Procedural Report for Assessing and Updating National Network Spatial Database West Virginia

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In Association with

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for

U.S. Department of Transportation

Bureau of Transportation Statistics

and

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Objective

The objective of the project is to review, correct, and update the National Network (NN) spatial database, which was initially developed in 1995 as part of a Federal Highway Administration (FHWA) Truck Size and Weight Study. The review and edit processes were carried out based on the Code of Federal Regulations Title 23 Part 658 (CFR-23) document. Another objective was to compare and report any anomalies of coded NN assignment on to the 2018 Highway Performance Monitoring (HPMS) geospatial database.

Task

The task includes the following for each of the States based on the Code of Federal Regulations [Title 23 (CFR-23) Part 658 Appendix A] document:

1. Correcting the errors related to NN designation and creating an updated NN shapefile.
2. Preparing and reporting tabular description of all identified errors and corrected actions.

Data and Reference Files Used

- Code of Federal Regulations Title 23 (CFR-23) document
- Google Map/ Open Street Map
- Shapefiles used:
  - Highway Performance Monitoring System (HPMS) Network 2018 Public Release (PR_2018)
  - Federal-aid Primary (FAP) Version 2 (FAP_V2)
  - National Highway System (NHS) Network updated as of 2018 HPMS geospatial submittal (in this document this file will be referred to as Master Network/ Working Layer and all the editing has been done in this shapefile) (Working Data).

Software Used

- ArcGIS Pro/ArcMap 10.4
- Microsoft Excel

Procedure

Documentation of all the updates in the Working Layer for each state are recorded in the Excel file, and the related modifications in the geospatial database are done in the shapefiles of the Working Layer~~)~~. The modified Working Layer shapefile contains the updated National Network geospatial data. The errors/changes are recorded in three sections in the Excel file:

- In first section, records of all the routes of a State that are reported as National Network in the CFR-23 document. States that have designated Surface Transport Assistance Act (STAA) routes or Federal-Aid Primary Highways as National Network, those route references were taken from FAP V2; however, the route geometry was used from HPMS 2018 geospatial database.
- In second section, records of all the routes that are designated as National Network as per HPMS database but are not in the CFR-23 document.
- In third section, records of all the routes that are designated as National Network under CFR-23 document but are not on HPMS database.

A coding protocol has been developed for documenting the errors and changes in the Working Layer. The coding protocol has been provided in the Excel file. The coding protocols for the Working Layer are given Below:

Table 1: Master Network (Working Layer) related Coding Protocol.

Layer = Master Network (Working Layer)		
Code Value	**Details**	**Field**
0	State (HPMS) Reported NN but Not in CFR23 Part 658 Appendix A	NN
1	NN Under CFR23 Part 658 Appendix A	NN
3	Mapped segments adjusted for topological connectivity to align with NN network written description in CFR23 Part 658 Appendix A	NN
4	New NN geometric alignment or diversion (such as newly constructed urban bypass) that comply with CFR23 Part 658 Appendix A Sign Number/Description	NN
5	NN under CFR23 Part 658 Appendix A but not on HPMS	NN
6	NN changes road sign or designation (State to U.S. route or vice versa, or road sign discrepancy with CFR23 Part 658 Appendix A)	NN
7	U.S. or State Highway NN route in CFR23 Part 658 Appendix A now designated as Interstate (CFR says non-interstate but now interstate)	NN

Step by step procedure for how to perform the task is given below:

For First Section in Excel file (Routes in CFR-23 Document):

Procedure for the States that have routes that are designated as National Network in CFR-23 Part 658 Appendix A:

1. In first section of the Excel file, record the 'route name', 'from', and 'to' locations for each route that is reported as National Network in the CFR-23 document. Each row will represent the records for a given highway segment.
2. Identify the routes recorded in the previous step in Master Network/Working Layer, enter NN field code value for the route (reported in the CFR-23 document), in the following way:
    - if the route exists in Working Layer, enter the code value '1', and if the route does not exist in the Working Layer, copy the route from the HPMS 2018 geospatial layer into Working Layer and enter code value '1'.
    - if the segments of the route need to be adjusted for topological connectivity to align with NN network written description in CFR-23, then for those segments enter code value '3'.
    - if new NN geometric alignment or diversion (such as newly constructed urban bypass) needs to be added that comply with CFR-23, then for those segments enter code value '4'.
    - if the route in CFR-23 document have a discrepancy with the route sign or designation given in HPMS layer and Google Map/Open Street Map, enter code value '6'.
    - if the route in CFR-23 document is designated as US or State Highway but in HPMS layer or Google Map/Open Street Map it is designated as Interstate, enter code value '7'.

