



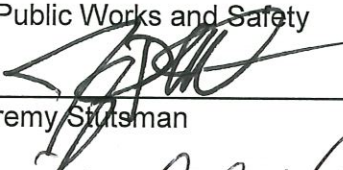
City of Goshen

Pavement Management Plan

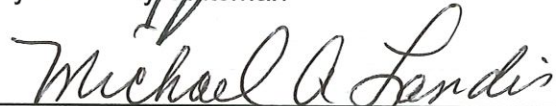
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Definitions

1. **Transverse Crack** - Cracks perpendicular to the pavement's centerline.
2. **Longitudinal Crack** - Cracks parallel to the pavement's centerline.
3. **Rutting** - Surface depression in the wheel path of the pavement.
4. **Block Cracking** - Interconnected cracks that divide the pavement up into rectangular pieces.
5. **Alligator Cracking** - A series of interconnected cracks caused by fatigue failure of the HMA surface under repeated traffic loading.
6. **Raveling** - The progressive disintegration of an HMA layer from the surface downward as a result of the dislodgement of aggregate particles.

Project Overview

The purpose of this inspection report was to rate the current pavement conditions of each street segment and to identify needed maintenance and repair of the 137 roadway miles under the jurisdiction of the City of Goshen utilizing the PASER guidelines. The results of the study will be the basis for the development of programs depending on availability of funds. The study should be kept current on an annual basis.

Goals and Objectives

It is the City of Goshen's goal to use the inventory and condition ratings to apply appropriate roadway preservation techniques in order to extend the life of the City's roadways in a cost effective manner. It is the City's goal to reduce the number of poor roads (PASER rating 1-4) from 70% to 30% in the next 20 years.

What is the PASER System?

The Pavement Surface Evaluation and Rating (PASER) system visually evaluates the condition of road segments. Ratings are applied to road segments of varying length, with segment values ranging from 10 for a new road segment to 1 for a completely failed segment, and specific ratings determined by the number and type of surface defects. The rating is based upon the worst area within the street segment.

PASER also recommends needed maintenance or repair, based on the condition of the roadway. PASER Ratings for this report are divided into the following maintenance categories:

PASER Rating	Pavement Quality
10	Excellent
9	↑
8	
7	
6	
5	
4	
3	
2	↓
1	
	Poor

- **Roads with PASER ratings of 8-10 (Good Condition) require Routine Maintenance.** Routine maintenance encompasses day-to-day maintenance activities, such as street sweeping, drainage, shoulder gravel grading, and sealing cracks to prevent standing water and water penetration.



PASER Rating 9

There are no visible distresses in PASER ratings 9 and 10 because they are new constructions or recent overlays.

Pictured is River Race Drive between Madison Street and Monroe Street shows no signs of wear.



PASER Rating 8

Roadways with a PASER rating 8 have no longitudinal cracks, except for reflection of pavement joints. Occasional transverse cracks spaced 40 feet or more apart. All cracks are sealed or tight (open less than 1/4").

Pictured is Martin Avenue from the Meijer Access Road to Corporate limits. This roadway has small occasional cracks, and requires very little maintenance.

- **Roads with PASER ratings of 5-7 (Fair Condition) require Capital Preventative Maintenance.** Capital preventative maintenance is a planned set of cost effective treatments to an existing roadway system that slow down future deterioration and

maintain or improve the functional condition of the system without significantly increasing structural capacity. The purpose of capital preventative maintenance fixes is to protect the pavement structure, slow the rate of pavement deterioration, and/or correct pavement surface deficiencies. These treatments are targeted at pavement surface defects primarily caused by the environment and by pavement material deficiencies.



PASER Rating 7

PASER rating 7 pavement can include very slight or no raveling and shows some surface wear. Longitudinal cracks from reflection or paving joints can be up to 1/4" wide and transverse cracks can be up to 1/4" wide and spaced between 10' and 40' apart. There is little or slight crack raveling, no patching, or very few patches in excellent condition.

