2023

Highway Performance Monitoring System Quality Review

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DEPARTMENT OF TRANSPORTATION
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Cover Photo: PA-65, Allegheny County.

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INTRODUCTION

The Highway Performance Monitoring System (HPMS) is an annual data reporting program created by the Federal Highway Administration (FHWA) to meet their need to provide information to the Congress for development and analysis of national policy and programs relating to highways.

In Pennsylvania, HPMS serves as the primary source of highway information utilized in the allocation of highway maintenance funds, revenue enhancement initiatives and PennDOT's annual report of mileage and travel statistics. HPMS data is used to access the state's minimum pavement condition level for the interstate system on an annual basis and for determining significant progress towards pavement condition targets. HPMS data are also used to fulfill requests for information received from consulting firms, PennDOT District Offices, Metropolitan Planning Organizations (MPOs), and national organizations as well as the general public.

Each year, an annual quality review of Pennsylvania's HPMS is conducted. The review is performed by the Bureau of Planning and Research's (BPR) HPMS staff and consists of HPMS field views of randomly selected sample sections in several counties. The purpose of this review is:

1. To ascertain the current state of HPMS data quality and ensure that any errors found are corrected.

2. To determine if any common problem areas exist and identify subsequent training needs.

3. To determine if any organizational or procedural changes to the HPMS program are warranted.

4. To ensure that communications regarding HPMS are maintained between PennDOT, MPOs and PennDOT District Offices.

The HPMS program continues to deliver a high level of timely and accurate data for the purpose of allocating national and state highway funds, project planning and programming, assessing air quality conformity, and travel monitoring.
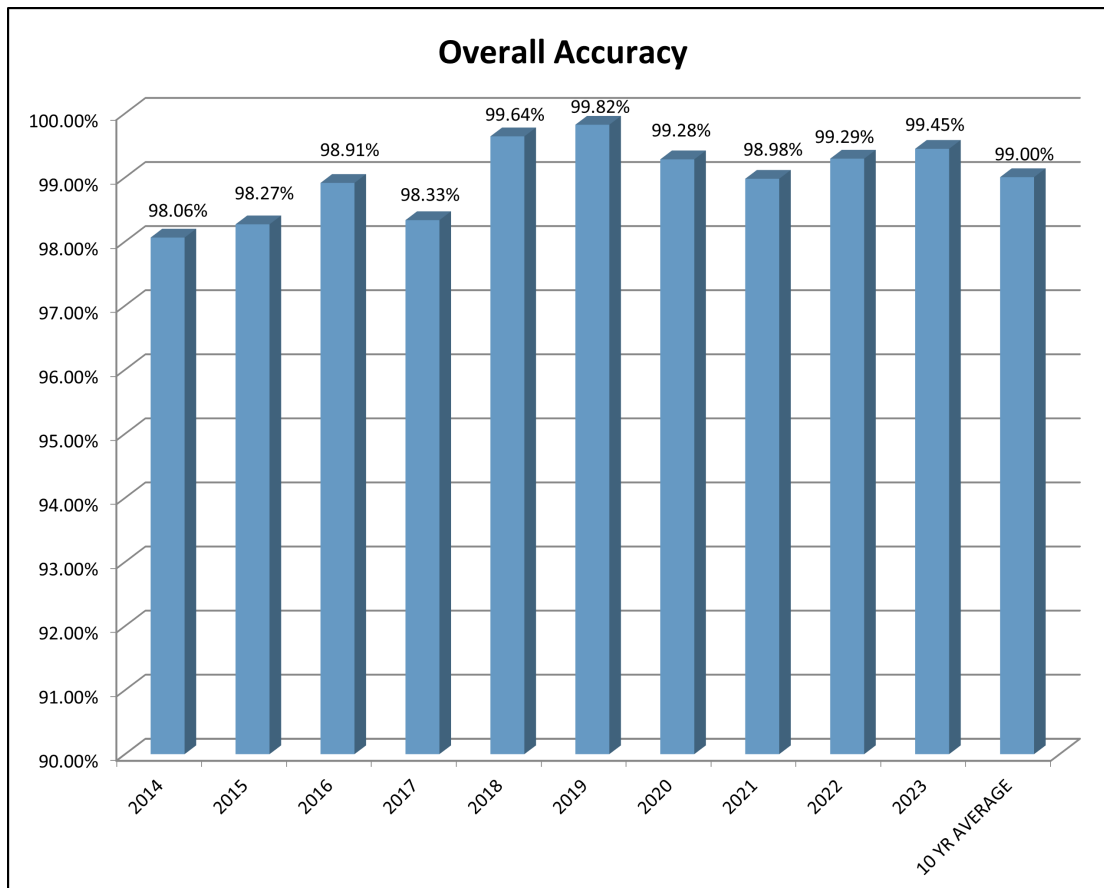
The following pages contain the results of this year's review.

