DEPARTMENT OF COMMERCE
NOAA - NOS - C&GS
NATIONAL GEODETIC SURVEY

PUBLICATION DATE: NOVEMBER 26, 1991
USGS QUAD SHEET: SOLON SPRINGS *

SOLON SPRINGS GPS

PID: RM0895

HORIZONTAL DATUM: NAD 83 (1991)
VERTICAL DATUM: NGVD 29

STATE: WISCONSIN
COUNTY: DOUGLAS

LATITUDE:	46° 19′ 08.51697″ N	±0.00050	SECONDS
LONGITUDE:	091° 48′ 52.85386″ W	±0.00090	SECONDS

ORTHOMETRIC HEIGHT:	335.3		METERS
	1100.		FEET
DEFLECTIONS: ξ= 1.30	η= 7.41		SECONDS
LAPLACE CORRECTION:	-7.76		SECONDS
GEOID HEIGHT:	-26.756		METERS
ELLIPSOIDAL HEIGHT:	308.275	±0.017	METERS
X:	-139744.505		METERS
Y:	-4410742.232		METERS
Z:	4590033.226		METERS

HORIZONTAL NETWORK ORDER: B

THE HORIZONTAL COORDINATES WERE ESTABLISHED BY GPS OBSERVATIONS
AND ADJUSTED BY THE NATIONAL GEODETIC SURVEY IN JUNE 1991
THE ORTHOMETRIC HEIGHT WAS DETERMINED BY GPS OBSERVATIONS.

PLANE COORDINATES

GRID	ZONE	NORTHING METERS	EASTING METERS	POINT SCALE FACTOR	CONVERGENCE DEG MIN SEC	*GRID AZIMUTH TO SOLON SPRINGS GPS AZ MK DEG MIN SEC
SPC	WI N	129,676.263	460,258.183	0.99994882	- 1 18 32.6	195 11 06.7
UTM	15	5,130,177.860	591,252.724	0.99970236	+ 0 51 26.2	193 01 07.9

(*ARC-TO-CHORD CORRECTION NOT APPLIED)

STATION MARKS AND REFERENCE OBJECTS

PID	REFERENCE OBJECT	DISTANCE	GEODETIC AZIMUTH
RM0902	SOLON SPRINGS GPS AZ MK	APPROX. 1.0 KM	193 52 34.1

STATION MARK IS A .... HORIZONTAL CONTROL DISK
WITH SETTING ..... SET IN TOP OF CONCRETE MONUMENT (ROUND)
THE MARK IS STAMPED ... SOLON SPRINGS GPS 1989

STATION MARK HISTORY

YEAR MONUMENTED OR RECOVERED	CONDITION OF MARK	RECOVERED OR DESCRIBED BY
1989	STATION MONUMENTED	WI DEPT OF TRANSP

(Continued on Next Page)

DEPARTMENT OF COMMERCE
NOAA - NOS - C&GS
NATIONAL GEODETIC SURVEY

PUBLICATION DATE: NOVEMBER 26, 1991
USGS QUAD SHEET: SOLON SPRINGS *

SOLON SPRINGS GPS

PID: RM0895

STATION DESCRIPTION

DESCRIBED BY WI DEPT OF TRANSP 1989
THE STATION IS LOCATED ABOUT 3.94 KM (2.45 MI) SOUTH OF SOLON SPRINGS, 50.30 KM (31.25 MI) SOUTH-SOUTHEAST OF SUPERIOR, AND 19.32 KM (12.00 MI) NORTH OF WASCOTT. OWNERSHIP--CITY OF SOLON SPRINGS.
TO REACH THE STATION FROM THE JUNCTION OF COUNTY ROAD A, LAKE AVENUE AND U.S. HIGHWAY 53 IN THE TOWN OF SOLON SPRINGS, GO SOUTH FOR 3.94 KM (2.45 MI) ON U.S. HIGHWAY 53 TO A GRAVEL DRIVEWAY ON THE RIGHT LEADING INTO THE AIRPORT PROPERTY. TURN RIGHT AND GO WEST FOR 0.25 KM (0.15 MI) ON THE GRAVEL DRIVEWAY TO AN ASPHALT TAXIWAY. CONTINUE STRAIGHT AND GO WEST FOR 25 M (82.0 FT) ACROSS A GRASSY AREA BETWEEN THE TAXIWAY AND THE RUNWAY TO THE STATION ON THE LEFT.
THE STATION IS A STANDARD NGS HORIZONTAL CONTROL MARK DISK STAMPED---SOLON SPRINGS GPS 1989---, SET INTO THE TOP OF A ROUND CONCRETE MONUMENT 42 CM IN DIAMETER FLUSH WITH THE GROUND. LOCATED 24.17 M (79.3 FT) WEST FROM THE WEST EDGE OF THE ASPHALT TAXIWAY, 23.25 M (76.3 FT) SOUTH FROM THE EXTENDED CENTER-LINE OF THE GRAVEL DRIVEWAY LEADING TO THE STATION, 33.08 M (108.5 FT) EAST FROM THE NORTHEAST CORNER OF A PAVED APRON AT THE NORTH END OF THE RUNWAY, AND 0.92 M (3.0 FT) EAST FROM A CARSONITE WITNESS POST.