Pictured is Wheatland Drive from Barley Lane to Oatfield Lane. This roadway has some longitudinal cracks. There are also transverse cracks 10'-40' apart. Most of the cracks are not open due to being crack sealed in 2015.



PASER Rating 6

Roadways with a PASER rating of 6 are starting to show signs of traffic wear and/or raveling. There are open longitudinal cracks with a width between 1/4"-1/2". Transverse cracks are open with a width between 1/4"-1/2" with some being less than 10' apart. The first signs of block cracking can appear, slight to moderate flushing or polishing, and it may have occasional patches in good condition.

Pictured is Waterford Mills Parkway between Regent Street and Edison Drive. This roadway has transverse cracks that are open between 1/4" and 1/2" and are less than 10 feet apart. Some longitudinal cracking along the corridor.



PASER Rating 5

Roadways with a PASER rating of 5 have moderate to severe raveling, longitudinal and transverse cracks open 1/2" or more and secondary cracks. Block cracking on up to 50% of the pavement surface, extensive to severe polishing, and some patching or wedging in good condition.

Pictured is Mountain Ash Lane between Redpire Boulevard and Tulip Boulevard. This roadway has transverse cracks that are greater than 1/2" wide.

Roads with PASER ratings of 1-4 (Poor Condition) require Structural Improvements.

This category includes work identified as rehabilitation and reconstruction, addressing the structural integrity of a road.



PASER Rating 4

PASER rating 4 roadways have severe surface raveling, multiple longitudinal and transverse cracks with slight raveling, block cracking over 50% of the surface, patching in fair condition, and rutting of less than 1/2".

Pictured is Sixth Street between Lincoln Avenue and Washington Street. This roadway has longitudinal cracks in the wheel path and the block cracking.



PASER Rating 3

Roadways with PASER rating 3 may have closely spaced longitudinal and transverse cracks, severe block cracking, alligator cracking on less than 25% of the surface, patches in fair to poor condition, occasional potholes, and rutting between 1/2" and 2".

Pictured is Lincoln Avenue between Greene Road and Silverwood Lane. This roadway has longitudinal and transverse cracks that are showing erosion, and there is also rutting in the wheelpath.



PASER Rating 2

A PASER rating 2 road has cracking over 25% of the surface, rutting greater than 2", patches in poor condition, and potholes.

Pictured is VanGuilst Drive between Alfalfa Street and Michigan Street. This roadway has alligator cracking over 25% of the surface, and patches that are in poor condition.



PASER Rating 1

PASER rating 1 roadways have severe distress with a loss of surface integrity.

Pictured is Westfield Drive between Pike Street and Wilkinson Street. This roadway has extensive alligator cracking and multiple patches that are in poor condition making it a PASER rating 1.

Study Methodology

The City of Goshen utilized 2-person data collection teams. Each roadway segment was driven. At the end of the segment, the team discussed the roadway and documented on a data collection sheet the factors that resulted in the segment rating. All segments were entered into a spreadsheet that will allow for easy data presentation. Data for the 2020 report was collected between March 9, 2020 and March 16, 2020.

