Geodetic Data Sheet (Feet)
GSID Station # 25100 2

MINNESOTA MNDT

03/16/2010
Sheet Help 1

Mn/DOT Name: MINNESOTA MNDT 3 **NGS Name:** MINNESOTA 4

County: RAMSEY, MN (Sheet 1) 5

NGS ACRN: AB9783 6 7 Get Map 9
NGS Quad / Sta Num : 44093111/
USGS Quad: ST PAUL EAST 8

1/4	Sec	Twp	Rng	Reference Latitude	Reference Longitude	Vert Order	Horz Order
NW	31	29 N	22 W	445723.23 10	930558.28	2 11	B

12 Agency	Year Set	Last Recovery	Condition	GPSable	Photos	Bridge Num	F/P/R 15	Magnetic Properties
MNDT	1985	2008	13 GOOD	14 YES	YES		FLUSH	MARKER W/BAR MAGNET

16 **Monument Type**
CONCRETE SLAB

17 **Disk Type**
HORIZONTAL CONTROL DISK

18 **Description:** (2008) 19 **Stamping:** MINNESOTA 1985

IN ST. PAUL, 0.35 MILE WEST ALONG UNIVERSITY AVENUE FROM THE JUNCTION OF UNIVERSITY AVENUE AND INTERSTATE HIGHWAY 35E, THEN 0.1 MILE NORTH ALONG PARK STREET, THEN 0.15 MILE EAST ALONG SHERBURNE AVENUE, 800 FEET NORTHEAST OF STATE CAPITOL BUILDING, 166.80 FEET SOUTH-SOUTHEAST OF REFERENCE MARK 2, IN THE CENTER OF A OBSERVATION PLATFORM LOCATED NEAR THE SOUTHEAST CORNER OF THE PARKING LOT AT CEDAR AVENUE AND SHERBURNE AVENUE, 19 FEET EAST-SOUTHEAST OF NORTH EDGE OF WALL, 19 FEET EAST-NORTHEAST OF SOUTH EDGE OF WALL.

Station Notes
NATIONAL GEODETIC SURVEY CBN B ORDER STATION.

20 Leveling-Derived Orthometric Heights (Feet)

21 **NAVD88**

Orthometric Height			Ellipsoid (NAD83)				Project Info	
Height	Acc	Order (/Class)	Height	Acc	Adj	Determination Method 22	Year	Reference 23
24 913.486	.016 25	2/1 26				VERTICAL CONTROL SURVEY	2003	VD9

21 **NGVD29**

Orthometric Height			Ellipsoid (NAD83)				Project Info	
Height	Acc	Order (/Class)	Height	Acc	Adj	Determination Method	Year	Reference
913.338	.016	2/1				VERTICAL CONTROL SURVEY	2003	VD9

27 Non Leveling-Derived Orthometric and Ellipsoid Heights (Feet)

21 **NAVD88**

Orthometric Height			Ellipsoid (NAD83) 30				Project Info	
Height	Acc	Order (/Class)	Height	Acc	Adj	Determination Method 22	Year	Reference 23
913.482	.131		823.643	.066	2007	GPS - STATIC	2010	HWSHN
24 913.482	.131 25		823.643	.066	2007	GPS - STATIC	2009	HINVR
913.482	.131		823.883	.066	1996	GPS - STATIC	2009	HINVR
913.482	.131		823.643	.066	2007	GPS - STATIC	2009	HRMSY
913.482	.131		823.643	.066	2007	HORIZONTAL ADJUSTMENT	2009	GPS2526
			823.643	.066	2007	HORIZONTAL ADJUSTMENT	2009	GPS2224-B
913.482	.131		823.830	.066	1996	GPS - STATIC	2008	HRMSY
913.482	.131		823.830	.066	1996	GPS - STATIC	2008	HWSHN
913.309	.262		823.696	.197	1996	GPS - RTRN	2007	M07RAMS
			823.643	.010	2007	HORIZONTAL ADJUSTMENT	2007	GPS2300
913.482	.131		823.830	.066	1996	HORIZONTAL ADJUSTMENT	2006	GPS2224
913.482	.131		823.830	.066	1996	GPS - STATIC	2006	HWEAV
913.482	.098		823.830	.049	1996	GPS - STATIC	2005	GPS2036
913.450	.131		823.830	.066	1996	HORIZONTAL ADJUSTMENT	2005	GPS2120
913.450	.131		823.830	.066	1996	GPS - STATIC	2005	HCED
913.482	.098		823.830	.049	1996	GPS - STATIC	2004	GPS1994
913.515	.098		823.830	.049	1996	HORIZONTAL ADJUSTMENT	1999	G17648
913.548	.098		823.830	.049	1996	GPS - STATIC	1996	GPS0805

