

Latitude and Longitude Conversion

The US DOT National Crossing Inventory File requires Latitude and Longitude to be submitted in "Degrees.Digital Degrees" (DDD) format. The coordinates are to be measured at the center of the highway-rail crossing. These data are used to identify the crossing location using a standardized GPS (Global Positioning System) location point. The measurement values are to be entered entered in decimal (DDD) format as (nn.nnnnnnn) for Latitude and as (-nnn.nnnnnnn) for Longitude. These readings need to be taken to seven (7) decimal places. (Note: Five decimal places translates to an accuracy of within four feet.)

The FRA Office of Safety uses the WGS-84 (World Geodetic System 1984) datum standard. (A datum is the measurement [shape] of the earth's ellipsoid.) The WGS-84 is the international version of the NAD-83 Standard (North American Datum 1983). The standard datum for the United States National Grid (USNG) is the North American Datum 1983 (NAD-83), or its international equivalent, the World Geodetic System 1984 (WGS-84).

Federal government mapping agencies have adopted the NAD-83 as the US National Standard. However, many existing maps are still referenced to the North American Datum 1927 (NAD-27). When it is necessary to identify a point on NAD-27 Standard, the coordinates of a point are designated by "(NAD 27)" after the coordinate. Coordinates in NAD-83 have nothing behind them; NAD-83 is implied. The United States National Grid (USNG) reference is identical to the Military Grid Reference System (MGRS) and is designed for use with the WGS-84 and with NAD-83 over U.S. areas.

On the Inventory Form, indicate the Source, as "Actual" or "Estimated," for the coordinates being provided. Actual values are those where GPS measurements are taken at the crossing or determined by a positive identification method. Otherwise, the values are indicated as "Estimated."

Use of the Degrees/Minutes/Seconds (DMS) format is not acceptable. However, recognizing that some agencies may record their GPS values in this format, conversion methods are provided here. First, an equation to convert latitude and longitude from degrees, minutes, seconds to the decimal format is as follows:

$$\text{GPS Value in Decimal Format} = \text{Degrees} + (\text{Minutes divided by } 60) + (\text{Seconds divided by } 3600)$$

Latitude/Longitude Coordinate Ranges within the continental United States:

Latitude values range from 24 to 49 degrees.

Longitude values range from -65 to -124 degrees.

Alaska Latitude values range from 50 to 71 and Longitude from -129 to -168.

Also, there are several Websites that offer conversion and even mapping of a location when the Latitude and Longitude are provided in either format, and vice versa, will identify the Latitude and Longitude values when a point is identified on a map. Links to these sites are provided below for convenience only. FRA does not vouch for their correctness nor that any of these Websites will be operational in the future.

State of West Virginia Lat Long Converter

This Converter Site is simple and basic:

http://gis.wvdep.org/convert/llutm_conus.php

Convert Latitude / Longitude to Decimal

This site allows one to convert Latitude and Longitude values between decimal format and degrees/minutes/seconds (DMS) format. It uses the same equation identified above.

http://andrew.hedges.name/experiments/convert_lat_long/

Latitude and Longitude Internet Conversion Program with Mapping

This Web address is for a latitude and longitude program connected to a map for locating specific points;

<http://itouchmap.com/latlong.html>

Directions on how to use this Website:

This site is very accurate and can be used to get or locate either decimal (DDD) or/and degree (DMS) coordinates. When the program opens, scroll down to the bottom past the map of the world. On the right there are two boxes. The top box is for decimal (DDD) coordinates and the lower box is for degree (DMS) coordinates. Enter the crossing coordinates here and select "Show Point." Then scroll back up to the map. For example, if you enter Latitude +42.2909452 and Longitude -83.1207374, and press "Show Point," it will take you to a highway-rail crossing at Copland Street.

On the left side of the map are the controls to zoom and move the map. The map can also be moved by holding the left mouse button down, and then move the mouse right or left, and up or down. If you zoom in on a location, you can see quite a bit of detail. When you put the cursor on the blue marker, the little hand turns into an arrow. If you left click the arrow cursor, it will show you the coordinates right on the map and also at the bottom of the page.

If you put the pointer on top of the crossing again, and left click, a new blue marker will show up. If you now scroll down and look at the boxes on the left side of the screen, it will show you the coordinates of the point you have just selected on the map. So, if you want to convert degree (DMS) coordinates to decimal (DDD) coordinates, enter the degrees on the right side, go to the map and select the same point with the pointer, and then scroll back to the bottom left to see the decimal coordinates.