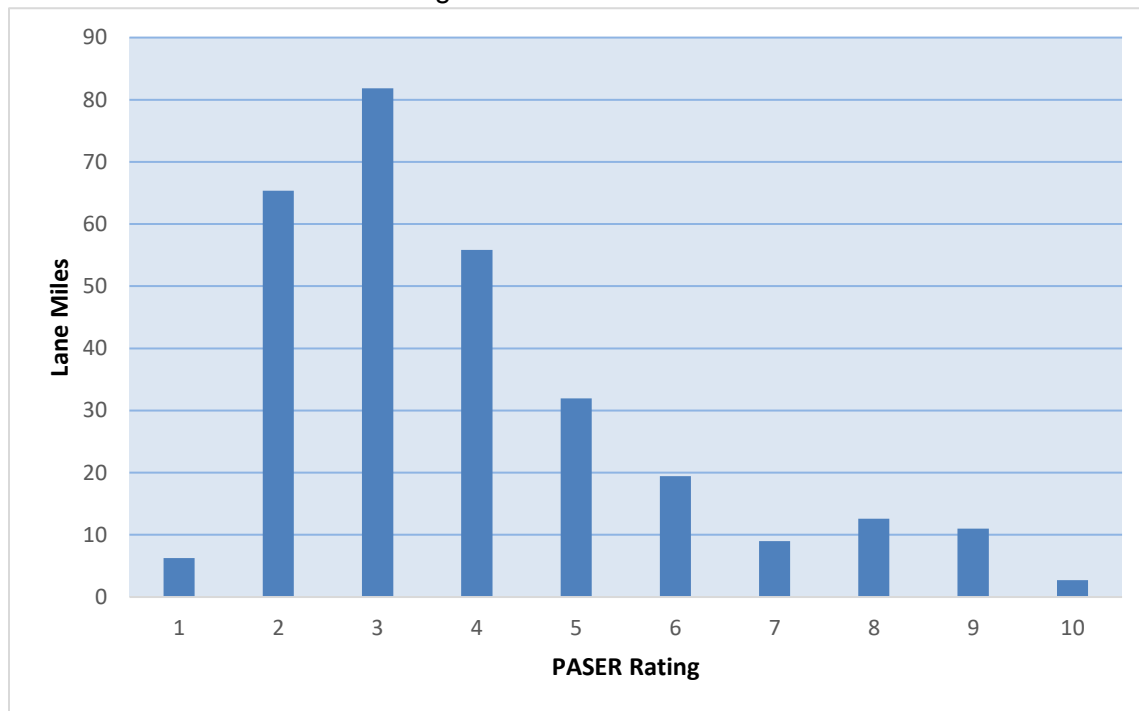
Team members of the data collection attended a training session that took place in Shipshewana hosted by Indiana Local Technical Assistance Program (LTAP) on March 28, 2018. Participants received an overview of the project and were given instructions on how to use the PASER road rating system for data collection.

Goshen's Existing Roadway Conditions

A detailed table of the system is included in Appendix A. The table below provides a summary of the mileage and condition rating for the City. A rating of 5 is the minimum acceptable pavement condition, because it is the last rating that does not require structural repairs. Currently the average rating per lane mile for the City's network is **3.96**.

Rating and Mileage Summary		
Ratings	Miles	Percentage
0-4	103.3	71.0%
5-7	29.8	20.5%
8-10	12.4	8.5%
Total	145.5	100.0%

Results of the 2020 PASER ratings are shown below in chart form.



A color-coded map of the PASER ratings for every street within the City of Goshen Street network is included in Appendix A.

How to use the PASER Data?

The 2020 PASER data is in spreadsheet form. The City can easily sort this data in a variety of ways. Possible data sorting scenarios include the following:

- All data sorted by PASER rating (high to low).
- Road classification sorted by PASER rating.
- Numerous other scenarios, as desired.

Pavement Maintenance and Cost Considerations

A good pavement maintenance program involves a combination of activities that revolve around the principal that once pavement gets to a certain condition, that the deterioration of the pavement accelerates. Maintenance items such as crack sealing on roads with PASER ratings in the Good categories (PASE Ratings 8-10) and sealing or micro-surfacing roadways with PASER ratings in the Fair categories (PASE Rating 5-7) are an essential part of roadway maintenance program. Crack sealing is a low-cost method to keep the roads from needing high cost reconstruction.

Structural improvements are recommended for streets with a PASER Rating of 4 or below. Streets with a PASER Rating 3-4 are typically slated for milling and overlay with full depth

patches. Street with a PASER Rating 1-2 are typically full-depth pavement reconstruction projects.

The following table summarizes the anticipated costs associated with the City of Goshen's streets.

