1.1 General
It is the policy and practice of WisDOT to take all reasonable measures to perpetuate, preserve and replace survey monuments. Therefore, all reasonable efforts will be taken to assure that no survey monuments will be destroyed, disturbed, removed or buried to the degree that they are no longer usable without first following the instructions listed below.

United States Public Land Survey System (USPLSS) corners, Boundary Monuments and Geodetic Survey Control Stations are the most significant types of monuments found within road rights of way. USPLSS corners and boundary monuments are used to help identify land ownership boundaries while geodetic survey control station monuments mark a location where a precise elevation and/or latitude and longitude have been determined. They are two completely separate entities. If USPLSS or boundary monuments are disturbed or destroyed, they can be replaced in substantially the same location using local references. Geodetic stations, if disturbed or destroyed, must be replaced and resurveyed in their entirety due to their precision.

Refer to CMM 7-85 for additional information.

1.2 Definitions

Accessory: A nearby physical object to which corners or monuments are referenced for perpetuation or recovery. Distances and/or directions are measured from the corner or monument to the accessory. Examples may include trees, poles, roads, fences or any other easily discernible object. Accessories should be selected based on location and permanence and can be natural or man-made.

Boundary Line: A line of demarcation between adjoining lands. Boundary lines may delineate areas of different political jurisdiction and/or different land parcels. Land parcel boundaries are more commonly referred to as ‘property lines’, and may have the same ownership on both sides of the line.

Boundary Monument: Physical object(s) placed on or near a boundary line to preserve and delineate a line where two land areas meet. Boundary Monuments may delineate lines of political and/or land parcel boundaries. Also see Boundary Line.

Corner: A point on the Earth where two or more land boundary lines meet denoting the end or a change of direction in the line. This is not the same as Monument, which is a physical object used to represent the location of a corner. The terms Monument, Mark, Landmark, Corner, Point and Station are not synonymous, but are often used interchangeably.

Geodetic Survey Control Station: A survey monument with either a precise latitude and longitude used for horizontal control, or a precise elevation used for vertical control, or both that has been determined by the most rigorous of surveying methods to meet the specifications set forth by the National Geodetic Survey (NGS). A typical Geodetic Survey Control Station established by WisDOT’s Height Modernization Program is a 3.5” bronze disk set in a 16” diameter concrete post, with the survey monument’s position of record published as part of NGS’ National Spatial Reference System (NSRS).

Landmark: See monument.

Lost USPLSS Corner or Monument: From the 2009 BLM Manual of Surveying Instructions, a lost corner or monument is one whose original position cannot be determined by substantial evidence, either from traces of the original marks or from acceptable evidence or reliable testimony that bears upon the original position. The location of a lost corner can be restored only by proportioning to one or more existing interdependent corners.

Monument: A physical object that indicates the location of a corner or a point determined by survey. Monuments may include (but are not limited to) a brass disk in concrete, iron rods or pipes with or without plastic caps, chiseled X’s, PK nails etc. More than one monument may define a location. The terms Monument, Mark, Landmark, Corner, Point and Station are not synonymous, but are often used interchangeably.

Obliterated USPLSS Corner or Monument: From the 2009 BLM Manual of Surveying Instructions, an obliterated corner is an existent corner where there are no remaining traces of the monument or its accessories but whose position may be recovered by substantial evidence from the reliable testimony of competent witnesses, or by acceptable record evidence.
Parcel (Land): A continuous area or acreage of land which is described with its own unique land description such as metes and bounds, etc. Adjoining land parcels can have the same or different owners.

Perpetuate: The establishment of monuments, accessories and other relevant evidence that sustains the location of a corner in the event of its destruction. Corners can be perpetuated, geodetic survey control stations cannot. Perpetuations of corners should be recorded with the appropriate jurisdiction to preserve the chain of evidence from the present day back to the original monument. Geodetic survey control stations have measurements to other monuments and/or accessories to help locate the station, but are not used to perpetuate it.

Property Corner: The same as a land parcel corner. A property corner may or may not have a monument designating its location.

Replace/Reset/Restore: The reestablishment of a survey monument that has been destroyed or disturbed in the same location as the original monument. The original location is typically determined via perpetuation of the original monument prior to destruction. Land Parcel monuments and Section Corners can be reset, but Geodetic Survey Control Stations cannot. The terms Replace, Reset and Restore are often used interchangeably.