In primarily July, August, September and October 2023, BPR's HPMS staff conducted its annual quality review of Pennsylvania's HPMS. The quality reviews were conducted with the appropriate MPO or PennDOT District Office HPMS representative present with both HPMS Coordinators from Central Office, resulting in improved communication between our HPMS staff and our data providers. The review included HPMS field views of sample sections on which HPMS data are provided by:

- Adams County Planning Commission
- Berks County Planning Commission
- Blair County Planning Commission
- Cambria County Planning Commission
- Delaware Valley Regional Planning Commission
- Erie County Department of Planning
- Franklin County Planning Commission
- Luzerne County Planning Commission
- Lycoming County Planning Commission

- Northeastern Pennsylvania Alliance
- SEDA - Council of Governments
- PennDOT District Office 3-0
- PennDOT District Office 4-0
- PennDOT District Office 6-0
- PennDOT District Office 8-0
- PennDOT District Office 9-0
- PennDOT District Office 10-0
- PennDOT District Office 12-0

All eighteen (18) of the data providers reviewed this year recorded an accuracy rate of 98% or greater. The average overall accuracy rates of the data providers reviewed for the last ten years appear in the chart below.

Overall Accuracy

Year	Accuracy
2014	98.06%
2015	98.27%
2016	98.91%
2017	98.33%
2018	99.64%
2019	99.82%
2020	99.28%
2021	98.98%
2022	99.29%
2023	99.45%
10 YR AVERAGE	99.00%

2023 HPMS DATA REVIEWS

Organization	Participants	Counties Reviewed	Date
SEDA - Council of Governments	Steve Herman Bryce Buck John Moloney Mike Ballinger	Montour	July 20
PennDOT District Office 12-0	Zac Cross John Moloney Mike Ballinger	Greene	August 15
PennDOT District Office 10-0	Darren Zapsky John Moloney Mike Ballinger	Butler	August 16
Erie County Department of Planning	Emily Aloiz Brent Aller John Moloney Mike Ballinger	Erie	August 17
Franklin County Planning Commission	Quentin Clapper John Moloney Mike Ballinger	Franklin	August 21
Cambria County Planning Commission	Shanna Murphy Sosko Jacob Zerby John Moloney Mike Ballinger	Cambria	August 22
Blair County Planning Commission	Wes Burkett John Moloney Mike Ballinger	Blair	August 23
PennDOT District Office 9-0	Ben West John Moloney Mike Ballinger	Bedford	August 24
PennDOT District Office 8-0	Christopher Pedrick Andrew Walak Tim Noel John Moloney Mike Ballinger	Franklin	August 28
Luzerne County Planning Commission	Chris Chapman Jonathan Shaw John Moloney Mike Ballinger	Luzerne	August 29
PennDOT District Office 4-0	Jon Viola John Moloney Mike Ballinger	Susquehanna	August 30

Lycoming County Planning Commission	Sal Vitko Ed Feigles John Moloney Mike Ballinger	Lycoming	August 31
Berks County Planning Commission	Devon Hain Amanda Timochenko John Moloney Mike Ballinger	Berks	September 11
PennDOT District Office 3-0	Shawn Buck Kelly DeHart John Moloney Mike Ballinger	Lycoming	September 12
Northeastern Pennsylvania Alliance	Kate McMahon Daniel Yelito John Moloney Mike Ballinger	Monroe	September 13
Delaware Valley Regional Planning Commission	Jonathan Ferullo John Moloney Mike Ballinger	Bucks	September 14
Adams County Planning Commission	Charles Kumpas Austin Crosbie John Moloney Mike Ballinger	Adams	September 18
PennDOT District Office 6-0	Gregory Vallette Mike Durkin Mittal Patel Vincent Rodriguez Kevin Mahoney John Moloney Mike Ballinger	Bucks	October 3

