meter fixed height tripods. Ecology provided two Trimble 4400 receivers and one fixed height tripod. Ecology coordinated with the USGS office in Menlo Park, California, to obtain six Ashtech Z-12 receivers and seven fixed height tripods for the survey. Efforts were undertaken to obtain trained operators and receivers from Grays Harbor County and the Washington Department of Transportation. However, budgetary and time constraints precluded their employment in this project. A private survey company, HLB & Associates, Seaside, Oregon, volunteered two Trimble 4400 receivers with wood tripods and tribachs to observe stations CANN and MEADOW RESET in northwest Oregon.

The guidelines for establishing GPS-derived ellipsoid heights (Zilkoski et al. 1997) required meteorological data (wet bulb, dry bulb, relative humidity, and air pressure) be collected at the primary and secondary base stations. Efforts were made to obtain these instruments through the

2The primary base network consisted of five primary (HATCHERY, CENTRAL, SOUTH BEND, GP 35004-3, CANN) and fourteen secondary control stations (SOUTH, R 443, MOTULIPS, OMEN, GRAYS HARBOR EAST BASE 2, GUNVILLE, CSW 1, BONE, X 537, M 536, NORTH HEAD RM 4, SMUR, UU 282, MEADOW RESET).
Department of Ecology, the Washington State NGS advisor, NGS Seattle field office, and the USGS. This process resulted in the loan of four full meteorological stations and a fifth air pressure sensor—two less than required by the guidelines. To overcome this limitation the meteorological stations were distributed such that the primary base stations would always have meteorological data. The remaining meteorological stations were distributed among the secondary base stations to insure pressure and weather variations between coastal and inland locations would be well represented.

Procedures
Each operator was assigned a GPS receiver, antenna, and tripod along with a receiver number. This number was permanently assigned to each set of equipment for the duration of the project. Each operator was given a binder that included spotter maps and site descriptions for all 76 stations, meteorological station assignments by receiver number and station, and a day-by-day schedule showing the start and end time for each session. The receiver number was used in all scheduling and insured that all field personnel would know where and when they should have their assigned GPS receivers operational.

During the pre-project meeting (held on July 20th) all 2-meter fixed height tripods were inspected and their bubbles plumbed using two three-wire levels provided by the Washington State NGS advisor. Each equipment configuration was setup and run for 15 to 20 minutes and the antenna heights measured. Serial and model numbers for each receiver/antenna set were recorded as the equipment was repacked and batteries recharged in preparation for the start of phase 1 of the project on July 21, 1997.

Observations, Phase 1, 2, and 3
A majority of the observations were conducted over two weeks in two phases. Phase 1 involved a subset of eighteen stations. Phase 2 involved the observation of seventy-one stations. Phase 3 involved observations to tie in MCKENZIE HEAD RM 3 and the reobservation of several stations whose adjusted baselines were not within NGS specifications.

Phase 1 of the field operation ran from July 21 through July 25, 1997 and involved observation of the five primary and fourteen secondary control stations. Each session ran from 9:00 a.m. to 3:00 p.m., and used a 10-degree mask with a 15-second epoch interval. Due to the movement of a tripod leg at station CANN, near Cannon Beach, Oregon, a makeup session was held on August 2. The makeup session observed station CANN and its six nearest primary and secondary control stations.

Phase 2 of the field operation ran from July 27 through August 1, 1997 and involved observations at the fourteen secondary stations and fifty-seven local network stations. Each session ran for 45-minutes and used a 15-degree mask with a 15-second epoch interval.

After initial adjustment of the survey data by Weber GPS Consultants it was determined that several baselines were not within NGS specifications and that one station, MCKENZIE HEAD, did not have suitable GPS visibility.
As a result of these findings, station MCKENZIE HEAD RM 3 was installed by Ecology in November 1997 for better GPS visibility. Phase 3 data collection was conducted between December 1997 and January 1998 to tie MCKENZIE HEAD RM 3 to the network and to observe other out-of-specification baselines. Additional observations were carried out on September 29-30, 1998 to replace station IREDALE, which had been destroyed by vandals. The new station, named IREDALE RESET, is located at approximately the same location as the original. These sessions ran for 45-minutes and used a 15-degree mask with a 15-second epoch interval, the same as used for the phase 2 observations.

3.4 Adjustment of the Data

Ecology and Weber GPS Consultants conducted preliminary formatting and review of the survey data prior to submission to the NGS. All of the data were converted from their native formats (proprietary Trimble or Ashtech formats) to a standard data interchange format, RINEX. During this conversion any problems with antenna phase centers and correct antenna heights were rectified. Data quality was also reviewed at this time via an initial check of each survey session for cycle slips and proper session start and stop times. Baseline distances were calculated to insure that baseline misclosures between neighboring stations were less than 2 cm, the NGS standard for surveys of this type. The NGS software program DDPROC was run and station descriptions created or updated for each station in the network. Once this initial review was completed, all the data was sent to the NGS for adjustment. Along with the digital data, Ecology furnished the NGS with station photographs and/or rubbings, observation logs, station visibility diagrams and a final equipment list and field report (Daniels and Ruggiero 1997).

The Washington Coastal Geodetic Control Network was reviewed by the National Geodetic Survey (NGS) and final adjustment completed in December 1998. The three primary steps taken by the NGS to adjust the data are explained in the following paragraphs. For detailed information on the NGS adjustment procedures see Section 4.

In the first step the primary base network was adjusted. During this adjustment the horizontal coordinates of the nine HARN stations and two CORS stations were held fixed. During the calculation of the NAD 83 ellipsoid heights the heights of the two CORS stations (FORT STEVENS 1 ARP and ROBINSON POINT 1 ARP) were held fixed. The adjustment of the primary base network produced horizontal and NAD 83 ellipsoid heights for the secondary and primary base stations.

In the second step of the adjustment process the local network was adjusted. Since the secondary stations are common to both the primary and local network, the secondary stations served as the fixed horizontal and NAD 83 ellipsoid control for the adjustment.

The third step was to estimate the NAVD 88 orthometric heights for the non-benchmark stations in the network. In the combined vertical adjustment, the orthometric height of the following stations with known NAVD 88 orthometric heights were held fixed: 944 0574 A TIDAL, 944 1102 TIDAL 2 1952, FLAG, GUNVILLE, L 443, M 536, MESS, R 443, SOUTH, SOUTH BEND, TURN RM 4, and X 537.
The results from this three step process for the Washington Coastal Geodetic Control Network are shown in Table 1, where internally consistent coordinates for stations over 161 km apart are shown. The NAVD 88 elevations in Table 1 are shown to the accuracy of the data, leveled benchmarks are shown to millimeters while GPS stations are shown to centimeters in Washington and decimeters in Oregon. The coordinates shown in Table 1 meet NGS local 2-cm ellipsoid height standards. In addition, the horizontal coordinates shown meet B-order horizontal specifications (1 cm, ±1:1,000,000) for the primary base stations and first-order specifications (1 cm, ±1:100,000) for stations in the local network.

Table 1. Coordinates for the seventy-six stations contained within the Washington Coastal Geodetic Control Network in the Washington State Plane, South, meters, NAD 83 and NAVD 88 coordinate systems.

<table>
<thead>
<tr>
<th>Station Number</th>
<th>County</th>
<th>NGS PID</th>
<th>Station Designation</th>
<th>Type</th>
<th>Easting (m)</th>
<th>Northing (m)</th>
<th>NAVD 88 Elevation (m)</th>
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<td>SD0794</td>
<td>GRENVILLE</td>
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<td>04</td>
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<td>PIER RM 1 AZ MK</td>
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*Leveled NAVD 88 orthometric height differed from GPS derived height by more than one decimeter. Due to these errors GPS derived NAVD 88 orthometric heights for Oregon are shown to the nearest decimeter.
3.5 Additional Stations

The completion of the Washington Coastal Geodetic Control Network has allowed the Department of Ecology to conduct several GPS surveys in support of on-going research efforts in the region. Two GPS surveys and one leveling survey have been completed in which four temporary survey stations were installed and three permanent stations reobserved. The GPS surveys followed National Geodetic Survey guidelines for deriving 2-cm local vertical networks (Zilkoski et al. 1997). The coordinates for these stations are shown in Table 2, with station descriptions contained in Section 3 of this document.

The four temporary stations, BC TIDAL, NC TIDAL, NR TIDAL, and SB TIDAL, consist of PK-Nail and washer markers that were placed in support of an U.S. Army Corps of Engineers study being conducted in Willapa Bay, Washington. These marks were used to reference four temporary tidal gauges to the NAVD 88 datum. In addition, during this survey horizontal coordinates were obtained for the National Geodetic Survey benchmark T 530.

Survey station ASTOR (a.k.a. ASTO) was first surveyed by the NASA Wallops Flight Facility, Wallops Island, Virginia, in support of two LIDAR flights flown from the Astoria Airport in 1997 and 1998. The LIDAR flights were flown as part of the Airborne LIDAR Assessment of Coastal Erosion (ALACE) Project (Meredith et al. 1998). The ALACE project was being conducted as part of a cooperative agreement with the NOAA Coastal Services Center, NOAA Aircraft Operations Center (AOC), and the USGS Coastal and Marine Geology Program. As part of an effort to ground truth the LIDAR data, the Department of Ecology resurveyed the station to tie it into the local network (Daniels, submitted).

The last station listed in Table 2, X 1 RM 1, is a stainless steel rod marker. The reference station was set to prevent the loss of the vertical elevation information for station X 1, which was located within 3 m of a 4 m tall erosion scarp caused by coastal erosion during the winter of 1998. The reference station elevation was leveled using second order reset leveling techniques.

Table 2. Coordinates for six stations tied to the network but not adjusted by the NGS in the Washington State Plane South, meters, NAD 83 and NAVD 88 coordinate systems.

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<th>NGS PID</th>
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<th>NAVD 88 Elevation</th>
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3.6 Project Summary

During this GPS survey the Department of Ecology, with the assistance of the USGS and NGS, successfully established a GPS-derived 2 cm-level local vertical control network based on NGS guidelines for establishing GPS-derived ellipsoid heights (Zilkoski et al. 1997). The Washington Coastal Geodetic Control Network has been reviewed by the NGS and was adjusted in December 1998. This network is currently part of the National Spatial Reference System. The National Spatial Reference System database contains descriptions for benchmarks and survey stations for the entire United States and may be accessed via the NGS web page at [http://www.ngs.noaa.gov](http://www.ngs.noaa.gov).

4.0 Oregon Elevation Offset

This geodetic control project identified a vertical offset between the leveling network in northwest Oregon and southwest Washington. Leveled NAVD 88 orthometric heights at four of the five first order vertical benchmarks occupied in Oregon differed from GPS derived orthometric heights by more than one decimeter. It appears that the orthometric heights used in the original NAVD 88 adjustment were not accurate enough to control the leveling network. The NGS is currently investigating the problem and a regional readjustment will be completed by the NGS in the future (Carlson 1998; Section 4 of this report).

This height discrepancy was identified by the NGS during their final adjustment of the GPS data. Leveling work conducted by the NGS in 1996 identified similar misclosures in the leveling network in the northwestern part of Clatsop County. The first leveling line in the area was installed in 1943. The second was installed independently in 1987. When these two lines were connected by leveling in 1996 during the installation of the U.S. Coast Guard DGPS/CORS system at Fort Stevens, Oregon, differences as large as 0.20 m were identified between the two leveling lines (Fredrick et al. 1996).

Due to this elevation offset, the new stations installed in Oregon for this survey have published NAVD 88 elevations shown to the nearest decimeter (0.1 m). In comparison, heights were published to the nearest centimeter for Washington. This discrepancy is problematic, as the Southwest Washington Coastal Erosion Study requires centimeter level elevations for the stations. Fortunately, if we assume that the leveled NAVD 88 orthometric heights at the four problematic stations are incorrect, the methods developed by Milbert and Smith (1996a) may be used to estimate the “true” NAVD 88 orthometric height of the stations in Oregon. Milbert and Smith (1996a) have determined that the NAVD 88 orthometric height of a station may be estimated with the following equation:

\[ H_{88} = h_{83} - N_{96}, \]  

(1a)

where \( H_{88} \) is the estimated NAVD 88 orthometric height, \( h_{83} \) is the NAD 83 GPS ellipsoid height, and \( N_{96} \) is the a geoid height calculated from a model of the Earth’s gravity (GEOID96). When utilizing this equation, one should not expect the estimated NAVD 88 height to exactly match a leveled NAVD 88 orthometric height for a station. The difference between the leveled and estimated orthometric height for a station is partially a result of error in the GEOID96 model.
and datum definition. By subtracting the estimated height, $H_{88}$, from the published orthometric height for an existing station one may obtain a “local orthometric height correction factor” that can be applied to other nearby stations (Milbert and Smith 1996b). If many benchmarks are occupied over an extensive area (> 100 km’s), trends in this correction factor may be detected.

The orthometric height correction factor used here for Oregon is based on seven benchmarks in Washington. The Washington stations selected were directly across the Columbia River from the effected area. These stations included four first order vertical benchmarks and three stations with GPS derived orthometric heights. The published NAVD 88 elevation of each station was compared with that obtained using equation (1a) and the difference obtained. These differences were then averaged to obtain a local orthometric height correction factor for Oregon of 0.14 m. This correction factor was then applied to each of the thirteen Oregon stations using a modified version of Equation 1a:

$$H_{88} = h_{83} - N_{96} + L, \quad (1b)$$

where $L$ is the local orthometric height correction factor. Equation 1b was applied to the Oregon stations and estimated centimeter level NAVD 88 orthometric heights obtained. The estimated NAVD 88 orthometric heights are shown with bold text in Table 3 and are estimated to be correct within ±2 cm.
Table 3. Estimated centimeter level elevations for the twelve Oregon stations.
Estimated elevations based on the regional GEOID96 correction factor are shown in bold text (values in meters).

<table>
<thead>
<tr>
<th>Station Designation</th>
<th>State</th>
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<th>NAD 83 Ellipsoid</th>
<th>NAVD 88 Published Elevation</th>
<th>NAVD 88 Predicted (Eq. 1a)</th>
<th>Predicted w/correction (Eq. 1b)</th>
<th>Predicted w/correction Less Published</th>
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<td>5.75</td>
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<td>WA</td>
<td>-23.970</td>
<td>-21.09</td>
<td>3.03</td>
<td>2.88</td>
<td>3.02</td>
<td>-0.01</td>
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<td>0.01</td>
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<td>-15.27</td>
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<td>0.04</td>
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<td>11.40</td>
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<tr>
<td>CANN</td>
<td>OR</td>
<td>-22.910</td>
<td>7.46</td>
<td>30.5</td>
<td>30.37</td>
<td>30.51</td>
<td>0.01</td>
<td>GPS</td>
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The GEOID96 to NAVD 88 regional correction factor based on Washington stations is 0.14 meters.
Bold values are predicted NAVD 88 orthometric heights for the twelve stations in Clatsop County, Oregon.
Note that the GPS-derived NAVD 88 elevations have been published by the NGS for Oregon to 0.1 m.

5.0 Tidal Datums

The sponsors of this geodetic network are conducting coastal research and are interested in the relationship between the terrestrial NAVD 88 datum and water level datums, such as, Mean Lower Low Water (MLLW), Mean Low Water (MLW), Mean High Water (MHW), and Mean Higher High Water (MHHW). It is important to note that the terms MLLW, MLW, MHW, and MHHW are used in relation to a tidal datum that has been calculated for a given location based on several months to years of tide gauge data. The relationship between a terrestrial based datum such as NAVD 88 and a tidal datum is not uniform throughout a region as large as the Columbia River littoral cell. As such, a tidal datum has minimal value outside of the area for which it was calculated. In contrast, the NAVD 88 datum is valid throughout North America (Note, the term mean sea level is not discussed here as it is an alternate name for the old NGVD 1929 vertical datum and is not a true tidal datum).

In an effort to determine the relationship between NAVD 88 and the tidal datums within the region, ten National Ocean Service (NOS) tidal benchmarks were identified with known or GPS
surveyed NAVD 88 elevations (Table 4). The MLLW, MLW, MHW, and MHHW elevation for each benchmark was calculated based on NOS tidal benchmark data sheets. The NAVD 88 elevations of the tidal stations were observed in the field with RTK-GPS using the WCGC network for control. Vertical elevation discrepancies between GPS-derived and published elevations of 10 cm were found at the three tidal benchmarks in Oregon; a 5-cm error was noted at one of the two benchmarks at Point Grenville, WA. The 0.1 m discrepancy in Oregon may be related to the Oregon offset problem previously discussed. When discrepancies occurred between published and observed NAVD 88 elevations, the GPS elevations were used in the analysis.

Table 4. NAVD 88 elevations for tidal benchmarks located throughout the Columbia River littoral cell (values in meters).

<table>
<thead>
<tr>
<th>Station Designation</th>
<th>NGS PID</th>
<th>Northing (m)</th>
<th>Geographic Location</th>
<th>NAVD88 Elevation</th>
<th>NAVD88 MLLW</th>
<th>NAVD88 MLW</th>
<th>NAVD88 MHW</th>
<th>NAVD88 MHHW</th>
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<td>942 8478 TIDAL 1 B</td>
<td>SC1040</td>
<td>80015.82</td>
<td>Seaside, OR</td>
<td>5.76</td>
<td>0.74</td>
<td>0.86</td>
<td>2.29</td>
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<td>1971 GPS</td>
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<td></td>
<td></td>
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<tr>
<td>FORT STEVENS</td>
<td>SC0584</td>
<td>100053.64</td>
<td>Ft. Stevens, OR</td>
<td>5.59</td>
<td>-0.16</td>
<td>0.22</td>
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<td>2.41</td>
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<td>LONGITUDE STATION GPS</td>
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<td>943 9008 TIDAL 3</td>
<td>SD0586</td>
<td>100053.64</td>
<td>Ft. Stevens, OR</td>
<td>3.14</td>
<td>-0.15</td>
<td>0.23</td>
<td>2.21</td>
<td>2.42</td>
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<tr>
<td>1940 GPS</td>
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<tr>
<td>BETTY M 1976</td>
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<td>110920.23</td>
<td>Jetty A, Columbia River</td>
<td>6.55</td>
<td>-0.19</td>
<td>0.23</td>
<td>2.06</td>
<td>2.27</td>
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<td>944 0574 A 1982</td>
<td>SD0299</td>
<td>110670.30</td>
<td>North Jetty, Columbia River</td>
<td>4.87</td>
<td>-0.05</td>
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<td>2.06</td>
<td>2.26</td>
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<td>FLAG 1958</td>
<td>SC0916</td>
<td>158293.89</td>
<td>Tokeland, WA</td>
<td>4.10</td>
<td>-0.24</td>
<td>0.17</td>
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<td>944 1102 TIDAL 2</td>
<td>SD0042</td>
<td>181306.38</td>
<td>Westport, WA</td>
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<td>Ocean Shores, WA</td>
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<td>-0.54</td>
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<td>2.10</td>
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<td>1992 GPS</td>
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<tr>
<td>944 1627 TIDAL 7</td>
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<td>225404.00</td>
<td>Point Grenville, WA</td>
<td>2.89</td>
<td>-0.36</td>
<td>-0.02</td>
<td>1.90</td>
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<tr>
<td>944 1627 TIDAL 4</td>
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<td>225404.00</td>
<td>Point Grenville, WA</td>
<td>2.29</td>
<td>-0.31</td>
<td>0.03</td>
<td>1.95</td>
<td>2.17</td>
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<td>1944 GPS</td>
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</table>

Average -0.17 0.19 2.11 2.33
Std. Dev. 0.35 0.27 0.12 0.12

NAVD 88 elevations for stations with ‘GPS’ appended to their name may differ from published values. Published NAVD88 elevations are only available for stations with NGS PID numbers.

In an effort to extrapolate the available tidal data to the entire coast, linear regression analyses were performed on the data shown in Table 4. These analyses assume that the northing coordinate (i.e., latitude) of a station is a controlling factor in determining its tidal elevation and that a linear equation may be developed to predict the MLLW, MLW, MHW, and MHHW for open coast locations within the study area.
The linear regression analysis obtained a $r^2$ value of 0.46 between northing coordinates and NAVD 88 MLLW elevations (i.e., 46% of the variation within the data was explained by the linear regression equation). Similar linear regression equations obtained $r^2$ values for the MLW (0.58), MHW (0.54), and MHHW (0.48) datums.

The linear regression results were used to derive Equations 2, 3, 4, and 5. These equations may be used to estimate a MLLW, MLW, MHW, or MHHW elevation for coastal location within the Columbia River littoral cell. The equation derived for MLW and MHW have the highest $r^2$ and should be used when possible. Note that these equations use Northing values in meters, expressed in the NAD 83 Washington State Plane South coordinate system.

\[
\text{MHHW} = \text{Northing} \times -2.556 \times 10^{-6} + 2.5561, \quad (2) \\
\text{MHW} = \text{Northing} \times -1.670 \times 10^{-6} + 2.3593, \quad (3) \\
\text{MLW} = \text{Northing} \times -3.819 \times 10^{-6} + 0.7546, \quad (4) \\
\text{MLLW} = \text{Northing} \times -4.423 \times 10^{-6} + 0.4822. \quad (5)
\]

Equations 2, 3, 4, and 5 are based on historical tide data for eight stations within the region. A more detailed analysis of the relationship between NAVD 88 and MLLW, MLW, MHW, and MHHW would require the placement and simultaneous monitoring of several tide gauges on the open ocean coast over several months. As such, these equations can only approximate the true tidal elevation for a site. Based on the 95% confidence intervals calculated for each equation the estimated error range of each equation is about ±0.15 m.

To provide a graphical example of the error associated with these equations, Figure 6 has been developed. Figure 6 shows the actual and estimated values for MLW and MHW for the eight tidal stations within the Columbia River littoral cell along with the 95% standard error bar for each estimate.
Figure 6. Estimated (○) and actual (♦) MHW and MLW elevations for the tidal stations within the Columbia River littoral cell. Dashed lines show the 95% confidence interval of the equations used to calculate the estimated MHW and MLW values.
6.0 Station Descriptions

Section 2 of this document contains the NGS data sheets for all seventy-six stations successfully occupied during this survey. Section 3 contains descriptions of several additional stations that have been subsequently tied to the Washington Coastal Geodetic Control Network. These additional stations have not been adjusted by the NGS.

7.0 Acknowledgements

The completion of the Washington Coastal Geodetic Control Project has been made possible by the contributions of many individuals and agencies. Fred Budweg and Steve Tew (Ecology) compiled the initial survey station inventories for the region. Gene Zerby and Bill Shootie of Grays Harbor County and Fred Childress of Pacific County provided station information to Ecology. The project scope was conceived by George Kaminsky (Ecology) with the support of Gary Perasso (NGS) and Kurt Iverson (WS DOT). Initial network design was completed by Ecology with the assistance of Kurt Iverson (WS DOT), Gary Perasso (NGS), Steve Frakes (NGS). New geodetic survey stations were installed by a combined crew of Ecology and NGS personnel (J. Gary Fredricks, NGS Survey Section E, Seattle). Weber GPS consultants conducted initial data processing and preliminary adjustment of the data. Final adjustment of the data was completed and reviewed by David Zilkoski and Edward Carlson of the NGS. Funding for the Washington Coastal Geodetic Control Network was provided by Ecology and the USGS as part of the Southwest Washington Coastal Erosion Study.

8.0 References


SECTION 2: NGS DATA SHEETS

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<td>R 443</td>
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<td>RICH</td>
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<td>RILEA</td>
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<td>ROBINSON POINT 1 CORS ARP</td>
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<td>SEASIDE RM 2</td>
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<td>SMUR</td>
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<td>SNAKE 2</td>
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<td>SOUTH BEND</td>
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<td>TURN RM 4</td>
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National Geodetic Survey, Retrieval Date = OCTOBER 6, 1999

TIDAL BM - This is a Tidal Bench Mark.

DESIGNATION - 944 0574 A TIDAL

PID - SD0299

STATE/COUNTY- WA/PACIFIC

USGS QUAD - CAPE DISAPPOINTMENT (1985)

*CURRENT SURVEY CONTROL

NAD 83(1991)- 46 16 22.39978(N) 124 04 25.72046(W) ADJUSTED

NAVD 88 - 4.872 (meters) 15.98 (feet) ADJUSTED

X - -2,474,354.980 (meters) COMP

Y - -3,658,207.684 (meters) COMP

Z - 4,586,252.261 (meters) COMP

LAPLACE CORR- 14.40 (seconds) DEFLEC96

ELLIP HEIGHT- -19.50 (meters) GPS OBS

GEOID HEIGHT- -24.24 (meters) GEOID96

DYNAMIC HT - 4.872 (meters) 15.98 (feet) COMP

MODELED GRAV- 980,706.4 (mgal)

HORZ ORDER - FIRST

VERT ORDER - FIRST CLASS II

ELLP ORDER - THIRD CLASS II

The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999.

The orthometric height was determined by differential leveling and adjusted by the National Geodetic Survey in June 1991.

This mark is designated as VM 8938 in the Oceanographic Products and Services Division Tidal Bench Mark database.

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

The Laplace correction was computed from DEFLEC96 derived deflections.

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

The geoid height was determined by GEOID96.

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

The modeled gravity was interpolated from observed gravity values.

North East Units Scale Converg.

SPC WA S 110,670.308 224,638.597 MT 0.99992937 -2 35 45.6

UTM 10 5,124,928.346 417,262.225 MT 0.99968415 -0 46 33.7

SUPERSEDED SURVEY CONTROL
No superseded survey control is available for this station.

**MARKER:** DJ = TIDAL STATION DISK  
**SETTING:** 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)  
**STAMPING:** 0574 A 1982  
**PROJECTION:** RECESSED 10 CENTIMETERS  
**MAGNETIC:** I = MARKER IS A STEEL ROD  
**STABILITY:** B = PROBABLY HOLD POSITION/ELEVATION WELL  
**ROD/PIPE-DEPTH:** 10 meters

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<td>1997</td>
<td>GOOD</td>
<td>WADECO</td>
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</table>

**STATION DESCRIPTION**

'DESCRIBED BY NATIONAL GEODETIC SURVEY 1987

5.7 KM (3.55 MI) SOUTH FROM ILWACO.

0.16 KM (0.10 MI) WEST ALONG SPRUCE STREET FROM THE JUNCTION OF FIRST STREET SOUTH AND US HIGHWAY 101 NORTH IN ILWACO, THENCE 3.6 KM (2.25 MI) SOUTH ALONG 2ND AVENUE TO THE ENTRANCE GATE TO CANBY PARK, THENCE 1.93 KM (1.20 MI) SOUTHWEST ALONG JETTY ROAD, 50.0 M (164.0 FT) NORTHEAST OF THE NORTHEAST SHOULDER OF A ROAD LEADING SOUTHEAST OF A PARKING LOT, 7.0 M (23.0 FT) SOUTHEAST OF THE SOUTHEAST EDGE OF JETTY ROAD.

THE MARK IS 0.91 METERS N FROM A WITNESS POST

THE MARK IS 0.3 M ABOVE THE ROAD.

**STATION RECOVERY (1989)**

RECOVERY NOTE BY US POWER SQUADRON 1989 (FPC)

RECOVERED IN GOOD CONDITION.

**STATION RECOVERY (1997)**

RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)

RECOVERED AS DESCRIBED.
The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999. The orthometric height was determined by differential leveling and adjusted by the National Geodetic Survey in June 1991. This mark is designated as VM 8980 in the Oceanographic Products and Services Division Tidal Bench Mark database. The X, Y, and Z were computed from the position and the ellipsoidal ht. The Laplace correction was computed from DEFLEC96 derived deflections. The ellipsoidal height was determined by GPS observations and is referenced to NAD 83. The geoid height was determined by GEOID96. The dynamic height is computed by dividing the NAVD 88 geopotential number by the normal gravity value computed on the Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45 degrees latitude (G = 980.6199 gals.). The modeled gravity was interpolated from observed gravity values.

The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999. The orthometric height was determined by differential leveling and adjusted by the National Geodetic Survey in June 1991. This mark is designated as VM 8980 in the Oceanographic Products and Services Division Tidal Bench Mark database. The X, Y, and Z were computed from the position and the ellipsoidal ht. The Laplace correction was computed from DEFLEC96 derived deflections. The ellipsoidal height was determined by GPS observations and is referenced to NAD 83. The geoid height was determined by GEOID96. The dynamic height is computed by dividing the NAVD 88 geopotential number by the normal gravity value computed on the Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45 degrees latitude (G = 980.6199 gals.). The modeled gravity was interpolated from observed gravity values.

The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999. The orthometric height was determined by differential leveling and adjusted by the National Geodetic Survey in June 1991. This mark is designated as VM 8980 in the Oceanographic Products and Services Division Tidal Bench Mark database. The X, Y, and Z were computed from the position and the ellipsoidal ht. The Laplace correction was computed from DEFLEC96 derived deflections. The ellipsoidal height was determined by GPS observations and is referenced to NAD 83. The geoid height was determined by GEOID96. The dynamic height is computed by dividing the NAVD 88 geopotential number by the normal gravity value computed on the Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45 degrees latitude (G = 980.6199 gals.). The modeled gravity was interpolated from observed gravity values.
SD0042 NGVD 29 - 3.655 (m) 11.99 (f) ADJ UNCH 1 2

SD0042.Superseded values are not recommended for survey control.
SD0042.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
SD0042.See file dsdata.txt to determine how the superseded data were derived.
SD0042
SD0042_MARKER: DB = BENCH MARK DISK
SD0042_SETTING: 30 = FLAG POLE BASE (POLE REMOVED)
SD0042_STAMPING: TIDAL 2 RESET 1952
SD0042_PROJECTION: FLUSH
SD0042_MAGNETIC: O = OTHER; SEE DESCRIPTION
SD0042_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
SD0042+STABILITY: SURFACE MOTION
SD0042
SD0042 HISTORY - Date Condition Recov. By
SD0042 HISTORY - 1952 MONUMENTED CGS
SD0042 HISTORY - 1968 GOOD NGS
SD0042 HISTORY - 1976 GOOD LOCENG
SD0042 HISTORY - 19971015 GOOD WADECO
SD0042
SD0042 STATION DESCRIPTION

SD0042 DESCRIBED BY NATIONAL GEODETIC SURVEY 1968
SD0042 '1.25 MI N FROM WESTPORT.
SD0042 '0.9 MILE NORTH ALONG MONTESANO AVENUE FROM THE POST OFFICE AT
SD0042 'WESTPORT, THENCE 0.15 MILE NORTHEAST ALONG PATTERSON STREET, THENCE
SD0042 '0.2 MILE NORTHWEST ALONG WESTHAVEN DRIVE, AT WESTHAVEN GRAYS HARBOR
SD0042 'COAST GUARD STATION, IN THE TOP OF THE CONCRETE BASE OF THE FLAGPOLE,
SD0042 '0.6 FOOT SOUTH OF THE POLE, 150 FEET SOUTHWEST OF THE CENTER LINE OF
SD0042 'THE DRIVE, 54 FEET NORTH OF THE CENTER OF THE NORTHEAST ENTRANCE TO
SD0042 'THE COAST GUARD BUILDING, AND ABOUT LEVEL WITH THE GROUND.

SD0042 STATION RECOVERY (1976)
SD0042
SD0042 RECOVERY NOTE BY LOCAL ENGINEER (INDIVIDUAL OR FIRM) 1976
SD0042 RECOVERED IN GOOD CONDITION.
SD0042
SD0042 STATION RECOVERY (1997)
SD0042
SD0042 RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SD0042 RECOVERED AS DESCRIBED. A NEW USCG STATION HAS BEEN BUILT 0.1 MILES
SD0042 '(0.2 KM) EAST ON WESTHAVEN DRIVE. THE MARK IS NOW LOCATED AT THE
SD0042 'WESTPORT MERITIME MUSEUM. THE CURRENT FLAG POLE AT THE MUSEUM
SD0042 REPLACES THE ORIGINAL ONE THAT WAS REMOVED. HOWEVER, THE CEMENT PAD
SD0042 'WITH THE TIDAL DISK IS STILL IN PLACE. THE STATION IS 54 FT (16.5 M)
SD0042 SOUTH OF THE CENTER OF THE NORTHEAST (MAIN) ENTRANCE TO THE MUSEUM AND
SD0042 ON-LINE WITH THE WEST MOST SIDE OF THE BUILDING.
National Geodetic Survey, Retrieval Date = OCTOBER 6, 1999

**SD0640**

**TIDAL BM** - This is a Tidal Bench Mark.

**DESIGNATION** - BETTY M

**PID** - SD0640

**STATE/COUNTY** - WA/PACIFIC

**USGS QUAD** - CAPE DISAPPOINTMENT (1985)

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**CURRENT SURVEY CONTROL**

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| NAD 83(1991) | 46 16 34.06634(N) | 124 02 31.88320(W) | ADJUSTED NAVD 88 - 6.55 (meters) 21.5 (feet) GPS OBS |
| X | -2,472,190.627 (meters) | COMP |
| Y | -3,659,358.066 (meters) | COMP |
| Z | 4,586,502.580 (meters) | COMP |
| LAPLACE CORR | 13.63 (seconds) | DEFLEC96 |
| ELLIP HEIGHT | -17.66 (meters) | GPS OBS |
| GEOID HEIGHT | -24.08 (meters) | GEOID96 |

**HORZ ORDER** - FIRST

**ELLP ORDER** - THIRD CLASS II

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The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999.

The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques.

This mark is designated as VM 8923 in the Oceanographic Products and Services Division Tidal Bench Mark database.

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

The Laplace correction was computed from DEFLEC96 derived deflections.

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

The geoid height was determined by GEOID96.

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### SPC WA S

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### SPC OR N

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<td>BAKER BAY W CHAN DAYBEACON 11</td>
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SUPERSEDED SURVEY CONTROL

NAD 83(1991) - 46 16 34.06883(N) 124 02 31.88083(W) AD( ) 2
NAD 83(1991) - 46 16 34.06878(N) 124 02 31.88086(W) AD( ) 2
NAD 83(1986) - 46 16 34.07202(N) 124 02 31.85574(W) AD( ) 2
NAD 27 - 46 16 34.71214(N) 124 02 27.30520(W) AD( ) 2
NGVD 29 - 5.4 (m) 18. (f) VERT ANG

Superseded values are not recommended for survey control. NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums. See file dsdata.txt to determine how the superseded data were derived.

MARKER: DD = SURVEY DISK
SETTING: 4 = TOP OF SQUARE CONCRETE MONUMENT
STAMPING: BETTY M 1976
PROJECTION: FLUSH
MAGNETIC: A = STEEL ROD ADJACENT TO MONUMENT
STABILITY: D = MARK OF QUESTIONABLE OR UNKNOWN STABILITY
SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR SATELLITE OBSERVATIONS - October 12, 1989

HISTORY - Date Condition Recov. By
- 1976 MONUMENTED WA-049
- 1976 GOOD WA-049
- 19830113 GOOD NGS
- 19891012 GOOD MGSINC
- 19971204 GOOD WADECO

STATION DESCRIPTION

'DESCRIBED BY PACIFIC COUNTY WASHINGTON 1976 (CLN)
'THIS STATION WAS ESTABLISHED TO REPLACE TRESTLE 1942 WHICH MIGHT BE DISTURBED BY WAVE ACTION DURING THE SEASONAL STORMS.
'STATION IS ABOUT 2 MILES DUE SOUTH OF ILWACO, ON THE SOUTHWEST SIDE OF BAKER BAY ON A ROCK FILL AT THE NORTHEASTERLY (INLAND) END OF A-JETTY AND ABOUT 200 FEET NORTHEAST OF THE END OF THE ROAD.
'TO REACH FROM THE INTERSECTION OF 1ST AND SPRUCE ST. IN ILWACO, GO WEST ON ILWACO-NORTH HEAD ROAD 0.07 MILE, TAKE RIGHT FORK, GO 0.76 MILE KEEP LEFT, GO 0.12 MILE KEEP LEFT, GO 0.36 MILE KEEP LEFT AT NORTH HEAD LIGHTHOUSE ROAD, GO 0.70 MILE KEEP RIGHT AT Y INTERSECTION, GO 0.47 MILE CONTINUE STRAIGHT, GO 0.12 MILE KEEP LEFT, GO 0.14 MILE TO INTERSECTION CONTINUE STRAIGHT, GO 0.20 MILE TO GATE AT U.S. COAST GUARD STATION, CONTINUE ALONG SHORELINE 0.22 MILE TO A LOCKED U.S. CORP. OF ARMY ENGINEERS GATE AT BOAT HOUSE PARKING LOT. (KEY CAN BE OBTAINED FROM COAST GUARD STATION) CONTINUE THRU GATE 0.03 MILE, TAKE LEFT FORK GO 0.22 MILE KEEP RIGHT, GO 0.02 MILE KEEP LEFT, GO 0.12 MILE TO STATION ON LEFT.

TO STATION ON LEFT.
TWO WHEEL DRIVE VEHICLE CAN BE DRIVEN TO STATION.

THE STATION MARK HAS A SURFACE DISK ONLY, STAMPED BETTY M 1976.

MARK IS A STANDARD PACIFIC COUNTY DISK SET IN CONCRETE TWO FEET IN DIAMETER, PROJECTING 4 INCHES ABOVE GROUND.

REFERENCE MARK NO. 1 IS A STANDARD PACIFIC COUNTY DISK STAMPED BETTY M 1976 RM 1 SET IN CONCRETE 8 INCHES IN DIAMETER, PROJECTING 4 INCHES ABOVE GROUND.

REFERENCE MARK NO. 2 IS A STANDARD PACIFIC COUNTY DISK STAMPED BETTY M 1976 RM 2 SET IN CONCRETE 8 INCHES IN DIAMETER, PROJECTING 4 INCHES ABOVE GROUND.

NOTE--STATION BETTY M 1976 CONTAINS STEEL BARS IN THE CONCRETE FOR MAGNETIC DETECTION PURPOSES.

NEAREST TOWN--ILWACO.

STATION RECOVERY (1976)

RECOVERY NOTE BY PACIFIC COUNTY WASHINGTON 1976 RECOVERED IN GOOD CONDITION.

STATION RECOVERY (1983)

RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1983 (DAW) STATION RECOVERY (1989)

RECOVERY NOTE BY MINISTER AND GLAESER 1989 RECOVERED IN GOOD CONDITION.

STATION RECOVERY (1997)

RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD) RECOVERED AS DESCRIBED. THE CORP OF ENGINEERS GATE IN THE 1976
DESCRIPTION HAS BEEN REMOVED AND NO KEY IS REQUIRED. RM 2 WAS RECOVERED AS DESCRIBED. COE SURVEY MARKER BOAT-HUB (WITH ORANGE WITNESS POST) IS LOCATED ABOUT 15 M, (49.2 FT) 37 DEGREES GRID, OF THE STATION. RM 1 WAS NOT RECOVERED AND HAS BEEN DESTROYED. THE PLOTTED LOCATED OF RM 1 IS ABOUT 5 M (16.4 FT) SEAWARD OF A 2 M (6.6 FT) TALL EROSION SCARP LOCATED AT THE MEAN HIGH WATER LINE.
The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999. The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques. The X, Y, and Z were computed from the position and the ellipsoidal ht. The Laplace correction was computed from DEFLEC96 derived deflections. The ellipsoidal height was determined by GPS observations and is referenced to NAD 83. The geoid height was determined by GEOID96. No superseded survey control is available for this station.
AH6997 HISTORY - Date  Condition  Recov. By
AH6997 HISTORY - 1997 MONUMENTED  NGS

AH6997 STATION DESCRIPTION

AH6997 DESCRIBED BY NATIONAL GEODETIC SURVEY 1997 (RCD)
AH6997 DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY (RCD) FROM THE
AH6997 INTERSECTION OF SR 109 AND OCEAN BEACH ROAD IN PACIFIC BEACH GO SOUTH
AH6997 ON SR 109 FOR 3.4 MILES (5.5 KM) TO THE ROOSEVELT BEACH ACCESS ROAD ON
AH6997 RIGHT OR, FROM THE COPALIS RIVER BRIDGE IN COPALIS CROSSING, GO NORTH
AH6997 ON SR 109 4.7 MILES (7.6 KM) TO THE ROOSEVELT BEACH ACCESS ROAD ON
AH6997 LEFT. TURN WEST GOTO THE BEACH ACCESS PARKING AREA AND A WOOD FRAME
AH6997 RESTROOM ON THE NORTH SIDE OF LOT. THE STATION IS 3 M (9.8 FT) WEST
AH6997 OF THE NORTHWEST CORNER OF THE BATHROOM AND 1 M (3.3 FT) NORTH OF AN
AH6997 EXTENDED EAST/WEST LINE FORMED BY THE NORTH SIDE OF THE BATHROOM, OR
AH6997 77 M (252.6 FT) WEST OF THE CENTERLINE OF SR 109 AND 7.25 M (23.79 FT)
AH6997 NORTH OF THE CENTERLINE OF THE ROOSEVELT BEACH ACCESS ROAD. THE
AH6997 STATION IS A STAINLESS STEEL ROD DRIVEN 104 FT. (31.7 M) ACCESS TO THE
AH6997 DATUM POINT IS HAD THROUGH A 5-INCH STANDARD NGS LOGO CAP THAT IS
AH6997 STAMPED BHUX 1997.
AH6995: The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999.

AH6995: The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques.

AH6995: The X, Y, and Z were computed from the position and the ellipsoidal ht.

AH6995: The Laplace correction was computed from DEFLEC96 derived deflections.

AH6995: The ellipsoidal height was determined by GPS observations and is referenced to NAD 83.

AH6995: The geoid height was determined by GEOID96.

AH6995: No superseded survey control is available for this station.

AH6995: Marker: DD = SURVEY DISK

AH6995: Setting: 7 = SET IN TOP OF CONCRETE MONUMENT

AH6995: Stamping: BONE 1993

AH6995: Projection: FLUSH

AH6995: Magnetic: O = OTHER; SEE DESCRIPTION

AH6995: Stability: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO SURFACE MOTION

AH6995: Satellite: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR SATELLITE OBSERVATIONS - 1993
AH6995 HISTORY - 1993 MONUMENTED WADT
AH6995 HISTORY - 1999 GOOD WADECO

AH6995 STATION DESCRIPTION

AH6995 DESCRIBED BY WA DEPT OF TRANSP 1993
AH6995 THE STATION IS LOCATED 5 MILES (8.0 KM) SOUTH OF SOUTH BEND. FROM
AH6995 SOUTH BEND GO SOUTHWEST ON US 101 TO THE PALIX RIVER BRIDGE. CONTINUE
AH6995 SOUTH 0.3 MILES (0.5 KM) TO INTERSECTION WITH BAY CENTER DIKE ROAD.
AH6995 GO WEST 0.95 MILES (1.53 KM) ON BAY CENTER DIKE ROAD TO STATION ON
AH6995 SOUTH SIDE OF ROAD AND GRAVEL PULL OFF. STATION IS LOCATED 1.0 METERS
AH6995 (3.3 FT) NORTHEAST OF A WHITE WITNESS POST, 6.9 METERS (22.6 FT)
AH6995 SOUTHWEST OF A CENTERLINE AND 30.8 METERS (101.0 FT) NORTHWEST OF A
AH6995 TELEPHONE (ATT) BOX P-12. THE MARK IS A WSDOT BRASS DISK SET INTO A
AH6995 ROUND CONCRETE MONUMENT FLUSH WITH EXISTING GROUND SURFACE AND AT THE
AH6995 SOUTH EDGE OF THE GRAVEL PULL OFF.

AH6995 STATION RECOVERY (1999)

AH6995 RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)
AH6995 RECOVERED AS DESCRIBED.
AH7002 The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999.

AH7002 The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques.

AH7002 The X, Y, and Z were computed from the position and the ellipsoidal ht.

AH7002 The Laplace correction was computed from DEFLEC96 derived deflections.

AH7002 The ellipsoidal height was determined by GPS observations and is referenced to NAD 83.

AH7002 The geoid height was determined by GEOID96.

AH7002; North  East  Units  Scale  Converg.
AH7002;SPC WA S  -187,608.277  220,765.202 MT 0.99993630 -2 39 58.3
AH7002;UTM 10  -5,201,687.323  410,954.826 MT 0.99969745 -0 51 20.0

AH7002 No superseded survey control is available for this station.

AH7002 MARKER: I = METAL ROD

AH7002 SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)

AH7002 STAMPING: BUTTER 1997

AH7002 PROJECTION: RECESSED 10 CENTIMETERS

AH7002 MAGNETIC: I = MARKER IS A STEEL ROD

AH7002 STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL

AH7002 SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR SATELLITE OBSERVATIONS - 1997

AH7002 ROD/PIPE-DEPTH: 10 meters
AH7002 HISTORY - 1997 MONUMENTED NGS
AH7002
AH7002 STATION DESCRIPTION
AH7002
AH7002 DESCRIBED BY NATIONAL GEODETIC SURVEY 1997 (RCD)
AH7002 DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD).
AH7002 THE STATION IS LOCATED IN THE CITY OF OCEAN SHORES. FROM THE
AH7002 INTERSECTION OF CHANCE ALAMER ROAD AND OCEAN SHORES BOULEVARD SW GO
AH7002 SOUTH ON OCEAN SHORES BOULEVARD TO THE INTERSECTION WITH BUTTER CLAM
AH7002 ROAD. TURN WEST AND FOLLOW BUTTER CLAM ROAD TO A BEACH ACCESS PARKING
AH7002 AREA. THE STATION IS 1 M (3.3 FT) WEST OF THE NORTHWEST CORNER OF THE
AH7002 PARKING AREA AND IS 0.6 M (2.0 FT) EAST OF A STANDARD ORANGE NGS
AH7002 WITNESS POST, OR 124 M (406.8 FT) WEST OF THE CENTERLINE OF SOUTH SAND
AH7002 DUNE AVENUE AND 15 M (49.2 FT) NORTH OF THE EXTENDED CENTERLINE OF
AH7002 BUTTER CLAM ROAD. THE STATION IS ABOUT 250 M (820.2 FT) WEST AND EVEN
AH7002 WITH AN EXTENDED EAST/WEST LINE FORMED BY THE NORTH WALL OF THE SINGLE
AH7002 STORY GRAY HOUSE AT 698 OCEAN SHORES BOULEVARD SW. THE STATION IS A
AH7002 STAINLESS STEEL ROD DRIVEN 73 FT, (22.3 M) ACCESS TO THE DATUM POINT
AH7002 IS HAD THROUGH A 5-INCH STANDARD NGS LOGO CAP THAT IS STAMPED BUTTER
AH7002 1997.
RD4216 FBN - This is a Candidate for Federal Base Network Control.
RD4216 DESIGNATION - CANN
RD4216 PID - RD4216
RD4216 STATE/COUNTY- OR/CLATSOP
RD4216 USGS QUAD - ARCH CAPE (1985)

**CURRENT SURVEY CONTROL**

| NAD 83(1991) | 45 51 41.99940(N) | 123 57 37.19597(W) | ADJUSTED NAVD 88 - 30.5 (meters) 100. (feet) GPS OBS |
| X | -2,485,503.287 (meters) | COMP |
| Y | -3,690,418.902 (meters) | COMP |
| Z | 4,554,558.649 (meters) | COMP |
| LAPLACE CORR- | 21.99 (seconds) | DEFLEC96 |
| ELLIP HEIGHT- | 7.46 (meters) | GPS OBS |
| GEOID HEIGHT- | -22.91 (meters) | GEOID96 |
| HORZ ORDER - | B |
| ELLP ORDER - | THIRD CLASS II |

The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in February 1991.

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

The Laplace correction was computed from DEFLEC96 derived deflections.

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

The geoid height was determined by GEOID96.

North East Units Scale Converg.  
SPC OR N | 249,672.798 2,231,374.855 | MT 0.99996777 2 27 14.5  
UTM 10 | 5,079,126.242 425,454.262 | MT 0.99966832 0 41 21.2

SUPERSEDED SURVEY CONTROL

NGVD 29 | 7.63 (m) | GP( ) 4 1  
NGVD 29 | 29.4 (m) | 96. (f) GPS OBS

Superseded values are not recommended for survey control.

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

See file dsdata.txt to determine how the superseded data were derived.

MARKER: DH = HORIZONTAL CONTROL DISK
SETTING: 35 = CEMENT SLAB BASE FOR CANNON
STAMPING: CANN 1989
PROJECTION: FLUSH
MAGNETIC: O = OTHER; SEE DESCRIPTION
STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO SURFACE MOTION
RD4216_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
RD4216+SATELLITE: SATELLITE OBSERVATIONS – May 22, 1990
RD4216
RD4216 HISTORY – Date  Condition  Recov. By
RD4216 HISTORY – 1989  MONUMENTED  ORDT
RD4216 HISTORY – 19900522  GOOD
RD4216 HISTORY – 19970725  GOOD  WADECO
RD4216
RD4216  STATION DESCRIPTION
RD4216
RD4216'DESCRIBED BY OREGON DEPARTMENT OF TRANSPORTATION 1989
RD4216'THE STATION IS LOCATED AT THE SOUTH ENTRANCE TO CANNON BEACH AND IN A
RD4216'SMALL PARK.
RD4216'THE STATION IS AN ORDOT PRIMARY GPS MARK STAMPED---CANN 1989---SET
RD4216'INTO A DRILL HOLE IN A 3 METER SQUARE CONCRETE BASE FOR A SMALL
RD4216'CANNON. IT IS 25.6 M (84.0 FT) NORTH OF HIGHWAY 101, 18.0 M
RD4216'(59.1 FT) EAST OF CENTERLINE OF SOUTH HEMLOCK, 12.0 M (39.4 FT) NE OF
RD4216'ENTERING CANNON BEACH SIGN, AND 0.65 M (2.13 FT) SW OF THE NE CORNER
RD4216'OF THE CONCRETE BASE.
RD4216'DESCRIBED BY L.L. RIGGERS
RD4216
RD4216  STATION RECOVERY (1990)
RD4216
RD4216'RECOVERED 1990
RD4216'RECOVERED IN GOOD CONDITION.
RD4216
RD4216  STATION RECOVERY (1997)
RD4216
RD4216'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
RD4216'RECOVERED AS DESCRIBED. STATION IS IN A SMALL ROAD SIDE RESTAREA/PARK
RD4216'LOCATED AT THE SOUTH END OF CANNON BEACH ON US 101.
National Geodetic Survey, Retrieval Date = OCTOBER 6, 1999

SC2824 CBN - This is a Cooperative Base Network Control Station.
SC2824 DESIGNATION - CENTRAL
SC2824 PID - SC2824
SC2824 STATE/COUNTY - WA/GRAYS HARBOR
SC2824 USGS QUAD - CENTRAL PARK (1986)

*CURRENT SURVEY CONTROL

SC2824 NAD 83(1991) - 46 58 21.77887(N) 123 42 11.49944(W) ADJUSTED
SC2824 NAVD 88 - 38.31 (meters) 125.7 (feet) GPS OBS

SC2824 X - -2,419,277.364 (meters) COMP
SC2824 Y - -3,627,115.290 (meters) COMP
SC2824 Z - 4,639,706.992 (meters) COMP
SC2824 LAPLACE CORR - 10.61 (seconds) DEFLEC96
SC2824 ELLIP HEIGHT - 15.49 (meters) GPS OBS
SC2824 GEOID HEIGHT - -22.67 (meters) GEOID96

SC2824 HORZ ORDER - B
SC2824 ELLP ORDER - THIRD CLASS II

The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in May 1991. The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques. The X, Y, and Z were computed from the position and the ellipsoidal ht. The Laplace correction was computed from DEFLEC96 derived deflections. The ellipsoidal height was determined by GPS observations and is referenced to NAD 83. The geoid height was determined by GEOID96.

SC2824; SPC WA S - 187,168.502 256,336.101 MT 0.99993746 -2 19 36.4
SC2824; UTM 10 - 5,202,372.136 446,512.131 MT 0.99963516 -0 30 50.6

SUPERSEDED SURVEY CONTROL

SC2824 ELLIP HT - 15.62 (m) GP( ) 4 1
SC2824 NGVD 29 - 37.2 (m) 122. (f) GPS OBS

Superseded values are not recommended for survey control. NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums. See file dsdata.txt to determine how the superseded data were derived.

SC2824 MARKER: DH = HORIZONTAL CONTROL DISK
SC2824 SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
SC2824 STAMPING: CENTRAL 1990
SC2824 PROJECTION: FLUSH
SC2824 MAGNETIC: O = OTHER; SEE DESCRIPTION
SC2824_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
SC2824+STABILITY: SURFACE MOTION
SC2824_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
SC2824+SATELLITE: SATELLITE OBSERVATIONS - February 08, 1991
SC2824
SC2824 HISTORY - Date Condition Recov. By
SC2824 HISTORY - 1990 MONUMENTED NGS
SC2824 HISTORY - 19910208 GOOD
SC2824 HISTORY - 19970718 GOOD WADECO
SC2824
SC2824 STATION DESCRIPTION
SC2824
SC2824'DESCRIBED BY NATIONAL GEODETIC SURVEY 1990
SC2824'THE STATION IS LOCATED ABOUT 40.2 KM (25.0 MI) SOUTH-SOUTHEAST OF
SC2824'HUMPTULIPS, 32.2 KM (20.0 MI) EAST-NORTHEAST OF WESTPORT, 24.1 KM
SC2824'(15.0 MI) WEST OF ELMA AND AT THE FIRE HALL IN CENTRAL PARK.
SC2824'TO REACH FROM THE INTERSECTION OF US HIGHWAY 12 AND HILL ROAD IN
SC2824'CENTRAL PARK, GO WEST ON US HIGHWAY 12 FOR 0.97 KM (0.60 MI) TO THE
SC2824'INTERSECTION OF PIONEER ROAD AND THE STATION ON THE LEFT.
SC2824'THE MARK IS SET IN THE TOP OF A ROUND CONCRETE MONUMENT THAT PROJECTS
SC2824'5 CM (2 INCHES) ABOVE THE GROUND SURFACE. IT IS 32.0 M (105.0 FT)
SC2824'WEST OF THE NORTHWEST CORNER OF THE FIRE HALL, 31.0 M (101.7 FT) EAST
SC2824'OF THE CENTER OF PIONEER ROAD, 8.0 M (26.2 FT) SOUTH OF THE SOUTH FOG
SC2824'LINE OF US HIGHWAY 12, 1.3 M (4.3 FT) SOUTH OF THE CURB OF THE
SC2824'PARKING LOT, 0.6 M (2.0 FT) NORTH OF THE CURB OF THE BUS LANE AND 0.6
SC2824'M (2.0 FT) EAST OF A WITNESS POST.
SC2824
SC2824 STATION RECOVERY (1991)
SC2824
SC2824'RECOVERED 1991
SC2824'RECOVERED IN GOOD CONDITION.
SC2824
SC2824 STATION RECOVERY (1997)
SC2824
SC2824'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SC2824'RECOVERED AS DESCRIBED. FROM MONTESANO GO WEST 5.1 MILES (8.2 KM) ON
SC2824'US 12 FROM THE INTERSECTION OF U.S. 12 AND RT 109 (BRIDGE) IN
SC2824'MONTESANO. STATION IS ON SOUTH SIDE OF ROAD AT FIRE STATION.
National Geodetic Survey,  Retrieval Date = OCTOBER 6, 1999

SD0554 ***********************************************************************
SD0554 DESIGNATION - COTTA
SD0554 PID - SD0554
SD0554 STATE/COUNTY- WA/PACIFIC
SD0554 USGS QUAD - OCEAN PARK (1985)
SD0554
SD0554 *CURRENT SURVEY CONTROL
SD0554
SD0554* NAD 83(1991)- 46 29 53.91357(N) 124 01 54.72671(W) ADJUSTED
SD0554* NAVD 88 - 2.79 (meters) 9.2 (feet) GPS OBS
SD0554
SD0554 X - -2,461,522.680 (meters) COMP
SD0554 Y - -3,644,982.610 (meters) COMP
SD0554 Z - 4,603,535.532 (meters) COMP
SD0554 LAPLACE CORR- 16.31 (seconds) DEFLEC96
SD0554 ELLIP HEIGHT- -21.36 (meters) GPS OBS
SD0554 GEOID HEIGHT- -24.01 (meters) GEOID96
SD0554
SD0554 HORZ ORDER - FIRST
SD0554 ELLP ORDER - THIRD CLASS II
SD0554
SD0554.The horizontal coordinates were established by GPS observations
SD0554.and adjusted by the National Geodetic Survey in January 1999.
SD0554
SD0554.The orthometric height was determined by GPS observations and a
SD0554.high-resolution geoid model using precise GPS observation and
SD0554.processing techniques.
SD0554
SD0554.The X, Y, and Z were computed from the position and the ellipsoidal ht.
SD0554
SD0554.The Laplace correction was computed from DEFLEC96 derived deflections.
SD0554
SD0554.The ellipsoidal height was determined by GPS observations
SD0554.and is referenced to NAD 83.
SD0554
SD0554.The geoid height was determined by GEOID96.
SD0554
SD0554: North East Units Scale Converg.
SD0554: SPC WA S - 135,555.140 228,989.637 MT 0.99991574 -2 33 55.9
SD0554: UTM 10 - 5,149,932.698 420,820.543 MT 0.99967706 -0 44 54.6
SD0554
SD0554: Primary Azimuth Mark Grid Az
SD0554: SPC WA S - COTTA AZ MK 200 48 06.7
SD0554: UTM 10 - COTTA AZ MK 198 59 05.4
SD0554
SD0554| PID | Reference Object | Distance | Geod. Az |
SD0554|-----|------------------|----------|---------|
SD0554| SD0513 | NAHCOTTA OYSTER SHELL PLT STK | 207.202 METERS | 00941 |
SD0554| SD0541 | NAHCOTTA EAGLE OYSTER CO E GAB | 372.116 METERS | 06605 |
SD0554| SC2482 | ILWACO OYSTER CO HOUSE W GAB | APPROX. 7.5 KM | 0671658.3 |
SD0554| SC2468 | NEMAH R ENT PILES CABIN S GAB | APPROX. 7.8 KM | 0693702.4 |
SD0554| COTTA AZ MK | 1981410.8 |
SD0554| COTTA RM 1 | 31.288 METERS | 24326 |
SD0554| SE COR OF PUMPHOUSE | 45.568 METERS | 30143 |
SD0554| COTTA RM 2 | 55.913 METERS | 33316 |
SUPERSEDED SURVEY CONTROL

NAD 83 (1991) - 46 29 53.90979 (N) 124 01 54.72873 (W) AD ( ) 2
NAD 83 (1991) - 46 29 53.90908 (N) 124 01 54.72825 (W) AD ( ) 2
NAD 83 (1986) - 46 29 53.90978 (N) 124 01 54.70874 (W) AD ( ) 2
NAD 27 - 46 29 54.55586 (N) 124 01 50.12282 (W) AD ( ) 2
NGVD 29 - 1.93 (m) 6.3 (f) LEVELING 3

Superseded values are not recommended for survey control. NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums. See file dsdata.txt to determine how the superseded data were derived.