United States Public Land Survey System (USPLSS): System of surveys that began in 1784 by the US Federal Government that provides direction and instruction for the orderly survey and subdivision of federally owned lands into grids prior to settlement. The grids from largest to smallest are: Townships (also called Congressional Townships to distinguish from Political Townships), Sections, Quarter Sections, Quarter-Quarter Sections (40 acres) and so on. Generally, the original USPLSS surveys monumented township and section exteriors. Further subdivisions and Monumentation was carried out by local surveyors. In Wisconsin, the USPLSS surveys began in December 1831 with substantial completion in 1866. Further information can be found in FDM 9-20-5 or most introductory survey textbooks.

Wisconsin Height Modernization Program (HMP): The Wisconsin Department of Transportation’s Division of Transportation Systems Development, Bureau of Technical Services, Geodetic Surveys Unit (GSU) is responsible for the development and maintenance of the statewide vertical, horizontal, and gravitational geodetic control network in support of the Wisconsin Spatial Reference System (WSRS).

In 1998 the Wisconsin Department of Transportation’s Geodetic Surveys Unit, in conjunction with the National Geodetic Survey (NGS), began work on a Height Modernization Program in Wisconsin. The goal was to construct a dense statewide network of permanent Geodetic Survey Control stations with highly accurate, reliable heights using global positioning satellite technology with traditional leveling, gravity, and modern remote sensing methods.

Upon completion of initial Height Modernization Program efforts, the Geodetic Surveys Unit serves as chief custodian of the statewide Geodetic Survey Control Network, which includes the core functions of replacement and reestablishment of Geodetic Survey Control Stations that are disturbed and/or destroyed.

See CMM 7-85-2 for additional information.

1.3 Types of Monuments Typically Found along WisDOT Projects
There are four categories of monuments typically found along WisDOT projects.

1. Geodetic Survey Control Station Monuments – cannot be perpetuated. If disturbed due to nearby activity it must be replaced. Contact the Geodetic Surveys Unit by phone 866-568-2852 or email geodetic@dot.wi.gov if a project may endanger a geodetic survey control station. See FDM 9-5-1.4 for more details.

2. United States Public Land Survey System (USPLSS) Monument - shall be perpetuated prior to construction. See FDM 9-5-1.5 for more details.

3. Land Parcel or Boundary Monument - shall be perpetuated prior to construction. See FDM 9-5-1.5 for more details.

4. Any other types of monuments - contact the appropriate WisDOT region survey coordinator for guidance prior to disturbing.

1.4 Geodetic Survey Control Station Replacement Procedure
When a Wisconsin Height Modernization Program geodetic survey control station will be disturbed or destroyed during construction, it must be replaced and reestablished as specified in the "Geodetic Survey Control Station Replacement Procedure". The "Geodetic Survey Control Station Replacement Procedure" was created to describe the roles, responsibilities, and funding necessary to ensure the replacement and reestablishment of a HMP geodetic survey control station is performed to the same specification and survey accuracy of the station it
1.5 Procedure to Perpetuate USPLSS and/or Land Parcel Boundary Monuments

1. Each region will notify all counties, villages and cities of upcoming construction projects within their county/municipal boundaries that may endanger disturb any survey landmark. This notification will be sent out at least 60 days before the start of construction. This notification will include the location and limits of the project as well as the anticipated start of construction. This notification will serve as the 30-day written notice as required by Wis. Stat. s. 59.74(2)(b)1, that a landmark may be destroyed.

2. A thorough search of the records will be made to determine if landmarks of public record exist on the proposed project. County surveyors and city/village engineers will be asked to research their records and provide WisDOT with any information they have concerning landmarks within the project limits. WisDOT will make a thorough search of the records in the region office.

3. WisDOT will make a determination of which landmarks may be endangered and notify the county, village or city of these landmarks.

4. At least 30 days before construction, the county surveyor and city/village engineer will be asked to inform the region of the landmarks that will be preserved by the county surveyor and city/village engineer under statute s. 59.74(2)(b)1.

5. The WisDOT region survey unit will determine if there are recorded landmarks in addition to those perpetuated by the county or municipality that are deemed necessary to preserve in the public interest. These additional recorded landmarks shall be perpetuated with witness monuments.

6. WisDOT will make a field survey of the affected landmarks and witness monuments and provide a copy to the county. This will be done for informational purposes only. A note will state explicitly that this monument is not being certified as an actual corner, only that a certain type of landmark was found and is perpetuated by a monument or reference monuments. This will be done at WisDOT cost.

