2021

Highway Performance Monitoring System Quality Review

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Cover Photo: US-22, Huntingdon 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.
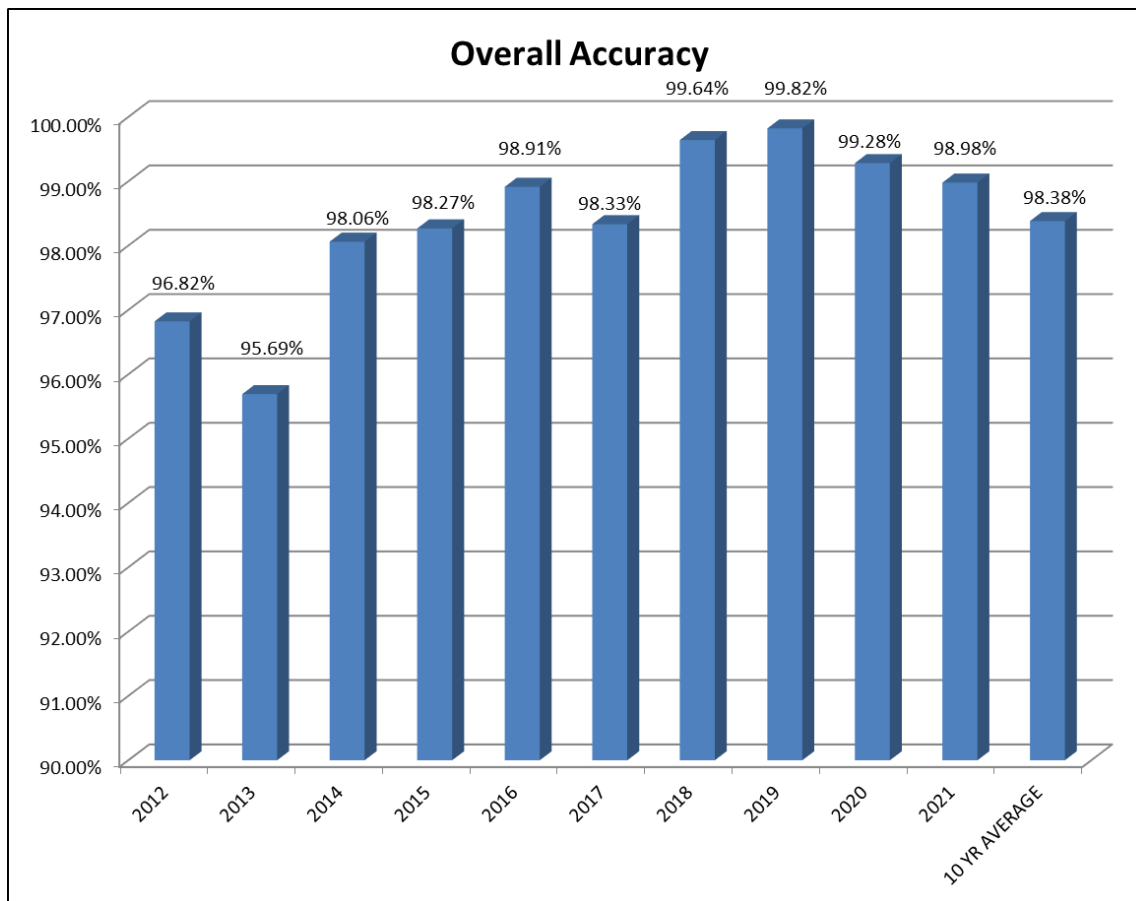
The following pages contain the results of this year's review.

EXECUTIVE SUMMARY

In August and September 2021, 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, 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:

- 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 5-0
- 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 96% 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
2012	96.82%
2013	95.69%
2014	98.06%
2015	98.27%
2016	98.91%
2017	98.33%
2018	99.64%
2019	99.82%
2020	99.28%
2021	98.98%
10 YR AVERAGE	98.38%