MARKER: DS = TRIANGULATION STATION DISK
SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
STAMPING: COTTA 1938 1971
PROJECTION: FLUSH
MAGNETIC: O = OTHER; SEE DESCRIPTION
STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO

HISTORY - Date Condition Recov. By
1939 MONUMENTED CGS
1953 MONUMENTED CGS
1971 MONUMENTED NGS
1977 MONUMENTED WA-049
19971015 GOOD WADECO

STATION DESCRIPTION

DESCRIPTED BY COAST AND GEODETIC SURVEY 1939 (WMS)

SURFACE MARK IS A STANDARD DISK SET IN THE TOP END OF A CONCRETE POST 3 FEET LONG AND ABOUT 10 INCHES SQUARE. THE POST PROJECTS ABOUT 3 INCHES.

SUBSURFACE MARK IS A STANDARD DISK SET IN A LARGE MASS OF CEMENT PLACED 3 FEET BELOW THE SURFACE.

REFERENCE MARK NO.1 IS A STANDARD REFERENCE DISK CEMENTED IN THE TOP END OF A 30-INCH SECTION OF 4-INCH CAST-IRON SOIL PIPE AND PROJECTS 2 INCHES. IT IS ON LOW GROUND SW OF THE STATION AND 88.5 FEET E BY S FROM THE CORNER OF FENCE MENTIONED ABOVE, STAMPED COTTA NO.1, 1938.

REFERENCE MARK NO.2 IS MARKED THE SAME AS NO.1. IT IS PLACED NW OF THE STATION ON LOW GROUND, 43.5 FEET SE OF THE CORNER OF SQUARE
BUILDING MENTIONED ABOVE AND 4 FEET S OF THE LINE BETWEEN THE
STATION AND THE BUILDING, STAMPED COTTA NO.2, 1938.

HEIGHT OF LIGHT ABOVE STATION MARK 8.5 METERS.

STATION RECOVERY (1953)

RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1953 (FN)

RECOVERED. STATION AND BOTH REFERENCE MARKS RECOVERED IN GOOD
CONDITION. A COMPLETE DESCRIPTION FOLLOWS--

ON THE E SIDE OF THE NORTH BEACH PENINSULA AT NAHCOTTA, ON MARSH
GROUND BETWEEN THE OLD OREGON AND WASHINGTON RAILROAD PIER AND THE
SHINGLED BUILDING, 5 FT. SQUARE, AT THE SW CORNER OF A DWELLING,
45.7 M. E OF THE SE CORNER OF A SMALL METAL BUILDING (PUMPHOUSE) 8
FT. SQUARE, 25.2 M. SW OF THE SW CORNER OF THE WILSON PACKING
COMPANY, 11 M. W OF THE MEAN HIGH-WATERLINE, AND 5.8 M. W OF THE
TOP EDGE OF A LOW BANK. A STANDARD DISK, STAMPED COTTA 1938 AND
SET IN THE TOP OF A 10-IN. SQUARE CONCRETE POST FLUSH WITH THE
GROUND. UNDERGROUND MARK IS A STANDARD DISK, SET IN A LARGE MASS OF
CONCRETE PLACED 3 FT. BELOW THE SURFACE.

REFERENCE MARK 1 IS ON A LOW BANK SW OF THE STATION. A STANDARD
DISK, STAMPED COTTA NO 1 1938 AND CEMENTED IN THE TOP OF A 30-IN.
SECTION OF 4-IN. SOIL PIPE SET FLUSH WITH THE GROUND.

REFERENCE MARK 2 IS NW OF THE STATION, 43.5 FT. SE OF THE SE CORNER
OF THE SMALL SHINGLED BUILDING MENTIONED ABOVE, 1.2 M. SW OF THE
LINE BETWEEN THE STATION AND THE BUILDING, AND 3 M. W OF A LIGHT
POLE. A STANDARD DISK, STAMPED COTTA RM NO 2 1938 AND CEMENTED IN
THE TOP OF A 30-IN. SECTION OF 4-IN. CAST-IRON SOIL PIPE SET FLUSH
WITH THE GROUND.

STATION RECOVERY (1971)

RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1971 (LFS)

THE STATION MARK WAS FOUND TILTED ABOUT 25 DEGREES. REFERENCE MARK
NO. 1 WAS RECOVERED IN GOOD CONDITION. REFERENCE MARK NO. 2 WAS
NOT FOUND. THE SURFACE STATION MARK WAS DUG OUT AND RESET OVER THE
UNDERGROUND MARK. REFERENCE MARK NO. 3 AND AN AZIMUTH MARK WERE
ESTABLISHED. A COMPLETE NEW DESCRIPTION FOLLOWS--

THE STATION IS ABOUT 2 BLOCKS SOUTH OF THE DOCK IN NAHCOTTA, 1 BLOCK
NORTH AND ABOUT 150 YARDS EAST OF THE NACOTTA POST OFFICE AND
STORE, AT THE HIGH WATER LINE, IN SECTION 27, T 12 N, R 11 W. AN
ATTEMPT TO BULLDOZE A ROAD INTO THE WATER (PERHAPS FOR Launching
BOATS) WAS MADE A FEW YARDS NORTH OF THE STATION, AND THIS NOW
APPEARS MORE LIKE AN ERODED TRENCH INTO THE BEACH.

THE STATION MARK IS 149.5 FEET EAST-SOUTHEAST OF THE SOUTHEAST CORNER
OF A SMALL, METAL PUMP-HOUSE BUILDING, 83 FEET SOUTH-SOUTHWEST OF
THE SOUTHWEST CORNER OF STACEYS CANNERY (NO LONGER IN USE), AND 27
FEET WEST OF THE PROJECTED WEST END OF THE CANNERY. THE STATION
MARK IS A STANDARD DISK SET IN A SQUARE CONCRETE POST 1 INCH BELOW
THE SURFACE OF THE GROUND. UNDERGROUND MARK IS 2.5 FEET BELOW THE
SURFACE.
REFERENCE MARK NO. 1, STAMPED COTTA NO 1 1938, IS A STANDARD DISK SET IN A 4-INCH SOIL PIPE FLUSH WITH THE GROUND 129 FEET SOUTH-SOUTHEAST OF THE SOUTHEAST CORNER OF THE PUMP HOUSE, 51 FEET SOUTH OF THE CENTER OF A GRAVEL ROAD, 40 FEET NORTHWEST OF THE BANK AT THE HIGH WATER LINE AND ON A FLAT AREA SOUTHWEST OF THE STATION.

REFERENCE MARK NO. 3, STAMPED COTTA 1939 NO 3 1971, IS A STANDARD DISK SET IN A ROUND CONCRETE POST WHICH PROJECTS 1 INCH. IT IS 108 FEET EAST OF THE SOUTHEAST CORNER OF THE PUMP HOUSE AND ON LINE WITH THE PROJECTED SOUTH SIDE OF THE PUMP HOUSE, 77.6 FEET EAST OF A POWER POLE, 47.5 FEET WEST OF THE SOUTHWEST CORNER OF THE CANNERY AND 1.5 FEET NORTH OF THE PROJECTED SOUTH SIDE OF THE CANNERY AND 17 FEET EAST EAST OF A GRAVEL ROAD.


TO REACH THE AZIMUTH MARK FROM THE NAHCOTTA STORE AND POST OFFICE, GO SOUTH 0.1 MILE TO THE WILLAPA BAY SHELLFISH LABORATORY ON THE LEFT--AND THE AZIMUTH MARK ON THE LEFT, ABOUT 50 YARDS EAST OF THE ROAD.

AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN IN NAHCOTTA.

STATION RECOVERY (1977)

RECOVERY NOTE BY PACIFIC COUNTY WASHINGTON 1977

NO MEASUREMENTS OR OBSERVATIONS MADE DURING THIS VISIT.


AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN IN NAHCOTTA.

STATION RECOVERY (1997)

RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)

RECOVERED AS DESCRIBED. THE SHEET METAL PUMP HOUSE DESCRIBED HAS BEEN BLOWN OVER BY WIND. PUMPS ARE STILL IN-PLACE ON CEMENT FOUNDATION WHICH IS ABOUT 3 FT (0.9 M) BELOW GRADE. A 2 FT (0.6 M) BY 6 FT (1.8 M) TANK PROJECTS 3 FT (0.9 M) ABOVE THE SURFACE. REFERENCE MARK 3 IS 14 M (45.9 FT) WEST OF THE SOUTHWEST MOST PILE OF CANNERY.
The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999. The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques. The X, Y, and Z were computed from the position and the ellipsoidal ht. The Laplace correction was computed from DEFLEC96 derived deflections. The ellipsoidal height was determined by GPS observations and is referenced to NAD 83. The geoid height was determined by GEOID96.

<table>
<thead>
<tr>
<th>PID Reference Object</th>
<th>Distance</th>
<th>Geod. Az</th>
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</thead>
<tbody>
<tr>
<td>AH7012 CSW 2</td>
<td>51.639 METERS</td>
<td>34926</td>
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<td>34926</td>
</tr>
</tbody>
</table>

No superseded survey control is available for this station.
AH6994 STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
AH6994+STABILITY: SURFACE MOTION
AH6994+SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AH6994+SATELLITE: SATELLITE OBSERVATIONS - 1996
AH6994
AH6994 HISTORY - Date Condition Recov. By
AH6994 HISTORY - 1996 MONUMENTED USGS
AH6994
AH6994 STATION DESCRIPTION
AH6994 DESCRIBED BY US GEOLOGICAL SURVEY 1996 (TER)
AH6994 THE STATION IS LOCATED SOUTHEAST OF NORTH COVE APPROXIMATELY 16.5 KM
AH6994 (10.25 MI) SOUTH OF WESTPORT, 23 KM (14.30 MI) NW OF SOUTH BEND AND 41
AH6994 KM (25.45 MI) NORTH OF LONG BEACH. TO REACH THE STATION FROM THE
AH6994 INTERSECTION OF WARRENTON CANNERY ROAD AND HIGHWAY 105 TAKE HIGHWAY
AH6994 105 SOUTHEAST 1.3 MILES (2.1 KM) TOWARD TOKELAND. TURN NORTH ON
AH6994 PRIVATE DRIVE, NAMED PANORAMA LANE, TO GATE. THE PRIVATE DRIVE IS
AH6994 LOCATED BETWEEN MILE MARKER 20 AND 21 (APPROXIMATELY 20.8) . PASS
AH6994 THROUGH A LOCKED GATE AND TRAVEL UP HILL 0.3 MILES (0.5 KM) TO SECOND
AH6994 LOCKED GATE. CONTINUE THROUGH GATE ABOUT 300 METERS (984.2 FT) TO TOP
AH6994 OF HILL AND STATION. THE STATION IS 1 METER (3.3 FT) EAST OF A
AH6994 PLASTIC WITNESS POST. THERE ARE THREE REFERENCE MARKS FOR THIS
AH6994 STATION. REFERENCE MARK CSW 2 IS 49.6 METERS (162.7 FT) 350 DEGREES
AH6994 TRUE OF THE STATION. REFERENCE MARK CSW 3 IS 53.4 METERS (175.2 FT)
AH6994 080 DEGREES TRUE OF THE STATION. REFERENCE MARK CSW 4 IS 27.6 METERS
AH6994 (90.6 FT) 202 DEGREES TRUE OF THE STATION. THE STATION IS A STAINLESS
AH6994 STEEL ROD WITH ALUMINUM CAP DRIVEN 10 FEET (3.0 M) . CAP IS STAMPED
AH6994 CSW 1 1996. THE ROD IS SURROUNDED BY A PVC PIPE WHICH EXTENDS 5
AH6994 INCHES ABOVE GROUND LEVEL. THE CAP IS LEVEL WITH THE GROUND. THE
AH6994 REFERENCE MARKS ARE STAINLESS STEEL RODS WITH ALUMINUM CAPS DRIVEN 10
AH6994 FEET (3.0 M) AND STAMPED CSW 2, CSW 3, CSW 4. STATION SET IN 1996.
AH6994 DESCRIBED AND SURVEYED BY WASHINGTON STATE DEPARTMENT OF ECOLOGY,
The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999. The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques. The X, Y, and Z were computed from the position and the ellipsoidal ht. The Laplace correction was computed from DEFLEC96 derived deflections. The ellipsoidal height was determined by GPS observations and is referenced to NAD 83. The geoid height was determined by GEOID96.

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<td>AH6994</td>
<td>CSW 1</td>
<td>51.639 METERS</td>
<td>16926</td>
</tr>
</tbody>
</table>

No superseded survey control is available for this station.
AH7012_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
AH7012_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AH7012+SATELLITE: SATELLITE OBSERVATIONS - 1996
AH7012_ROD/PIPE-DEPTH: 10 meters

AH7012

AH7012 HISTORY - Date Condition Recov. By
AH7012 HISTORY - 1996 MONUMENTED USGS

AH7012

STATION DESCRIPTION

AH7012

AH7012' DESCRIBED BY US GEOLOGICAL SURVEY 1996 (TER)
AH7012' DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD)

AH7012' THE STATION IS LOCATED SOUTHEAST OF NORTH COVE NEAR THE CAPE
AH7012' SHOALWATER INDIAN RESERVATION. FROM THE INTERSECTION OF WARRENTON
AH7012' CANNERY ROAD AND SR 105 IN NORTH COVE HEAD SOUTH ON SR 105 1.3 MILES
AH7012' (2.1 KM) TOWARD TOKELAND. BETWEEN MILE POST 20 AND 21 (ABOUT 20.8)
AH7012' TURN LEFT ONTO PANORMA LANE. PASS THROUGH GATE AND CONTINUE UP HILL
AH7012' FOR 0.3 MILES (0.5 KM) TO SECOND GATE. PASS THROUGH GATE AND GO ABOUT
AH7012' 300 M (984.2 FT) UP HILL TO STATION. THE STATION IS ON A TALL HILL
AH7012' OVERLOOKING WILLAPA BAY AND SR 105. THE STATION IS 87 M, (285.4 FT)
AH7012' 261 DEGREES GRID, FROM A METAL STORAGE SHED, 1 M (3.3 FT) EAST OF A
AH7012' ORANGE WITNESS POST. THERE ARE THREE REFERENCE MARKS FOR THIS
AH7012' STATION. REFERENCE MARK CSW 1 IS 51.28 M, (168.24 FT) 170 DEGREES
AH7012' GRID, OF THE STATION. REFERENCE MARK CSW 3 IS 77.44 M, (254.07 FT)
AH7012' 121 DEGREES GRID, OF THE STATION. REFERENCE MARK CSW 4 IS 76.44 M,
AH7012' (250.79 FT) 183 DEGREES GRID, OF THE STATION. THE STATION IS A
AH7012' STAINLESS STEEL ROD WITH CAP DRIVEN 10 FT. (3.0 M) THE CAP IS
AH7012' SURROUNDED BY A PVC PIPE THAT EXTENDS 5 INCHES ABOVE THE GROUND. THE
AH7012' CAP IS LEVEL WITH THE GROUND. THE CAP IS STAMPED CSW 2 1996. THE
AH7012' REFERENCE MARKS ARE STAINLESS STEEL RODS WITH CAPS DRIVEN 10 FT. (3.0
The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999. The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques. The X, Y, and Z were computed from the position and the ellipsoidal ht. The Laplace correction was computed from DEFLEC96 derived deflections. The ellipsoidal height was determined by GPS observations and is referenced to NAD 83. The geoid height was determined by GEOID96. The site location was reported as suitable for satellite observations - 1997. No superseded survey control is available for this station.
AH7000  DESCRIPTION  MONUMENTED  NGS
AH7000  DESCRIPTION  DESCRIBED BY NATIONAL GEODETIC SURVEY 1997 (RCD)
AH7000  DESCRIPTION  DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY (RCD)

AH7000  STATION DESCRIPTION
AH7000

The station is located in Oyhut State Park in Oyhut and just north of the north corp. boundary of the city of oceans shores. From the intersection of damon road and point brown avenue in ocean shores go west on damon road to the beach access parking area on left. Within the parking area there is a large traffic island with a cement block restroom on the west end. The station is at the east end of the island. The station is 31 m (101.7 ft) east of the center of the restrooms and 13.6 m (44.6 ft) west of a standard orange ngs witness post, or 72 meters (236.2 ft) southeast (141 degrees grid) from the center of the intersection of damon road and chichamin avenue. The station is a stainless steel rod driven 55 ft, (16.8 m) access to the datum point is had through a 5-inch standard ngs logo cap that is stamped damons 1997.
*CURRENT SURVEY CONTROL

**AH7031**

**DETECTION - DELRAY**

**PID - AH7031**

**STATE/COUNTY - OR/CLATSOP**

**USGS QUAD - GEARHART (1984)**

The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999. The orthometric height was determined by GPS observations. The X, Y, and Z were computed from the position and the ellipsoidal ht. The Laplace correction was computed from DEFLEC96 derived deflections. The ellipsoidal height was determined by GPS observations and is referenced to NAD 83. The geoid height was determined by GEOID96.

<table>
<thead>
<tr>
<th>NAD 83(1991)</th>
<th>46 02 52.93245(N)</th>
<th>123 55 41.57389(W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAVD 88</td>
<td>11.5 (meters)</td>
<td>38. (feet) GPS OBS</td>
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</tbody>
</table>

**AH7031**

**X**

**Y**

**Z**

**LAPLACE CORR**

**ELLIP HEIGHT**

**GEOID HEIGHT**

**HORZ ORDER - FIRST**

**ELLP ORDER - THIRD CLASS II**

**SUPERSEDED SURVEY CONTROL**

**AH7031**

**MARKER : I = METAL ROD**

**SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT. +)**

**STAMPING: DELRAY 1997**

**PROJECTION: RECESSED 10 CENTIMETERS**

**MAGNETIC: I = MARKER IS A STEEL ROD**

**STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL**

**SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR SATELLITE OBSERVATIONS - 1997**

**ROD/PIPE-DEPTH: 10 meters**

**HISTORY - Date Condition Recov. By**

**AH7031**

**HISTORY - 1997 MONUMENTED NGS**
AH7031 STATION DESCRIPTION
AH7031 DESCRIBED BY NATIONAL GEODETIC SURVEY 1997 (RCD)
AH7031 DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD).
AH7031 THE STATION IS ABOUT 2 MILES (3.2 KM) NORTH OF GEARHART AT THE DELRAY
BEACH ACCESS. TO REACH FROM THE INTERSECTION OF US 101/26 AND PACIFIC
WAY IN GEARHART GO NORTH 1.75 MILES (2.82 KM) ON US 101/26 TO
HIGHLANDS ROAD. TURN LEFT (WEST) AND FOLLOW HIGHLANDS ROAD TO THE
DELRAY BEACH ACCESS PARKING AREA (LOCATED SOUTH OF THE BEACH ACCESS
ROAD). THE STATION IS 68 M (223.1 FT) SOUTHWEST (224 DEGREES GRID)
LOCATED AT THE Y INTERSECTION OF THE PARKING LOT ACCESS ROAD AND THE
BEACH ACCESS ROAD, 10 M (32.8 FT) NORTH OF THE CENTERLINE OF THE
PARKING LOT ACCESS ROAD, 13 M (42.7 FT) NORTHEAST (54 DEGREES GRID)
FROM THE NORTHEAST MOST CORNER OF THE SIDEWALK AROUND THE PARKING
AREA, AND 1 M (3.3 FT) SOUTH OF A ORANGE NGS WITNESS POST. THE
STATION IS A STAINLESS STEEL ROD DRIVEN 64 FT, (19.5 M) ACCESS TO THE
DATUM POINT IS HAD THROUGH A 5-INCH STANDARD NGS LOGO CAP THAT IS
STAMPED DELRAY 1997.
National Geodetic Survey, Retrieval Date = OCTOBER 6, 1999

AH6999 DESIGNATION - DIANA
AH6999 PID - AH6999
AH6999 STATE/COUNTY- WA/GRAYS HARBOR

*CURRENT SURVEY CONTROL

<table>
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<tr>
<th>NAD 83(1991) -</th>
<th>47 04 11.89504(N) 124 10 17.95897(W) ADJUSTED</th>
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<tbody>
<tr>
<td>NAVD 88 -</td>
<td>6.01 (meters) 19.7 (feet) GPS OBS</td>
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</tbody>
</table>

AH6999 X - -2,444,396.177 (meters) COMP
AH6999 Y - -3,600,650.078 (meters) COMP
AH6999 Z - 4,647,052.750 (meters) COMP
AH6999 LAPLACE CORR- 9.13 (seconds) DEFLEC96
AH6999 ELLIP HEIGHT- -18.67 (meters) GPS OBS
AH6999 GEOID HEIGHT- -24.51 (meters) GEOID96

AH6999 HORZ ORDER - FIRST
AH6999 ELLP ORDER - THIRD CLASS II

AH6999 The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999.

AH6999 The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques.

AH6999 The X, Y, and Z were computed from the position and the ellipsoidal ht.

AH6999 The Laplace correction was computed from DEFLEC96 derived deflections.

AH6999 The ellipsoidal height was determined by GPS observations and is referenced to NAD 83.

AH6999 The geoid height was determined by GEOID96.

AH6999

AH6999; North East Units Scale Converg.
AH6999; SPC WA S - 199,520.997 221,227.901 MT 0.99995040 -2 40 01.5
AH6999; UTM 10 - 5,213,605.785 411,041.028 MT 0.99969726 -0 51 28.5

AH6999 SUPERSEDED SURVEY CONTROL

AH6999 No superseded survey control is available for this station.

AH6999 MARKER: I = METAL ROD
AH6999_SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)
AH6999_STAMPE: DIANA 1997
AH6999_PROJECTION: RECESSED 10 CENTIMETERS
AH6999_MAGNETIC: I = MARKER IS A STEEL ROD
AH6999_STABILITY: A = MOST RELIABLE AND EXPECTED TO HOLD
AH6999+STABILITY: POSITION/ELEVATION WELL
AH6999_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR SATELLITE OBSERVATIONS - 1997
AH6999_ROD/PIPE-DEPTH: 10 meters

AH6999
AH6999  HISTORY - Date  Condition  Recov. By
AH6999  HISTORY - 1997  MONUMENTED  NGS
AH6999
AH6999  STATION DESCRIPTION
AH6999
AH6999'DESCRIPTION BY NATIONAL GEODETIC SURVEY 1997 (RCD)
AH6999'DESCRIPTION BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY (RCD) THE
AH6999'STATION IS LOCATED WITHIN OCEAN CITY STATE PARK. FROM THE
AH6999'INTERSECTION OF SR 109 AND SECOND STREET IN OCEAN CITY GO WEST ON
AH6999'SECOND STREET TO THE BEACH ACCESS PARKING AREA ON LEFT. THE STATION
AH6999'IS IN THE SOUTHWEST CORNER OF THE PARKING LOT, 12 M (39.4 FT) SOUTH OF
AH6999'THE EDGE OF THE PAVEMENT, CENTERED ON THE THREE TRAFFIC ISLANDS THAT
AH6999'ARE NORTH AND ON-LINE WITH THE STATION, AND 1 METER (3.3 FT) NORTH OF
AH6999'A ORANGE NGS WITNESS POST. THE STATION IS 81 METERS (265.7 FT)
AH6999'WEST (245 DEGREES GRID) FROM THE SOUTHWEST CORNER OF THE CEMENT
AH6999'BLOCK BATHROOM LOCATED ON THE NORTH SIDE OF THE PARKING LOT AND WEST
AH6999'OF, AND ON-LINE WITH, THE CENTER OF A TWO STORY RED AND WHITE HOUSE
AH6999'WITH A TRIANGULAR A-FRAME TYPE GABLE. THE STATION IS A STAINLESS
AH6999'STEEL ROD DRIVEN 54 FT. (16.5 M) ACCESS TO THE DATUM POINT IS HAD
AH6999'THROUGH A 5-INCH STANDARD NGS LOGO CAP THAT IS STAMPED DIANA 1997.
**National Geodetic Survey, Retrieval Date = OCTOBER 6, 1999**

**SD0651 DESIGNATION - EAST JETTY 2**

**SD0651 PID - SD0651**

**SD0651 STATE/COUNTY - OR/CLATSOP**

**SD0651 USGS QUAD - CLATSOP SPIT (1985)**

**CURRENT SURVEY CONTROL**

**NAD 83(1991) - 46 13 31.35020(N) 124 00 30.59244(W) ADJUSTED NAVD 88 - 9.8 (meters) 32. (feet) GPS OBS**

**X - -2,472,319.115 (meters) COMP**

**Y - -3,664,191.425 (meters) COMP**

**Z - 4,582,603.808 (meters) COMP**

**LAPLACE CORR - 13.62 (seconds) DEFLEC96**

**ELLIP HEIGHT - -14.26 (meters) GPS OBS**

**GEOID HEIGHT - -23.93 (meters) GEOID96**

**HORZ ORDER - FIRST**

**ELLP ORDER - THIRD CLASS II**

The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999.

The orthometric height was determined by GPS observations.

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

The Laplace correction was computed from DEFLEC96 derived deflections.

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

The geoid height was determined by GEOID96.

<table>
<thead>
<tr>
<th>PID Reference Object Distance Geod. Az</th>
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<tr>
<td>SD0575 SAND ISLAND LOWER DIKE LIGHT APPROX. 3.9 KM 0002444.2</td>
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<tr>
<td>SD0652 YELLOW IRON CROSS 2.551 METERS 00812</td>
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<tr>
<td>SC2267 SAND ISLAND MIDDLE DIKE LIGHT APPROX. 3.9 KM 0145248.6</td>
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<tr>
<td>SC2263 SAND ISLAND RANGE FRONT LT APPROX. 4.7 KM 0145535.9</td>
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<tr>
<td>SC2273 SAND ISLAND LOOKOUT TOWER M-4 APPROX. 4.4 KM 0183031.2</td>
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<tr>
<td>SC2306 SAND ISLAND RANGE REAR LIGHT APPROX. 5.1 KM 0242029.4</td>
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<td>EAST JETTY 2 RM 3 04415</td>
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<td>SC2292 BAKER BAY EAST CHANNEL LT 2 APPROX. 5.1 KM 0513042.2</td>
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<tr>
<td>Station Description</td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td>SD0651 SC2294 CHINOOK DIKE LIGHT 1958</td>
</tr>
<tr>
<td>SD0651 SC2203 DESDEMONA SANDS LIGHT</td>
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<tr>
<td>SD0651 SC2000 ASTOR COLUMN</td>
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<tr>
<td>SD0651 EAST JETTY 2 RM 1</td>
</tr>
<tr>
<td>SD0651 EAST JETTY 2 RM 2</td>
</tr>
<tr>
<td>SD0651 SD0657 CLATSOP SPIT COAST GUARD LOT</td>
</tr>
<tr>
<td>SD0651 SD0595 CAPE DISAPPOINTMENT LH</td>
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<tr>
<td>SD0651 SD0614 COLUMBIA RIV ENT RNG FRONT LT</td>
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<td>SD0651 SD0616 BAKER BAY W CHANNEL W JETTY LT</td>
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<tr>
<td>SD0651 SD0615 COLUMBIA RIV ENT S RANGE FRONT</td>
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<td>SD0651 SD0577 BAKER BAY W CHANNEL E JETTY LT</td>
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<td>SD0651 SD0584 SAND ISLAND LOOKOUT TOWER M-5</td>
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**SUPERSEDED SURVEY CONTROL**

**NAD 83(1991)-**

- 46 13 31.35209(N) 124 00 30.59327(W) AD( ) 2

**NAD 83(1986)-**

- 46 13 31.36005(N) 124 00 30.56712(W) AD( ) 2

**NAD 27-**

- 46 13 31.99670(N) 124 00 26.02906(W) AD( ) 2

**NGVD 29-**

- 10.2 (m) 33. (f) VERT ANG

---

Superseded values are not recommended for survey control. NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums. See file dsdata.txt to determine how the superseded data were derived.

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**MARKER:** DS = TRIANGULATION STATION DISK

**SETTING:** 7 = SET IN TOP OF CONCRETE MONUMENT

**PROJECTION:** FLUSH

**MAGNETIC:** O = OTHER; SEE DESCRIPTION

**STABILITY:** C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO SURFACE MOTION

**SATELLITE:** THE SITE LOCATION WAS REPORTED AS SUITABLE FOR SATELLITE OBSERVATIONS - September 29, 1998

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**HISTORY**

- Date | Condition | Recov. By
- 1948 | MONUMENTED | USE
- 1956 | GOOD | USE
- 1958 | GOOD | CGS
- 1971 | GOOD | NGS
- 1972 | GOOD | NGS
- 1977 | GOOD | USGS
- 19881213 | GOOD | MGSINC
- 19971204 | GOOD | WADECO
- 19980929 | GOOD | WADOE

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**STATION DESCRIPTION**

**DESCRIBED BY US ENGINEERS 1956 (FN)**

THE STATION IS LOCATED ABOUT 3.5 MILES NORTHWEST OF HAMMOND, ABOUT 0.5 MILE SOUTH OF THE NORTH END OF CLATSOP SPIT, ABOUT 1200 FEET SOUTHWEST OF A COAST GUARD LOOKOUT TOWER, ABOUT 300 FEET NORTH OF WHERE THE ROAD CROSSES AN ABANDONED RAILROAD TRESTLE, ABOUT 150 FEET EAST-NORTHEAST OF FOUR LARGE CONCRETE FOOTINGS WHICH SUPPORTED A DISMANTLED WATER TANK, ON A GRASS COVERED SAND DUNE.

THE STATION IS A BRONZE U.S. ARMY ENGINEERS DISK STAMPED 'EAST JETTY 2 1948 SET IN THE TOP OF AN 8X8 INCH CONCRETE
MONUMENT PROJECTING ABOUT 8 INCHES ABOVE THE SURFACE.

A YELLOW IRON CROSS ABOUT 12 FEET HIGH CONSTRUCTED OF 6 INCH IRON PIPE AND SET IN A 3X3 FOOT CONCRETE BLOCK IS 8.2 FEET NORTH OF THE STATION.

REFERENCE MARK NO. 1 IS A STANDARD DISK STAMPED EAST JETTY NO. 1 1956 SET IN THE TOP OF AN 8X8 INCH CONCRETE MONUMENT PROJECTING ABOUT 8 INCHES. IT IS SOUTHEAST OF AND ABOUT 1 FOOT LOWER THAN THE STATION.

REFERENCE MARK NO. 2 IS A U.S. ENGINEERS DISK STAMPED E. JETTY 2 1956 RM BM SET IN THE TOP OF THE NORTHWESTERLY ONE OF FOUR CONCRETE FOOTINGS WHICH WERE USED TO SUPPORT A DISMANTLED WATER TANK. THE FOOTING IS APPROXIMATELY 30X30 INCHES AND PROJECT ABOUT 3 FEET.

TO REACH THE STATION FROM THE POST OFFICE AT HAMMOND GO WEST 0.4 MILE TO THE OLD ENTRANCE TO FORT STEVENS, CONTINUE NORTHWESTERLY FOR 0.3 MILE TO AN INTERSECTION AT THE NORTH END OF THE OLD PARADE GROUNDS, TURN LEFT AND GO SOUTH 0.6 MILE TO A FORK, TAKE THE RIGHT FORK WESTERLY FOR 0.5 MILE TO A T-ROAD SOUTH, CONTINUE WESTERLY 0.1 MILE TO A FORK, TAKE THE RIGHT FORK NORTH 0.6 MILE TO A T-ROAD WEST, TURN LEFT AND FOLLOW THE MAIN TRAVELED ROAD WEST 0.6 MILE TO A FORK, TAKE THE LEFT FORK WESTERLY 0.2 MILE TO WHERE THE ROAD MAKES A SHARP BEND TO THE NORTHWEST, CONTINUE NORTHERLY ON THE MAIN TRAVELED ROAD 1.3 MILES TO AN OLD CONCRETE BUILDING FOUNDATION ON THE LEFT, CONTINUE NORTHWESTERLY ABOUT 0.6 MILE TO THE END OF TRAVEL BY STANDARD DRIVE VEHICLES, CONTINUE NORTHWESTERLY ABOUT 0.1 MILE THROUGH AN AREA CLUTTERED WITH DRIFTWOOD AND LOGS TOWARD AN OLD WOODEN TOWER ABOUT 20 FEET HIGH. AN OLD ROAD NORTHWARD FROM THE BEACH Crosses AN ABANDONED RAILROAD TRESTLE ABOUT 200 FEET WEST OF THE TOWER. FOLLOW THE ROAD NORTH ABOUT 150 FEET TO A FORK, TAKE THE RIGHT FORK NORTH ABOUT 300 FEET TO THE STATION ON THE RIGHT, ABOUT 50 FEET EAST OF THE CENTERLINE OF THE ROAD.

HEIGHT OF LIGHT ABOVE STATION MARK 8 METERS.

STATION RECOVERY (1958)

STATION RECOVERY (1971)

RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1958 (VRS)

STATION AND BOTH REFERENCE MARKS RECOVERED AS DESCRIBED BY F.N. IN 1956.

STANDARD DRIVE VEHICLES MAY NOW TRAVEL THE SOUTH JETTY APPROACH ROAD TO A PARKING LOT WHICH IS ABOUT A FIFTEEN MINUTE PACK SOUTH OF THE STATION.

NOTE--THE DISCREPANCIES IN DISTANCES WERE NOTED AND CHECKED IN THE FIELD. THE 1958 DISTANCES ARE CORRECT.

STATION RECOVERY (1971)

RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1971 (LFS)

THE STATION MARK AND REFERENCE MARK NO. 1 WERE RECOVERED IN GOOD CONDITION. THE DISK HAS BEEN CHISELED OFF REFERENCE MARK NO. 2 AND
ONLY THE STEM OF THE DISK REMAINS IN THE NORTH CORNER OF THE NORTH CONCRETE FOOTING OF THE DISMANTLED WATER TANK.

THE STATION IS ABOUT 3.5 MILES NORTHWEST OF HAMMOND, 0.5 MILE SOUTH OF THE NORTH END OF CLATSOPO SPIT, 1/4 MILE EAST OF KLATOSPO SPIT, COAST GUARD LOOKOUT TOWER, (A 75-FOOT HIGH SKELETON STEEL STRUCTURE WITH ENCLOSURE CAB), 150 FEET EAST-NORHEAST OF 3 LARGE CONCRETE FOOTINGS FOR A DISMANTLED WATER TANK AND ON A LOW, GRASS-COVERED, NORTH-SOUTH SAND RIDGE, 8.2 FEET SOUTH OF A 12-FOOT HIGH CROSS MADE OF 6-INCH PIPE AND SET IN A 3-FOOT SQUARE-ConCRETE BLOCK AND 1.5 FEET SOUTHWEST OF A METAL WITNESS POST.

TO REACH FROM THE POST OFFICE IN HAMMOND, GO WEST ON PACIFIC STREET FOR 0.25 MILE TO WILLOW STREET, CONTINUE STRAIGHT AHEAD 0.2 MILE TO A SIDE ROAD LEFT, TURN LEFT AND FOLLOW WINDING ROAD 0.2 MILE TO A T-INTERSECTION, KEEP LEFT 0.3 MILE TO A FORK AT THE SOUTHWEST CORNER OF A CEMETERY, KEEP RIGHT FORK AND FOLLOW THE MAIN BLACKTOP ROAD WEST AND NORTHWEST FOR 1.8 MILES TO A BLACKTOP ROAD LEFT (STATION CHUMMY IS ABOUT 200 FEET SOUTHWEST OF THIS INTERSECTION), CONTINUE NORTHERLY ON THE BLACKTOP ROAD FOR 1.65 MILES TO A BLACKTOP ROAD LEFT ON A CURVE TO THE RIGHT, TURN LEFT AND GO WEST 0.05 MILE TO THE WEST EDGE OF A LOW AREA, THEN SOUTH 0.1 MILE TO THE STATION.

THE STATION MARK, STAMPED EAST JETTY 2 1948, IS AN ARMY ENGINEERS CONTROL STATION DISK SET IN AN 8-INCH SQUARE CONCRETE POST WHICH PROJECTS 2 INCHES.

REFERENCE MARK NO. 1, STAMPED EAST JETTY NO 1 1956, IS A STANDARD U.S.C. AND G.S. DISK SET IN A SQUARE CONCRETE POST 3 INCHES BELOW GROUND. IT IS 37.5 FEET SOUTH-SOUTHEAST OF THE 12-FOOT HIGH CROSS, 3 FEET WEST OF THE EASTERN EDGE OF THE SAND DUNE, 29.7 FEET SOUTH-SOUTHEAST OF AND ABOUT 1 FOOT LOWER THAN THE STATION MARK.

THE DISK HAS BEEN CHISELED OFF REFERENCE MARK NO. 2, BUT THE STEM REMAINS IN THE NORTH CORNER OF THE NORTHERN CONCRETE FOOTING, 141.5 FEET SOUTHWEST OF THE STATION. THESE CONCRETE FOOTINGS PROJECT ABOUT 3 FEET ABOVE GROUND.

AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN 3 MILES NORTHWEST OF HAMMOND.

STATION RECOVERY (1972)

RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1972 (LFS)

THE STATION MARK, AND REFERENCE MARK NO. 1 WERE RECOVERED IN GOOD CONDITION. REFERENCE MARK NO. 2 HAD BEEN DESTROYED. REFERENCE MARK NO. 3 WAS ESTABLISHED. LANDMARKS HAVE CHANGED. A NEW AND COMPLETE DESCRIPTION FOLLOWS.

THE STATION IS 3 MILES NORTHWEST OF HAMMOND ON GOVERNMENT OWNED LAND.

TO REACH THE STATION FROM THE HAMMOND POST OFFICE GO SOUTHWEST ON PACIFIC AVENUE FOR 0.5 MILE TO A SIDE ROAD LEFT, AND SIGN,
SD0651'SOUTH JETTY, TURN LEFT AS PER SIGN, AND GO SOUTHWEST, AND SOUTH
ON THE MACADAM ROAD FOR 0.5 MILE TO A FORK, JUST WEST OF THE
FORT STEVENS ARMY CEMETERY, TAKE THE RIGHT FORK, AND GO WEST,
AND NORTHWEST ON THE MACADAM ROAD FOR 1.7 MILE TO THE CORPS OF
ENGINEERS TOWER OVER TRIANGULATION STATION CHUMMY 1956, ON THE
LEFT. CONTINUE NORTH ON THE MACADAM ROAD FOR 1.7 MILES TO A
SIDE ROAD LEFT, TURN LEFT, AND GO WEST FOR 0.05 MILE TO A SAND
TRACK ROAD ON THE LEFT, TURN LEFT, AND GO SOUTH ON THE SAND
ROAD FOR 0.1 MILE TO THE STATION.

SD0651'THE STATION MARK, STAMPED EAST JETTY 2 1948, IS A U.S. ENGINEERS
DISK SET IN A 7-INCH SQUARE CONCRETE MONUMENT THAT PROJECTS 1
INCH, 80 FEET WEST OF THE SAND TRACK ROAD, 8.5 FEET SOUTHWEST
OF AN IRON CROSS THAT IS 8 FEET HIGH, AND SET IN A CONCRETE BASE,
AND 2 FEET WEST OF A METAL WITNESS POST.

SD0651'REFERENCE MARK NO. 1, STAMPED EAST JETTY 2 NO 1 1956, IS A
STANDARD DISK SET IN AN 8-INCH SQUARE CONCRETE MONUMENT THAT IS
2 INCHES BELOW THE SURFACE, 38 FEET SOUTHEAST OF THE IRON CROSS,
30 FEET SOUTHEAST OF THE WITNESS POST, AND 3 FEET WEST OF THE TOP
OF THE BANK. (NOTE 11A)

SD0651'REFERENCE MARK NO. 3, STAMPED EAST JETTY 2 USE 1956 NO 3 1972,
IS A STANDARD DISK SET IN A 10-INCH SQUARE CONCRETE MONUMENT
THAT PROJECTS 4 INCHES, 62 FEET NORTHEAST OF THE WITNESS POST,
56 FEET NORTHEAST OF THE CROSS, AND 7 FEET WEST OF THE TOP
OF THE BANK. (NOTE 11A)

SD0651'DISTANCE BETWEEN R.M. NO. 1, AND R.M. NO. 3 IS 80.80 FEET OR
24.628 METERS.

SD0651'LOCAL OBJECTS WILL SERVE FOR AZIMUTH CONTROL.

SD0651'AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN
3 MILES NORTHWEST OF HAMMOND.

SD0651'STATION RECOVERY (1977)
SD0651'RECOVERY NOTE BY US GEOLOGICAL SURVEY 1977
SD0651'THE LAND THAT THE STATION IS ON IS NOW IN FT STEVENS STATE
PARK. A GOOD BLACKTOP ROAD CAN BE DRIVEN ALMOST TO THE
STATION. THE STATION IS 0.2 MILE FROM THE PARKING LOT AT THE END
OF THE ROAD ON THE SOUTH JETTY AND ABOUT 150 YARDS SOUTH ALONG
AN OLD ROAD THROUGH ROLLING SAND HILLS. THE YELLOW IRON CROSS
IS STILL IN THE SAME POSITION AND IS EASILY SEEN FROM THE
BLACKTOP ROAD.

SD0651'STATION RECOVERY (1988)
SD0651'RECOVERY NOTE BY MINISTER AND GLAESER 1988
RECOVERED IN GOOD CONDITION.

SD0651'STATION RECOVERY (1997)
SD0651'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
RECOVERED AS DESCRIBED. YELLOW CROSS IS NOW A NICE SHADE OF BROWN.
STATION IS RECESSED IN THE GROUND ABOUT 30 CM.
RECOVERY NOTE BY WA STATE DEPT ECOLOGY 1998 (RCD)
RECOVERED AS DESCRIBED. CROSS CONSTRUCTED FROM 8 INCH STEEL PIPE IS NOW A NICE SHADE OF BROWN. STATION IS RECESSED IN THE GROUND ABOUT 30 CM AND IS DUE SOUTH (MAGNETIC) OF THE CROSS.
National Geodetic Survey, Retrieval Date = OCTOBER 6, 1999

AH7001 DESIGNATION - ET
AH7001 PID - AH7001
AH7001 STATE/COUNTY- WA/GRAYS HARBOR
AH7001 USGS QUAD - POINT BROWN (1984)

*CURRENT SURVEY CONTROL

AH7001* NAD 83(1991) - 46 59 37.24579(N) 124 10 09.26176(W) ADJUSTED
AH7001* NAVD 88 - 8.55 (meters) 28.1 (feet) GPS OBS

AH7001 X - -2,447,730.903 (meters) COMP
AH7001 Y - -3,605,889.376 (meters) COMP
AH7001 Z - 4,641,273.703 (meters) COMP
AH7001 LAPLACE CORR- 9.50 (seconds) DEFLEC96
AH7001 ELLIP HEIGHT- -16.19 (meters) GPS OBS
AH7001 GEOID HEIGHT- -24.58 (meters) GEOID96

AH7001 The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999.
AH7001 The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques.
AH7001 The X, Y, and Z were computed from the position and the ellipsoidal ht.
AH7001 The Laplace correction was computed from DEFLEC96 derived deflections.
AH7001 The ellipsoidal height was determined by GPS observations and is referenced to NAD 83.
AH7001 The geoid height was determined by GEOID96.

AH7001; SPC WA S - 191,040.669 221,016.816 MT 0.99994001 -2 39 55.2
AH7001; UTM 10 - 5,205,125.123 411,097.841 MT 0.99969714 -0 51 18.3

AH7001 SUPERSEDED SURVEY CONTROL

AH7001 No superseded survey control is available for this station.

AH7001 MARKER: DD = SURVEY DISK
AH7001_SETTING: 4 = OBJECT SURROUNDED BY MASS OF CONCRETE
AH7001_STAMPING: ET 1988
AH7001_PROJECTION: FLUSH
AH7001_MAGNETIC: O = OTHER; SEE DESCRIPTION
AH7001_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO SURFACE MOTION
AH7001_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR SATELLITE OBSERVATIONS - 1988

AH7001 HISTORY - Date Condition Recov. By
AH7001 HISTORY - 1988 MONUMENTED USE
AH7001 STATION DESCRIPTION
AH7001 DESCRIBED BY US ENGINEERS 1988
AH7001 DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD) .
The station is located in the city of Ocean Shores. From SR 115 and Point Brown Avenue follow Point Brown Avenue south to Change Alamer Road. Turn west and proceed to Ocean Shores Boulevard SW. Turn south and follow Ocean Shores Boulevard to Pacific Boulevard. Turn west and follow Pacific Boulevard toward beach and station on left. The station is on a linear sand dune 0.15 miles (0.24 km) west of the centerline of Ocean Shores Boulevard, 4 m (13.1 ft) higher and 21 m (68.9 ft) south of the centerline of Pacific Boulevard, 0.75 m (2.46 ft) southeast of a 4 m (13.1 ft) tall 4x4 wood flag pole, and 0.6 m (2.0 ft) north of a metal U.S. Army Corp of Engineers witness post. The station is a U.S. Army Corp of Engineers brass disk set in an irregular mass of concrete. The disk is stamped ET 1988.
SC0916 TIDAL BM - This is a Tidal Bench Mark.
SC0916 DESIGNATION - FLAG
SC0916 PID - SC0916
SC0916 STATE/COUNTY- WA/PACIFIC
SC0916 USGS QUAD - BAY CENTER (1984)
SC0916

*CURRENT SURVEY CONTROL

<table>
<thead>
<tr>
<th></th>
<th>NAD 83(1991)</th>
<th>NAVD 88</th>
<th>ADJUSTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>-2,448,318.021 (meters)</td>
<td>COMP</td>
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<tr>
<td>Y</td>
<td>-3,633,758.753 (meters)</td>
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<td>Z</td>
<td>4,619,319.032 (meters)</td>
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<td>LAPLACE CORR-</td>
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<td>ELLIP HEIGHT-</td>
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<td>GPS OBS</td>
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<tr>
<td>GEOID HEIGHT-</td>
<td>-23.64 (meters)</td>
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<td>DYNAMIC HT</td>
<td>4.095 (meters)</td>
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<td>MODELED GRAV-</td>
<td>980,749.1 (mgal)</td>
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SC0916 HORZ ORDER - FIRST
SC0916 VERT ORDER - FIRST CLASS II
SC0916 ELLP ORDER - THIRD CLASS II

The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999.

The orthometric height was determined by differential leveling and adjusted by the National Geodetic Survey in June 1991.

This mark is designated as VM 1083 in the Oceanographic Products and Services Division Tidal Bench Mark database.

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

The Laplace correction was computed from DEFLEC96 derived deflections.

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

The geoid height was determined by GEOID96.

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

The modeled gravity was interpolated from observed gravity values.

North East Units Scale Converg.

SC0916; SPC WA S  -  158,293.909  234,674.370 MT  0.99991678  -2 31 16.5
SC0916; UTM 10 -  5,172,834.611  425,780.719 MT  0.99966771  -0 42 24.1

SUPERSEDED SURVEY CONTROL
Superseded values are not recommended for survey control. NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums. See file dsdata.txt to determine how the superseded data were derived.

MARKER: DD = SURVEY DISK
SETTING: 35 = FLAG POLE FOUNDATION
STAMPING: FLAG 1958
PROJECTION: FLUSH
MAGNETIC: O = OTHER; SEE DESCRIPTION
STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO SURFACE MOTION

HISTORY - Date Condition Recov. By
1958 MONUMENTED DOD
1968 GOOD NGS
19971015 GOOD WADECO

STATION DESCRIPTION

DESCRIBED BY NATIONAL GEODETIC SURVEY 1968 IN TOKELAND.
AT TOKELAND, 0.55 MILE SOUTHEAST ALONG AN ASPHALT ROAD FROM THE POST OFFICE, IN R10W T14N, SECTION 18, AT WILLAPA BAY COAST GUARD STATION, IN THE TOP OF THE CONCRETE BASE OF THE FLAGPOLE, 2.8 FEET SOUTHWEST OF THE POLE, 46 FEET NORTH OF THE CENTER LINE OF THE ROAD, AND ABOUT LEVEL WITH THE ROAD.

STATION RECOVERY (1997)

RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
RECOVERED AS DESCRIBED. TOKELAND USCG STATION HAS BEEN CLOSED AND SOLD TO PRIVATE HOME OWNERS. FROM THE INTERSECTION OF SR 105 AND TOKELAND ROAD FOLLOW TOKELAND ROAD 2.5 MILES (4.0 KM) SOUTHEAST TO THE OLD USCG STATION AND THE INTERSECTION OF KINDRED AVENUE AND NORTH AVENUE. THE STATION IS IN THE CEMENT FOUNDATION FOR A FLAG POLE LOCATED IN THE FRONT YARD OF A WHITE SINGLE STORY HOME NORTHEAST OF THE INTERSECTION AND 46 FT (14.0 M) NORTH OF THE CENTERLINE OF TOKELAND ROAD.
National Geodetic Survey, Retrieval Date = OCTOBER 6, 1999

CORS - This is a GPS Continuously Operating Reference Station.

DESIGNATION - FORT STEVENS 1 CORS ARP
CORS_ID - FTS1
PID - AF9545
STATE/COUNTY - OR/CLATSOP
USGS QUAD - WARRENTON (1985)

*CURRENT SURVEY CONTROL

NAD 83(CORS) - 46 12 17.57696(N) 123 57 21.88547(W) ADJUSTED

EPOCH DATE - 1997.00
X - -2,469,884.587 (meters) COMP
Y - -3,667,816.179 (meters) COMP
Z - 4,581,028.113 (meters) COMP
ELLIP HEIGHT - -13.60 (meters) GPS OBS
GEOID HEIGHT - -23.63 (meters) GEOID96
HORZ ORDER - SPECIAL (CORS)
ELLP ORDER - SPECIAL (CORS)

ITRF positions available for this station.
The coordinates were established by GPS observations
and adjusted by the National Geodetic Survey in April 1996.
The coordinates are valid at the epoch date displayed above.
The epoch date for horizontal control is a decimal equivalence
of Year/Month/Day.

The XYZ, and position/ellipsoidal ht. are equivalent.
The ellipsoidal height was determined by GPS observations
and is referenced to NAD 83.
The geoid height was determined by GEOID96.

SUPERSEDED SURVEY CONTROL

NAD 83(CORS) - 46 12 17.57676(N) 123 57 21.88603(W) AD(1996.00) c
ELLIP HT - -13.60 (m) GP(1996.00) c c

Superseded values are not recommended for survey control.
NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
See file dsdata.txt to determine how the superseded data were derived.
VELOCITIES ARE AVAILABLE IN THE COORDINATE AND LOG FILES ACCESSIBLE BY ANONYMOUS FTP OR THE WORLDWIDE WEB.
FTP CORS.NGS.NOAA.GOV: CORS/COORD AND CORS/STATION_LOG
HTTP://WWW.NGS.NOAA.GOV UNDER PRODUCTS AND SERVICES.
The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999. The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques. The X, Y, and Z were computed from the position and the ellipsoidal ht. The Laplace correction was computed from DEFLEC96 derived deflections. The ellipsoidal height was determined by GPS observations and is referenced to NAD 83. The geoid height was determined by GEOID96. No superseded survey control is available for this station.

Ah7011; SPC WA S  -  163,324.692  225,512.109  MT  0.99991856  -2 36 37.4
Ah7011; UTM 10  -  5,177,571.666  416,466.030  MT  0.99968577  -0 47 47.6

Ah7011; SUPERSEDED SURVEY CONTROL

Ah7011; MARKER: I = METAL ROD
Ah7011; SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+
Ah7011; STAMPING: GELF 1997
Ah7011; PROJECTION: RECESSED 10 CENTIMETERS
Ah7011; MAGNETIC: I = MARKER IS A STEEL ROD
Ah7011; STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
Ah7011; SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
Ah7011; SATELLITE: SATELLITE OBSERVATIONS - 1997
Ah7011; ROD/PIPE-DEPTH: 10  meters

Ah7011; HISTORY - Date Condition Recov. By
AH7011 HISTORY - 1997 MONUMENTED NGS

AH7011

AH7011 STATION DESCRIPTION

AH7011 DESCRIBED BY NATIONAL GEODETIC SURVEY 1997 (RCD)
AH7011 DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD) THE
AH7011 STATION IS LOCATED NEAR THE TOWN OF NORTH COVE, WA AND IS 5.7 MILES
AH7011 (9.2 KM) SOUTH OF GRAYLAND. FROM THE INTERSECTION OF SR 105 AND
AH7011 CRANBERRY LANE/GRAYLAND BEACH ROAD IN GRAYLAND GO SOUTH ON SR 105 5.7
AH7011 MILES (9.2 KM) TO WARRENTON CANNERY ROAD. TURN WEST AND FOLLOW
AH7011 WARRENTON CANNERY ROAD TO THE BEACH ACCESS PARKING AND WOOD FRAME
AH7011 RESTROOMS ON THE NORTH SIDE OF ROAD. THE STATION IS 100 M (328.1 FT)
AH7011 WEST OF THE NORTHWEST CORNER OF THE RESTROOMS, 8.2 M (26.9 FT) NORTH
AH7011 OF THE CENTERLINE OF WARRENTON CANNERY ROAD, AND 1 M (3.3 FT) SOUTH
AH7011 OF A ORANGE NGS WITNESS POST, OR 65 M (213.3 FT) (43 DEGREES GRID)
AH7011 FROM A LONE TELEPHONE POLE WITH A RED 8 X 8 FT (2.4 M) COE
AH7011 HYDROGRAPHIC SIGNAL. THE STATION IS A STAINLESS STEEL ROD DRIVEN 74
AH7011 FT. (22.6 M) ACCESS TO THE DATUM IS HAD THROUGH A 5-INCH STANDARD NGS
AH7011 LOGO CAP THAT IS STAMPED GELF 1997.
AH6996
DESIGNATION - GKAM
AH6996 PID - AH6996
AH6996 STATE/COUNTY- WA/GRAYS HARBOR
AH6996 USGS QUAD - MOCLIPS (1985)
AH6996

*CURRENT SURVEY CONTROL

AH6996

<table>
<thead>
<tr>
<th>NAD 83(1991)</th>
<th>NAVD 88</th>
</tr>
</thead>
<tbody>
<tr>
<td>47 12 25.56964(N)</td>
<td>7.16 (meters) 23.5 (feet)</td>
</tr>
</tbody>
</table>

AH6996

X - -2,440,130.545 (meters) COMP
AH6996 Y - -3,590,039.528 (meters) COMP
AH6996 Z - 4,657,424.092 (meters) COMP
AH6996 LAPLACE CORR- 8.51 (seconds) DEFLEC96
AH6996 ELLIP HEIGHT- -17.30 (meters) GPS OBS
AH6996 GEOID HEIGHT- -24.27 (meters) GEOID96
AH6996

AH6996 HORIZONTAL ORDER - FIRST
AH6996 ELLP ORDER - THIRD CLASS II

AH6996

The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999.

AH6996

The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques.

AH6996

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

AH6996

The Laplace correction was computed from DEFLEC96 derived deflections.

AH6996

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

AH6996

The geoid height was determined by GEOID96.

AH6996

AH6996; SPC WA S - 214,862.915 219,509.530 MT 0.99997357 -2 41 25.4
AH6996; UTM 10 - 5,228,881.846 408,840.024 MT 0.99970213 -0 53 00.2

AH6996

SUPERSEDED SURVEY CONTROL

AH6996

No superseded survey control is available for this station.

AH6996

AH6996_MARKER: I = METAL ROD
AH6996_SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT. +)
AH6996_PROJECTION: RECESSED 10 CENTIMETERS
AH6996_MAGNETIC: I = MARKER IS A STEEL ROD
AH6996_STABILITY: A = MOST RELIABLE AND EXPECTED TO HOLD
AH6996+SATellite: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AH6996+SATellite: SATELLITE OBSERVATIONS - 1997
AH6996_ROD/PIPE-DEPTH: 10 meters

AH6996

71
AH6996 HISTORY - Date Condition Recov. By
AH6996 HISTORY - 1997 MONUMENTED NGS
AH6996

AH6996 DESCRIPTION

AH6996 DESCRIBED BY NATIONAL GEODETIC SURVEY 1997 (RCD)
AH6996 DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY (RCD). THE
AH6996 STATION IS LOCATED IN PACIFIC BEACH STATE PARK IN THE CITY OF PACIFIC
AH6996 BEACH. FROM THE INTERSECTION OF SR 109 AND OCEAN BEACH ROAD GO WEST
AH6996 ON MAIN STREET (OCEAN BEACH ROAD) TO SECOND STREET. TURN SOUTH AND
AH6996 PROCEED TO THE ENTRANCE TO PACIFIC BEACH STATE PARK. FROM THE ENTRANCE
AH6996 OF PACIFIC BEACH STATE PARK TURN WEST TOWARD BEACH AND FOLLOW ROAD
AH6996 PAST CEMENT BLOCK BATHROOMS TO A T INTERSECTION. TURN RIGHT AND
AH6996 PROCEED TO THE DAY USE PARKING AREA AND A VEHICLE TURN AROUND WITH
AH6996 TRAFFIC ISLAND. THE STATION IS AT THE CENTER OF THE TRAFFIC ISLAND
AH6996 AND IS LOCATED 0.5 M (1.6 FT) EAST OF A ORANGE NGS WITNESS POST, OR 68
AH6996'M (223.1 FT) WEST (280 DEGREES GRID) OF THE INTERSECTION OF CENTRAL
AH6996 AVENUE AND FIRST STREET IN THE CITY OF PACIFIC BEACH. THE STATION IS
AH6996 A STAINLESS STEEL ROD DRIVEN 33 FT. (10.1 M) ACCESS TO THE DATUM POINT
AH6996 IS HAD THROUGH A 5-INCH STANDARD NGS LOGO CAP THAT IS STAMPED GKAM
AH6996 1997. THIS STATION WAS CONVENTIONALLY TIED TO STATION A 443 1977
AH6996 USING SECOND ORDER METHODS. LEVELS HAVE BEEN RUN TO THIS POINT. THE
AH6996 STATION IS 5.225 M (17.142 FT) LOWER, 450.7 M (1478.7 FT) WEST, AND
AH6996 309.8 M (1016.4 FT) SOUTH OF A 443 (SD0121). THE LEVELED NAVD88
AH6996 ELEVATION OF GKAM IS 7.173 M, (23.533 FT) OR 5.225 M (17.142 FT) LOWER
AH6996 THAN A 443 (SD0121).
The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999. The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques. The X, Y, and Z were computed from the position and the ellipsoidal ht. The Laplace correction was computed from DEFLEC96 derived deflections. The ellipsoidal height was determined by GPS observations and is referenced to NAD 83. The geoid height was determined by GEOID96. No superseded survey control is available for this station.
AH7018 HISTORY - 1939 MONUMENTED CGS

AH7018

AH7018 STATION DESCRIPTION

AH7018

AH7018 DEScribed by coast and geodetic survey 1939 (wms)

AH7018 Described by the Washington state department of ecology (RCD). this

AH7018 station replaces goulter 2 1938 (sd0515) which has been destroyed.

