

Bridge and Pavement Condition Management System

2023-2024 UPWP Report

DRAFT

OCTOBER 2024



Syracuse Metropolitan Transportation Council

BRIDGE AND PAVEMENT CONDITION MANAGEMENT SYSTEM

Syracuse Metropolitan Planning Area

October 2024

2023-2024 Unified Planning Work Program

DRAFT

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PROJECT OVERVIEW

The purpose of the Bridge and Pavement Condition Management System (BPCMS) report is to serve as a comprehensive clearinghouse for condition information on selected bridges and pavements throughout the Metropolitan Planning Area (MPA) of the Syracuse Metropolitan Transportation Council (SMTC). Infrastructure improvements such as bridge rehabilitation and pavement milling routinely make up a significant portion of both total Transportation Improvement Program (TIP) projects and the associated FHWA and FTA funds spent in the MPA, as shown in Charts 1 and 2 at left. Through the BPCMS report, member agencies are able to track investments in infrastructure across the system.

In 2017, one of the Federal Highway Administration (FHWA)'s final rules establishing performance measures on the National Highway System (NHS) for State Departments of Transportation and Metropolitan Planning Organizations took effect. The rule establishes measures to assess the condition of bridges and pavements, and addresses requirements established in two federal surface transportation authorizations, the Moving Ahead for Progress in the 21st Century (MAP-21) and the Fixing America's Surface Transportation (FAST) Act. Performance measurement continues in the current transportation bill, the Infrastructure Investment and Jobs Act (IIJA).

The body of this report only considers federal-aid eligible roads, which are determined by functional classification and listed in Chart 3 at left. However, the SMTC continues its partnership with the City of Syracuse to collect pavement ratings on the entirety of the City's road network. Additional information on the City's system is available at the end of this report.

Environmental justice remains a priority for the SMTC in its planning efforts. For this report, the SMTC used the White House's Climate and Economic Justice Screening Tool to identify disadvantaged census tracts in our planning area.

Chart 1: TIP Projects by Project Type

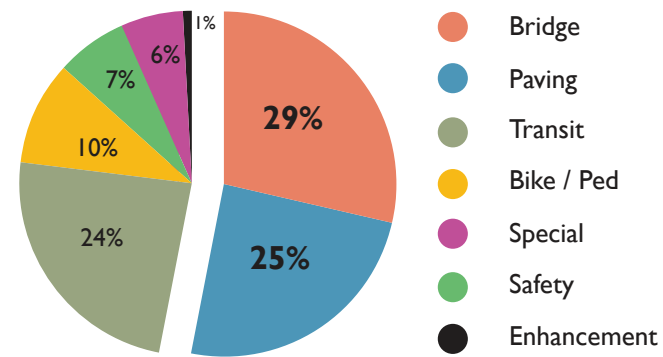


Chart 2: TIP Projects by Federal Funds

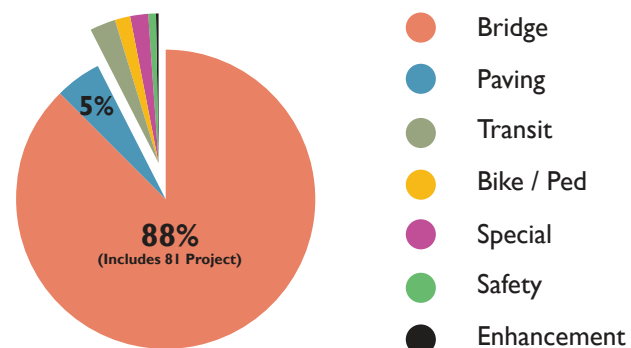


Chart 3: Functional Classifications and Federal-aid Eligibility

Urban Classifications	Rural Classifications
Urban Principal Arterial (interstates, other expressways, and other principal arterials)	Rural Principal Arterial (interstates, other expressways, and other principal arterials)
Urban Minor Arterial	Rural Minor Arterial
Urban Major Collector	Rural Major Collector
Urban Minor Collector	Rural Minor Collector
Urban Local	Rural Local

Functional Classifications in Italics are not federal-aid eligible.

ABOUT THE DATA

Collection

There are many different types of bridges in the SMTC MPA, which includes all of Onondaga County and portions of Madison and Oswego Counties. This report includes information on roadway bridges open to vehicular travel – it does not contain information on private railroad bridges or pedestrian or bicycle overpasses. Pavement conditions are reported on federal-aid eligible roads. Federal-aid eligibility on roadways is based on functional classification – the process by which streets and highways are grouped into classes or systems according to the character of services they are intended to provide. Roads are considered federal-aid eligible if they have a functional classification of Principal Arterial, Minor Arterial, Major Collector, or Urban Minor Collector.

Current federal performance measures for bridges monitor condition by deck area, not by number of structures. The pavement condition rating data in this document is based on linear centerline miles of roads, not lane miles of roads. A linear centerline mile of road is a continuous line of pavement along the center of the length of pavement, whereas a lane mile is the length of each lane in a given section of pavement.

The New York State Department of Transportation (NYSDOT) inspects all highway bridges that it owns, as well as those owned by local municipalities, at a maximum of once every 24 months. Tolling authorities (such as the New York State Thruway Authority) are responsible for their own inspections but are required to submit their data to NYSDOT. SMTC staff collect and inventory pavement conditions. SMTC staff began rating federal-aid eligible roads owned by Onondaga County and the City of Syracuse in 2015, and federal-aid eligible Madison County, Oswego County, and town and village roads MPA-wide in 2020. NYSDOT is still responsible for rating pavements on the Interstate System, the US Highway System, and state-owned roads on the State Touring Route System. NYSDOT also collects ratings on all NHS roads, regardless of ownership, for the purposes of performance measurement.

Condition Ratings

Bridge condition ratings are given on a scale of Good-Fair-Poor. This classification is based on the National Bridge Inventory (NBI) condition ratings for Item 58 (Deck), Item 59 (Superstructure), Item 60 (Substructure), and Item 62 (Culvert). Each of these items are rated on a scale of 0-9. If the lowest rating is greater than or equal to 7, the bridge is classified as "Good." If the lowest rating is less than or equal to 4, it is classified as "Poor." Bridges rated below 7 but above 4 are classified as "Fair."

For the purpose of federal performance measures, pavement condition is rated based on cracking, faulting (concrete) or rutting (asphalt), and International Roughness Index (IRI) or the Present Serviceability Rating (PSR). Pavements are rated Good, Fair, or Poor based on the values of these individual metrics. Pavement in Good condition suggests that no major investment is needed. Pavement in Poor condition suggests major reconstruction investment is needed in the near term.

However, this rating process requires intricate and specialized technology. Instead, for planning purposes, a moving-vehicle windshield survey is used to assess pavement condition. NYSDOT developed and formerly used this technique, and the SMTC adopted this method for the ratings staff complete for the BPCMS. The procedure involves the use of a carefully crafted scale, called the Surface Score, ranging from "1" (very poor) to "10" (excellent condition), based on the frequency and severity of pavement distress. This procedure is designed to permit rapid estimates of overall condition. The scores of 1-10 fall into four categories: Excellent (9-10), Good (7-8), Fair (6), and Poor (1-5). There are also a small number of roads listed as "unrated," largely due to either construction occurring, or the use of road materials not suited to pavement rating (such as brick or bridge deck).

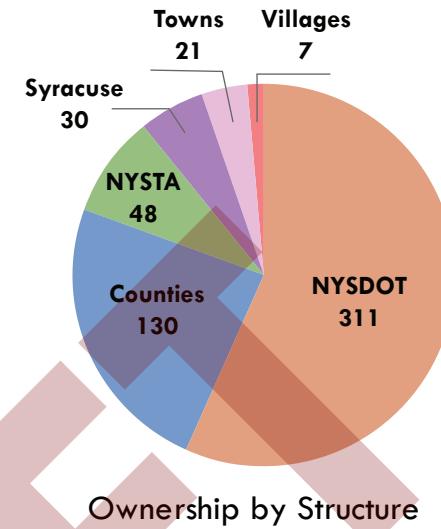
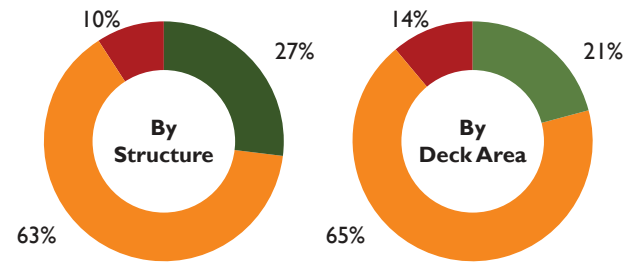


BRIDGES

All Bridges

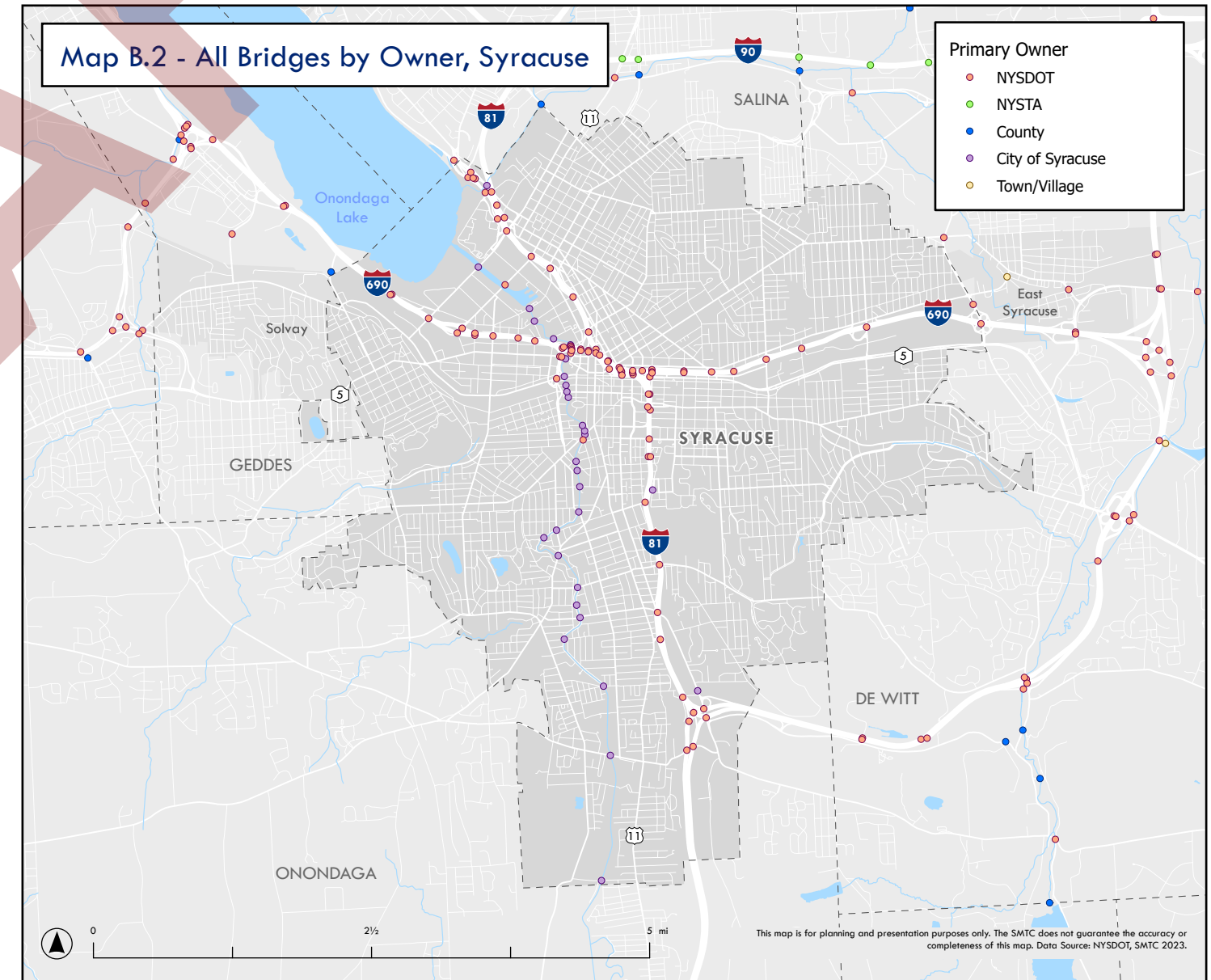
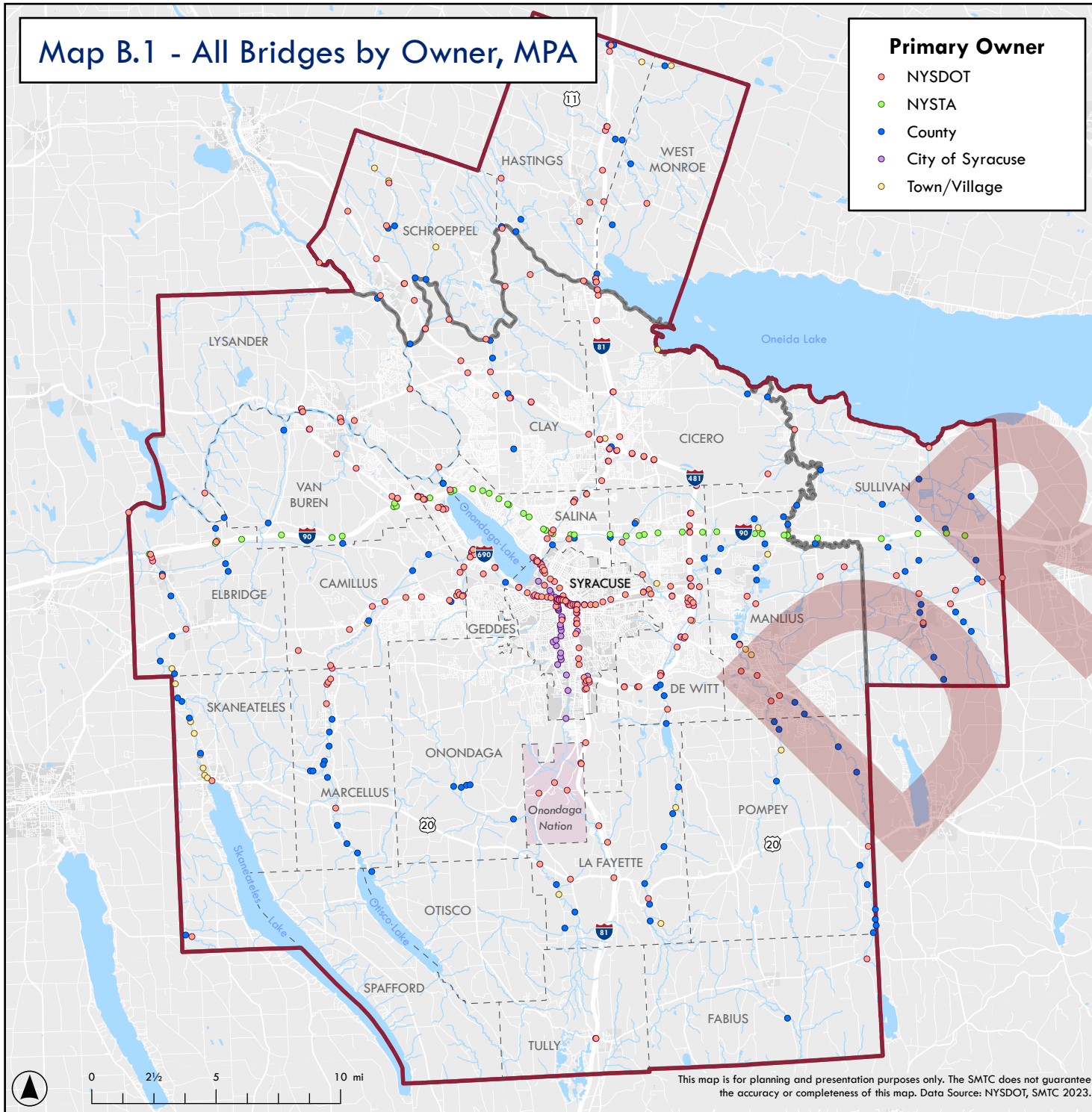
KEY POINTS

- There are 547 roadway bridges in the SMTC MPA.
- NYSDOT has the most structures (57%) and deck area (80%) of any bridge owner.
- 90% of bridges in the MPA are rated either *Good* or *Fair*.