DATASHEET ITEMS

WARNING - The NAVD 88 orthometric height will be displayed when available. If no NAVD 88 height is available then the NGVD 29 height will be shown. The vertical datum is displayed on each datasheet. Care should be taken not to "mix" vertical datums within a project.

PUBLICATION DATE:
This refers to the date when the data was retrieved from the NGS database.

USGS QUAD SHEET:
This is the name of the USGS map sheet for the 7.5-minute area in the vicinity of the station. NGS often publishes datasheets by use of a quad system, for which the USGS quad sheet name is used as a reference. The quad system is explained in detail on a separate page.

DATUM:
The horizontal datum will always be NAD83. The vertical datum will be NAVD88 when available and NGVD29 otherwise.

The data sheet contains one to three boxes. The first box contains Horizontal and/or Vertical Control data. The latitude/longitude will be inside the first box if it is adjusted and the orthometric height will be inside the first box if it is a bench mark. The second box contains other geodetic data either observed or computed. The third box contains azimuth and distances to reference objects.

PID:
Displayed in the top center of the datasheet below the station designation. This is the unique "Permanent Identifier" assigned to the station.

DEFLECTIONS:
Displayed in the second box, the "Deflection of the Vertical" of a given point is the angle between a line perpendicular to the geoid surface and a line perpendicular to the ellipsoid surface. This angle of deflection is displayed as two components: ξ = The meridian component of the deflection, η = The prime-vertical component. The deflections are obtained from NGS deflection computation program DEFLEC90 unless stated otherwise on the datasheet. DEFLEC90 has an accuracy of 1 arc-second RMS. A positive ξ indicates that the astronomic latitude will fall North of the geodetic latitude. A positive η indicates that the astronomic longitude will fall East of the geodetic longitude.

LAPLACE CORRECTION:
Displayed in the second box, the laplace correction is the quantity which, when added to an astronomic azimuth, will yield a geodetic azimuth. The laplace correction is derived from the geodetic latitude (ϕ) and the deflection in the prime-vertical by the equation: Laplace Corr. = $(-1)\eta TAN\phi$ The value $\eta TAN\phi$ is multiplied by -1 in DEFLEC90 so that the resulting laplace correction may be "added" to the astro azimuth instead of subtracted. A second term correction known as the "deflection correction" has not been included in the published laplace correction. This deflection correction is generally of consequence when observing over rough terrain where large vertical angles are encountered. The deflection correction is given by: $[(\xi SIN(azimuth) - \eta COSIN(azimuth)] * \eta COTAN(zenith\ dist.)$ and should be subtracted from the laplace correction first term.

GEOID HEIGHT:
Displayed in the second box, the geoid height is the height of the geoid surface above or below the ellipsoid surface. A positive geoid height indicates that the geoid surface lies above the ellipsoid surface. The geoid height is determined by the NGS geoid height computation program GEOID90 unless stated otherwise on the datasheet.

ELLIPSOID HEIGHT:
Displayed in the second box if available, the ellipsoid height is the height of the station above the ellipsoid. Generally the orthometric height = ellipsoid ht - geoid ht however on the datasheet these three quantities will not add up exactly since they were derived from separate sources. The ellipsoid height is determined by GPS observations unless stated otherwise on the datasheet.

XYZ:
The cartesian coordinates, X,Y, and Z are computed from the stations position and ellipsoid height and are only displayed when the ellipsoid height is available.

MODELED GRAVITY:
Displayed in the second box, this is the interpolated gravity which was used in the NAVD88 adjustment.

ORDER and CLASS:
The station order and class is as defined by the Federal Geodetic Control Committee in its publication Standards and Specifications for Geodetic Control Networks. For vertical control CLASS 0 represents other cases. Usually, the tolerance factor for ORDER/CLASS 1/0 is 2 mm or less; For 2/0, 8.4 mm; and for 3/0, 12.0 mm

PLANE COORDINATES:
The data needed perform computations on a flat (grid) surface are displayed for the two major plane coordinate systems State Plane Coordinates (SPC) and Universal Transverse Mercator (UTM). The "point scale factor" is that quantity which, when multiplied by a sea-level distance will yield a grid distance. The "convergence" also known as the "mapping angle" is the quantity which, when subtracted from the geodetic azimuth will yield the grid azimuth. On the datasheet the grid azimuth is displayed for the "preferred azimuth object" found in the reference object box. All azimuths shown on the datasheet are referenced from North. A second term correction known as the Arc-To-Chord Correction has not been included in the published convergence.

REFERENCE OBJECTS:
The following reference objects are displayed in the third box: Any mark which is designated as being for reference or azimuth purposes, any positioned mark within 20 seconds of the occupied station, and any landmark which was at sometime observed from the occupied station.

January 16, 1992