AH7018 Reference mark 1 (goulter 2 no. 1 1938) has been restamped goulter 3

AH7018 no. 1 1987 and remonumented in a round concrete form as the cast-iron

AH7018 soil pipe was badly rusted. the station is on the west shore of

AH7018 willapa bay, about 278 m (912.1 ft) north of bradys oyster house in

AH7018 the town of oysterville. the station is 5 m (16.4 ft) west of the top

AH7018 of a rock revetment on the shoreline of willapa bay. from the

AH7018 intersection of oysterville road and peninsula hwy proceed east on

AH7018 oysterville road to pacific street. turn north and proceed to bradys

AH7018 oyster house and the intersection of clark street and pacific street.

AH7018 from the intersection proceed about 240 m (787.4 ft) north along

AH7018 shoreline below rock revetment (gravel road may be driven to within 40

AH7018 m (131.2 ft) of mark on all but high tide). continue north about 40

AH7018 m. (131.2 ft) the station is about 20 m (65.6 ft) west of the storm

AH7018 high water line, 5 m (16.4 ft) west of the top of the rock revetment,

AH7018 1 m (3.3 ft) east of a thorn thicket, and 0.25 m (0.82 ft) east of a

AH7018 orange ngs witness post projecting 2 ft (0.6 m) (damaged). the

AH7018 station is a standard cgs reference mark disk stamped goulter 3 no. 1

AH7018 1987 attached to a 30 inch by 4 inch cast-iron soil pipe within a

AH7018 round concrete monument that projects 6-inches above the surface.

AH7018 reference mark 2 is about 38 m (124.7 ft) south of the station, 13 m

AH7018 (42.7 ft) west of the rock revetment, and on the west side of the

AH7018 thorn thicket and the east side of a old farm field. the mark is near

AH7018 two large half-buried drift logs and under the branches of a 10 ft

AH7018 (3.0 m) tall deciduous tree. the reference mark is a standard disk

AH7018 stamped goulter 3 no. 2 1938 attached to a 30 inch by 4 inch

AH7018 cast-iron soil pipe within a round concrete monument that projects

AH7018 about 3-inches above the surface. a orange ngs witness post is 1 m

AH7018 (3.3 ft) from the mark.
The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999. The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques. The X, Y, and Z were computed from the position and the ellipsoidal ht. The Laplace correction was computed from DEFLEC96 derived deflections. The ellipsoidal height was determined by GPS observations and is referenced to NAD 83. The geoid height was determined by GEOID96. No superseded survey control is available for this station.
AH6998 HISTORY - 1993 MONUMENTED WADT
AH6998
AH6998 STATION DESCRIPTION
AH6998
AH6998 DESCRIBED BY WA DEPT OF TRANSP 1993
AH6998 DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY (RCD) FROM THE
AH6998 INTERSECTION OF SR 109 AND BENNER ROAD IN THE CITY OF COPALIS BEACH GO
AH6998 0.25 MILES (0.40 KM) WEST ON BENNER ROAD TO GRIFFITH-FRIDAY STATE PARK
AH6998 AND THE BEACH ACCESS PARKING AREA ON RIGHT. THERE IS A CONCRETE BLOCK
AH6998 BATHROOM ON THE NORTH SIDE OF PARKING AREA. THE STATION IS 15 M (49.2
AH6998 FT) NORTH OF THE CENTERLINE OF BENNER ROAD, 4.8 M (15.7 FT) EAST OF
AH6998 THE WEST END OF A CONCRETE CURB (OF A TRAFFIC ISLAND), AND 1.5 M (4.9
AH6998 FT) SOUTHWEST OF A WHITE WITNESS POST. THE STATION IS A BRASS
AH6998 WASHINGTON STATE DEPARTMENT OF TRANSPORTATION DISK SET INTO A ROUND
AH6998 CONCRETE MONUMENT PROJECTING 10 CM ABOUT THE GROUND. THE DISK IS
AH6998 STAMPED GP14109-31 1983.
National Geodetic Survey, Retrieval Date = OCTOBER 6, 1999

AH7013  *****************************************************
AH7013 DESIGNATION - GP 25105 13
AH7013 PID - AH7013
AH7013 STATE/COUNTY - WA/PACIFIC
AH7013 USGS QUAD - NORTH COVE (1985)

AH7013  *CURRENT SURVEY CONTROL
AH7013

AH7013* NAD 83(1991) - 46 43 42.41416(N) 124 02 17.35091(W) ADJUSTED
AH7013* NAVD 88 - 4.33 (meters) 14.2 (feet) GPS OBS

AH7013 X - -2,451,516.286 (meters) COMP
AH7013 Y - -3,629,306.938 (meters) COMP
AH7013 Z - -4,621,110.023 (meters) COMP

AH7013 LAPLACE CORR - 15.19 (seconds) DEFLEC96
AH7013 ELLIP HEIGHT - -19.81 (meters) GPS OBS
AH7013 GEOID HEIGHT - -24.00 (meters) GEOID96

AH7013 HORZ ORDER - FIRST
AH7013 ELLP ORDER - THIRD CLASS II

AH7013 The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999.

AH7013 The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques.

AH7013 The X, Y, and Z were computed from the position and the ellipsoidal ht.

AH7013 The Laplace correction was computed from DEFLEC96 derived deflections.

AH7013 The ellipsoidal height was determined by GPS observations and is referenced to NAD 83.

AH7013 The geoid height was determined by GEOID96.

AH7013

AH7013; North East Units Scale Converg.
AH7013; SPC WA S - 161,131.872 229,654.821 MT 0.99991772 -2 34 12.4
AH7013; UTM 10 - 5,175,511.570 420,675.083 MT 0.99967734 -0 45 21.4

AH7013 SUPERSEDED SURVEY CONTROL

AH7013 No superseded survey control is available for this station.

AH7013 MARKER: DD = SURVEY DISK
AH7013 SETTING: 2 = OBJECT DRIVEN INTO GROUND
AH7013 STAMPING: GP26105-31 1995
AH7013 PROJECTION: FLUSH
AH7013 MAGNETIC: O = OTHER; SEE DESCRIPTION
AH7013 STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
AH7013+SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AH7013+SATELLITE: SATELLITE OBSERVATIONS - 1995
AH7013 HISTORY - Date Condition Recov. By
AH7013 HISTORY - 1995 MONUMENTED WADT
AH7013
AH7013 STATION DESCRIPTION
AH7013 DESCRIBED BY WA DEPT OF TRANSP 1995
AH7013 DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD).
AH7013 THE STATION IS SOUTHEAST OF NORTH COVE AND NORTHWEST OF TOKELAND. FROM
AH7013 SR 105 AND TOKELAND ROAD GO WEST 0.9 MILES (1.4 KM) TO STATION ON
AH7013 RIGHT. THE STATION IS 6.5 M (21.3 FT) NORTHWEST OF THE CENTERLINE OF
AH7013 SR 105, 38.8 M (127.3 FT) SOUTHEAST OF A DOUBLE POWER POLE WITH THREE
AH7013 LARGE TRANSFORMERS, 25.2 M (82.7 FT) SOUTHEAST OF POWER POLE P829, AND
AH7013'1.1 M (3.6 FT) SOUTHEAST OF A DOT WHITE WITNESS POST. THE STATION IS
AH7013'A BRASS WS DOT SURVEY DISK LOCATED UNDER A DOT CAST IRON MONUMENT AND
AH7013 COVER. THE STATION IS ABOUT 10 CM LOWER THAN THE GRAVEL SURFACE OF
AH7013'THE ROAD SHOULDER.
CBN - This is a Cooperative Base Network Control Station.

DESIGNATION - GP 35004 3

PID - SC2756

STATE/COUNTY- WA/WAHKIATUK

USGS QUAD – ROSBURG (1985)

*CURRENT SURVEY CONTROL

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
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<td>NAD 83(1991)</td>
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<td>123 38 56.57971(W)</td>
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<tr>
<td>NAVD 88</td>
<td>27.89 (meters)</td>
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<td>91.5 (feet) GPS OBS</td>
</tr>
<tr>
<td>X</td>
<td>-2,444,458.254 (meters)</td>
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<tr>
<td>Y</td>
<td>-3,672,380.894 (meters)</td>
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<tr>
<td>Z</td>
<td>4,590,958.324 (meters)</td>
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<tr>
<td>LAPLACE CORR-</td>
<td>13.44 (seconds)</td>
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<tr>
<td>ELLIP HEIGHT-</td>
<td>5.64 (meters)</td>
</tr>
<tr>
<td>GEOID HEIGHT-</td>
<td>-22.10 (meters)</td>
</tr>
</tbody>
</table>

The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in May 1991.

The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques.

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

The Laplace correction was computed from DEFLEC96 derived deflections.

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

The geoid height was determined by GEOID96.

<table>
<thead>
<tr>
<th>North Units Scale Converg.</th>
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<tr>
<td>SPC WA S  -  116,055.416 257,618.625 MT 0.99992416 -2 17 14.8</td>
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<tr>
<td>UTM 10 - 5,131,355.802 450,045.807 MT 0.99963067 -0 28 10.3</td>
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SUPERSEDED SURVEY CONTROL

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<tr>
<th>Component</th>
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<tr>
<td>ELLIP HT</td>
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<td>46 20 02.17411(N)</td>
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<td>123 38 56.5214(W)</td>
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<tr>
<td>NGVD 29</td>
<td>26.6 (m)</td>
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</tbody>
</table>

Superseded values are not recommended for survey control. NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums. See file dsdata.txt to determine how the superseded data were derived.
SC2756_MAGNETIC: O = OTHER; SEE DESCRIPTION
SC2756_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
SC2756+STABILITY: SURFACE MOTION
SC2756_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
SC2756+SATELLITE: SATELLITE OBSERVATIONS - February 07, 1991
SC2756
SC2756 HISTORY - Date Condition Recov. By
SC2756 HISTORY - 1986 MONUMENTED NGS
SC2756 HISTORY - 1986 GOOD NGS
SC2756 HISTORY - 19870519 GOOD
SC2756 HISTORY - 19890727 GOOD NGS
SC2756 HISTORY - 19910207 GOOD
SC2756 HISTORY - 19970724 GOOD WADECO
SC2756
SC2756 STATION DESCRIPTION
SC2756
SC2756'DESCRIBED BY NATIONAL GEODETIC SURVEY 1986 (DAW)
SC2756'THE STATION IS LOCATED ABOUT 16.1 KM (10 MI) NORTHWEST OF
SC2756'SKAMOKAWA, 12.9 KM (8 MI) SOUTHEAST OF NASELLE, 8.1 KM (5 MI) NORTH
SC2756'OF ALTOONA AND ON HIGHWAY RIGHT-OF-WAY.
SC2756
SC2756'TO REACH THE STATION FROM THE POST OFFICE IN ROSBURG GO WESTERLY ON
SC2756'STATE HIGHWAY 4 FOR 0.72 KM (0.45 ) TO A DRIVEWAY ON THE LEFT AND
SC2756'THE STATION.
SC2756
SC2756'THE MARK IS SET IN THE TOP OF A ROUND CONCRETE MONUMENT THAT IS FLUSH
SC2756'WITH THE GROUND SURFACE. IT IS 17.1 M (56.1 FT) WEST OF A FIRE
SC2756'HYDRANT, 5.8 M (19 FT) SOUTH OF THE
SC2756'CENTER OF THE HIGHWAY, 4.3 M (14 FT) NORTHWEST OF AN APPLE TREE AND
SC2756'7.1 M (23.4 FT) EAST OF A WITNESS POST.
SC2756
SC2756'THIS STATION IS SUITEABLE FOR GPS OBSERVATIONS.
SC2756
SC2756'DESCRIBED BY DA WEGENAST.
SC2756
SC2756 STATION RECOVERY (1986)
SC2756
SC2756'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1986
SC2756'RECOVERED IN GOOD CONDITION.
SC2756
SC2756 STATION RECOVERY (1987)
SC2756
SC2756'RECOVERED 1987
SC2756'RECOVERED IN GOOD CONDITION.
SC2756
SC2756 STATION RECOVERY (1989)
SC2756
SC2756'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1989
SC2756'THE STATION IS LOCATED ABOUT 16.0 KM (9.9 MI) NORTHWEST OF SKAMOKAWA,
SC2756'12.9 KM (8.0 MI) SOUTHEAST OF NASELLE, 8.1 KM (5.0 MI) NORTH
SC2756'OF ALTOONA AND ON HIGHWAY RIGHT-OF-WAY.
SC2756'TO REACH FROM THE POST OFFICE IN ROSBURG, GO WEST ON STATE ROUTE 4 FOR
SC2756'0.72 KM (0.45 MI) TO THE TOP OF THE HILL, A DRIVEWAY ON THE LEFT AND
SC2756'THE STATION.
SC2756'THE MARK IS SET IN THE TOP OF A ROUND CONCRETE MONUMENT THAT IS FLUSH
SC2756'WITH THE GROUND SURFACE. IT IS 17.1 M (56.1 FT) WEST OF A FIRE
HYDRANT, 5.8 M (19.0 FT) SOUTH OF THE CENTER OF STATE ROUTE 4, 4.3 M (14.1 FT) NORTHWEST OF AN APPLE TREE AND 7.1 M (23.3 FT) EAST OF A WITNESS POST.

STATION RECOVERY (1991)

RECOVERED 1991

RECOVERED IN GOOD CONDITION.

STATION RECOVERY (1997)

RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)

RECOVERED AS DESCRIBED. THE STATION IS 14.7 MILES (23.7 KM) EAST ON SR 4 FROM INTERSECTION OF U.S. 101 AND SR 4. STATION IS ON SOUTH SIDE OF ROAD, ACROSS FROM LARGE GRAVEL TURNOUT.
FBN - This is a Candidate for Federal Base Network Control.

**CURRENT SURVEY CONTROL**

<table>
<thead>
<tr>
<th>NAD 83(1991)</th>
<th>46 54 10.09754(N) 124 05 59.00899(W)</th>
<th>ADJUSTED</th>
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</thead>
<tbody>
<tr>
<td>NAVD 88</td>
<td>5.06 (meters) 16.6 (feet)</td>
<td>GPS OBS</td>
</tr>
</tbody>
</table>

X - -2,447,491.734 (meters) COMP
Y - -3,614,967.597 (meters) COMP
Z - 4,634,374.793 (meters) COMP

LAPLACE CORR- 13.06 (seconds) DEFLEC96
ELLIP HEIGHT- -19.43 (meters) GPS OBS
GEOID HEIGHT- -24.33 (meters) GEOID96

HORZ ORDER - A
ELLIP ORDER - THIRD CLASS II

The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999.

The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques.

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

The Laplace correction was computed from DEFLEC96 derived deflections.

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

The geoid height was determined by GEOID96.

<table>
<thead>
<tr>
<th>PID Reference Object</th>
<th>Distance Geod. Az</th>
<th>Grid Az</th>
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</thead>
<tbody>
<tr>
<td>SD0010 BAYVIEW</td>
<td>03014</td>
<td></td>
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<tr>
<td>SC2669 GRAYS HARBOR RANGE 4 REAR LT</td>
<td>APPROX. 9.8 KM 0524919.9</td>
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<tr>
<td>SC2671 GRAYS HARBOR RANGE 4 FRONT LT</td>
<td>APPROX. 10.3 KM 0534541.1</td>
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<tr>
<td>SC2675 GRAYS HARBOR RANGE 3 REAR LT</td>
<td>APPROX. 11.9 KM 0540819.8</td>
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<td>SC2679 GRAYS HARBOR RANGE 3 FRONT LT</td>
<td>APPROX. 11.5 KM 0543434.9</td>
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<tr>
<td>SC2706 TIDE USE</td>
<td>APPROX. 11.5 KM 0544611.8</td>
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<tr>
<td>SD0397 WESTPORT</td>
<td></td>
<td>06811</td>
</tr>
</tbody>
</table>
83

**SUPERSEDED SURVEY CONTROL**

**MARKER:** DR = REFERENCE MARK DISK  
**SETTING:** 4 = CONCRETE POST  
**STAMPING:** EAST BASE 2 1940  
**PROJECTION:** FLUSH  
**MAGNETIC:** O = OTHER; SEE DESCRIPTION  
**STABILITY:** D = MARK OF QUESTIONABLE OR UNKNOWN STABILITY  
**SATELLITE:** THE SITE LOCATION WAS REPORTED AS SUITABLE FOR  
**SATELLITE:** SATELLITE OBSERVATIONS - February 08, 1991  

**HISTORY**  
- Date    Condition    Recov. By
  - 1940    MONUMENTED    CGS  
  - 1940    GOOD         CGS  
  - 1951    GOOD         CGS  
  - 1969    GOOD         CGS  
  - 1973    GOOD         NGS  
  - 1985    GOOD         NOS  
  - 19891204 GOOD         NGS  
  - 19900105 GOOD         MGSINC  
  - 19910208 GOOD         NGS  
  - 19970720 GOOD         WADECO  

**STATION DESCRIPTION**

**DESCRIBED BY COAST AND GEODETIC SURVEY 1940 (GLB)**  
**STATION IS LOCATED ON A SMALL FLAT SAND DUNE SURROUNDED BY WATER**  
**AT HIGH TIDE, ON THE W SIDE OF CHEHALIS POINT, AND 100 METERS S**  
**OF THE PIER USED BY THE COLUMBIA CONSTRUCTION COMPANY.**  
**STATION MARK IS A STANDARD REFERENCE DISK SET IN THE TOP OF A**  
**6-INCH DIAMETER CONCRETE TILE FILLED WITH CONCRETE, 30 INCHES DEEP**
ANDFlush with the ground. This reference mark disk was to be used for east base but as east base washed out before the connection was made, a standard triangulation disk stamped east base 2, 1940 was centered over the reference mark in a mass of concrete 10 inches square and 6 inches deep placed over and around the reference mark.

Reference mark no. 1 is a standard bronze disk stamped east base 2, 1940, no. 1 in the top of a 6-inch diameter concrete tile filled with concrete, 30 inches deep and set flush with the ground surface.

From the junction of U.S. highway 101, and state highway 13A in south Aberdeen, follow state highway 13A for 22.2 miles, passing through the town of Westport 0.7 mile before arriving at end of truck travel. From end of truck travel, walk due E about 1/2 mile to station.

Station recovery (1940)

Recovery note by coast and geodetic survey 1940

Recovered in good condition.

Station recovery (1951)

Recovery note by coast and geodetic survey 1951 (CWC)

Recovered

The station and R.M. no. 1 were recovered in good condition. Grays Harbor east base was not recovered. R.M. no. 2 was established.

About 3/4 mile east-northeast of Westport, about 3/4 mile southeast of Westhaven, on the east side of Point Chehalis, about 100 yards south of the piling near the east end of the south jetty, about 100 yards southwest of the high water line, on the northeast side of Westport airport, on top of a flat sand hill southwest of and separate from a sand ridge at the storm water line, 13.0 feet above m.s.l., 3 feet east of a white witness post, and set in top of a square concrete post projecting 3 inches, a standard disk stamped east base 2 1940.

Reference mark no. 1 (note 11B) is on the south slope of the sand hill and about 2 feet lower than the station and projects 12 inches. The disk is stamped east base 2 no 1 1940.

Reference mark no. 2 (note 11A) is at the north end of the top of the sand hill and projects 3 inches. The disk is stamped east base 2 1940 no 2.

B.M. Y 295 (see description thereof) is 0.45 mile south of and across the airport from the station.

Station recovery (1969)

Recovery note by coast and geodetic survey 1969 (JBW)

The station and R.M. no. 2 were recovered in good condition. The concrete monument of R.M. no. 1 was found, but the disk has been
THE STATION IS ABOUT 0.75 MILE EAST-NOR'EAST OF WESTPORT, ABOUT 0.75 MILE SOUTHEAST OF WESTHAVEN, ON THE EAST SIDE OF POINT CHEHALIS, ON TOP OF A FLAT SAND HILL SOUTHWEST OF AND SEPARATE FROM A SAND RIDGE AT THE STORM WATER LINE, 13.0 FEET ABOVE M.S.L., AND 3 FEET EAST OF WHITE WITNESS POST.

TO REACH THE STATION FROM THE WESTPORT POST OFFICE, GO 0.7 MILE WEST ON N. MONTESANO AVE. TO WILSON STREET. TURN RIGHT AND GO 0.1 MILE EAST ON WILSON STREET TO A DIRT ROADWAY. TURN RIGHT AND GO 0.2 MILE ON THE DIRT ROADWAY TO A CLEARED AREA ON THE RIGHT. FROM THE CENTER OF THE DIRT ROADWAY GO ABOUT 240 YARDS EAST ONTO A 7 FOOT HIGH SAND RIDGE. THEN GO ABOUT 71 YARDS SOUTHEAST TO A 10 FOOT HIGH SAND DUNE (SURROUNDED BY WATER AT HIGH TIDE) AND THE STATION.

THE STATION MARK IS A STANDARD U.S.C. AND G.S. TRIANGULATION DISK, STAMPED EAST BASE 2 1940, SET IN TOP OF A SQUARE CONCRETE POST PROJECTING 3 INCHES.


AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN ABOUT 0.75 MI. EAST-NOR'EAST OF WESTPORT.

STATION RECOVERY (1973)

RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1973 (RMB)

THE STATION AND REFERENCE MARK 2 WAS RECOVERED IN GOOD CONDITION. REFERENCE MARK 1 WAS FOUND DESTROYED, PROBABLY BY VANDALS WHO SMASHED THE TOP OF THE MONUMENT TO GET THE DISK.

AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN 3/4 MILE EAST-NOR'EAST OF WESTPORT.

STATION RECOVERY (1985)

RECOVERY NOTE BY NATIONAL OCEAN SURVEY 1985 (RBM)

THE STATION WAS RECOVERED AT THIS DATE. THE STATION WAS RECOVERED IN GOOD CONDITION AS DESCRIBED.

RECOVERED BY MJM.

STATION RECOVERY (1989)

RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1989

THE STATION IS LOCATED ABOUT 43.4 KM (27.0 MI) NORTH OF OCEAN PARK, 35.4 KM (22.0 MI) NORTHWEST OF SOUTH BEND, 27.4 KM (17.0 MI) SOUTHWEST OF ABERDEEN AND ON THE TOP OF A FLAT SAND HILL ON THE EAST SIDE OF POINT CHEHALIS.

TO REACH FROM THE POST OFFICE IN WESTPORT, GO WEST ON NORTH MONTESANO AVENUE FOR 1.13 KM (0.70 MI) TO A CROSS ROAD. TURN RIGHT AND GO WEST ON WILSON STREET FOR 0.16 KM (0.10 MI) TO A SIDE ROAD RIGHT. TURN
RIGHT AND GO NORTH ON THE GRAVELED ROAD FOR 0.16 KM (0.10 MI) TO A CABLE GATE, THE KEY CAN BE OBTAINED FROM THE CITY OFFICE, CALL AT LEAST A DAY BEFORE, PHONE NUMBER 206-268-0131. PASS THROUGH THE GATE AND CONTINUE AHEAD ON THE GRAVELED ROAD FOR 0.08 KM (0.05 MI) TO THE NORTHWEST CORNER OF THE CHAIN LINK FENCE AROUND THE COAST GUARD BASE AND A FORK. TAKE THE RIGHT FORK FOR 0.15 KM (0.09 MI), THIS ROAD IS VERY SOFT SAND, IN DRY WEATHER IT MAY TAKE A FOURWHEEL DRIVE, TO THE BEACH AND THE END OF TRUCK TRAVEL. WALK SOUTHEASTERLY FOR ABOUT 150 FT (45.7 M) TO A LONE BRUSH COVERED DUNE AND THE STATION. THIS DUNE IS ISOLATED FROM THE REST OF THE BEACH HIGHWATER LINE AND IS AN ISLAND AT EXTREME HIGH WATER.

THE MARK IS SET IN THE TOP OF A SQUARE CONCRETE MONUMENT THAT IS FLUSH WITH THE GROUND SURFACE. IT IS 0.6 M (2.0 FT) NORTH OF A WITNESS POST AND ON THE HIGHEST PART OF THE DUNE.

RECOVERY NOTE BY MINISTER AND GLAESER 1990

RECOVERED IN GOOD CONDITION.

STATION RECOVERY (1991)

RECOVERED 1991

RECOVERED IN GOOD CONDITION.

STATION RECOVERY (1997)

RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)

RECOVERED AS DESCRIBED.
1 National Geodetic Survey, Retrieval Date = OCTOBER 6, 1999
SD0794 ***********************************************************************
SD0794 DESIGNATION - GRENVILLE
SD0794 PID - SD0794
SD0794 STATE/COUNTY - WA/GRAYS HARBOR
SD0794 USGS QUAD - TAHOLAH (1982)
SD0794
SD0794 *CURRENT SURVEY CONTROL
SD0794
SD0794* NAD 83(1991)- 47 18 15.15012(N) 124 16 43.25125(W) ADJUSTED
SD0794* NAVD 88 - 37.63 (meters) 123.5 (feet) GPS OBS
SD0794 ___________________________________________________________________
SD0794 X - -2,440,370.678 (meters) COMP
SD0794 Y - -3,580,310.585 (meters) COMP
SD0794 Z - 4,664,773.963 (meters) COMP
SD0794 LAPLACE CORR- 6.90 (seconds) DEFLEC96
SD0794 ELLIP HEIGHT- 13.28 (meters) GPS OBS
SD0794 GEOID HEIGHT- -24.15 (meters) GEOID96
SD0794
SD0794 HORZ ORDER - FIRST
SD0794 ELLP ORDER - THIRD CLASS II
SD0794
SD0794 The horizontal coordinates were established by GPS observations
SD0794 and adjusted by the National Geodetic Survey in January 1999.
SD0794 The orthometric height was determined by GPS observations and a
SD0794 high-resolution geoid model using precise GPS observation and
SD0794 processing techniques.
SD0794 The X, Y, and Z were computed from the position and the ellipsoidal ht.
SD0794 The Laplace correction was computed from DEFLEC96 derived deflections.
SD0794 The ellipsoidal height was determined by GPS observations
SD0794 and is referenced to NAD 83.
SD0794 The geoid height was determined by GEOID96.
SD0794
SD0794; North East Units Scale Converg.
SD0794;SPC WA S - 225,915.358 214,355.081 MT 0.99999347 -2 44 41.3
SD0794;UTM 10 - 5,239,763.362 403,341.326 MT 0.99971482 -0 56 23.5
SD0794
SD0794 Primary Azimuth Mark Grid Az
SD0794;SPC WA S - VILLE 082 53 48.6
SD0794;UTM 10 - VILLE 081 05 30.8
SD0794
SD0794|---------------------------------------------------------------------|
SD0794| PID Reference Object Distance Geod. Az |
SD0794| dddmss.s |
SD0794| SD0787 POINT GRENVILLE LORAN MAST 153.864 METERS 04240 |
SD0794| GRENVILLE RM 1 13.410 METERS 06433 |
SD0794| SD0699 POINT GRENVILLE LOT 1953 APPROX. 3.8 KM 0795837.8 |
SD0794| SD0697 VILLE APPROX. 3.8 KM 0800907.3 |
SD0794| GRENVILLE RM 3 17.342 METERS 09145 |
SD0794| GRENVILLE RM 2 15.392 METERS 19752 |
SD0794| SD0793 ROCK 166.005 METERS 25240 |
SD0794| GRENVILLE RM 2 RESET 10.735 METERS 32347 |
SUPERSEDED SURVEY CONTROL

NAD 83(1991) - 47 18 15.14789(N) 124 16 43.26281(W) AD( ) 2
NAD 83(1986) - 47 18 15.13628(N) 124 16 43.27045(W) AD( ) 2
NAD 27 - 47 18 15.83300(N) 124 16 38.61100(W) AD( ) 2
NGVD 29 - 36.9 (m) 121. (f) VERT ANG

Superseded values are not recommended for survey control.
NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
See file dsdata.txt to determine how the superseded data were derived.

MARKER: DD = SURVEY DISK
SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
STAMPING: GRENVILLE XXVII
PROJECTION: FLUSH
MAGNETIC: O = OTHER; SEE DESCRIPTION
STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
+STABILITY: SURFACE MOTION

HISTORY - Date Condition Recov. By
1927 MONUMENTED CGS
1951 MONUMENTED CGS
1953 MONUMENTED CGS
1962 MONUMENTED CGS
1969 MONUMENTED CGS
1974 MONUMENTED RAYONI
19971015 GOOD WADECO

STATION DESCRIPTION

DESCRIPTED BY COAST AND GEODETIC SURVEY 1927 (TJM)
ON THE WESTERNMOST PART OF POINT GRENVILLE ON THE LEVEL GRASSY AREA,
23-1/2 METERS FROM THE EDGE OF THE BLUFF MEASURED IN LINE WITH
100-FOOT ROCK CLOSE OFF POINT. 24 METERS FROM EDGE OF BLUFF IN
LINE WITH STATION NORTH. 40.4 METERS FROM EDGE OF BLUFF IN LINE
WITH STATION ARCH.

STATION AND REFERENCE MARKS ARE STANDARD BRONZE DISKS SET IN
CONCRETE, AS DESCRIBED IN NOTES 1A AND 11A. THE STANDARD DISK IS
STAMPED GRENVILLE XXVII. THE DISK OF THE REFERENCE MARK IS STAMPED
R.M.NO.1, GRENVILLE, XXVII.

STATION CAN BEST BE REACHED BY FOLLOWING THE EDGE OF THE BLUFF
FROM THE NW BY LEAVING THE OLD ROAD NEAR THE SMALL STREAM 500
METERS TO THE N OF THE POINT.
HEIGHT OF SIGNAL ABOVE STATION MARK - 8 METERS.

RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1951 (CWC)
RECOVERED--
THE STATION AND THE REFERENCE MARK WERE RECOVERED IN GOOD
CONDITION. A NEW REFERENCE MARK WAS SET BY THIS PARTY.

A NEW REFERENCE MARK WAS SET BY THIS PARTY. A NEW REFERENCE MARK WAS SET BY THIS PARTY. ON POINT GRENVILLE, 5.1 MILES AIRLINE FROM THE VILLAGE OF MOCLIPS, ON THE U.S. COAST GUARD RESERVATION, 154 METERS SOUTH-SOUTHWEST OF A 310-FOOT STEEL RADIO MAST, 23.5 METERS SOUTHEAST OF THE EDGE OF THE BLUFF, 24 METERS SOUTH OF THE EDGE OF THE BLUFF, 40.4 METERS EAST OF THE EDGE OF THE BLUFF, A STANDARD TRIANGULATION STATION MARK DISK STAMPED GRENVILLE XXVII SET IN TOP OF SQUARE CONCRETE MONUMENT.

REFERENCE MARK 1 IS EAST OF THE STATION IN AREA COVERED BY GRASS AND SMALL BRUSH. IT IS A STANDARD REFERENCE DISK STAMPED GRENVILLE RM 1 XXVII SET IN TOP OF A SQUARE CONCRETE POST.

REFERENCE MARK 2 IS SOUTH OF THE STATION, A STANDARD REFERENCE MARK DISK STAMPED GRENVILLE RM 2 1927 SET IN TOP OF A CONCRETE FILLED STOVE PIPE.

TO REACH THE STATION FROM MOCLIPS, GO NORTH ALONG THE GRAVEL ROAD TOWARD TAHOlah FOR 7.6 MILES TO A ROAD LEFT AND A SIGN COAST GUARD RESERVATION - NO VISITORS ALLOWED. TURN LEFT (WEST) FOR ABOUT ONE MILE TO THE END OF THE ROAD AND THE COAST GUARD STATION. DRIVE ON DIM TRACK ROAD TO THE END OF THE TRAIL AND PACK WEST FOR ABOUT 50 YARDS AND THE STATION.

THE DISTANCE TO THE OLD REFERENCE MARK DOES NOT CHECK WITH THAT REPORTED IN 1927.

STATION RECOVERY (1953)

RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1953 (RAG) STATION MARK WAS RECOVERED AND FOUND TO BE IN GOOD CONDITION. REFERENCE MARK 1 WAS FOUND TO BE DESTROYED. TWO NEW REFERENCE MARKS WERE SET. NEW MARKS ARE STANDARD BRONZE DISKS SET IN CONCRETE AS DESCRIBED BY NOTES 11A.

A COMPLETE DESCRIPTION FOLLOWS--

THE STATION ON THE WESTERNMOST PART OF POINT GRENVILLE ON THE LEVEL GRASSY AREA, 76 FEET EAST FROM THE EDGE OF THE BLUFF MEASURED IN LINE WITH 100-FOOT ROCK CLOSE OFF POINT, 128 FEET NORTHWEST OF THE MOST SOUTHERLY OF TWO GUYED POLES, AND 111 FEET WEST OF THE MOST NORTHERLY OF TWO GUYED POLES. THE STATION IS ON PROPERTY OF THE U.S. COAST GUARD.

TO REACH FROM THE POST OFFICE IN PACIFIC BEACH, GO WEST AND NORTH ON STATE HIGHWAY 9C FOR 2.0 MILES TO A FORK AND THE MOCLIPS POST OFFICE ON THE LEFT. TAKE LEFT FORK, GO 0.3 MILE TO A T-ROAD INTERSECTION. TURN RIGHT, CONTINUE ON STATE HIGHWAY 9C FOR 6.0 MILES TO A SIDE ROAD LEFT AT SIGN ON LEFT, U.S. COAST GUARD POINT GRENVILLE. TURN LEFT, GO 0.6 MILE TO COAST GUARD BUILDINGS. KEEP RIGHT AND GO BETWEEN BUILDINGS AND THEN SOUTH ON A TRACK ROAD FOR 0.25 MILE TO THE STATION.

STATION MARK, A STANDARD DISK IN A CONCRETE MONUMENT, STAMPED GRENVILLE XXVII IS 3 FEET EAST OF A STANDARD WITNESS POST. MONUMENT PROJECTS 6 INCHES FROM GROUND.
REFERENCE MARK 2 IS 76 FEET EAST-NORTHEAST FROM THE EDGE OF THE BLUFF MEASURED IN LINE WITH 100-FOOT ROCK CLOSE OFF POINT. THE DISK IS STAMPED GRENVILLE NO 2 1927. THE CONCRETE POST PROJECTS 4 INCHES FROM GROUND.

REFERENCE MARK 3 IS 62 FEET WEST OF THE MOST NORTHERLY OF TWO GUYED POLES, AND 81 FEET NORTHWEST OF THE MOST SOUTHERLY OF TWO GUYED POLES. THE DISK IS STAMPED GRENVILLE NO 3 1927. THE CONCRETE POST PROJECTS 6 INCHES FROM GROUND.

NO AZIMUTH MARK WAS ESTABLISHED. TRIANGULATION STATION VILLE CAN BE USED FOR THE AZIMUTH MARK.

NOTE--A 4 FT. STAND WAS USED.

STATION RECOVERY (1962)

THE STATION WAS RECOVERED AS DESCRIBED ON PAGE 14, BOOK 1152, IN 1953. THE STATION MARK AND REFERENCE MARKS 2 AND 3 WERE RECOVERED IN GOOD CONDITION. A REFERENCE MARK WAS SET IN 1951 WHICH WAS STAMPED GRENVILLE RM 2 1927. IT IS SOUTH OF THE STATION SET IN A CONCRETE-FILLED STOVE PIPE. THIS MARK WAS NOT RECOVERED, BUT A THOROUGH SEARCH WAS NOT MADE FOR IT. THE OTHER REFERENCE MARK 2 WHICH WAS SET IN 1953 IS NORTH OF THE STATION IN A SQUARE CONCRETE POST. NO OBSERVATIONS WERE MADE FROM THE STATION DURING THIS RECOVERY.

STATION RECOVERY (1969)

THE STATION AND REFERENCE MARKS RM NO. 2 AND RM NO. 3 WERE RECOVERED IN GOOD CONDITION.

THE STATION IS ON THE WESTERNMOST PART OF POINT GRENVILLE ON THE LEVEL GRASSY AREA, 76 FEET EAST FROM THE EDGE OF THE BLUFF MEASURED IN LINE WITH AN 100 FOOT ROCK CLOSE OFF THE POINT, 128 FEET NORTHWEST OF THE MOST SOUTHERLY OF TWO GUYED POLES, AND 111 FEET WEST OF THE MOST NORTHERLY OF TWO GUYED POLES. THE STATION IS ON PROPERTY BELONGING TO THE U.S. COAST GUARD.


THE STATION IS A STANDARD USC AND GS TRIANGULATION DISK STAMPED GRENVILLE XXVII, SET IN A CONCRETE MONUMENT PROJECTING 6 INCHES ABOVE THE GROUND, AND 3 FEET EAST OF A STANDARD WITNESS POST.

REFERENCE MARK 2 IS A STANDARD USC AND GS REFERENCE MARK, STAMPED GRENVILLE NO 2 1927, SET IN A CONCRETE POST PROJECTING 4 INCHES FROM THE GROUND. THE DISK IS 76 FEET EAST-NORtheast FROM THE EDGE
OF THE BLUFF MEASURED IN LINE WITH AN 100 FOOT ROCK CLOSE OFF THE
POINT.

REFERENCE MARK 3 IS A STANDARD USC AND GS REFERENCE MARK STAMPED,
GRENVILLE NO 3 1927, SET IN A CONCRETE POST PROJECTING 6 INCHES
FROM THE GROUND. THE DISK IS 62 FEET WEST OF THE MOST NORTHERLY
OF TWO GUYED POLES, AND 81 FEET NORTHWEST OF THE MOST SOUTHERLY OF
TWO GUYED POLES.

AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN
ABOUT 4.5 MILES NORTH OF MOCLIPS.

STATION RECOVERY (1974)

RECOVERY NOTE BY ITT RAYONIER INCORPORATED 1974
THE STATION AND REFERENCE MARKS NO. 2 AND NO. 3 WERE RECOVERED IN
GOOD CONDITION.
REFERENCE MARK NO. 2 BEARS NORTH 36 DEG WEST, AND REFERENCE MARK
NO. 3 BEARS SOUTH 87 DEG EAST.

THE SOUTHERLY GUYED POWER POLE BEARS SOUTH 62 DEG EAST 118 FEET
(PACED DISTANCE) FROM THE STATION AND SOUTH 42 DEG EAST 75 FEET
(PACED DISTANCE) FROM REFERENCE MARK NO. 3. THE LORAN MAST BEARS
NORTH 43 DEG EAST. THE SOUTHWEST CORNER OF A FOUR POLE LIGHT
PLATFORM BEARS NORTH 55 DEG EAST 24 FEET. THE SURVEY MARKER POST
BEARS SOUTH 21 DEG WEST 26 INCHES.

THE STATION AND REFERENCE MARKS BECOME COVERED WITH HIGH GRASS
AND ARE DIFFICULT TO FIND.

TO REACH THE STATION FROM THE U.S. POST OFFICE ON STATE HIGHWAY
109 AT MOCLIPS, WASHINGTON, GO NORTH ALONG STATE HIGHWAY 109 TOWARD
TAHOLAH FOR 6.6 MILES TO T ROAD LEFT WHICH GOES TO THE U.S. COAST
GUARD STATION ON POINT GRENVILLE (THERE IS A SIGN HERE). TURN
LEFT ON THE COAST GUARD ROAD AND GO 0.65 MILE TO THE
BUILDINGS. PARK HERE AND GO NORTHWEST THROUGH THE BUILDING AREA
TO THE TRUCK ROAD GOING SOUTHWEST. A BRIDGE IS OUT ON THIS
ROAD, AND IT IS NOW NECESSARY TO WALK THE 0.25 MILE TO THE
STATION.

STATION RECOVERY (1997)

RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
RECOVERED AS DESCRIBED. THE USCG STATION IN THE DESCRIPTION HAS
CLOSED AND THE PROPERTY IS NOW PART OF THE QUINAULT INDIAN
RESERVATION. A NGS ORANGE WITNESS POST WAS PLACED ABOUT 1 M (3.3 FT)
EAST OF THE STATION.
National Geodetic Survey, Retrieval Date = OCTOBER 6, 1999

**SD0020**

**TIDAL BM** - This is a Tidal Bench Mark.

**DESIGNATION** - GUNVILLE

**PID** - SD0020

**STATE/COUNTY** - WA/GRAYS HARBOR

**USGS QUAD** - GRAYLAND (1985)

**CURRENT SURVEY CONTROL**

<table>
<thead>
<tr>
<th>NAD 83(1991)</th>
<th>ADJUSTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>46 51 42.23944(N)</td>
<td>124 04 23.36012(W)</td>
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<table>
<thead>
<tr>
<th>NAVD 88</th>
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<tbody>
<tr>
<td>4.934 (meters)</td>
<td>16.19 (feet)</td>
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<table>
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<tr>
<th>X</th>
<th>COMP</th>
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<tbody>
<tr>
<td>-2,447,682.387 (meters)</td>
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<tr>
<th>Y</th>
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<td>4,631,254.038 (meters)</td>
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<tr>
<th>LAPLACE CORR-</th>
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<tr>
<td>14.31 (seconds)</td>
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<tr>
<th>ELLIP HEIGHT-</th>
<th>GPS OBS</th>
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<tbody>
<tr>
<td>-19.41 (meters)</td>
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<table>
<thead>
<tr>
<th>GEOID HEIGHT-</th>
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<tbody>
<tr>
<td>-24.19 (meters)</td>
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<table>
<thead>
<tr>
<th>DYNAMIC HT</th>
<th>COMP</th>
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<td>4.934 (meters)</td>
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<thead>
<tr>
<th>MODELED GRAV-</th>
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<tbody>
<tr>
<td>980,747.0 (mgal)</td>
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**HORZ ORDER** - FIRST

**VERT ORDER** - FIRST CLASS II

**ELLP ORDER** - THIRD CLASS II

The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999.

The orthometric height was determined by differential leveling and adjusted by the National Geodetic Survey in June 1991.

WARNING-Repeat measurements at this control monument indicate possible vertical movement.

This mark is designated as VM 8971 in the Oceanographic Products and Services Division Tidal Bench Mark database.

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

The Laplace correction was computed from DEFLEC96 derived deflections.

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

The geoid height was determined by GEOID96.

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

The modeled gravity was interpolated from observed gravity values.

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<tr>
<th>North Units</th>
<th>Scale</th>
<th>Con verg.</th>
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<td>227,653.074</td>
<td>MT 0.99992624 -2 35 43.9</td>
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<tr>
<td>5,190,358.218</td>
<td>418,202.796</td>
<td>MT 0.99968223 -0 46 59.3</td>
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SD0020: Primary Azimuth Mark Grid Az
SD0020:SPC WA S - WESTPORT MUNICIPAL TANK 326 49 01.9
SD0020:UTM 10 - WESTPORT MUNICIPAL TANK 325 00 17.3

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<th>Reference Object</th>
<th>Distance</th>
<th>Geod. Az</th>
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<td>SD0023 GUNVILLE RM 3</td>
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<td>METERS 15808</td>
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<tr>
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<td>SD0022 GUNVILLE RM 2</td>
<td>19.194</td>
<td>METERS 25138</td>
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<td>SD0021 GUNVILLE RM 1</td>
<td>17.483</td>
<td>METERS 30931</td>
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<td>SD0413 WESTPORT MUNICIPAL TANK</td>
<td>APPROX. 4.4 KM 3241318.0</td>
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SUPERSEDED SURVEY CONTROL

NAD 83(1991)- 46 51 42.24380(N) 124 04 23.36385(W) AD( ) 2
NAD 83(1986)- 46 51 42.23619(N) 124 04 23.35961(W) AD( ) 2
NAD 27 - 46 51 42.90300(N) 124 04 18.74400(W) AD( ) 2
NGVD 29 - 3.937 (m) 12.92 (f) ADJ UNCH 1 2

Superseded values are not recommended for survey control.
NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
See file dsdata.txt to determine how the superseded data were derived.

STAMPING: GUNVILLE 1939
PROJECTION: FLUSH
MAGNETIC: O = OTHER; SEE DESCRIPTION
STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO SURFACE MOTION

HISTORY - Date Condition Recov. By
1940 MONUMENTED CGS
1944 MONUMENTED CGS
1952 MONUMENTED CGS
1967 MONUMENTED CGS
1968 MONUMENTED CGS
1968 GOOD NGS
1976 GOOD LOCENG
1977 GOOD NGS
1977 GOOD NGS
1985 GOOD NOS
1989 GOOD USPSQD
19970730 GOOD WADECO

STATION DESCRIPTION

DESCRIBED BY COAST AND GEOETIC SURVEY 1940 (GLB)
STATION MARK AND REFERENCE MARK NO.2 ARE STANDARD BRONZE DISKS
SET IN CONCRETE AS DESCRIBED IN NOTES 1A AND 11A.
REFERENCE MARK NO.1 IS A STANDARD BRONZE DISK SET IN CONCRETE, IN THE TOP OF A TILE.
REFERENCE MARK NO.1 IS 19 FEET N OF THE CENTER LINE OF HIGHWAY 13A.
REFERENCE MARK NO.2 IS 1 FOOT N OF FENCE LINE AND 28.5 FEET S OF CENTER LINE HIGHWAY 13A.
STATION IS REACHED AS FOLLOWS FROM SOUTH ABERDEEN, ON STATE HIGHWAY 13A, GO SOUTHWESTERLY TOWARDS WESTPORT, FOR 17.8 MILES TO STATION AT THE W END OF THE BAY CITY DRAWBRIDGE, 30 FEET S OF THE CENTER LINE OF HIGHWAY 13A, AND 4.5 FEET N OF E AND W FENCE LINE.

STATION RECOVERY (1944)

RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1944 (HCW)

STATION MARK IS A BRONZE STATION DISK, STAMPED GUNVILLE 1939, SET IN THE TOP OF A CONCRETE POST, ABOUT 0.6 MILE W ALONG STATE HIGHWAY 13A FROM BAY CITY, AT THE W END OF LONG HIGHWAY BRIDGE, 30 FEET S OF CENTER LINE OF HIGHWAY, 6 INCHES N OF FENCE LINE, AND 23 FEET W OF SW BANK OF SOUTH BAY.

STATION RECOVERY (1952)

RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1952 (CWC)

THE STATION AND BOTH REFERENCE MARKS WERE RECOVERED IN GOOD CONDITION.

ABOUT 2-1/2 MILES SOUTHEAST OF WESTPORT, ABOUT 1/2 MILE WEST OF BAY CITY, AT THE WEST END OF STATE HIGHWAY 13A BRIDGE OVER SOUTH BAY, 30 FEET SOUTH OF THE CENTERLINE OF THE HIGHWAY, 22 FEET WEST OF THE WEST SHORE OF SOUTH BAY, 12 FEET WEST OF A TELEPHONE POLE AND 0.6 FOOT NORTH OF A WHITE PICKET FENCE, A STANDARD TRAVERSAL STATION MARK DISK STAMPED GUNVILLE 1939 SET IN TOP OF A SQUARE CONCRETE POST PROJECTING 3 INCHES.

STATION RECOVERY (1967)

RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1967 (BIW)

THE STATION AND BOTH REFERENCE MARKS WERE RECOVERED IN GOOD CONDITION. A REVISED DESCRIPTION FOLLOWS--THE STATION IS ABOUT
SD0020'160 FEET WNW OF THE CENTERLINE OF HIGHWAY 105 AT THE WEST END OF
SD0020'THE BRIDGE OVER SOUTH BAY AND 30 FEET SOUTH OF THE CENTERLINE OF
SD0020'OLD HIGHWAY 13A. THE ORIGINAL BRIDGE HAS BEEN REMOVED. STATION
SD0020'IS ALSO 22 FEET WEST OF THE WEST SHORE OF SOUTH BAY, 12 FEET
SD0020'WEST OF A TELEPHONE POLE, AND 0.6 FOOT NORTH OF A WHITE PICKET
SD0020'FENCE. IT IS A STANDARD TRIANGULATION -STATION DISC,
SD0020'STAMPED GUNVILLE 1939 AND SET IN THE TOP OF A SQUARE
SD0020'CONCRETE POST PROJECTING 3 INCHES.
SD0020'
SD0020'REFERENCE MARK 1 IS 19 FEET NORTH OF THE CENTERLINE OF THE OLD
SD0020'HIGHWAY, 18 FEET WEST OF THE WEST SHORE OF SOUTH BAY, AND 7 FEET
SD0020'EAST OF POWER POLE W-16-27. IT IS A STANDARD REFERENCE MARK DISC
SD0020'STAMPED GUNVILLE NO 1 1939 AND SET IN THE TOP OF A CYLINDRICAL
SD0020'CONCRETE POST PROJECTING 4 INCHES.
SD0020'
SD0020'REFERENCE MARK 2 IS WEST OF THE STATION, 28 FEET SOUTH OF THE
SD0020'CENTERLINE OF THE OLD HIGHWAY AND 0.5 FOOT NORTH OF THE PROJECTED
SD0020'CENTERLINE OF THE WHITE PICKET FENCE. IT IS A STANDARD DISC
SD0020'STAMPED GUNVILLE NO 2 1939 AND SET IN THE TOP OF A SQUARE CONCRETE
SD0020'POST PROJECTING 6 INCHES.
SD0020'
SD0020'AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN
SD0020'2.2 MILES SW OF WESTPORT.
SD0020'
SD0020' STATION RECOVERY (1968)
SD0020'
SD0020'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1968 (CS)
SD0020'THE STATION, REFERENCE MARKS 1 AND 2 WERE RECOVERED IN GOOD
SD0020'CONDITION AND LEVELED OVER.
SD0020'
SD0020'TO REACH FROM THE POST OFFICE AT WESTPORT, GO 2.4 MILE SOUTH
SD0020'ALONG MONTESANO AVENUE, THENCE 1.25 MILES EAST ALONG STATE HIGHWAY
SD0020'105, IN R11W T16N, SECTION 20.
SD0020'
SD0020'THE STATION IS A C AND GS TRIANGULATION STATION DISK, STAMPED
SD0020'GUNVILLE 1939. 0.1 MILE WEST OF THE WEST END OF A CONCRETE BRIDGE
SD0020'OVER ELK CREEK, 187 FEET NORTH OF THE CENTER LINE OF THE HIGHWAY,
SD0020'42.0 FEET EAST-NORtheast OF THE NORTHEAST CORNER OF A HOUSE, IN
SD0020'THE TOP OF A CONCRETE POST.
SD0020'
SD0020'R.M. 1 IS A C AND GS REFERENCE MARK DISK, STAMPED GUNVILLE NO 1
SD0020'1939. 57.3 FEET NORTH-NORTHWEST OF THE STATION, IN A CONCRETE POST.
SD0020'
SD0020'R.M. 2 IS A C AND GS REFERENCE MARK DISK, STAMPED GUNVILLE NO 2
SD0020'1939. 63.0 FEET WEST OF THE STATION, IN THE TOP OF A CONCRETE POST.
SD0020'
SD0020'AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN
SD0020'ABOUT 3 MILE SOUTHEAST OF WESTPORT.
SD0020'
SD0020' STATION RECOVERY (1968)
SD0020'
SD0020'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1968
SD0020'3.65 MI SE FROM WESTPORT.
SD0020'TO REACH FROM THE POST OFFICE IN WESTPORT GO SOUTH ON MONTESANO AVE
SD0020'FOR 2.4 MILES THEN EAST ON STATE HIGHWAY 105 FOR 1.15 MILES, THEN LEFT
SD0020'50 YARDS TO T INTERSECTION, TURN R AND GO E 0.15 MILE TO MARK 20 FEET
SD0020'WEST OF THE BANK AT THE HIGH WATER LINE, BETWEEN THE SHD SHOP
BUILDINGS AND CRABPOT SEAFOOD BUILDINGS, 26 FEET SOUTH OF THE PROJECTED SOUTH SIDE OF THE ENTRANCE ROAD (WHICH WAS ONCE THE STATE HIGHWAY) 9.5 FEET WEST OF A TELEPHONE POLE AND 1.5 FEET WEST OF A METAL WITNESS POST. A TRIANGULATION STATION DISK IN A SQUARE CONCRETE POST PROJECTING 4 INCHES.

STATION RECOVERY (1976)

RECOVERY NOTE BY LOCAL ENGINEER (INDIVIDUAL OR FIRM) 1976

FOUND AS DESCRIBED. ASPHALT ROAD REFERENCED TO RUN PARALLEL TO STATE HWY. HOUSE 42 FT. SW OF MON. GONE, POWER POLE W16-28 GONE. BRIDGE OVER ELK RIVER, NOT CREEK. MONUMENT IN OPEN AREA NW OF STATE GRAVEL STOCK YARD.

STATION RECOVERY (1977)

RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1977 (CLN)

THE STATION MARK, REFERENCE MARKS NO.1 AND NO. 2 WERE RECOVERED AND APPEAR TO BE IN GOOD CONDITION, BUT DISTANCES SHOW THE FOLLOWING DISCREPANCIES WHEN COMPARED TO 1940 MEASUREMENTS--R.M. 1 .033M LONGER. R.M. 2 .009 M LONGER. ANGLE BETWEEN MARKS 7 MINUTES 27 SECONDS SMALLER. LEVELS WERE RUN OVER THE MARKS IN 1968 AND AGAIN DURING THIS VISIT. REFERENCE MARK NO. 2 IS ABOUT 0.1 FOOT LOWER. THIS MARK IS LOCATED IN A DRAIVEWAY AND POSSIBLY TRAFFIC HAS CAUSED IT TO SETTLE. A NEW MARK, REFERENCE MARK NO. 3 WAS ESTABLISHED.

THE STATION IS LOCATED ABOUT 2-1/2 MILES SOUTHEAST OF WESTPORT, 1/2 MILE WEST OF BAY CITY, IN THE YARD AT THE HIGHWAY DEPARTMENT SHOP BUILDINGS, ABOUT 50 YARDS NORTH OF STATE HIGHWAY 105 AND 20 FEET WEST OF THE BANK AT THE HIGH WATER LINE.

TO REACH FROM THE POST OFFICE IN WESTPORT, GO SOUTH ON MONTESANO AVENUE FOR 2.4 MILES, TURN LEFT AND GO EAST ON STATE HIGHWAY 105 FOR 1.15 MILES TO A ROAD LEFT, 0.15 MILE BEFORE REACHING THE BRIDGE OVER ELK RIVER. TURN LEFT, GO 50 YARDS TO A T-INTERSECTION, TURN RIGHT AND GO EAST 0.15 MILE TO THE WATERS EDGE BETWEEN THE STATE HIGHWAY DEPARTMENT SHOP BUILDINGS AND CRABPOT SEAFOOD BUILDINGS. (AT ONE TIME THIS ROAD WAS THE STATE HIGHWAY).

THE STATION MARK, STAMPED GUNVILLE 1939, IS A STANDARD DISK SET IN A SQUARE CONCRETE POST WHICH PROJECTS 4 INCHES. IT IS 26 FEET SOUTH OF THE PROJECTED SOUTH SIDE OF THE ENTRANCE ROAD (WHICH WAS ONCE THE STATE HIGHWAY), 20 FEET WEST OF THE BANK AT THE HIGH WATER LINE, 9.5 FEET WEST OF A TELEPHONE POLE, AND 1.5 FEET WEST OF A METAL WITNESS POST.

REFERENCE MARK NO. 1, STAMPED GUNVILLE NO 1 1939, IS A STANDARD DISK SET IN CONCRETE 2 INCHES BELOW GROUND, 18.5 FEET SOUTH OF THE SOUTHWEST CORNER OF THE CRABPOT SEAFOOD BUILDING, 7 FEET NORTH OF THE PROJECTED NORTH SIDE OF THE ENTRANCE ROAD AND 7 FEET EAST OF A POWER POLE. REFERENCE MARK NO. 2, STAMPED GUNVILLE NO 2 1939, IS A STANDARD DISK SET IN A SQUARE CONCRETE POST WHICH PROJECTS 2 INCHES. IT IS 89.5 FEET NORTHEAST OF THE NORTHEAST CORNER OF THE 12-FOOT SQUARE HWY DEPT. ROAD SHOP OFFICE BLDG, 19 FEET SOUTH OF THE PROJECTED SOUTH SIDE OF THE ENTRANCE ROAD AND AT
THE EASTERN END OF A CIRCULAR DRIVEWAY AROUND A GRAVEL PILE IN FRONT OF THE HIGHWAY DEPARTMENT BUILDINGS.

REFERENCE MARK NO. 3, STAMPED GUNVILLE 1939 NO 3 1977, IS A STANDARD DISK SET IN A ROUND CONCRETE POST WHICH PROJECTS 3 INCHES. IT IS 35 FEET NORTH OF AN 18-INCH PINE TREE, 16 FEET WEST OF THE BANK AT THE HIGH WATER LINE AND 32 FEET SOUTH-SOUTHWEST OF A TELEPHONE POLE.

FOLLOWING IS THE DIFFERENCE IN ELEVATION OF THE R.M.S FROM STATION MK.

REFERENCE MARK NO. 1 = -1.245 FEET
REFERENCE MARK NO. 2 = +1.209 FEET
REFERENCE MARK NO. 3 = -0.005 FEET

AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN 2-1/2 MILES SOUTHEAST OF WESTPORT.

STATION RECOVERY (1977)
RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1977
RECOVERED IN GOOD CONDITION.

STATION RECOVERY (1985)
RECOVERY NOTE BY NATIONAL OCEAN SURVEY 1985 (RBM)
RECOVERED IN GOOD CONDITION.

STATION RECOVERY (1989)
RECOVERY NOTE BY US POWER SQUADRON 1989 (DJM)
RECOVERED IN GOOD CONDITION.