DATA ITEMS

Each review consisted of field verifying data that could be measured through field observations in accordance with the Federal Highway Administration's HPMS Field Manual. The field verifiable data items included in this assessment are listed below. Those items shown in **bold type** are data items collected by the MPOs and PennDOT District Offices exclusively for the HPMS program. All other items reside in the Roadway Management System (RMS) and are controlled by the PennDOT Central Office staff and District Offices' RMS staff. MPOs must notify the PennDOT Central Office staff of inaccuracies found in the RMS data items. The PennDOT Central Office and District Office staff are responsible for correcting the errors.

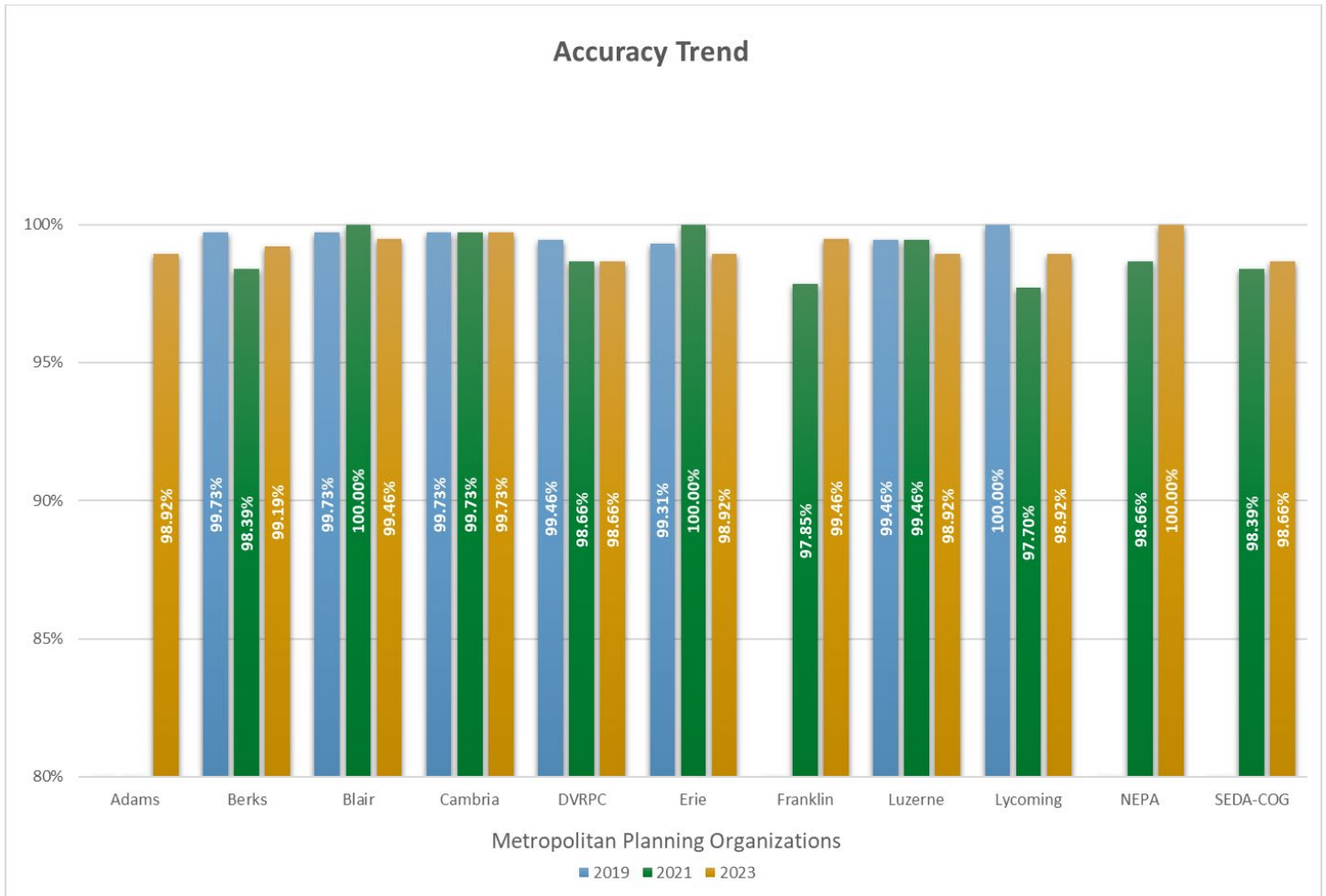| Data Item	Description
3	Facility Type
4	Structure ID
5	Access Control
7	Through Lanes
8	HOV Type
9	HOV Lanes
10	**Peak Lanes**
11	**Counter Peak Lanes**
12	**Right Turn Lanes**
13	**Left Turn Lanes**
14	Speed Limit
17	Route Number
18	Route Signing
19	Route Qualifier
20	Road Name
29	**Signal Type**
30	**Percent Green Time**
31	**Signalized Intersections**
32	**Stop Sign Controlled Intersections**
33	**At-Grade Other Intersections**
34	**Lane Width**
35	Median Type
36	Median Width
37	Shoulder Type
38	Right Shoulder Width
39	Left Shoulder Width
40	**Peak Parking**
42	**Widening Potential**
44	**Terrain Type**
46	**Percent Passing Sight Distance**