Cost Summary of Goshen's Roadway Network (Based on 2020 PASER Ratings)					
PASER Rating	Centerline Miles	Treatment	Estimated Cost Per Mile	Estimated Cost	Typical Performance Period (Years)
8-10 (Good)	12.4	Crack Seal	\$8,000	\$99,200	2-4
7 (Fair)	4.4	Chip Seal	\$21,000	\$92,400	4-6
6 (Fair)	9.6	Slurry Seal	\$31,000	\$297,600	4-6
5 (Fair)	15.8	Micro-Surface	\$60,000	\$948,000	5-7
4 (Poor)	27.5	Mill & Overlay w/ 5% Full-Depth Patching	\$159,000	\$4,372,500	5-10
3 (Poor)	40.1	Mill & Overlay w/ 25% Full-Depth Patching	\$301,000	\$12,070,100	5-10
1-2 (Poor)	35.7	Full Reconstruction	\$979,000	\$34,950,300	15-25
Total =				\$52,830,100	

The above methods are the most used methods for the City of Goshen. The costs alone show why it is so important maintain the higher rated streets and keep them from failure. The crack sealing and chip sealing is typically done with in-house crews, whereas the other options are bid and done by a contractor.

Roadway Improvements Scheduled for 2021

Road	From	To	Treatment
Middlebury	Main	City Limits	Crack Seal
Larimer	Plymouth	Copley	Crack Seal
Karisa			Crack Seal
Ardmore			Crack Seal
S. Eisenhower	N. Eisenhower	Dierdorff	Reconstruction
N. Eisenhower	S. Eisenhower	Dierdorff	Reconstruction
16th	College	Fairfield	Reconstruction
Douglas	US 33	Reynolds	Reconstruction
Reynolds	US 33	Douglas	Reconstruction
16th	Douglas	Egbert Radio	Reconstruction
Lincoln	Rock Run Creek	Station	Reconstruction
Steury	Lincoln	S-curve	Reconstruction
Berkey	Greene	City Limits	2.0" Mill and Overlay
Pine Manor	Kercher	Colorado	2.0" Mill and Overlay

Colonial Manor	Bashor	Edward	2.0" Mill and Overlay
West	Riverside	Dewey	2.0" Mill and Overlay
Messick	Kercher	Eisenhower	2.0" Mill and Overlay
Lombardy	Kercher	Caragana	2.0" Mill and Overlay
Liberty Court			2.0" Mill and Overlay
Lantern	William	Edward	2.0" Mill and Overlay
Greene	Plymouth	Berkey	2.0" Mill and Overlay
Colorado	Evergreen	Lismore	2.0" Mill and Overlay
7th	Plymouth	Franklin	1.5" Mill and Overlay
Adams	11th	15th	1.5" Overlay
Douglas	10th	15th	1.5" Overlay
Constitution			Concrete - Full-Depth Repairs
Barclay			Concrete - Full-Depth Repairs
Maribou			Concrete - Full-Depth Repairs
Marshwood			Concrete - Full-Depth Repairs
Russet			Concrete - Full-Depth Repairs
Saybrook			Concrete - Full-Depth Repairs
Sweetbriar			Concrete - Full-Depth Repairs
Woodmere			Concrete - Full-Depth Repairs
Tanglewood			Concrete - Full-Depth Repairs