STATION RECOVERY (1997)
RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
RECOVERED AS DESCRIBED.
SY5644 FBN - This is a Candidate for Federal Base Network Control.
SY5644 DESIGNATION - HATCHERY
SY5644 PID - SY5644
SY5644 STATE/COUNTY - WA/GRAYS HARBOR
SY5644 USGS QUAD - HUMPTULIPS (1990)
SY5644
SY5644
SY5644
SY5644 The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in May 1991.
SY5644 The orthometric height was determined by differential leveling and adjusted by the National Geodetic Survey in October 1996.
SY5644 The height was determined by precise leveling from only one NSRS bench mark. This was not adequate "tie leveling" to NSRS and was allowed ONLY to validate the GPS-derived height.
SY5644 The X, Y, and Z were computed from the position and the ellipsoidal ht.
SY5644 The Laplace correction was computed from DEFLEC96 derived deflections.
SY5644 The ellipsoidal height was determined by GPS observations and is referenced to NAD 83.
SY5644 The geoid height was determined by GEOID96.
SY5644 The dynamic height is computed by dividing the NAVD 88 geopotential number by the normal gravity value computed on the Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45 degrees latitude (G = 980.6199 gals.).
SY5644 The modeled gravity was interpolated from observed gravity values.
SY5644;
SY5644 North East Units Scale Converg.
SY5644;SPC WA S - 216,822.066 236,150.839 MT 0.99997830 -2 31 54.5
SY5644;UTM 10 - 5,231,364.241 425,406.426 MT 0.99966838 -0 43 24.4
SY5644
SY5644 SUPERSEDED SURVEY CONTROL
SY5644 ELLIP HT - 13.19 (m) GP( ) 4 1
SY5644 NGVD 29 - 35.48 (m) 116.4 (f) N HEIGHT 3
SY5644
SY5644.Superseded values are not recommended for survey control.
SY5644.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
SY5644.See file dsdata.txt to determine how the superseded data were derived.
SY5644
SY5644_MARKER: DH = HORIZONTAL CONTROL DISK
SY5644_SETTING : 7 = SET IN TOP OF CONCRETE MONUMENT
SY5644_STAMPING: HATCHERY 1990
SY5644_PROJECTION: FLUSH
SY5644_MAGNETIC : O = OTHER; SEE DESCRIPTION
SY5644_STABILITY : C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
SY5644+STABILITY: SURFACE MOTION
SY5644_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
SY5644+SATELLITE: SATELLITE OBSERVATIONS - February 13, 1991
SY5644
SY5644 HISTORY - Date Condition Recov. By
SY5644 HISTORY - 1990 MONUMENTED NGS
SY5644 HISTORY - 19910213 GOOD
SY5644 HISTORY - 19970721 GOOD WADECO
SY5644
SY5644 STATION DESCRIPTION
SY5644
SY5644'DESCRIBED BY NATIONAL GEODETIC SURVEY 1990
SY5644'THE STATION IS LOCATED ABOUT 66.0 KM (41.0 MI) WEST OF SHELTON, 29.0
SY5644'KM (18.0 MI) NORTH OF HOQUIAM, 27.4 KM (17.0 MI) SOUTH OF AMANDA PARK
SY5644'AND AT THE HUMPTULIPS STATE SALMON HATCHERY.
SY5644'TO REACH FROM THE POST OFFICE, AT THE JUNCTION OF US HIGHWAY 101 AND
SY5644'THE COPALIS CROSSING COUNTY ROAD IN HUMPTULIPS, GO WESTERLY ON THE
SY5644'COUNTY ROAD FOR 2.09 KM (1.30 MI) TO A SIDE ROAD LEFT, JUST BEFORE
SY5644'REACHING A BRIDGE. TURN LEFT, PASS THROUGH THE GATE, IF IT IS CLOSED
SY5644'CHECK AT THE MAIN OFFICE OF THE HATCHERY, AND GO SOUTHERLY ON THE
SY5644'GRAVELED ROAD FOR 0.32 KM (0.20 MI) TO THE STATION ON THE RIGHT.
SY5644'THE MARK IS SET IN THE TOP OF A ROUND CONCRETE MONUMENT THAT IS FLUSH
SY5644'WITH THE GROUND SURFACE. IT IS 15.7 M (51.5 FT) SOUTHWEST OF A POWER
SY5644'POLE, 7.4 M (24.3 FT) WEST OF THE NORTHEAST CORNER OF A PUMP HOUSE
SY5644'AND 2.7 M (8.9 FT) EAST OF A WITNESS POST.
SY5644
SY5644 STATION RECOVERY (1991)
SY5644
SY5644'RECOVERED 1991
SY5644'RECOVERED IN GOOD CONDITION.
SY5644
SY5644 STATION RECOVERY (1997)
SY5644
SY5644'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SY5644'RECOVERED AS DESCRIBED.
National Geodetic Survey, Retrieval Date = OCTOBER 6, 1999

AH7005  ***********************************************************************
AH7005 DESIGNATION - HD 1
AH7005 PID - AH7005
AH7005 STATE/COUNTY- WA/GRAYS HARBOR
AH7005 USGS QUAD - POINT BROWN (1984)

*CURRENT SURVEY CONTROL

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<th>NAVD 88</th>
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ADJUSTED GPS OBS

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<td>-3,613,630.341 (meters)</td>
<td>4,634,372.435 (meters)</td>
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COMP

LAPLACE CORR- 11.78 (seconds) DEFLEC96

ELLIP HEIGHT- -16.59 (meters) GPS OBS

GEOID HEIGHT- -24.47 (meters) GEOID96

HORZ ORDER - FIRST
ELLIP ORDER - THIRD CLASS II

The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999.

The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques.

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

The Laplace correction was computed from DEFLEC96 derived deflections.

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

The geoid height was determined by GEOID96.

No superseded survey control is available for this station.

MARKER: A = ALUMINUM MARKER
SETTING: 17 = SET INTO TOP OF METAL PIPE DRIVEN INTO GROUND
STAMPING: HD 1
PROJECTION: FLUSH
MAGNETIC: O = OTHER; SEE DESCRIPTION
STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO SURFACE MOTION
SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR SATELLITE OBSERVATIONS - 1988

HISTORY - Date Condition Recov. By

1
AH7005 HISTORY - 1988 MONUMENTED USE
AH7005
AH7005 STATION DESCRIPTION
AH7005

AH7005'DESCRIBED BY US ENGINEERS 1988
AH7005'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD) .
AH7005'THE STATION IS LOCATED IN THE CITY OF WESTPORT AT WESTHAVEN STATE
AH7005'PARK. FROM THE INTERSECTION OF SR 105 AND SR 105 SPUR GO NORTH ON 105
AH7005'SPUR TO OCEAN AVENUE. TURN RIGHT (EAST) AND FOLLOW OCEAN AVENUE TO
AH7005'MONTESANO AVENUE. TURN LEFT (NORTH) AND FOLLOW MONESANO AVENUE TO THE
AH7005'WESTHAVEN STATE PARK ACCESS ROAD ON LEFT. FOLLOW THE ACCESS ROAD WEST
AH7005'1.0 MILES (1.6 KM) TO BEACH ACCESS PARKING AREA AND WOOD FRAME
AH7005'RESTROOMS ON THE WEST SIDE OF LOT. THE STATION IS 28 M, (91.9 FT) 330
AH7005'DEGREES GRID, FROM THE NORTHWEST CORNER OF THE RESTROOMS, ABOUT 262 M
AH7005'(859.6 FT) SOUTH OF THE JETTY, AND 0.5 M (1.6 FT) SOUTH OF A 0.75 M
AH7005'(2.46 FT) TALL 4X4 WOOD WITNESS POST. THE STATION IS ABOUT 0.1 M (0.3
AH7005'FT) BELOW THE SURFACE IN SHIFTING SAND. THE STATION IS A ALUMINUM
AH7005'DISK ON A 3 INCH PIPE DRIVEN 10 FT. (3.0 M) THE DISK IS STAMPED HD 1
AH7005'1988.
The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999. The orthometric height was determined by GPS observations. The X, Y, and Z were computed from the position and the ellipsoidal ht. The Laplace correction was computed from DEFLEC96 derived deflections. The ellipsoidal height was determined by GPS observations and is referenced to NAD 83. The geoid height was determined by GEOID96.

**National Geodetic Survey, Retrieval Date = FEBRUARY 3, 1999**

**AH7028 DESIGNATION - IREDALE**

**AH7028 PID - AH7028**

**AH7028 STATE/COUNTY - OR/CLATSOP**

**AH7028 USGS QUAD - WARRENTON (1985)**

**AH7028 CURRENT SURVEY CONTROL**

**AH7028 NAD 83(1991) 123 58 42.18864(W) ADJUSTED NAVD 88 - 8.3 (meters) 27. (feet) GPS OBS**

**AH7028 X - -2,472,525.360 (meters) COMP**

**AH7028 Y - -3,668,654.139 (meters) COMP**

**AH7028 Z - 4,578,943.469 (meters) COMP**

**AH7028 LAPLACE CORR - 15.09 (seconds) DEFLEC96**

**AH7028 ELLIP HEIGHT - -15.52 (meters) GPS OBS**

**AH7028 GEOID HEIGHT - -23.72 (meters) GEOID96**

**AH7028 HORZ ORDER - FIRST**

**AH7028 ELLP ORDER - THIRD CLASS II**

**AH7028 SUPERSEDED SURVEY CONTROL**

**AH7028 No superseded survey control is available for this station.**

**AH7028 MARKER: I = METAL ROD**

**AH7028 SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)**

**AH7028 STAMPING: IREDALE 1997**

**AH7028 PROJECTION: RECESSED 10 CENTIMETERS**

**AH7028 STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL**

**AH7028 SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR SATELLITE OBSERVATIONS - 1997**

**AH7028 ROD/PIPE-DEPTH: 10 meters**

**AH7028 HISTORY - Date Condition Recov. By**

**AH7028 HISTORY - 1997 MONUMENTED NGS**

**AH7028 HISTORY - 1998 DESTROYED WADECO**
AH7028 STATION DESCRIPTION

AH7028

AH7028 DESCRIBED BY NATIONAL GEODETIC SURVEY 1997 (RCD)
AH7028 DESCRIBED BY THE WASINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD).
AH7028 THE STATION IS IN FORT STEVENS STATE PARK NEAR THE PETER IREDALE SHIP
AH7028 WRECK AND WITHIN 150 M (492.1 FT) OF THE PACIFIC OCEAN. TO REACH FROM
AH7028 WARRENTON TAKE US 101 SPUR TO 18TH STREET SW. FOLLOW 18TH STREET (AKA
AH7028 RIDGE ROAD) NORTHWEST TO THE SOUTH (CAMPING) ENTRANCE TO THE STATE
AH7028 PARK. FROM THIS INTERSECTION GO WEST ON PETER IREDALE ROAD THROUGH
AH7028 FLASHING RED LIGHTS AND CAMPGROUND. CONTINUE WEST, THEN NORTHWEST ON
AH7028 PETER IREDALE ROAD TO A 4 X 4 FT (1.2 M) SIGN TO THE PETER IREDALE
AH7028 SHIPWRECK. FOLLOW SIGNS TO THE PETER IREDALE SHIPWRECK PARKING AREAS.
AH7028 GO TO THE SOUTHERN MOST MARKING LOT WITH A WOOD FRAME BATHROOM ON THE
AH7028 NORTH SIDE OF LOT. THE STATION IS 28.5 M (93.5 FT) EAST (60 DEGREES
AH7028 GRID) OF THE SOUTHEAST CORNER OF THE CEMENT SLAB FOUNDATION OF THE
AH7028 BATHROOMS, 14.5 M (47.6 FT) NORTH OF THE CENTERLINE OF THE PARKING LOT
AH7028 ACCESS ROAD, 1 M (3.3 FT) SOUTH OF A ORANGE NGS WITNESS POST, AND 1.5
AH7028 M (4.9 FT) NORTHWEST OF A STEEL U-SHAPED PICKET THAT EXTENDS ABOUT 5
AH7028 FT (1.5 M) ABOVE THE GROUND. THE STATION IS 107 M (351.0 FT)
AH7028 SOUTHWEST (204 DEGREES GRID) OF A LONE TELEPHONE POLE (NO WIRES)
AH7028 LOCATED BY A 6 X 6 FT (1.8 M) OLD MILITARY GUARD HOUSE THAT IS LOCATED
AH7028 NORTH OF THE APPROACH ROAD TO THE PETER IREDALE SHIPWRECK. THE
AH7028 STATION IS A STAINLESS STEEL ROD DRIVEN 98 FT, (29.9 M) ACCESS TO THE
AH7028 DATUM POINT IS HAD THROUGH A 5-INCH STANDARD NGS LOGO CAP THAT IS
AH7028 COVERED BY 1.5 FT (0.5 M) OF BLOWING SAND.

AH7028 STATION RECOVERY (1998)

AH7028

AH7028 REPORTED DESTROYED ON 6/31/1998 WITH TOP 2 FT (0.6 M) OF ROD BENT
AH7028 45 DEGREES TO THE WEST. STATION RESET ON 7/15/1998. TOP SECTION OF
AH7028 STAINLESS STEEL ROD AND COVER REPLACED. NEW STANDARD NGS LOGO COVER IS
*CURRENT SURVEY CONTROL

**NAD 83(1991)** - 46 10 40.11162(N) 123 58 42.18851(W) ADJUSTED NAVD 88 - 8.6 (meters) 28. (feet) GPS OBS

**X** - -2,472,525.445 (meters) COMP
**Y** - -3,668,654.270 (meters) COMP
**Z** - 4,578,943.663 (meters) COMP

**LAPLACE CORR-** 15.09 (seconds) DEFLEC96

**ELLIP HEIGHT-** -15.27 (meters) GPS OBS
**GEOID HEIGHT-** -23.72 (meters) GEOID96

**HORZ ORDER -** FIRST
**ELLP ORDER -** FOURTH CLASS II

The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in March 1999.

The orthometric height was determined by GPS observations.

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

The Laplace correction was computed from DEFLEC96 derived deflections.

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

The geoid height was determined by GEOID96.

**SUPERSEDED SURVEY CONTROL**

No superseded survey control is available for this station.

**MARKER:** I = METAL ROD

**SETTING:** 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+

**STAMPING:** IREDALE 1997 1998

**PROJECTION:** RECESSED 10 CENTIMETERS

**MAGNETIC:** I = MARKER IS A STEEL ROD

**STABILITY:** B = PROBABLY HOLD POSITION/ELEVATION WELL

**SATELLITE:** THE SITE LOCATION WAS REPORTED AS SUITABLE FOR

**ROD/PIPE-DEPTH:** 30.0 meters

**HISTORY:** - Date Condition Recov. By

**HISTORY:** - 1998 MONUMENTED WADOE
AH8187

AH8187 DESCRIBED BY WA STATE DEPT ECOLOGY 1998 (RCD)
AH8187 DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1998 (RCD)
AH8187 REPLACES STATION IREDALE 1997 THAT WAS DESTROYED. STATION RESET AT THE SAME LOCATION ON 07/15/1998. NEW DESCRIPTION FOLLOWS. THE STATION IS IN FORT STEVENS STATE PARK NEAR THE PETER IREDALE SHIPWRECK AND WITHIN 150 M (492.1 FT) OF THE PACIFIC OCEAN. TO REACH FROM WARRENTON TAKE US 101 SPUR TO 18TH STREET SW. FOLLOW 18TH STREET (AKA RIDGE ROAD) NORTHWEST TO THE SOUTH (CAMPING) ENTRANCE TO THE STATE PARK. FROM THIS INTERSECTION GO WEST ON PETER IREDALE ROAD THROUGH FLASHING RED LIGHTS AND CAMPGROUND. CONTINUE WEST, THEN NORTHWEST ON PETER IREDALE ROAD TO A 4 X 4 FT (1.2 M) SIGN TO THE PETER IREDALE SHIPWRECK. FOLLOW SIGNS TO THE PETER IREDALE SHIPWRECK PARKING AREAS. GO TO THE SOUTHERN MOST MARKING LOT WITH A WOOD FRAME BATHROOM ON THE NORTH SIDE OF LOT. THE STATION IS 28.5 M (93.5 FT) EAST (60 DEGREES GRID) OF THE SOUTHEAST CORNER OF THE CEMENT SLAB FOUNDATION OF THE BATHROOMS, 14.5 M (47.6 FT) NORTH OF THE CENTERLINE OF THE PARKING LOT ACCESS ROAD. STATION IS CENTERED BETWEEN FOUR ORANGE WITNESS POSTS THAT ARE 1 M (3.3 FT) NORTH, EAST, WEST, AND SOUTH OF THE STATION. A STEEL U-SHAPED PICKET THAT EXTENDS ABOUT 5 FT (1.5 M) ABOVE THE GROUND SOUTH (204 DEGREES GRID) OF A LONE TELEPHONE POLE (NO WIRES) LOCATED BY A 6 X 6 FT (1.8 M) OLD MILITARY GUARD HOUSE THAT IS LOCATED NORTH OF THE APPROACH ROAD TO THE PETER IREDALE SHIPWRECK. THE STATION IS A STAINLESS STEEL ROD Driven 99 FT, (30.2 M) ACCESS TO THE DATUM POINT IS HAD THROUGH A 5-INCH STANDARD NGS LOGO CAP THAT IS STAMPED IREDALE 1997 1998. THE NGS LOGO COVER IS SET IN 300 LBS OF CONCRETE WITH REBAR. THE CAP IS 1 FT (0.3 M) BELOW GRADE AND THE CONCRETE EXTENDS 1.5 FT (0.5 M) FROM THE EDGE OF THE CAP. FOUR 1/2 INCH REBAR FORM A SQUARE WITHIN THE CONCRETE AROUND THE LOGO CAP. THE ORIGINAL BENT SECTION OF ROD WAS REPLACEMENT WITH A NEW SECTION OF STAINLESS STEEL ROD THAT WAS 26.35 CM LONGER THAN THE ORIGINAL.
The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999. The orthometric height was determined by GPS observations. The X, Y, and Z were computed from the position and the ellipsoidal ht. The Laplace correction was computed from DEFLEC96 derived deflections. The ellipsoidal height was determined by GPS observations and is referenced to NAD 83. The geoid height was determined by GEOID96. No superseded survey control is available for this station.
AH7029 STATION DESCRIPTION

AH7029

AH7029'DESCRIPTED BY NATIONAL GEODETIC SURVEY 1997 (RCD)
AH7029'DESCRIPTED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD).

AH7029'THE STATION IS AT THE NORTHERN BOUNDARY OF CAMP RILEA NATIONAL GUARD
AH7029'BASE. FROM WARRENTON CITY HIGH SCHOOL GO WEST ON SOUTH MAIN STREET/US
AH7029'101 SPUR TO INTERSECTION OF US 101 SPUR AND 18TH STREET SW/OCEANVIEW
AH7029'CEMETERY ROAD. GO NORTH ON 18TH STREET 1.75 MILES (2.82 KM) TO A Y
AH7029'INTERSECTION. CONTINUE ABOUT 15 M (49.2 FT) FURTHER NORTH AND TURN
AH7029'LEFT (WEST) ONTO DELAURA BEACH ROAD. GO WEST ON DELAURA BEACH ROAD TO
AH7029'A T INTERSECTION WITH PINE ROAD SW. CONTINUE WEST 375 M (1230.3 FT)
AH7029'ON DELAURA BEACH ROAD TO A GRAVEL OR SAND PIT WITH TWO CLATSOP COUNTY
AH7029'WITNESS POSTS ON RIGHT AND 3 FT (0.9 M) BELOW GRADE. THE STATION IS
AH7029'65 M (213.3 FT) SOUTH OF THE ROAD ON A TALL PARTIALLY WOODED DUNE, 18
AH7029'M (59.1 FT) NORTH OF THE CAMP RILEA BOUNDARY FENCE, IN THE CENTER OF
AH7029'THE ROOF OF A 4 X 4 M (13.1 FT) CONCRETE OBSERVATION POST. A SECOND
AH7029'AND LARGER OBSERVATION POST IS LOCATED SOUTH OF THE STATION. THIS
AH7029'SECOND BUNKER LIES SOUTH OF THE CAMP RILEA BOUNDARY FENCE. NGS
AH7029'STATION GALENA RM 2 LIES 111 M (364.2 FT) SOUTH AND 7 M (23.0 FT) EAST
AH7029'OF STATION KIM AND WILL SERVE AS A REFERENE MARK. THE STATION IS A
AH7029'STANDARD NATIONAL OCEAN SERVICE HORIZONTAL CONTROL MARK STAMPED KIM

AH7029

AH7029 STATION RECOVERY (1998)

AH7029

AH7029'RECOVERY NOTE BY WA STATE DEPT ECOLOGY 1998 (RCD)
AH7029'DESCRIPTED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD).

AH7029'THE STATION IS AT THE NORTHERN BOUNDARY OF CAMP RILEA NATIONAL GUARD
AH7029'BASE. FROM WARRENTON CITY HIGH SCHOOL GO WEST ON SOUTH MAIN STREET/US
AH7029'101 SPUR TO INTERSECTION OF US 101 SPUR AND 18TH STREET SW/OCEANVIEW
AH7029'CEMETERY ROAD. GO NORTH ON 18TH STREET 1.75 MILES (2.82 KM) TO A Y
AH7029'INTERSECTION. CONTINUE ABOUT 15 M (49.2 FT) FURTHER NORTH AND TURN
AH7029'LEFT (WEST) ONTO DELAURA BEACH ROAD. GO WEST ON DELAURA BEACH ROAD TO
AH7029'A T INTERSECTION WITH PINE ROAD SW. CONTINUE WEST 375 M (1230.3 FT)
AH7029'ON DELAURA BEACH ROAD TO A GRAVEL OR SAND PIT WITH TWO CLATSOP COUNTY
AH7029'WITNESS POSTS ON RIGHT AND 3 FT (0.9 M) BELOW GRADE. THE STATION IS
AH7029'65 M (213.3 FT) SOUTH OF THE ROAD ON A TALL PARTIALLY WOODED DUNE, 18
AH7029'M (59.1 FT) NORTH OF THE CAMP RILEA BOUNDARY FENCE, IN THE CENTER OF
AH7029'THE ROOF OF A 4 X 4 M (13.1 FT) CONCRETE OBSERVATION POST. A SECOND
AH7029'AND LARGER OBSERVATION POST IS LOCATED SOUTH OF THE STATION. THIS
AH7029'SECOND BUNKER LIES SOUTH OF THE CAMP RILEA BOUNDARY FENCE. NGS
AH7029'STATION GALENA RM 2 LIES 111 M (364.2 FT) SOUTH AND 7 M (23.0 FT) EAST
AH7029'OF STATION KIM AND WILL SERVE AS A REFERENE MARK. THE STATION IS A
AH7029'STANDARD NATIONAL OCEAN SERVICE HORIZONTAL CONTROL MARK STAMPED KIM
The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999. The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques. The X, Y, and Z were computed from the position and the ellipsoidal ht. The Laplace correction was computed from DEFLEC96 derived deflections. The ellipsoidal height was determined by GPS observations and is referenced to NAD 83. The geoid height was determined by GEOID96.

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<thead>
<tr>
<th>PID Reference Object</th>
<th>Distance</th>
<th>Geod. Az</th>
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<td>30.885 METERS</td>
<td>02821</td>
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<td>SD0553 KLIPSAN</td>
<td>54.487 METERS</td>
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<td>SD0565 KLIPSAN 2 1976 RM 3</td>
<td>21.061 METERS</td>
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<td>SD0568 024</td>
<td>APPROX. 0.7 KM</td>
<td>1815802.7</td>
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<td>SD0604 NORTH HEAD LH</td>
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<td>SD0567 026</td>
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SUPERSEDED SURVEY CONTROL

SD0560 NAD 83 (1991) - 46 27 52.29500 (N) 124 03 22.96162 (W) AD ( ) 2
SD0560 NAD 83 (1991) - 46 27 52.29418 (N) 124 03 22.96117 (W) AD ( ) 2
SD0560 NAD 83 (1986) - 46 27 52.29457 (N) 124 03 22.94053 (W) AD ( ) 2
SD0560 NGVD 29 - 8.4 (m) 28. (f) VERT ANG

Superseded values are not recommended for survey control.
NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
See file dsdata.txt to determine how the superseded data were derived.

MARKER: DS = TRIANGULATION STATION DISK
SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
STAMPING: KLIPSAN 2 1976
PROJECTION: FLUSH
MAGNETIC: O = OTHER; SEE DESCRIPTION
STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO

HISTORY - Date Condition Recov. By
1976 MONUMENTED NGS
1981 GOOD NOS
19971015 GOOD WADECO

STATION DESCRIPTION

DESCRIBED BY NATIONAL GEODETIC SURVEY 1976 (CLN)
THIS STATION WAS ESTABLISHED TO REPLACE KLIPSAN 1926 WHICH HAS VERY
LIMITED LINES OF SIGHT.

THE STATION IS ON THE WESTERN SIDE OF NORTH BEACH PENINSULA ABOUT 7
MILES NORTH OF LONG BEACH, 2 MILES SOUTH OF OCEAN PARK IN THE LOCAL
AREA CALLED KLIPSAN BEACH AND IN SECTION 4, T 11 N, R 11 W.

TO REACH THE STATION FROM THE INTERSECTION OF SR103 AND BAY AVE.
LOCATED 1/2 BLOCK EAST FROM THE POST OFFICE, GO SOUTH ON SR 103 FOR
1.85 MILE TO A BLACK TOP ROAD TO THE RIGHT AND A SIGN TO BEACH IN
KLIPSAN BEACH. TURN RIGHT AND GO WEST 0.1 MILE TO A POWER LINE
CROSSING THE ROAD AND A LOW SHED TYPE ROOFED HOUSE WITH THE NAME
avery ABOUT 150 FEET SOUTH OF THE ROAD. STATION IS LOCATED
WEST-SOUTHWEST 199.6 FEET FROM THE NORTHWEST CORNER OF THE
avery HOUSE.

THE STATION MARK, STAMPED KLIPSAN 2 1976 IS A STANDARD DISK SET IN A
10 INCH DIAMETER CONCRETE POST FLUSH WITH THE SURFACE. A WITNESS
POST WAS SET 4 FEET WEST OF THE STATION.

THE SUBSURFACE MARK IS A STANDARD DISK STAMPED KLIPSAN 2 1976 SET IN
A MASS OF CONCRETE 4 FEET BELOW THE SURFACE.
REFERENCE MARK NO. 2 IS A STANDARD DISK STAMPED KLIPSAN 2 1976 NO. 2
SET IN A 8 INCH DIAMETER CONCRETE MONUMENT PROJECTING 4 INCHES ABOVE
GROUND SURFACE.
REFERENCE MARK NO. 3 IS A STANDARD DISK STAMPED KLIPSAN 2 1976 NO. 3
SET IN A 8 INCH DIAMETER CONCRETE MONUMENT PROJECTING 6 INCHES ABOVE
THE GROUND SURFACE AND LOCATED SOUTH OF THE AVERY HOUSE.

STATION 024 IS A PACIFIC COUNTY BRASS DISK SET IN 10 INCH DIAMETER CONCRETE MONUMENT ON THE WESTERLY MOST SAND DUNE LOCATED .43 MILE SOUTH FROM THE STATION.

NEAREST TOWN--OCEAN PARK.

STATION RECOVERY (1981)

RECOVERY NOTE BY NATIONAL OCEAN SURVEY 1981 (RBM)
THE STATION AND REFERENCE MARK 3 WERE RECOVERED IN GOOD CONDITION REFERENCE MARK 2 WAS NOT FOUND AFTER A BRIEF SEARCH.

STATION RECOVERY (1997)

RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
RECOVERED AS DESCRIBED. TO REACH FROM THE INTERSECTION OF SR 103 AND BAY AVENUE IN THE CITY OF OCEAN PARK GO SOUTH ON SR 103 FOR 1.85 MILES (2.98 KM) TO 225 STREET AND SIGN TO BEACH (KLIPSAN BEACH) . TURN WEST AND FOLLOW ROAD 0.1 MILES (0.2 KM) TO A POWER LINE AND A LOW SHED TYPE ROOFED HOUSE ABOUT 150 FT (45.7 M) SOUTH OF THE ROAD. THE STATION IS 199.6 FT (60.8 M) WEST-SOUTHWEST FROM THE NORTHWEST CORNER OF THE HOUSE.
National Geodetic Survey, Retrieval Date = OCTOBER 6, 1999

**DESIGNATION - L 443**

**PID - SD0129**

**STATE/COUNTY- WA/GRAYS HARBOR**

**USGS QUAD - SHALE SLOUGH (1982)**

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**CURRENT SURVEY CONTROL**

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<th>Datum</th>
<th>North (m)</th>
<th>East (m)</th>
<th>Units</th>
<th>Scale</th>
<th>Converg.</th>
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<td>-3,583,536.016</td>
<td>meters</td>
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**ELLIP HORIZONTAL ORDER - FIRST**

**VERTICAL ORDER - SECOND CLASS I**

**ELLIP ORDER - THIRD CLASS II**

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The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999.

The orthometric height was determined by differential leveling and adjusted by the National Geodetic Survey in June 1991.

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

The Laplace correction was computed from DEFLEC96 derived deflections.

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

The geoid height was determined by GEOID96.

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

The modeled gravity was interpolated from observed gravity values.

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<table>
<thead>
<tr>
<th>Datum</th>
<th>North (m)</th>
<th>East (m)</th>
<th>Units</th>
<th>Scale</th>
<th>Converg.</th>
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SUPERSEDED SURVEY CONTROL

**NGVD 29**

5.836 (m) 19.15 (f) ADJ UNCH 2 1

Superseded values are not recommended for survey control.

NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
SD0129. See file dsdata.txt to determine how the superseded data were derived.
SD0129
SD0129_MARKER: DV = VERTICAL CONTROL DISK
SD0129_SETTING: 30 = BRIDGE ABUTMENT
SD0129_STAMPING: L 443 1977
SD0129_PROJECTION: FLUSH
SD0129_MAGNETIC: O = OTHER; SEE DESCRIPTION
SD0129_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
SD0129+STABILITY: SURFACE MOTION
SD0129
SD0129 HISTORY - Date Condition Recov. By
SD0129 HISTORY - 1977 MONUMENTED NGS
SD0129 HISTORY - 1987 GOOD USPSQD
SD0129 HISTORY - 19971015 GOOD WADECO
SD0129
SD0129 STATION DESCRIPTION
SD0129
SD0129'DESCRIBED BY NATIONAL GEODETIC SURVEY 1977
SD0129'4.1 MI NORTH FROM MOCLIPS.
SD0129'4.05 MILES NORTH ALONG STATE HIGHWAY 109 FROM THE POST OFFICE AT
SD0129'MOCLIPS, IN THE TOP OF THE WEST CURB OF A BRIDGE OVER WRECK CREEK,
SD0129'1.3 FT NORTH OF THE SOUTH END AND 14.5 FT WEST OF THE CENTER LINE
SD0129'OF THE HIGHWAY.
SD0129
SD0129 STATION RECOVERY (1987)
SD0129
SD0129'RECOVERY NOTE BY US POWER SQUADRON 1987 (EEM)
SD0129'RECOVERED IN GOOD CONDITION.
SD0129
SD0129 STATION RECOVERY (1997)
SD0129
SD0129'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SD0129'RECOVERED AS DESCRIBED.
National Geodetic Survey, Retrieval Date = OCTOBER 6, 1999

AH7014 DESIGNATION - LB 1
AH7014 PID - AH7014
AH7014 STATE/COUNTY - WA/PACIFIC
AH7014 USGS QUAD - NORTH COVE (1985)

*CURRENT SURVEY CONTROL

AH7014* NAD 83(1991) - 46 39 00.22195(N) 124 03 43.34887(W) ADJUSTED
AH7014* NAVD 88 - 3.88 (meters) 12.7 (feet) GPS OBS

AH7014 X - -2,456,580.291 (meters) COMP
AH7014 Y - -3,633,536.885 (meters) COMP
AH7014 Z - 4,615,132.299 (meters) COMP
AH7014 LAPLACE CORR - 15.17 (seconds) DEFLEC96
AH7014 ELLIP HEIGHT - -20.41 (meters) GPS OBS
AH7014 GEOID HEIGHT - -24.16 (meters) GEOID96
AH7014

AH7014 HORZ ORDER - FIRST
AH7014 ELLP ORDER - THIRD CLASS II

AH7014 The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999.

AH7014 The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques.

AH7014 The X, Y, and Z were computed from the position and the ellipsoidal ht.

AH7014 The Laplace correction was computed from DEFLEC96 derived deflections.

AH7014 The ellipsoidal height was determined by GPS observations and is referenced to NAD 83.

AH7014 The geoid height was determined by GEOID96.

AH7014

AH7014; SPC WA S - 152,509.793 227,437.439 MT 0.99991524 -2 35 14.8
AH7014; UTM 10 - 5,166,825.659 418,732.301 MT 0.99968118 -0 46 20.4

AH7014 SUPERSEDED SURVEY CONTROL

AH7014 No superseded survey control is available for this station.

AH7014 MARKER: I = METAL ROD
AH7014 SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)
AH7014 STAMPING: RECESSED 10 CENTIMETERS
AH7014 MAGNETIC: I = MARKER IS A STEEL ROD
AH7014 STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
AH7014 SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR SATELLITE OBSERVATIONS - 1997
AH7014 ROD/PIPE-DEPTH: 10 meters

AH7014 HISTORY - Date Condition Recov. By
AH7014 HISTORY - 1997 MONUMENTED NGS

AH7014

AH7014 STATION DESCRIPTION

AH7014

AH7014 DESCRIBED BY NATIONAL GEODETIC SURVEY 1997 (RCD)

AH7014 THE STATION IS LOCATED IN THE WILLOPA BAY WILDLIFE REFUGE AT THE

AH7014 EXTREME NORTH END OF LEADBETTER POINT IN PARTIALLY VEGETATED AND

AH7014 SHIFTING SAND DUNES. FROM OYSTERVILLE FOLLOW OYSTERVILLE ROAD WEST

AH7014 ABOUT 1.5 MILES (2.4 KM) TO A BEACH ACCESS. FROM THE BEACH ACCESS

AH7014 DRIVE NORTH (4WD REQUIRED) ON BEACH FOR 7.4 MILES. (11.9 KM) PARK

AH7014 VEHICLE ABOVE THE HIGH TIDE LINE. THE STATION IS ON A PARTIALLY

AH7014 VEGETATED DUNE LOCATED 340 M (1115.5 FT) EAST (135 DEGREES GRID) FROM

AH7014 THE MEAN HIGH WATER LINE AND CENTERED BETWEEN TWO ORANGE NGS WITNESS

AH7014 POSTS (TIDE RANGE WAS -1.4 TO 9.0 FT (2.7 M) WHEN STATION WAS

AH7014 INSTALLED) . THE POSTS ARE 2 M (6.6 FT) EAST AND 2 M (6.6 FT) WEST OF

AH7014 THE STATION. A REFERENCE MARK IS LOCATED 75 M (246.1 FT) WEST OF THE

AH7014 STATION. THE REFERENCE MARK IS 263 M (862.9 FT) EAST (140 DEGREES

AH7014 GRID) FROM THE MEAN HIGH WATER LINE. THE STATION IS 75 M (246.1 FT)

AH7014 EAST (125 DEGREES GRID) OF THE REFERENCE MARK. THE REFERENCE MARK IS

AH7014 A STAINLESS STEEL BOLT WITH DATUM POINT ATTACHED TO A STAINLESS STEEL

AH7014 ROD DRIVEN 8 FT. (2.4 M) THE ROD IS CEMENTED IN PLACE BY 60 LBS OF

AH7014 CONCRETE. A ORANGE NGS WITNESS POST IS 1 M (3.3 FT) EAST OF THE MARK

AH7014 AND EXTENDS 0.6 M (2.0 FT) ABOVE THE SURFACE AND THE MARK. AN ARROW

AH7014 DRAWN IN THE CONCRETE POINTS TOWARD THE STATION. THE STATION IS A

AH7014 STAINLESS STEEL ROD DRIVEN 134 FT. (40.8 M) ACCESS TO THE DATUM POINT

AH7014 IS HAD THROUGH A 5-INCH STANDARD NGS LOGO CAP THAT IS STAMPED LB 1

AH7014 1997. THE LOGO CAP IS FLUSH WITH THE SURFACE.
The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999.

The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques.

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

The Laplace correction was computed from DEFLEC96 derived deflections.

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

The geoid height was determined by GEOID96.

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<td>LIME RM 2</td>
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SUPERSEDED SURVEY CONTROL
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SD0536 NAD 83(1991) - 46 24 36.18648(N) 124 01 04.10396(W) AD( ) 2
SD0536 NAD 83(1991) - 46 24 36.18611(N) 124 01 04.10349(W) AD( ) 2
SD0536 NAD 83(1986) - 46 24 36.82847(N) 124 00 59.50953(W) AD( ) 2
SD0536 NGVD 29 - 2.8 (m) 9. (f) VERT ANG
SD0536
SD0536 Superseded values are not recommended for survey control. NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums. See file dsdata.txt to determine how the superseded data were derived.
SD0536
SD0536 Marker: DS = TRIANGULATION STATION DISK
SD0536 Setting: 7 = SET IN TOP OF CONCRETE MONUMENT
SD0536 Stamping: LIME 2 1971
SD0536 Projection: FLUSH
SD0536 Magnetic: O = OTHER; SEE DESCRIPTION
SD0536 Stability: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO SURFACE MOTION
SD0536
SD0536 HISTORY - Date Condition Recov. By
SD0536 HISTORY - 1971 MONUMENTED NGS
SD0536 HISTORY - 1977 MONUMENTED NGS
SD0536 HISTORY - 19971203 GOOD WADECO
SD0536
SD0536 Station Description
SD0536 Described by National Geodetic Survey 1971 (LFS)
SD0536 This station was established to replace LIME 1938.
SD0536
SD0536 The station is located on North Beach Peninsula, on the west side of Shoalwater Bay, 5 miles north-northeast of Long Beach, 4 miles south-southeast of Klipsan Beach, 1-3/4 miles east of Oceanides and in section 27, T 11 N, R 11 W, on land owned by Mr. Mel Stratton.
SD0536
SD0536 To reach from the Nahcotta Store and Post Office in Nahcotta, go south on the Blacktop road for 0.4 mile to the intersection of Bay Road and Peninsula Road, continue south on Peninsula Road for 5.5 miles to Litschke Road, continue south on Peninsula Road for 0.25 mile to two driveways separated by a fence. Turn left and go east on the southern driveway for 0.1 mile to Mr. Mel Strattons house on the right and a gate across the road. Continue straight ahead through the gate for 0.1 mile to the beach and reference mark No. 3 on the left and the station on the right, 75 feet south of the center of the road.
SD0536
SD0536 The station mark, stamped LIME 2 1971, is a standard disk stamped LIME 2 1971, set in a round concrete post flush with the ground, on an 18-inch high bank, built up primarily of oyster shells, 22 yards west of the high water line, 14 feet east of the west edge of the bank and 1.3 feet south of the projected south side of the concrete tank which is described below. Under Ground mark is set in concrete 2.5 feet below ground.
SD0536
SD0536 Reference mark No. 2, stamped LIME 1938 No 2, is a standard disk set in a 4-inch soil pipe which projects 4 inches. It is 26.0 feet south of the 2-inch pipe and on line with the center of the
CONCRETE TANK, 7 FEET EAST OF A FENCeline AND ABOUT 1.5 FEET LOWER THAN THE STATION.

REFERENCE MARK NO. 3, STAMPED LIME 2 NO 3 1971, IS A STANDARD DISK SET IN A ROUND CONCRETE POST WHICH PROJECTS 2 INCHES. IT IS 81.8 FEET NORTH OF THE 2-INCH PIPE, 10 YARDS WEST OF THE EDGE OF THE GRASS AT THE HIGH WATER LINE, 10 FEET NORTH OF THE CENTER OF THE EAST-WEST ROAD 17 FEET EAST OF THE PROJECTED CENTERLINE OF THE CONCRETE TANK, 1 FOOT EAST OF THE FENCE CORNER AND 1 FOOT SOUTH OF A METAL WITNESS POST.

2-INCH PIPE ON TANK, IS THE 2-INCH PIPE WHICH PROJECTS 1.2 FEET ABOVE THE TOP OF A 3.7X4.5-FOOT CONCRETE TANK WHICH IS BURIED, EXCEPT FOR THE TOP 18 INCHES WHICH PROJECTS ABOVE GROUND. TOP OF THE TANK IS SOMEWHAT ROUNDED AND HAS A 2-INCH, A 1 1/2-INCH AND 3/4-INCH PIPE PROJECTING OUT OF THE TOP.

TRIANGULATION STATION SNAKE 2 WILL SERVE AS AN AZIMUTH MARK FOR THIS STATION.

STATION RECOVERY (1977)

RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1977 (CLN)


THE STATION IS LOCATED ON NORTH BEACH PENINSULA, ON THE WEST SIDE OF SHOALWATER BAY, 5 MILES NORTH-NORtheast OF LONG BEACH, 4 MILES SOUTH-SOUTHEAST OF KLIPSAN BEACH, 1-3/4 MILES EAST OF OCEANSIDE AND IN SECTION 27, T 11 N, R 11 W, ON LAND OWNED BY MR. MEL STRATTON.

TO REACH FROM THE NAHCOTTA STORE AND POST OFFICE IN NAHCOTTA, GO SOUTH ON THE BLACKTOP ROAD FOR 0.4 MILE TO THE INTERSECTION OF BAY ROAD AND PENINSULA ROAD, CONTINUE SOUTH ON PENINSULA ROAD FOR 5.5 MILES TO LITSCHKE ROAD, CONTINUE SOUTH ON PENINSULA ROAD FOR 0.25 MILE TO TWO DRIVEWAYS SEPARATED BY A FENCE. TURN LEFT AND GO EAST ON THE SOUTHERN DRIVEWAY FOR 0.1 MILE TO MR. MEL STRATTONS HOUSE ON THE RIGHT AND A GATE ACROSS THE ROAD. CONTINUE STRAIGHT AHEAD THROUGH THE GATE FOR 0.1 MILE TO THE BEACH AND REFERENCE MARK NO. 3 ON THE LEFT AND THE STATION ON THE RIGHT, 75 FEET SOUTH OF THE CENTER OF THE ROAD.

THE STATION MARK, IS A STANDARD DISK STAMPED LIME 2 1971, SET IN A CONCRETE POST FLUSH WITH THE GROUND, ON AN 18-INCH HIGH BANK, BUILT UP PRIMARILY OF OYSTER SHELLS, 22 YARDS WEST OF THE HIGH WATER LINE, 14 FEET EAST OF THE WEST EDGE OF THE BANK AND 1.3 FEET SOUTH OF THE PROJECTED SOUTH SIDE OF THE CONCRETE TANK WHICH IS DESCRIBED BELOW. UNDERGROUND MARK IS SET IN CONCRETE 2.5 FEET BELOW GROUND.

REFERENCE MARK NO. 2, STAMPED LIME 1938 NO 2, IS A STANDARD DISK SET IN A 4-INCH SOIL PIPE WHICH PROJECTS 4 INCHES. IT IS...
SD0536'26.0 FEET SOUTH OF THE 2-INCH PIPE AND ON LINE WITH THE CENTER SD0536'OF THE CONCRETE TANK, 7 FEET EAST OF A FENCeline AND ABOUT 1.5 SD0536'FEET LOWER THAN THE STATION.
SD0536'
SD0536'REFERENCE MARK NO. 3, STAMPED LIME 2 NO 3 1971, IS A STANDARD SD0536'DISK SET IN A ROUND CONCRETE POST WHICH PROJECTS 2 INCHES. IT SD0536'IS 81.8 FEET NORTH OF THE 2-INCH PIPE, 10 YARDS WEST OF THE SD0536'EDGE OF THE GRASS AT THE HIGH WATER LINE, 10 FEET NORTH OF THE SD0536'CENTER OF THE EAST-WEST ROAD 17 FEET EAST OF THE PROJECTED SD0536'CENTERLINE OF THE CONCRETE TANK, 1 FOOT EAST OF THE FENCE CORNER SD0536'AND 1 FOOT SOUTH OF A METAL WITNESS POST.
SD0536'
SD0536'2-INCH PIPE ON TANK, IS THE 2-INCH PIPE WHICH PROJECTS 1.2 SD0536'FT. ABOVE THE TOP OF A 3.7X4.5 FOOT CONCRETE TANK WHICH IS SD0536'BURIED, EXCEPT FOR THE TOP 18 INCHES WHICH PROJECTS ABOVE SD0536'GROUND. TOP OF TANK IS SOMEWHAT ROUNDED AND HAS A 2-INCH, A SD0536'1 1/2-INCH AND 3/4-INCH PIPE PROJECTING OUT OF THE TOP.
SD0536'
SD0536'TRIANGULATION STATION SNAKE 2 WILL SERVE AS AN AZIMUTH MARK SD0536'FOR THIS STATION.
SD0536'
SD0536'AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN SD0536'5 MILES NNE OF LONG BEACH.
SD0536'
SD0536'STATION RECOVERY (1997)
SD0536'
SD0536'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD) SD0536'RECOVERED AS DESCRIBED. THE HOUSE HAS BEEN SOLD. THE NEW OWNER IS SD0536'MR. LARRY KRATZER. THE FENCE DESCRIBED IN 1977 HAS BEEN REMOVED AND SD0536'A ROW OF LOW BUSHES SEPERATES THE DRIVeways. A SMALL VOLUNTEER FIRE SD0536'STATION (GARAGE) IS ACROSS THE STREET AND EVEN WITH THE DRIVeways. THE SD0536'STATION IS 14 EAST AND 1.3 FT (0.4 M) SOUTH OF THE THE SOUTHEAST SD0536'CORNER OF THE CONCRETE TANK AND RECESSED ABOUT 1 TO 3 CM INTO GRASS ON SD0536'THE OYSTER SHELL BANK (OLD ROADWAY) . THE TANK IS 3.7 FT (1.1 M) BY SD0536'4.5 FT (1.4 M) AND PROJECTS 1 FT (0.3 M) ABOVE GROUND. THE STATION SD0536'DOES NOT HAVE A WITNESS POST.
The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999.

The orthometric height was determined by differential leveling and adjusted by the National Geodetic Survey in June 1991.

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

The Laplace correction was computed from DEFLEC96 derived deflections.

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

The geoid height was determined by GEOID96.

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

The modeled gravity was interpolated from observed gravity values.

The geoid height was determined by GEOID96.

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

The modeled gravity was interpolated from observed gravity values.

No superseded survey control is available for this station.

Marker: DB = BENCH MARK DISK

Setting: 66 = SET IN ROCK OUTCROP
SC1020 STAMPING: M 536 1987
SC1020 PROJECTION: FLUSH
SC1020 MAGNETIC: O = OTHER; SEE DESCRIPTION
SC1020 STABILITY: A = MOST RELIABLE AND EXPECTED TO HOLD
SC1020+STABILITY: POSITION/ELEVATION WELL
SC1020
SC1020 HISTORY - Date Condition Recov. By
SC1020 HISTORY - 1987 MONUMENTED NGS
SC1020 HISTORY - 1988 GOOD USPSQD
SC1020 HISTORY - 19970725 GOOD WADECO
SC1020
SC1020 STATION DESCRIPTION
SC1020
SC1020 DESCRIBED BY NATIONAL GEODETIC SURVEY 1987
SC1020'20.7 KM (12.85 MI) NE FROM SEAVIEW.
SC1020'0.08 KM (0.05 MI) SOUTH ALONG STATE HIGHWAY 103 FROM THE POST OFFICE
SC1020'IN SEAVIEW, THENCE 20.6 KM (12.80 MI) NORTHEAST ALONG US HIGHWAY 101,
SC1020'AT THE SOUTHEAST CORNER OF THE BRIDGE OVER THE NASELLE RIVER, IN TOP
SC1020'AND CENTER OF A 3 BY 5 FT ROUND ROCK OUTCROP IN A GRASSY AREA FORMED
SC1020'BY THE JUNCTION OF PAPALIA ROAD, 32.3 M (106.0 FT) SOUTHEAST OF THE
SC1020'CENTERLINE OF THE HIGHWAY, 25.9 M (85.0 FT) SOUTHEAST OF THE
SC1020'SOUTHWEST END OF THE SOUTHEAST CONCRETE GUARDRAIL OF THE BRIDGE.
SC1020'THE MARK IS 0.30 METERS S FROM A WITNESS POST
SC1020'THE MARK IS 0.30 M ABOVE THE GROUND.
SC1020
SC1020 STATION RECOVERY (1988)
SC1020
SC1020 RECOVERY NOTE BY US POWER SQUADRON 1988 (KRN)
SC1020 RECOVERED IN GOOD CONDITION.
SC1020
SC1020 STATION RECOVERY (1997)
SC1020
SC1020 RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SC1020 RECOVERED AS DESCRIBED. THE STATION IS 2.7 MILES (4.3 KM) WEST ON US
AH7027 DESIGNATION - MCKENZIE HEAD RM 3
AH7027 PID - AH7027
AH7027 STATE/COUNTY- WA/PACIFIC
AH7027 USGS QUAD - CAPE DISAPPOINTMENT (1985)
AH7027

**CURRENT SURVEY CONTROL**

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AH7027 HORZ ORDER - FIRST
AH7027 ELLP ORDER - THIRD CLASS II

AH7027 The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999.

AH7027 The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques.

AH7027 The X, Y, and Z were computed from the position and the ellipsoidal ht.

AH7027 The Laplace correction was computed from DEFLEC96 derived deflections.

AH7027 The ellipsoidal height was determined by GPS observations and is referenced to NAD 83.

AH7027 The geoid height was determined by GEOID96.

AH7027

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AH7027 SUPERSEDEDED SURVEY CONTROL

AH7027 No superseded survey control is available for this station.

AH7027 MARKER: DR = REFERENCE MARK DISK
AH7027 SETTING: 40 = ARTILLARY EMPLACEMENT
AH7027 STAMPING: MCKENZIE HEAD NO 3 1997
AH7027 PROJECTION: FLUSH
AH7027 MAGNETIC: O = OTHER; SEE DESCRIPTION
AH7027 STABILITY: A = MOST RELIABLE AND EXPECTED TO HOLD
AH7027 SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AH7027 SATELLITE: SATELLITE OBSERVATIONS - 1997

AH7027 HISTORY - Date Condition Recov. By
AH7027 HISTORY - 1997 MONUMENTED WADECO

AH7027 STATION DESCRIPTION

AH7027 D DESCRIBED BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (TCD)
AH7027 D DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD).
AH7027 THE STATION IS LOCATED ON MCKENZIE HEAD, A LONE PROMINENT HILL THAT IS
AH7027 2 MILES (3.2 KM) SSW OF ILWACO, WASHINGTON, AND 1.2 MILES (1.9 KM)
AH7027 SOUTHEAST OF THE NORTH HEAD LIGHTHOUSE. THE STATION IS IN FORT CANBY
AH7027 STATE PARK AT THE MOUTH OF THE COLUMBIA RIVER. TO REACH FROM THE
AH7027 INTERSECTION OF 1ST STREET AND SPRUCE STREET IN ILWACO GO WEST FOR 1
AH7027 BLOCK. CONTINUE WEST AND THEN SOUTH ON SR 100 (ROBERT GRAY DRIVE) FOR
AH7027 3.28 MILES (5.28 KM) TO THE FORT CANBY STATE PARK ENTRANCE ON RIGHT
AH7027 (WEST SIDE OF ROAD). THE ENTRANCE TO THE CAPE DISAPPOINTMENT USCG
AH7027 STATION IS 0.05 MILES (0.08 KM) FURTHER SOUTH ON THE LEFT. FROM THE
AH7027 ENTRANCE GATE OF FORT CANBY STATE PARK PROCEED WEST ON JETTY ROAD FOR
AH7027 0.2 MILES (0.3 KM) TO INTERSECTION. TURN NORTH AND PROCEED 0.4 MILES
AH7027 (0.6 KM) THROUGH CAMPGROUND TO MCKENZIE HEAD ON LEFT AND GRASS COVERED
AH7027 PULL OFF AREA. PROCEED UPHILL FOR 0.3 MILES (0.5 KM) TO ABANDONED
AH7027 ARTILLARY EMLACEMENT AND BUNKER ENTRANCE ON RIGHT. THE STATION IS 20
AH7027 M (65.6 FT) 221 DEGREES GRID, FROM THE SOUTH PORTAL OF A CONCRETE
AH7027 BUNKER AND 1.0 M (3.3 FT) NORTH OF THE WEST EDGE OF THE CONCRETE
AH7027 FOUNDATION FOR A ARTILLARY PIECE (REMOVED). THREE WOOD BENCHES ARE
AH7027 LOCATED BY THE W AND SW EDGE OF THE FOUNDATION. THE STATION IS A
AH7027 STANDARD NGS REFERENCE MARK DISK CEMENTED INTO A MASSIVE CONCRETE MAT
AH7027 FOUNDATION. THE DISK IS STAMPED MCKENZIE HEAD NO 3 1997. THIS
AH7027 STATION WAS ESTABLISHED FOR BETTER GPS VISIBILITY AND CONVENTIONALLY
AH7027 TIED TO STATION MCKENZIE HEAD 1942 (SD0090) AND MCKENZIE HEAD RM 2
AH7027 (SD0089) USING SECOND ORDER LEVELING METHODS. LEVELS HAVE BEEN RUN TO
AH7027 THIS POINT. THE STATION IS 1.232 M (4.042 FT) LOWER, 2.42 M (7.94 FT)
AH7027 NORTH, 29.5 M (96.8 FT) WEST, AND 278 DEGREES GRID FROM MCKENZIE HEAD
AH7027 1942. THE STATION IS 0.782 M (2.566 FT) LOWER, 8.69 M (28.51 FT)
AH7027 NORTH, 29.98 M (98.36 FT) WEST, AND 283 DEGREES GRID OF MCKENZIE HEAD
AH7027 RM 2. THE LEVEL RUN BETWEEN MCKENZIE HEAD 1942 AND RM 2 DOES NOT
AH7027 CHECK WITH PUBLISHED VALUES BY -9.2 CM. GPS WAS USED TO OBTAIN
AH7027 ELEVATIONS FOR COMPARISON TO THE PUBLISHED AND LEVELED DATA. THE GPS
AH7027 DERIVED ELEVATION DIFFERENCE BETWEEN RM 2 AND RM 3 WAS 0.721 M, (2.365
AH7027 FT) A -6.1 CM DIFFERENCE BETWEEN LEVELED AND GPS. GPS DERIVED
AH7027 ELEVATION DIFFERENCE BETWEEN MCKENZIE HEAD AND RM 3 WAS 1.264 M,
AH7027 (4.147 FT) A +3.2 CM DIFFERENCE BETWEEN LEVELED AND GPS. ERROR OF GPS
AH7027 WAS +/- 2 CM. DUE TO THE LARGE ELEVATION DISCREPANCY BETWEEN RM 2 AND
AH7027 MCKENZIE HEAD, ONLY THE LEVELING DATA FROM MCKENZIE HEAD 1942 WAS USED
AH7027 TO CALCULATED THE ELEVATION OF RM 3. BASED ON THIS ASSUMPTION, THE
AH7027 LEVELLED NAVD88 ELEVATION OF MCKENZIE HEAD RM 3 IS 59.033 M, (193.677
AH7027 FT) OR 1.232 M (4.042 FT) LOWER THAN MCKENZIE HEAD 1942 (SD0090).
The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999.

The orthometric height was determined by differential leveling and adjusted by the National Geodetic Survey in June 1991.

WARNING-GPS observations at this control monument resulted in a GPS derived orthometric height which differed from the leveled height by more than one decimeter (0.1 meter).

WARNING-Repeat measurements at this control monument indicate possible vertical movement.

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

The Laplace correction was computed from DEFLEC96 derived deflections.

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

The geoid height was determined by GEOID96.

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

The modeled gravity was interpolated from observed gravity values.

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**SUPERSEDED SURVEY CONTROL**

**SC0617**

**SC0617**

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**Superseded values are not recommended for survey control.**

**SC0617**

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

**SC0617**

**See file dsdata.txt to determine how the superseded data were derived.**

**SC0617**

**MARKER: DS = TRIANGULATION STATION DISK**

**SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT**

**STAMPING: MEADOW 1874**

**PROJECTION: FLUSH**

**MAGNETIC: O = OTHER; SEE DESCRIPTION**

**STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO SURFACE MOTION**

**SC0617**

<table>
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**STATION DESCRIPTION**

**SC0617**

**DESCRIBED BY OREGON GEODETIC SURVEY 1934**

**SC0617**

**THIS STATION MARK FOUND BY MEASURING FROM STATION GEARHART**

**SC0617**

**STATION IS ABOUT 15 FEET N OF 15TH TEE, OF GEARHART GOLF LINKS, ON A SMALL RIDGE, E PART OF LINKS, AND ABOUT 50 FEET W OF SC0617 N AND S STREET.**

**SC0617**

**STATION RE-MARKED BY A STANDARD DISK STAMPED MEADOW 1874 SET IN HEAVY CONCRETE PIER 4 FEET DEEP ON EXACT CENTER OF OLD BLOCK IS BURIED 4 FEET.**
STATION RECOVERY (1936)

RECOVERY NOTE BY US ENGINEERS 1936

THIS STATION WAS RECOVERED AS DESCRIBED.

STATION RECOVERY (1941)

RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1941 (LAM)

STATION VISITED AND FOLLOWING DESCRIPTIONS PREPARED FOR 1941

U.S.C. AND G.S. LEVEL PARTY.

TRIANGULATION STATION MEADOW--GEARHART, ABOUT 0.3 MILE N OF INTERSECTION OF COTTAGE AVENUE AND SIXTH STREET, ABOUT 80 FEET W OF E FENCE OF GOLF LINKS, ABOUT MIDWAY BETWEEN FIRST STREET AND A STREET, IF PROJECTED WESTWARD. DISK, STAMPED MEADOW 1874, IN CONCRETE POST. 24.877 FEET. BY OREGON INSTITUTE OF TECHNOLOGY, 1934.

REFERENCE MARK MEADOW--GEARHART, ABOUT 0.3 MILE N OF INTERSECTION OF COTTAGE AVENUE AND SIXTH STREET, ABOUT MIDWAY BETWEEN FIRST STREET AND A STREET, ON W LINE OF COTTAGE AVENUE. DISK, STAMPED MEADOW REF 1 1934, IN CONCRETE POST.

STATION RECOVERY (1942)

RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1942 (JCP)

STATION IS AT GEARHART, ON THE S END OF THE GOLF LINKS, 82 FEET W OF THE E FENCE LINE OF GOLF LINKS, ON A SMOOTH GRASSY HUMP.