7. Upon completion of construction, WisDOT will, if requested, reset an appropriate type of monument in the original location. WisDOT will file with the county/municipality the type of monument set. This will be done for informational purposes only. The notes will state that this monument is not being certified as an actual monument, only that certain evidence of a monument was found and that due to construction, it was necessary to remove and reset a monument at the location. This service will be provided by WisDOT at its expense. Resetting of monuments shall be done under the responsible charge of a Professional Land Surveyor (PLS) per Wisconsin Statute 443.01(6s)(c).

8. If WisDOT has determined that a lost or obliterated United States Public Land Survey System (USPLSS) corner or monument must be restored prior to construction, the first point of contact will be the county surveyor where the corner in question is located. Per State Statute 59.74, the cost of perpetuating the evidence of any (USPLSS) landmark shall be borne by the county. Thus, the county surveyor (or designated representative if there is no county surveyor) shall be contacted for guidance on restoring a lost or obliterated USPLSS monument.

9a. In the areas that are acquired as new fee acquisition, WisDOT shall notify the owner that it will facilitate, upon request, the actual and reasonable cost to have new property monuments set on the new right-of-way line in those instances where there is an existing property survey by a Professional Land Surveyor (PLS) and evidence of monumentation is found or identified prior to construction for the property in question. By facilitate, the region has the option to pay the property owner to hire a PLS or hire a PLS directly to set monuments on the new right-of-way line. Property owner notification to WisDOT for setting of property monuments on the new right-of-way via the above procedure shall occur prior to the closing of the construction project. The region Technical Services Chief or designee in consultation with the Project Development, Real Estate, Survey, Plat and other relevant region unit(s) shall determine if WisDOT will pay for new property monuments in areas new right-of-way acquisition area that does not meet the above qualifications.

9b. In the areas where rights and or other interests (e.g. Temporary Limited Easement (TLE), Permanent Limited Easement (PLE), Highway Easement (HE), etc.) are being acquired by WisDOT, WisDOT will replace any property monuments that are damaged or destroyed as a result of construction activities provided that there is an existing property survey by a Professional Land Surveyor (PLS) and evidence of monumentation is found or identified prior to construction for the property in question. Property owner notification to WisDOT for replacement property monuments shall occur prior to the closing of
the construction project. The region Technical Services Chief or designee in consultation with the Project Development, Real Estate, Survey, Plat and other relevant region unit(s) shall determine if WisDOT will pay for monument replacement of a property in area(s) where rights or other interests are acquired, but does not meet the property survey or monumentation qualifications mentioned above.

10. In areas where there are no Real Estate acquisitions, the construction contractor will be responsible for having a Professional Land Surveyor (PLS) replace any property monument that is damaged or destroyed during construction. Per the requirements in areas of new right-of-way acquisition, the property owner must be able to provide an existing property survey by a Professional Land Surveyor (PLS) and evidence of monumentation prior to construction. The property owner shall notify WisDOT or WisDOT’s representative of any missing property monuments prior to the closing of the construction project.

FDM 9-5-5 Right-of-Way Monumentation

Right-of-way monuments shall be set for all transportation projects requiring right-of-way acquisition.

Refer to Attachment 5.1 for the department’s policy on right-of-way monumentation, to FDM 9-25-6 for right-of-way monumentation, implementation methods and requirements, and to FDM 9-5-10 for the department’s policy on standard geodetic references.

Requests for information about this procedure should be directed to the Right-of-Way Plat Coordinator/Land Surveyor at 608-243-3397 or the Chief Surveying & Mapping Engineer at 608-246-7941.

LIST OF ATTACHMENTS

Attachment 5.1 Right-of-Way Monumentation Policy

FDM 9-5-10 Standard Geodetic References

The Department policy on geodetic datums and coordinates specifies having a single standard reference for horizontal measurements, a single standard reference for vertical measurements, and a single standard for large-scale mapping. This policy became effective January 1, 1997, and is applicable to all new work begun after that date. The standard geodetic references as revised in January 2014 are as follows:

<table>
<thead>
<tr>
<th>Geodetic Reference</th>
<th>Datum or Adjustment</th>
</tr>
</thead>
</table>
| Horizontal Datum (HMP¹ area)                           | North American Datum of 1983 adjustment of 2011
| Horizontal Datum (HMP¹ area)                           | NAD 83 (2011)                |
| Horizontal Datum (non-HMP area)                        | North American Datum of 1983 adjustment of 1991
| Vertical Datum (HMP area)                              | NAD 83 (1991)                |
| Vertical Datum (non-HMP area)                          | NAVD 88 (2012)               |
| Rectangular Coordinate System (except in Jackson County)| Wisconsin County Coordinate System (WCCS) or
| Rectangular Coordinate System                           | Wisconsin Coordinate Reference Systems (WISCRS) |
| Rectangular Coordinate System in Jackson County        | WISCRS, which is the same as the Jackson County Official Coordinate System (JCOCS) |

The standard reference shall be used for all data collection, maintenance, integration, analysis, reporting activities, and large-scale conformal mapping. This includes all survey work, photogrammetric mapping, and project development activities for which the department provides funding. Using a standard reference will eliminate the additional effort, costs, and errors associated with using various references.