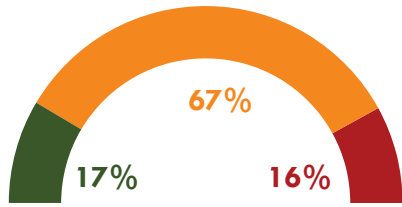
Ownership by Area

Owner	Deck Area (sf)	Percent
NYSDOT	4,358,914	80.1%
NYSTA	482,524	8.9%
Onondaga County	330,723	6.1%
Madison County	36,669	0.7%
Oswego County	23,919	0.4%
Syracuse	157,034	2.9%
Towns	25,710	0.5%
Villages	23,718	0.4%
Grand Total	5,439,211	100%



NYSDOT Bridges

By Deck Area



311
Bridges

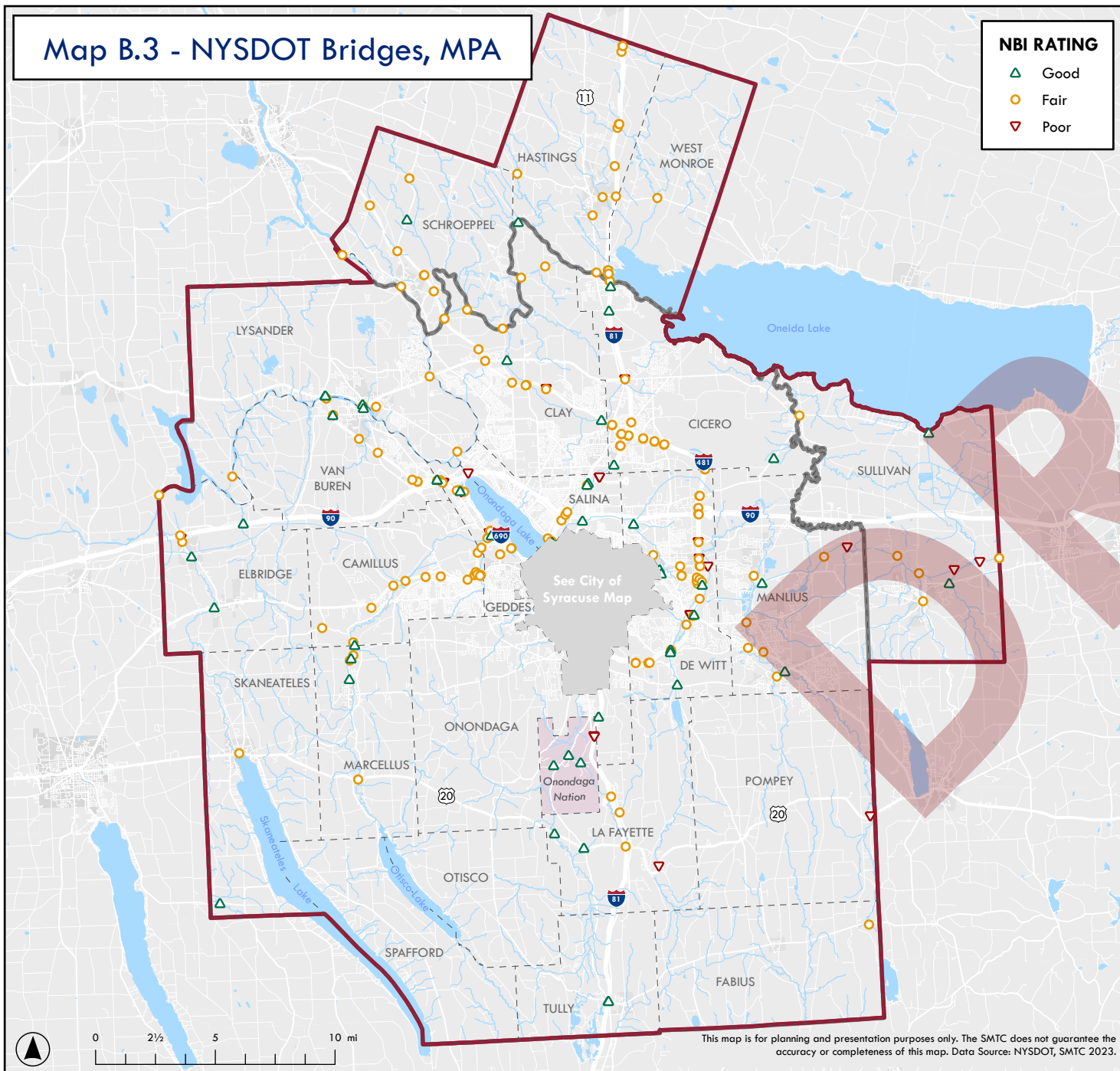
By Structure

62 Good
214 Fair
35 Poor

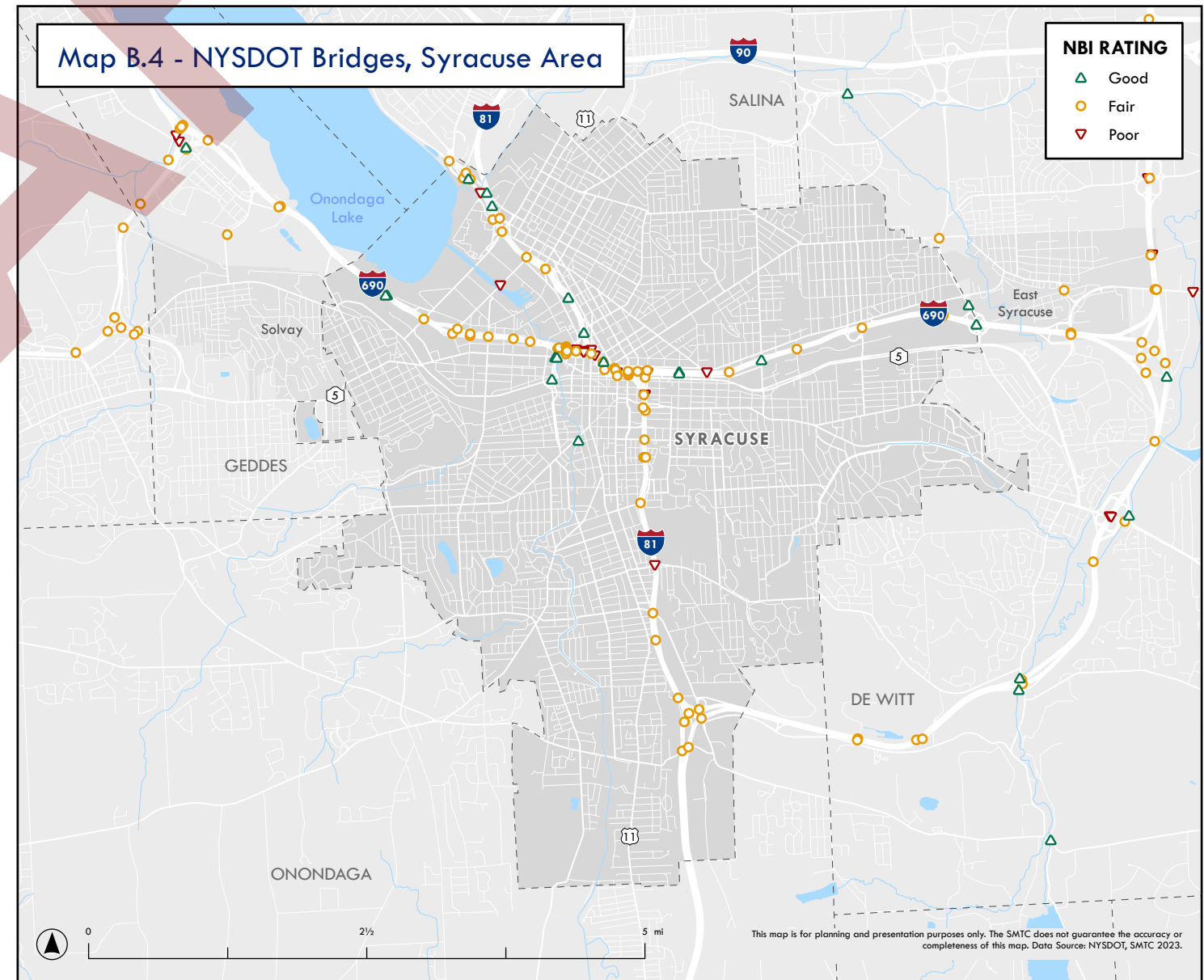
NHS Status

151 Carry NHS
69 Carry/Cross NHS
32 Cross NHS
32 Non-NHS

Map B.3 - NYSDOT Bridges, MPA



Map B.4 - NYSDOT Bridges, Syracuse Area



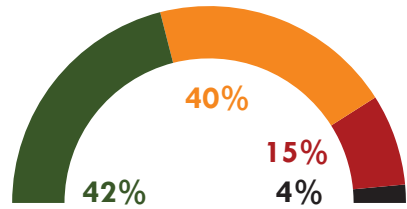
- (9) **Excellent Condition**
- (8) **Very Good Condition** – no problems noted.
- (7) **Good Condition** – some minor problems.
- (6) **Satisfactory Condition** – structural elements show minor deterioration.
- (5) **Fair Condition** – all primary structural elements are sound but may have minor corrosion, cracking, or chipping. May include minor erosion on bridge piers.
- (4) **Poor Condition** – advanced corrosion, deterioration, cracking, or chipping. Significant erosion of concrete bridge piers.
- (3) **Serious Condition** – corrosion, deterioration, cracking, and chipping, or erosion of concrete bridge piers have seriously affected deck, superstructure, or substructure. Local failures are possible.

- (2) **Critical Condition** – advanced deterioration of deck, superstructure, or substructure. May have cracks in steel or concrete, or erosion may have removed substructure support. It may be necessary to close the bridge until corrective action is taken.
- (1) **“Imminent” Failure Condition** – major deterioration or corrosion in deck, superstructure, or substructure, or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic, but corrective action may put back in light service.
- (0) **Failed Condition** – out of service. Beyond corrective action.
- (N) **Not applicable.**

Four bridge items are rated using the scale at left: Deck, Superstructure, Substructure, and Culvert. If the lowest rating is greater than or equal to 7, the bridge is classified as “Good.” If the lowest rating is less than or equal to 4, it is classified as “Poor.” Bridges rated below 7 but above 4 are classified as “Fair.”

NYSTA Bridges

By Deck Area



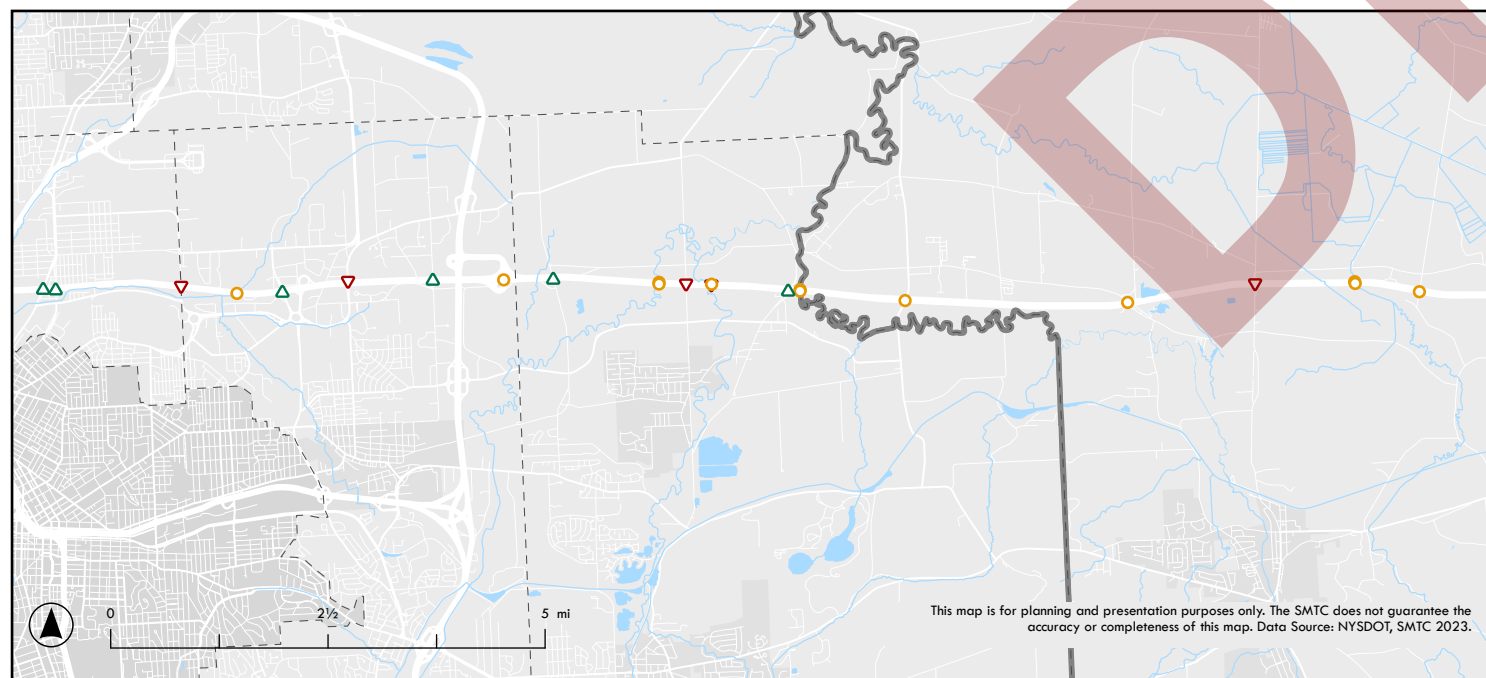
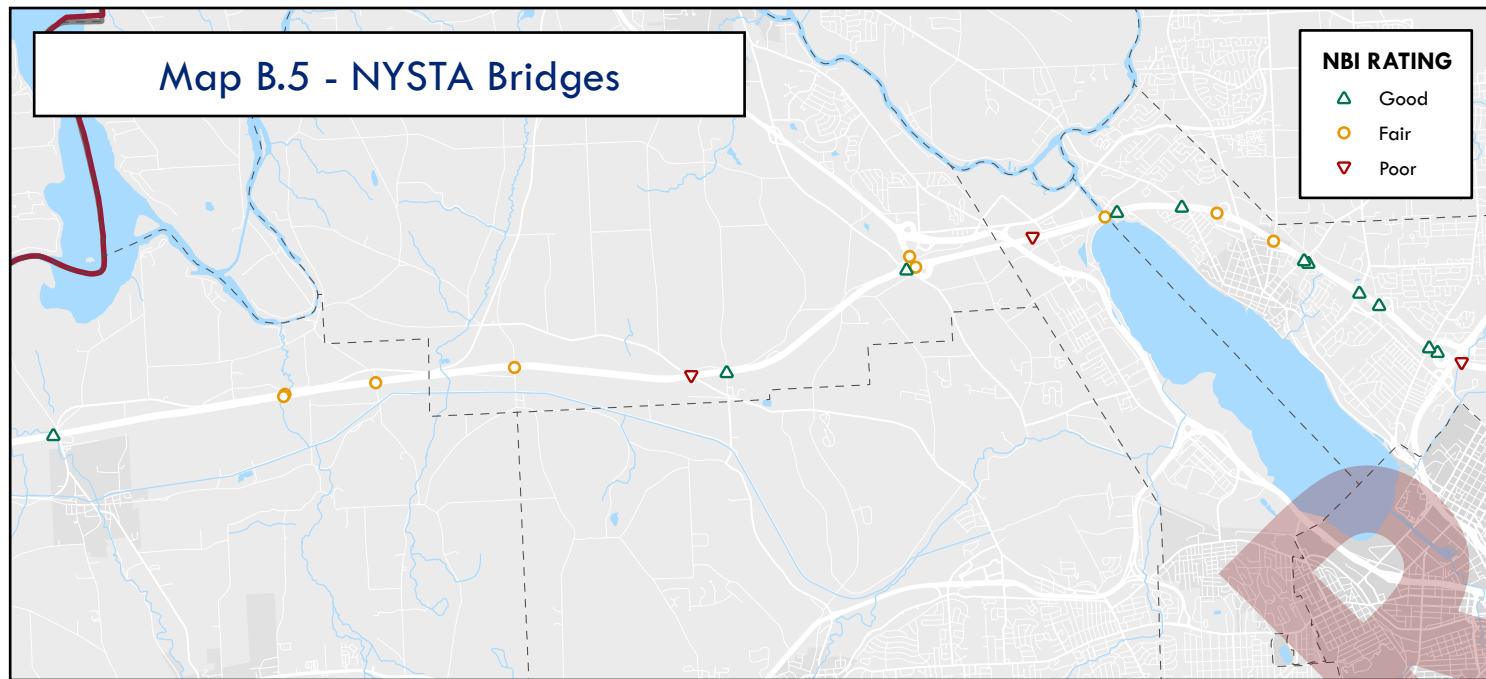
48
Bridges