TO REACH FROM THE POST OFFICE AT GEARHART WHICH IS AT THE CORNER OF SIXTH STREET AND COTTAGE AVENUE GO N ON COTTAGE AVENUE ABOUT 1/4 MILE TO STATION ON THE LEFT. IT IS BETWEEN FIRST STREET AND A STREET (E-W STREETS) AND ABOUT 15 FEET N OF THE 15TH TEE OF THE COURSE.

STATION IS A BRONZE STATION DISK SET IN CONCRETE. IT IS FLUSH WITH THE GROUND AND IS STAMPED MEADOW 1874.

REFERENCE MARK 1 IS A BRONZE REFERENCE DISK SET IN A CONCRETE CYLINDER. IT IS E OF AND ABOUT 7 FEET LOWER THAN THE STATION AND IS STAMPED MEADOW REF 1 1934.

REFERENCE MARK 2 IS A BRONZE REFERENCE DISK SET IN CONCRETE. IT IS SE OF AND ABOUT 7 FEET LOWER THAN THE STATION AND IS STAMPED MEADOW NO 2 1942.

STATION RECOVERY (1965)

RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1965 (PAS)

THE STATION MARK, STAMPED MEADOW 1874, WAS RECOVERED IN GOOD CONDITION. THE REFERENCE MARK, STAMPED MEADOW REF 1 1934, WAS RECOVERED IN GOOD CONDITION. A WITNESS POST WAS PLACED 1 FOOT SOUTH OF THE STATION MARK AND A WITNESS POST WAS PLACED 1 FOOT WEST OF THE REFERENCE MARK. THE TO REACH IS ADEQUATE FOR RECOVERY.
SC0617 STATION RECOVERY (1965)
SC0617'

SC0617'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1965
SC0617'

SC0617'AT GEARHART, 0.25 MILE NORTH OF THE POST OFFICE ALONG COTTAGE AVENUE, SC0617'BETWEEN A AND FIRST STREETS, 114 FEET WEST OF THE CENTER OF COTTAGE SC0617'AVENUE, 83 FEET WEST OF THE EAST FENCE AROUND THE GOLF LINKS, 18 FEET SC0617'NORTH OF THE FIFTEENTH TEE AND 1 FOOT NORTH OF A WITNESS POST SET IN A SC0617'12-INCH SQUARE CONCRETE MONUMENT THAT PROJECTS 1 INCH.
SC0617

SC0617 STATION RECOVERY (1971)
SC0617'

SC0617'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1971 (DRT)
SC0617'STATION MARK, STAMPED MEADOW 1874, AND RM 1, STAMPED, MEADOW SC0617'REF 1 1934, RECOVERED AS DESCRIBED IN GOOD CONDITION. RM 2 SC0617'STAMPED, MEADOW NO 2 1942, RECOVERED IN GOOD CONDITION BUT WITHOUT SC0617'WITNESS POST. RM 2, LIKE RM 1, IS IN THE FENCE LINE AND IS 125.5 SC0617'FEET SOUTH OF RM 1, 36.3 FEET FROM INTERSECTION OF COTTAGE AVENUE SC0617'AND 1ST ST., AND IS 28.9 FEET W OF THE CENTERLINE OF COTTAGE SC0617'AVENUE. STATION IS ON GOLF COURSE, BUT RMS COULD BE UTILIZED SC0617'FOR SEA-FIX IF NECESSARY.
SC0617'

SC0617'AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN SC0617'IN GEARHART.
SC0617

SC0617 STATION RECOVERY (1984)
SC0617'

SC0617'RECOVERY NOTE BY US POWER SQUADRON 1984
SC0617'

SC0617'NEW DESC: AT GEARHART, 0.25 MILES NORTH ALONG COTTAGE AVE. FROM THE SC0617'INTERSECTIN OF PACIFIC WAY, ON THE FIRST LOW RIDGE WEST OF SC0617'COTTAGEAVE, MIDWAY BETWEEN FIFTH AND SIXTH STREETS, 82 FEET WEST OF SC0617'THE EAST FENCE AROUND GEARHART GULF COURSE, AT THE FIFTEENTH TEE, BY SC0617'A 4 X 4 WOODEN USBM WITNESS POST. WEST OF PP AND L POWER POLE 030103.
SC0617

SC0617 STATION RECOVERY (1987)
SC0617'

SC0617'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1987
SC0617'RECOVERED IN GOOD CONDITION, A NEW DESCRIPTION FOLLOWS. IN GEARHART, SC0617'AT THE INTERSECTION OF COTTAGE AVENUE AND 6TH STREET, ON A SMALL SC0617'KNOLL AT THE FIFTEENTH TEE OF THE GEARHART GOLF COURSE, 33.6 M (110.2 SC0617'FT) SOUTH OF THE EXTENDED CENTER OF THE STREET, 33.5 M (109.9 FT) SC0617'WEST OF THE CENTERLINE OF THE AVENUE, 8.8 M (28.9 FT) WEST OF SC0617'REFERENCE MARK 1, AND 2.8 M (9.2 FT) NORTH OF THE NORTH EDGE OF THE SC0617'TEE.
SC0617'THE MARK IS 2.5 M ABOVE THE AVENUE.
SC0617

SC0617 STATION RECOVERY (1989)
SC0617'

SC0617'RECOVERY NOTE BY US POWER SQUADRON 1989 (KRN)
SC0617'RECOVERED IN GOOD CONDITION.
SC0617

SC0617 STATION RECOVERY (1997)
SC0617'

SC0617'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SC0617'RECOVERED AS DESCRIBED. BRASS CAP WAS FOUND TO BE LOOSE FROM SC0617'PREFABRICATED CEMENT POST. CAP RESTAMPED AS SHOWN IN DESCRIPTION SC0617'(I.E. MEADOW 1874) AND RECEMENTED TO THE POST.
The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999.

The orthometric height was determined by differential leveling and adjusted by the National Geodetic Survey in June 1991.

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

The Laplace correction was computed from DEFLEC96 derived deflections.

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

The geoid height was determined by GEOID96.

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

The modeled gravity was interpolated from observed gravity values.

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<th>PID Reference Object Distance Geod. Az</th>
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<td>SPC WA S - Goulter 2 183 46 19.1</td>
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SUPERSEDED SURVEY CONTROL

NAD 83(1991)- 46 34 58.02305(N) 124 01 27.81004(W) AD( ) 2
NAD 83(1991)- 46 34 58.02195(N) 124 01 27.80936(W) AD( ) 2
NAD 83(1986)- 46 34 58.02172(N) 124 01 27.79271(W) AD( ) 2
NAD 27 - 46 34 58.66678(N) 124 01 23.19595(W) AD( ) 2

Superseded values are not recommended for survey control.
NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
See file dsdata.txt to determine how the superseded data were derived.

MARKER: DS = TRIANGULATION STATION DISK
SETTING: 17 = SET INTO TOP OF METAL PIPE DRIVEN INTO GROUND
STAMPING: MESS 1939
PROJECTION: FLUSH
MAGNETIC: O = OTHER; SEE DESCRIPTION
STABILITY: D = MARK OF QUESTIONABLE OR UNKNOWN STABILITY

HISTORY - Date Condition Recov. By
1939 MONUMENTED CGS
1953 MONUMENTED CGS
1968 MONUMENTED WAA
1987 GOOD NGS
19971015 GOOD WADECO

STATION DESCRIPTION

Described by Coast and Geodetic Survey 1939 (WMS)
Station is in a flat grassy area at the N end of an extensive meadow
on land presently owned by Ed. Goulter, and about 0.5 mile N of his
dairy barn. It is about 60 meters W of the high-water line on the
east and 45 meters S of the high-water line on the N. About half-way
between the station and the high-water line on the E is a hedge of
small spruce trees approximately 80 meters in length and parallel to
the beach. The station is 16.5 meters NW of a 30-inch broken-top
spruce tree, and 32.5 meters E by S from 2 large crabapple trees in
a group.

The station mark is a standard bronze disk stamped MESS 1939. It is
cemented in the top end of a 60-inch section of 4-inch cast-iron
soil pipe which projects 4 inches.

There is no subsurface mark.
Reference mark No. 1 is a standard reference disk cemented in the
top end of a 30-inch section of cast-iron soil pipe which projects 3
inches.
REFERENCE MARK NO.2 IS MARKED THE SAME AS NO.1. THE PIPE PROJECTS 3 INCHES AND IS APPROXIMATELY ON LINE BETWEEN THE STATION AND THE CRAB APPLE TREES.

TO REACH THE STATION BY ROAD GO W 0.4 MILE FROM OYSTERVILLE TO THE STACKPOLE ROAD. TURN RIGHT ON THE STACKPOLE ROAD AND GO N 2.6 MILES TO A CURVE TO THE LEFT WHICH IS JUST W OF THE N END OF THE MEADOW. LEAVE ROAD AND WALK E ACROSS THE MEADOW TO THE STATION.

STATION RECOVERY (1953)

STATION AND REFERENCE MARKS RECOVERED IN GOOD CONDITION. THE CRABAPPLE TREES MENTIONED IN THE ORIGINAL DESCRIPTION HAVE BEEN DESTROYED. A COMPLETE DESCRIPTION FOLLOWS--

ON THE EAST SIDE OF THE NORTH BEACH PENINSULA ABOUT 2.3 MILES NORTH OF OYSTERVILLE ON LAND OWNED BY MR. GOULTER, 51 METERS SOUTH OF THE MEAN HIGH WATER LINE NORTH OF THE STATION, 27 METERS WEST OF A FENCE, 26 METERS SOUTH OF THE INTERSECTION OF A FENCE LINE AND A NORTH-SOUTH TREE LINE, AND 16.5 METERS NORTHWEST OF A BROKEN-TOP 30-INCH SPRUCE TREE. ABOUT HALFWAY BETWEEN THE STATION AND THE SHORELINE ON THE EAST IS A HEDGE OF SPRUCE TREES ABOUT 65 METERS IN LENGTH AND PARALLEL TO THE BEACH. A STANDARD DISK STAMPED MESS 1939 CEMENTED IN THE TOP OF A 5-FOOT SECTION OF 4-INCH CAST IRON SOIL PIPE PROJECTING 5 INCHES. THERE IS NO UNDERGROUND MARK.

REFERENCE MARK 1 IS SOUTH SOUTHEAST OF THE STATION, A STANDARD DISK CEMENTED IN THE TOP OF A 30-INCH SECTION OF 4-INCH CAST IRON SOIL PIPE SET FLUSH WITH THE GROUND.

REFERENCE MARK 2 IS NORTHWEST OF THE STATION, A STANDARD DISK SET IN THE TOP OF A 30-INCH SECTION OF 4-INCH CAST IRON SOIL PIPE SET FLUSH WITH THE GROUND.

TO REACH FROM OYSTERVILLE GO WEST 0.4 MILE AND TURN RIGHT ON THE STACKPOLE ROAD CONTINUING NORTH FOR 2.5 MILES TO A CURVE TO THE LEFT WHICH IS JUST WEST OF THE NORTH END OF A MEADOW. LEAVE ROAD AND WALK EAST ACROSS MEADOW TO THE STATION.

NEW DISTANCES TO THE REFERENCE MARKS--R.M. 1 25.640 METERS, R.M. 2 15.000 METERS.

STATION RECOVERY (1968)

RECOVERY NOTE BY WALKER AND ASSOCIATES INCORPORATED 1968

MESS 1939 GOOD

SET METAL WITNESS TAG IN 30 IN BROKEN SPRUCE MENTIONED IN DESCRIPTION THAT IS 54.3 FT SW OF STATION. DID NOT HAVE TIME TO SEARCH FOR RMS.

STATION RECOVERY (1987)

RECOVERY NOTE BY NATIONAL GEODEtic SURVEY 1987
SD0358'31.0 KM (19.25 MI) NORTH FROM SEAVIEW.
SD0358'0.08 KM (0.05 MI) SOUTH ALONG STATE HIGHWAY 103 FROM THE POST OFFICE
IN SEAVIEW, THENCE 0.80 KM (0.50 MI) EAST ALONG US HIGHWAY 101,
SD0358'THENCE 25.3 KM (15.70 MI) NORTH ALONG SANDRIDGE ROAD, THENCE 0.48 KM
SD0358'(0.30 MI) WEST ALONG OYSTERVILLE ROAD, THENCE 4.19 KM (2.60 MI) NORTH
SD0358'ALONG STACKPOLE ROAD, THENCE ABOUT 0.2 KM (0.10 MI) EAST ALONG A
SD0358'TRACK ROAD AND ACROSS A LOW MEADOW, AT A CLUSTER OF FOUR 18 INCH
SD0358'DIAMETER SPRUCE TREES NEAR THE EDGE OF THE BAY, 0.45 M (1.5 FT)
SD0358'NORTHEAST OF A 2 BY 2-INCH GUYED SIGNAL, DISK IN THE TOP OF A 4-INCH
SD0358'CAST IRON SOIL PIPE.
SD0358'THE MARK IS 0.61 METERS S FROM A WITNESS POST
SD0358'THE MARK IS ABOVE LEVEL WITH THE GROUND.
SD0358
SD0358
STATION RECOVERY (1997)
SD0358
RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SD0358'RECOVERED AS DESCRIBED. FROM OYSTERVILLE PROCEED WEST ON OYSTERVILLE
SD0358'ROAD TO STACKPOLE ROAD. TURN NORTH AND FOLLOW STACKPOLE ROAD NORTH
SD0358'FOR ABOUT 2.55 MILES (4.10 KM) TO CURVE TO NORTHWEST AND PULL OFF AREA
SD0358'ON RIGHT. THE PULL OFF IS LOCATED SOUTH OF A 3 STORY GRAY HOUSE WITH
SD0358'FENCE. THE LONE CLUSTER OF FOUR SPRUCE TREES DESCRIBED IN 1987 MAY BE
SD0358'SEEN FROM THIS POINT ACROSS A LOW MEADOW (WET AT HIGH TIDE) . THE
SD0358'STATION IS ABOUT 15 M (49.2 FT) SOUTHEAST FROM THE THREE LARGEST
SD0358'SPRUCE TREES, 4 M (13.1 FT) FROM THE STORM HIGH WATER LINE, 0.61 M
SD0358'(2.00 FT) SOUTH OF A ORANGE NGS WITNESS POST, AND PROJECTS 4 INCHES
SD0358'ABOVE THE GROUND. REFERENCE MARKS WERE NOT RECOVERED AFTER A 30 MIN
SD0358'SEARCH.
The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999. The orthometric height was determined by GPS observations. The X, Y, and Z were computed from the position and the ellipsoidal ht. The Laplace correction was computed from DEFLEC96 derived deflections. The ellipsoidal height was determined by GPS observations and is referenced to NAD 83. The geoid height was determined by GEOID96.

Superseded values are not recommended for survey control. NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums. See file dsdata.txt to determine how the superseded data were derived.
SC2198+STABILITY: SURFACE MOTION
SC2198_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
SC2198+SATELLITE: SATELLITE OBSERVATIONS - September 29, 1998
SC2198
SC2198 HISTORY - Date Condition Recov. By
SC2198 HISTORY - 1958 MONUMENTED CGS
SC2198 HISTORY - 19971204 GOOD WADECO
SC2198 HISTORY - 19980929 GOOD WADECO
SC2198 HISTORY - 19990419 GOOD WADECO
SC2198
SC2198 STATION DESCRIPTION
SC2198
SC2198'DESCRIBED BY COAST AND GEODETIC SURVEY 1958 (VRS)
SC2198'LOCATED 1.5 MILES SOUTHWEST OF HAMMOND IN FORT STEVENS STATE PARK,
SC2198'0.7 MILES WEST OF RIDGE ROAD, 0.25 MILE NORTH OF PETER IREDALE
SC2198'ROAD AND APPROXIMATELY 200 FEET WEST OF A GRAVEL ROAD, UNDER THE
SC2198.CENTER OF A U.S. ENGINEER HYDROGRAPHIC SIGNAL WHICH IS ON A HIGH
SC2198'BRUSHY DUNE. THE HYDROGRAPHIC SIGNAL IS U.S. E. STATION BEACH
SC2198'ROAD.
SC2198'
SC2198'STATION MARK IS A STANDARD HYDROGRAPHIC DISK SET IN AN 8-INCH
SC2198'SQUARE CONCRETE MONUMENT PROJECTING 4 INCHES ABOVE THE
SC2198'GROUND. STAMPED MIT 1935.
SC2198'
SC2198'TO REACH FROM THE POST OFFICE AT HAMMOND, PROCEED WEST 0.25 MILE
SC2198'TO RIDGE ROAD. TURN SOUTH AND PROCEED 1.1 MILES TO SIGN FOR
SC2198'STATE PARK AND PAVED ROAD WEST (PETER IREDALE ROAD). TURN
SC2198'RIGHT (WEST) AND PROCEED 0.65 MILE ALONG MAIN ROAD THROUGH PARK
SC2198'TO GRAVEL ROAD NORTH. TURN RIGHT AND PROCEED 0.3 MILE NORTH TO
SC2198'TRAIL ON LEFT. WALK ABOUT 200 FEET WEST ALONG TRAIL TO
SC2198'HYDROGRAPHIC SIGNAL AND STATION ON RIGHT.
SC2198
SC2198 STATION RECOVERY (1997)
SC2198
SC2198'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SC2198'DESCRIPTED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY (RCD) TO
SC2198'REACH FROM THE INTERSECTION OF PACIFIC AVENUE AND LAKE DRIVE IN
SC2198'HAMMOND GO SOUTH ON LAKE DRIVE 0.37 MILES (0.60 KM) TO Y INTERSECTION
SC2198'WITH RIDGE ROAD. PROCEED SOUTH ON RIDGE ROAD FOR 0.25 MILES (0.40 KM)
SC2198'TO ENTRANCE TO FORT STEVENS STATE PARK. PROCEED WEST THEN NORTHWEST
SC2198'ON PETER IREDALE ROAD THROUGH FLASHING STOP LIGHT AND CAMPGROUND FOR
SC2198'ABOUT 0.7 MILES (1.1 KM) TO A 4 BY 4 FT (1.2 M) SIGN WITH ARROWS TO
SC2198'BATTERY RUSSELL, THE PETER IREDALE, HAMMOND, AND WARRENTON AND A
SC2198'INTERSECTING ROAD ON LEFT (WHICH LEADS TO THE PARKING AREA FOR THE
SC2198'PETER IREDALE SHIP WRECK). FROM THIS INTERSECTION GO SOUTHEAST
SC2198'(RETRACE PATH) FOR 0.1 MILE (0.2 KM) TO SMALL BRIDGE WHICH Passes
SC2198'VEHICLES OVER A PAVED BIKE PATH. PARK VEHICLE AND PROCEED ON FOOT
SC2198'NORTHEAST AND UPHILL ON THE BIKE TRAIL FOR ABOUT 200 FT (61.0 M) TO A
SC2198'FORK IN THE TRAIL. TAKE THE LEFT (NORTH) FORK AND PROCEED ABOUT 250
SC2198'FT (76.2 M) IN A NORTHERLY DIRECTION UNTIL A SANDY TRAIL IS SEEN
SC2198'ON THE LEFT (NORTHWEST) SIDE OF THE BIKE TRAIL. FOLLOW THIS HIKING
SC2198'PATH UPHILL AND NORTH ALONG A OLD VEGETATED DUNE LINE ABOUT 425 FT
SC2198'(129.5 M) TILL A POWER LINE RIGHT-OF-WAY IS REACHED (POWER POLE NO.
SC2198'87743 IS JUST TO LEFT OF TRAIL). CONTINUE NORTH VIA TRAIL FOR ABOUT
SC2198'1320 FT (402.3 M) OVER HILLY TERRAIN. IN THE LAST 100 FT (30.5 M)
SC2198'PROCEED NORTHEAST UP THE STEEP TRAIL THAT CLIMES A HIGH BRUSHY DUNE TO
SC2198'REACH THE STATION. THE STATION IS ON TOP OF THE HIGH BRUSH DUNE. TO
REACH CONTINUE NORTH VIA TRAIL TO A FLAT WOODED AREA AND INTERSECTION WITH A SMALL WINDY TRAIL TO THE WEST. FOLLOW THIS TRAIL ABOUT 50 FT (15.2 M) TO THE WEST EDGE OF DUNE AND STATION. THE STATION IS CENTERED BETWEEN THE 1 X 1 FT (0.3 M) CEMENT FOOTINGS FOR THE OLD U.S.E. HYDROGRAPHIC SIGNAL. THE SIGNAL HAS FALLEN TO THE GROUND AND THE JUMBLE OF 4 X 4 WHITE POSTS WILL SERVE AS WITNESS POSTS (THE SOUTHWEST MOST FOOTING STILL HAS A 6 FT (1.8 M) TALL SECTION OF 4 X 4 STANDING VERTICALLY). ENCUMBERED HIKING TIME IS 15 MINUTES. THE STATION IS STAMPED MIT 1935 AND IS 2 INCHES BELOW GRADE. NOTE THAT THE STATION IS ABOUT 60 M (196.8 FT) EAST OF PETER IREDALE ROAD AND ON THE SECOND NORTH-SOUTH TRENDING DUNE LINE (ON THE LARGEST DUNE) AND ABOUT 450 M (1476.4 FT) NNW OF THE INTERSECTION OF PETER IREDALE ROAD AND THE ROAD TO THE PETER IREDALE PARKING AREA (DESCRIBED ABOVE). IF UNENCUMBERED AND THE WEATHER HAS BEEN DRY THIS ROUTE MAY BE PREFERABLE.

STATION RECOVERY (1998)

RECOVERY NOTE BY WA STATE DEPT ECOLOGY 1998 (RCD)

DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY (RCD). TO REACH FROM THE INTERSECTION OF PACIFIC AVENUE AND LAKE DRIVE IN HAMMOND GO SOUTH ON LAKE DRIVE 0.37 MILES (0.60 KM) TO Y INTERSECTION WITH RIDGE ROAD. PROCEED SOUTH ON RIDGE ROAD FOR 0.25 MILES (0.40 KM) TO ENTRANCE TO FORT STEVENS STATE PARK (CAMPING ENTRANCE). PROCEED WEST THEN NORTHWEST ON PETER IREDALE ROAD THROUGH FLASHING STOP LIGHT AND CAMPGROUND FOR ABOUT 0.7 MILES (1.1 KM) TO A 4 BY 4 FT (1.2 M) SIGN WITH ARROWS TO BATTERY RUSSELL, THE PETER IREDALE, HAMMOND, AND WARRENTON AND A INTERSECTING ROAD ON LEFT (WHICH LEADS TO THE PARKING AREA OF THE IREDALE SHIP WRECK). FROM THIS INTERSECTION GO SOUTHEAST (RETRACE PATH) FOR 0.1 MILE (0.2 KM) TO SMALL BRIDGE WHICH PASSES VEHICLES OVER A PAVED BIKE PATH. PARK VEHICLE AND PROCEED ON FOOT NORTHEAST AND UPHILL ON THE BIKE TRAIL FOR ABOUT 200 FT (61.0 M) TO A FORK IN THE TRAIL. TAKE THE LEFT (NORTHWEST) FORK AND PROCEED ABOUT 250 FT (76.2 M) IN A NORTHWESTERLY DIRECTION UNTIL A SANDY TRAIL IS SEEN ON THE LEFT (NORTHWEST) SIDE OF THE BIKE TRAIL. FOLLOW THIS HIKING PATH UPHILL AND NORTH ALONG A OLD VEGETATED DUNE LINE ABOUT 425 FT (129.5 M) TILL A POWER LINE RIGHT-OF-WAY IS REACHED (POWER POLE NO. 87743 IS JUST TO LEFT OF TRAIL). CONTINUE NORTH VIA TRAIL FOR ABOUT 1320 FT (402.3 M) OVER HILLY TERRAIN. IN THE LAST 100 FT (30.5 M) PROCEED NORTHEAST UP THE STEEP TRAIL THAT CLIMES A HIGH BRUSHY DUNE TO REACH THE STATION. THE STATION IS ON TOP OF THE HIGH BRUSH DUNE. TO REACH CONTINUE NORTH VIA TRAIL TO A FLAT WOODED AREA AND PLATIC ORANGE WITNESS POST. FOLLOW THE SMALL WINDY TRAIL JUST NORTH OF POST WEST ABOUT 50 FT (15.2 M) TO THE WEST EDGE OF DUNE AND STATION ON RIGHT. THE STATION IS CENTERED BETWEEN THE 1 X 1 FT (0.3 M) CEMENT FOOTINGS FOR THE OLD U.S.E. HYDROGRAPHIC SIGNAL. THE SIGNAL HAS FALLEN TO THE GROUND AND THE JUMBLE OF 4 X 4 WHITE POSTS WILL SERVE AS WITNESS POSTS (THE SOUTHWEST MOST FOOTING STILL HAS A 6 FT (1.8 M) TALL SECTION OF 4 X 4 STANDING VERTICALLY). A ORANGE WITNESS POST IS SET 1.5 FT (0.5 M) NORTH OF THE STATION. ENCUMBERED HIKING TIME IS 25 MINUTES. THE STATION IS STAMPED MIT 1935 AND IS 2 INCHES BELOW GRADE. NOTE THAT THE STATION IS ABOUT 60 M (196.8 FT) EAST OF PETER IREDALE ROAD AND ON THE SECOND NORTH-SOUTH TRENDING DUNE LINE (ON THE LARGEST DUNE) AND ABOUT 450 M (1476.4 FT) NNW OF THE INTERSECTION OF PETER IREDALE ROAD AND THE ROAD TO THE PETER IREDALE PARKING AREA (DESCRIBED ABOVE). IF UNENCUMBERED AND THE WEATHER HAS BEEN DRY THIS ROUTE MAY BE PREFERABLE.
RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)

RECOVERED AS DESCRIBED. ORANGE WITNESS POST SET 0.25 M (0.82 FT) NORTH OF THE STATION. ADDITIONAL WITNESS POST SET ABOUT 20 M (65.6 FT) SE OF STATION TO MARK THE TURN-OFF FROM THE MAIN TRAIL -FOLLOW NW TRENDING SMALL TAIL TO STATION.
National Geodetic Survey, Retrieval Date = OCTOBER 6, 1999

DESIGNATION - MOTULIPS

PID - SD0720

STATE/COUNTY- WA/GRAYS HARBOR

USGS QUAD - COPALIS CROSSING (1984)

*CURRENT SURVEY CONTROL

NAD 83(1991)- 47 04 07.19116(N) 124 01 43.69254(W) ADJUSTED

X - -2,435,474.675 (meters) COMP

Y - -3,606,827.150 (meters) COMP

Z - 4,646,961.170 (meters) COMP

LAPLACE CORR- 13.38 (seconds) DEFLEC96

ELLIP HEIGHT- -8.62 (meters) GPS OBS

GEOID HEIGHT- -23.95 (meters) GEOID96

PARALLEL CORREV- 13.50 (meters) DEFLEC96

HORIZONTAL ORDER - FIRST

ELLIP ORDER - THIRD CLASS II

The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999.

The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques.

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

The Laplace correction was computed from DEFLEC96 derived deflections.

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

The geoid height was determined by GEOID96.

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<tr>
<th>PID Reference Object</th>
<th>Distance</th>
<th>Geod. Az</th>
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<tbody>
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<td>MOTULIPS AZ MK</td>
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<td>MOTULIPS RM 2</td>
<td>32.001 METERS</td>
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SUPERSEDED SURVEY CONTROL

NAD 83(1991)- 47 04 07.19087(N) 124 01 43.69857(W) AD( ) 1
Superseded values are not recommended for survey control. NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums. See file dsdata.txt to determine how the superseded data were derived.

**MARKER:** DD = SURVEY DISK  
**SETTING:** 7 = SET IN TOP OF CONCRETE MONUMENT  
**STAMPING:** MOTULIPS 1953  
**PROJECTION:** FLUSH  
**STABILITY:** C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO SURFACE MOTION

---

**HISTORY**  
- Date | Condition | Recov. By  
- 1953 | MONUMENTED | CGS  
- 1964 | MONUMENTED | CGS  
- 1974 | MONUMENTED | RAYONI  
- 1997 | GOOD | WADECO

---

**STATION DESCRIPTION**

The station is described by Coast and Geodetic Survey 1953 (RAG). The station is located about 8.75 miles northwest of Hoquiam, about 6.7 miles east southeast of Copalis, 101 feet west of the intersection of two paved roads and 40.7 feet southwest of power pole number T-105.

To reach from Hoquiam, go north on U.S. Highway number 101 for 4.4 miles. Turn left, onto a paved road which leads toward the beach, and go westerly for 5.9 miles to the station in the northwest corner of a T road intersection.

The station is a standard disk, stamped Motulips 1953, set in the top of a square concrete post which projects 6 inches.

The underground station is a standard disk, stamped Motulips 1953, set into a mass of concrete which lies about 40 inches below the surface of the soil.

Reference mark number 1 is a standard disk, stamped Motulips no 1 1953, set in the top of a square concrete post which projects 1 inch. It is located at the southeast edge of a graveled driveway, 30 feet north of the centerline of the highway and about 10 feet lower than the station.

Reference mark number 2 is a standard disk, stamped Motulips no 2 1953, set in the top of a square concrete post which projects 2 inches. It is located 30 feet north of the centerline of the paved road, 5 feet north of a cutbank and about the same elevation as the station.

The azimuth mark is a standard disk, stamped Motulips 1953, set in the top of a square concrete post which projects 5 inches. It is located 0.4 mile east southeast of the station, 29 feet north...
OF THE CENTERLINE OF A PAVED ROAD, 3 FEET NORTHWEST OF TELEPHONE POLE NUMBER 410 AND ABOUT 2 FEET HIGHER THAN THE ROAD.

PICTURE POINT A IS THE BASE AND CENTER OF A SMALL, LONE, TREE WHICH IS LOCATED 7 FEET WEST OF THE GRAVELED DRIVEWAY WHICH LEADS INTO A PRIVATE YARD. IT IS LOCATED 7.607 FEET LOWER THAN THE STATION.

OBSERVATIONS WERE MADE FROM A 114 FOOT TOWER.

STATION RECOVERY (1964)

RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1964 (IRR)

THE STATION WAS RECOVERED AS DESCRIBED EXCEPT FOR A 9-FOOT DISCREPANCY ON THE MEASUREMENT TO REFERENCE MARK NO. 1, THE STATION MARK PROJECTS ONLY 1 INCH AND THE POWER POLES HAVE BEEN CHANGED, MAKING NEW REFERENCES NECESSARY.


REFERENCE MARK NO. 2 IS 77 FEET EAST OF A POWER POLE, 52-1/2 FEET WEST OF A TELEPHONE POLE, 29 FEET NORTH OF THE CENTER OF GRASS CREEK ROAD AND 4 FEET NORTH OF THE EDGE OF THE ROAD CUT.

THE AZIMUTH MARK IS 0.25 MILE EAST-SOUTHEAST OF THE STATION, INSTEAD OF 0.4 MILE, 3 FEET NORTH OF POLE NO. 410 AND 2 FEET SOUTHWEST OF A METAL WITNESS POST.

DIRECTIONS TO REACH THE STATION ARE ADEQUATE.

STATION RECOVERY (1974)

RECOVERY NOTE BY ITT RAYONIER INCORPORATED 1974

THE STATION WAS RECOVERED AS DESCRIBED. A LARGE, WOOD SIGN HAS BEEN CONSTRUCTED BY THE STATION.

REFERENCE MARK NO. 1 HAS BEEN COVERED OVER BY A CONCRETE ADDITION TO THE DRIVEWAY MENTIONED IN THE NOTE ON PAGE 30 OF BOOK NO. 1152.

REFERENCE MARK NO. 2 AND THE AZIMUTH MARK WERE RECOVERED AS DESCRIBED.

DIRECTIONS TO REACH THE STATION ARE ADEQUATE.

STATION RECOVERY (1997)

RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)

RECOVERED AS DESCRIBED. THE WOOD SIGN DESCRIBED IN THE 1974 RECOVERY NOTE IS PARTLY DOWN. TO REACH FROM HOQUIAM FOLLOW SR 109 WEST TO
SD0720'POWELL ROAD (JUST EAST OF THE HUMPTULIPS BRIDGE) . TURN NORTH ON TO SD0720'POWELL ROAD AND PROCEED NORTH TO GRASS CREEK ROAD. TURN NORTHEAST AND SD0720'FOLLOW TO THE INTERSECTION OF OCEAN BEACH ROAD AND GRASS CREEK ROAD. SD0720'THE STATION IS WEST OF, AND 5 FT (1.5 M) HIGHER THAN, THE ROAD.
AH7003

**DESIGNATION** - NERR NERR

**PID** - AH7003

**STATE/COUNTY** - WA/GRAYS HARBOR

**USGS QUAD** - POINT BROWN (1984)

---

**CURRENT SURVEY CONTROL**

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<th>NAD 83(1991)</th>
<th>NAVD 88</th>
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</thead>
<tbody>
<tr>
<td>46 55 58.26881(N)</td>
<td>7.42 (meters) 24.3 (feet)</td>
</tr>
<tr>
<td>124 09 22.88730(W)</td>
<td>GPS OBS</td>
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</table>

---

**X** - -2,449,694.714 (meters) COMP

**Y** - -3,610,528.981 (meters) COMP

**Z** - 4,636,657.970 (meters) COMP

**LAPLACE CORR** - 10.47 (seconds) DEFLEC96

**ELLIP HEIGHT** - -17.30 (meters) GPS OBS

**GEOID HEIGHT** - -24.56 (meters) GEOID96

**HORZ ORDER** - FIRST

**ELLP ORDER** - THIRD CLASS II

---

The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999.

The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques.

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

The Laplace correction was computed from DEFLEC96 derived deflections.

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

The geoid height was determined by GEOID96.

---

All North, East, Units, Scale, and Converg. values listed below indicate consistency with the State Plane Coordinates (SPC) Base of SPC WA S - 184,240.742 221,682.225 MT 0.99993300 -2 39 21.5

**SUPERSEDED SURVEY CONTROL**

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No superseded survey control is available for this station.

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**MARKER** - DD = SURVEY DISK

**SETTING** - 7 = SET IN TOP OF CONCRETE MONUMENT (ROUND)

**STAMPING** - NERR NERR 1988

**PROJECTION** - FLUSH

**STABILITY** - C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO SURFACE MOTION

**SATellite** - THE SITE LOCATION WAS REPORTED AS SUITABLE FOR SATELLITE OBSERVATIONS - 1988

**HISTORY** - Date Condition Recov. By

**HISTORY** - 1988 MONUMENTED USE
AH7003 HISTORY - 1997 GOOD WADECO
AH7003 HISTORY - 1999 DESTROYED WADECO

AH7003 STATION DESCRIPTION

AH7003 DESCRIBED BY US ENGINEERS 1988
AH7003 DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD).
AH7003 THE STATION IS LOCATED IN THE CITY OF OCEANS SHORES AT THE CITY SEWAGE
AH7003 TREATMENT PLANT. FROM SR 115 AND POINT BROWN AVENUE IN OCEAN SHORES
AH7003 FOLLOW POINT BROWN AVENUE SOUTH TO CHANCE ALAMER ROAD. TURN WEST AND
AH7003 FOLLOW CHANCE ALAMER ROAD TO OCEAN SHORES BOULEVARD SW. TURN SOUTH AND
AH7003 FOLLOW OCEAN SHORES BOULEVARD SW SOUTH TO JETTY. CONTINUE EAST ALONG
AH7003 JETTY ON OCEAN SHORES BOULEVARD E TO SEWAGE TREATMENT PLANT AND
AH7003 STATION ON RIGHT. PASS THROUGH GATE AND CHECK IN AT PLANT OFFICE.
AH7003 THE STATION IS ABOUT 100 M (328.1 FT) (210 DEGREES GRID) FROM THE
AH7003 TALLER OF TWO COE HYDROGRAPHIC SIGNAL TOWERS THAT ARE ON-LINE WITH THE
AH7003 STATION, 14 M (45.9 FT) SOUTHEAST OF THE EAST EDGE OF THE SOUTHEAST
AH7003 MOST OF THREE WATER TREATMENT PONDS, 26.8 M (87.9 FT) (110 DEGREES
AH7003 GRID) FROM CEMENT STEPS LEADING TO A 1 M (3.3 FT) TALL CEMENT BASE
AH7003 WITH THREE LARGE SEWAGE CONTROL VALVES, AND 0.7 M (2.3 FT) SOUTHWEST
AH7003 OF A METAL U.S. ARMY CORP OF ENGINEERS WITNESS POST. THE STATION IS
AH7003 OF A ARMY CORP OF ENGINEERS BRASS SURVEY DISK. THE DISK IS STAMPED NERR

AH7003 STATION RECOVERY (1997)

AH7003 RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
AH7003 RECOVERED AS DESCRIBED.

AH7003 STATION RECOVERY (1999)

AH7003 RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)
AH7003 STATION DESTROYED DURING THE CONSTRUCTION OF A RETAINING WALL.
AH7003 THE WALL IS TO PREVENT FLOODING DURING HIGH TIDE CONDITIONS ORIGINATING
AH7003 FROM THE SMALL BAY EAST OF THE SEWAGE TREATMENT PLANT.
**SD0854**

**CBN** - This is a Cooperative Base Network Control Station.

**DESIGNATION** - NORTH HEAD RM 4

**PID** - SD0854

**STATE/COUNTY** - WA/PACIFIC

**USGS QUAD** - CAPE DISAPPOINTMENT (1985)

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**CURRENT SURVEY CONTROL**

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<tr>
<th>Datum</th>
<th>North</th>
<th>East</th>
<th>Units</th>
<th>Scale</th>
<th>Converg.</th>
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<tr>
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<td>(meters)</td>
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</table>

**Position Data**

- X: -2,473,282.197 (meters)
- Y: -3,656,329.904 (meters)
- Z: 4,588,414.682 (meters)

**Height Data**

- LAPLACE CORR: 14.49 (seconds)
- ELLIP HEIGHT: 53.31 (meters)
- GEOID HEIGHT: -24.25 (meters)

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The vertical coordinates were established by GPS observations and adjusted by the National Geodetic Survey in February 1991.

The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques.

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

The Laplace correction was computed from DEFLEC96 derived deflections.

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

The geoid height was determined by GEOID96.

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**SUPERSEDED SURVEY CONTROL**

**ELLIP HT** - 53.52 (m) GP( ) 4 1

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<th>Datum</th>
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<th>Scale</th>
<th>Converg.</th>
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<td>(f) LEVELING 3</td>
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<td>NGVD 29</td>
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<td>(m)</td>
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---

Superseded values are not recommended for survey control.

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

See file dsdata.txt to determine how the superseded data were derived.

---

**MARKER:** DR = REFERENCE MARK DISK

**SETTING:** 36 = SET INTO A CONCRETE BUNKER

**STAMPING:** NORTH HEAD 1942 NO 4 1987
SD0854_PROJECTION: FLUSH
SD0854_MAGNETIC: O = OTHER; SEE DESCRIPTION
SD0854_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
SD0854_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
SD0854+SATELLITE: SATELLITE OBSERVATIONS - February 13, 1991

SD0854

SD0854 HISTORY - Date Condition Recov. By
SD0854 HISTORY - 1987 MONUMENTED NGS
SD0854 HISTORY - 1987 GOOD NGS
SD0854 HISTORY - 19890727 GOOD NGS
SD0854 HISTORY - 19900524 GOOD
SD0854 HISTORY - 19910213 GOOD NGS
SD0854 HISTORY - 19970725 GOOD WADECO

SD0854

SD0854 STATION DESCRIPTION

SD0854'DESCRIBED BY NATIONAL GEODETIC SURVEY 1987 (DAW)
SD0854'THE STATION IS LOCATED ABOUT 3.2 KM (2 MI) SOUTHWEST OF ILWACO,
SD0854'0.3 KM (0.2 MI) NORTHEAST OF THE NORTH HEAD LIGHT HOUSE, AT THE WEST
SD0854'EDGE OF CAPE DISAPOINTMENT AND ON PROPERTY CONTROLLED BY THE PARK
SD0854'SERVICE.
SD0854'

SD0854'TO REACH THE STATION FROM THE INTERSECTION OF FIRST STREET AND
SD0854'SPRUCE STREET IN ILWACO GO WEST FOR 1 BLOCK. CONTINUE AHEAD ON THE
SD0854'FORT CANBY STATE PARK-NORTH HEAD ROAD FOR 3.54 KM (2.2 MI) TO A SIDE
SD0854'ROAD RIGHT. TURN RIGHT ON THE NORTH HEAD LIGHT HOUSE ROAD FOR
SD0854'0.64 KM (0.4 MI) TO A SIDE ROAD RIGHT, TURN RIGHT ON THE NARROW
SD0854'ROAD FOR 0.48 KM (0.3 MI) TO AN ANTENNA SITE AND THE STATION ON THE
SD0854'HIGHEST ONE OF THE THREE ROOF LINES OF THE CONCRETE BUNKER.
SD0854'

SD0854'THE STATION MARK IS A STANDARD NGS REFERENCE MARK DISK STAMPED---
SD0854'---NORTH HEAD 1942 NO 4 1987---SET IN A DRILL HOLE ON THE HIGHEST
SD0854'ROOF LEVEL OF THE CONCRETE BUNKER. IT IS1.2 M (4 FT) SOUTH OF THE
SD0854'NORTH EDGE OF THE ROOF AND 1.1 M (3.5 FT) EAST OF THE WEST EDGE OF
SD0854'THE ROOF.
SD0854'

SD0854'THIS STATION WAS ESTABLISHED FOR BETTER GPS VISABILITY AND CONVENTIO
SD0854'CONVENTIONALLY TIED TO STATIONS NORTH HEAD 1942 AND NORTH HEAD RM 3
SD0854'1976, LEVELS HAVE BEEN RUN TO THIS POINT.
SD0854'

SD0854'DESCRIBED BY DA WEGENAST.

SD0854

SD0854 STATION RECOVERY (1987)

SD0854'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1987
SD0854'RECOVERED IN GOOD CONDITION.

SD0854

SD0854 STATION RECOVERY (1989)

SD0854'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1989
SD0854'THE STATION IS LOCATED ABOUT 3.2 KM (2 MI) SOUTHWEST OF ILWACO,
SD0854'0.3 KM (0.2 MI) NORTHEAST OF THE NORTH HEAD LIGHT HOUSE, AT THE WEST
SD0854'EDGE OF CAPE DISAPOINTMENT AND ON PROPERTY CONTROLLED BY THE PARK
SD0854'SERVICE.
SD0854'TO REACH THE STATION FROM THE INTERSECTION OF FIRST STREET AND
SD0854'SPRUCE STREET IN ILWACO GO WEST FOR 1 BLOCK. CONTINUE AHEAD ON THE

142
ROAD RIGHT. TURN RIGHT ON THE NORTH HEAD LIGHT HOUSE ROAD FOR 0.64 KM (0.4 MI) TO A SIDE ROAD RIGHT, TURN RIGHT ON THE NARROW ROAD FOR 0.48 KM (0.3 MI) TO AN ANTENNA SITE AND THE STATION ON THE HIGHEST ONE OF THE THREE ROOF LINES OF THE CONCRETE BUNKER.

THE STATION MARK IS A STANDARD NGS REFERENCE MARK DISK STAMPED---NORTH HEAD 1942 NO 4 1987---SET IN A DRILL HOLE ON THE HIGHEST ROOF LEVEL OF THE CONCRETE BUNKER. IT IS 1.2 M (4 FT) SOUTH OF THE NORTH EDGE OF THE ROOF AND 1.1 M (3.5 FT) EAST OF THE WEST EDGE OF THE ROOF.

THE STATE PARKS DEPARTMENT PLAN ON LOCKING THE GATE AT NIGHT. CALL LARRY CHATMAN AT 206 642-3078 FOR A KEY. ALSO PACIFIC COUNTY WILL HAVE A KEY.

STATION RECOVERY (1990)

RECOVERED 1990

RECOVERED IN GOOD CONDITION.

STATION RECOVERY (1991)

RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1991

THE STATION IS LOCATED ABOUT 57.9 KM (36.0 MI) SOUTHWEST OF SOUTH BEND, 32.2 KM (20.0 MI) WEST OF ROSBURG, 20.9 KM (13.0 MI) NORTHWEST OF ASTORIA, 3.2 KM (2.0 MI) SOUTHWEST OF ILWACO, 0.3 KM (0.2 MI) NORTHEAST OF THE NORTH HEAD LIGHT HOUSE AND ON PROPERTY CONTROLLED BY THE STATE PARK SERVICE. THE GATE MAY BE LOCKED AFTER DARK, CONTACT MR LARRY CHAPMAN, AREA DIRECTOR FOR THE STATE PARK, PO BOX 488, ILWACO 98624-0488, PHONE 206-642-3078.

TO REACH FROM THE INTERSECTION OF FIRST STREET AND SPRUCE STREET IN ILWACO, GO WEST FOR 1 BLOCK TO A CROSS STREET. CONTINUE AHEAD ON THE FORT CANBY STATE PARK-NORTH HEAD ROAD FOR 3.54 KM (2.20 MI) TO A SIDE ROAD RIGHT. TURN RIGHT AND GO NORTH ON THE NORTH HEAD LIGHT HOUSE ROAD FOR 0.64 KM (0.40 MI) TO A SIDE ROAD RIGHT. TURN RIGHT ON THE NARROW ROAD FOR 0.48 KM (0.30 MI) TO AN ANTENNA SITE AND THE STATION ABOUT 25 PACES WEST OF THE FENCE AND ON THE HIGHEST ROOF LINE OF A CONCRETE BUNKER.

THE MARK IS SET IN A DRILL HOLE IN THE ROOF OF THE CONCRETE BUNKER. IT IS 1.2 M (3.9 FT) SOUTH OF THE NORTH SIDE OF THE ROOF AND 1.1 M (3.6 FT) EAST OF THE WEST EDGE OF THE ROOF.

STATION RECOVERY (1997)

RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)

RECOVERED AS DESCRIBED.
The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999. The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques. The X, Y, and Z were computed from the position and the ellipsoidal ht. The Laplace correction was computed from DEFLEC96 derived deflections. The ellipsoidal height was determined by GPS observations and is referenced to NAD 83. The geoid height was determined by GEOID96. No superseded survey control is available for this station.
AH6993 HISTORY - 1997 MONUMENTED WADECO

AH6993

AH6993 STATION DESCRIPTION

AH6993 DESCRIBED BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD). THE AH6993 STATION IS LOCATED AT DAMON POINT STATE PARK IN THE CITY OF OCEAN SHORES APPROXIMATELY 7 KM (4.35 MI) N OF WESTPORT 48 KM (29.80 MI) SOUTH OF TAHOLAH AND 18 KM (11.20 MI) W OF HOQUIM. TO REACH STATION FROM THE INTERSECTION OF POINT BROWN AVENUE AND SR 115 IN OCEAN SHORES, GO SOUTH ON POINT BROWN AVENUE TO THE OCEAN SHORES MARINA. GO SOUTHWEST ON MARINE VIEW DRIVE 0.15 MILES (0.24 KM) FROM THE MARINA TO THE ENTRANCE TO DAMON POINT STATE PARK. TURN LEFT AND FOLLOW THE GRAVEL PARK ROAD SOUTHEAST 1.3 MILES (2.1 KM) TO THE END OF THE ROAD. A SMALL TRIANGULAR SHAPED TRAFFIC ISLAND ON THE SOUTHEAST CORNER OF LOT. THE STATION IS 90 METERS, (295.3 FT) 94 DEGREES GRID, FROM THE CENTER OF THE TRIANGULAR SHAPED TRAFFIC ISLAND, 24 METERS, (78.7 FT) 70 DEGREES GRID, FROM A 1.5 METER (4.9 FT) TALL 0.5 METER (1.6 FT) DIAMETER STUMP, 16 METERS (52.5 FT) WEST OF THE ORDINARY HIGH WATER LINE, 5 METERS (16.4 FT) WEST OF THE STORM HIGH WATER LINE, AND 0.3 METERS (1.0 FT) SOUTH OF A PLASTIC WITNESS POST.
The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999. The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques. The X, Y, and Z were computed from the position and the ellipsoidal ht. The Laplace correction was computed from DEFLEC96 derived deflections. The ellipsoidal height was determined by GPS observations and is referenced to NAD 83. The geoid height was determined by GEOID96.

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<thead>
<tr>
<th>PID Reference Object</th>
<th>Distance</th>
<th>Geod. Az</th>
</tr>
</thead>
<tbody>
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<td>15.987 METERS</td>
<td>00247</td>
</tr>
<tr>
<td>OYSTER 3 RM 4</td>
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<td>422.672 METERS</td>
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SD0531 SUPERSEDED SURVEY CONTROL

SD0531 NAD 83(1991) - 46 32 50.26289(N) 124 03 34.82917(W) AD(  ) 2
SD0531 NAD 83(1991) - 46 32 50.26207(N) 124 03 34.82853(W) AD(  ) 2
SD0531 NAD 83(1986) - 46 32 50.26227(N) 124 03 34.81076(W) AD(  ) 2
SD0531 NAD 27 - 46 32 50.90603(N) 124 03 30.21696(W) AD(  ) 2
SD0531 NGVD 29 - 7.8 (m) 26. (f) VERT ANG
SD0531 Superseded values are not recommended for survey control.
SD0531 NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
SD0531 See file dsdata.txt to determine how the superseded data were derived.
SD0531 SD0531_MARKER: DS = TRIANGULATION STATION DISK
SD0531_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
SD0531_STAMPING: OYSTER 3 1976
SD0531_PROJECTION: FLUSH
SD0531_MAGNETIC: O = OTHER; SEE DESCRIPTION
SD0531_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
SD0531+STABILITY: SURFACE MOTION
SD0531 HISTORY - Date Condition Recov. By
SD0531 HISTORY - 1976 MONUMENTED NGS
SD0531 HISTORY - 19971015 GOOD WADECO
SD0531 STATION DESCRIPTION
SD0531 'DESCRIBED BY NATIONAL GEODETIC SURVEY 1976 (CLN)
SD0531 'THIS STATION WAS ESTABLISHED TO REPLACE OYSTER 2 1926.
SD0531 'STATION IS LOCATED ON THE OCEAN BEACH 400 FEET SOUTHWEST OF THE BEACH
SD0531 'APPROACH ROAD AND ON THE HIGHEST POINT OF THE WESTERLY MOST SAND
SD0531 'DUNE.
SD0531 'TO REACH FROM THE OYSTERVILLE STORE AND POST OFFICE PROCEED WEST .22
SD0531 'MILE TO A PAVED INTERSECTION CONTINUE STRAIGHT .11 MILE TO AN
SD0531 'INTERSECTION THEN CONTINUE WEST ON PAVED ROAD .10 MILE, CONTINUE
SD0531 'STRAIGHT .58 MILE TO THE INTERSECTION OF I ST. AND OYSTERVILLE
SD0531 'ROAD. CONTINUE STRAIGHT .20 MILE AND THE END OF TWO WHEEL DRIVE
SD0531 'TRUCK TRAVEL AND THE HIGHER HIGH WATER EDGE AT THE BEACH, CONTINUE ON
SD0531 'FOOT 400 FEET SOUTHWEST ALONG THE WESTERLY SAND DUNE TO THE
SD0531 'STATION.
SD0531 'THE STATION MARK STAMPED OYSTER 3 1976 IS A STANDARD DISK SET IN AN
SD0531 '8 INCH DIAMETER CONCRETE MASS. IT IS 152.5 FEET WEST OF THE
SD0531 'SOUTHWEST CONCRETE FOUNDATION CORNER TO A 4-UNIT CONDOMINIUM.
SD0531 'THE SUBSURFACE MARK IS A STANDARD DISK STAMPED OYSTER 3 1976 SET IN
SD0531 'AN IRREGULAR MASS OF CONCRETE 4 FEET BELOW THE GROUND SURFACE.
SD0531 'REFERENCE MARK NO. 3 STAMPED OYSTER 3 NO 3 1976 IS A STANDARD DISK
SD0531 'SET IN AN 8 INCH DIAMETER CONCRETE POST NORTH OF THE STATION.
SD0531 'REFERENCE MARK NO. 4 STAMPED OYSTER 3 NO 4 1976 IS A STANDARD DISK
SD0531 'SET IN AN 8 INCH DIAMETER CONCRETE POST EAST OF THE STATION. IT IS
SD0531 '81.22 FEET WEST OF THE SOUTHWEST CORNER OF A 4-UNIT CONDOMINIUM AND
SD0531 '82.45 FEET WEST-NORTHWEST OF THE NORTHWEST CORNER OF THE 2-UNIT
SD0531 'CONDOMINIUM SOUTH OF THE 4-UNIT.
SD0531 'NEAREST TOWN--OYSTERVILLE.
SD0531 STATION RECOVERY (1997)
SD0531 RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SD0531 RECOVERED AS DESCRIBED. A WITNESS POST IS WITHIN 1 M (3.3 FT) OF THE SD0531 STATION.
National Geodetic Survey, Retrieval Date = OCTOBER 6, 1999

AH7026 DESIGNATION - PC 004
AH7026 PID - AH7026
AH7026 STATE/COUNTY - WA/PACIFIC
AH7026 USGS QUAD - CAPE DISAPPOINTMENT (1985)

*CURRENT SURVEY CONTROL

AH7026 NAD 83(1991) - 46 18 49.19074(N) 124 04 08.55166(W) ADJUSTED
AH7026 NAVD 88 - 7.25 (meters) 23.8 (feet) GPS OBS

AH7026 X - -2,472,215.960 (meters) COMP
AH7026 Y - -3,655,700.906 (meters) COMP
AH7026 Z - 4,589,385.750 (meters) COMP
AH7026 LAPLACE CORR- 14.53 (seconds) DEFLEC96
AH7026 ELLIP HEIGHT- -17.12 (meters) GPS OBS
AH7026 GEOID HEIGHT- -24.22 (meters) GEOID96

AH7026 HORZ ORDER - FIRST
AH7026 ELLP ORDER - THIRD CLASS II

The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999.

The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques.

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

The Laplace correction was computed from DEFLEC96 derived deflections.

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

The geoid height was determined by GEOID96.

<table>
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<th>North</th>
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SUPERSEDED SURVEY CONTROL

No superseded survey control is available for this station.

MARKER: DD = SURVEY DISK
SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
STAMPING: STA 004
PROJECTION: FLUSH
MAGNETIC: R = STEEL ROD IMBEDDED IN MONUMENT
STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO SURFACE MOTION

HISTORY - Date Condition Recov. By
- 1976 MONUMENTED WA-049
- 19990419 GOOD WADECO
AH7026 STATION DESCRIPTION

AH7026 DESCRIBED BY PACIFIC COUNTY WASHINGTON 1976 (JOT)
AH7026 DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD) TO
AH7026 REACH FROM SR 103/SR 101 AND 38TH PLACE PROCEED WEST 0.55 MILES (0.89
AH7026 KM) TO THE OCEAN BEACH. PROCEED SOUTH FROM THE BEACH ACCESS 1.21
AH7026 MILES (1.95 KM). PARK VEHICLE ABOVE THE HIGH TIDE LINE AND PROCEED
AH7026 ABOUT 80 M (262.5 FT) EAST TO STATION ON TOP OF A VEGETATED DUNE. THE
AH7026 STATION IS A STANDARD PACIFIC COUNTY SURVEY DISK SET FLUSH IN A ROUND
AH7026 CONCRETE MONUMENT. THE UNDERGROUND MARK IS A 5/8 INCH REBAR SET IN
AH7026 CONCRETE 2.5 FT (0.8 M) BELOW THE SURFACE MARK. RM 1 AND RM 3 ARE
AH7026 STANDARD PACIFIC COUNTY SURVEY DISKS SET IN CONCRETE WITH WITNESS
AH7026 POSTS IN LINE WITH THE STATION. A 2 INCH PIPE PROJECTING 3 FT (0.9 M)
AH7026 MARKS THE BASED OF THE SEAWARD MOST VEGETATED DUNE AND IS ABOUT 80 M,
AH7026 (262.5 FT) 277 DEGREES GRID, OF THE STATION. THE STATION IS STAMPED
AH7026 STA 004. A ORANGE NGS WITNESS POST AND A STEEL WITNESS POST ARE
AH7026 WITHIN 1 M (3.3 FT) OF THE STATION. REFERENCE MARK 1 IS STAMPED STA
AH7026 RM 1. RM 1 IS 18.34 M, (60.17 FT) 22 DEGREES GRID, FROM THE
AH7026 STATION. REFERENCE MARK 2 HAS BEEN DESTROYED. REFERENCE MARK 3 IS
AH7026 STAMPED STA 004 RM 3. RM 3 IS ABOUT 20 M, (65.6 FT) 120 DEGREES, FROM
AH7026 THE STATION. THE 2 INCH DIAMETER PIPE IS ABOUT 100 M, (328.1 FT) 277
AH7026 DEGREES GRID, FROM THE STATION.

AH7026 STATION RECOVERY (1999)
AH7026 RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)
AH7026 RECOVERED AS DESCRIBED.
The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999. The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques. The X, Y, and Z were computed from the position and the ellipsoidal height. The Laplace correction was computed from DEFLEC96 derived deflections. The ellipsoidal height was determined by GPS observations and is referenced to NAD 83. The geoid height was determined by GEOID96. No superseded survey control is available for this station.