REVIEW ANALYSIS

The following table quantifies the findings of this year's quality reviews. The table indicates, by data source, the number of errors found for each field verifiable data item for each of the agencies reviewed the total number of errors for each agency, and the percent of error for each agency. The overall accuracy rate for each agency is also included in this table. Percent of error was calculated by dividing the total number of errors by the number of segments reviewed in each agency multiplied by the number of data items reviewed per data source.

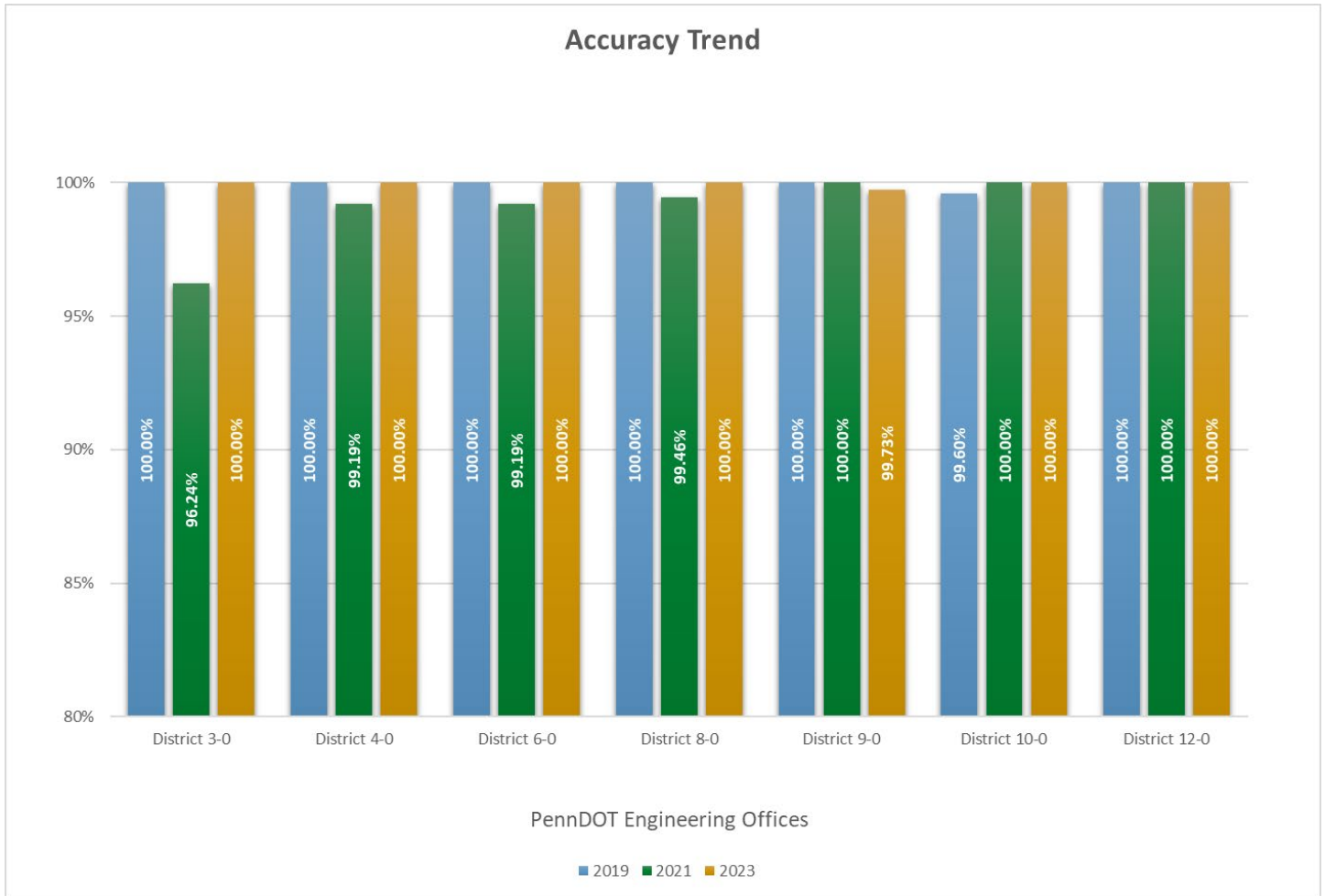| 2023 QUALITY REVIEW SUMMARY																			
AGENCY CODING ERRORS PER ITEM REVIEWED																			
Data Items Reviewed	Adams MPO	Berks MPO	Blair MPO	Cambria MPO	DVRPC MPO	Erie MPO	Franklin MPO	Luzerne MPO	Lycoming MPO	NEPA MPO	SEDA-COG MPO	District 3-0	District 4-0	District 6-0	District 8-0	District 9-0	District 10-0	District 12-0	TOTAL
3 - Facility Type	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4 - Structure ID	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - Access Control	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7 - Through Lanes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - HOV Type	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9 - HOV Lanes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 - Peak Lanes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - Counter Peak Lanes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12 - Right Turn Lanes	0	0	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	3
13 - Left Turn Lanes	1	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	4
14 - Speed Limit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