For the states that have no additional routes that are designated as National Network in CFR-23 Part 658 Appendix A, other than the routes that are designated as Federal-aid primary (FAP) highways, the routes were not recorded in Excel file. In the geospatial database, for those states the national network routes were identified using the following procedure:

1. From the HPMS 2018 Geospatial shapefile select the routes that are in FAP V2.
2. Copy the selected features and paste them into Working Layer and in NN field enter code value '1'.

For the Second Section in Excel file (State Designated National Network as per HPMS but not in CFR-23 document):

1. First create separate layer from HPMS 2018 Geospatial shapefile, containing only the routes that have TRUCK field value '1', and name the newly created layer as 'PR_Truck' layer. (According to HPMS

Field Manual data item 66 ‘National Truck Network’, in HPMS Geospatial database, TRUCK field value ‘1’ represents National Network.)

2. In the second section of the Excel file, record each of the routes in the‘PR TRUCK’ layer but not in the CFR-23 document. Record the ‘route name’, ‘from’, and ‘to’ location locations of the route.
3. In the Working Layer if that route exists, enter the code value ‘2’ in its NN field. If the route does not exist in the Working Layer, copy it from ‘PR TRUCK’ layer into Working Layer and enter the code value ‘2’ in its NN field.

For the Third Section in Excel file (National Network under CFR23 Part 658 Appendix A but not on HPMS):

1. In the third section of the Excel file, record each route in the Working Layer having NN field code value greater than ‘0’ but does not exist in the ‘PR TRUCK’ layer. Record ‘route name’, ‘from’, and ‘to’ locations of the route.
2. In the Working Layer for the route segments, enter the NN field code value ‘5’.

Spatially Calculated Length of National Network for Each State Based on Routes in CFR-23 Part 658 Appendix A (National Network—Federally Designated Routes) Document

State	Length of National Network in miles
Alabama	1903.09
Alaska	1081.41
Arizona	2484.77
Arkansas	5929.76
California	4267.10
Colorado	5483.73
Connecticut	475.97
Delaware	209.46
District of Columbia	16.75
Florida	2211.08
Georgia	2421.29
Hawaii	195.34
Idaho	1928.97
Illinois	2262.18
Indiana	6348.27
Iowa	6368.98
Kansas	8895.92
Kentucky	2736.92
Louisiana	4747.54
Maine	380.53
Maryland	774.83
Massachusetts	657.11
Michigan	5652.23
Minnesota	4939.96
Mississippi	6672.32
Missouri	3577.70

State	Length of National Network in miles
Montana	6831.52
Nebraska	7663.53
Nevada	2641.87
New Hampshire	236.29
New Jersey	454.43
New Mexico	2445.51
New York	2084.42
North Carolina	3732.32
North Dakota	2272.21
Ohio	9734.57
Oklahoma	6842.55
Oregon	3726.10
Pennsylvania	2307.83
Puerto Rico	341.27
Rhode Island	90.04
South Carolina	1958.72
South Dakota	6452.54
Tennessee	2761.82
Texas	22014.36
Utah	2262.28
Vermont	351.42
Virginia	2638.48
Washington	5759.10
West Virginia	757.08
Wisconsin	3797.92
Wyoming	3930.50