21 **NGVD29** 28 29

Orthometric Height			Ellipsoid (NAD83)				Project Info	
Height	Acc	Order (/Class)	Height	Acc	Adj	Determination Method	Year	Reference
913.286						LEVELING	1985	HORZ

31 **Geoid 2003 Separation: -89.649**

32 **Lat/Lon and County Coordinates (Feet)**

33 **NAD83(2007)**

Geodetic Position		Ramsey County					Project Info	
Latitude	Longitude	X	Y	Acc	Order	Determination Method	Year	Reference
44 57 23.23074	93 05 58.28007	573475.741	160414.514	.033	C	GPS - STATIC	2010	HWSHN
44 57 23.23074	93 05 58.28007	573475.741	160414.514	.033	C	GPS - STATIC	2009	HINVR
44 57 23.23074	93 05 58.28007	573475.741	160414.514	.033	C	GPS - STATIC	2009	HRMSY
44 57 23.23074	93 05 58.28007	573475.741	160414.514	.033	C	ADJUSTMENT	2009	GPS2526
44 57 23.23074	93 05 58.28007	573475.741	160414.514	.033	C	ADJUSTMENT	2009	GPS2224-B
44 57 23.23074	93 05 58.28007	573475.741	160414.514	.007		ADJUSTMENT	2007	GPS2300

33 **NAD83(1996)**

34 35

Geodetic Position		Ramsey County					Project Info	
Latitude	Longitude	X	Y	Acc	Order	Determination Method	Year	Reference
44 57 23.23047	93 05 58.27944	573475.787	160414.487	.033	C	GPS - STATIC	2009	HINVR
44 57 23.23047	93 05 58.27944	573475.787	160414.487	.033	C	GPS - STATIC	2008	HRMSY
44 57 23.23047	93 05 58.27944	573475.787	160414.487	.033	C	GPS - STATIC	2008	HWSHN
44 57 23.22972	93 05 58.28007	573475.741	160414.411	.131	3	GPS - RTRN	2007	M07RAMS
44 57 23.23047	93 05 58.27944	573475.787	160414.487	.033	C	ADJUSTMENT	2006	GPS2224
44 57 23.23047	93 05 58.27944	573475.787	160414.487	.033	C	GPS - STATIC	2006	HWEAV
44 57 23.23047	93 05 58.27944	573475.787	160414.487	.016	B	GPS - STATIC	2005	GPS2036
44 57 23.23047	93 05 58.27944	573475.787	160414.487	.033	C	ADJUSTMENT	2005	GPS2120
44 57 23.23047	93 05 58.27944	573475.787	160414.487	.033	C	GPS - STATIC	2005	HCED
44 57 23.23047	93 05 58.27944	573475.787	160414.487	.016	B	GPS - STATIC	2004	GPS1994
44 57 23.23047	93 05 58.27944	573475.787	160414.487	.016	B	ADJUSTMENT	1999	G17648
44 57 23.23047	93 05 58.27944	573475.785	160414.489	.016	B	GPS - STATIC	1996	GPS0805