By Structure

17 Good
21 Fair
8 Poor
2 Not Rated

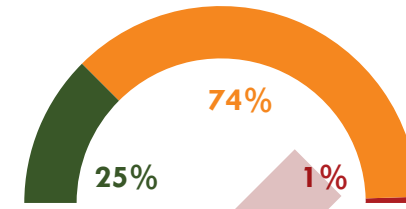
NHS Status

19 Carry NHS
8 Carry/Cross NHS
21 Cross NHS
0 Non-NHS



Onondaga County Bridges

By Deck Area



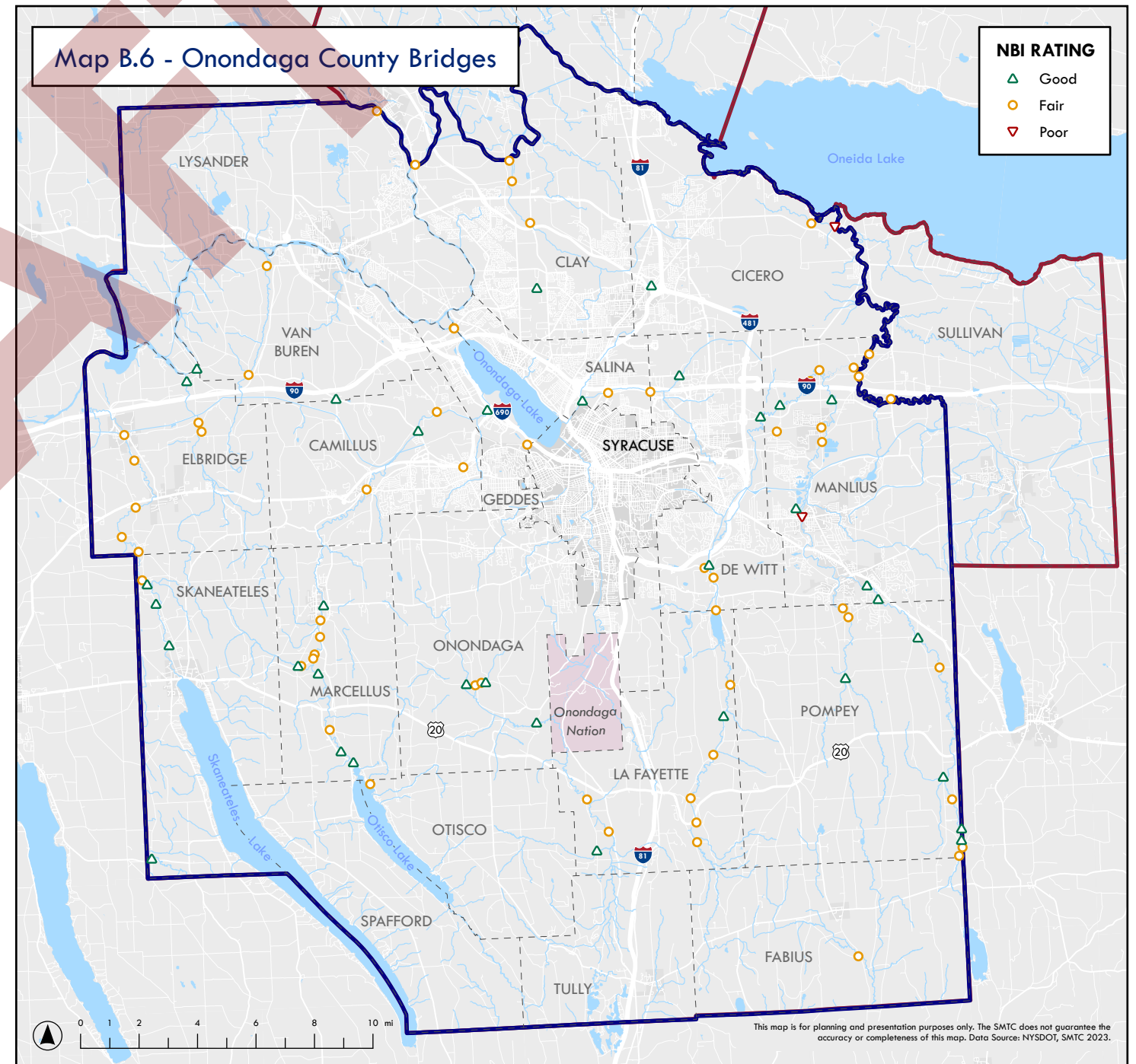
96
Bridges

By Structure

35 Good
59 Fair
2 Poor

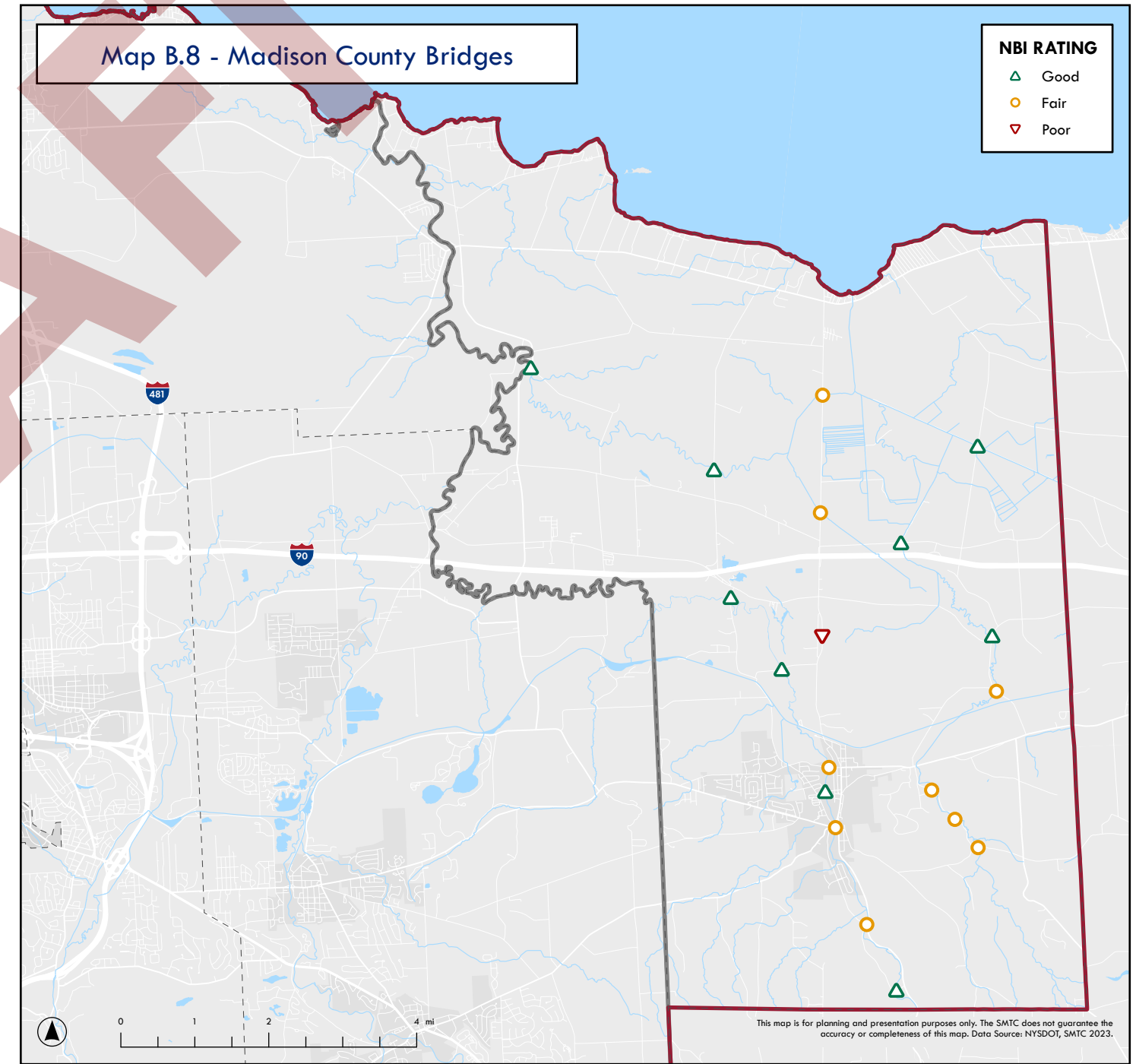
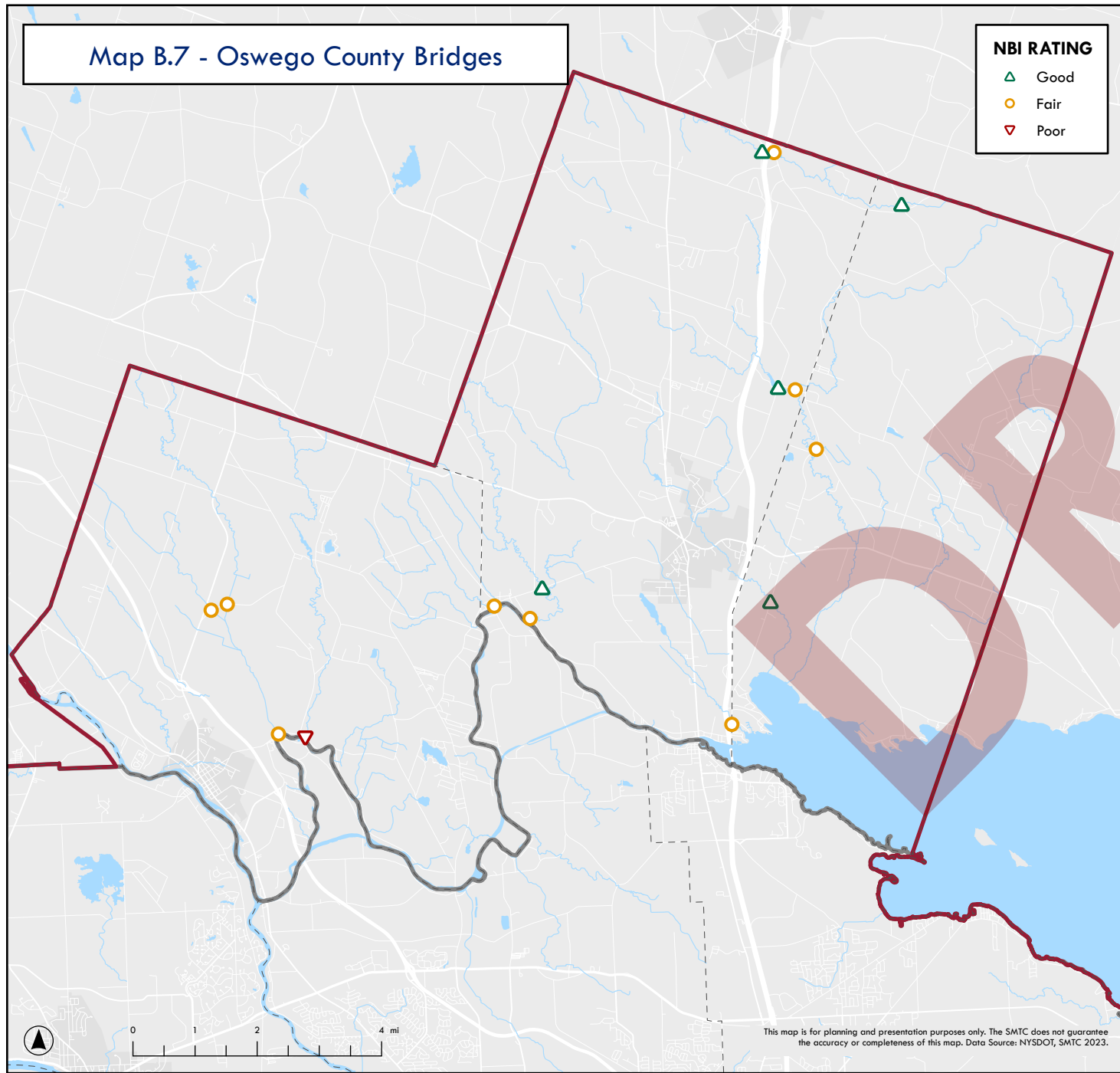
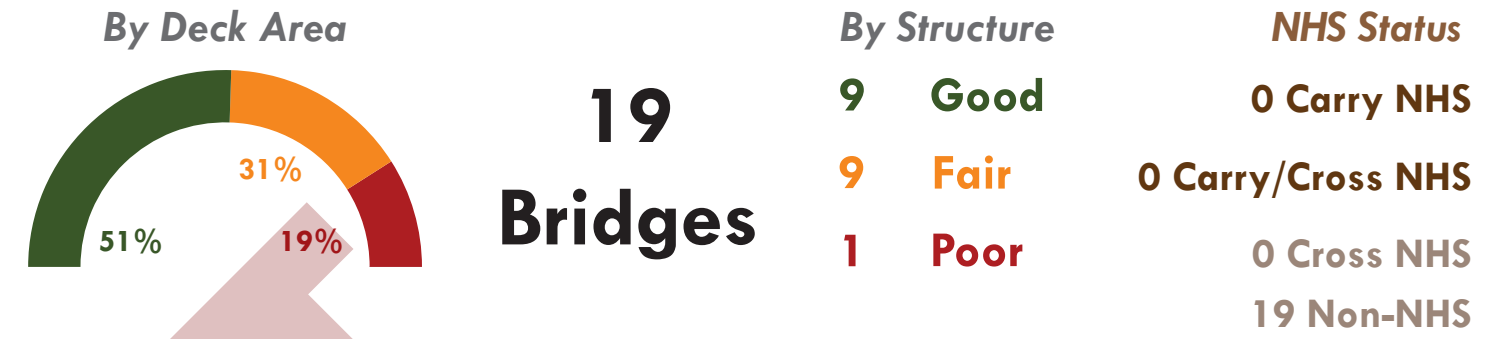
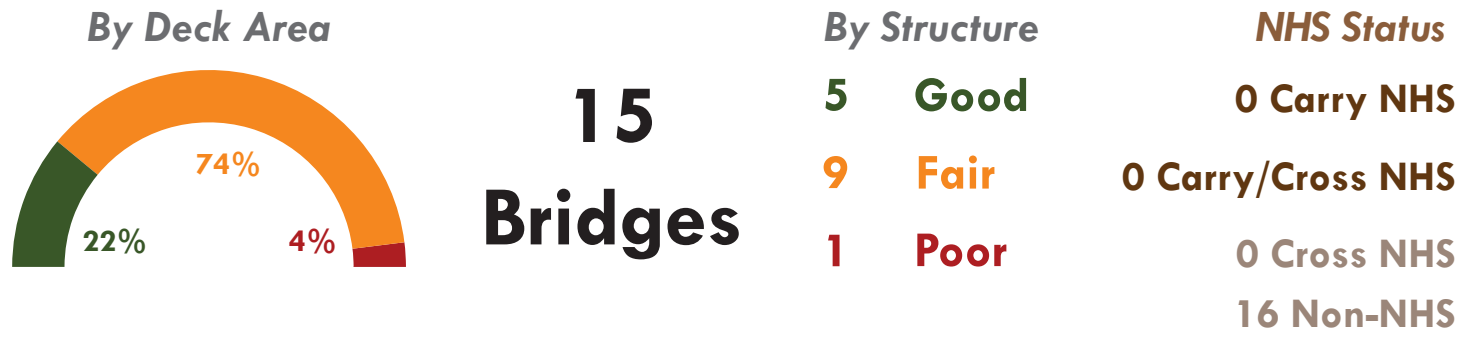
NHS Status

4 Carry NHS
0 Carry/Cross NHS
0 Cross NHS
92 Non-NHS



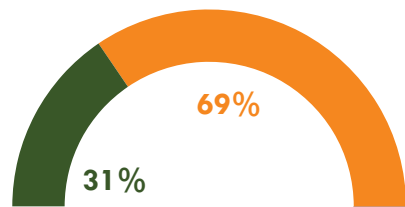
Oswego County Bridges (in MPA)

Madison County Bridges (in MPA)