2021 HPMS DATA REVIEWS

Organization	Participants	Counties Reviewed	Date
Lycoming County Planning Commission	Sal Vitko Ed Feigles Pat McVeigh	Lycoming	August 3
PennDOT District Office 3-0	Kevin Schreffler Chad Lutz Pat McVeigh	Union/Northumberland	August 4
Franklin County Planning Commission	Kenana Korkutovic Pat McVeigh	Franklin	August 11
SEDA - Council of Governments	Katherine Wilde Jim Saylor Pat McVeigh	Union/Montour/ Northumberland	August 17
Blair County Planning Commission	Wes Burkett John Moloney	Blair	August 17
Cambria County Planning Commission	Chris Allison Shanna Murphy Sosko John Moloney	Cambria	August 18
Luzerne County Planning Commission	Chris Chapman Jay Schectman Tina Bauman Pat McVeigh	Luzerne	August 18
PennDOT District Office 9-0	Kevin Boslet John Moloney	Somerset	August 19
PennDOT District Office 4-0	Sarah Fenton George Kapral Pat McVeigh	Luzerne	August 19
Berks County Planning Commission	Devon Hain Shanice Ellison Pat McVeigh	Berks	August 24
Northeastern Pennsylvania Alliance	Kate McMahon Daniel Yelito Pat McVeigh	Schuylkill	August 25
PennDOT District Office 8-0	Christopher Pedrick Andrew Walak Pat McVeigh	Dauphin	September 8
Delaware Valley Regional Planning Commission	Chip Henry Pat McVeigh	Delaware	September 9
PennDOT District Office 6-0	Gregory Vallette Vicente Morales Pat McVeigh	Delaware	September 10

Erie County Department of Planning	Emily Aloiz Adam Kupfer John Moloney	Erie	September 14
PennDOT District Office 10-0	Darren Zapsky John Moloney	Jefferson	September 15
PennDOT District Office 12-0	Zac Cross John Moloney	Washington	September 16
PennDOT District Office 5-0	Isaias Petros Pat McVeigh	Berks	September 29

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 District Offices' RMS staff. MPOs must notify the PennDOT District Offices of inaccuracies found in the RMS data items and the PennDOT District Offices are responsible for correcting the errors.

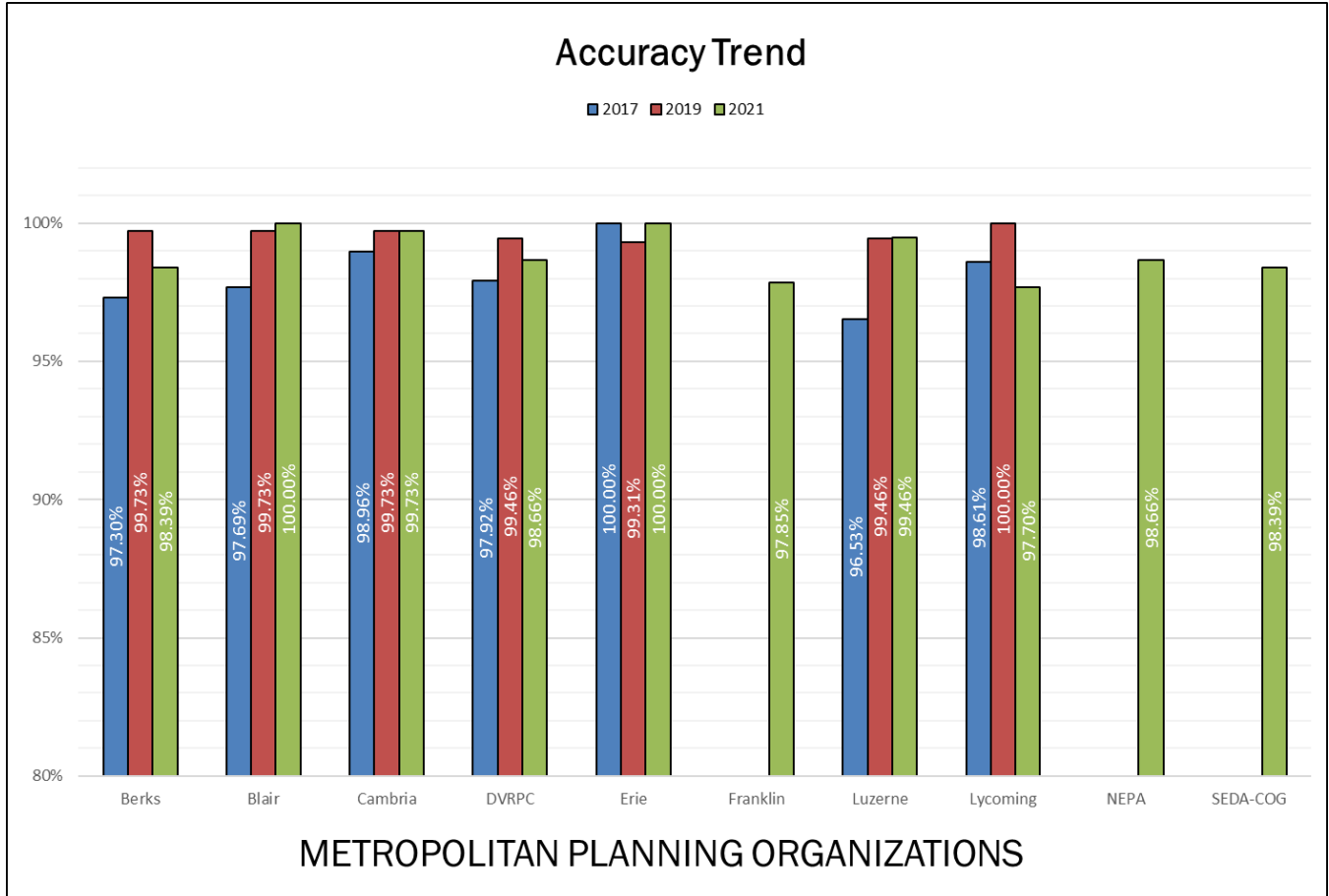| Data Item	Description
3	Facility Type
4	Structure ID
5	Access Control
7	Through Lanes
8	HOV Type
9	HOV Lanes
10	**Peak Lanes**
11	**Counter Peak Lanes**
12	**Right Turn Lanes**
13	**Left Turn Lanes**
14	Speed Limit
17	Route Number
18	Route Signing
19	Route Qualifier
20	Road Name
29	**Signal Type**
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**
41	**Widening Obstacle**
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.