APPENDICES

State: West Virginia

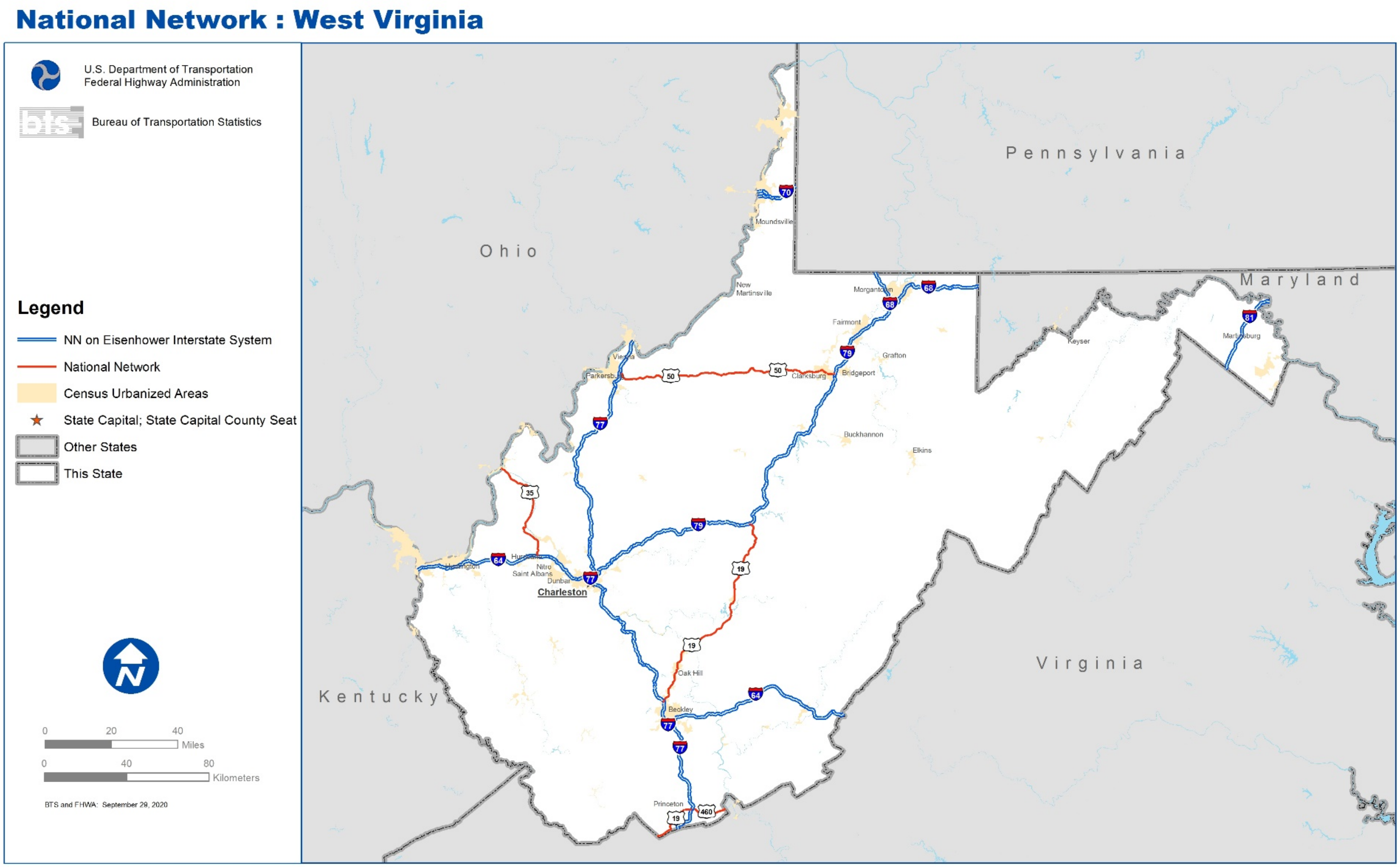
Total Length of the National Network for the State based on spatial calculation of routes listed in CFR-23 Part 658 Appendix A (National Network—Federally Designated Routes) Document: 757.08 miles

National Network—Federally Designated Routes for West Virginia according to CFR-23 (Code of Federal Regulations Title 23) Part 658 Appendix A

[The federally designated routes on the National Network consist of the Interstate System, except as noted, and the following additional highways.]

Route	**From**	**To**
US 19	I–77 Bradley	I–79 Gassaway
US 35	WV 34 Winfield	OH State Line
US 48	I–79 Morgantown	MD State Line
US 50	I–77 Parkersburg	I–79 Clarksburg
US 460	VA State Line Bluefield	VA State Line Kelleysville.
WV 34	I–64 Putnam Co	US 35 Winfield

National Network for West Virginia according to CFR-23 Part 658 Appendix A



Comments on some of the routes in the National Network for West Virginia: Potential Descriptive anomalies in CFR-23

Route	From	To	Comments
US 48	I–79 Morgantown	MD State Line	This route has been designated Interstate I-68

State Designated National Network according to Highway Performance Monitoring System (HPMS) Network 2018 Public Release but Not National Network according to CFR-23 (Code of Federal Regulations Title 23) Part 658 Appendix A for West Virginia