33 **NAD83(1986)**

Geodetic Position		Ramsey County					Project Info	
Latitude	Longitude	X	Y	Acc	Order	Determination Method	Year	Reference
44 57 23.22405	93 05 58.27470	573476.130	160413.839	.033	C	GPS - STATIC	1991	DIXON'S
44 57 23.22372	93 05 58.27529	573476.087	160413.803	.033	C	GPS - STATIC	1987	METRO
44 57 23.22499	93 05 58.27465	573476.133	160413.934	.033	C	GPS - STATIC	1985	METRO

33 **NAD27**

Geodetic Position							Project Info	
Latitude	Longitude	X	Y	Acc	Order	Determination Method	Year	Reference
44 57 23.34580	93 05 57.48560			.100	B	CLASSICAL SURVEY	1950	UNK

32 State Plane and UTM Coordinates (Feet)

NAD83(2007)

MN State Plane - South Zone		UTM - Zone 15					Project Info	
X	Y	X	Y	Acc	Order	Determination Method	Year	Reference
2857766.082	1042579.563	1614662.734	16332374.534	.033	C	GPS - STATIC	2010	HWSHN
2857766.082	1042579.563	1614662.734	16332374.534	.033	C	GPS - STATIC	2009	HINVR
2857766.082	1042579.563	1614662.734	16332374.534	.033	C	GPS - STATIC	2009	HRMSY
2857766.082	1042579.563	1614662.734	16332374.534	.033	C	ADJUSTMENT	2009	GPS2526
2857766.082	1042579.563	1614662.734	16332374.534	.033	C	ADJUSTMENT	2009	GPS2224-B
2857766.082	1042579.563	1614662.734	16332374.534	.007		ADJUSTMENT	2007	GPS2300

NAD83(1996)

MN State Plane - South Zone		UTM - Zone 15					Project Info	
X	Y	X	Y	Acc	Order	Determination Method	Year	Reference
2857766.128	1042579.537	1614662.780	16332374.506	.033	C	GPS - STATIC	2009	HINVR
2857766.128	1042579.537	1614662.780	16332374.506	.033	C	GPS - STATIC	2008	HRMSY
2857766.128	1042579.537	1614662.780	16332374.506	.033	C	GPS - STATIC	2008	HWSHN
2857766.083	1042579.460	1614662.734	16332374.430	.131	3	GPS - RTRN	2007	M07RAMS
2857766.128	1042579.537	1614662.780	16332374.506	.033	C	ADJUSTMENT	2006	GPS2224
2857766.128	1042579.537	1614662.780	16332374.506	.033	C	GPS - STATIC	2006	HWEAV
2857766.128	1042579.537	1614662.780	16332374.506	.016	B	GPS - STATIC	2005	GPS2036
2857766.128	1042579.537	1614662.780	16332374.506	.033	C	ADJUSTMENT	2005	GPS2120
2857766.128	1042579.537	1614662.780	16332374.506	.033	C	GPS - STATIC	2005	HCED
2857766.128	1042579.537	1614662.780	16332374.506	.016	B	GPS - STATIC	2004	GPS1994
2857766.128	1042579.537	1614662.780	16332374.506	.016	B	ADJUSTMENT	1999	G17648
2857766.128	1042579.537	1614662.779	16332374.506	.016	B	GPS - STATIC	1996	GPS0805

NAD83(1986)

MN State Plane - South Zone		UTM - Zone 15					Project Info	
X	Y	X	Y	Acc	Order	Determination Method	Year	Reference
2857766.476	1042578.890	1614663.119	16332373.856	.033	C	GPS - STATIC	1991	DIXON'S
2857766.434	1042578.856	1614663.077	16332373.822	.033	C	GPS - STATIC	1987	METRO
2857766.478	1042578.985	1614663.123	16332373.951	.033	C	GPS - STATIC	1985	METRO

NAD27

MN State Plane - South Zone							Project Info	
X	Y	X	Y	Acc	Order	Determination Method	Year	Reference
2233163.287	714501.396			.100	B	CLASSICAL SURVEY	1950	UNK