2021 QUALITY REVIEW SUMMARY																			
AGENCY CODING ERRORS PER ITEM REVIEWED																			
Data Items Reviewed	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 5-0	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	1	0	0	0	0	0	0	0	0	1
12 - Right Turn Lanes	3	0	0	1	0	3	0	1	1	0	0	0	0	0	0	0	0	0	9
13 - Left Turn Lanes	0	0	0	0	0	3	0	1	0	0	0	0	0	0	0	0	0	0	4
14 - Speed Limit	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	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	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
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	1	0	0	0	0	0	0	0	0	0	0	0	0	1
32 - Stop Sign Controlled Intersections	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	2
33 - At-Grade Other Intersections	1	0	0	2	0	1	0	1	3	3	0	0	0	0	0	0	0	0	11
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	1	0	0	0	0	1
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	1	0	1	0	0	0	0	0	0	0	0	2
38 - Right Shoulder Width	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
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	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
41 - Widening Obstacle	1	0	1	0	0	0	1	2	0	0	7	0	0	1	1	0	0	0	14
42 - Widening Potential	1	0	0	0	0	1	2	0	0	0	7	0	0	1	1	0	0	0	13
44 - Terrain Type	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	4
46 - Percent Passing Sight Distance	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3
Total Errors	6	0	1	5	0	8	2	10	5	6	14	3	4	3	2	0	0	0	69
Error Rate	1.61%	0.00%	0.27%	1.34%	0.00%	2.15%	0.54%	2.30%	1.34%	1.61%	3.76%	0.81%	1.08%	0.81%	0.54%	0.00%	0.00%	0.00%	1.02%
Local Fed. Aid Seg. Reviewed	3	2	0	4	1	1	5	7	1	1	0	0	0	0	0	0	0	0	25
State Segments Reviewed	9	10	12	8	11	11	7	7	11	11	12	12	12	12	12	12	12	12	193
Total Segments Reviewed	12	12	12	12	12	12	12	14	12	12	12	12	12	12	12	12	12	12	218
Overall Accuracy Rate	98.39%	100.00%	99.73%	98.66%	100.00%	97.85%	99.46%	97.70%	98.66%	98.39%	96.24%	99.19%	98.92%	99.19%	99.46%	100.00%	100.00%	100.00%	98.98%