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| AH7024 | SUPERSEDED SURVEY CONTROL |

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<th>HISTORY</th>
<th>Date</th>
<th>Condition</th>
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151
AH7024 HISTORY - 1976 MONUMENTED WA-049
AH7024 HISTORY - 19990419 GOOD WADECO
AH7024

AH7024 STATION DESCRIPTION

AH7024 DESCRIBED BY PACIFIC COUNTY WASHINGTON 1976 (JOT)
AH7024 DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY (RCD). THE
AH7024 STATION IS LOCATED ON THE WESTERN MOST VEGETATED SAND DUNE IN THE CITY
AH7024 OF LONG BEACH. FROM THE INTERSECTION OF SR 103 AND 10TH STREET SOUTH
AH7024 IN LONG BEACH GO WEST 0.4 MILES (0.6 KM) PAST THE EDGEWATER INN TO A
AH7024 PUBLIC RESTROOM LOCATED ABOUT 25 M (82.0 FT) SOUTH OF THE SOUTH END OF
AH7024 THE LONG BEACH BOARD WALK. FROM THE RESTROOMS PROCEED SOUTH 152 M
AH7024 (498.7 FT) TO A HIGH VEGETATED DUNE AND STATION. THE STATION IS
AH7024 SOUTHWEST OF THE EDGEWATER HOTEL. THE STATION IS A STANDARD PACIFIC
AH7024 COUNTY SURVEY DISK SET FLUSH IN A ROUND CONCRETE MOUNUMENT. THE
AH7024 UNDERGROUND MARK CONSISTS OF A 5/8 INCH REBAR SET IN CONCRETE 2.5 FT
AH7024 (0.8 M) BELOW THE SURFACE. REFERENCE MARK 1 AND 2 ARE STANDARD
AH7024 PACIFIC COUNTY SURVEY DISKS SET IN CONCRETE WITH WITNESS POSTS IN LINE
AH7024 WITH THE STATION. A 2 INCH PIPE PROJECTING 6 FT (1.8 M) MARKS THE
AH7024 BASE OF THE SEAWARD MOST VEGETATED DUNE. THE STATION IS STAMPED STA
AH7024 008. A NGS ORANGE WITNESS POST IS 1 M (3.3 FT) WEST OF THE STATION. REFERENCE MARK 1 IS
AH7024 STAMPED STA 008 RM 1. RM 1 IS 25.17 M, (82.58 FT) 12 DEGREES GRID,
AH7024 FROM THE STATION. RM 1 IS 0.6 M (2.0 FT) BELOW GRADE AND 1.25 M (4.10
AH7024 FT) BELOW THE TOP OF THE STEEL WITNESS POST. REFERENCE MARK 2 IS
AH7024 STAMPED STA 008 RM 2. RM 2 IS 28.27 M, (92.75 FT) 98 DEGREES GRID,
AH7024 FROM THE STATION. THE 2 INCH DIAMETER PIPE IS 33.8 M, (110.9 FT) 295
AH7024 DEGREES GRID, OF THE STATION.

AH7024 STATION RECOVERY (1999)

AH7024 RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)
AH7024 RECOVERED AS DESCRIBED.
The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999. The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques. The X, Y, and Z were computed from the position and the ellipsoidal ht. The Laplace correction was computed from DEFLEC96 derived deflections. The ellipsoidal height was determined by GPS observations and is referenced to NAD 83. The geoid height was determined by GEOID96. 

**SUPERSEDED SURVEY CONTROL**

No superseded survey control is available for this station.

**MARKER:** DD = SURVEY DISK
**SETTING:** 7 = SET IN TOP OF CONCRETE MONUMENT
**STAMPING:** STA 014
**PROJECTION:** FLUSH
**MAGNETIC:** R = STEEL ROD IMBEDDED IN MONUMENT
**STABILITY:** C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO SURFACE MOTION
**SATELLITE:** THE SITE LOCATION WAS REPORTED AS SUITABLE FOR SATELLITE OBSERVATIONS - 1976

**HISTORY:** Date Condition Recov. By

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1 National Geodetic Survey, Retrieval Date = OCTOBER 6, 1999

AH7023 DESIGNATION - PC 014
AH7023 PID - AH7023
AH7023 STATE/COUNTY - WA/PACIFIC
AH7023 USGS QUAD - OCEAN PARK (1985)

*CURRENT SURVEY CONTROL*

AH7023 NAD 83(1991) - 46 23 08.68982(N) 124 03 32.37596(W) ADJUSTED NAVD 88 - 7.40 (meters) 24.3 (feet) GPS OBS

AH7023 X - -2,468,327.892 (meters) COMP
AH7023 Y - -3,651,331.423 (meters) COMP
AH7023 Z - 4,594,916.626 (meters) COMP
AH7023 LAPLACE CORR - 15.43 (seconds) DEFLEC96
AH7023 ELLIP HEIGHT - -16.93 (meters) GPS OBS
AH7023 GEOID HEIGHT - -24.18 (meters) GEOID96
AH7023

AH7023 HORZ ORDER - FIRST
AH7023 ELLP ORDER - THIRD CLASS II

AH7023

AH7023 Marker: DD = SURVEY DISK
AH7023 Setting: 7 = SET IN TOP OF CONCRETE MONUMENT
AH7023 Stamping: STA 014
AH7023 Projection: FLUSH
AH7023 Magnetic: R = STEEL ROD IMBEDDED IN MONUMENT
AH7023 Stability: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO SURFACE MOTION
AH7023 Satellite: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR SATELLITE OBSERVATIONS - 1976
AH7023

AH7023 History - Date Condition Recov. By
AH7023 HISTORY - 1976 MONUMENTED WA-049
AH7023 HISTORY - 19990419 GOOD WADECO
AH7023
AH7023 STATION DESCRIPTION
AH7023
AH7023 'DESCRIBED BY PACIFIC COUNTY WASHINGTON 1976 (JOT)
AH7023 'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY (RCD) . FROM
AH7023 'THE INTERSECTION OF PIONEER ROAD AND SR 103 IN LONG BEACH PROCEED
AH7023 'NORTH TO THE INTERSECTION WITH CRANBERRY ROAD. TURN WEST AND PROCEED
AH7023 'ALONG THE CRANBERRY ROAD BEACH ACCESS 0.3 MILES (0.5 KM) TO THE OCEAN
AH7023 'BEACH. GO SOUTH 0.66 MILES (1.06 KM) AND PARK VEHICLE ABOVE THE HIGH
AH7023 'TIDE LINE. FROM THE FIRST VEGETATED DUNE PROCEED EAST ABOUT 50 M
AH7023 ' (164.0 FT) TO THE STATION. THE STATION IS A STANDARD PACIFIC COUNTY
AH7023 'SURVEY DISK SET FLUSH WITH THE GROUND IN A ROUND CONCRETE MONUMENT.
AH7023 'THE UNDERGROUND MARK CONSISTS OF 5/8 INCH REBAR IN CONCRETE 2.5 FT
AH7023 ' (0.8 M) BELOW THE SURFACE MARK. REFERENCE MARK 1 AND 2 ARE STANDARD
AH7023 'PACIFIC COUNTY SURVEY DISKS SET IN CONCRETE WITH WITNESS POSTS IN LINE
AH7023 'WITH THE STATION. A 2 INCH PIPE PROJECTING 6 FT (1.8 M) MARKS THE
AH7023 'BASE OF THE SEAWARD MOST VEGETATED DUNE AND IS 49 M (160.8 FT) WEST OF
AH7023 'THE STATION. THE STATION IS STAMPED STA 014. A STEEL WITNESS MOST IS
AH7023 'ABOUT 1 M (3.3 FT) FROM THE STATION. REFERENCE MARK 1 IS STAMPED STA
AH7023 '014 RM 1. RM 1 IS 26.64 M, (87.40 FT) 23 DEGREES GRID, FROM THE
AH7023 'STATION. REFERENCE MARK 2 IS STAMPED STA 014 RM 2. RM 2 IS 28.26 M,
AH7023 ' (92.72 FT) 120 DEGREES GRID, FROM THE STATION. THE 2 INCH DIAMETER
AH7023 'PIPE IS 49 M, (160.8 FT) 270 DEGREES FROM THE STATION.
AH7023
AH7023 STATION RECOVERY (1999)
AH7023
AH7023 'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)
AH7023 'RECOVERED AS DESCRIBED.
1 National Geodetic Survey, Retrieval Date = OCTOBER 6, 1999

AH7022

DESIGNATION -  PC 021
AH7022  PID -  AH7022
AH7022  STATE/COUNTY - WA/PACIFIC
AH7022  USGS QUAD - OCEAN PARK (1985)

AH7022

*CURRENT SURVEY CONTROL

AH7022*  NAD 83(1991) - 46 26 17.65792(N) 124 03 24.38101(W) ADJUSTED
AH7022*  NAVD 88 - 8.69 (meters) 28.5 (feet) GPS OBS

AH7022

X -2,465,820.082 (meters) COMP
AH7022  Y -3,647,926.427 (meters) COMP
AH7022  Z 4,598,940.519 (meters) COMP
AH7022  LAPLACE CORR- 15.61 (seconds) DEFLEC96
AH7022  ELLIP HEIGHT- -15.63 (meters) GPS OBS
AH7022  GEOID HEIGHT- -24.17 (meters) GEOID96
AH7022

AH7022  HORZ ORDER - FIRST
AH7022  ELLP ORDER - THIRD  CLASS II

AH7022

The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999.

AH7022

The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques.

AH7022

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

AH7022

The Laplace correction was computed from DEFLEC96 derived deflections.

AH7022

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

AH7022

The geoid height was determined by GEOID96.

AH7022

AH7022;

North  East  Units  Scale  Converg.
AH7022;SPC WA S  128,970.830 226,778.995 MT 0.99991787 -2 35 01.0
AH7022;UTM 10  5,143,283.171 418,820.306 MT 0.99968101 -0 45 56.9

AH7022

SUPERSEDED SURVEY CONTROL

AH7022

No superseded survey control is available for this station.

AH7022

AH7022_MARKER: DD = SURVEY DISK
AH7022_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
AH7022_STAMPING: STA 021
AH7022_PROJECTION: FLUSH
AH7022_MAGNETIC: R = STEEL ROD IMBEDDED IN MONUMENT
AH7022_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
AH7022+STABILITY: SURFACE MOTION
AH7022_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AH7022+SATELLITE: SATELLITE OBSERVATIONS - 1976

AH7022

AH7022  HISTORY - Date  Condition  Recov. By
AH7022 HISTORY - 1976 MONUMENTED WA-049
AH7022 HISTORY - 19990419 GOOD WADECO
AH7022

AH7022 STATION DESCRIPTION

AH7022 DESCRIBED BY PACIFIC COUNTY WASHINGTON 1976 (JOT)
AH7022 DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY (RCD). THE
AH7022 STATION IS ON THE WESTERN SIDE OF THE LONG BEACH PENINSULA, ABOUT 5.5
AH7022 MILES (8.9 KM) NORTH OF LONG BEACH AND 3.8 MILES (6.1 KM) SOUTH OF
AH7022 OCEAN PARK, IN THE AREA LOCALLY CALLED KLIPSAN BEACH. TO REACH FROM
AH7022 THE INTERSECTION OF SR 103 AND BAY AVENUE IN THE CITY OF OCEAN PARK GO
AH7022 SOUTH 1.85 MILES (2.98 KM) TO A BEACH ACCESS SIGN (KLIPSAN BEACH) AND
AH7022 225TH STREET. GO WEST ON 225TH ABOUT 0.25 MILES (0.40 KM) TO BEACH
AH7022 AND TURN SOUTH. PROCEED SOUTH ON BEACH 1.85 MILES (2.98 KM) TURN
AH7022 EAST AND PROCEED ABOUT 100 M (328.1 FT) EAST ON A PRIVATE BEACH ACCESS
AH7022 ROAD TO A HIGH GRASSED DUNE ON LEFT AND STATION. THE STATION IS
AH7022 LOCATED BETWEEN 187TH AND 188TH PLACE OF OFF SR 103. THE STATION IS A
AH7022 STANDARD PACIFIC COUNTY SURVEY DISK SET FLUSH WITH THE GROUND IN A
AH7022 ROUND CONCRETE MONUMENT. THE UNDERGROUND MARK CONSISTS OF A 5/8 INCH
AH7022 REBAR SET IN CONCRETE 2.5 FT (0.8 M) BELOW THE SURFACE MARK. THE
AH7022 STATION HAS TWO REFERENCE MARKS. RM 1 IS NORTH OF THE STATION AND RM
AH7022 2 IS EAST OF THE STATION. RM 1 AND RM 2 ARE STANDARD PACIFIC COUNTY
AH7022 SURVEY DISKS SET IN CONCRETE WITH WITNESS POSTS IN LINE WITH THE
AH7022 STATION. A 2 INCH PIPE PROJECTING 6 FT (1.8 M) MARKS THE BASE OF THE
AH7022 SEAWARD MOST VEGETATED DUNE ON THE OCEAN SIDE. THE STATION IS A
AH7022 STANDARD PACIFIC COUNTY SURVEY DISK STAMPED STA 021 WITH A STEEL
AH7022 WITNESS POST LOCATED ABOUT 0.8 M (2.6 FT) FROM THE STATION. REFERENCE
AH7022 MARK 1 IS A STANDARD PACIFIC COUNTY SURVEY DISK STAMPED STA 021 RM 1.
AH7022 RM 1 IS 18 M, (59.1 FT) 2 DEGREES GRID, FROM THE STATION. A STEEL
AH7022 WITNESS POST IS 1 M (3.3 FT) NORTH OF RM 1. REFERENCE MARK 2 IS A
AH7022 STANDARD PACIFIC COUNTY SURVEY DISK STAMPED STA 021 RM 2. RM 2 IS 19
AH7022 M, (62.3 FT) 99 DEGREES GRID, FROM THE STATION. A STEEL WITNESS POST
AH7022 IS 1 M (3.3 FT) EAST OF RM 2. A 2 INCH PIPE PROJECTING 6 FT (1.8 M)
AH7022 MARKS THE BASE OF THE SEAWARD MOST VEGETATED DUNE AND IS ABOUT 100 M
AH7022 (328.1 FT) WEST OF THE STATION.

AH7022 STATION RECOVERY (1999)

AH7022 RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)
AH7022 RECOVERED AS DESCRIBED.
### Survey Control Information

**Designation:** PC 025  
**PID:** AH7025  
**State/County:** WA/PACIFIC  
**USGS Quad:** CAPE DISAPPOINTMENT (1985)

- **Current Survey Control**
  - **NAD 83 (1991):**
    - Position: 46 19 30.04613(N) 124 03 58.91588(W)
    - Height: NAVD 88 - 6.32 (meters) 20.7 (feet) GPS OBS
  - **X:** -2,471,533.788 (meters) COMP
  - **Y:** -3,655,060.116 (meters) COMP
  - **Z:** 4,590,256.318 (meters) COMP
  - **Laplace Corr:** 14.69 (seconds) DEFLEC96
  - **Ellipsoidal Height:** -18.04 (meters) GPS OBS
  - **Geoid Height:** -24.21 (meters) GEOID96

- **Horizontal Order:** FIRST  
- **Ellipsoid Order:** THIRD CLASS II

The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999. The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques.

### Marker Information

- **Marker:** DD = SURVEY DISK  
- **Setting:** 7 = SET IN TOP OF CONCRETE MONUMENT  
- **Stamping:** STA 025  
- **Projection:** FLUSH  
- **Magnetic:** R = STEEL ROD IMBEDDED IN MONUMENT  
- **Stability:** C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO SURFACE MOTION

### Survey History

- **1976:** MONUMENTED WA-049
- **19990419:** GOOD WADECO

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1. National Geodetic Survey, Retrieval Date = OCTOBER 6, 1999

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**Superseded Survey Control**

No superseded survey control is available for this station.

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**Recovery Information**

- **History - Date:**
  - 1976 MONUMENTED WA-049
  - 19990419 GOOD WADECO
AH7025 STATION DESCRIPTION
AH7025
AH7025 DESCRIBED BY PACIFIC COUNTY WASHINGTON 1976 (JOT)
AH7025 DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY (RCD). THE
AH7025 STATION IS LOCATED ON THE WESTERN MOST VEGETATED SAND DUNES IN THE
AH7025 VICINITY OF SEAVIEW. TO REACH FROM THE INTERSECTION OF SR 103/SR 101
AH7025 AND 38TH PLACE IN SEAVIEW GO WEST ON 38TH PLACE 0.55 MILES (0.89 KM)
AH7025 TO THE OCEAN BEACH. PROCEED SOUTH ON BEACH 0.36 MILES (0.58 KM) PARK
AH7025 VEHICLE AND PROCEED EAST ABOUT 90 M (295.3 FT) TO HIGH VEGETATED DUNE
AH7025 AND STATION. THE STATION IS A STANDARD PACIFIC COUNTY SURVEY DISK SET
AH7025 FLUSH IN A ROUND CONCRETE MONUMENT. THE UNDERGROUND MARK IS A 5/8
AH7025 INCH REBAR SET IN CONCRETE 2.5 FT (0.8 M) BELOW THE SURFACE MARK. RM 1
AH7025 AND RM 2 ARE STANDARD PACIFIC COUNTY SURVEY DISKS SET IN CONCRETE WITH
AH7025 WITNESS POSTS SET IN LINE WITH THE STATION. A 2 INCH PIPE PROJECTING
AH7025 6 FT (1.8 M) MARKS THE BASE OF THE SEAWARD MOST VEGETATED DUNE AND IS
AH7025 ABOUT 90 M (295.3 FT) WEST OF THE STATION. THE STATION IS STAMPED STA
AH7025 025. A ORANGE NGS WITNESS POST AND A STEEL WITNESS POST ARE WITHIN 1
AH7025 M (3.3 FT) OF THE STATION. REFERENCE MARK 1 IS STAMPED STA 025 RM 1.
AH7025 RM 1 IS 21.91 M, (71.88 FT) 96 DEGREES GRID, FROM THE STATION.
AH7025 REFERENCE MARK 2 IS STAMPED STA 025 RM 2. RM 2 IS 19.71 M, (64.67 FT)
AH7025 185 DEGREES GRID FROM THE STATION. THE 2 INCH DIAMETER PIPE IS 90 M
AH7025 (295.3 FT) WEST OF THE STATION.
AH7025

AH7025 STATION RECOVERY (1999)
AH7025
AH7025 RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)
AH7025 RECOVERED AS DESCRIBED.
1 National Geodetic Survey, Retrieval Date = OCTOBER 6, 1999
AH7021 ***********************************************************************
AH7021 DESIGNATION - PC 032
AH7021 PID - AH7021
AH7021 STATE/COUNTY- WA/PACIFIC
AH7021 USGS QUAD - OCEAN PARK (1985)
AH7021
AH7021 *CURRENT SURVEY CONTROL
AH7021
AH7021* NAD 83(1991)- 46 29 58.66582(N) 124 03 25.77919(W) ADJUSTED
AH7021* NAVD 88 - 9.67 (meters) 31.7 (feet) GPS OBS
AH7021
AH7021 X - -2,463,074.447 (meters) COMP
AH7021 Y - -3,643,811.305 (meters) COMP
AH7021 Z - 4,603,641.421 (meters) COMP
AH7021 LAPLACE CORR- 16.25 (seconds) DEFLEC96
AH7021 ELLIP HEIGHT- -14.64 (meters) GPS OBS
AH7021 GEOID HEIGHT- -24.16 (meters) GEOID96
AH7021
AH7021 HORZ ORDER - FIRST
AH7021 ELLP ORDER - THIRD CLASS II
AH7021
AH7021 The horizontal coordinates were established by GPS observations
AH7021 and adjusted by the National Geodetic Survey in January 1999.
AH7021
AH7021 The orthometric height was determined by GPS observations and a
AH7021 high-resolution geoid model using precise GPS observation and
AH7021 processing techniques.
AH7021
AH7021 The X, Y, and Z were computed from the position and the ellipsoidal ht.
AH7021
AH7021 The Laplace correction was computed from DEFLEC96 derived deflections.
AH7021
AH7021 The ellipsoidal height was determined by GPS observations
AH7021 and is referenced to NAD 83.
AH7021
AH7021 The geoid height was determined by GEOID96.
AH7021
AH7021; North East Units Scale Converg.
AH7021; SPC WA S - 135,788.931 227,056.809 MT 0.99991571 -2 35 02.1
AH7021; UTM 10 - 5,150,105.045 418,881.732 MT 0.99968088 -0 46 00.7
AH7021
AH7021 SUPERSEDED SURVEY CONTROL
AH7021
AH7021 No superseded survey control is available for this station.
AH7021
AH7021 MARKER: DD = SURVEY DISK
AH7021 SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
AH7021 STAMPING: STA 032
AH7021 PROJECTION: FLUSH
AH7021 MAGNETIC: R = STEEL ROD IMBEDDED IN MONUMENT
AH7021 STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
AH7021 STABILITY: SURFACE MOTION
AH7021 SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AH7021 SATELLITE OBSERVATIONS - 1976
AH7021
AH7021 HISTORY - Date Condition Recov. By
AH7021 HISTORY - 1976 MONUMENTED WA-049
AH7021 HISTORY - 19990419 GOOD WADECO
AH7021 STATION DESCRIPTION

AH7021'STATION IS LOCATED ON THE WESTERN MOST VEGETATED SAND DUNES IN THE
AH7021'VINCITY OF OCEAN PARK. FROM THE INTERSECTION OF SR 103 AND BAY AVENUE
AH7021'IN OCEAN CITY GO WEST ALONG BAY AVENUE TO BEACH ACCESS. GO NORTH
AH7021'ALONG BEACH FOR 0.55 MILES. (0.89 KM) FROM THE SEAWORD MOST VEGETATED
AH7021'DUNE GO EAST ABOUT 100 M (328.1 FT) TO STATION. THE STATION IS MARKED
AH7021'WITH A STANDARD PACIFIC COUNTY SURVEY DISK SET FLUSH WITH THE GROUND
AH7021'IN A ROUND CONCRETE MONUMENT. THE UNDERGROUND MARKS CONSISTS OF A
AH7021'5/8-INCH REBAR SET IN CONCRETE 2.5 FT (0.8 M) BELOW THE SURFACE MARK.
AH7021'REFERENCE MARK 1 AND 2 ARE STANDARD PACIFIC COUNTY SURVEY DISKS SET IN
AH7021'CONCRETE WITH STEEL WITNESS POSTS SET IN LINE WITH THE STATION. THE
AH7021'STATION IS STAMPED STA 032. A STEEL WITNESS POST IS LOCATE WITHIN 1 M
AH7021'(3.3 FT) OF THE STATION. REFERENCE MARK 1 IS STAMPED STA 032 RM 1.
AH7021'RM 1 IS 26.0 M (85.3 FT) (0 DEGREES GRID) FROM THE STATION. REFERENCE
AH7021'MARK 2 IS STAMPED STA 032 RM 2. RM 2 IS 21.4 M (70.2 FT) (96 DEGREES
AH7021'GRID) FROM THE STATION. A 2 INCH PIPE PROJECTIN 6 FT (1.8 M) MARKS
AH7021'THE BASE OF THE SEAWORD MOST VEGETATED DUNE AND IS 100 M (328.1 FT)
AH7021'WEST OF THE STATION.

AH7021 STATION RECOVERY (1999)

AH7021'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)
AH7021'RECOVERED AS DESCRIBED.
The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999. The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques.

The X, Y, and Z were computed from the position and the ellipsoidal ht. The Laplace correction was computed from DEFLEC96 derived deflections. The ellipsoidal height was determined by GPS observations and is referenced to NAD 83. The geoid height was determined by GEOID96.

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<td>13031 dddmms.s</td>
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AH7020

AH7020 STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
AH7020+STABILITY: SURFACE MOTION
AH7020_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AH7020+SATELLITE: SATELLITE OBSERVATIONS - 1976
AH7020

AH7020 HISTORY - Date Condition Recov. By
AH7020 HISTORY - 1976 MONUMENTED WA-049
AH7020 HISTORY - 19830113 GOOD NGS
AH7020 HISTORY - 19990419 GOOD WADECO

AH7020

AH7020 STATION DESCRIPTION
AH7020

AH7020'DESCRIBED BY PACIFIC COUNTY WASHINGTON 1976 (JOT)
AH7020'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY (RCD) . THE
AH7020'STATION IS LOCATED NORTH OF OCEAN PARK. FROM THE INTERSECTION OF SR
AH7020'103 AND VERNON AVENUE FOLLOW VERNON AVENUE NORTH TO JOE JOHNS ROAD.
AH7020'TURN WEST AND FOLLOW JOE JOHNS ROAD TO THE INTERSECTION WITH H STREET.
AH7020'TURN NORTH AND FOLLOW H STREET TO INTERSECTION WITH 295TH STREET. THE
AH7020'STATION IS 113.5 M (372.4 FT) (270 DEGREES GRID) FROM THE INTERSECTION
AH7020'OF H STREET AND 295TH STREET, 57 M (187.0 FT) WEST OF THE CENTERLINE
AH7020'OF G STREET, 73 M (239.5 FT) NORTH OF THE CENTERLINE OF THE BEACH
AH7020'ACCESS ROAD, AND 0.5 M (1.6 FT) EAST OF A METAL WITNESS POST. THE
AH7020'STATION IS A STANDARD PACIFIC COUNTY SURVEY DISK SET FLUSH WITH THE
AH7020'GROUND IN A ROUND CONCRETE MONUMENT. THE UNDERGROUND MARK CONSISTS OF
AH7020'5/8-INCH REBAR SET ON CONCRETE 2.5 FT (0.8 M) BELOW THE SURFACE MARK.
AH7020'REFERENCE MARK 1 AND 2 ARE STANDARD PACIFIC COUNTY DISKS SET IN
AH7020'CONCRETE. THE STATION IS STAMPED STA 035. REFERENCE MARK 1 IS
AH7020'STAMPED STA 035 RM 1. RM 1 IS 16.5 M (54.1 FT) (76 DEGREES GRID) FROM
AH7020'THE STATION. REFERENCE MARK 2 IS STAMPED STA 035 RM 2. RM 2 IS 23.4
AH7020'(177 DEGREES GRID) FROM THE STATION. THIS STATION WAS CONVENTIONALLY
AH7020'TIED TO STATION X 537 USING SECOND ORDER LEVELING METHODS. LEVELS
AH7020'HAVE BEEN RUN TO THIS POINT. THE STATION IS 4.001 M (13.127 FT) HIGHER
AH7020'AND 113.5 M (372.4 FT) NORTHWEST OF X 537 (SD0323) . THE LEVELED
AH7020'NAVD88 ELEVATION OF 035 IS 9.764 M, (32.034 FT) OR 4.001 M (13.127 FT)
AH7020'HIGHER THAN X 537.
AH7020

AH7020 STATION RECOVERY (1983)
AH7020

AH7020'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1983 (DAW)
AH7020'THE STATION IS LOCATED ABOUT 4 KM (2.50 MI) SOUTHWEST OF OYSTERVILLE,
AH7020'1.7 KM (1.05 MI) NORTH OF OCEAN PARK AND ON THE TOP OF THE MOST
AH7020'WESTERLY SAND DUNE IN THE VICINITY. TO REACH FROM THE INTERSECTION OF
AH7020'STATE ROUTE 103 AND BAY AVENUE IN OCEAN PARK, GO WEST ON BAY AVENUE
AH7020'FOR 0.64 KM (0.40 MI) TO THE BEACH. TURN RIGHT AND GO NORTHERLY ALONG
AH7020'THE BEACH FOR 2.74 KM (1.70 MI) TO THE END OF TRUCK TRAVEL. WALK EAST
AH7020'FOR ABOUT 90 M (295.3 FT) TO THE TOP OF THE HIGHEST DUNE AND THE
AH7020'STATION. THE MARK IS SET IN THE TOP OF A ROUND CONCRETE MONUMENT THAT
AH7020'IS 0.20 INCHES IN DIAMETER AND PROJECTS 0.10 M (0.33 FT) ABOVE THE
AH7020'GROUND SURFACE. IT IS 64 M (210.0 FT) NORTH-NORTHEAST OF A 2-INCH
AH7020'IRON PIPE, 17.1 M (56.1 FT) WEST-SOUTHWEST OF A WITNESS POST AND 23.8
AH7020'M (78.1 FT) NORTH OF A WITNESS POST.
AH7020

AH7020 STATION RECOVERY (1999)
AH7020

AH7020'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)
AH7020'RECOVERED AS DESCRIBED.
The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999. The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques. The X, Y, and Z were computed from the position and the ellipsoidal ht. The Laplace correction was computed from DEFLEC96 derived deflections. The ellipsoidal height was determined by GPS observations and is referenced to NAD 83. The geoid height was determined by GEOID96.

The geoid height was determined by GEOID96.

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No superseded survey control is available for this station.
AH7019_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
AH7019_STAMPING: STA 037
AH7019_PROJECTION: FLUSH
AH7019_MAGNETIC: R = STEEL ROD IMBEDDED IN MONUMENT
AH7019_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO SURFACE MOTION
AH7019_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR SATELLITE OBSERVATIONS - January 13, 1983

AH7019

AH7019 HISTORY - Date Condition Recov. By
AH7019 HISTORY - 1976 MONUMENTED WA-049
AH7019 HISTORY - 19830113 GOOD NGS
AH7019 HISTORY - 19990419 GOOD WADECO

AH7019

AH7019 STATION DESCRIPTION

AH7019'DESCRIBED BY PACIFIC COUNTY WASHINGTON 1976 (JOT)
AH7019'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY (RCD). THIS STATION IS LOCATED IN THE GRASSED SAND DUNES ALONG THE PACIFIC OCEAN IN THE VICINITY OF THE CITY OF OCEAN PARK. FROM THE INTERSECTION OF SR 103 AND BAY AVENUE GO WEST ALONG BAY AVENUE TO BEACH ACCESS AND BEACH. GO NORTHERLY ALONG THE BEACH FOR 2.46 MILES (3.96 KM) AND STATION ON RIGHT. THE STATION IS ABOUT 100 M (328.1 FT) EAST OF THE SEAWORD MOST GRASS COVERED SAND DUNE. THE STATION IS A STANDARD PACIFIC COUNTY SURVEY DISK SET FLUSH WITH THE GROUND IN A ROUND CONCRETE MONUMENT. THE UNDERGROUND MARK CONSISTS OF A 5/8-INCH REBAR SET IN CONCRETE 2.5 FT (0.8 M) BELOW THE SURFACE MARK. REFERENCE MARK 1 AND 2 ARE STANDARD SURVEY DISKS SET IN CONCRETE WITH WITNESS POSTS SET IN LINE WITH THE STATION. THE STATION IS STAMPED STA 037. A STEEL WITNESS POST IS WITHIN 1 M (3.3 FT) OF THE STATION. REFERENCE MARK 1 IS STAMPED STA 037 RM 1. RM 1 IS 19.9 M (65.3 FT) (352 DEGREES GRID) FROM THE STATION. REFERENCE MARK 2 IS STAMPED STA 037 RM 2. RM 2 IS 16.7 M (54.8 FT) (83 DEGREES GRID) FROM THE STATION. A 2 INCH PIPE PROJECTING 6 FT (1.8 M) IS 100 M (328.1 FT) WEST OF THE STATION AND MARKS THE BASE OF THE SEAWORD MOST SAND DUNE ON THE OCEAN SIDE.

AH7019 STATION RECOVERY (1983)

AH7019 RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1983 (DAW)
AH7019 THE STATION IS LOCATED ABOUT 4 KM (2.50 MI) NORTH OF OCEAN PARK, 3.2 KM (2.00 MI) SOUTHWEST OF OYSTERVILLE AND ON THE TOP OF THE MOST WESTERLY SAND DUNE IN THE AREA. TO REACH FROM THE INTERSECTION OF STATE ROUTE 103 AND BAY AVENUE IN OYSTERVILLE, GO WEST ON BAY AVENUE FOR 0.64 KM (0.40 MI) TO THE BEACH. TURN RIGHT AND GO NORTH ON THE BEACH FOR 4.02 KM (2.50 MI) TO THE END OF TRUCK TRAVEL. WALK EAST THROUGH THE SAND FOR ABOUT 90 M (295.3 FT) TO THE TOP OF THE FIRST DUNE AND THE STATION. THE MARK IS SET IN THE TOP OF A ROUND CONCRETE MONUMENT THAT IS 0.26 M (0.85 FT) IN DIAMETER AND IS FLUSH WITH THE SURFACE OF THE SAND DUNE. IT IS 29.6 M (97.1 FT) EAST OF A 2-INCH PIPE THAT PROJECTS 1.8 M (5.9 FT) ABOVE THE GROUND SURFACE, 17.4 M (57.1 FT) WEST OF A WITNESS POST AND 20.4 M (66.9 FT) SOUTH OF A WITNESS POST.

AH7019 STATION RECOVERY (1999)

AH7019 RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)
AH7019 RECOVERED AS DESCRIBED.
AH7016 DESIGNATION - PC 044
AH7016 PID - AH7016
AH7016 STATE/COUNTY- WA/PACIFIC
AH7016 USGS QUAD - OYSTERVILLE (1985)

*CURRENT SURVEY CONTROL

NAD 83(1991) - 46 34 43.28341(N) 124 03 46.28945(W) ADJUSTED NAVD 88 - 7.26 (meters) 23.8 (feet) GPS OBS

X - -2,459,862.897 (meters) COMP
Y - -3,638,280.412 (meters) COMP
Z - 4,609,684.896 (meters) COMP

LAPLACE CORR- 15.52 (seconds) DEFLEC96
ELLIP HEIGHT- -17.06 (meters) GPS OBS
GEOID HEIGHT- -24.18 (meters) GEOID96

HORZ ORDER - FIRST
ELLP ORDER - THIRD CLASS II

The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999. The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques.

The X, Y, and Z were computed from the position and the ellipsoidal ht. The Laplace correction was computed from DEFLEC96 derived deflections. The ellipsoidal height was determined by GPS observations and is referenced to NAD 83. The geoid height was determined by GEOID96.

SUPERSDED SURVEY CONTROL

No superseded survey control is available for this station.

MARKER: DD = SURVEY DISK
SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
STAMPING: STA 044
PROJECTION: FLUSH
MAGNETIC: R = STEEL ROD IMBEDDED IN MONUMENT
STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO SURFACE MOTION
SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR SATELLITE OBSERVATIONS - 1976

HISTORY - Date Condition Recov. By
AH7016 HISTORY - 1976 MONUMENTED WA-049
AH7016 HISTORY - 19990419 GOOD WADECO
AH7016
AH7016 STATION DESCRIPTION

AH7016 DESCRIBED BY PACIFIC COUNTY WASHINGTON 1976 (JOT)
AH7016 DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY (RCD). THE
AH7016 STATION IS LOCATED NORTH OF OCEAN PARK AND WEST OF OYSTERVILLE. FROM
AH7016 OYSTERVILLE GO WEST ON OYSTERVILLE ROAD TO BEACH ACCESS. GO NORTH
AH7016 2.10 MILES (3.38 KM) ON BEACH TO STATION ON RIGHT. THE STATION IS 280
AH7016 M (918.6 FT) NORTH OF A PRIVATE BEACH ACCESS ROAD WITH TWO RAILROAD
AH7016 TIES PROJECTING 4 FT (1.2 M) ABOVE THE GROUND, ABOUT 100 M (328.1 FT)
AH7016 EAST OF THE SEAWORD MOST VEGETATED DUNE, AND 1 M (3.3 FT) EAST OF A
AH7016 METAL WITNESS POST. THE STATION IS MARKED WITH A STANDARD PACIFIC
AH7016 COUNTY SURVEY DISK SET FLUSH WITH THE GROUND IN A ROUND CONCRETE
AH7016 MONUMENT. THE UNDERGROUND MARK CONSISTS OF A 5/8 INCH REBAR WITH
AH7016 PLASTIC CAP SET IN CONCRETE 2.5 FT (0.8 M) BELOW THE SURFACE MARK. RM
AH7016 1 AND RM 2 ARE STANDARD PACIFIC COUNTY DISKS SET IN CONCRETE WITH
AH7016 WITNESS POSTS IN LINE WITH THE STATION. A 6 INCH PIPE PROJECTING 6 FT
AH7016 (1.8 M) IS ABOUT 100 M (328.1 FT) WEST OF THE STATION AND MARKS THE
AH7016 OCEAN SIDE OF THE WEST MOST VEGETATED DUNE. THE STATION IS STAMPED
AH7016 STA 044. REFERENCE MARK 1 IS STAMPED STA 044 RM 1 AND IS 24 M (78.7
AH7016 FT) (110 DEGREES GRID) FROM THE STATION. REFERENCE MARK 2 IS STAMPED
AH7016 STA 044 RM 2 AND IS 22 M (72.2 FT) (7 DEGREES GRID) FROM THE STATION.

AH7016 STATION RECOVERY (1999)

AH7016 RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)
AH7016 RECOVERED AS DESCRIBED.
National Geodetic Survey, Retrieval Date = OCTOBER 6, 1999

SD0533 DESIGNATION - 051
SD0533 PID - SD0533
SD0533 STATE/COUNTY- WA/PACIFIC
SD0533 USGS QUAD - OYSTERVILLE (1985)

*CURRENT SURVEY CONTROL

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The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999.

The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques.

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

The Laplace correction was computed from DEFLEC96 derived deflections.

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

The geoid height was determined by GEOID96.
SD0533 NAD 83(1991)- 46 36 53.74993(N) 124 04 01.06426(W) AD( ) 2
SD0533 NAD 83(1986)- 46 36 53.74897(N) 124 04 01.04902(W) AD( ) 2
SD0533 NAD 27 - 46 36 54.39838(N) 124 03 56.44795(W) AD( ) 2
SD0533 NGVD 29 - 7.9 (m) 26. (f) VERT ANG

Superseded values are not recommended for survey control.
NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
See file dsdata.txt to determine how the superseded data were derived.

MARKER: DD = SURVEY DISK
SETTING : 7 = SET IN TOP OF CONCRETE MONUMENT
STAMPING: STA 051
_ALIAS: PC 051
_PROJECTION: FLUSH
_MAGNETIC: R = STEEL ROD IMBEDDED IN MONUMENT
_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
+SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
+SATELLITE: SATELLITE OBSERVATIONS - February 03, 1982

HISTORY - Date Condition Recov. By
HISTORY - 1976 MONUMENTED WA-049
HISTORY - 19820203 GOOD NGS
HISTORY - 19971015 GOOD WADECO
HISTORY - 19990419 GOOD WADECO

STATION DESCRIPTION

DESCRIBED BY PACIFIC COUNTY WASHINGTON 1976 (CLN)
THIS STATION IS A PACIFIC COUNTY CONTROL STATION, WHICH IS LOCATED
IN THE AREA OF LEADBETTER POINT ON THE OCEAN SIDE ABOUT 5-1/2 MILES
N.W. OF THE U.S. POST OFFICE AT OYSTERVILLE.

TO REACH THE STATION FROM THE OYSTERVILLE BEACH APPROACH ROAD GO
NORTH ALONG THE BEACH 4.88 MILES (4 WHEEL DRIVE NEEDED) THEN TURN
EAST AND GO .07 MILE TO THE FIRST GRASS COVERED SAND DUNE. THE
STATION IS LOCATED ON THE HIGHEST POINT OF THE DUNE.

THE STATION IS A PACIFIC COUNTY BRASS DISK STAMPED STATION 051 SET
IN A 8-INCH DIAMETER CONCRETE CYLINDER FLUSH TO THE SURFACE. A
2-INCH IRON PIPE PROJECTING 6 FOOT IS LOCATED 70.03 FEET N.W. OF THE
STATION AND MARKS THE GRASSLINE.

THE SUBSURFACE MARK IS A 5/8-INCH STEEL ROAD WITH A PLASTIC CONE
SHAPE CAP STAMPED PACIFIC COUNTY D.P.W. AND A DRILLED CENTER HOLE
SET IN AN IRREGULAR MASS OF CONCRETE.

REFERENCE MARK NO. 1 IS A PACIFIC COUNTY BRASS DISK STAMPED STATION
051 R.M. 1 SET IN A 8-INCH DIAMETER CONCRETE CYLINDER.

REFERENCE MARK NO. 2 IS A PACIFIC COUNTY BRASS DISK STAMPED STATION
051 R.M. 2 SET IN A 8-INCH DIAMETER CONCRETE CYLINDER.

NEAREST TOWN--OYSTERVILLE.
HEIGHT OF LIGHT ABOVE STATION MARK 1.5 METERS.
SD0533

STATION RECOVERY (1982)

SD0533

STATION RECOVERY (1997)

SD0533

STATION RECOVERY (1999)

SD0533

RECOVERY NOTE BY NATIONAL GEOGRAPHIC SURVEY 1982 (DAW)

THE STATION IS LOCATED ABOUT 8.8 KM (5.45 MI) NORTHWEST OF OYSTERVILLE ON THE OCEAN SIDE OF LEADBETTER POINT. TO REACH FROM THE OYSTERVILLE BEACH APPROACH ROAD, GO NORTH ALONG THE BEACH FOR 7.89 KM (4.90 MI). TURN RIGHT AND GO EAST FOR 0.16 KM (0.10 MI) TO THE FIRST GRASS COVERED DUNE AND THE STATION. THE MARK IS SET IN THE TOP OF A ROUND CONCRETE MONUMENT THAT IS 0.20 M (0.66 FT) IN DIAMETER AND IS FLUSH WITH THE GROUND SURFACE. IT IS 21.3 M (69.9 FT) SOUTHEAST OF A 2-INCH PIPE THAT MARKS THE GRASS LINE.

RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)

RECOVERED AS DESCRIBED.

RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)

RECOVERED AS DESCRIBED.
**AH7015 DESIGNATION - PC 055 RM 2**

**AH7015 PID - AH7015**

**AH7015 STATE/COUNTY- WA/PACIFIC**

**AH7015 USGS QUAD - NORTH COVE (1985)**

**AH7015 CURRENT SURVEY CONTROL**

**AH7015**

NAD 83(1991)- 46 38 06.59917(N) 124 03 56.79439(W) ADJUSTED NAVD 88 - 4.58 (meters) 15.0 (feet) GPS OBS

**AH7015**

**AH7015 X - -2,457,491.762 (meters)**

**AH7015 Y - -3,634,374.439 (meters)**

**AH7015 Z - 4,613,995.999 (meters)**

**AH7015 LAPLACE CORR- 15.18 (seconds)**

**AH7015 ELLIP HEIGHT- -19.75 (meters)**

**AH7015 GEOID HEIGHT- -24.18 (meters)**

**AH7015 HORZ ORDER - FIRST**

**AH7015 ELLP ORDER - THIRD CLASS II**

**AH7015**

The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999.

The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques.

The Laplace correction was computed from DEFLEC96 derived deflections.

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

The geoid height was determined by GEOID96.

**AH7015**

**AH7015; North East Units Scale Converg.**

**AH7015; SPC WA S - 150,868.728 227,077.024 MT 0.99991498 -2 35 24.6**

**AH7015; UTM 10 - 5,165,174.387 418,424.122 MT 0.99968179 -0 46 29.5**

**AH7015 SUPERSEDED SURVEY CONTROL**

**AH7015**

No superseded survey control is available for this station.

**AH7015**

**AH7015 MARKER: DD = SURVEY DISK**

**AH7015_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT**

**AH7015_STAMPING: STA 055 RM 2**

**AH7015_PROJECTION: FLUSH**

**AH7015_MAGNETIC: R = STEEL ROD IMBEDDED IN MONUMENT**

**AH7015_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO SURFACE MOTION**

**AH7015_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR SATELLITE OBSERVATIONS - 1976**

**AH7015**

**AH7015 HISTORY - Date Condition Recov. By**
AH7015 HISTORY - 1976 MONUMENTED WA-049
AH7015 HISTORY - 19990419 GOOD WADECO
AH7015
AH7015 STATION DESCRIPTION
AH7015
AH7015 DESCRIBED BY PACIFIC COUNTY WASHINGTON 1976 (JOT)
AH7015 DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY (RCD) . THE
AH7015 STATION IS A PACIFIC COUNTY CONTROL STATION WHICH IS LOCATED ON THE
AH7015 OCEAN SIDE OF leadbetter point AND ABOUT 7 MILES (11.3 KM) NORTHWEST
AH7015 OF THE POST OFFICE IN OYSTERVILLE. TO REACH THE STATION FROM
AH7015 OYSTERVILLE, PROCEED WEST ON OYSTERVILLE ROAD TO BEACH ACCESS. PROCEED
AH7015 NORTH ON THE BEACH FOR 6.43 MILES (10.35 KM) INTO THE WILLAPA BAY
AH7015 NATIONAL WILDLIFE REFUGE. THE STATION IS 100 M (328.1 FT) EAST OF THE
AH7015 SEAWARD MOST VEGETATED DUNE. THE STATION IS MARKED WITH A STANDARD
AH7015 PACIFIC COUNTY SURVEY DISK STAMPED STA 055 RM 2 SET FLUSH WITH THE
AH7015 GROUND IN CONCRETE. A STEEL WITNESS POST IS ABOUT 1 M (3.3 FT) SOUTH
AH7015 OF THE STATION. STATION STA 055 IS LOCATED ABOUT 20 M (65.6 FT) (290
AH7015 DEGREES GRID) OF RM 2. STA 055 IS A STANDARD SURVEY DISK THAT WAS SET
AH7015 FLUSH WITH THE GROUND IN CONCRETE. THE UNDERGROUND MARK CONSISTS OF
AH7015 5/8 INCH REBAR AND PLASTIC CAP SET IN CONCRETE 2.5 FT (0.8 M) BELOW
AH7015 THE SURFACE MARK. STATION STA 055 RM 1 IS ABOUT 20 M (65.6 FT) (11
AH7015 DEGREES GRID) FROM THIS STATION. BOTH STA 055 AND STA 055 RM 1 WERE
AH7015 NOT RECOVERED DURING THIS SURVEY AND LOOK TO BE BARRIED 2 TO 3 FT (0.9
AH7015 M) UNDER VEGETATED DUNES. A 2 INCH PIPE, PROJECTING 6 FT, (1.8 M) IS
AH7015 ABOUT 80 M (262.5 FT) WEST OF THE STATION AND MARKS THE OCEAN SIDE OF
AH7015 THE DUNE WHERE THE STATIONS IS LOCATED.
AH7015
AH7015 STATION RECOVERY (1999)
AH7015
AH7015 RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)
AH7015 RECOVERED AS DESCRIBED.

171
AH7017 The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999.

AH7017 The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques.

AH7017 The X, Y, and Z were computed from the position and the ellipsoidal ht.

AH7017 The Laplace correction was computed from DEFLEC96 derived deflections.

AH7017 The ellipsoidal height was determined by GPS observations and is referenced to NAD 83.

AH7017 The geoid height was determined by GEOID96.

AH7017 No superseded survey control is available for this station.
AH7017 HISTORY - 1976 MONUMENTED WA-049
AH7017 HISTORY - 19990419 GOOD WADECO
AH7017
AH7017 STATION DESCRIPTION
AH7017
AH7017 DESCRIBED BY PACIFIC COUNTY WASHINGTON 1976 (JOT)
AH7017 DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY (RCD). THE
AH7017 STATION IS LOCATED NORTH OF OCEAN PARK AND WEST OF OYSTERVILLE. FROM
AH7017 OYSTERVILLER GO WEST ON OYSTERVILLE ROAD PAST G STREET TO BEACH
AH7017 ACCESS. GO NORTH FOR 0.89 MILES (1.43 KM) ON BEACH TO STATION ON
AH7017 RIGHT (4WD REQUIRED). IF IN A 2WD VEHICLE TURN NORTH ON G STREET AND
AH7017 PROCEED NORTH TO THE INTERSECTION OF 357TH STREET AND G STREET. THE
AH7017 STATION IS 166 M (544.6 FT) NORTHWEST OF THE INTERSECTION OF 357TH
AH7017 STREET AND G STREET, ABOUT 80 M (262.5 FT) EAST OF THE SEAWORD MOST
AH7017 VEGETATED DUNE, 145 M (475.7 FT) NORTH OF THE NORTH MOST WALL OF A
AH7017 MULTIUNIT TOWN HOUSE (SURFCREST CONDOS), AND 1 M (3.3 FT) SOUTH OF A
AH7017 STEEL WITNESS POST. THE STATION IS MARKED WITH A STANDARD PACIFIC
AH7017 COUNTY SURVEY DISK SET FLUSH WITH THE GROUND IN A ROUND CONCRETE
AH7017 MONUMENT. THE UNDERGROUND MARK CONSISTS OF A 5/8 INCH REBAR SET IN
AH7017 CONCRETE 2.5 FT (0.8 M) BELOW THE SURFACE MARK. RM 1 AND RM 2 ARE
AH7017 STANDARD PACIFIC COUNTY SURVEY DISKS SET IN CONCRETE WITH WITNESS
AH7017 POSTS IN LINE WITH THE STATION. THE STATION IS STAMPED STA 057.
AH7017 REFERENCE MARK 1 IS STAMPED STA 057 RM 1 AND IS 19.9 M (65.3 FT) (17
AH7017 DEGREES GRID) FROM THE STATION. REFERENCE MARK 2 IS STAMPED STA 057
AH7017 RM 2 AND IS 22.3 M (73.2 FT) (96 DEGREES GRID) FROM THE STATION.
AH7017
AH7017 STATION RECOVERY (1999)
AH7017
AH7017 RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)
AH7017 RECOVERED AS DESCRIBED.
The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999.

The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques.

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

The Laplace correction was computed from DEFLEC96 derived deflections.

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

The geoid height was determined by GEOID96.
SD0453 NAD 83(1991) - 46 46 05.50959(N) 124 05 42.58745(W) AD( ) 2
SD0453 NAD 83(1986) - 46 46 05.50887(N) 124 05 42.57956(W) AD( ) 2
SD0453 NAD 27 - 46 46 06.16711(N) 124 05 37.95239(W) AD( ) 2
SD0453 NGVD 29 - 7.1 (m) 23. (f) VERT ANG
SD0453 Superseded values are not recommended for survey control.
SD0453 NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
SD0453 See file dsdata.txt to determine how the superseded data were derived.
SD0453
SD0453 Marker: DD = SURVEY DISK
SD0453 Setting: 7 = SET IN TOP OF CONCRETE MONUMENT
SD0453 Stamping: STA 064
SD0453 Projection: FLUSH
SD0453 Magnetic: R = STEEL ROD IMBEDDED IN MONUMENT
SD0453 Stability: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
SD0453 Stability: SURFACE MOTION
SD0453
SD0453 HISTORY - Date Condition Recov. By
SD0453 HISTORY - 1976 MONUMENTED WA-049
SD0453 HISTORY - 19971015 GOOD WADECO
SD0453 HISTORY - 19990419 GOOD WADECO
SD0453
SD0453 STATION DESCRIPTION
SD0453
SD0453 DESCRIBED BY PACIFIC COUNTY WASHINGTON 1976 (CLN)
SD0453 THIS STATION IS A PACIFIC COUNTY CONTROL STATION, LOCATED 7 MILES N.
SD0453 OF TOKELAND, 2-1/2 MILES S. OF GRAYLAND ON THE OCEAN BEACH.
SD0453
SD0453 TO REACH THE STATION FROM THE INTERSECTION OF THE TOKELAND AND SR
SD0453 105 GO NORTH ALONG SR 105 5.26 MILES TO THE MIDWAY BEACH APPROACH
SD0453 TURN LEFT ONTO APPROACH ROAD AND GO .62 MILE TO THE OCEAN BEACH,
SD0453 THEN GO .05 MILE SOUTH ALONG THE WESTERLY SAND DUNE TO THE
SD0453 STATION.
SD0453
SD0453 THE STATION IS A PACIFIC COUNTY BRASS DISK STAMPED STA. 064 SET IN A
SD0453 8-INCH DIAMETER CONCRETE CYLINDER FLUSH TO THE SURFACE.
SD0453
SD0453 THE SUBSURFACE MARK IS A 5/8-INCH STEEL ROD WITH A CONE SHAPED
SD0453 PLASTIC CAP STAMPED PACIFIC COUNTY D.P.W. WITH A CENTER DRILL HOLE
SD0453 SET IN AN IRREGULAR MASS OF CONCRETE 3.5 FEET BELOW THE SURFACE.
SD0453
SD0453 REFERENCE MARK NO. 1 IS A PACIFIC COUNTY BRASS DISK STAMPED STA 064
SD0453 RM 1 SET IN A 8-INCH DIAMETER CONCRETE CYLINDER PROJECTING 4-INCHES
SD0453 ABOVE GROUND.
SD0453
SD0453 REFERENCE MARK NO. 2 IS A PACIFIC COUNTY BRASS DISK STAMPED STA 064
SD0453 RM 2 SET IN A 8-INCH DIAMETER CONCRETE CYLINDER PROJECTING 6-INCHES
SD0453 ABOVE GROUND.
SD0453
SD0453 NEAREST TOWN--GRAYLAND.
SD0453
SD0453 STATION RECOVERY (1997)
SD0453
SD0453 RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SD0453 RECOVERED AS DESCRIBED. FROM THE COE HYDROGRAPHIC SIGNAL LOCATED JUST
SD0453 NORTH OF MIDWAY BEACH ROAD PROCEED WEST 0.18 MILES (0.29 KM) TO
SD0453 STATION ON LEFT. THE STATION IS AND ABOUT 90 M (295.3 FT) SOUTH OF
THE CENTERLINE OF MIDWAY BEACH ROAD.

STATION RECOVERY (1999)

RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)

RECOVERED AS DESCRIBED.
1 National Geodetic Survey, Retrieval Date = OCTOBER 6, 1999

AH7010 ***********************************************************************
AH7010 DESIGNATION - PC 068
AH7010 PID - AH7010
AH7010 STATE/COUNTY- WA/PACIFIC
AH7010 USGS QUAD - GRAYLAND (1985)
AH7010

*CURRENT SURVEY CONTROL

AH7010* NAD 83(1991)- 46 47 38.41504(N) 124 05 50.69679(W) ADJUSTED
AH7010* NAVD 88 - 7.80 (meters) 25.6 (feet) GPS OBS

AH7010 X - -2,452,293.839 (meters) COMP
AH7010 Y - -3,622,374.783 (meters) COMP
AH7010 Z - 4,626,104.605 (meters) COMP
AH7010 LAPLACE CORR- 14.79 (seconds) DEFLEC96
AH7010 ELLIP HEIGHT- -16.65 (meters) GPS OBS
AH7010 GEOID HEIGHT- -24.30 (meters) GEOID96

AH7010 HORZ ORDER - FIRST
AH7010 ELLP ORDER - THIRD CLASS II

AH7010 The horizontal coordinates were established by GPS observations
AH7010 and adjusted by the National Geodetic Survey in January 1999.
AH7010
AH7010 The orthometric height was determined by GPS observations and a
AH7010 high-resolution geoid model using precise GPS observation and
AH7010 processing techniques.
AH7010
AH7010 The X, Y, and Z were computed from the position and the ellipsoidal ht.
AH7010
AH7010 The Laplace correction was computed from DEFLEC96 derived deflections.
AH7010
AH7010 The ellipsoidal height was determined by GPS observations
AH7010 and is referenced to NAD 83.
AH7010
AH7010 The geoid height was determined by GEOID96.
AH7010

AH7010;
AH7010; North   East   Units   Scale   Converg.
AH7010;SPC WA S - 168,616.114 225,461.984 MT 0.99992123 -2 36 47.3
AH7010;UTM 10 - 5,182,857.615 416,248.526 MT 0.99968621 -0 47 59.8

AH7010 SUPERSEDED SURVEY CONTROL

AH7010 No superseded survey control is available for this station.

AH7010 MARKER: DD = SURVEY DISK
AH7010 SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
AH7010 STAMPING: STA 068
AH7010 PROJECTION: FLUSH
AH7010 MAGNETIC: R = STEEL ROD IMBEDDED IN MONUMENT
AH7010 STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
AH7010+STABILITY: SURFACE MOTION
AH7010+SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AH7010+SATELLITE: SATELLITE OBSERVATIONS - 1977

AH7010 HISTORY - Date Condition Recov. By
AH7010 HISTORY - 1977 MONUMENTED WA-049
AH7010 HISTORY - 1999 GOOD WADECO
AH7010
AH7010 STATION DESCRIPTION
AH7010

AH7010'DESCRIBED BY PACIFIC COUNTY WASHINGTON 1977 (JOT)
AH7010'DESCRIPTED BY THE WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD) THE
AH7010'STATION IS LOCATED IN THE VICINITY OF GRAYLAND, WASHINGTON. FROM
AH7010'GRAYLAND PROCEED SOUTH ABOUT 1 MILE (1.6 KM) ON SR 105 TO
AH7010'SMITH-ANDERSON ROAD AND THE PACIFIC COUNTY LINE. TURN WEST ON
AH7010'SMITH-ANDERSON ROAD AND GO 0.37 MILES (0.60 KM) (TOWARD BEACH) AND
AH7010'STATION ON LEFT. THE STATION IS 10 M (32.8 FT) SOUTH OF THE
AH7010'CENTERLINE OF SMITH-ANDERSON ROAD ON TOP OF DUNE. THE STATION IS
AH7010'MARKED WITH A STANDARD PACIFIC COUNTY BRONZE DISK SET FLUSH WITH THE
AH7010'GROUND IN A ROUND CONCRETE MONUMENT. THE UNDERGROUND MARK CONSISTS OF
AH7010'A 5/8 INCH REBAR WITH PLASTIC CAP SET IN CONCRETE 2.5 FT (0.8 M) BELOW
AH7010'THE SURFACE. THERE ARE TWO REFERENCE MARKS FOR THIS STATION. REFERENCE
AH7010'MARK NO. 1 IS A PACIFIC COUNTY BRASS DISK STAMPED STA 068 RM 1 SET
AH7010'FLUSH WITH THE GROUND. RM 1 IS 24.592 FT, (7.496 M) 248 DEGREES OF
AH7010'THE STATION. REFERENCE MARK NO. 2 IS A PACIFIC COUNTY BRASS DISK
AH7010' STAMPED STA 068 RM 2 SET FLUSH WITH THE GROUND. RM 2 IS 38.095 FT,
AH7010'(11.611 M) 184 DEGREES OF THE STATION. BOTH REFERENCE MARKS HAVE
AH7010'STEEL WITNESS POSTS SET IN LINE WITH THE STATION. POSTS ARE WITHIN 2
AH7010'FT (0.6 M) OF THE MARKS. A 2 INCH GALVANIZED PIPE PROJECTING 6 FT
AH7010'(1.8 M) MARKS THE BASE OF THE DUNE ON THE OCEAN SIDE. THE PIPE IS
AH7010'86.87 FT (26.48 M) WEST OF THE STATION.

AH7010

AH7010 STATION RECOVERY (1999)

AH7010

AH7010'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)
AH7010'RECOVERED AS DESCRIBED.
**CURRENT SURVEY CONTROL**

<table>
<thead>
<tr>
<th>Datum</th>
<th>North</th>
<th>East</th>
<th>Units</th>
<th>Scale</th>
<th>Converg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAD 83(1991)</td>
<td>47 14</td>
<td>21.36360(N)</td>
<td>124 12</td>
<td>59.67787(W)</td>
<td>ADJUSTED</td>
</tr>
<tr>
<td>NAVD 88</td>
<td>-7.13</td>
<td>23.4(foot)</td>
<td>GPS OBS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- X: -2,439,459.151 (meters)  
- Y: -3,587,322.100 (meters)  
- Z: 4,659,852.690 (meters)  
- LAPLACE CORR: 8.42 (seconds)  
- ELLIP HEIGHT: -17.27 (meters)  
- GEOID HEIGHT: -24.21 (meters)  
- HORZ ORDER: FIRST  
- ELLP ORDER: THIRD  
- CLASS II

The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999. The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques. The X, Y, and Z were computed from the position and the ellipsoidal ht. The Laplace correction was computed from DEFLEC96 derived deflections. The ellipsoidal height was determined by GPS observations and is referenced to NAD 83. The geoid height was determined by GEOID96.