Roadway Improvements Completed in 2020

Road	From	To	Treatment
Monroe	Blackport	US 33	Crack Seal - Rubber
Waterford Mills			
Pkwy	Dierdorff	Regent	Crack Seal - Rubber
Lincoln	5 Points	Elk River	Crack Seal - Rubber
Lincoln	5 Points	Greene	Crack Seal - Rubber
		Short of US	
Greene	Berkey	33	Crack Seal - Rubber
Indiana	Plymouth	US 33	Crack Seal - Rubber
College Manor	Dead End	College	Crack Seal - Rubber
Dierdorff	Airport	CR 42	Crack Seal - Rubber
Clinton	Greene	CR 17	Crack Seal - Rubber
Rieth	CR 17	US 33	Crack Seal - Rubber
Egbert	SR 15	16th	Crack Seal - Hot Oil
Purl	5th	9th	Crack Seal - Hot Oil
Baker	Riverside	Dewey	Crack Seal - Hot Oil
Riverside	Berkey	US 33	Crack Seal - Hot Oil
Wheatland	Berkey	Lincoln	Crack Seal - Hot Oil
5th	Middlebury	Hilltop	Crack Seal - Hot Oil
Burdick	9th	11th	Crack Seal - Hot Oil
Fairfield	US 33	16th	Crack Seal - Hot Oil
10th	College	New York	Crack Seal - Hot Oil

11th	Reynolds	Plymouth	Crack Seal - Hot Oil
14th	Reynolds	Douglas	Crack Seal - Hot Oil
Greene	RR	Dead End	Crack Seal - Hot Oil
River Race	Jefferson	Washington	Reconstruction
Kercher	Dierdorff	US 33	Reconstruction
Main	Madison	Middlebury	Full-Depth Asphalt Repairs
Winsted			Concrete - Full-Depth Repairs
Auten Court			Concrete - Full-Depth Repairs
Pembroke			Concrete - Full-Depth Repairs
Kentfield			Concrete - Full-Depth Repairs
Hampton Circle			Concrete - Full-Depth Repairs
College Manor			Concrete - Full-Depth Repairs
Manor Haus			Concrete - Full-Depth Repairs

Recommendations and Conclusions

This report provides the City with valuable information to assist in determining the annual maintenance budget. The results of this plan provide the City with a summary of the potential costs and different life cycle options that can be used in creating a plan for road maintenance. However, if more manhours were available, much more could be done to better track the deterioration and current condition of the pavement and the associated costs of maintenance. With the improved data, analysis and optimization, there would be a potential for a significant increase in the amount of improvement realized per dollar spent.