Syracuse Bridges

By Deck Area



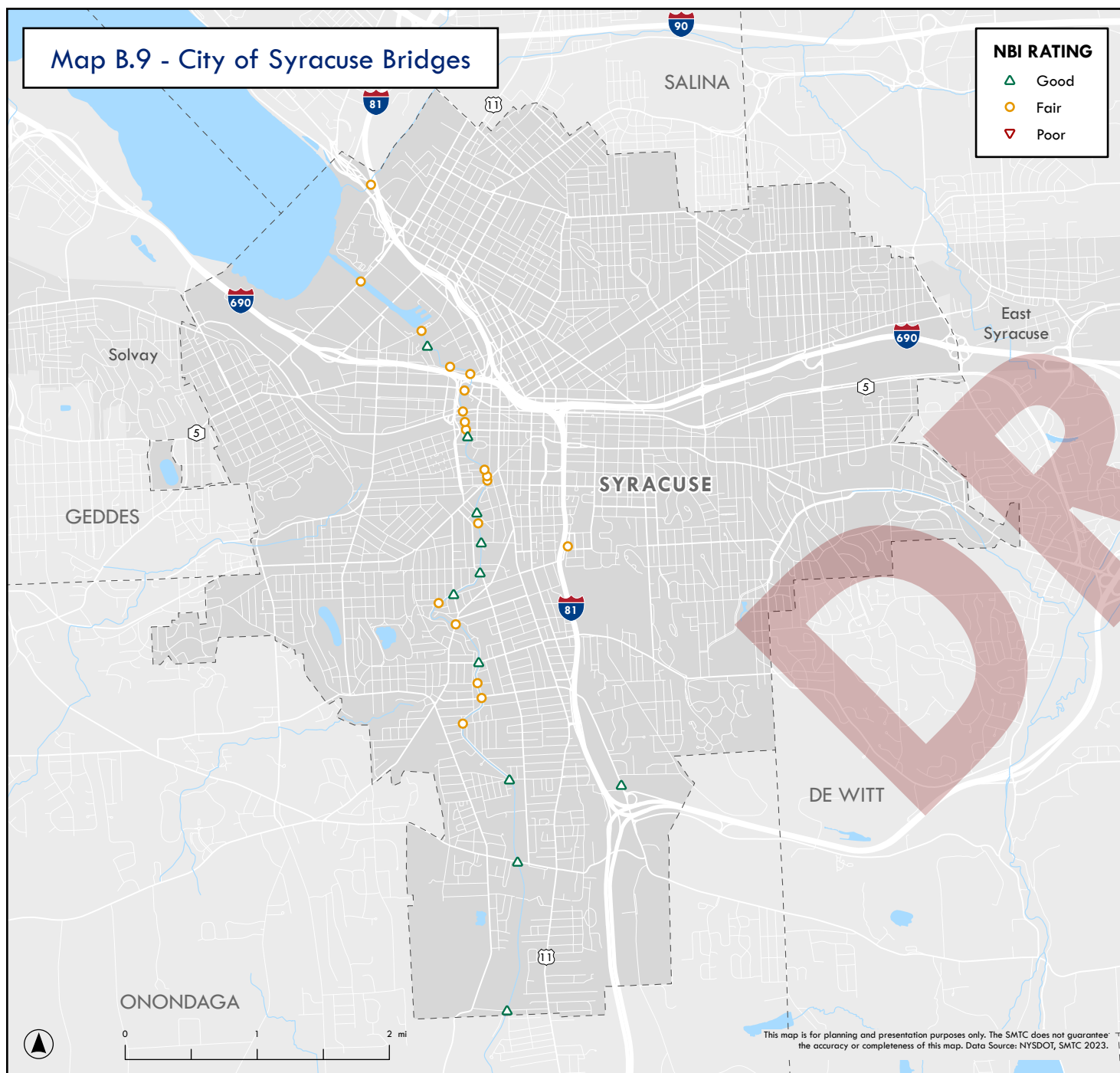
30
Bridges

By Structure

11 Good
19 Fair
0 Poor

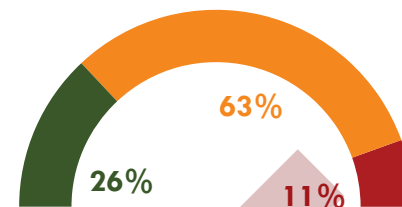
NHS Status

5 Carry NHS
0 Carry/Cross NHS
0 Cross NHS
25 Non-NHS



Town and Village Bridges

By Deck Area



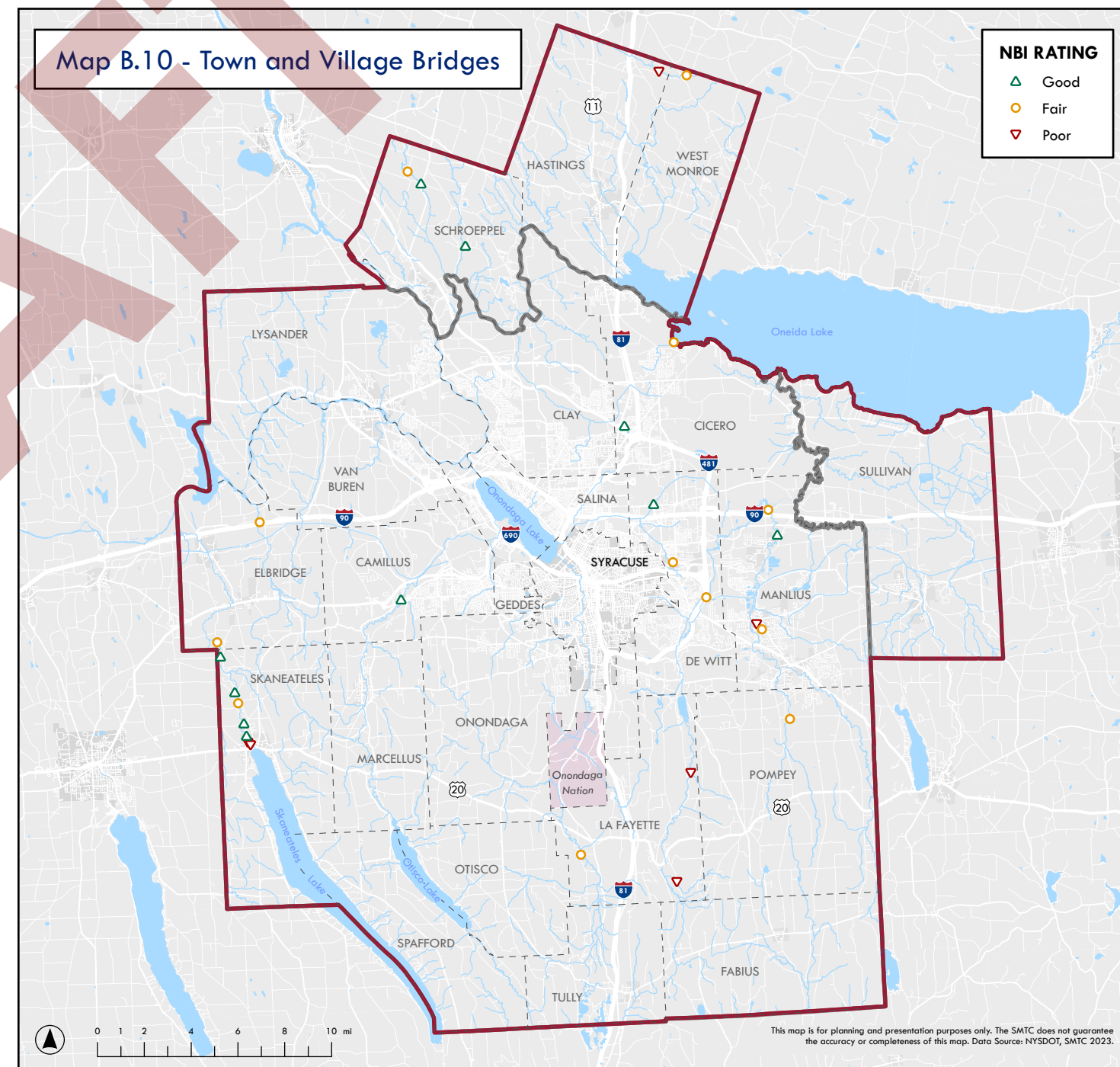
28
Bridges

By Structure

10 Good
12 Fair
6 Poor

NHS Status

0 Carry NHS
0 Carry/Cross NHS
0 Cross NHS
28 Non-NHS



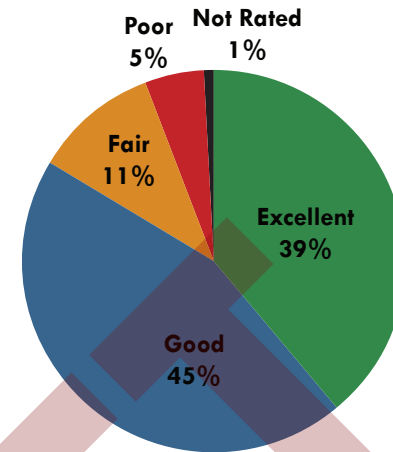
DRIVE

PAVEMENT

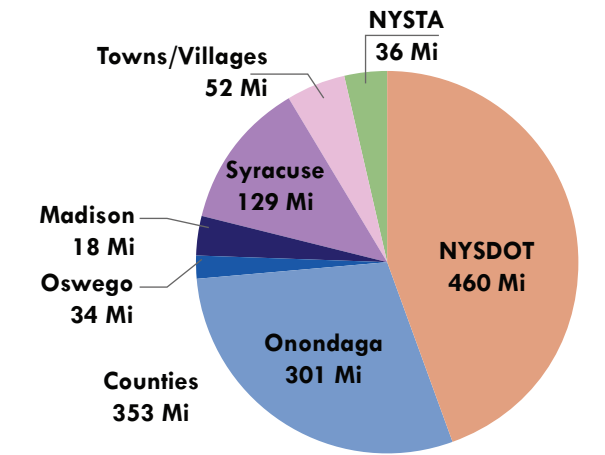
All Pavement

KEY POINTS

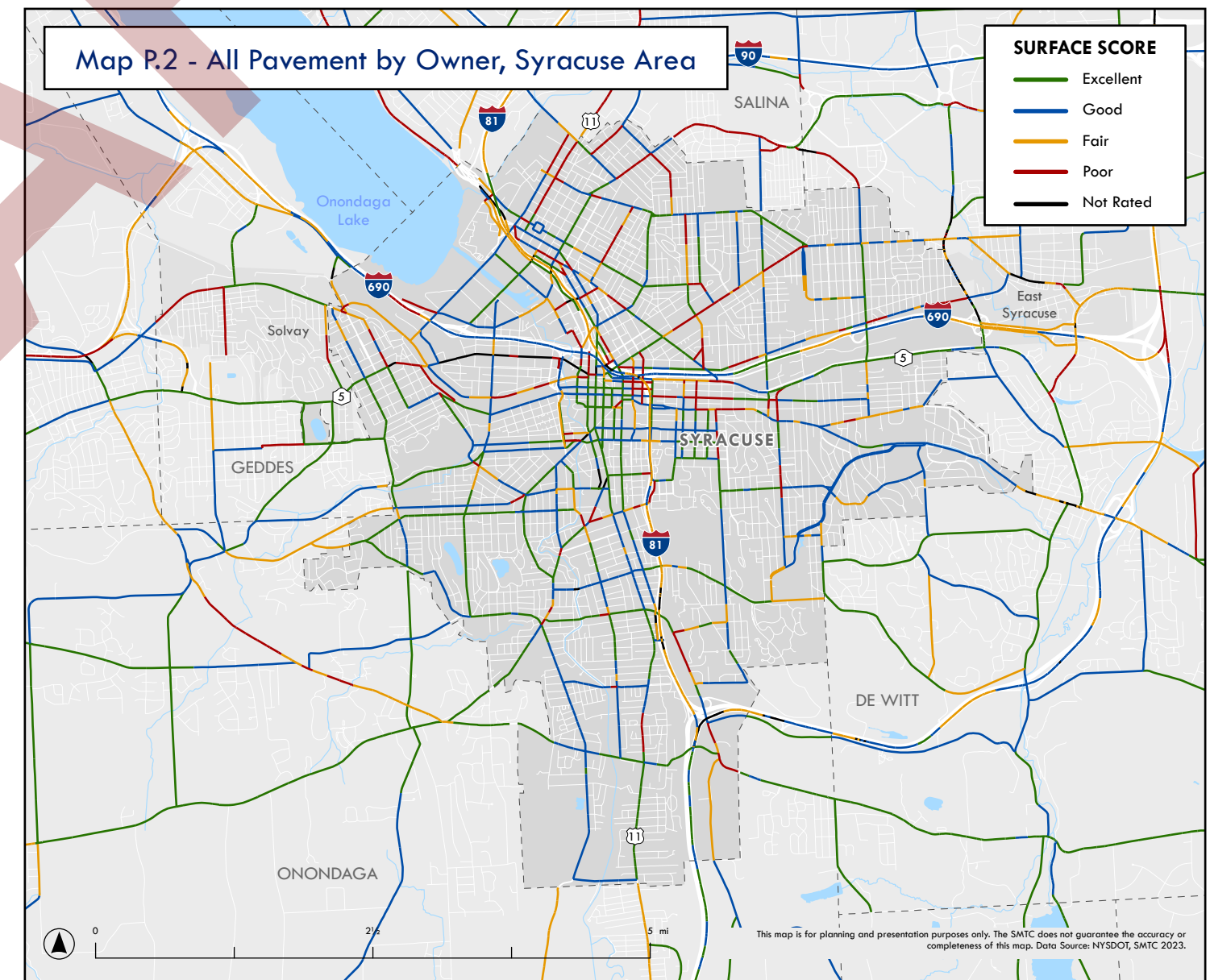
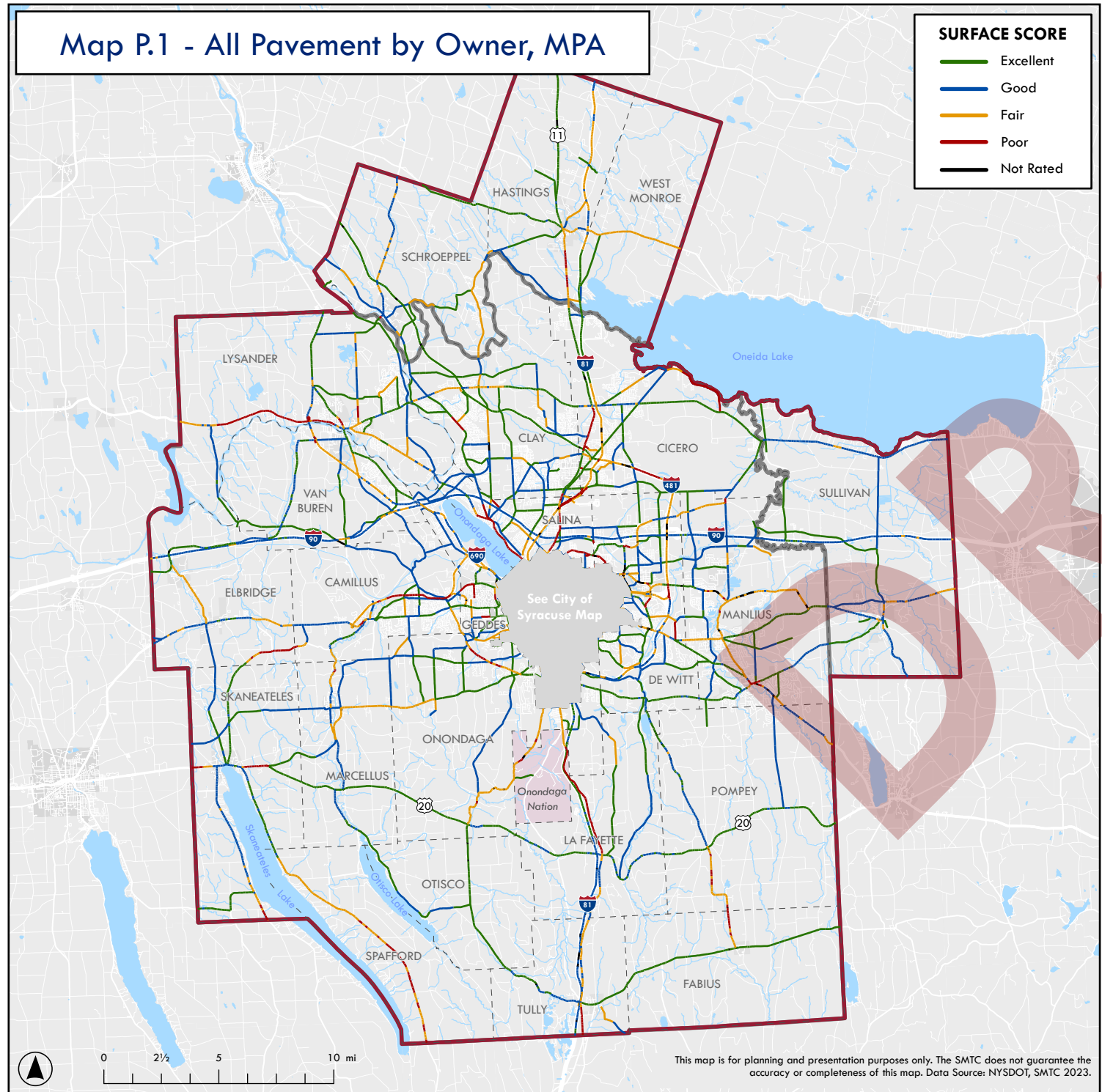
- There are approximately 1,000 centerline miles of federal-aid eligible roadways in the SMTC MPA.
- The overall weighted average rating for roads is 7.6.
- Federal-aid eligible pavements in the MPA are largely in Good or Excellent condition.