Route	From	To
US 119	Near WV 1/2, Julian	US 52, Nolan
US 52	US 119, Nolan	US 119, Williamson
US 119	US 52, Williamson	KY State Line
US 119	I 64, Charleston	Near WV 8, Alum Creek
US 817	Near I 64, Scary	US 60, Amandaville
US 60	Near I 64, South Charleston	Us 817, Amandaville
US 33	I 79, Weston	Weston
WV 32	WV 93, Davis	WV 219, Thomas
US 48	Near WV 93, Bismarck	Near 259, Old West Virginia 55, Wardensville
US 22	PA State Line, Weirton	OH State Line, Weirton
WV 2	I 77, North Hills	US 250, Moundsville
WV 9	Coast Guard Dr, Kearneysville	US 340, Charles Town
WV 9	US 340, Charles Town	VA State Line
US 522	MD State Line	VA State Line
US 250	WV 2, Moundsville	I 70, Fulton
WV 101	US 60, Huntington	US 60, Huntington
WV 2	46 th St, Edgemont	US 60, Huntington
US 60	WV 2, Huntington	WV 101, Huntington
US 60	Near WV 10, Huntington	Near I 64, West Pea Ridge
WV 16	I 77, MacArthur	US 19, Beckley
US 60	I 64, Charleston	I 64, Sam Black Church
WV 27	Near I 77, Charleston	
WV 21	US 60, Charleston	WV 27, Charleston
WV 27	WV 21, Charleston	Charleston
WV 25	WV 62, Mountain	US 60, West Side
US 60	WV 25, Charleston	WV 25, Charleston
WV 25	Near I 64, Charleston	Near I 64, Charleston
WV 55	US 19, Muddlety	Near WV 11, Allingdale
US 35	WV 34, Teays Valley	WV 33, Teays Valley
WV 817	US 35, Fraziers Bottom	WV 34, Winfield
WV 34	WV 817, Winfield	Near WV 817, Winfield
WV 2	US 33, Silverton	Century Rd, Silverton
WV 892	US 50, Wellsley	Smith Ln, Washington
WV 68	WV 95, Wellsley	US 33, Ravenswood
WV 95	WV 68, Wellsley	WV 14, Parkersburg
WV 618	WV 14, Parkersburg	
WV 95	WV 14, Parkersburg	I 77, Point Dr, Parkersburg

WV 32	WV 95, Parkersburg	WV 14, Parkersburg
WV 14	WV 32, Parkersburg	Capital Dr, Parkersburg
WV 47	I 77, Parkersburg	WV 618, Parkersburg
WV 151	WV 20, Ellamore	US 48, Harding
WV 250	WV 24, Philippi	US 33, Harding
WV 24	WV 250, Philippi	Near Kelly Terrace, Philippi
US 119	WV 57, Wellington Heights	WV 119, Philippi
WV 20	WV 57, Bridgeport	Stonewood
WV 58	WV 20, Stonewood	WV 20, Stonewood
WV 20	WV58, Stonewood	
US 50	I 79, Bridgeport	
WV 57	WV 20, Bridgeport	57/3 Bridgeport
WV 131	I 79, McAlpin	US 50, Bridgeport
US 50	WV 131, Bridgeport	Near WV 76, Bridgeport
WV 76	US 50, Bridgeport	Oakwood Ln, Bridgeport
US 119	PA State Line	C 857, Morgantown
C 857	US 119, Morgantown	I 68, Morgantown
US 40	I 70, ELM Crove	near 2/9, Valley Grove
US 30	OH State Line	PA State Line
WV 2	US 30, Chester	Near 66/2, Moscow
US 11	Specks Run Rd, Ridgeway	Monument Ln, Bunker Hill
WV 51	I 81, Inwood	US 11, Inwood
US 11	WV 51, Inwood	WV 45, Martinsburg
WV 45	I 81, Martinsburg	Near US 11, Martinsburg
WV 58	Near Stonewood	
US 60	Near Damon Ave, Milton	WV 13, Milton
WV 7	WV 2, Hannibal	OH State Line
WV 2	Near Moundsville	OH State Line
WV 2	Cove Rd, Marland Heights	Near Maryland Ave, Marland Heights

National Network for West Virginia according to CFR-23 (Code of Federal Regulations Title 23) Part 658 Appendix A but are Not Designated as National Network in Highway Performance Monitoring System (HPMS) Network 2018 Public Release

NOT APPLICABLE.

State Designated National Network in HPMS 2018 Public Release Database but not in CFR-23 Part 658 Appendix A, and National Network in CFR-23 Part 658 Appendix A but not in HPMS 2018 Public Release Database for West Virginia