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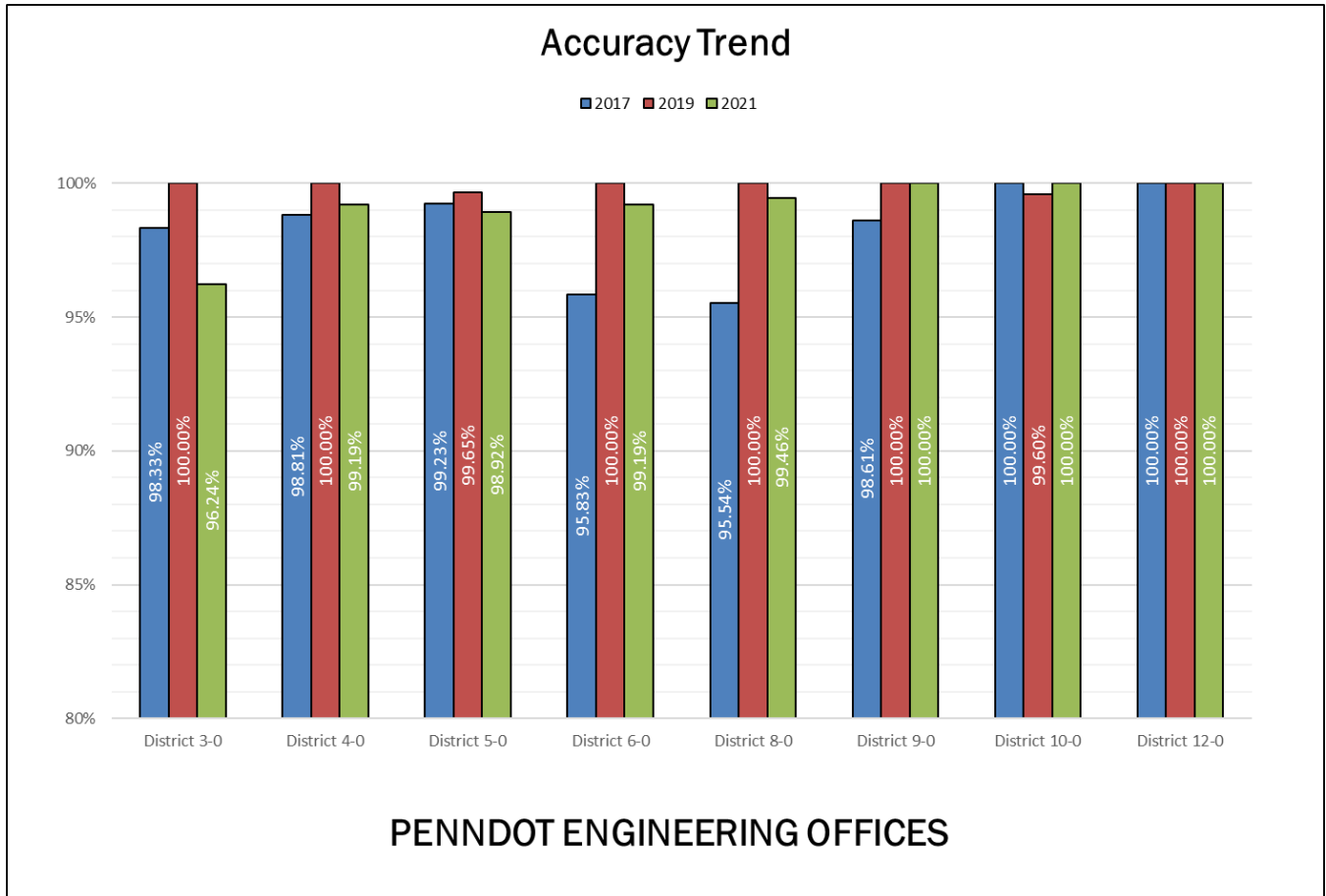
The following chart shows the accuracy trend for each Metropolitan Planning Organization (MPO) over the past three reviews.

Accuracy Trend

2017 2019 2021

MPO	2017	2019	2021
Berks	97.30%	99.73%	98.39%
Blair	97.69%	99.73%	100.00%
Cambria	98.96%	99.73%	99.73%
DVRPC	97.92%	99.46%	98.66%
Erie	100.00%	99.31%	100.00%
Franklin			97.85%
Luzerne	96.53%	99.46%	99.46%
Lycoming	98.61%	100.00%	97.70%
NEPA			98.66%
SEDA-COG			98.39%

METROPOLITAN PLANNING ORGANIZATIONS

2021 was Franklin County Planning Commission, Northeastern Pennsylvania Alliance and SEDA - Council of Governments first Quality Assurance Review.