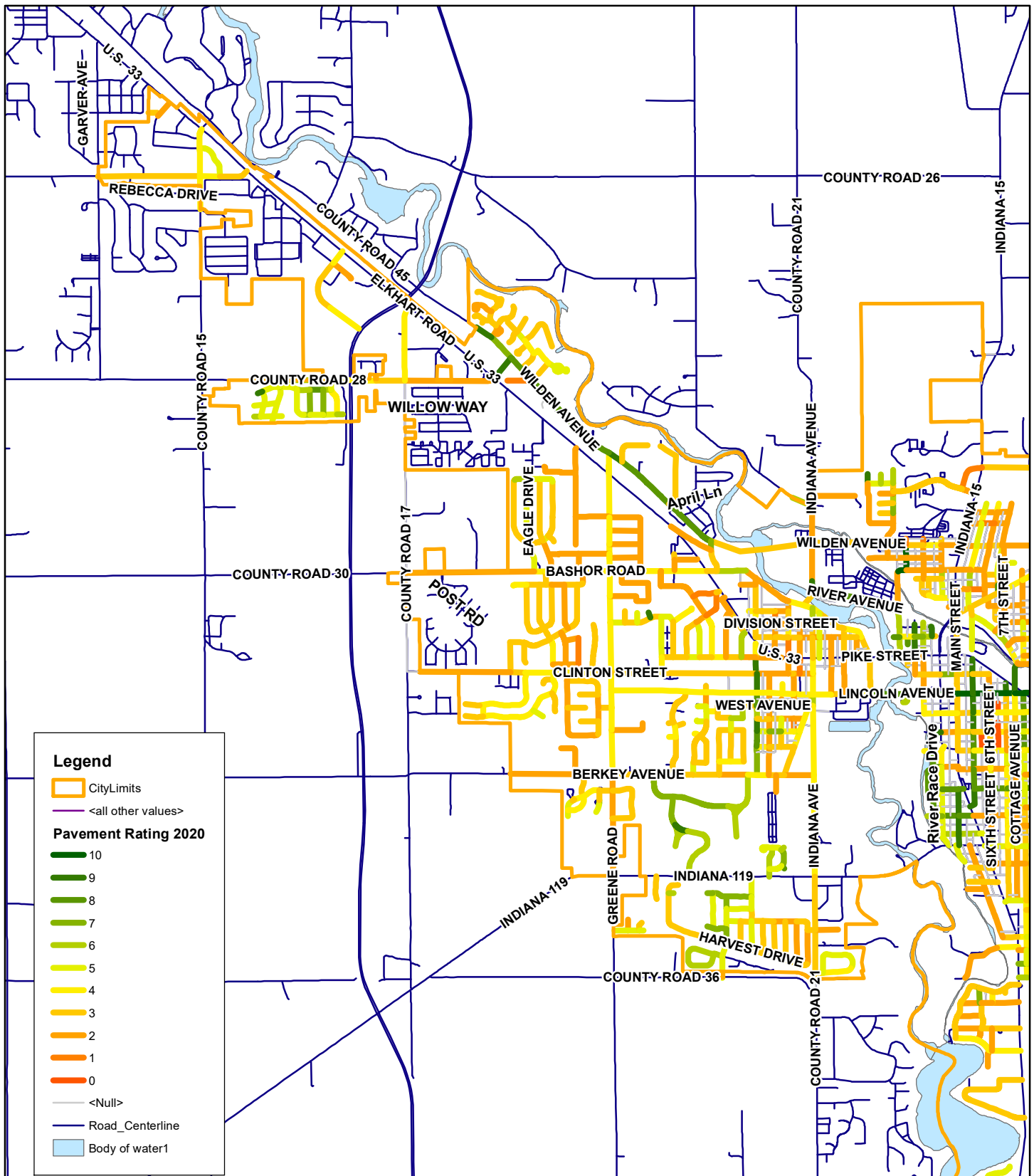
While many of the City's streets are not in need of complete reconstruction, the overall network is currently deteriorating year over year. There are several options that are currently used and some that are being considered to help preserve and extend the life of City streets. It is important to utilize preventative maintenance treatments early on in the life cycle of pavement, while the pavement is in good condition in order to extend the life of the pavement.

Biennial monitoring of all streets will need to be done to ensure that roadways are deteriorating at expected rates. This will help to find what maintenance methods help extend the lifecycle of the pavement most efficiently. Drainage conditions need to be looked at as well to determine if a drainage issue is causing the pavement failure. With overlays and reconstructions, the drainage catch basins may need to be adjusted to make sure that water is not trapped on the pavement. The following is a list of recommendations presented in this report:

- Adopt this plan as a framework for future maintenance and rehabilitation of the City of Goshen's Streets.
- The City should perform routine maintenance on streets with condition ratings of 7 and higher to extend the life of those streets.
- The City should also perform routine maintenance on streets with condition ratings of 5-6 but may also need to look at performing some structural repairs and patchwork or overlays.
- The City should perform patching or mill and overlays for ratings of 3-4.

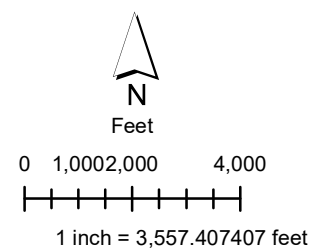
- The City should perform full reconstruction on streets with a rating of 1-2.
- The City should consider investment in a comprehensive asset management program to better optimize each dollar spent.