Superseded values are not recommended for survey control. NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums. See file dsdata.txt to determine how the superseded data were derived.
SD0780_MAGNETIC: O = OTHER; SEE DESCRIPTION
SD0780_STABILITY: D = MARK OF QUESTIONABLE OR UNKNOWN STABILITY

SD0780

SD0780 HISTORY - Date Condition Recov. By
SD0780 HISTORY - 1976 MONUMENTED NGS
SD0780 HISTORY - 19971015 GOOD WADECO

SD0780

SD0780 STATION DESCRIPTION

SD0780 DESCRIBED BY NATIONAL GEODETIC SURVEY 1976

SD0780 TO REACH STATION PIER RM 1 FROM THE POST OFFICE IN MOCLIPS, GO NORTH
SD0780 ON STATE HIGHWAY 109 FOR 0.4 MILE TO THE T INTERSECTION ON THE NORTH
SD0780 SIDE OF THE MOCLIPS RIVER, TURN LEFT AND GO WEST 0.1 MILE TO THE
SD0780 AZIMUTH MARK IN THE NORTHEAST ANGLE OF A T-INTERSECTION.
SD0780 THE AZIMUTH MARK, STAMPED PIER NO 1 1927, IS A STANDARD DISK SET
SD0780 IN CONCRETE 2 INCHES BELOW GROUND, 41 FEET NORTH OF THE CENTER OF
SD0780 THE EAST-WEST STREET, 17.5 FEET EAST OF THE CENTER OF PACIFIC
SD0780 AVE., 62.2 FEET WEST-NORTHWEST OF THE SOUTHWEST CORNER AND 18.9
SD0780 FEET NORTH OF THE PROJECTED SOUTH SIDE OF THE HOUSE IN THE
SD0780 NORTHEAST ANGLE OF THE INTERSECTION. 41.5 FEET EAST OF UTILITY
SD0780 POLE NO. 31B/4580W/5N/1 AND 9.1 FEET NORTH-NORTHWEST OF A
SD0780 TELEPHONE POLE.

SD0780

SD0780 STATION RECOVERY (1997)
SD0780

SD0780 RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SD0780 RECOVERED AS DESCRIBED. STATION WAS INSTALLED BY THE CGS IN 1953 (SEE
SD0780 DESCRIPTION FOR PIER RM 1 RESET). MARK IS UNDER A 7 FT (2.1 M) LONG
SD0780 SECTION OF TELEPHONE POLE AT THE NORTHEAST CORNER OF PACIFIC AND 2ND
SD0780 AVENUE IN MOCLIPS. THE POLE MAY BE ROLLED ASSIDE TO GAIN ACCESS TO
SD0780 THE STATION.
The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999. The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques. The X, Y, and Z were computed from the position and the ellipsoidal ht. The Laplace correction was computed from DEFLEC96 derived deflections. The ellipsoidal height was determined by GPS observations and is referenced to NAD 83. The geoid height was determined by GEOID96.

The geoid height was determined by GEOID96.

The geoid height was determined by GEOID96.

No superseded survey control is available for this station.

AH7009 MARKER: I = METAL ROD
AH7009_SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+
AH7009_PROJECTION: RECESSED 10 CENTIMETERS
AH7009_MAGNETIC: I = MARKER IS A STEEL ROD
AH7009_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
AH7009_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AH7009+SATELLITE: SATELLITE OBSERVATIONS - 1997
AH7009_ROD/PIPE-DEPTH: 10 meters
AH7009 HISTORY - Date Condition Recov. By
AH7009 DESCRIPTION

AH7009 DESCRIBED BY NATIONAL GEODETIC SURVEY 1997 (RCD)
AH7009 DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD).

AH7009 THE STATION IS LOCATED 0.3 MILES (0.5 KM) NORTH OF THE CITY OF
AH7009 GRAYLAND. FROM THE GRAYLAND CITY LIMIT SIGN ON THE NORTH END OF TOWN
AH7009 GO NORTH 0.3 MILES (0.5 KM) ON SR 105 TO MARINE DRIVE. TURN WEST AND
AH7009 FOLLOW MARINE DRIVE TO A T INTERSECTION WITH SALT AIRE BOULEVARD. THE
AH7009 STATION IS 71 M (232.9 FT) WEST OF THE CENTERLINE OF SALT AIRE
AH7009 BOULEVARD AND 4 M (13.1 FT) NORTH OF THE EXTENDED CENTERLINE OF MARINE
AH7009 DRIVE, OR 75 M (246.1 FT) WEST (319 DEGREES GRID) FROM THE CENTER OF
AH7009 THE INTERSECTION OF SALT AIR BOULEVARD AND MARINE DRIVE AND ON-LINE
AH7009 WITH THE EXTENDED NORTH EDGE OF MARINE DRIVE. THE STATION IS CENTERED
AH7009 BETWEEN TWO ORANGE NGS WITNESS POSTS WHICH ARE 1 M (3.3 FT) SOUTH AND
AH7009 1 M (3.3 FT) NORTH OF THE STATION. THE STATION IS A STAINLESS STEEL
AH7009 ROD DRIVEN 81 FT. (24.7 M) ACCESS TO THE DATUM POINT IS HAD THROUGH A
AH7009 STANDARD 5-INCH NGS LOGO CAP THAT IS STAMPED PRUG 1997.
The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999.

The orthometric height was determined by differential leveling and adjusted by the National Geodetic Survey in June 1991.

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

The Laplace correction was computed from DEFLEC96 derived deflections.

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

The geoid height was determined by GEOID96.

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

The modeled gravity was interpolated from observed gravity values.

SUPERSEDED SURVEY CONTROL

Superseded values are not recommended for survey control.

NGVD 29

Superseded values are not recommended for survey control.
See file dsdata.txt to determine how the superseded data were derived.

**SD0117**

**MARKER:** DB = BENCH MARK DISK  
**SETTING:** 17 = SET INTO TOP OF METAL PIPE Driven INTO GROUND  
**STAMPING:** R 443 1977  
**_PROJECTION:** FLUSH  
**MAGNETIC:** O = OTHER; SEE DESCRIPTION  
**STABILITY:** C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO  
**SATellite:** THE SITE LOCATION WAS REPORTED AS SUITABLE FOR  
**SATELLITE:** SATELLITE OBSERVATIONS - June 19, 1998

**HISTORY**  
**- Date**  
**Condition**  
**Recover. By**

- 1977 MONUMENTED NGS  
- 19770718 GOOD WADECO  
- 1987 GOOD USPSQD  
- 19980619 GOOD NGS

**STATION DESCRIPTION**

**DESCRIBED BY NATIONAL GEODETIC SURVEY 1977**  
**2.05 MI SE FROM ALOHA.**

**AT ALOHA, 29 FT NORTHEAST OF THE CENTER LINE OF THE ROAD AND 4**  
**FT EAST OF POWER POLE 197 THAT IS NORTHWEST OF A GRAVELED ROAD.**

**A DISK ON TOP OF AN ALUMINUM ROD, ACCESS HAD THROUGH A 4-INCH**  
**PLASTIC CAP ENCASED IN CONCRETE.**

**STATION RECOVERY (1977)**

**RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1977 (RCD)**

**RECOVERED AS DESCRIBED. FROM THE NEW POST OFFICE IN COPALIS CROSSING,**  
**GO NORWEST 6.3 MILES (10.1 KM) ON OCEAN BEACH ROAD TO CURVE TO WEST**

**AND STATION ON RIGHT. STATION IS 1 METER (3.3 FT) SOUTHEAST OF A**  
**PLASTIC WITNESS POST.**

**STATION RECOVERY (1987)**

**RECOVERY NOTE BY US POWER SQUADRON 1987 (REW)**

**RECOVERED IN GOOD CONDITION.**

**STATION RECOVERY (1998)**

**RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1998 (GAS)**  
**5.9 KM (3.65 MI) SOUTHEASTERLY ALONG OCEAN BEACH ROAD FROM THE POST**  
**OFFICE IN PACIFIC BEACH, 99.0 M (324.8 FT) NORTHWEST OF THE CENTER OF**  
**A GRAVELED ROAD LEADING NORTH, 8.7 M (28.5 FT) NORTHWEST OF THE ROAD**  
**CENTERLINE, 1.0 M (3.3 FT) NORTHWEST OF UTILITY POLE NUMBER 19 7, 0.8**  
**2.6 FT SOUTH OF A WITNESS POST, AND 0.4 M (1.3 FT) BELOW THE LEVEL**  
**OF THE ROAD. NOTE--ACCESS TO THE DISK IS THROUGH A 4-INCH PVC SCREW**  
**CAP. THE MONUMENT IS ON ROAD RIGHT-OF-WAY.**
The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999.

The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques.

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

The Laplace correction was computed from DEFLEC96 derived deflections.

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

The geoid height was determined by GEOID96.

North East Units Scale Converg.
174,824.006 224,751.964 MT 0.99992523 -2 37 21.4
5,189,038.479 415,342.692 MT 0.99968809 -0 48 36.6

SUPERSEDED SURVEY CONTROL

No superseded survey control is available for this station.

MARKER: I = METAL ROD
SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+
STAMPING: RDAN 1997
PROJECTION: RECESSED 10 CENTIMETERS
MAGNETIC: I = MARKER IS A STEEL ROD
STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
SATELLITE OBSERVATIONS - 1997
ROD/PIPE-DEPTH: 10 meters
AH7008 DESCRIPTION

AH7008 THE STATION IS LOCATED SOUTH OF THE CITY OF WESTPORT AT THE SOUTHERN BOUNDARY OF TWIN HARBORS STATE PARK. FROM THE INTERSECTION OF SR 105 AND SR 105 SPUR IN WESTPORT GO SOUTH 1.4 MILES (2.3 KM) TO BONG AVENUE (YELLOW HOUSE ON CORNER, CURRENTLY A KITE STORE). TURN WEST AND FOLLOW BONG AVENUE TO BEACH ACCESS PARKING AREA ON RIGHT AND WOOD FRAME RESTROOMS ON THE WEST SIDE OF LOT. THE STATION IS 34 M (111.5 FT) SOUTHWEST (270 DEGREES GRID) OF THE SOUTHWEST CORNER OF THE RESTROOMS AND 1 M (3.3 FT) SOUTH OF A ORANGE NGS WITNESS POST, OR 7.25 M (23.79 FT) NORTH OF THE CENTERLINE OF BONG AVENUE AND 150 M (492.1 FT) WEST OF THE EXTENDED CENTERLINE OF SEASHORE AVENUE. THE STATION IS A STAINLESS STEEL ROD DRIVEN 67 FT. (20.4 M) ACCESS TO THE DATUM POINT IS HAD THROUGH A STANDARD 5-INCH NGS LOGO CAP THAT IS STAMPED RDAN 1997.
The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999.

The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques.

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

The Laplace correction was computed from DEFLEC96 derived deflections.

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

The geoid height was determined by GEOID96.

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<td>189 31 31.3</td>
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<td>187 42 26.1</td>
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<td>RICH RM 2</td>
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SD0563. NAD 83(1986) - 46 24 50.49770(N) 124 03 27.92287(W) AD( ) 2
SD0563. NAD 27 - 46 24 51.14236(N) 124 03 23.34510(W) AD( ) 2
SD0563. NGVD 29 - 6.7 (m) 22. (f) VERT ANG
SD0563
SD0563. Superseded values are not recommended for survey control.
SD0563. NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
SD0563. See file dsdata.txt to determine how the superseded data were derived.
SD0563
SD0563_MARKER: DS = TRIANGULATION STATION DISK
SD0563_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
SD0563_PROJECTION: FLUSH
SD0563_MAGNETIC: O = OTHER; SEE DESCRIPTION
SD0563_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
SD0563+STABILITY: SURFACE MOTION
SD0563
SD0563_HISTORY - Date Condition Recov. By
SD0563_HISTORY - 1976 MONUMENTED NGS
SD0563_HISTORY - 19971015 GOOD WADECO
SD0563
SD0563_MARKER: DS = TRIANGULATION STATION DISK
SD0563_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
SD0563_PROJECTION: FLUSH
SD0563_MAGNETIC: O = OTHER; SEE DESCRIPTION
SD0563_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
SD0563+STABILITY: SURFACE MOTION
SD0563
SD0563_HISTORY - Date Condition Recov. By
SD0563_HISTORY - 1976 MONUMENTED NGS
SD0563_HISTORY - 19971015 GOOD WADECO
SD0563
SD0563_MARKER: DS = TRIANGULATION STATION DISK
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SD0563_PROJECTION: FLUSH
SD0563_MAGNETIC: O = OTHER; SEE DESCRIPTION
SD0563_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
SD0563+STABILITY: SURFACE MOTION
SD0563
SD0563_HISTORY - Date Condition Recov. By
SD0563_HISTORY - 1976 MONUMENTED NGS
SD0563_HISTORY - 19971015 GOOD WADECO
SD0563
SD0563_STATION DESCRIPTION
SD0563
SD0563"DESCRIBED BY NATIONAL GEODETIC SURVEY 1976 (CLN)
SD0563"THE STATION IS LOCATED 3-1/2 MILES NORTH OF LONG BEACH ON THE OCEAN
SD0563"BEACH, .27 MILE WEST OF STATE HIGHWAY 103.
SD0563'
SD0563'TO REACH STATION FROM THE CRANBERRY ROAD BEACH APPROACH (LOCATED 2.95
SD0563'MILES NORTH OF THE BLINKER LIGHT AT 1ST AND PACIFIC IN LONG BEACH)
SD0563'GO NORTH ALONG THE BEACH 1.3 MILES, THEN TURN RIGHT AND GO EAST 350
SD0563'FEET TO THE WESTERLY MOST SAND DUNE AND STATION.
SD0563'
SD0563'THE STATION MARK IS A STANDARD DISK STAMPED RICH 1976 SET IN AN 8
SD0563'INCH DIAMETER CONCRETE CYLINDER FLUSH TO THE GROUND. IT IS 63.67
SD0563'FEET EAST OF A 2 INCH PIPE MARKING THE WESTERLY MOST GRASSLINE.
SD0563'
SD0563'THE SUBSURFACE MARK IS A STANDARD DISK STAMPED RICH 1976 SET IN AN
SD0563'IRREGULAR MASS OF CONCRETE 4.0 FEET BELOW THE SURFACE.
SD0563'
SD0563'REFERENCE MARK NO. 1 IS A STANDARD DISK STAMPED RICH 1976 R.M. NO. 1
SD0563'SET IN AN 8 INCH DIAMETER CONCRETE CYLINDER PROJECTING 6 INCHES
SD0563'ABOVE GROUND.
SD0563'
SD0563'REFERENCE MARK NO. 2 IS A STANDARD DISK STAMPED RICH 1976 R.M. NO. 2
SD0563'SET IN AN 8 INCH DIAMETER CONCRETE CYLINDER PROJECTING 4 INCHES
SD0563'ABOVE GROUND.
SD0563'
SD0563'NEAREST TOWN--LONG BEACH.
SD0563'
SD0563'STATION RECOVERY (1997)
SD0563'
SD0563'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SD0563'RECOVERED AS DESCRIBED. STATION AND REFERENCE MARKS RECOVERED.
SD0563'ALTERNATE TO REACH FOLLOWS. FROM LONG BEACH PROCEED NORTH ON SR 103
SD0563'TO 158TH PLACE AND STEEL GATE ON LEFT (BUTTERFLY SHORES SUBDIVISION) .
SD0563'PROCEED WEST THROUGH GATE ON 158TH PLACE TO M PLACE. GO SOUTH ON M
SD0563'PLACE TO 155TH PLACE. GO WEST ON 155TH PLACE TO K PLACE. GO SOUTH ON
SD0563'K PLACE TO STATION ON RIGHT. STATION IS ON THE WEST SIDE OF ROAD AND
ABOUT 30 M (98.4 FT) NORTH OF THE VEHICLE TURN AROUND AT THE END OF K PLACE. THE STATION IS 0.6 M (2.0 FT) BELOW GROUND AND MARKED BY A WITNESS POST
The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999. The orthometric height was determined by GPS observations. The X, Y, and Z were computed from the position and the ellipsoidal ht. The Laplace correction was computed from DEFLEC96 derived deflections. The ellipsoidal height was determined by GPS observations and is referenced to NAD 83. The geoid height was determined by GEOID96. No superseded survey control is available for this station.
AH7030's DESCRIBED BY NATIONAL GEODETIC SURVEY 1997 (RCD) 
AH7030's DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD) . 
AH7030's THE STATION IS ON THE FIRST DUNE LINE AT THE SOUTHERN END OF THE CAMP 
AH7030's RILEA NATIONAL GUARD BASE. TO REACH FROM THE MAIN GATE AT CAMP RILEA 
AH7030's GO SOUTH 1.6 MILES (2.6 KM) ON US 101/26 TO SUNSET BEACH ROAD. TURN 
AH7030's WEST INTO SUNSET BEACH AND FOLLOW TO BEACH ACCESS. FROM BEACH ACCESS 
AH7030's POINT GO NORTH ON BEACH FOR 1.09 MILES (1.75 KM) TO A LONE TELEPHONE 
AH7030's POLE AND DUNE ON RIGHT AND STATION. THE STATION IS 40 M (131.2 FT) 
AH7030's SOUTHEAST (113 DEGREES GRID) OF THE TELEPHONE POLE, 8.5 M (27.9 FT) 
AH7030's SOUTH OF THE SOUTHERN MOST OF TWO 6-INCH DIAMETER STEEL POSTS (PART OF 
AH7030's A OLD GATE) , 1.5 M (4.9 FT) NORTH OF A STEEL U-SHAPED PICKET, AND 
AH7030's CENTERED BETWEEN TWO ORANGE NGS WITNESS POSTS. THE WITNESS POSTS ARE 
AH7030's 1 M (3.3 FT) WEST AND 1 M (3.3 FT) EAST OF THE STATION. THE STATION 
AH7030's IS 62 M (203.4 FT) SOUTHWEST (254 DEGREES GRID) FROM A NEW GALVANIZED 
AH7030's STEEL FARM GATE THAT BLOCKS ACCESS INTO THE NATIONAL GUARD BASE FROM 
AH7030's THE OCEAN SIDE VIA SLUSHER LAKE ROAD. THE STATION IS A STAINLESS 
AH7030's STEEL ROD DRIVEN 74 FT, (22.6 M) ACCESS TO THE DATUM POINT IS HAD 
**National Geodetic Survey, Retrieval Date = OCTOBER 6, 1999**

**AF9503 CORS** - This is a GPS Continuously Operating Reference Station.

**AF9503 DESIGNATION** - ROBINSON POINT 1 CORS ARP

**AF9503 CORS_ID** - RPT1

**AF9503 PID** - AF9503

**AF9503 STATE/COUNTY** - WA/KING

**AF9503 USGS QUAD** - POVERTY BAY (1981)

---

**CURRENT SURVEY CONTROL**

**AF9503**

**NAD 83(CORS)** - 47 23 15.00509(N) 122 22 29.10144(W) ADJUSTED

**AF9503 NAVD 88** -

**AF9503 EPOCH DATE** - 1997.00

**AF9503 X** - -2,316,417.118 (meters) COMP

**AF9503 Y** - -3,653,647.280 (meters) COMP

**AF9503 Z** - 4,671,031.737 (meters) COMP

**AF9503 ELLIP HEIGHT** - -9.50 (meters) GPS OBS

**AF9503 GEOID HEIGHT** - -22.48 (meters) GEOID96

**AF9503 HORZ ORDER** - SPECIAL (CORS)

**AF9503 ELLP ORDER** - SPECIAL (CORS)

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**AF9503 STATION IS THE ANTENNA REFERENCE POINT OF THE GPS ANTENNA**

**AF9503 STATION DESCRIPTION**

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**AF9503 DESCRIBED BY NATIONAL GEODETIC SURVEY 1996**

**AF9503 STATION IS A GPS CORS. LATEST INFORMATION INCLUDING POSITIONS AND**
VELOCITIES ARE AVAILABLE IN THE COORDINATE AND LOG FILES ACCESSIBLE BY ANONYMOUS FTP OR THE WORLDWIDE WEB.
FTP CORS.NGS.NOAA.GOV: CORS/COORD AND CORS/STATION_LOG
HTTP://WWW.NGS.NOAA.GOV UNDER PRODUCTS AND SERVICES.
1. National Geodetic Survey, Retrieval Date = OCTOBER 6, 1999

RD1141 ***************************************************************
RD1141 DESIGNATION - SEASIDE RM 2
RD1141 PID - RD1141
RD1141 STATE/COUNTY - OR/CLATSOP
RD1141 USGS QUAD - TILLAMOOK HEAD (1978)
RD1141
RD1141 *CURRENT SURVEY CONTROL
RD1141
RD1141 NAD 83(1991) - 45 59 42.29185(N) 123 55 46.38544(W) ADJUSTED
RD1141 NAVD 88 - 7.297 (meters) 23.94 (feet) ADJUSTED
RD1141
RD1141 X - -2,477,564.347 (meters) COMP
RD1141 Y - -3,682,900.051 (meters) COMP
RD1141 Z - 4,564,856.219 (meters) COMP
RD1141 LAPLACE CORR - 17.17 (seconds) DEFLEC96
RD1141 ELLIP HEIGHT - -15.99 (meters) GPS OBS
RD1141 GEOID HEIGHT - -23.03 (meters) GEOID96
RD1141 DYNAMIC HT - 7.297 (meters) 23.94 (feet) COMP
RD1141 MODELED GRAV - 980,705.6 (mgal) NAVD 88
RD1141
RD1141 HORZ ORDER - FIRST
RD1141 VERT ORDER - FIRST CLASS II
RD1141 ELLP ORDER - THIRD CLASS II
RD1141
RD1141 The horizontal coordinates were established by GPS observations
RD1141 and adjusted by the National Geodetic Survey in January 1999.
RD1141
RD1141 The orthometric height was determined by differential leveling
RD1141 and adjusted by the National Geodetic Survey in June 1991.
RD1141 WARNING-GPS observations at this control monument resulted in a GPS
RD1141 derived orthometric height which differed from the leveled height by
RD1141 more than one decimeter (0.1 meter).
RD1141
RD1141 The X, Y, and Z were computed from the position and the ellipsoidal ht.
RD1141
RD1141 The Laplace correction was computed from DEFLEC96 derived deflections.
RD1141
RD1141 The ellipsoidal height was determined by GPS observations
RD1141 and is referenced to NAD 83.
RD1141
RD1141 The geoid height was determined by GEOID96.
RD1141
RD1141 The dynamic height is computed by dividing the NAVD 88
RD1141 geopotential number by the normal gravity value computed on the
RD1141 Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
RD1141 degrees latitude (G = 980.6199 gals.).
RD1141
RD1141 The modeled gravity was interpolated from observed gravity values.
RD1141
RD1141 SUPERSEDED SURVEY CONTROL
RD1141
RD1141 NGVD 29 - 6.202 (m) 20.35 (f) ADJ UNCH 1 2

194
Superseded values are not recommended for survey control. NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums. See file dsdata.txt to determine how the superseded data were derived.

**MARKER:** DR = REFERENCE MARK DISK

**SETTING:** 32 = SEAWALL

**STAMPING:** 20.348 1926

**PROJECTION:** FLUSH

**MAGNETIC:** O = OTHER; SEE DESCRIPTION

**STABILITY:** C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO

**SATELLITE:** THE SITE LOCATION WAS REPORTED AS SUITABLE FOR

**SATELLITE OBSERVATIONS** - March 10, 1993

**HISTORY** - Date Condition Recov. By

- 1926 MONUMENTED CGS
- 1965 GOOD NGS
- 1984 GOOD USPSQD
- 1987 GOOD NGS
- 19930310 GOOD NGS
- 19971205 GOOD WADECO

**STATION DESCRIPTION**

Described by National Geodetic Survey 1965

In Seaside.

At Seaside, at the extreme west end of Second Avenue, at the west edge of the sidewalk, at the top of the promenade steps leading down to the beach, cemented in a drill hole in the sidewalk.

**STATION RECOVERY (1984)**

Recovery note by US Power Squadron 1984

Recovered in good condition.

**STATION RECOVERY (1987)**

Recovery note by National Geodetic Survey 1987

Recovered in good condition, a new description follows. In Seaside, at the intersection of 2nd Avenue and Columbia Street, in the north end of the first step of a set of steps leading to the beach at the extreme west end of the avenue, 198.2 m (650.3 ft) west of the center of the street, 8.6 m (28.2 ft) northwest of the northwest corner of the Ocean Front Motel, 8.5 m (27.9 ft) southeast of the southeast corner of the aquarium building, 2.2 m (7.2 ft) west of the center of the beach walkway, and 0.9 m (3.0 ft) north of the extended center of the avenue. Note—This is a reference mark disk and the only stamping on the disk is 20.348 1926.

**STATION RECOVERY (1993)**

**STATION RECOVERY (1997)**
RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
RECOVERED AS DESCRIBED. THE STATION IS ABOUT 5 M (16.4 FT) SOUTHWEST
OF THE SOUTHWEST CORNER OF THE SEASIDE AQUARIUM.
### National Geodetic Survey, Retrieval Date = OCTOBER 6, 1999

**FBN** - This is a Federal Base Network Control Station.

**DESIGNATION** - SMUR

**PID** - AB2106

**STATE/COUNTY** - OR/CLATSOPO

**USGS QUAD** - WARRENTON (1985)

**CURRENT SURVEY CONTROL**

| NAD 83(1991) | 46 12 23.30948 (N) | 123 57 32.25720 (W) | ADJUSTED |
| NAVD 88 | 7.669 (meters) | 25.16 (feet) | ADJUSTED |

| X | -2,469,996.640 (meters) | COMP |
| Y | -3,667,584.513 (meters) | COMP |
| Z | 4,581,148.730 (meters) | COMP |

**LAPLACE CORR** - 15.39 (seconds) DEFLEC96

**ELLIP HEIGHT** - 16.20 (meters) GPS OBS

**GEOID HEIGHT** - 23.65 (meters) GEOID96

**DYNAMIC HT** - 7.669 (meters) 25.16 (feet) COMP

**MODELED GRAV** - 980,713.5 (mgal) NAVD 88

**HORZ ORDER** - A

**VERT ORDER** - FIRST CLASS II

**ELLP ORDER** - THIRD CLASS II

The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in March 1996.

The orthometric height was determined by differential leveling and adjusted by the National Geodetic Survey in July 1999.

The Laplace correction was computed from DEFLEC96 derived deflections.

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

The geoid height was determined by GEOID96.

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

The modeled gravity was interpolated from observed gravity values.

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<td>SPC OR N 287,959.647 2,233,121.690 MT 1.00005908 -2 27 11.0</td>
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<tr>
<td>UTM 10 5,117,435.579 426,022.306 MT 0.99966727 -0 41 32.1</td>
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The X, Y, and Z were computed from the position and the ellipsoidal ht.

The Laplace correction was computed from DEFLEC96 derived deflections.

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

The geoid height was determined by GEOID96.

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

The modeled gravity was interpolated from observed gravity values.
AB2106 | SUPERSEDED SURVEY CONTROL

AB2106 | ELLIP HT - -16.07 (m)     GP( ) 1 1

AB2106.Superseded values are not recommended for survey control.
AB2106.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
AB2106.See file dsdata.txt to determine how the superseded data were derived.

AB2106_MARKER: DS = TRIANGULATION STATION DISK
AB2106SETTING: 36 = ROOF OF CONCRETE BUNKER
AB2106_STAMPING: SMUR 1994
AB2106_PROJECTION: FLUSH
AB2106_MAGNETIC: O = OTHER; SEE DESCRIPTION
AB2106_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
AB2106_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AB2106+SATELLITE: SATELLITE OBSERVATIONS - September 29, 1998

AB2106 | HISTORY - Date    Condition    Recov. By
AB2106 | HISTORY - 1994   MONUMENTED    NGS
AB2106 | HISTORY - 19960711 GOOD     NGS
AB2106 | HISTORY - 19960718 GOOD     NGS
AB2106 | HISTORY - 19970725 GOOD     WADECO
AB2106 | HISTORY - 19980929 GOOD     WADOE

AB2106 | STATION DESCRIPTION

AB2106'DESCRIBED BY NATIONAL GEODETIC SURVEY 1994 (LLR)
AB2106'THE STATION IS LOCATED ABOUT 0.6 MILE NNW OF HAMMOND ON THE GROUNDS OF
AB2106+FORT STEVENS STATE PARK.

AB2106'TO REACH FROM THE FOUR WAY STOP (LAKE DRIVE AND PACIFIC) IN HAMMOND GO
AB2106'WEST ON PACIFIC DRIVE FOR 0.2 MILE TO A ROAD FORK, TAKE RIGHT FORK AND
AB2106'GO 0.4 MILE TO A FOUR WAY STOP, TURN RIGHT AND GO 0.1 MILE TO BATTERY
AB2106'ELIAS SMUR AND STATION ABOUT 35 METER ON THE LEFT.

AB2106'THE STATION IS AN NGS DISK SET INTO A DRILL HOLE IN THE ROOF OF THE
AB2106'BATTERY. IT IS 10.6 METERSSOUTH OF THE NORTH EDGE OF THE BATTERY, AND 1.7 METERSEAST OF
AB2106'THE WEST EDGE OF THE BATTERY.

AB2106'DESCRIBED BY LYLE RIGGERS.

AB2106'STATION RECOVERY (1996)

AB2106'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1996 (JGF)
AB2106'RECOVERED AS DESCRIBED. THE STATION IS ABOUT 4 METER (13.1 FT) ABOVE
AB2106'THE GROUND ELEVATION BUT CAN BE EASILY LEVELED UP THE CONCRETE
AB2106'STAIRCASE.

AB2106'STATION RECOVERY (1996)

AB2106'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1996 (JGF)
THE STATION WAS RECOVERED AS DESCRIBED.

STATION RECOVERY (1997)

RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)

RECOVERED AS DESCRIBED.

STATION RECOVERY (1998)

RECOVERY NOTE BY WA STATE DEPT ECOLOGY 1998 (RCD)

RECOVERED AS DESCRIBED. THE STATION IS LOCATED ON THE GROUNDS OF THE FORT STEVENS MILITARY MUSEUM OVERLOOKING THE COLUMBIA RIVER AND IS 0.6 MILES (1.0 KM) NW OF THE TOWN OF HAMMOND
The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999.

The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques.

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

The Laplace correction was computed from DEFLEC96 derived deflections.

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

The geoid height was determined by GEOID96.

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<td>PETERSONS OYSTER HOUSE CHIMNEY</td>
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<td>LIME</td>
<td>APPROX. 3.0 KM</td>
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Superseded values are not recommended for survey control.
NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
See file dsdata.txt to determine how the superseded data were derived.

**MARKER:** DD = SURVEY DISK
**SETTING:** 2 = OBJECT DRIVEN INTO GROUND
**STAMPING:** SNAKE 2 1938
**PROJECTION:** FLUSH
**MAGNETIC:** P = MARKER IS A STEEL PIPE
**STABILITY:** D = MARK OF QUESTIONABLE OR UNKNOWN STABILITY

**HISTORY**
- Date: Condition: Recov. By
  - 1939: MONUMENTED: CGS
  - 1953: GOOD: CGS
  - 1958: GOOD: CGS
  - 1971: GOOD: NGS
  - 1977: GOOD: WA-049
  - 19971015: GOOD: WADECO

**STATION DESCRIPTION**

- DESCRIBED BY COAST AND GEODETIC SURVEY 1939 (WMS)
- THIS STATION IS ABOUT 4 MILES S OF THE VILLAGE OF NAHCOTTA, ON THE W SHORE OF WILLAPA BAY. IT IS ON LAND OWNED BY A MR. PETERSON WHO ALSO OWNS EXTENSIVE OYSTER LANDS IN THE VICINITY. MR. PETERSONS PIER OR ELEVATED BOARDWALK RUNS E FROM HIGH GROUND ABOUT MIDWAY BETWEEN TWO SMALL COTTAGES ON THE EDGE OF THE TIMBER. THE COTTAGES ARE ABOUT 500 YARDS APART. THE STATION IS 31.2 METERS S OF THE PIER OR WALK, 188 FEET E OF A 24-INCH FIR TREE WHICH HAS A SMALLER DOUBLE FIR TREE ABOUT 7 FEET W OF IT.

- SURFACE MARK IS A STANDARD DISK CEMENTED IN THE TOP END OF A 36-INCH SECTION OF 4-INCH CAST-IRON SOIL PIPE WHICH PROJECTS 4 INCHES AND IS STAMPED SNAKE 2 1938.

- SUBSURFACE MARK IS A STANDARD DISK CEMENTED IN THE TOP END OF A 12-INCH SECTION OF 4-INCH CAST-IRON SOIL PIPE PLACED 4 FEET UNDERGROUND AND IS STAMPED SNAKE 2 1938.

- REFERENCE MARK NO.1 IS A STANDARD REFERENCE DISK CEMENTED IN THE TOP END OF A 30-INCH SECTION OF 4-INCH CAST-IRON SOIL PIPE WHICH PROJECTS 4 INCHES, WSW OF THE STATION AND IS STAMPED SNAKE 2 NO.1 1938.

- REFERENCE MARK NO.2 IS MARKED THE SAME AS NO.1, PROJECTING 4
TO REACH THE STATION BY ROAD FROM THE INTERSECTION OF U.S. HIGHWAY 101, AND THE NAHCOTTA - OYSTERVILLE GRAVEL ROAD, GO N 8.1 MILES TO A DIM ROAD TO THE E, GO THROUGH A BOARD GATE AND PROCEED 0.1 MILE TO THE BEACH AND THE STATION.

HEIGHT OF LIGHT ABOVE STATION MARK 3.3 METERS.

STATION RECOVERY (1953)

THE STATION AND REFERENCE MARK NUMBER 1 WERE RECOVERED AS DESCRIBED, IN GOOD CONDITION. REFERENCE MARK NUMBER 2 WAS FOUND TO HAVE BEEN DESTROYED BY WAVE ACTION. A NEW REFERENCE MARK, STAMPED NO 3, WAS ESTABLISHED. AN AZIMUTH MARK WAS ALSO ESTABLISHED. A NEW DESCRIPTIONFOLLOWS--

THE STATION IS LOCATED ON THE WEST SHORE OF WILLAPA BAY AND LIES ABOUT 4 MILES SOUTH OF THE VILLAGE OF NAHCOTTA, ABOUT 200 FEET EAST OF THE TIMBER AND 30 FEET WEST THE LOW BANK.

TO REACH FROM THE LONG BEACH HOTEL IN THE VILLAGE OF LONG BEACH. GO NORTH ON STATE ROUTE 12 A FOR 3.1 MILES. TURN RIGHT AND GO EAST FOR 1.35 MILES TO A T-ROAD INTERSECTION. TURN LEFT AND GO NORTH FOR 2.7 MILES TO THE AZIMUTH MARK ON THE RIGHT HAND SIDE OF THE ROAD. CONTINUE NORTH FOR 0.1 MILE. TURN RIGHT, ONTO A DIM ROAD, AND GO EAST FOR 0.1 MILE TO THE END OF THE POINT AND THE STATION.

REFERENCE MARK NUMBER 1 IS A STANDARD DISK, STAMPED SNAKE 2 NO 1 1938, SET IN THE TOP OF A 4 INCH CAST IRON SOIL PIPE WHICH PROJECTS 4 INCHES AND IS LOCATED AT ABOUT THE SAME ELEVATION AS THE STATION.

REFERENCE MARK NUMBER 3 IS A STANDARD DISK, STAMPED SNAKE 2 NO 3 1938, SET IN THE TOP OF A 4 INCH CAST IRON SOIL PIPE WHICH PROJECTS 4 INCHES AND IS LOCATED AT ABOUT THE SAME ELEVATION AS THE STATION.

THE AZIMUTH MARK IS A STANDARD DISK, STAMPED SNAKE 2 1953, SET IN THE TOP OF A SQUARE CONCRETE POST WHICH PROJECTS 8 INCHES. IT IS LOCATED ABOUT 0.15 MILE SOUTHWEST OF THE STATION, 14 FEET EAST OF THE CENTER OF A PAVED ROAD, 3 FEET WEST OF A WIRE FENCE AND 18 INCHES NORTH OF A POWER POLE.

OBSERVATIONS WERE MADE FROM A 64 FOOT STEEL TOWER.

STATION RECOVERY (1958)

RECOVERED IN GOOD CONDITION ABOUT 4 MILES SOUTH OF NAHCOTTA, ABOUT 650 FEET EAST OF SAND RIDGE ROAD, ABOUT 150 FEET NORTHEAST OF A HOUSE, 6 FEET SOUTHWEST OF THE SHORELINE ON THE WEST SHORE OF SHOALWATER BAY, ON A LOW, GRASSY POINT.

TO REACH FROM FIRST STREET AND PACIFIC AVENUE NORTH (STATE HIGHWAY 12A) IN LONG BEACH, GO NORTH ON STATE HIGHWAY 12A FOR 3.1 MILES, TURN RIGHT (EAST) ONTO A PAVED ROAD, GO 1.35 MILES TO A T-ROAD, TURN LEFT (NORTH) ONTO SAND RIDGE ROAD (PAVED), GO 2.7 MILES TO
THE AZIMUTH MARK ON THE RIGHT. CONTINUE NORTH ON SAND RIDGE ROAD FOR 0.1 MILE, TURN RIGHT (EAST) ONTO DIRT ROAD, GO 0.1 MILE TO END OF ROAD. THE STATION IS ABOUT 400 FEET TO THE NORTHEAST.

SURFACE MARK IS A STANDARD DISK, STAMPED SNAKE 2 1938, SET IN THE TOP OF A 4-INCH IRON PIPE, PROJECTING 3 INCHES ABOVE THE GROUND.

SUBSURFACE MARK WAS NOT SEARCHED FOR.

REFERENCE MARK 1 IS A STANDARD DISK, STAMPED SNAKE 2 1938 NO 1, SET IN THE TOP OF A 4-INCH IRON PIPE, FLUSH WITH THE GROUND. IT IS SOUTHWEST OF THE STATION AT ABOUT THE SAME ELEVATION.

REFERENCE MARK 3 IS A STANDARD DISK, STAMPED SNAKE 2 1938 NO 3, SET IN THE TOP OF A 4-INCH IRON PIPE, PROJECTING 6 INCHES ABOVE THE GROUND. IT IS NORTHWEST OF THE STATION AT ABOUT THE SAME ELEVATION.

SURFACE MARK AND REFERENCE MARKS ARE AWASH AT STORM HIGH WATERS.

REFERENCES MARK 1 IS A STANDARD DISK, STAMPED SNAKE 2 1953, SET IN THE TOP OF A 10-INCH SQUARE CONCRETE MONUMENT, PROJECTING 8 INCHES ABOVE THE GROUND. IT IS SOUTHWEST OF THE STATION, ABOUT 1-1/2 FEET NORTH OF A POWER POLE, 3 FEET WEST OF A WIRE FENCE, 14 FEET EAST OF THE CENTERLINE OF SAND RIDGE ROAD.

STATION RECOVERY (1971)

RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1971 (LFS)


THE STATION IS ON THE WEST SHORE OF SHOALWATER BAY, ON THE EAST SIDE OF NORTH BEACH PENINSULA, 6-1/2 MILES NORTH OF LONG BEACH, 4 1/2 MILES SOUTH OF NAHCOTTA AND ON PROPERTY OWNED BY MR. OLDENBOURG, IN SECTION 15, T 11 N, R 11 W.

TO REACH FROM THE NAHCOTTA STORE AND POST OFFICE IN NAHCOTTA, GO SOUTH ON THE BLACKTOP ROAD FOR 0.4 MILE TO THE INTERSECTION OF BAY ROAD AND PENINSULA ROAD, CONTINUE SOUTH ON PENINSULA ROAD FOR 3.9 MILES TO MR. J. L. PETERSENS DRIVEWAY ON THE LEFT. (CONTINUE SOUTH 0.1 MILE TO THE AZIMUTH MARK). (THIS DRIVEWAY IS 1.6 MILES NORTH OF LITSCHEK ROAD). TURN LEFT AND GO EAST ON MR. PETERSENS DRIVEWAY 0.1 MILE TO HOUSE. WALK AROUND NORTH SIDE OF HOUSE AND EAST ABOUT 75 YARDS FROM THE NORTHEAST CORNER OF THE HOUSE TO THE STATION, WHICH IS 15 FEET NORTH OF MR. PETERSENS PROPERTY LINE.

REFERENCE MARK NO. 1, STAMPED SNAKE 2 1938 NO 1, IS A STANDARD DISK SET IN A 4-INCH SOIL PIPE 3 INCHES BELOW GROUND, 58.3 FEET EAST OF THE EAST ONE OF THREE, 5-INCH DIAMETER ORNAMENTAL FIR TREES GROWING 6 FEET APART, 51.1 FEET NORTH OF THE PROJECTED NORTH SIDE OF THE HOUSE (PROJECTED N. SIDE OF HOUSE IS NOT THE GARAGE, WHICH PROTRUDES FARTHER NORTH THAN THE HOUSE), AND 8.5 FEET SOUTH OF THE PROPERTY LINE.

REFERENCE MARK NO. 3, STAMPED SNAKE 2 1938 NO 3, IS A STANDARD DISK SET IN A 4-INCH SOIL PIPE WHICH PROJECTS 8 INCHES. IT IS 48.5 FEET NORTH OF THE PROPERTY LINE AND 3 FEET SOUTH OF A 1-FOOT BANK AT THE HIGH WATER LINE.

THE AZIMUTH MARK, STAMPED SNAKE 2 1938 1971, IS A STANDARD DISK SET IN A SQUARE CONCRETE POST 105 FEET SSW OF A 30-INCH FIR TREE, 104 FEET SOUTH OF A POWER POLE, 18 FEET EAST OF CENTER OF ROAD, 1 FT E OF FENCE, 1/2 FT E OF WIT. POST.

AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN 4-1/2 MILES SOUTH OF NAHCOTTA.

STATION RECOVERY (1977)

RECOVERY NOTE BY PACIFIC COUNTY WASHINGTON 1977

THE STATION MARK AND REFERENCE MARKS WERE RECOVERED IN GOOD CONDITION. *

THE STATION IS LOCATED ON THE WEST SHORE OF WILLAPA BAY AND LIES ABOUT 4 MILES SOUTH OF NAHCOTTA AND ABOUT 200 FEET EAST OF THE TIMBER.

TO REACH THE STATION FROM THE INTERSECTION OF SR101 AND PENINSULA HIGHWAY (ALSO KNOWN AS SANDRIDGE ROAD) HEAD NORTH ON PENINSULA HIGHWAY 7.46 MILE TO THE DRIVEWAY OF MR. PETERSENS ON THE RIGHT. TURN RIGHT INTO DRIVEWAY AND PARK BY GARAGE ABOUT 150 YARDS EAST OF PENINSULA HIGHWAY. THE STATION IS LOCATED NE OF THE HOUSE ON THE EDGE OF WILLAPA BAY IN THE TIDAL GRASS.

THE STATION MARK STAMPED SNAKE 2 1938 IS A STANDARD DISK SET IN THE TOP OF A 4 INCH SOIL PIPE PROJECTING 6 INCHES ABOVE THE GROUND SURFACE. IT IS 246.2 FEET NORTHEAST OF THE NORTH CORNER OF THE ADDITION ON THE NORTH SIDE OF THE PETERSON HOUSE. A WITNESS POST WAS SET 3 FEET SOUTHEAST OF STATION.

REFERENCE MARK NO. 1 STAMPED SNAKE 2 NO. 1 1938, A STANDARD DISK SET IN A 4 INCH PIPE WAS FOUND 4 INCHES BELOW THE SURFACE AND ABOUT 3 FEET NORTH OF A 3 FOOT HIGH BANK CAUSED BY EROSION. BRICK WERE PLACED AROUND THE REFERENCE MARK AND A WITNESS POST TO AID IN FUTURE RECOVERY.

REFERENCE MARK NO. 3 STAMPED SNAKE 2 NO. 3 1938 A STANDARD DISK SET IN A 4 INCH PIPE PROJECTS 6 INCHES ABOVE THE SURFACE. A WITNESS POST WAS SET TO AID IN FUTURE RECOVERY.

AZIMUTH MARK STAMPED SNAKE 2 1953 SET IN CONCRETE WAS FOUND 0.15 MILE SOUTHWEST OF THE STATION 14 FEET EAST OF THE CENTER OF THE COUNTY ROAD AND 2 FEET WEST OF THE FENCE LINE. IT IS MARKED BY A
SD0538'WITNESS POST 2 FEET EAST OF MARK. AZIMUTH MARK SIGHT LINE IS
SD0538'BLOCKED BY SHRUBBERY IN THE PETERSON YARD.
SD0538'
SD0538'CHANNEL MARKER DOLFIN NO. 17 IS A CLUSTER OF 4 PILING DRIVEN AT A
SD0538'SLANT WITH ONE CENTER PILING PROJECTING UP TO A PLATFORM WITH A
SD0538'SQUARE PANEL WITH THE NUMBER 17 IN THE CENTER. THE CENTER PILING
SD0538'WAS USED FOR A SIGHT, BEING VERY VISIBLE AT ALL ANGLES. THE DOLFIN
SD0538'IS LOCATED NORTHEAST OF STATION ON THE EAST SIDE OF THE CHANNEL
SD0538'BETWEEN THE PENINSULA AND LONG ISLAND.
SD0538'
SD0538'*THE NEW MEASUREMENTS TO REFERENCE MARK NO 1 IS .02 FOOT SHORTER,
SD0538'REFERENCE MARK NO. 3 IS .03 LONGER AND THE INTERIOR ANGLE BETWEEN
SD0538'REFERENCE MARKS IS 0 DEG 01 MIN 51 SEC LARGER. THE STATION MARK AND
SD0538'REFERENCE MARKS APPEAR NOT TO HAVE BEEN DISTURBED.
SD0538
SD0538
SD0538'  STATION RECOVERY (1997)
SD0538
SD0538'
SD0538'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SD0538'RECOVERED AS DESCRIBED. STATION AND REFERENCE MARKS RECOVERED. TO
SD0538'REACH THE PETERSON HOME FROM THE INTERSECTION OF US 101 AND SANDRIDGE
SD0538'ROAD PROCEED NORTH 7.46 MILES (12.01 KM) TO THE DRIVEWAY OF THE
SD0538'PETERSON HOME (HOME HAS LARGE WELCOME SIGN IN 2 FT (0.6 M) TALL
SD0538'LETTERS IN GERMAN OVER THE GARAGE) . THE STATION IS AT THE NORTH EDGE
SD0538'OF THE PETERSON PROPERTY AND IS NE OF THE HOUSE IN TIDAL GRASS. THE
SD0538'STEEL WITNESS POSTS FOR THE STATION AND REFERENCE MARKS ARE VISIBLE
SD0538'FROM THE HOUSE.
SD0132

CBN - This is a Cooperative Base Network Control Station.

DESIGNATION - SOUTH

PID - SD0132

STATE/COUNTY - WA/GRAYS HARBOR

USGS QUAD - SHALE SLOUGH (1982)

*CURRENT SURVEY CONTROL

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**X** - -2,438,691.112 (meters)

**Y** - -3,581,887.829 (meters)

**Z** - 4,664,398.894 (meters)

**LAPLACE CORR** - 7.93 (seconds)

**ELLIP HEIGHT** - -19.65 (meters)

**GEOID HEIGHT** - -24.09 (meters)

**DYNAMIC HT** - 4.643 (meters)

**MODELED GRAV** - 980,768.3 (mgal)

**HORZ ORDER** - B

**VERT ORDER** - SECOND CLASS I

**ELLP ORDER** - THIRD CLASS II

The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in May 1991.

The orthometric height was determined by differential leveling and adjusted by the National Geodetic Survey in June 1991.

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

The Laplace correction was computed from DEFLEC96 derived deflections.

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

The geoid height was determined by GEOID96.

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

The modeled gravity was interpolated from observed gravity values.

SD0132:

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**SUPERSEDED SURVEY CONTROL**

**ELLIP HT** - -19.45 (m)  GP( ) 4 1

**NAD 83(1986)** - 47 17 58.38487(N) 124 14 54.91274(W) AD( ) 3

**NAD 27** - 47 17 59.08400(N) 124 14 50.25600(W) AD( ) 3

**NGVD 29** - 3.622 (m) 11.88 (f) ADJ UNCH 2 1

Superseded values are not recommended for survey control.

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

See file dsdata.txt to determine how the superseded data were derived.

**MARKER:** DS = TRIANGULATION STATION DISK

**SETTING:** 80 = SET IN A BOULDER

**STAMPING:** SOUTH XXVII

**PROJECTION:** FLUSH

**MAGNETIC:** O = OTHER; SEE DESCRIPTION

**STABILITY:** C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO SURFACE MOTION

**SATELLITE:** THE SITE LOCATION WAS REPORTED AS SUITABLE FOR SATELLITE OBSERVATIONS - February 15, 1991

**HISTORY** - Date  Condition  Recov. By

- 1927  MONUMENTED  CGS
- 1951  MONUMENTED  CGS
- 1962  MONUMENTED  CGS
- 1969  MONUMENTED  CGS
- 1977  GOOD  NGS
- 1986  GOOD  NGS
- 19870606  GOOD
- 19891017  GOOD  NGS
- 19910215  GOOD
- 19970721  GOOD  WADECO

**STATION DESCRIPTION**

**DESCRIBED BY COAST AND GEODETIC SURVEY 1927 (TJM)**

**THE STATION IS IN GRANVILLE BAY, ONE MILE N OF WRECK CREEK, ON AN ISOLATED ROCK, 12 FEET HIGH, 49 FEET IN DIAMETER, 18.5 METERS OUTSIDE OF HIGH-WATER LINE, 155 FEET FROM A SMALL STREAM. A SPUR ROAD RUNS FROM THE MAIN ROAD TO THE BEACH AT THIS POINT. THE STANDARD DISK IS STAMPED SOUTH XXVII.**

**STATION IS MARKED BY A STANDARD BRONZE DISK WEDGED IN A DRILL HOLE OUTCROPPING BEDROCK, AS DESCRIBED IN NOTE 2.**

**WITNESS MARK NO.1 IS THE TOP OF A COLUMNAR ROCK 16 FEET HIGH.**

**WITNESS MARK NO.2 IS THE W SIDE OF A COLUMNAR ROCK, 20 FEET HIGH ALONG SIDE THE ROAD OUTLET TO THE BEACH.**
HEIGHT OF SIGNAL ABOVE STATION MARK - 8 METERS.

STATION RECOVERY (1951)

RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1951 (CWC)

RECOVERED.

ABOUT 1-1/2 MILES SOUTHEAST OF POINT GRENVILLE, 1.2 MILES NORTH-NORTHWEST OF WRECK CREEK, ON AN ISOLATED ROCK, 12 FEET HIGH, AND 49 FEET IN DIAMETER, 30 METERS WEST, OFFSHORE, OF THE HIGH WATER LINE, ABOUT 170 METERS NORTHWEST OF ROAD LEADING TO BEACH, 75 METERS NORTH OF SMALL STREAM, 47 METERS NORTHWEST OF THE WEST SIDE OF A COLUMNAR ROCK 20 FEET HIGH, 45 METERS WEST OF THE BASE OF THE BLUFF, AND 7 METERS SOUTH OF SMALL STREAM. IT IS MARKED BY A STANDARD TRIANGULATION DISC CEMENTED IN DRILL HOLE AND STAMPED SOUTH, XXVII.

STATION RECOVERY (1962)

RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1962 (MEW)

THE STATION WAS RECOVERED IN GOOD CONDITION, ALTHO THE MARK DOES PROJECT ABOUT A QUARTER OF AN INCH ABOVE THE ROCK AT THE PRESENT TIME. THE TOP OF THE ROCK IS ABOUT 12 FEET IN DIAMETER AND THE ROCK PROJECTS ABOUT 10 FEET. ADDITIONAL INFORMATION FOLLOWS--

TO REACH FROM THE POST OFFICE IN PACIFIC BEACH, GO EAST ON THE MAIN STREET FOR 0.15 MILE TO A CROSSROAD, (STATE HIGHWAY 9C), TURN LEFT AND GO NORTH ON STATE HIGHWAY 9C TO A Y INTERSECTION AND THE MOCLIPS POST OFFICE ON THE LEFT, TAKE LEFT FORK AND GO 0.25 MILE TO A T-INTERSECTION, TURN RIGHT AND FOLLOW STATE HIGHWAY 9C EAST, THEN NORTH FOR 4.7 MILES TO A SIDE ROAD LEFT, WHICH RUNS ABOUT 100 FEET TO THE BEACH. THIS SIDE ROAD IS 1.3 MILES SOUTH OF THE ROAD INTO THE COAST GUARD STATION. FROM THE POINT WHERE THE ROAD ENTERS THE BEACH THE STATION IS ABOUT 190 YARDS TO THE NORTH. 42 YARDS NORTH OF THE ROAD ONTO THE BEACH IS A ROCK 8 FEET HIGH, 58 YARDS BEYOND THIS IS A SMALL STREAM, 43 YARDS BEYOND THIS THERE IS A ROCK 20 FEET HIGH, 37 YARDS BEYOND THIS IS A SECOND SMALL STREAM AND ABOUT 10 YARDS BEYOND THE STREAM IS THE ROCK ABOUT 10 FEET HIGH WITH THE MARK IN THE APPROXIMATE CENTER OF THE TOP. THIS ROCK IS ABOUT 2 FEET HIGHER ON THE NORTH SIDE THAN ON THE SOUTH SIDE AND IT IS ABOUT 75 FEET SOUTH OF A ROCK OUTCROP WHICH IS ABOUT 50 FEET LONG BY 35 FEET WIDE AND PROJECTS AN AVERAGE OF 4 FEET. THE STATION AND ALL ROCKS MENTIONED ARE ON THE OCEAN SIDE OF THE HIGH WATER LINE, BUT ARE NOT ORDINARILY IN THE WATER. NO OBSERVATIONS WERE MADE FROM THE STATION DURING THIS RECOVERY.

STATION RECOVERY (1969)

RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1969 (JBW)

THE STATION WAS RECOVERED IN GOOD CONDITION.

THE STATION IS IN GRENVILLE BAY, 1.0 MILE NORTH OF WRECK CREEK, ON ISOLATED ROCK 7 FEET HIGH AND 12 FEET IN DIAMETER.

TO REACH THE STATION FROM THE POST OFFICE IN PACIFIC BEACH, GO EAST ON MAIN STREET TO THE JUNCTION OF MAIN STREET AND WASHINGTON STATE HIGHWAY NO. 109. TURN LEFT ONTO STATE HIGHWAY NO. 109 AND GO NORTH

THE STATION IS MARKED BY A STANDARD USC AND GS TRIANGULATION DISK SET IN A DRILL HOLE AND IS STAMPED, SOUTH XXVII.

AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN 3.6 MILES NORTH OF MOCLIPS.

STATION RECOVERY (1977)

RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1977

5.3 MI NORTH FROM MOCLIPS.

5.25 MILES NORTH ALONG STATE HIGHWAY 109 FROM THE POST OFFICE AT MOCLIPS, THENCE 0.1 MI NORTH ALONG THE BEACH, ALONG THE NORTH EDGE OF A SMALL STREAM AND IN THE TOP OF A 12 BY 17 FT BOULDER THAT PROJECTS 7 FT.

STATION RECOVERY (1986)

RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1986 (DAW)

THE STATION WAS RECOVERED AT THIS DATE. THE STATION MARK WAS RECOVERED IN GOOD CONDITION IT IS ALSO A BENCH MARK. A NEW DESCRIPTION FOLLOWS.

THE STATION IS LOCATED ABOUT 6.4 KM (4 MI) NORTH OF MOCLIPS, 3.2 KM (2 MI) SOUTH OF PT GRENVILLE, 1.6 KM (1 MI) NORTH OF WRECK CREEK AND ON AN ISOLATED BOULDER ABOUT 7 FT IN HEIGHT ON THE BEACH.

TO REACH THE STATION FROM THE POST OFFICE IN PACIFIC BEACH GO EAST ON MAIN STREET FOR 0.24 KM (0.15 MI) TO THE JUNCTION OF STATE HIGHWAY 109. TURN LEFT AND GO NORTH ON STATE HIGHWAY 109 FOR 11.59 KM (7.2 MI) TO A SIDE ROAD LEFT. TURN LEFT ONTO THE BEACH AND RIGHT NORTHERLY UP THE BEACH FOR ABOUT 190 M (623 FT) TO A LARGE 7 FT HIGH BOULDER AND THE STATION.

THE STATION MARK IS A STANDARD C+GS DISK STAMPED—SOUTH XXVII—SET IN A DRILL HOLE IN A BOULDER THAT IS EXPOSED 3.7 M (12 FT). IT IS ON THE NORTHEDGE OF A SMALL STREAM.

THIS STATION IS SUITABLE FOR GPS OBSERVATIONS.

DESCRIBED BY DA WEGENAST.

STATION RECOVERY (1987)
SD0132'RECOVERED 1987
SD0132'RECOVERED IN GOOD CONDITION.
SD0132
SD0132 STATION RECOVERY (1989)
SD0132
SD0132'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1989
SD0132'THE STATION IS LOCATED ABOUT 6.4 KM (4.0 MI) NORTH OF MOCCLIPS, 3.2 KM
SD0132'(2.0 MI) SOUTH OF POINT GRENVILLE, 1.5 KM (0.9 MI) NORTH OF WRECK
SD0132'CREEK AND ON AN ISOLATED BOULDER ABOUT 2.6 M (8.5 FT) IN HEIGHT ON
SD0132'THE BEACH.
SD0132'TO REACH FROM THE POST OFFICE IN PACIFIC BEACH, GO EAST ON MAIN STREET
SD0132'FOR 0.24 KM (0.15 MI) TO THE JUNCTION OF STATE ROUTE 109. TURN LEFT
SD0132'AND GO NORTH ON STATE ROUTE 109 FOR 11.59 KM (7.20 MI) TO A SIDE ROAD
SD0132'LEFT. TURN LEFT ONTO THE BEACH, THENCE RIGHT NORTHERLY ON THE BEACH
SD0132'FOR ABOUT 190 M (623.4 FT) TO A LARGE 2.6 M (8.5 FT) HIGH BOULDER AND
SD0132'THE STATION.
SD0132'THE MARK IS SET IN A DRILL HOLE IN A BOULDER THAT PROJECTS 2.6 M
SD0132'(8.5 FT) . IT IS ON THE NORTH EDGE OF A SMALL STREAM.
SD0132
SD0132 STATION RECOVERY (1991)
SD0132
SD0132'RECOVERED 1991
SD0132'RECOVERED IN GOOD CONDITION.
SD0132
SD0132 STATION RECOVERY (1997)
SD0132
SD0132'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SD0132'RECOVERED AS DESCRIBED.
National Geodetic Survey, Retrieval Date = OCTOBER 6, 1999

CBN - This is a Cooperative Base Network Control Station.