36 Station Photos

Type	File Name	Dir	Date
Location:	ftp://ftp.olmweb.dot.state.mn.us/geod/StationPhotos/ramsey/MINNESOTA-AB9783-3SE-06NOV2008.jpg	SE	Nov 6, 2008
Monument:	ftp://ftp.olmweb.dot.state.mn.us/geod/StationPhotos/ramsey/MINNESOTA-AB9783-2-06NOV2008.jpg		Nov 6, 2008
Disk:	ftp://ftp.olmweb.dot.state.mn.us/geod/StationPhotos/ramsey/MINNESOTA-AB9783-1-06NOV2008.jpg		Nov 6, 2008

** All station images can be viewed at: ftp://ftp.olmweb.dot.state.mn.us/geod/StationPhotos **

Mn/DOT Geodetic Data Sheet Definitions

1. **SHEET HELP**
   An internet hyperlink to the Mn/DOT Geodetic Data Sheet Definitions document.

2. **MN/DOT GEODETIC DATABASE STATION #** (GSID)
   A unique identifier that is assigned sequentially as stations are added to Mn/DOT's database.

3. **MN/DOT NAME**
   Name assigned by Mn/DOT. The name is unique within a county but not necessarily within the state. May or may not be the same as the NGS name. May or may not be the same as the stamping.

4. **NGS NAME**
   Name assigned by NGS and referenced in their database. The name may or may not match the Mn/DOT station name. The NGS does not apply any duplicate name restrictions on this field.

5. **COUNTY MAP SHEET**
   To facilitate a common scale for the county maps, larger counties were divided into multiple map sheets. This number refers to the map sheet within which the station is located.

6. **NGS ACRN**
   A unique identifier that is assigned by the NGS and referenced to their database. It is also referred to as a PID in some of the NGS's online products. This field only appears on marks that have been submitted to the NGS.

7. **NGS ACRN**
   Where this field exists it is also an internet hyperlink to the NGS data sheet.

8. **NGS QUAD/STA NUM – USGS QUAD**
   A reference to the 7.5 minute NGS Horizontal Control Quadrangle Maps. The station number is an index number that was assigned by the NGS to horizontal control stations that fall within the quad. Mostly used for internal research purposes.

   The USGS Quad field is the name assigned by the United States Geological Survey to the same 7.5 minute quadrangle map.

9. **GET MAP**
   An internet hyperlink to Google Maps which automatically displays the station location.

10. **REFERENCE LATITUDE/LONGITUDE**
    A reference position which is derived from several possible sources including but not limited to: scaling, hand held GPS, uncalibrated VRS, and geodetic quality survey. As higher quality surveys are performed, this field is updated. The significant figures

displayed for this position are relative to the determination method but never exceed a hundredth of a second (approximately 1 foot). See the coordinate section of the data sheet for more precise values.

11. **VERT/HORZ ORDER**
    The vertical order represents the newest ordered elevation assigned to the station; this field is blank for stations whose elevations were not derived from a vertical control survey. The horizontal order refers to the highest order coordinate assigned to the station. See definitions 23 and 31 for more detailed descriptions.

12. **AGENCY**
    Generally represents the agency which is shown on the disk or sleeve logo.

13. **CONDITION**
    The reported condition of the station from the most recent recovery.
    Condition Types:

Good	*(includes Fair)*
Poor	*(includes disturbed, damaged, unstable)*
Not Found	
Destroyed	

14. **GPSABLE**
    Whether or not the station location is suitable for a static GPS control survey. Includes factors such as sky visibility, safety and whether or not the location is suitable for tripod occupation (bridge rail, wing wall).

15. **F/P/R**
    Flush/Projected/Recessed. The approximate vertical distance from the surrounding surface material to the reference point of the station.

16. **MONUMENT TYPE**
    The portion of the station to which the disk or reference point is attached (concrete, metal rod, rock).

17. **DISK TYPE**
    The part of the station to which survey measurements are made (disk, datum point).