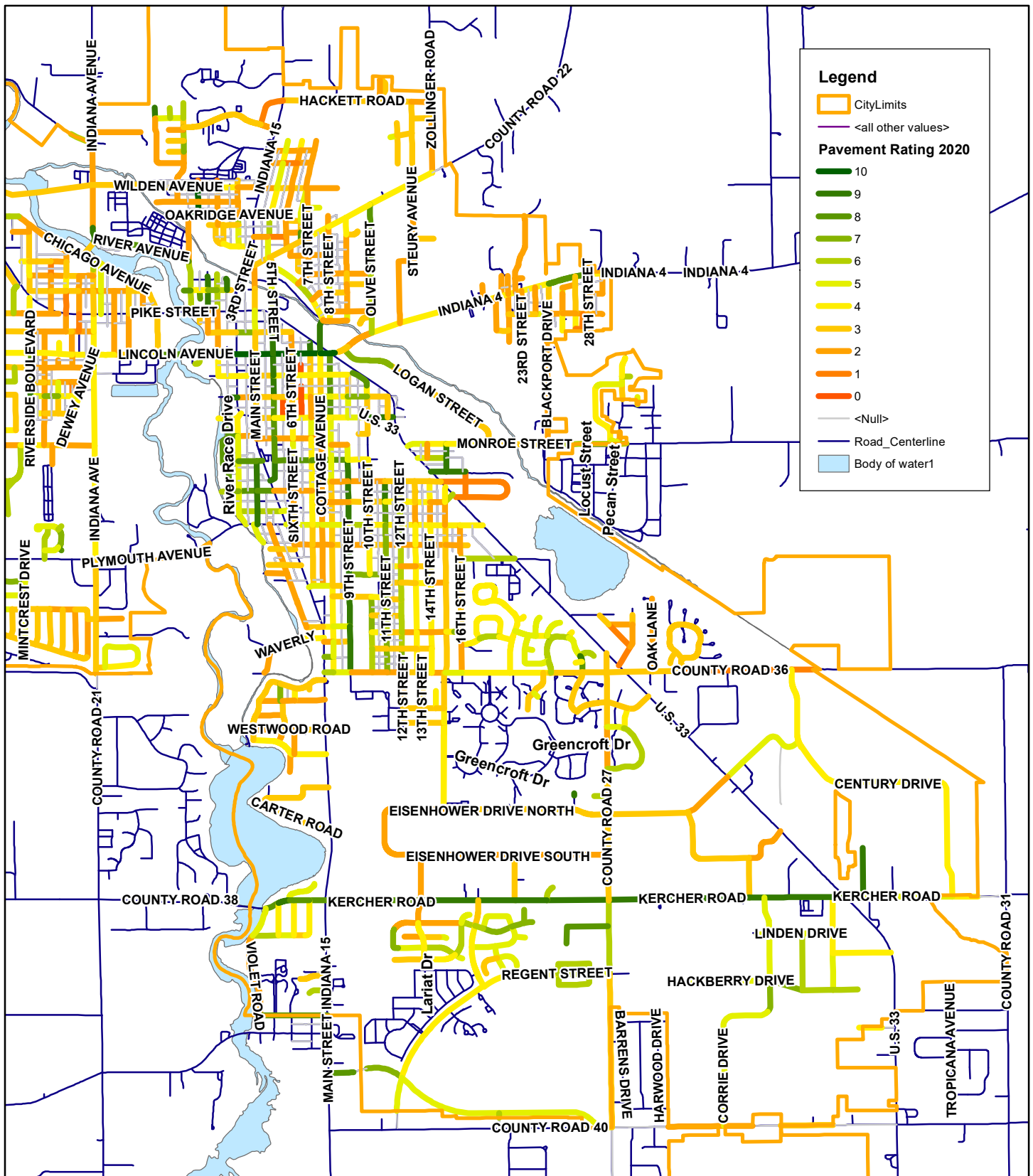
Appendix



City of Goshen
2020 PASER Ratings
Northwest - Map 1 of 2

Date: 11/25/2020
Drawn by: JSC





City of Goshen
2020 PASER Ratings
Southeast - Map 2 of 2

Date: 11/25/2020
Drawn by: JSC