17 - Route Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18 - Route Signing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19 - Route Qualifier	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20 - Road Name	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29 - Signal Type	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30 - Percent Green Time	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31 - Signalized Intersections	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32 - Stop Sign Controlled Intersections	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
33 - At-Grade Other Intersections	1	1	0	0	3	0	2	0	1	0	1	0	0	0	0	0	0	0	9
34 - Lane Width	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35 - Median Type	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36 - Median Width	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37 - Shoulder Type	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38 - Right Shoulder Width	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39 - Left Shoulder Width	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40 - Peak Parking	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	2
42 - Widening Potential	2	1	1	1	2	2	0	2	2	0	2	0	0	0	0	0	0	0	15
44 - Terrain Type	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
46 - Percent Passing Sight Distance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Errors	4	3	2	1	5	4	2	4	4	0	5	0	0	0	0	1	0	0	35
Error Rate	1.08%	0.81%	0.54%	0.27%	1.34%	1.08%	0.54%	1.08%	1.08%	0.00%	1.34%	0.00%	0.00%	0.00%	0.00%	0.27%	0.00%	0.00%	0.55%
Local Fed. Aid Seg. Reviewed	4	3	6	0	5	9	5	6	7	2	5	0	0	0	0	0	0	0	52
State Segments Reviewed	8	9	6	12	7	3	7	6	5	10	7	12	12	12	12	12	12	12	152
Total Segments Reviewed	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	204
Overall Accuracy Rate	98.92%	99.19%	99.46%	99.73%	98.66%	98.92%	99.46%	98.92%	98.92%	100.00%	98.66%	100.00%	100.00%	100.00%	100.00%	99.73%	100.00%	100.00%	99.45%

The following chart shows the accuracy trend for each Metropolitan Planning Organization (MPO) over the past three reviews.