To reduce the confusion over the references used for a project, WisDOT staff are encouraged to complete Form DT1773, Geodetic References Documentation, for every project and file the completed form with the project. If a non-standard geodetic reference is used, the region survey coordinator should fill out Form DT1773 to document the circumstances regarding the decision to use a non-standard datum. There is no requirement to complete either of the above. The form is available online from the Authorized Forms list. The references normally should be selected at the time the scoping meeting Survey Worksheet is completed, but no later than shortly after the scoping meeting and in accordance with Minimum Data Requirements (see FDM 9-43-1).

The region survey coordinators are responsible for overseeing the region’s survey projects; therefore, their

¹ Height Modernization Program. Contact the Chief, Surveying and Mapping Section for information on where the HMP has been completed.
choice of which datum and coordinate system to use should be followed. Generally, they are the ones that are most knowledgeable regarding what old projects, control, etc, exist in the area of a project and are best suited to decide the benefits/detriments of which datum and coordinate system should be used for any new project. If the region survey coordinators have questions or concerns, they should contact the Central Office Geodetic Surveys Unit for assistance.

Be sure to check three boxes on Form DT1773:
- One box for the standard horizontal reference.
- One box for the standard vertical reference.
- One box for the standard coordinate reference.

Below are some factors to consider when deciding on a project datum and coordinate system:
- The type of project: See FDM 3-5-2 for definitions and examples of project types. Also, see FDM 9-43-1 for survey activities associated with each of these types of projects.
- Alternative references available in the project area.
- Whether right-of-way acquisition will, or will not, be required for the project.
- References used for nearby projects.
- Any extenuating circumstances.
- Approximate effort (cost and/or crew time) to provide the requested reference and approximate effort to provide another reference for the project.
- The delay caused to the project if one reference is used over another.

Whether a standard reference or a nonstandard reference is used for a project, the coordinate values and datum of existing control used as starting point(s) to establish engineering (project) control shall be shown in the metadata of all project documents listing engineering control. This will assist future users of the project data in learning the origin of the engineering control.

For more information, see the procedures and their subject matter listed as follows:
- FDM 9-20-15 Horizontal Datums
- FDM 9-20-20 Vertical Datums
- FDM 9-20-25 Coordinate Systems
- FDM 9-20-26 Wisconsin State Plane Coordinate System
- FDM 9-20-27 Wisconsin County Coordinate System
- FDM 9-20-28 Wisconsin Coordinate Reference Systems
- FDM 9-43-1 Minimum Data Requirements

FDM 9-5-15 Requests for Photogrammetric Products and Services  December 21, 2010

It is the policy of WisDOT that all requests for products and services produced through photogrammetric methods (aerial imagery) and related sensor technologies (LiDAR scanning) shall be coordinated through the Photogrammetry Unit.

15.1 Procedure

Each region has a point of contact for requests, typically the Survey Unit Coordinator. Requests from other bureaus and any questions should be emailed to dotaerialmapping@dot.wi.gov.

When a consultant has a contract with WisDOT, the bureau or region responsible for the contract shall coordinate with the Photogrammetry Unit. Consultants should not make requests directly to the Photogrammetry Unit.

The Photogrammetry Unit shall be informed early in negotiations with design consultants when there is a possibility that photogrammetric methods will be needed. The Photogrammetry Unit will attempt to provide the needed data. When workload exceeds in-house resources, the Photogrammetry Unit will prepare, negotiate and administer photogrammetric consultant contracts. The Photogrammetry Unit will provide deliverables to the requestor for transmittal to the consultant. All costs will be charged to the project ID.

In some cases, the Photogrammetry Unit may determine the work can be performed through the prime design contract or by subcontract. In the latter case, the Photogrammetry Unit will assist the requestor with standards
and specifications and will provide review of the deliverables.

15.2 Resources
A list of products and services are specified in the online catalog.