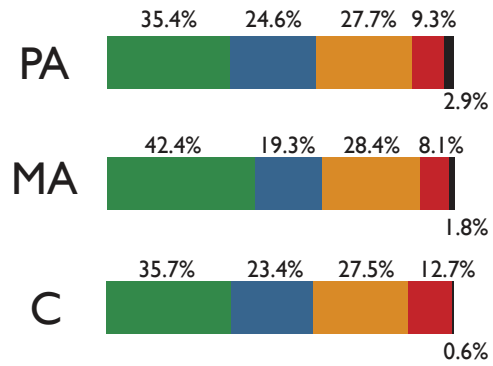
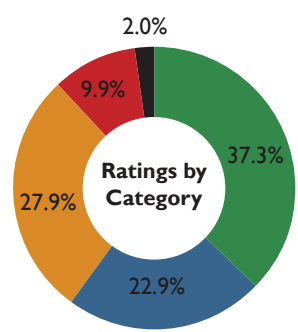
All FAE Pavement Conditions



FAE mileage by Ownership



NYSDOT Pavement



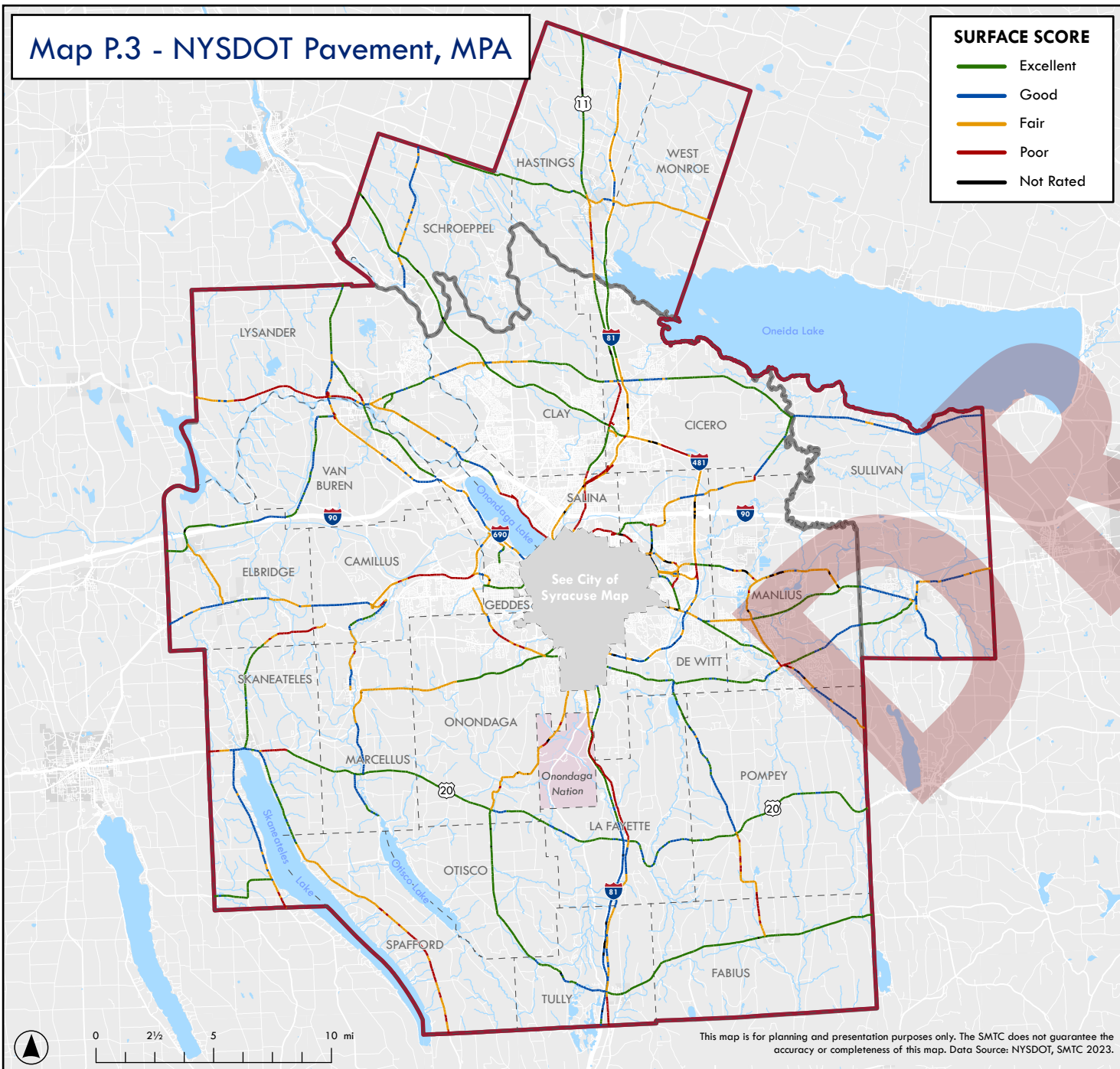
460 Total FAE Miles

210 NHS Miles

7.4 Weighted Average Rating

Historical data not available for trends.

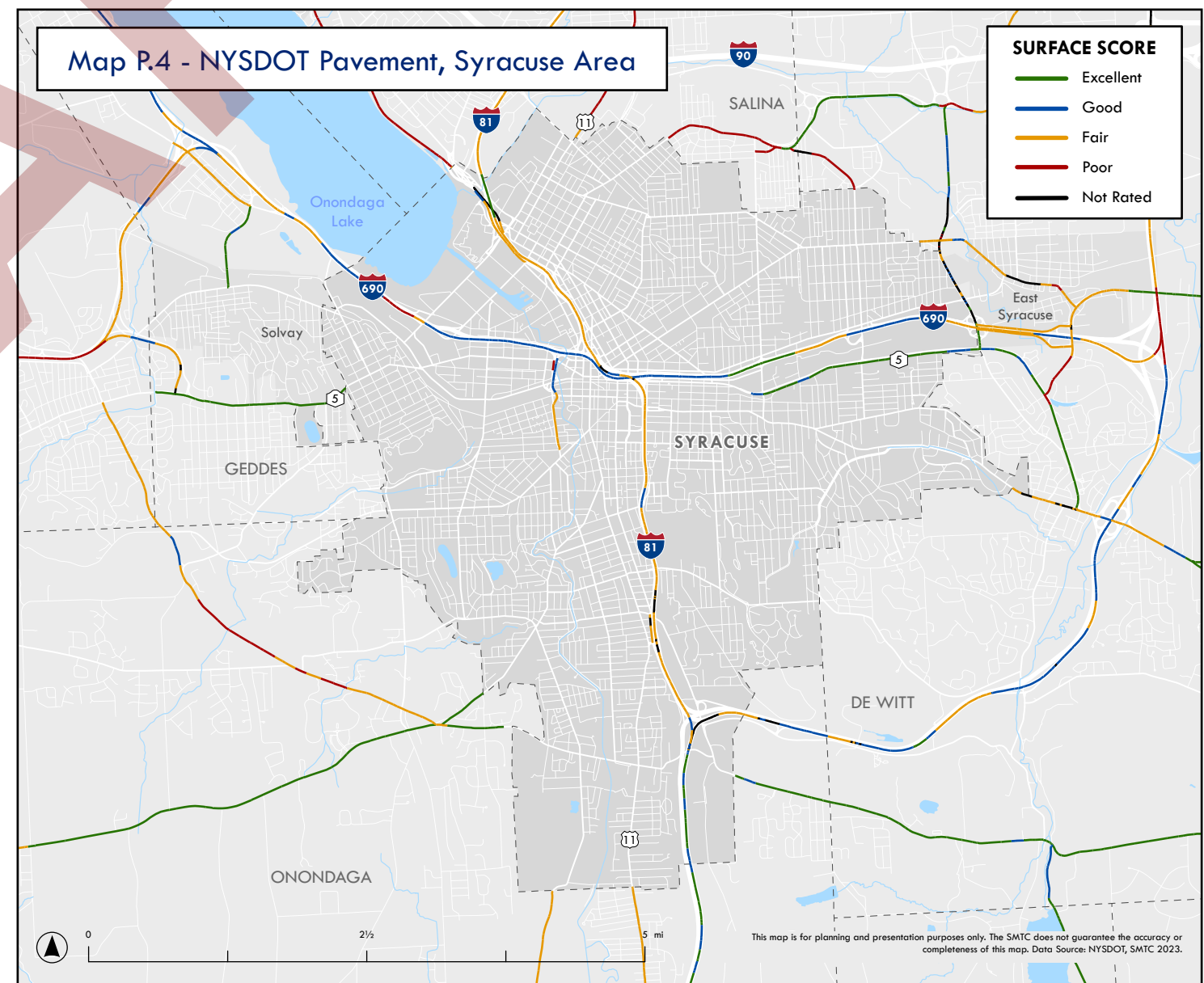
PA = Principal Arterial, MA = Minor Arterial, C = Collector.



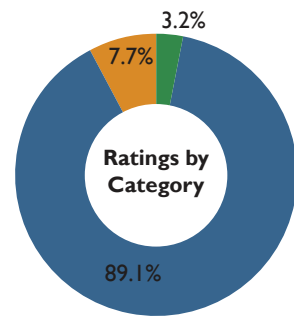
Although technological advances allow for the collecting of more intricate pavement data, the SMTC still uses the NYSDOT-developed Surface Score for a majority of this report. The Surface Score, which requires no additional equipment, allows for the collection of planning-level data which can inform decisions on pavement maintenance throughout the SMTC's MPA.

The limitation of any data collection procedure is that it is a single snapshot in time. Therefore, some roads may receive treatment after the SMTC has collected a rating. SMTC staff try to rate as late in the construction season as possible to limit these discrepancies between ratings and on-the-ground conditions, but staff do not return to a road after it has been rated until the following year.

An overview of the Surface Score...



NYSTA Pavement



The entirety of the NYS Thruway is made up of Principal Arterials.

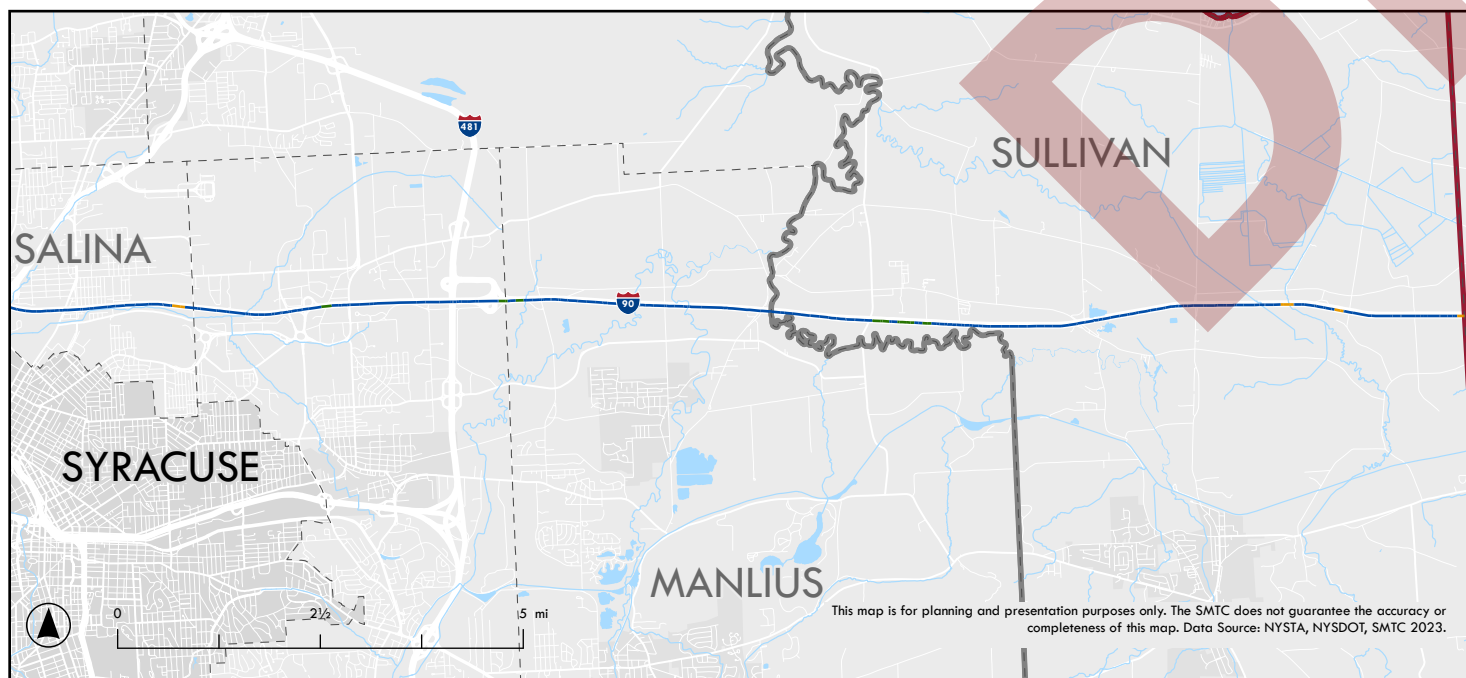
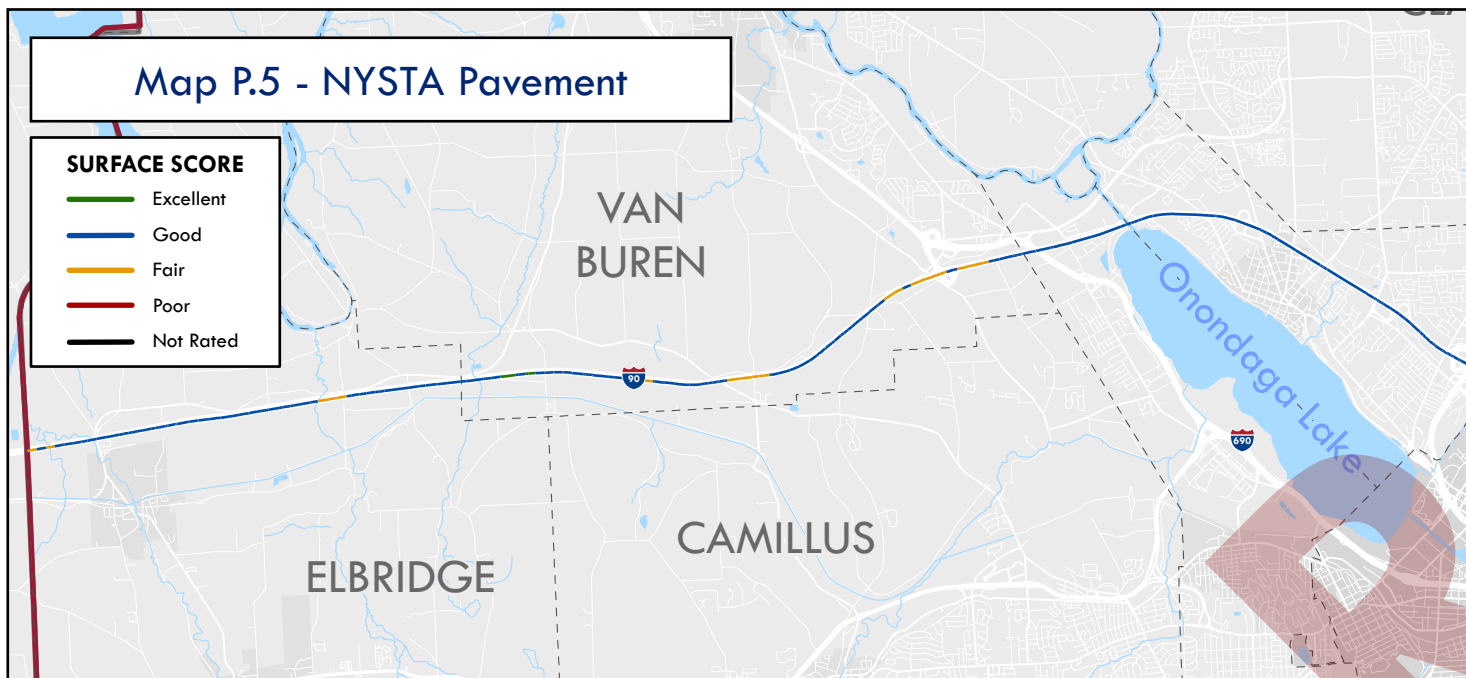
36 Total FAE Miles

All NHS Miles

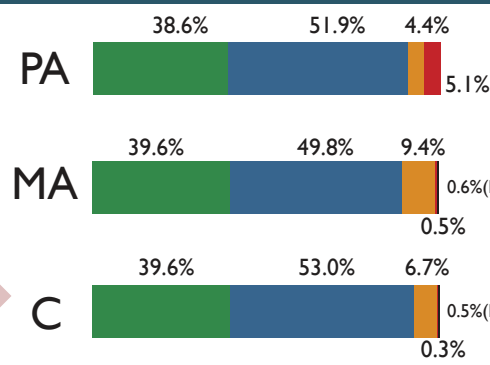
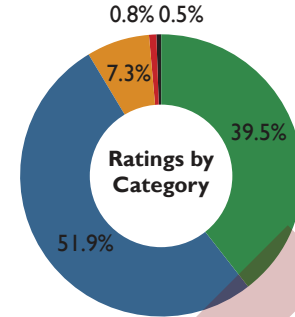
7.3 Weighted Average Rating

Historical data not available for trends.

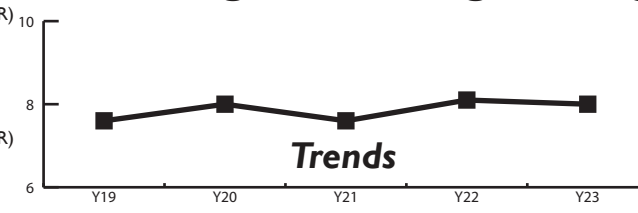
PA = Principal Arterial, MA = Minor Arterial, C = Collector.