Accuracy Trend

MPO	2019	2021	2023
Adams			98.92%
Berks	99.73%	98.39%	99.19%
Blair	99.73%	100.00%	99.46%
Cambria	99.73%	99.73%	99.73%
DVRPC	99.46%	98.66%	98.66%
Erie	99.31%	100.00%	98.92%
Franklin		97.85%	99.46%
Luzerne	99.46%	99.46%	98.92%
Lycoming	100.00%	97.70%	98.92%
NEPA		98.66%	100.00%
SEDA-COG		98.39%	98.66%

Metropolitan Planning Organizations

■ 2019 ■ 2021 ■ 2023

PENNDOT DISTRICT OFFICE SUMMARY

The following chart shows the accuracy trend for each PennDOT District Office over the past three reviews.

Accuracy Trend

District	2019	2021	2023
District 3-0	100.00%	96.24%	100.00%
District 4-0	100.00%	99.19%	100.00%
District 6-0	100.00%	99.19%	100.00%
District 8-0	100.00%	99.46%	100.00%
District 9-0	100.00%	100.00%	99.73%
District 10-0	99.60%	100.00%	100.00%
District 12-0	100.00%	100.00%	100.00%

PennDOT Engineering Offices

2019 2021 2023

DATA ITEM ERROR SUMMARY

The following chart shows the five highest reported errors in 2023. Of the data items reviewed, Widening Potential with a reported error rate of 42.86%, At-Grade Other Intersections with a reported error rate of 25.71%, Left Turn Lanes with a reported error rate of 11.43%, Right Turn Lanes with a reported error rate of 8.57%, Peak Parking with a reported error rate of 5.71%, were most often reported in error. Of the five highest reported errors in 2023, four of the items were consistently one of the top errors reported over the past three reviews.

The Widening Potential items are very subjective and subject to differing interpretations. At-Grade Other Intersection and Peak Parking errors often could be attributed to changing segment lengths over the years. Right and Left Turn Lane errors are caused by the signage and striping issues.

The BPR provides a web link to the FHWA's HPMS Field Manual (December 2016) and a link to PennDOT's HPMS Data Collection Guide (August 2022) to all PennDOT District Offices and MPOs to assist them with collecting HPMS data. Both the FHWA HPMS Field Manual and the PennDOT HPMS Data Collection Guide include photos and graphic representations of the various situations encountered in the field and explain the data items in detail.

Data Item Error Trends

% of Total Errors

Data Item	2021	2022	2023
42 - Widening Potential *	39.13%	19.35%	42.86%
33 - At-Grade Other Intersections	15.94%	16.13%	25.71%
13 - Left Turn Lanes	5.80%	25.81%	11.43%
12 - Right Turn Lanes	13.04%	12.90%	8.57%
40 - Peak Parking	1.45%	3.23%	5.71%

* In 2023 FHWA combined data items Widening Obstacle with Widening Potential.

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HPMS Field Program

Through the review of the field findings, the following conclusions and recommendations can be made:

Adams County Office of Planning & Development: The quality of the data is outstanding. Keep up the great work.

Berks County Planning Agency: The quality of the data is outstanding. Keep up the great work.

Blair County Planning Commission: The quality of the data is outstanding. Keep up the great work.

Cambria County Planning Commission: The quality of the data is outstanding. Keep up the great work.

Delaware Valley Regional Planning Commission: The quality of the data is outstanding. Keep up the great work.

Erie County Department of Planning: The quality of the data is outstanding. Keep up the great work.

Franklin County Planning Commission: The quality of the data is outstanding. Keep up the great work.

Luzerne County Planning Commission: The quality of the data is outstanding. Keep up the great work.

Lycoming County Planning Commission: The quality of the data is outstanding. Keep up the great work.

Northeastern Pennsylvania Alliance: A 100% accuracy rate is outstanding. Keep up the great work.