18. **DESCRIPTION**
    A description of the location of the station used to locate it in the field. Also referred to as a "To Reach" description. The general format includes a general location relative to the nearest town, driving directions with street references, and ties to local features near the station.

19. **STAMPING**
    The stamped reference on the station disk or access cover. Does not include the die-cast text. May or may not match the Station Name.

20. **LEVELING-DERIVED ORTHOMETRIC HEIGHTS**

All heights that were determined by leveling methods are shown in this section. The header also displays the reference units (US survey feet or meters).

21. **NAVD88/NGVD29**

The vertical datum to which the orthometric heights are referenced.

22. **DETERMINATION METHOD**

The survey method used to establish the horizontal or vertical position. In the vertical section of the data sheet this field also includes a reference to the datum from which the ellipsoid heights were computed.

Method Types:

Vertical Control Survey

- A vertical control survey ran by Mn/DOT.

GPS-Static

- A horizontal control survey ran by Mn/DOT.

GPS-RTK (Real Time Kinematic)

GPS-RTRN (Real Time Reference Network)

- Uncalibrated VRS positions established by Mn/DOT Geodetics for the purpose of monitoring the accuracy of the VRS system.

GPS-OPUS (Online Positioning User Service)

- A service provided by the NGS for the processing of raw GPS data.

Adjustment

- Generally an NGS adjustment of Mn/DOT projects.

Leveling

Reciprocal Vertical Angle

Non-reciprocal Vertical Angle

Mixed Survey

Digitized From Map

23. **REFERENCE**

A database reference pertaining to a common source from which a set of values originated.

General reference types:

H*XXX (HELKR)*

- Mn/DOT horizontal control projects of order = C.

V*XXX (VELKR2)*

- Mn/DOT vertical control projects of order/class = 2/1.

GPS*XXXX (GPS1945)*

- An NGS adjustment of one or more Mn/DOT horizontal projects.

00000*XXX (00000025)*

- An NGS adjustment of one or more Mn/DOT vertical projects.

M0*XXXXX (M07HENN)*

- Part of Mn/DOT's statewide recovery effort which includes uncalibrated VRS positions where they are available. Classified as 3rd order.

Specific references:

GPS2300

- Marks included in the NGS's NSRS2007 adjustment. Included only GPS derived observations.

GPS0805

- The original 1996 Minnesota HARN adjustment.

G17648

- Statewide NAD83(1996) adjustment of all marks in Minnesota including classically derived and GPS observation.

00000025, 00000135, 00000136

- The adjustments that established the framework of NAVD88 in Minnesota.

24. **ORTHOMETRIC HEIGHT**

The height of the station above the reference surface (NAVD88, NGVD29). Includes both leveling and GPS derived values.

The NGS did not publish GPS derived orthometric heights with the NAD83(2007) adjustment.

25. **ORTHOMETRIC ACC** (Accuracy)

This value represents the uncertainty of its coordinates relative to other directly connected, adjacent control points and is based on the methods, procedures and equipment used for the associated survey. It is only an estimate and is meant to give the user an indication of differences between the various determination methods. The accuracies for GPS derived orthometric heights include the uncertainty in the ellipsoid and geoid heights.

26. **ORDER (/CLASS)**

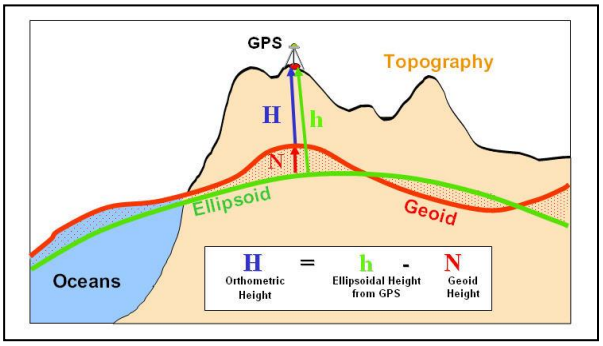
A designation that broadly characterizes methods, procedures and accuracies which were used in the associated vertical control survey, order/class = 1/1 being the best. The guidelines and standards were established by the NGS. Mn/DOT geodetics generally surveys to 2/1.