DESIGNATION - SOUTH BEND

PID - SC2806

STATE/COUNTY- WA/PACIFIC

USGS QUAD - SOUTH BEND (1985)

CURREN'T SURVEY CONTROL

| NAD 83(1991) | 46 39 46.85272(N) | 123 48 36.30219(W) |
| NAVD 88     | 25.193 (meters)   | 82.65 (feet)       |

| X           | -2,440,004.188 (meters) |
| Y           | -3,643,447.433 (meters) |
| Z           | 4,616,137.212 (meters)  |

LAPLACE CORR- 14.88 (seconds)

ELLIP HEIGHT- 2.42 (meters)

GEOID HEIGHT- -22.66 (meters)

DYNAMIC HT - 25.198 (meters) 82.67 (feet)

MODELED GRAV- 980,785.4 (mgal)

HORZ ORDER - B

VERT ORDER - SECOND  CLASS II

ELLP ORDER - THIRD  CLASS II

The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in May 1991.

The orthometric height was determined by differential leveling and adjusted by the National Geodetic Survey in April 1995.

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

The Laplace correction was computed from DEFLEC96 derived deflections.

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

The geoid height was determined by GEOID96.

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

The modeled gravity was interpolated from observed gravity values.

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<td>-2 24 16.0</td>
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<td>MT</td>
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<td>-0 35 21.2</td>
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</tbody>
</table>

SUPERSEDED SURVEY CONTROL

ELLIP HT - 2.57 (m)

NGVD 29 - 24.16 (m) 79.3 (f) LEVELING 3
SC2806.Superseded values are not recommended for survey control.
SC2806.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
SC2806. See file dsdata.txt to determine how the superseded data were derived.
SC2806
SC2806_MARKER: DH = HORIZONTAL CONTROL DISK
SC2806_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
SC2806_STAMPING: SOUTH BEND 1990
SC2806_PROJECTION: FLUSH
SC2806_MAGNETIC: O = OTHER; SEE DESCRIPTION
SC2806_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
SC2806+STABILITY: SURFACE MOTION
SC2806_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
SC2806+SATELLITE: SATELLITE OBSERVATIONS - February 08, 1991
SC2806
SC2806 HISTORY - Date Condition Recov. By
SC2806 HISTORY - 1990 MONUMENTED NGS
SC2806 HISTORY - 19910208 GOOD
SC2806 HISTORY - 19970723 GOOD WADECO
SC2806
SC2806 STATION DESCRIPTION
SC2806
SC2806'DESCRIPTED BY NATIONAL GEODETIC SURVEY 1990
SC2806'THE STATION IS LOCATED ABOUT 43.5 KM (27.0 MI) WEST OF DOTY, 35.4 KM
SC2806'(22.0 MI) SOUTHEAST OF WESTPORT, 27.4 KM (17.0 MI) NORTHEAST OF OCEAN
SC2806'PARK AND AT SOUTH BEND ON COUNTY PROPERTY.
SC2806'TO REACH FROM THE JUNCTION OF US HIGHWAY 101 AND MEMORIAL AVENUE IN
SC2806'SOUTH BEND, GO SOUTH ON MEMORIAL AVENUE FOR 0.32 KM (0.20 MI) TO THE
SC2806'COURTHOUSE AND THE STATION.
SC2806'THE MARK IS SET IN THE TOP OF A ROUND CONCRETE MONUMENT THAT IS FLUSH
SC2806'WITH THE SURFACE OF THE LAWN. IT IS 44 M (144.4 FT) NORTH OF THE
SC2806'BOTTOM STEP OF THE COURTHOUSE, 30.0 M (98.4 FT) SOUTH OF THE NORTH
SC2806'END OF THE SIDEWALK LEADING TO THE COURTHOUSE, 19.9 M (65.3 FT) WEST
SC2806'OF THE WEST CURB, 18.7 M (61.4 FT) SOUTHWEST OF A SIGN, PACIFIC
SC2806'COUNTY COURTHOUSE AND 0.8 M (2.6 FT) EAST OF THE EAST EDGE OF THE
SC2806'SIDEWALK.
SC2806
SC2806 STATION RECOVERY (1991)
SC2806
SC2806'RECOVERED 1991
SC2806'RECOVERED IN GOOD CONDITION.
SC2806
SC2806 STATION RECOVERY (1997)
SC2806
SC2806'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SC2806'RECOVERED AS DESCRIBED.
AH7007 DESIGNATION - SPICE
AH7007 PID - AH7007
AH7007 STATE/COUNTY - WA/GRAY'S HARBOR

AH7007 *CURRENT SURVEY CONTROL

AH7007* NAD 83(1991) - 46 52 33.67120(N) 124 07 15.14277(W) ADJUSTED
AH7007* NAVD 88 - 10.93 (meters) 35.9 (feet) GPS OBS

AH7007 X - -2,450,047.464 (meters) COMP
AH7007 Y - -3,615,866.825 (meters) COMP
AH7007 Z - 4,632,344.057 (meters) COMP
AH7007 LAPLACE CORR - 12.61 (seconds) DEFLEC96
AH7007 ELLIP HEIGHT - -13.65 (meters) GPS OBS
AH7007 GEOID HEIGHT - -24.42 (meters) GEOID96

AH7007 HORZ ORDER - FIRST
AH7007 ELLP ORDER - THIRD CLASS II

AH7007 The horizontal coordinates were established by GPS observations
AH7007 and adjusted by the National Geodetic Survey in January 1999.
AH7007 The orthometric height was determined by GPS observations and a
AH7007 high-resolution geoid model using precise GPS observation and
AH7007 processing techniques.
AH7007 The X, Y, and Z were computed from the position and the ellipsoidal ht.
AH7007 The Laplace correction was computed from DEFLEC96 derived deflections.
AH7007 The ellipsoidal height was determined by GPS observations
AH7007 and is referenced to NAD 83.
AH7007 The geoid height was determined by GEOID96.

AH7007; North East Units Scale Converg.
AH7007; SPC WA S - 177,805.208 224,091.455 MT 0.99992747 -2 37 48.7
AH7007; UTM 10 - 5,191,996.601 414,588.415 MT 0.99968966 -0 49 05.3

AH7007 SUPERSEDED SURVEY CONTROL

AH7007 No superseded survey control is available for this station.

AH7007 MARKER: DD = SURVEY DISK
AH7007 SETTING: 4 = OBJECT SURROUNDED BY MASS OF CONCRETE
AH7007 STAMPING: SPICE 1988
AH7007 PROJECTION: FLUSH
AH7007 MAGNETIC: O = OTHER; SEE DESCRIPTION
AH7007 STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
AH7007 SATellite: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AH7007 SATellite: SATELLITE OBSERVATIONS - 1988

AH7007 HISTORY - Date Condition Recov. By

213
AH7007 HISTORY - 1988 MONUMENTED USE
AH7007
AH7007 STATION DESCRIPTION
AH7007

'DESCRIPTION BY US ENGINEERS 1988
AH7007'DESCRIPTION BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD) .
AH7007'THE STATION IS LOCATED IN THE CITY OF WESTPORT. FROM THE INTERSECTION
AH7007'OF SR 105 AND SR 105 SPUR FOLLOW 105 SPUR NORTH TO NEWELL AVENUE.
AH7007'TURN LEFT (WEST) AND FOLLOW NEWELL AVENUE TO SURF STREET. TURN RIGHT
AH7007'(NORTH) AND FOLLOW SURF STREET ABOUT 100 M (328.1 FT) TO DUNEHAVEN
AH7007'ROAD ON LEFT. FOLLOW DUNEHAVEN ROAD WEST TO DUNE CREST DRIVE. TURN
AH7007'SOUTH ONTO DUNE CREST AND CONTINUE SOUTH TO END OF ROAD AND STATION.
AH7007'THE STATION IS 14.5 M (47.6 FT) SOUTH OF THE END OF THE ROAD, 0.5 M
AH7007'(1.6 FT) SOUTH OF A METAL POST AND A PLASTIC WITNESS POST, OR 14.7 M
AH7007'(48.2 FT) (206 DEGREES GRID) FROM THE SOUTHWEST CORNER OF THE FRONT
AH7007'DECK OF THE BLUE HOUSE AT 1112 DUNE CREST DRIVE. THE STATION IS A COE
AH7007'BRASS DISK IN A IRREGULAR MASS OF CONCRETE. THE DISK IS STAMPED SPICE
AH7007'1988.
<table>
<thead>
<tr>
<th>SD0287</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DESIGNATION</strong> - TURN RM 4</td>
<td><strong>PID</strong> - SD0287</td>
</tr>
<tr>
<td><strong>STATE/COUNTY</strong> - WA/PACIFIC</td>
<td><strong>USGS QUAD</strong> - CAPE DISAPPOINTMENT (1985)</td>
</tr>
<tr>
<td><strong>CURRENT SURVEY CONTROL</strong></td>
<td><strong>CURRENT SURVEY CONTROL</strong></td>
</tr>
<tr>
<td><strong>NAD 83(1991)</strong> - 46 19 26.20347(N) 124 02 52.02712(W) ADJUSTED</td>
<td><strong>NAVD 88</strong> - 5.358 (meters) 17.58 (feet) ADJUSTED</td>
</tr>
<tr>
<td><strong>X</strong> - -2,470,396.087 (meters) COMP</td>
<td><strong>Y</strong> - -3,655,932.018 (meters) COMP</td>
</tr>
<tr>
<td><strong>Z</strong> - 4,590,173.758 (meters) COMP</td>
<td><strong>LAPLACE CORR</strong> - 14.53 (seconds) DEFLEC96</td>
</tr>
<tr>
<td><strong>ELLIP HEIGHT</strong> - -18.91 (meters) GPS OBS</td>
<td><strong>GEOID HEIGHT</strong> - -24.11 (meters) GEOID96</td>
</tr>
<tr>
<td><strong>DYNAMIC HT</strong> - 5.358 (meters) 17.58 (feet) COMP</td>
<td><strong>MODELED GRAV</strong> - 980,707.6 (mgal) NAVD 88</td>
</tr>
<tr>
<td><strong>HORZ ORDER</strong> - FIRST</td>
<td><strong>VERT ORDER</strong> - FIRST CLASS II</td>
</tr>
<tr>
<td><strong>ELLP ORDER</strong> - THIRD CLASS II</td>
<td></td>
</tr>
</tbody>
</table>

The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999. The orthometric height was determined by differential leveling and adjusted by the National Geodetic Survey in June 1991. The X, Y, and Z were computed from the position and the ellipsoidal ht. The Laplace correction was computed from DEFLEC96 derived deflections. The ellipsoidal height was determined by GPS observations and is referenced to NAD 83. The geoid height was determined by GEOID96. The dynamic height is computed by dividing the NAVD 88 geopotential number by the normal gravity value computed on the Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45 degrees latitude (G = 980.6199 gals.). The modeled gravity was interpolated from observed gravity values.

<table>
<thead>
<tr>
<th>North</th>
<th>East</th>
<th>Units</th>
<th>Scale</th>
<th>Converg.</th>
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</thead>
<tbody>
<tr>
<td>116,248.932</td>
<td>226,897.696</td>
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<td>0.99967997</td>
<td>-0 45 28.3</td>
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</tbody>
</table>

SUPERSEDED SURVEY CONTROL

No superseded survey control is available for this station.

MARKER: DR = REFERENCE MARK DISK

SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
SD0287_STAMPING: TURN 1926 NO 4  
SD0287_PROJECTION: FLUSH  
SD0287_MAGNETIC: O = OTHER; SEE DESCRIPTION  
SD0287_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO SURFACE MOTION  

<table>
<thead>
<tr>
<th>Date</th>
<th>Condition</th>
<th>Recov. By</th>
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</thead>
<tbody>
<tr>
<td>1926</td>
<td>MONUMENTED</td>
<td>CGS</td>
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<tr>
<td>1987</td>
<td>GOOD</td>
<td>NGS</td>
</tr>
<tr>
<td>19971203</td>
<td>GOOD</td>
<td>WADECO</td>
</tr>
</tbody>
</table>

**STATION DESCRIPTION**  

'DESCRIBED BY NATIONAL GEODETIC SURVEY 1987  
0.08 km (0.05 MI) SOUTH ALONG STATE HIGHWAY 103 FROM THE POST OFFICE IN SEAVIEW, THENCE 0.81 km (0.50 MI) EAST ALONG US HIGHWAY 101, THENCE 0.81 km (0.50 MI) SOUTH ALONG OLD HIGHWAY 101, 5.8 m (19.0 ft) NORTH OF THE CENTERLINE OF 30TH STREET WEST (HOLMAN ROAD), 19.7 m (64.6 ft) WEST OF THE CENTERLINE OF THE OLD HIGHWAY.  
The MARK IS 0.30 METERS E FROM A WITNESS POST  
The MARK IS ABOVE LEVEL WITH 30TH STREET.  

**STATION RECOVERY (1997)**  

'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)  
'RECOVERED AS DESCRIBED. STATION IS NEAR THE NORTHWEST CORNER OF SANDRIDGE ROAD AND 30TH STREET IN THE TOWN OF SEAVIEW. STATION IS IN A OLD GRASS COVERED FLOWER BED AT THE ALAN COURT RV PARK.
The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999.
The orthometric height was determined by differential leveling and adjusted by the National Geodetic Survey in June 1991.
The X, Y, and Z were computed from the position and the ellipsoidal height.
The Laplace correction was computed from DEFLEC96 derived deflections.
The ellipsoidal height was determined by GPS observations and is referenced to NAD 83.
The geoid height was determined by GEOID96.
The dynamic height is computed by dividing the NAVD 88 geopotential number by the normal gravity value computed on the Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45 degrees latitude (G = 980.6199 gals.).
The modeled gravity was interpolated from observed gravity values.
Superseded values are not recommended for survey control.
NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
See file dsdata.txt to determine how the superseded data were derived.

Marker: DD = SURVEY DISK
Setting: 7 = SET IN TOP OF CONCRETE MONUMENT
Stamping: UU 282 1945
Projection: FLUSH
Magnetic: O = OTHER; SEE DESCRIPTION
Stability: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
Surface Motion
Satellite: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
Satellite Observations - July 15, 1996

History - Date Condition Recov. By
1945 MONUMENTED ORHD
1965 GOOD NGS
1984 GOOD USPSQD
1987 GOOD USPSQD
1989 GOOD USPSQD
19960715 GOOD NGS
19961107 GOOD CHANCE
19970725 GOOD WADECO

Station Description

Recovery by National Geodetic Survey 1965
6.5 mi s from Astoria.

Recovery Note by US Power Squadron 1984
Highway is now U.S. 101 Alt.

Recovery Note by US Power Squadron 1987 (GAN)
Recovered in good condition.

Recovery Note by National Geodetic Survey 1987
Recovered in good condition, a new description follows. 8.1 km (5.05 mi) southerly along U.S. Highway 101 business from its junction with U.S. Highway 101 in Astoria, 12.2 m (40.0 ft) south of the centerline of the highway, 8.9 m (29.2 ft) west of the centerline of a paved road leading south, and 7.6 m (24.9 ft) northeast of utility pole number 251106.
The mark is 0.4 meters NW from a witness post.
THE MARK IS 0.6 M ABOVE THE HIGHWAY.

RECOVERY NOTE BY US POWER SQUADRON 1989 (RCC)

RECOVERED IN GOOD CONDITION.

RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1996 (JGF)

RECOVERED AS DESCRIBED.

RECOVERY NOTE BY JE CHANCE AND ASSOCIATES 1996 (KAL)

RECOVERED IN GOOD CONDITION AS DESCRIBED BY NGS 1987 WITH FOLLOWING ADDITIONS AND TIES.

THE STATION IS LOCATED ABOUT 8.5 MILES (13.7 KM) NORTH OF GEARHART, 3 MILES (4.8 KM) SOUTHEAST OF WARRENTON AND 3 MILES (4.8 KM) SOUTHWEST OF ASTORIA. THE STATION IS LOCATED 12.2 M (40.0 FT) NORTHEAST OF A -DO NOT ENTER- SIGN, 10.5 M (34.4 FT) NORTH OF A GAS PIPELINE WARNING POST, 7.2 M (23.6 FT) NORTHEAST OF THE CENTER OF A UTILITY POLE, 17.4 M (57.1 FT) WEST OF A STOP SIGN AND 0.35 M (1.15 FT) NORTHWEST OF A WITNESS POST.

RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)

RECOVERED AS DESCRIBED.
AH7006

**DESIGNATION - WORM**

**PID - AH7006**

**STATE/COUNTY - WA/GRAYS HARBOR**

**USGS QUAD - POINT BROWN (1984)**

---

### *CURRENT SURVEY CONTROL*

<table>
<thead>
<tr>
<th>NAD 83(1991)</th>
<th>46 53 17.30235(N)</th>
<th>124 07 34.29610(W)</th>
<th>ADJUSTED NAVD 88</th>
<th>9.90 (meters)</th>
<th>32.5 (feet)</th>
<th>GPS OBS</th>
</tr>
</thead>
</table>

| X            | -2,449,831.058 (meters) | COMP |
| Y            | -3,614,824.573 (meters) | COMP |
| Z            | 4,633,264.190 (meters)  | COMP |

| LAPLACE CORR- | 12.23 (seconds) | DEFLEC96 |
| ELLIP HEIGHT- | -14.71 (meters) | GPS OBS |
| GEOID HEIGHT- | -24.45 (meters) | GEOID96 |

**HORZ ORDER - FIRST**

**ELLP ORDER - THIRD**

**CLASS II**

AH7006.The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999.

AH7006.The orthometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques.

AH7006.The X, Y, and Z were computed from the position and the ellipsoidal ht.

AH7006.The Laplace correction was computed from DEFLEC96 derived deflections.

AH7006.The ellipsoidal height was determined by GPS observations and is referenced to NAD 83.

AH7006.The geoid height was determined by GEOID96.

AH7006;

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<th>North Units Scale Converg.</th>
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<tbody>
<tr>
<td>179,169.649 223,748.246 MT 0.99992857 -2 38 02.6</td>
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<table>
<thead>
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<th>East Units Scale Converg.</th>
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<tr>
<td>5,193,349.185 414,202.327 MT 0.99969047 -0 49 19.9</td>
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</table>

AH7006.SUPERSEDED SURVEY CONTROL

AH7006.No superseded survey control is available for this station.

AH7006.MARKER: DD = SURVEY DISK

AH7006_SETTING: 4 = OBJECT SURROUNDED BY MASS OF CONCRETE

AH7006_STAMPING: WORM 1988

AH7006_PROJECTION: FLUSH

AH7006_MAGNETIC: O = OTHER; SEE DESCRIPTION

AH7006_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO SURFACE MOTION

AH7006_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR SATELLITE OBSERVATIONS - 1988

AH7006.HISTORY - Date Condition Recov. By
The station is located in the City of Westport. From the intersection of SR 105 and SR 105 Spur follow 105 Spur north to Ocean Avenue. Turn left (west) and follow Ocean Avenue west past the Westport Lighthouse to a beach access parking area on the north side of road. Park vehicle and follow cement walkway west (then north) about 70 m (229.7 ft) to station on left. The station is 0.45 miles (0.72 km) west (258 degrees grid) from the Westport Lighthouse, 19 m (62.3 ft) west of the center of the cement walkway when measured near a historical information marker, 2.8 m (9.2 ft) west of the west edge of a wooden handicapped accessible beach overlook, and 0.9 m (3.0 ft) east of a orange NGS witness post. A 6 ft (1.8 m) steel angle iron is driven 4 ft (1.2 m) into the ground and is located 1 inch west of the witness post. The station is a COE aluminum disk set in concrete. The disk is stamped WORM 1988.
AH7004 DESIGNATION - X 1
AH7004 PID - AH7004
AH7004 STATE/COUNTY- WA/GRAY'S HARBOR
AH7004 USGS QUAD - POINT BROWN (1984)

AH7004

*CURRENT SURVEY CONTROL

AH7004

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
<th>Units</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>-2,450,921.855</td>
<td>meters</td>
<td>COMP</td>
</tr>
<tr>
<td>Y</td>
<td>-3,610,141.373</td>
<td>meters</td>
<td>COMP</td>
</tr>
<tr>
<td>Z</td>
<td>4,636,313.076</td>
<td>meters</td>
<td>COMP</td>
</tr>
<tr>
<td>LAPLACE CORR-</td>
<td>10.03</td>
<td>seconds</td>
<td>DEFLEC96</td>
</tr>
<tr>
<td>ELLIP HEIGHT-</td>
<td>-17.67</td>
<td>meters</td>
<td>GPS OBS</td>
</tr>
<tr>
<td>GEOID HEIGHT-</td>
<td>-24.61</td>
<td>meters</td>
<td>GEOID96</td>
</tr>
</tbody>
</table>

AH7004

HORZ ORDER - FIRST
ELLP ORDER - THIRD CLASS II

AH7004

The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999.

AH7004

The ortometric height was determined by GPS observations and a high-resolution geoid model using precise GPS observation and processing techniques.

AH7004

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

AH7004

The Laplace correction was computed from DEFLEC96 derived deflections.

AH7004

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

AH7004

The geoid height was determined by GEOID96.

AH7004

AH7004; SPC WA S - 183,793.925 220,427.159 MT 0.99993252 -2 40 03.8
AH7004; UTM 10 - 5,197,865.099 410,737.539 MT 0.99969793 -0 51 23.8

AH7004

SUPERSEDED SURVEY CONTROL

AH7004

No superseded survey control is available for this station.

AH7004

AH7004 MARKER: DD = SURVEY DISK
AH7004_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
AH7004_STAMPING: X 1
AH7004_PROJECTION: FLUSH
AH7004_MAGNETIC: O = OTHER; SEE DESCRIPTION
AH7004_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
AH7004+STABILITY: SURFACE MOTION
AH7004_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AH7004+SATELLITE: SATELLITE OBSERVATIONS - 1997

AH7004

AH7004 HISTORY - Date Condition Recov. By
AH7004 HISTORY - 1997 MONUMENTED LOCENG
AH7004 HISTORY - 19990419 GOOD WADECO
AH7004 STATION DESCRIPTION
AH7004 DESCRIBED BY LOCAL ENGINEER (INDIVIDUAL OR FIRM) 1997 (RCD)
AH7004 DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD).
AH7004 THE STATION IS LOCATED IN THE CITY OF OCEAN SHORES. FROM THE
INTERSECTION OF CHANCE ALAMER ROAD AND OCEAN SHORES BOULEVARD SW
PROCEED SOUTH ON OCEAN SHORES BOULEVARD TO THE NORTH JETTY AND A
PUBLIC BEACH ACCESS POINT. THE STATION IS 66 M (216.5 FT) NORTH OF
THE JETTY, 30 M (98.4 FT) EAST OF THE SOUTHEAST CORNER OF A CEMENT
BLOCK RESTROOM, 73 M (239.5 FT) WEST (214 DEGREES GRID) FROM THE FRONT
DOOR OF THE HOUSE LOCATED AT 1599 OCEAN SHORES BOULEVARD SW. THE
STATION IS ON A LOW DUNE WEST OF THE JETTY PARKING AREA AND LEVEL WITH
THE GROUND. THE STATION IS A BASS SURVEY DISK ATTACHED TO A 55 GALLON
STEEL DRUM FILLED WITH CONCRETE SET VERTICALLY IN THE GROUND. THE
DISK IS STAMPED X-1.

AH7004 STATION RECOVERY (1999)
AH7004 RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)
AH7004 RECOVERED AS DESCRIBED. ON MARCH 3, 1999 A LARGE STORM HIT AT HIGH
TIDE AND WAVES OVER TOPPED THE GRAYS HARBOR NORTH JETTY. RESULTING
EROSION DESTROYED THE RESTROOMS DESCRIBED IN THE PREVIOUS DESCRIPTION.
THE STATION IF 5 M (16.4 FT) FROM A 4 M (13.1 FT) SCARP. REFERENCE
MARK 1 WAS SET AND LEVELLED TO BY THIS PARTY ON MARCH 12, 1999 USING
SECOND ORDER LEVELING METHODS. THE REFERENCE MARK IS 165.59 M (543.27
FT) NORTH, 13.41 M (44.00 FT) EAST, AND 1.415 M (4.642 FT) LOWER THAN
THE STATION. TO REACH THE REFERENCE MARK FROM THE STATION PROCEED
NORTH ABOUT 170 M (557.7 FT) ALONG THE EAST EDGE OF OCEAN SHORES
BOULEVARD. THE REFERENCE MARK IS 5 M (16.4 FT) EAST OF THE EAST EDGE
OF THE ROAD OR 37 M (121.4 FT) EAST AND 27 M (88.6 FT) SOUTH OF THE SE
CORNER OF THE GARAGE LOCATED AT THE BREESES DEL MAR CONDOMINIUMS. AN
ORANGE WITNESS POST IS 1 M (3.3 FT) EAST OF THE REFERENCE MARK. THE
REFERENCE MARK IS A 2.5 INCH ALUMINUM CAP ATTACHED TO A 3.0 M (9.8 FT)
STAINLESS STEEL ROD DRIVEN INTO THE GROUND. THE STATION IS ACCESSED
THROUGH A 4-INCH PVC PIPE SET IN CONCRETE. THE DISK IS STAMPED X-1
1999 WITH A WASHINGTON DEPARTMENT OF ECOLOGY INSCRIPTION.
The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in May 1991.

The orthometric height was determined by differential leveling and adjusted by the National Geodetic Survey in June 1991.

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

The Laplace correction was computed from DEFLEC96 derived deflections.

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

The geoid height was determined by GEOID96.

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

The modeled gravity was interpolated from observed gravity values.

<table>
<thead>
<tr>
<th>PID Reference Object</th>
<th>Distance</th>
<th>Geod. Az</th>
</tr>
</thead>
<tbody>
<tr>
<td>AH7020 PC 035</td>
<td>110.871</td>
<td>METERS 31031</td>
</tr>
</tbody>
</table>
SUPERSEDED SURVEY CONTROL

ELLIP HT  -18.47 (m)  GP( ) 4 1
NGVD 29  4.74 (m)  15.6 (f) LEVELING 3

Superseded values are not recommended for survey control.
NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
See file dsdata.txt to determine how the superseded data were derived.

MARKER: A = ALUMINUM MARKER
SETTING: 15 = METAL ROD DRIVEN INTO GROUND. SEE TEXT FOR ADDITIONAL
STAMPING: X 537 1987
PROJECTION: FLUSH
MAGNETIC: O = OTHER; SEE DESCRIPTION
STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
+SATELLITE: SATELLITE OBSERVATIONS - February 08, 1991
ROD/PIPE-DEPTH: 18.1 meters

HISTORY - Date Condition Recov. By
1987 MONUMENTED WA-049
1987 GOOD NGS
19900128 GOOD NGS
19910208 GOOD
19970725 GOOD WADECO

STATION DESCRIPTION

'DESCRIBED BY NATIONAL GEODETIC SURVEY 1987
3.4 KM (2.10 MI) NORTH FROM OCEAN PARK.
THE MARK IS ABOVE LEVEL WITH THE STREET.
2.29 KM (1.40 MI) NORTH ALONG VERNON AVENUE FROM THE INTERSECTION OF
BAY AVENUE IN OCEAN PARK, THENCE 0.64 KM (0.40 MI) WEST ALONG JO
JOHNS ROAD, THENCE 0.48 KM (0.30 MI) NORTH ALONG H STREET, 2.74 M
(9.0 FT) SOUTH OF THE CENTERLINE OF 295TH STREET, 7.92 M (26.0 FT)
WEST OF THE EXTENDED CENTERLINE OF H STREET NORTH, 6.4 M (21.0 FT)
EAST OF THE EXTENDED CENTERLINE OF H STREET SOUTH. NOTE--ACCESS TO
DATUM POINT IS HAD THROUGH AN 8-INCH IRON LOGO CAP.

STATION RECOVERY (1990)

'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1990
THE STATION IS LOCATED ABOUT 40.2 KM (25.0 MI) WEST OF FRANCIS, 27.4
KM (17.0 MI) NORTH OF ILWACO, 24.2 KM (15.0 MI) SOUTHWEST OF SOUTH
BEND AND AT OCEAN PARK IN A CITY STREET.
TO REACH FROM THE BLINKING RED LIGHT AT THE INTERSECTION OF VERNON
AVENUE AND BAY STREET IN OCEAN PARK, GO NORTH ON VERNON AVENUE FOR
2.25 KM TO A T-INTERSECTION. TURN LEFT AND GO WEST ON JOHNS ROAD FOR
0.64 KM (0.40 MI) TO A SIDE ROAD RIGHT. TURN RIGHT AND GO NORTH ON H
STREET FOR 0.48 KM (0.30 MI) TO 295TH STREET, AN OFFSET CORSSROAD AND
THE STATION.
THE MARK IS A STAINLESS STEEL ROD SET IN AN IRON MONUMENT CASE AND
COVER THAT IS FLUSH WITH THE ROAD SURFACE. IT IS 7.9 M (25.9 FT)
WEST OF THE EXTENDED CENTER OF H STREET NORTH, 6.4 M (21.0 FT) EAST OF
THE EXTENDED CENTER OF H STREET SOUTH AND 2.7 M (8.9 FT) SOUTH OF THE
Center of 295th Street.

Station Recovery (1991)

 Recovered 1991
 Recovered in good condition.

Station Recovery (1997)

Recovery Note by Washington Department of Ecology 1997 (RCD)
Recovered as described.
The horizontal coordinates were established by GPS observations and adjusted by the National Geodetic Survey in January 1999. The orthometric height was determined by differential leveling and adjusted by the National Geodetic Survey in June 1991. WARNING—GPS observations at this control monument resulted in a GPS derived orthometric height which differed from the leveled height by more than one decimeter (0.1 meter).

The X, Y, and Z were computed from the position and the ellipsoidal ht. The Laplace correction was computed from DEFLEC96 derived deflections. The ellipsoidal height was determined by GPS observations and is referenced to NAD 83. The geoid height was determined by GEOID96. The dynamic height is computed by dividing the NAVD 88 geopotential number by the normal gravity value computed on the Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45 degrees latitude (G = 980.6199 gals.). The modeled gravity was interpolated from observed gravity values.

North East Units Scale Converg.
SPC OR N 273,316.100 2,235,735.728 MT 1.00002018 -2 25 24.1
UTM 10 5,102,884.775 429,084.168 MT 0.99966182 -0 39 38.1

No superseded survey control is available for this station.
SC1033
SC1033_MARKER: DV = VERTICAL CONTROL DISK
SC1033_SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)
SC1033_STAMPING: X 711 1987
SC1033_PROJECTION: FLUSH
SC1033_MAGNETIC: I = MARKER IS A STEEL ROD
SC1033_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
SC1033_ROD/PIPE-DEPTH: 11.1 meters

SC1033
SC1033_HISTORY - Date Condition Recov. By
SC1033_HISTORY - 1987 MONUMENTED NGS
SC1033_HISTORY - 1987 GOOD USPSQD
SC1033_HISTORY - 19971204 GOOD WADECO

SC1033

SC1033 STATION DESCRIPTION

SC1033

SC1033'DESCRIPTION BY NATIONAL GEODETIC SURVEY 1987
SC1033'9.4 KM (5.85 MI) NORTH FROM SEASIDE.
SC1033'9.4 KM (5.85 MI) NORTHERLY ALONG U.S. HIGHWAY 101 FROM ITS JUNCTION
SC1033'WITH BROADWAY AVENUE IN SEADIDE, 47.5 M (155.8 FT) SOUTH OF THE
SC1033'CENTER OF DELLMOOR LOOP ROAD, 25.9 M (85.0 FT) NORTH OF THE EXTENDED
SC1033'CENTER OF A DRIVEWAY, 12.8 M (42.0 FT) WEST OF THE CENTERLINE OF THE
SC1033'HIGHWAY, AND 1.0 M (3.3 FT) SOUTH OF UTILITY POLE NUMBER 228 A.
SC1033'NOTE--ACCESS TO DATUM POINT IS HAD THROUGH A 5-INCH LOGO CAP.
SC1033'THE MARK IS 0.3 METERS E FROM A WITNESS POST AND FENCE
SC1033'THE MARK IS ABOVE LEVEL WITH THE HIGHWAY.

SC1033

SC1033

SC1033 STATION RECOVERY (1987)

SC1033

SC1033'RECOVERY NOTE BY US POWER SQUADRON 1987 (GAN)
SC1033'RECOVERED IN GOOD CONDITION.

SC1033

SC1033

SC1033 STATION RECOVERY (1997)

SC1033

SC1033'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SC1033'RECOVERED AS DESCRIBED. STATION IS SOUTHWEST OF THE INTERSECTION OF
SC1033'US 101 WITH WESTLAKE ROAD/DELMOER LOOP ROAD. FROM INTERSECTION GO
SC1033'SOUTH ON THE WEST SIDE OF ROAD 40 M (131.2 FT) TO POWER POLE NO.
SC1033'221404 AND WITNESS POST. MARK IS 0.3 M (1.0 FT) FROM WITNESS POST AND
SC1033'ABOUT 8 M (26.2 FT) WEST OF THE CENTERLINE OF US 101. THE STATION IS
SC1033'1.8 MILES (2.9 KM) NORTH OF THE INTERSECTION OF US 101 AND HIGHLANDS
SC1033'ROAD (DELRAY BEACH ACCESS).
SECTION 3: ADDITIONAL DATA SHEETS

ASTOR ................................................................. 231
BC TIDAL ............................................................. 232
NC TIDAL ............................................................. 233
NR TIDAL ............................................................. 234
SB TIDAL ............................................................. 235
T 530 ................................................................. 236
X 1 RM 1 ......................................................... See station X 1
Coordinates shown were derived by the Washington Department of Ecology and are not available from the NGS. NAVD 88 elevation was derived from GPS data, elevation accuracy estimated to be ±2.5 cm. Horizontal coordinates meet First Order standards.

**DESIGNATION:** ASTOR (ALIAS: ASTO)  
**PID:** NOT AN NGS STATION  
**STATE/COUNTY:** WA/CLATSOP  
**USGS QUAD:** WARRENTON (1985)  
**SPC WA SOUTH:** 97,089.346 N 238,953.073 E METERS  
**NAD 83(1991):** 46 09 23.38364 N 123 52 50.56747 W  
**NAVD88:** 3.022 meters  
**ELLIPOSED:** -20.280 meters  
**MARK TYPE:** Dimple on Aircraft Tie Down  
**STAMPING:** No stamping

<table>
<thead>
<tr>
<th>HISTORY</th>
<th>Date</th>
<th>Condition</th>
<th>Recov. By</th>
</tr>
</thead>
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<tr>
<td>HISTORY</td>
<td>1997</td>
<td>Monumented</td>
<td>NASA</td>
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<tr>
<td>HISTORY</td>
<td>1998</td>
<td>Good</td>
<td>WADECO</td>
</tr>
</tbody>
</table>

**DESCRIPTION:**

DESCRIBED BY NASA 1997 (EARL FREDRICK)  
NEAR ASTORIA, OR  
STATION IS LOCATED ON A TAXIWAY/PARKING AREA AT THE ASTORIA MUNICIPAL AIRPORT. TO OBTAIN PERMISSION TO DRIVE TO THE STATION CALL 503-325-4521 AND TALK TO THE AIRPORT MANAGER (RON LARSEN).

FROM THE SOUTHEAST CORNER OF THE ASTORIA TERMINAL BUILDING DRIVE THROUGH GATE AND PAST SMALL PLANE HANGERS (GREEN). TURN NORTHWEST AND DRIVE ALONG THE EAST EDGE OF THE TAXIWAY (NEXT TO GRASS "TRAFFIC" ISLANDS) PAST TWO LARGE HANGERS (WHITE, NO LONGER USED FOR AIRCRAFT). CONTINUE NORTHWEST UNTIL ON-LINE WITH A GREEN ONE STORY BUILDING WITH OBSERVATION/CONTROL TOWER (CURRENTLY THE NATIONAL WEATHER SERVICE BUILDING, FORMERLY THE FBO BUILDING) ON YOUR LEFT. THE STATION IS A DIMPLE ON TOP OF AN AIRCRAFT TIE DOWN. THE TIE DOWN IS 41.745 M NNW OF AN AIRCRAFT CROSSOVER (TENTH TIE DOWN FROM THE CROSSOVER) AND 59 CM SOUTH FROM A CEMENT RUNNEL WHICH RUNS BESIDE THE TAXIWAY FOR DRAINING THE TAXIWAY. THE STATION TIE DOWN HAS BEEN PAINTED RED.

**STATION RECOVERY**

RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1998 (RCD)  
RECOVERED AS DESCRIBED. A YELLOW FLASHING LIGHT IS REQUIRED FOR VEHICLE TO ACCESS THE STATION.
Coordinates shown were derived by the Washington Department of Ecology and are not available from the NGS. NAVD 88 elevation was derived from GPS data, elevation accuracy estimated to be ±2.5 cm. Horizontal coordinates meet First Order standards.

DESIGNATION: BC TIDAL
PID NOT AN NGS STATION
STATE/COUNTY: WA/PACIFIC
SPC WA SOUTH: 149158.719 N 236074.214 E METERS
NAD 83(1991) 46 37 24.22124 N 123 56 50.65111 W
NAVD88: 4.234 meters
ELLIPSOID: -19.403 meters
MARK TYPE: 2.5-INCH STEEL WASHER AND PK NAIL
STAMPING: BC TIDAL

HISTORY - Date Condition Recov. By
HISTORY - 1998 MONUMENTED WADECO

DESCRIPTION:

THE TIDAL GAUGE IS EAST OF THE TOWN OF BAY CENTER AT THE BAY CENTER MARICULTURE CO. BUILDING (BAY CENTER FARMS) ON THE PALIX RIVER. THE COMPANY BUILDING IS BUILT ON A PIER THAT IS NORTH OF BAY CENTER DIKE ROAD AND ON THE SOUTH BANK OF THE RIVER. THE TIDE GAUGE IS LOCATED ON THE SECOND TO LAST PILING ON THE WEST END OF THE PIER JUST BEFORE YOU GO DOWN A RAMP TO A FLOATING DOCK. AS YOU GO DOWN THE RAMP THE PILING IS BENEATH THE PIER TO THE EAST. DOCK OWNER IS DICK WILSON, PHONE (360) 875-6172.

DO TO LIMITED GPS VISIBILITY AT THE TIDE GAUGE THE STATION WAS POSITIONED ABOUT 65 METERS SOUTH OF A POINT ON THE PIER THAT WAS DIRECTLY OVER THE GAUGE. LEVELS WERE RUN FROM THIS POINT TO THE STATION. THE POINT ON THE PIER DECK IS 0.134 M LOWER THAN THE STATION.

Coordinates shown were derived by the Washington Department of Ecology and are not available from the NGS. NAVD 88 elevation was derived from GPS data, elevation accuracy estimated to be ±2.5 cm. Horizontal coordinates meet First Order standards.

**DESIGNATION:** NC TIDAL

**PID**  NOT AN NGS STATION

**STATE/COUNTY:** WA/PACIFIC

**USGS QUAD:** OCEAN PARK (1985)

**SPC WA SOUTH:** 135895.987 N  229622.823 E METERS

**NAD 83(1991)** 46 30 05.85887 N  124 01 25.77343 W

**NAVD88:** 6.007 meters

**ELLIPSOID:** -18.087 meters

**MARK TYPE:** 2.5-INCH STEEL WASHER AND PK NAIL

**STAMPING:** NC TIDAL

**HISTORY - Date**  Condition  Recov. By

**HISTORY - 1998** MONUMENTED  WADECO

**DESCRIPTION:**

THE TIDE GAUGE IS IN THE TOWN OF NAHCOTTA. FROM THE NAHCOTTA BOAT BASIN FALLOW A DIRT ROAD EAST OUT TO THE BASIN BREAKWATER. THE TIDE GAUGE IS NEAR THE NORTHEAST MOST END OF THE BREAKWATER AND IS MOUNTED ON COAST GUARD STRUCTURE NO. 2 (WITH A FLASHING 4 SECOND LIGHT). STRUCTURE NO. 2 IS ABOUT 50 M NORTH OF STRUCTURE NO. 1, WHICH IS LOCATED ON THE NORTH END OF THE STONE BREAKWATER.

THE STATION IS LOCATED ON THE OBSERVATION DECK OF STRUCTURE NO. 2 WHICH IS CONSTRUCTED ON TOP OF THREE LARGE PILINGS THAT ARE STRAPED TOGETHER WITH STEEL ROPE. THIS STATION IS ONLY ACCESSABLE BY BOAT. THE MARK IS LOCATED DIRECTLY OVER THE GAUGE AND IS ABOUT 0.4 M EAST OF THE WEST EDGE OF THE OBSERVATION DECK. THE MARK IS A 2.5-INCH STEEL WASHER AND PK NAIL STAMPED NC TIDAL.
Coordinates shown were derived by the Washington Department of Ecology and are not available from the NGS. NAVD 88 elevation was derived from GPS data, elevation accuracy estimated to be ±2.5 cm. Horizontal coordinates meet First Order standards.

DESIGNATION: NR TIDAL

PID: NOT AN NGS STATION
ID: 05
STATE/COUNTY: WA/PACIFIC
USGS QUAD: LONG ISLAND (1985)
SPC WA SOUTH: 127535.464 N 238296.162 E METERS
NAD 83(1991): 46 25 47.67322 N 123 54 22.41666 W
NAVD88: 2.961 meters
ELLIPSOID: -20.459 meters
MARK TYPE: 2.5-INCH STEEL WASHER AND PK NAIL
STAMPING: NR TIDAL

HISTORY - Date Condition Recov. By
HISTORY - 1998 MONUMENTED WADECO

DESCRIPTION:

THE TIDE GAUGE IS ON THE SOUTHWEST BANK OF THE NASELLE RIVER, JUST WEST OF THE NASELLE RIVER BRIDGE. THERE ARE SIX PILINGS WEST OF THE BRIDGE NEAR THE SOUTH BANK. THE GAUGE IS ON THE SECOND PILING AS ONE GOES WEST FROM THE BRIDGE.

Coordinates shown were derived by the Washington Department of Ecology and are not available from the NGS. NAVD 88 elevation was derived from GPS data, elevation accuracy estimated to be ±2.5 cm. Horizontal coordinates meet First Order standards.

DESIGNATION: SB TIDAL
PID: NOT AN NGS STATION
STATE/COUNTY: WA/PACIFIC
USGS QUAD: SOUTH BEND (1985)
SPC WA SOUTH: 153728.636 N 246578.968 E METERS
NAD 83(1991) 46 40 06.66806 N 123 48 46.29584 W
NAVD88: 4.334 meters
ELLIPSOID: -18.476 meters
MARK TYPE: 2.5-INCH STEEL WASHER AND PK NAIL
STAMPING: SB TIDAL

HISTORY - Date Condition Recov. By
HISTORY - 1998 MONUMENTED WADECO

DESCRIPTION:


Horizontal coordinates shown were derived by the Washington Department of Ecology and are not available from the NGS. Horizontal coordinates meet First Order standards.

**DESIGNATION** - T 530  
**PID** - SC0980  
**STATE/COUNTY** - WA/PACIFIC  
**USGS QUAD** - NEMAH (1985)

*CURRENT SURVEY CONTROL*

<table>
<thead>
<tr>
<th>Datum</th>
<th>North</th>
<th>East</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAD 83(1991)</td>
<td>46 31 57.75318 (N)</td>
<td>123 53 20.00224 (W)</td>
<td>GPS OBS</td>
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<thead>
<tr>
<th>Datum</th>
<th>Height</th>
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</thead>
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<tr>
<td>ELLIP</td>
<td>8.220 (meters)</td>
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<tr>
<td>GEOID</td>
<td>-23.116 (meters)</td>
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</tbody>
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<table>
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<th>Datum</th>
<th>Height</th>
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<tr>
<td>DYNAMIC HT</td>
<td>31.479 (meters)</td>
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<td>(feet) COMP</td>
<td>103.28</td>
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<tr>
<th>Datum</th>
<th>Value</th>
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</thead>
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<tr>
<td>MODELED GRAV</td>
<td>980,752.4 (mgal)</td>
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</tbody>
</table>

HORIZONTAL ORDER - FIRST (ESTIMATED BY ECOLOGY)  
VERTICAL ORDER - FIRST CLASS II  
ELLIPTICAL ORDER - FOURTH CLASS II (ESTIMATED BY ECOLOGY)

The horizontal coordinates were scaled from a topographic map and have an estimated accuracy of +/- 6 seconds.

The orthometric height was determined by differential leveling and adjusted by the National Geodetic Survey in June 1991.

The geoid height was determined by GEOID96.

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

The modeled gravity was interpolated from observed gravity values.

**SUPERSEDED SURVEY CONTROL**

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<tr>
<th>Datum</th>
<th>North</th>
<th>East</th>
<th>Units</th>
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<tr>
<td>NAD 83(1986)</td>
<td>46 32 01. (N)</td>
<td>123 53 22. (W)</td>
<td>SCALED</td>
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</table>

**MARKER**: I = METAL ROD  
**SETTING**: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)

**STAMPING**: T 530 1987  
**PROJECTION**: FLUSH  
**STABILITY**: B = PROBABLY HOLD POSITION/ELEVATION WELL  
**ROD/PIPE-DEPTH**: 11.0 meters

<table>
<thead>
<tr>
<th>History</th>
<th>Date</th>
<th>Condition</th>
<th>Recov. By</th>
</tr>
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<tr>
<td>HISTORY</td>
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<td>MONUMENTED</td>
<td>NGS</td>
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<tr>
<td>HISTORY</td>
<td>1998</td>
<td>GOOD</td>
<td>WADECO</td>
</tr>
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</table>

**STATION DESCRIPTION**
SC0980
DESCRIBED BY NATIONAL GEODETIC SURVEY 1987
SC0980'28.5 KM (17.70 MI) SW FROM SOUTH BEND.
SC0980'28.5 KM (17.70 MI) SOUTHWEST ALONG US HIGHWAY 101 FROM THE JUNCTION
SC0980'OF MEMORIAL AVENUE IN SOUTH BEND, 11.3 M (37.1 FT) WEST OF THE
SC0980'CENTERLINE OF THE HIGHWAY, 5.2 M (17.1 FT) WEST OF THE NORTH END OF
SC0980'AN 18-IN METAL PIPE CULVERT, 3.4 M (11.2 FT) SOUTH OF A WOODS ROAD
SC0980'LEADING WEST. NOTE--ACCESS TO DATUM POINT IS HAD THROUGH A 5-INCH
SC0980'LOGO CAP.
SC0980'THE MARK IS 0.30 METERS N FROM A WITNESS POST
SC0980'THE MARK IS 0.61 M ABOVE THE HIGHWAY.
SC0980
STATION RECOVERY (1997)
SC0980

SC0980'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1998 (RCD)
SC0980'RECOVERED AS DESCRIBED. STATION IS BETWEEN MILE POSTS 36 AND 37 ON
SC0980'US 101, 11.3 M WEST OF THE CENTERLINE OF THE HIGHWAY, 3.4 M NORTH
SC0980'OF THE CENTER OF A GRAVEL STUB ROAD LEADING WEST, AND 5.2 M NORTHWEST
SC0980'OF THE NORTH END OF AN 18-INCH METAL CULVERT PIPE GOING UNDER THE
SC0980'STUB ROAD AND RUNNING PARALLEL TO THE HIGHWAY.
SECTION 4: NGS REPORT OF HORIZONTAL CONTROL AND VERTICAL COMPUTATIONS
SECTION 5:
THE IMPACT OF GEOID99 OF THE CONTROL NETWORK
THE IMPACT OF GEOID99 ON THE CONTROL NETWORK

Introduction

The NGS has produced a new high-resolution geoid model, GEOID99. This model replaces the existing gravimetric model, GEOID96. This new model, and its companion products G99SSS and DEFLEC99, became available on September 30, 1999.

The GEOID99 Gravimetric Model

“The GEOID99 model is known as a hybrid geoid model, combining gravimetric information with GPS ellipsoid heights on leveled benchmarks. The GEOID99 model was developed to support direct conversion between NAD 83 GPS ellipsoidal heights and NAVD 88 orthometric heights. When comparing the GEOID99 model with GPS ellipsoidal heights in the NAD 83 reference frame and leveling in the NAVD 88 datum, it is seen that GEOID99 has roughly a 4.6 cm absolute accuracy (one sigma) in the regions of GPS benchmark coverage. In regions with sparse (150km+) GPS benchmark coverage, less point accuracy may be evident; but relative accuracy at about a 1 to 2 part-per-million level, or better, should still be obtained. For users with less stringent accuracy requirements, simple height conversions to obtain NAVD 88 elevations based on NAD 83 ellipsoid heights and the GEOID99 model may be used in the conterminous United States. For users with more stringent accuracy requirements, a ‘Orthometric Height Correction Factor’ may be derived” (Smith and Roman 1999).

The difference of a GPS NAD 83 ellipsoid height at a known point and the associated GEOID99 height should not be expected to exactly match any given vertical datum. The results will be close when converting NAD 83 GPS ellipsoidal heights into NAVD 88 elevations; but not accurate enough for studies needing sub-decimeter accuracy. However, one can combine the precision of differential carrier phase GPS with the precision of GEOID99 height differences, to approach that of leveling by including at least one existing benchmark in the GPS survey. The difference between the published elevation and the height obtained from differencing the GPS ellipsoidal height and the GEOID99 height at the benchmark may be considered a local orthometric height correction factor. If one surveys an extensive area (> 100 km), and several benchmarks are observed, a trend may be detect in the correction factor of up to a one part-per-million. This may be error in the GEOID99 model (Smith and Roman 1999).

The NGS does not currently consider geoid-corrected GPS orthometric heights as a substitute for geodetic leveling in meeting the Federal Geodetic Control Subcommittee (FGCS) standards for vertical control networks; however, projects with less stringent requirements may be satisfied by the currently available geoid models. Widespread success has been achieved with the proceeding models, GEOID96, GEOID93 and GEOID90.
GEOID99 and Washington Coastal Geodetic Control Network

The GEOID96 model was used in the Washington Coastal Geodetic Control Network to obtain NAVD 88 elevations for stations without leveled NAVD 88 elevations (see Table 3, page 17). Tables 5 and 6 have been developed to compare predicted NAVD 88 elevations obtained using GEOID96 with similar elevations produced with GEOID99. The NAVD 88 benchmarks with GPS ellipsoid heights included in these tables are within a region extending inland 10 km from the Pacific Ocean and 30 km north and south of the mouth of the Columbia River. A local orthometric height correction factor was derived separately for Washington and Oregon for both GEOID96 and GEOID99. These correction factors were used with Equation 1b (Section 1, page 16) to obtain the predicted NAVD 88 elevation for each station and model.

Table 5. Predicted NAVD 88 elevations for five first order Washington benchmarks as calculated with GEOID96 and GEOID99. The difference between the predicted elevations obtained with GEOID96 and GEOID99 are shown in the last column. All elevations are in meters.

<table>
<thead>
<tr>
<th>Station Designation</th>
<th>NAD 83 Ellipsoid</th>
<th>NAVD 88 Elevation</th>
<th>GEOID 96</th>
<th>Predicted NAVD 88 w/correction</th>
<th>GEOID 99</th>
<th>Predicted NAVD 88 w/correction</th>
<th>Difference G96-G99</th>
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<td>MESS</td>
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<td>4.210</td>
<td>-23.96</td>
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<td>X 537</td>
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<td>M 536</td>
<td>-15.61</td>
<td>7.788</td>
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<td>TURN RM 4</td>
<td>-18.91</td>
<td>5.358</td>
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<td>5.34</td>
<td>-24.32</td>
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<td>944 0574 A TIDAL</td>
<td>-19.50</td>
<td>4.872</td>
<td>-24.24</td>
<td>4.88</td>
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<td>4.88</td>
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<td>0.14</td>
<td>-0.07</td>
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</table>

Table 6. Predicted NAVD 88 elevations for five first order Oregon benchmarks as calculated with GEOID96 and GEOID99. The difference between the predicted elevations obtained with GEOID96 and GEOID99 are shown in the last column. All elevations are in meters.

<table>
<thead>
<tr>
<th>Station Designation</th>
<th>NAD 83 Ellipsoid</th>
<th>NAVD 88 Elevation</th>
<th>GEOID 96</th>
<th>Predicted NAVD 88 w/correction</th>
<th>GEOID 99</th>
<th>Predicted NAVD 88 w/correction</th>
<th>Difference G96-G99</th>
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<tbody>
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<td>SMUR</td>
<td>-16.20</td>
<td>7.669</td>
<td>-23.65</td>
<td>7.70</td>
<td>-23.86</td>
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<td>UU 282</td>
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<td>4.579</td>
<td>-23.11</td>
<td>4.56</td>
<td>-23.32</td>
<td>4.56</td>
<td>0.00</td>
</tr>
<tr>
<td>X 711</td>
<td>-13.71</td>
<td>9.742</td>
<td>-23.20</td>
<td>9.74</td>
<td>-23.41</td>
<td>9.74</td>
<td>0.00</td>
</tr>
<tr>
<td>MEADOW RESET</td>
<td>-11.51</td>
<td>11.834</td>
<td>-23.09</td>
<td>11.83</td>
<td>-23.30</td>
<td>11.83</td>
<td>0.00</td>
</tr>
<tr>
<td>SEASIDE RM 2</td>
<td>-15.99</td>
<td>7.297</td>
<td>-23.03</td>
<td>7.29</td>
<td>-23.25</td>
<td>7.29</td>
<td>0.00</td>
</tr>
<tr>
<td>Correction Factor</td>
<td></td>
<td></td>
<td>0.25</td>
<td>0.03</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In the portion of Washington included in the Southwest Washington Coastal Erosion Study, introduction of GEOID99 will have minimal impact (less than 0.02 m) on the calculated NAVD 88 elevation of stations within the network. Note, that both the GEOID96 and GEOID99 correction factors for Oregon and Washington have a difference of 0.11 m. This 0.11 m change occurs over a distance of less than 15 km (the distance from station 944 0574 A TIDAL to SMUR). Such a large variation in the correction factor over such a short distance is highly unlikely. To put this in perspective, from benchmark 944 0574 A TIDAL, located at the mouth of the Columbia River, to benchmark SOUTH, near Point Grenville, Washington, the GEOID96 correction factor varied only 0.07 m over a distance of more than 100-km.

The 0.11 m change in the correction factor has been interpreted by the NGS to imply that the orthometric heights used in the original NAVD 88 adjustment were not accurate enough to control the leveling network (Carlson 1998, Fredrick et al. 1996). The release of GEOID99 may have minimized the impact of this problem on GPS users in Oregon by forcing the geoid model to fit the published benchmark elevations. Benchmark elevation in this portion of Oregon have been found to be internally consistent, but may be in error when compared to Washington NAVD 88 elevations. As such, GPS users who need to compare GPS derived NAVD 88 elevations on both sides of the Columbia River are still faced with a dilemma.

Table 7 was developed to give an example of the impact of this problem. Table 7 shows the published elevations for seven stations whose elevations were derived from GPS observations using GEOID96 as well as the predicted elevation that would be obtained with GEOID99 using the 0.03 m correction factor derived for Oregon. Table 7 also shows the predicted NAVD 88 elevations that were obtained with GEOID96 using the 0.14 m correction factor derived for the southwest portion of Pacific County, Washington.

Table 7. Comparison of GPS derived NAVD 88 elevations for seven stations in northwest Oregon. Elevations shown are published (NGS), predicted with GEOID96 using the Washington 0.14 m correction factor, and predicted with GEOID99 using the Oregon 0.03 m correction factor. All elevations are in meters.

<table>
<thead>
<tr>
<th>Station Description</th>
<th>Published NAVD 88 Elevation</th>
<th>GEOID96 Predicted Elevation</th>
<th>GEOID99 Predicted Elevation</th>
<th>Difference NGS-GEOID96</th>
<th>Difference NGS-GEOID99</th>
<th>Difference GEOID96-GEOID99</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAST JETTY 2</td>
<td>9.8</td>
<td>9.81</td>
<td>9.92</td>
<td>-0.01</td>
<td>-0.12</td>
<td>-0.11</td>
</tr>
<tr>
<td>MIT</td>
<td>28.7</td>
<td>28.75</td>
<td>28.85</td>
<td>-0.05</td>
<td>-0.15</td>
<td>-0.10</td>
</tr>
<tr>
<td>IREDALE RESET</td>
<td>8.6</td>
<td>8.59</td>
<td>8.70</td>
<td>-0.01</td>
<td>-0.10</td>
<td>-0.11</td>
</tr>
<tr>
<td>KIM</td>
<td>28.3</td>
<td>28.32</td>
<td>28.43</td>
<td>-0.02</td>
<td>-0.13</td>
<td>-0.11</td>
</tr>
<tr>
<td>RILEA</td>
<td>13.0</td>
<td>13.04</td>
<td>13.15</td>
<td>-0.04</td>
<td>-0.15</td>
<td>-0.11</td>
</tr>
<tr>
<td>DELRAY</td>
<td>11.5</td>
<td>11.54</td>
<td>11.65</td>
<td>-0.04</td>
<td>-0.15</td>
<td>-0.11</td>
</tr>
<tr>
<td>CANN</td>
<td>30.5</td>
<td>30.51</td>
<td>30.61</td>
<td>-0.01</td>
<td>-0.11</td>
<td>-0.10</td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>-0.03</strong></td>
<td><strong>-0.13</strong></td>
<td><strong>-0.11</strong></td>
</tr>
</tbody>
</table>
The mean difference for the elevations calculated with the GEOID96 and GEOID99 models is -0.11 m, the same as the offset identified between the Washington and Oregon leveling networks. Thus, at this time there is no evidence to suggest that the use of GEOID99 in the northwest coastal portion of Clatsop County, Oregon, will provide better elevation for stations whose published NAVD 88 elevation were originally derived from GPS observations using GEOID96.

**Conclusion**

Based on the analysis described here the predicted NAVD 88 elevations (w/correction) shown in Table 3 (page 17) and Table 7 (GEOID96 predicted elevation) are deemed to be the most internally consistent estimate of these stations “true” NAVD 88 elevations. It is hoped that the NGS follows through with their effort to modernize the NAVD 88 leveling network in northwest Clatsop County, Oregon, so that this issue may be resolved.