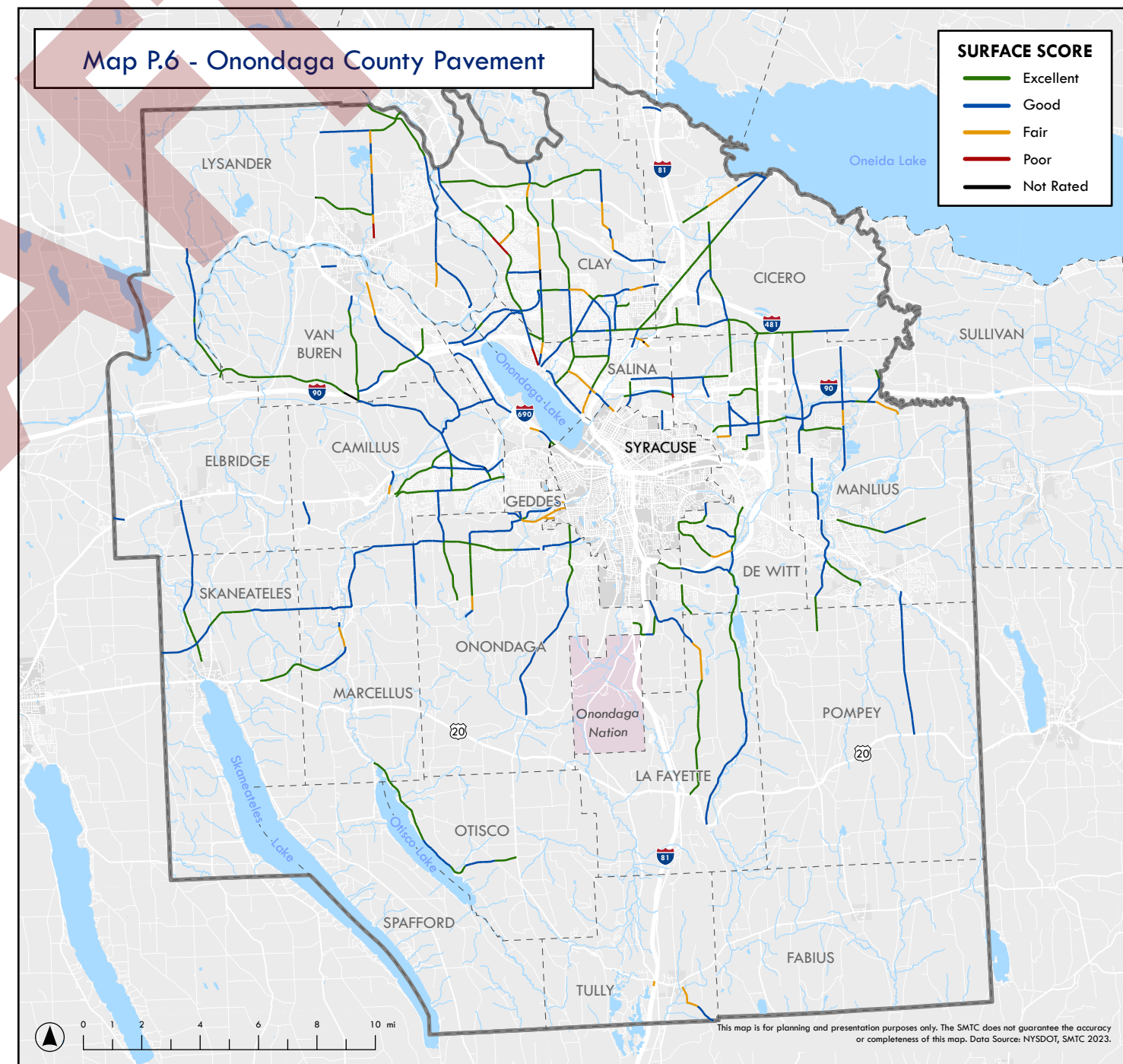
Onondaga County Pavement



301 Total FAE Miles
34 NHS Miles
8.0 Weighted Average Rating

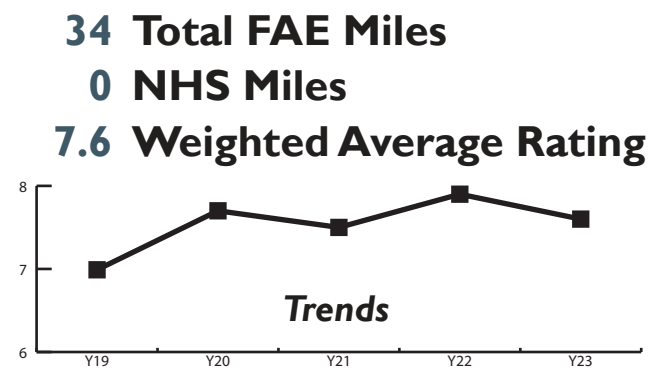
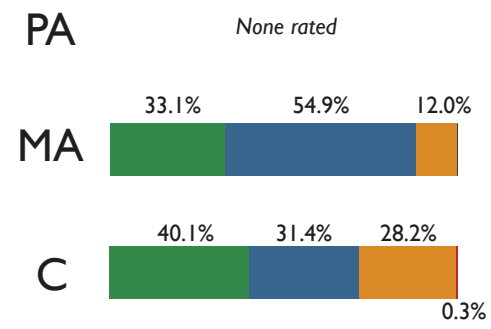
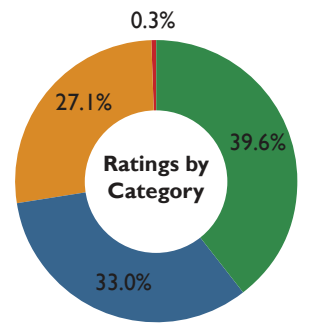


PA = Principal Arterial, MA = Minor Arterial, C = Collector.

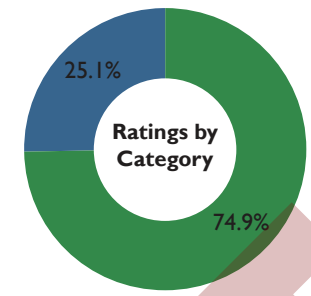
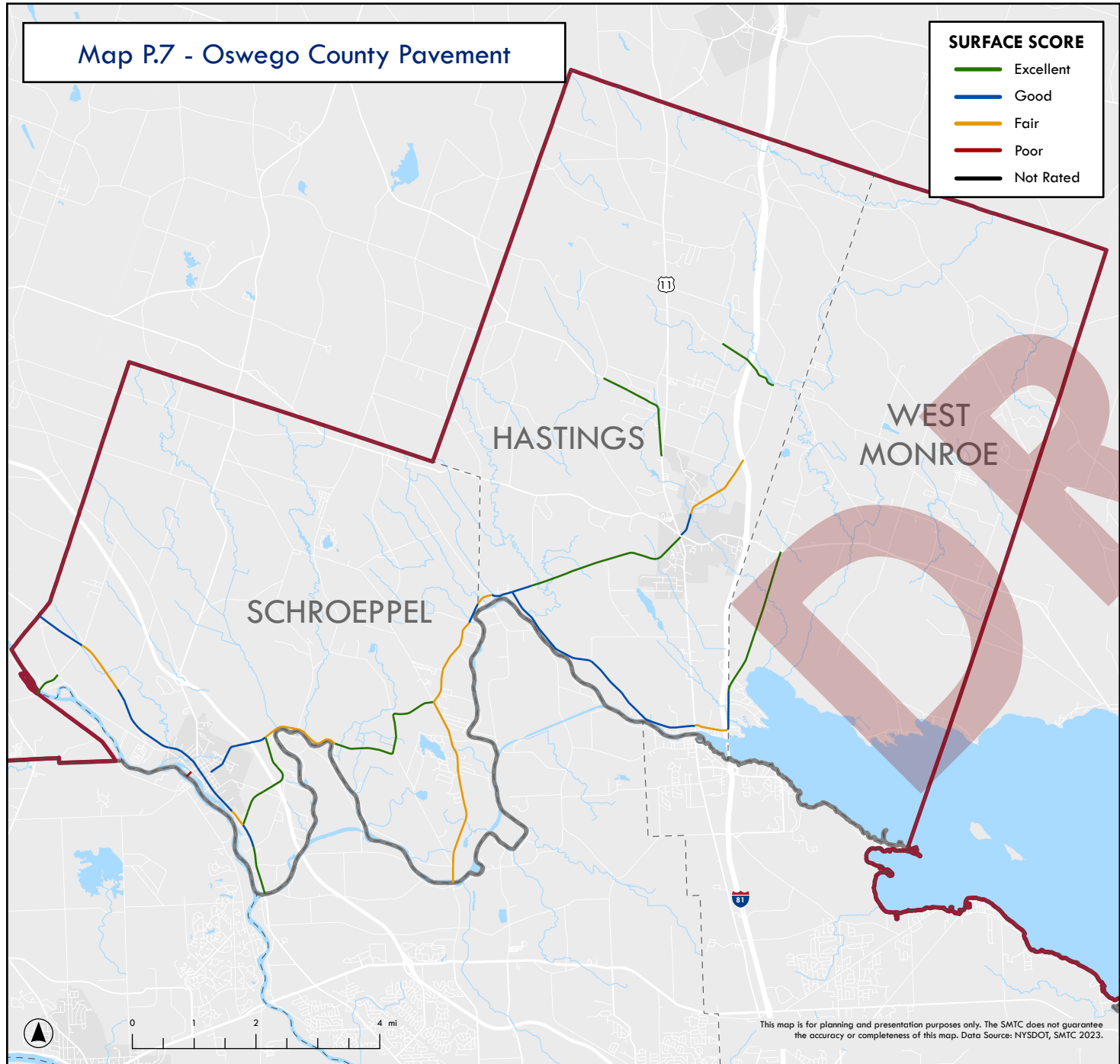


Oswego County Pavement (in MPA)

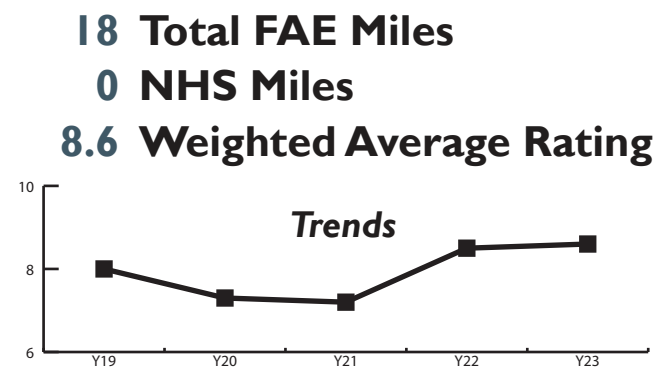
Madison County Pavement (in MPA)



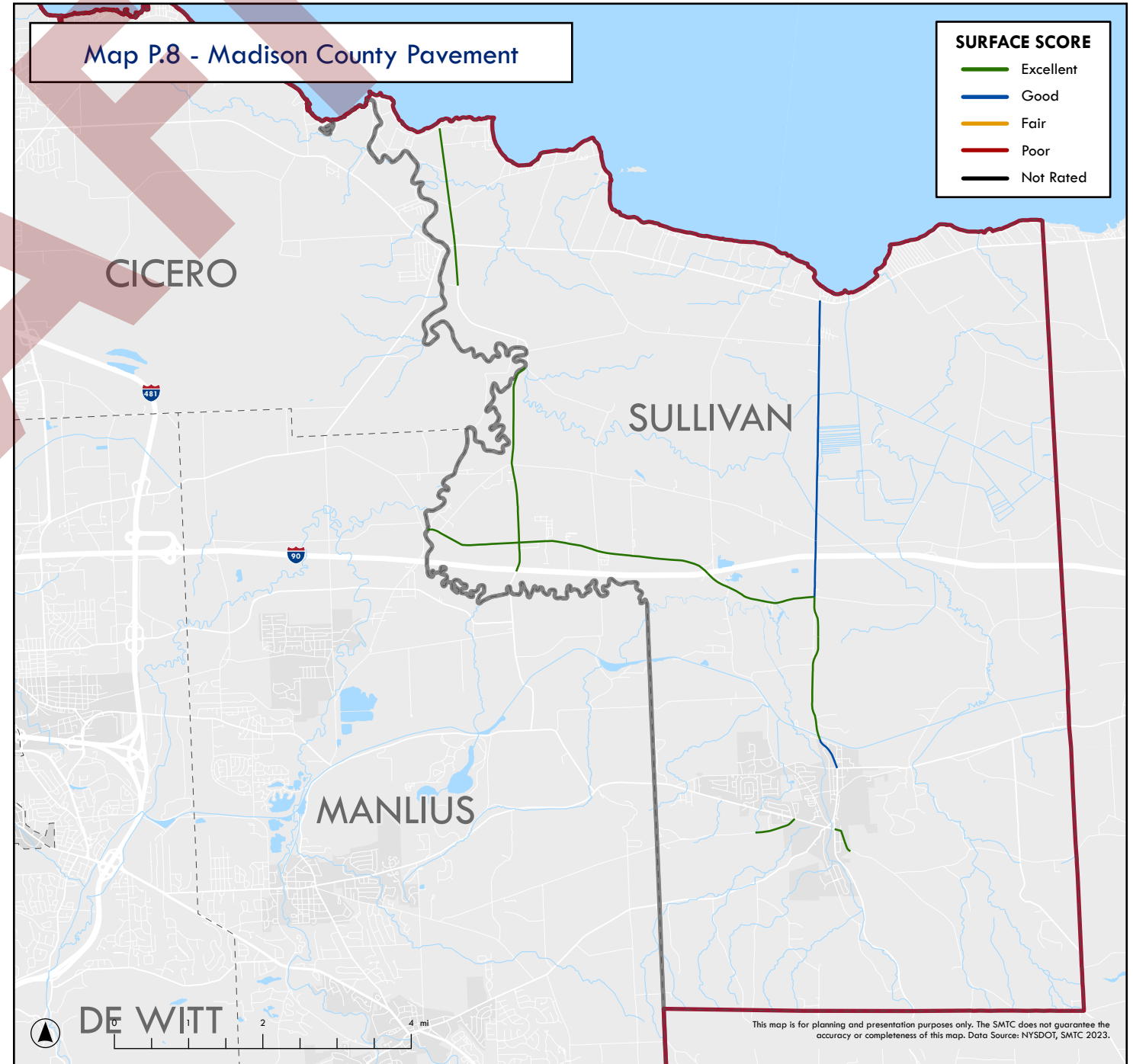
PA = Principal Arterial, MA = Minor Arterial, C = Collector.



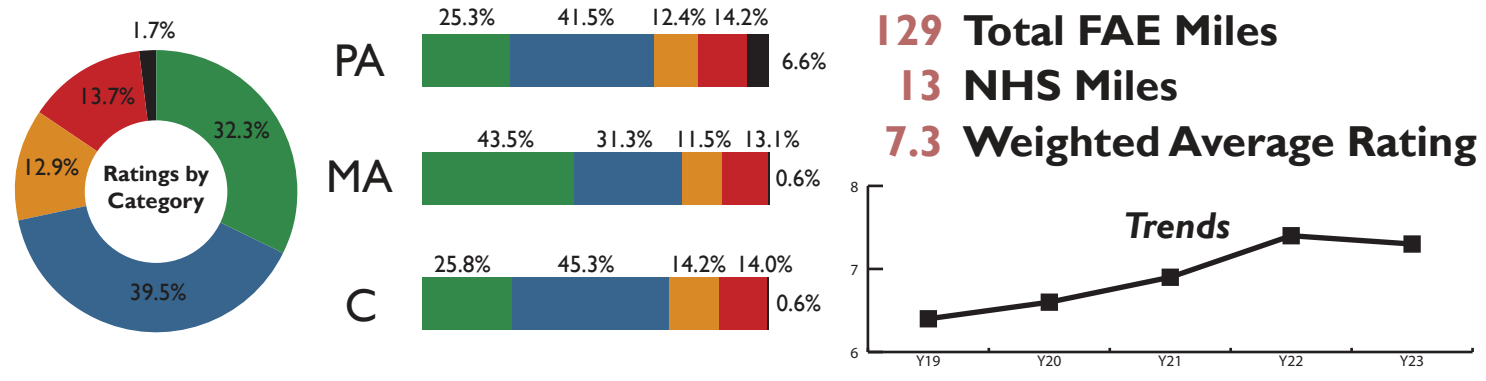
All SMTC-rated roads in Madison County are Collectors.



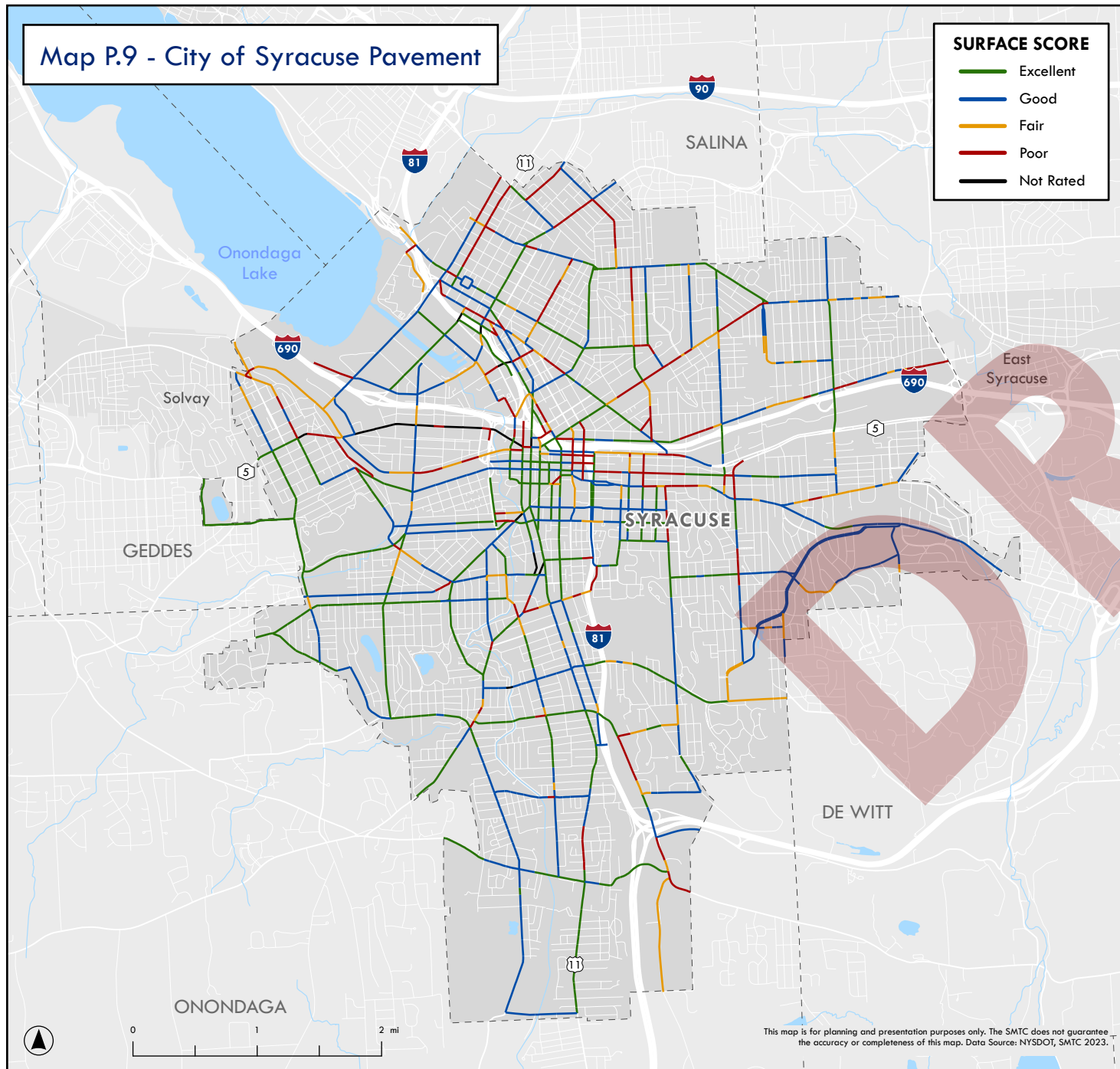
PA = Principal Arterial, MA = Minor Arterial, C = Collector.