27. **NON LEVELING-DERIVED ORTHOMETRIC AND ELLIPSIOD HEIGHTS**

All heights derived from direct GPS observation as well as from constrained least squares adjustments of horizontal control projects. The header also displays the reference units (US survey feet or meters).

28. **ELLIPSOID HEIGHT**

The height of the station above the reference ellipsoid. Derived from GPS observations.



29. **ELLIPSOID ACC** (Accuracy)
    For adjustments other than NAD83(2007) this value represents the uncertainty of its coordinates relative to other directly connected, adjacent control points and is based on the methods, procedures and equipment used for the associated survey. It is only an estimate and is meant to give the user an indication of differences between the various determination methods.

    For the NAD83(2007) adjustment this value is based on an explicit network accuracy published by the NGS. The network accuracy is based on least squares adjustment statistics and its value represents the uncertainty of its coordinates with respect to the geodetic datum, which is generally considered to be the CORS Network. NGS publishes at the 95-percent confidence level. Mn/DOT's published value is at the 68-percent level for consistency with other accuracies on the Mn/DOT data sheet.

30. **ELLIPSIOD DATUM AND DATE TAG**
    The name and date tag of the datum used to determine the ellipsoid height values.

31. **GEOID 2003 SEPARATION**
    The perpendicular distance between the geoid and the reference ellipsoid, based on the geoid model, at a specific latitude and longitude. A negative geoid separation indicates that the geoid is below the ellipsoid. See diagram shown in definition 18.

32. **LAT/LON AND COUNTY COORDINATES**
    STATE PLANE AND UTM COORDINATES
    The horizontal positions associated with each survey project are found in these two sections. The accuracy, order, determination method and project references are repeated in each section. Each header also displays the reference units (US survey feet or meters).

33. **NAD83(2007)/NAD83(1996)/NAD83(1986)/NAD27**
    The horizontal datum and date tag to which latitude and longitude positions are referenced.

34. **ACC** (Accuracy)
    For the NAD83(2007) adjustment this value is based on an explicit network accuracy published by the NGS. The network accuracy is based on least squares adjustment statistics and its value represents the uncertainty of its coordinates with respect to the geodetic datum, which is generally considered to be the CORS Network. NGS publishes at the 95-percent confidence level. Mn/DOT's published value is at the 68-percent level for consistency with other accuracies on the Mn/DOT data sheet.

    For adjustments prior to NAD83(2007) this value represents the uncertainty of its coordinates relative to other directly connected, adjacent control points and is based on the methods, procedures and equipment used for the associated survey. It is only an estimate and is meant to give the user an indication of differences between the various determination methods.

35. **ORDER**

A designation that broadly characterizes methods, procedures and accuracies which were used in the associated horizontal control survey, order = A being the best. The guidelines and standards were established by the NGS. Mn/DOT geodetics generally surveys to C order.

Order	Method	Accuracy
A	GPS	1:10 million
B	GPS	1:1 million
C	GPS	1:100,000
1	Classical	1:100,000
2	Classical	1:50,000
3	Classical	1:10,000
4	Classical	<1:10,000

The associated accuracy value in the above table represents the ratio of the maximum expected error between any 2 points to the distance between them, the units being the same.

Note: The NGS has replaced the Order designation with network accuracies for all NAD83(2007) values.

36. **STATION PHOTOS**

Type:

Location

- Generally showing the station from a distance and the direction from which you would approach the station.

Monument

- Generally showing the station from a few feet away. Should show the station relative to the surrounding surface material.

Disk

- A close up of the station showing the stamping and die-cast markings if they exist.

File Name:

The ftp path and file name for each photo available. The path name is also an internet hyperlink to access the photos directly.

Dir (direction):

Direction facing when taking the photo. Shown only for the Location photo.

Date:

Date the photos were taken.