SEDA - Council of Governments: The quality of the data is outstanding. Keep up the great work.

PennDOT District Office 3-0: A 100% accuracy rate is outstanding. Keep up the great work.

PennDOT District Office 4-0: A 100% accuracy rate is outstanding. Keep up the great work.

PennDOT District Office 6-0: A 100% accuracy rate is outstanding. Keep up the great work.

PennDOT District Office 8-0: A 100% accuracy rate is outstanding. Keep up the great work.

PennDOT District Office 9-0: The quality of the data is outstanding. Keep up the great work.

PennDOT District Office 10-0: A 100% accuracy rate is outstanding. Keep up the great work.

PennDOT District Office 12-0: A 100% accuracy rate is outstanding. Keep up the great work.

It should be noted that each quality review is held with the appropriate agency's HPMS staff present, therefore each quality review also serves as onsite training for our HPMS partners. Data reporting inadequacies are addressed immediately as conditions are found during the field view. Additional training is provided by the Bureau of Planning and Research on request.

HPMS Training: An attendee optional in-person and virtual statewide HPMS workshop was held in July 2023. The virtual format style was well received by the agencies as thirty-nine (39) participants utilized this format to attend the workshop. Meanwhile, twenty (20) participants chose to attend the workshop in person. These types of meetings and workshops are an effective way to provide attendees with new information and discuss HPMS data coding problems.

2024 Action Item: A statewide HPMS workshop will be scheduled in 2024. The primary focus of this conference will be any data items that are consistently troublesome during the quality reviews. Any changes and updates from FHWA pertaining to HPMS data items will also be discussed.

Quality Reviews: The HPMS Quality Review serves as a measuring tool for assessing the quality of the HPMS data submitted to the FHWA and reported in the Department's highway statistics report. It is used to ensure continuity and consistency of the field observations regardless of who is doing the review, the location of the review and the time of the review. The HPMS Quality Assurance field reviews include the participation of our data providers.

2024 Action Item: Thirteen Quality Reviews will be conducted in 2024. Each review will be conducted by the Transportation Planning Division's HPMS staff and the appropriate PennDOT District Office or MPO representative. The following Agencies and PennDOT District Offices will be scheduled for a review in 2024:

> Centre County Planning Agency
> Lackawanna County Department of Planning and Economic Development
> Lancaster County Planning Commission
> Lebanon County Planning Department
> Lehigh Valley Planning Commission
> Mercer County Regional Planning Commission
> Tri-County Regional Planning Commission
> Southwestern Pennsylvania Commission
> York County Planning Commission
> PennDOT District Office 1-0
> PennDOT District Office 2-0
> PennDOT District Office 5-0
> PennDOT District Office 11-0

Use of PennDOT SharePoint website: In 2023, the HPMS yearly sample packets were posted to the PennDOT SharePoint website as well as through the HPMS Mobile application, for distribution to the MPO's and PennDOT District Offices. This enabled the Department to provide the packets faster and eliminate postage and printing costs.

2024 Action Item: HPMS yearly sample packets will be distributed through the HPMS Mobile application as well as SharePoint for the 2024 data collection season. The MPO's and PennDOT District Offices will be notified via email when the 2024 packets are completed. While HPMS Mobile will be fully implemented for the 2024 data collection season, PennDOT will continue to place PDF versions of the HPMS sample sheets on SharePoint for those who wish to print for field use. Also,

posted on SharePoint, will be technical manuals and information pertinent to data collection and coding.

HPMS Mobile: The creation of a HPMS Mobile application was implemented prior to the beginning of the 2023 data collection season. The application allows partners to use a device in the field to update data item values and submit changes automatically to the Central Office HPMS Coordinators. Other features include automatic population of previous year's data, the ability to add notes, display locations, and access to other resource applications. The HPMS Mobile application provides a more automated collection process, helping save time for both the partners and Central Office HPMS Coordinators.

2024 Action Item: Review of the login and use of the HPMS Mobile application will occur during the HPMS workshop as a refresher and for any new users. Use of HPMS Mobile application will be the mandatory method of submitting samples to Central Office.

U.S. Department of Transportation
Federal Highway Administration

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