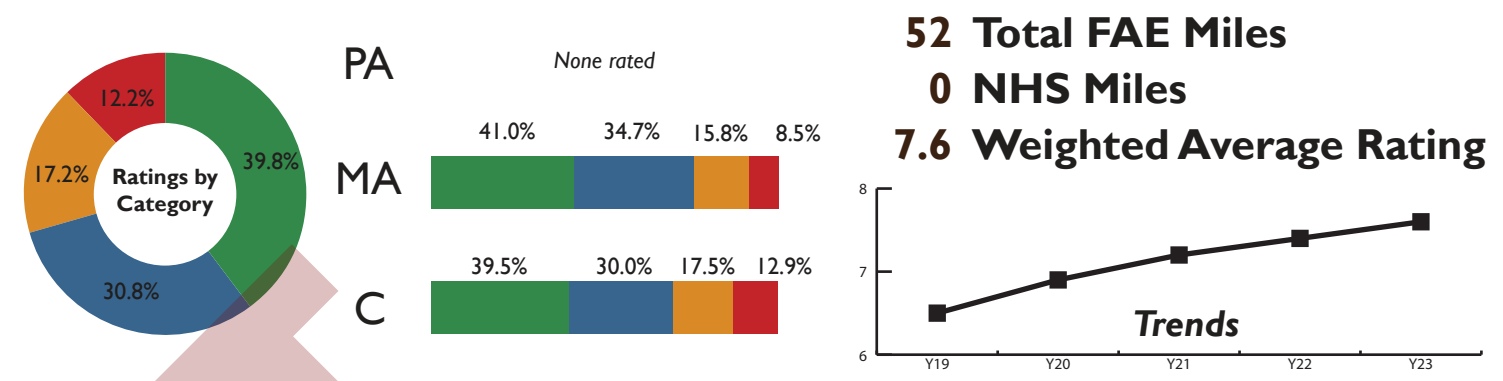
Syracuse Pavement



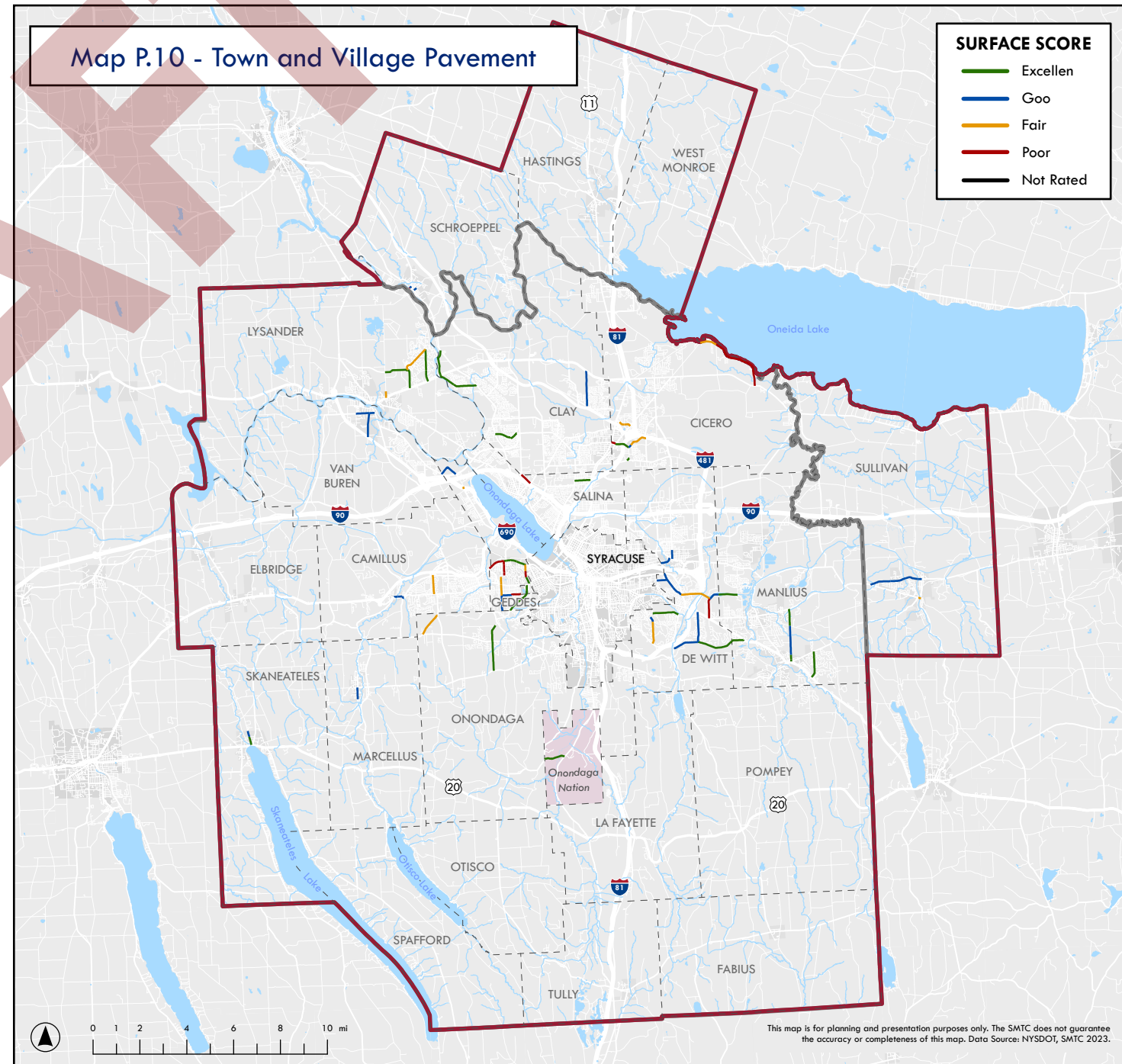
PA = Principal Arterial, MA = Minor Arterial, C = Collector.



Town and Village Pavement



PA = Principal Arterial, MA = Minor Arterial, C = Collector.





***OTHER
METRICS***

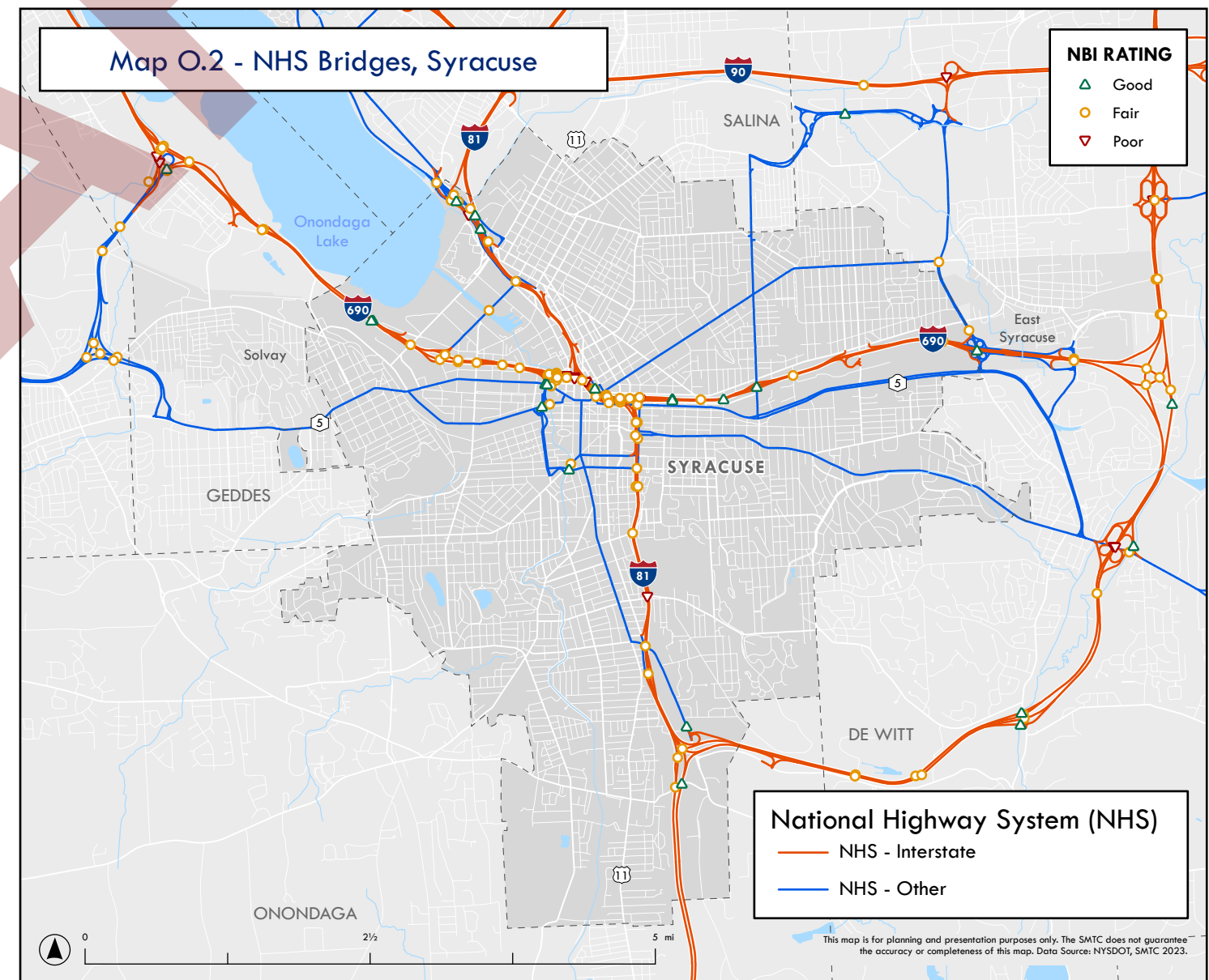
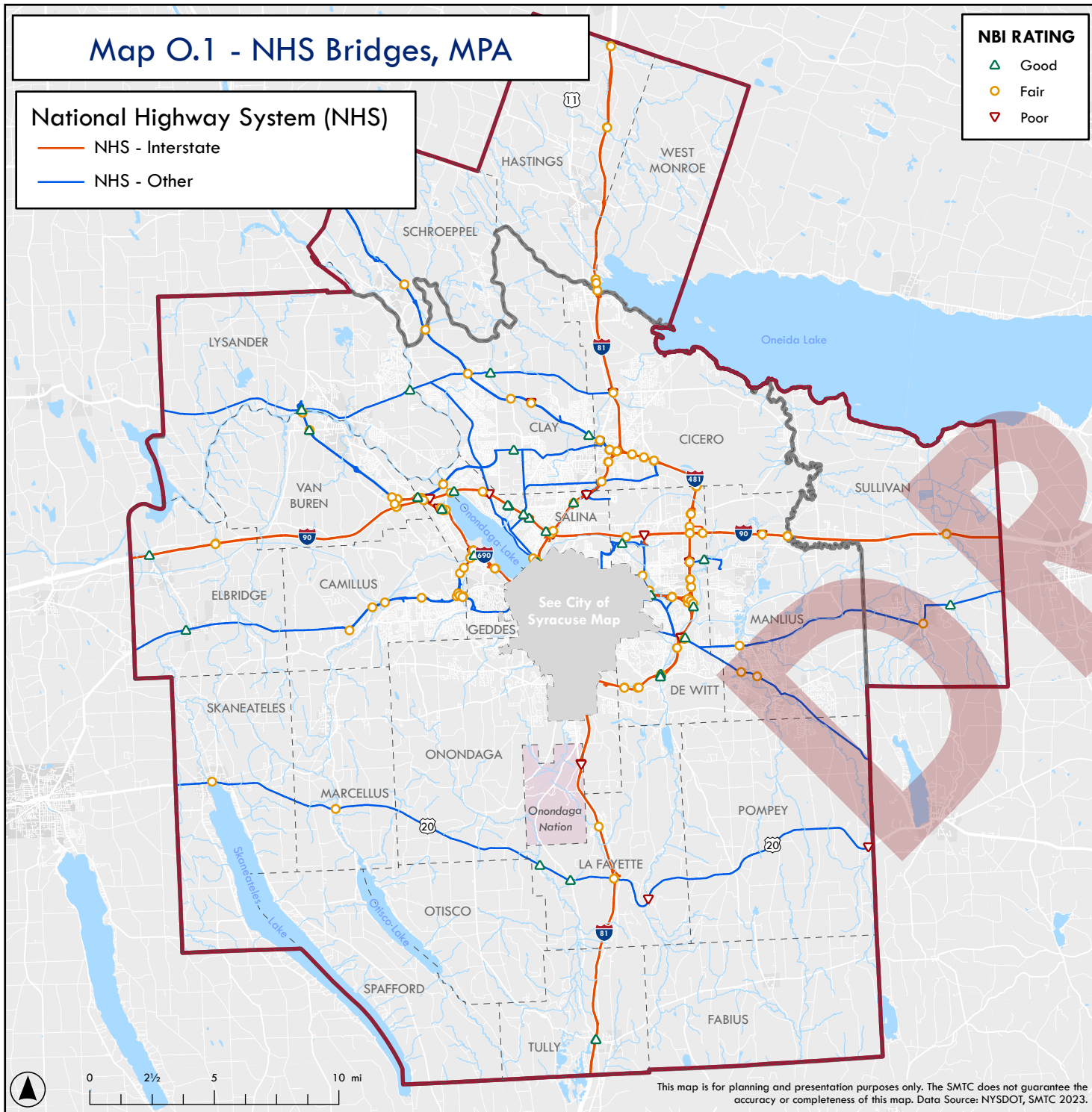
Bridge Performance Metrics

Performance Measure	NYSDOT Baseline	SMTC MPA Value	Two-Year Target	Four-Year Target
Percent of NHS bridges by deck area in Good condition	25.3%	20.5%	24.1%	21.1%
Percent of NHS bridges by deck area in Poor condition	11.3%	14.4%	12.5%	12.8%

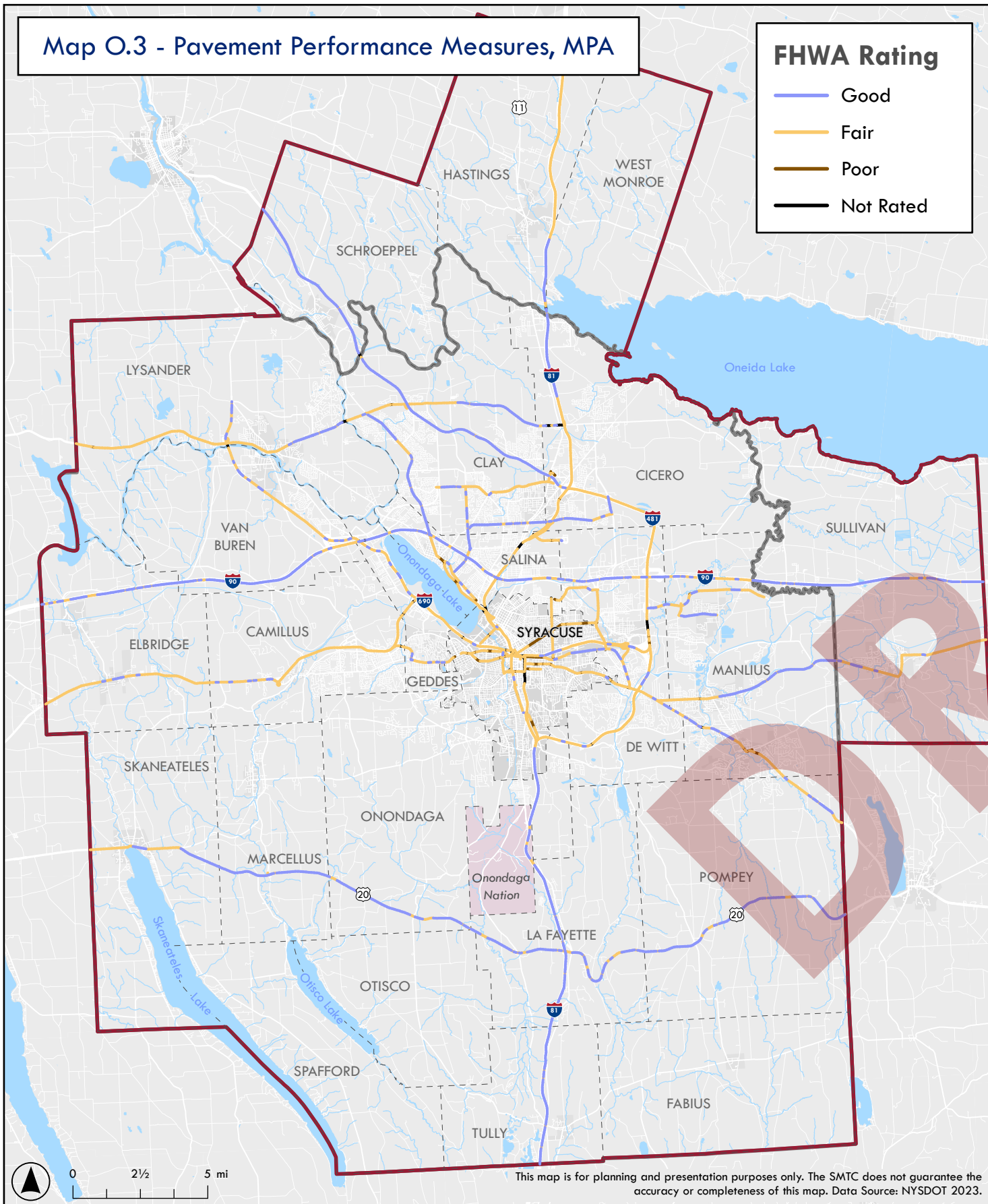
The National Highway System, created by an Act of Congress, includes the Interstate Highway System, as well as other roads important to the nation's economy, defense, and mobility.