PENNDOT DISTRICT OFFICE SUMMARY

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

Accuracy Trend

■2017 ■2019 ■2021

District	2017	2019	2021
District 3-0	98.33%	100.00%	96.24%
District 4-0	98.81%	100.00%	99.19%
District 5-0	99.23%	99.65%	98.92%
District 6-0	95.83%	100.00%	99.19%
District 8-0	95.54%	100.00%	99.46%
District 9-0	98.61%	100.00%	100.00%
District 10-0	100.00%	99.60%	100.00%
District 12-0	100.00%	100.00%	100.00%

PENNDOT ENGINEERING OFFICES

PennDOT District 5-0 previous yearly reviews were in 2016 and 2018.

DATA ITEM ERROR SUMMARY

The following chart shows the five highest reported errors in 2021. Of the data items reviewed, Widening Obstacle with a reported error rate of 25.29%, Widening Potential with a reported error rate of 18.84%, At-Grade Other Intersections with a reported error rate of 15.94%, Right Turn Lanes with a reported error rate of 13.03%, Left Turn Lanes with a reported error rate of 5.08%, were most often reported in error. Of the six highest reported errors in 2021, two of the items were consistently one of the top errors reported over the past three reviews.

The Widening Obstacle and Widening Potential items are very subjective and subject to differing interpretations. At-Grade Other Intersection 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 (October 2020) 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.

CONCLUSIONS & RECOMMENDATIONS

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

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

Blair County Planning Commission: A 100% accuracy rate 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: A 100% accuracy rate is outstanding. Keep up the great work.

Franklin County Planning Commission: The quality of the data is excellent. Data items in error should be reviewed in the 2016 FHWA HPMS Field Manual.

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 excellent. Data items in error should be reviewed in the 2016 FHWA HPMS Field Manual.

Northeastern Pennsylvania Alliance: The quality of the data 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: The quality of the data is excellent. Data items in error should be reviewed in the 2016 FHWA HPMS Field Manual.

PennDOT District Office 4-0: The quality of the data is outstanding. Keep up the great work.

PennDOT District Office 5-0: The quality of the data is outstanding. Keep up the great work.

PennDOT District Office 6-0: The quality of the data is outstanding. Keep up the great work.

PennDOT District Office 8-0: The quality of the data is outstanding. Keep up the great work.

PennDOT District Office 9-0: A 100% accuracy rate 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.

PROPOSED 2022 ACTION ITEMS

HPMS Training: A virtual statewide HPMS workshop was held in July 2021. The new format style which was necessitated by COVID-19 restrictions was well received by the agencies and will be utilized for future workshops. These types of meetings and workshops are an effective way to provide attendees with new information and discuss HPMS data coding problems.

2022 Action Item: A statewide HPMS workshop will be scheduled in 2022. Due to safety protocols for COVID-19 a decision to hold the workshop in person or virtually will be determined closer to the workshop. The tentative focus of this conference will be the 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.

2022 Action Item: Twelve Quality Reviews will be conducted in 2022. Each review will be conducted by the Transportation Planning Division's HPMS staff and the appropriate PennDOT District Office and/or MPO representative. The following Agencies and PennDOT District Offices will be scheduled for a review in 2022.

> 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
> Southwestern Pennsylvania Commission
> Tri-County Regional Planning Commission
> York County Planning Commission
> PennDOT District Office 1-0
> PennDOT District Office 2-0
> PennDOT District Office 11-0

Use of PennDOT SharePoint website: In 2021 the HPMS yearly sample packets were posted to the PennDOT SharePoint website 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.

2022 Action Item: Continue the use of SharePoint for the distribution of HPMS yearly sample packets. The MPO's and PennDOT District Offices will be notified via email when the 2022 packets are completed and posted on SharePoint. Also, posted on SharePoint are technical manuals and information pertinent to data collection and coding.

HPMS Mobile: The creation of a HPMS Mobile application is scheduled to be implemented by mid-June 2022. The application will allow 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 the ability to add notes, display locations, access to other resource applications, along with other features. The HPMS Mobile application will provide a more automated collection process, helping save time for both the partners and Central Office HPMS Coordinators.

2022 Action Item: The use of the HPMS Mobile application will begin for the 2022 sample reviews. Training sessions will be made available for partners prior to the 2022 sample review season so a transition to the new review process is successful.