Metropolitan Planning Organizations (MPOs), like the SMTC, must either support their DOT's targets or establish their own targets for these measures. The SMTC has chosen to support NYSDOT's targets. The figure at left shows NYSDOT's targets, and the current performance of bridges in the SMTC MPA.

The Federal Highway Administration (FHWA) establishes performance measures to use in managing bridge conditions on the National Highway System (NHS). The measures are the percentage of NHS bridges by deck area in Good condition and the percentages of NHS bridges by deck area in Poor condition. NHS bridges are defined as structures carrying the National Highway System.



Pavement Performance Metrics



Performance Measure	NYSDOT Baseline	SMTC MPA Value	Two-Year Target	Four-Year Target
Percent of Interstate Pavements in Good Condition	45.3%	44.5%	53.2%	54.3%
Percent of Interstate Pavements in Poor Condition	1.1%	0.4%	1.4%	1.7%
Percent of non-Interstate NHS Pavements in Good Condition	18.9%	38.3%	22.3%	20.7%
Percent of non-Interstate NHS Pavements in Poor Condition	7.6%	3.6%	9.3%	10.9%

There are four pavement condition measures, which apply to the National Highway System (NHS) and were established under Subpart C of 23 CFR 490. They are: the percentage of pavements on the Interstate System in Good condition, the percentage of pavements on the Interstate System in Poor condition, the percentage of pavements on the non-Interstate NHS in Good condition, and the percentage of pavements on the non-Interstate NHS in Poor condition. The calculation of these metrics are based on on cracking, faulting (concrete) or rutting (asphalt), and International Roughness Index (IRI) or the Present Serviceability Rating (PSR).

As a part of this legislation, NYSDOT established statewide performance planning targets for pavement on December 16, 2022. The SMTC agreed to support NYSDOT's performance targets on February 23, 2023 via SMTC Policy Resolution No. 2023-07. By adopting NYSDOT's targets, the SMTC will partner with the State to plan and program projects that achieve these targets.

As a result of adopting these targets, the SMTC is required to report conditions in the MPA as a part of the agency's Metropolitan Transportation Plan (MTP). This data uses the FHWA condition scale of Good-Fair-Poor, which is not congruent to the Surface Score conditions used by SMTC in the rest of this report.

Metric	Good	Fair	Poor
IRI (in/mi)	< 95	95 - 170	> 170
PSR* (0.0 - 5.0)	≥ 4.0	2.0 - 4.0	≤ 2.0
Cracking Percent	< 5%	CRCP 5 - 10 Jointed 5 - 15 Asphalt 5 - 20	CRCP > 10 Jointed > 15 Asphalt > 20
Rutting (in)	< 0.20	0.20 - 0.40	> 0.40
Faulting (in)	< 0.10	0.10 - 0.15	> 0.15

* PSR may only be used in place of IRI on routes with posted speed limit < 40 mph.

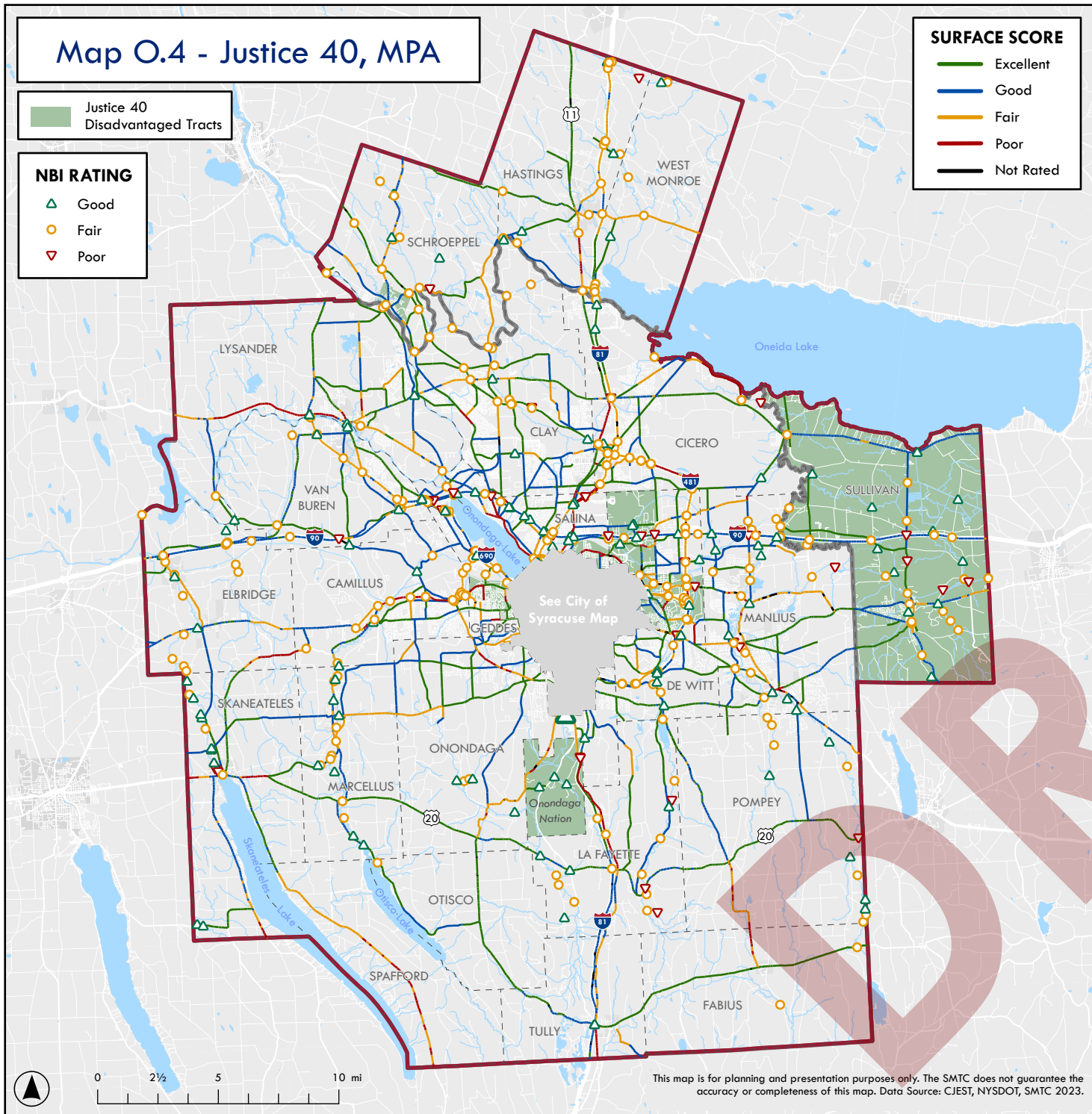
IRI, International Roughness Index, objectively measures the cumulative deviation from a smooth surface in inches per mile.

PSR, Present Serviceability Rating, is a subjective rating system based on a scale of 0 to 5.

Cracking Percent is defined as the percentage of pavement surface exhibiting cracking: fissures or discontinuities of the pavement surface not necessarily extending through the entire thickness of the pavement.

Average Rutting, longitudinal surface depressions in the asphalt pavement derived from measurements of a profile transverse to the path of travel on a highway lane.

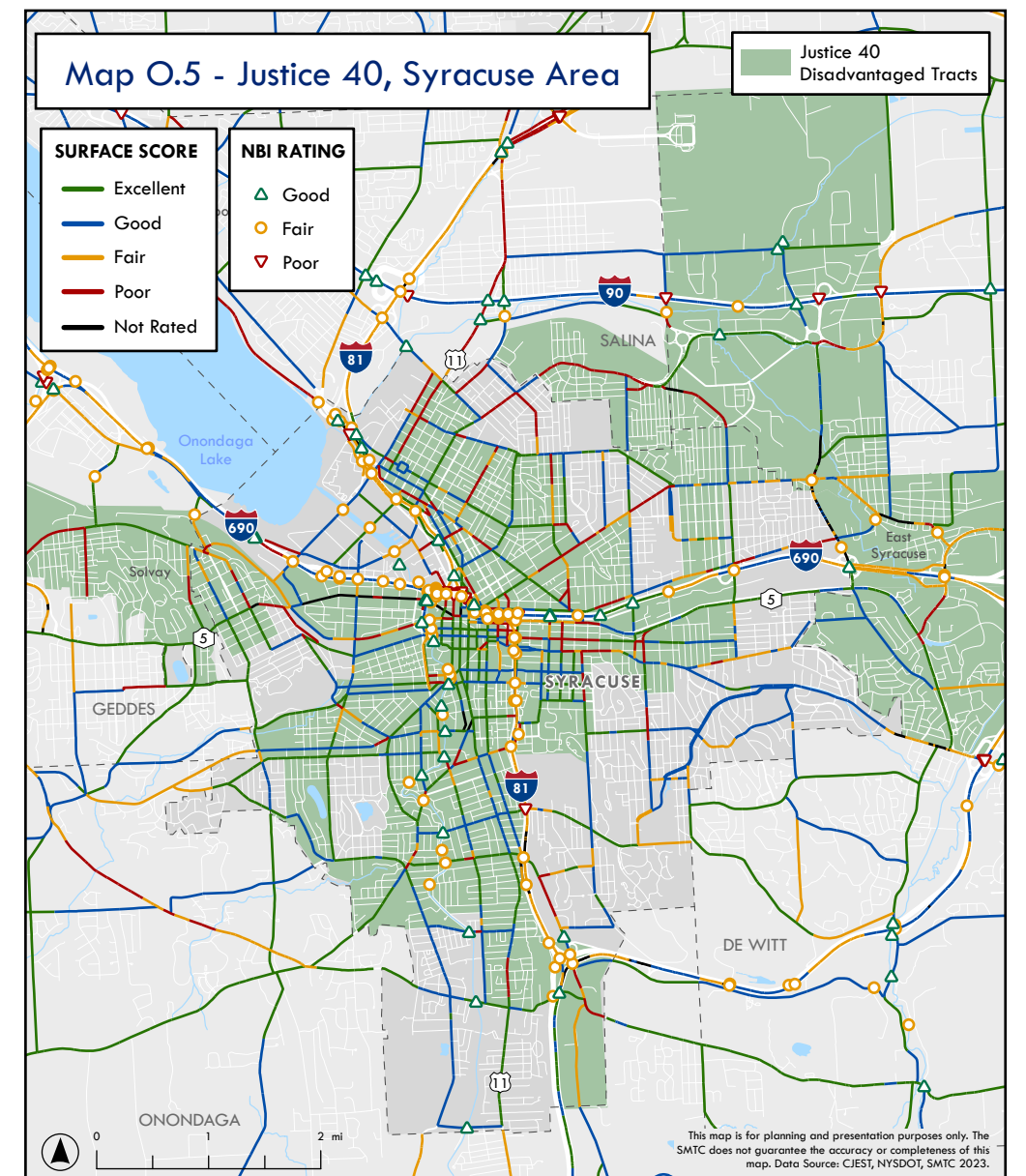
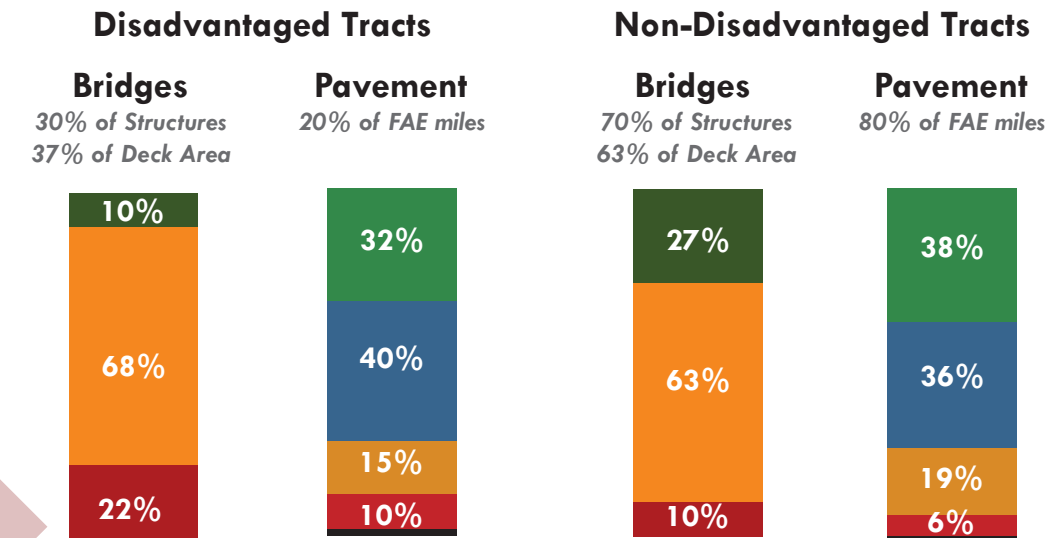
Average Faulting, vertical misalignments of pavement joints on concrete pavements.



Periodically, the SMTC evaluates recent and future transportation planning projects and programs throughout the MPA, with a goal of ensuring that both the positive and negative impacts of transportation planning are fairly distributed across all socioeconomic populations and that no one population is adversely affected or neglected.

To further this goal of equity in both planning and in the programming of funds, the SMTC is utilizing the Climate and Economic Justice Screening Tool to identify disadvantaged communities in the MPA. The tool uses datasets that are indicators of burdens in eight categories: climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development. Communities that are experiencing one or more of these burdens, plus meeting additional socioeconomic thresholds, are considered disadvantaged. These communities are identified at the census tract level.

By illustrating bridge and pavement conditions both in and outside of disadvantaged communities, the SMTC seeks to provide its member agencies with an additional tool to consider when weighing the effects of transportation investments in our area.



SMTC's
Environmental
Justice Mapper

Climate and
Economic Justice
Screening Tool





CONCLUSION

Overall, the goal of this report is to illustrate and analyze data collected on bridge and pavement conditions over the past rating cycle. This uniform dataset serves as a useful tool to the SMTC's member agencies and provides a window into the tangible return on infrastructure investment. By collecting and publishing this data, the SMTC hopes to continue to elucidate the importance of ongoing maintenance efforts. As mentioned in this report, a large portion of capital project funds are spent on highway and bridge projects in our MPA. The data in this report helps plan for ways to preserve and maintain the bridges and pavement of our infrastructure system, especially with limited increases in funding for capital improvements.



City of Syracuse Supplemental Pavement Rating

ABOUT THE PROGRAM

Each program year, the Syracuse Metropolitan Transportation Council publishes a Bridge and Pavement Condition Management System (BPCMS) report to serve as a comprehensive clearinghouse for condition information on selected bridges and pavements throughout the Metropolitan Planning Area (MPA). Throughout its history, the BPCMS has contained different types of information varying in scope, depending on the needs of member agencies, federal regulations, and data collection methods. Most recently, the Pavement section of the report has included condition information on all federal-aid eligible roads in the MPA.

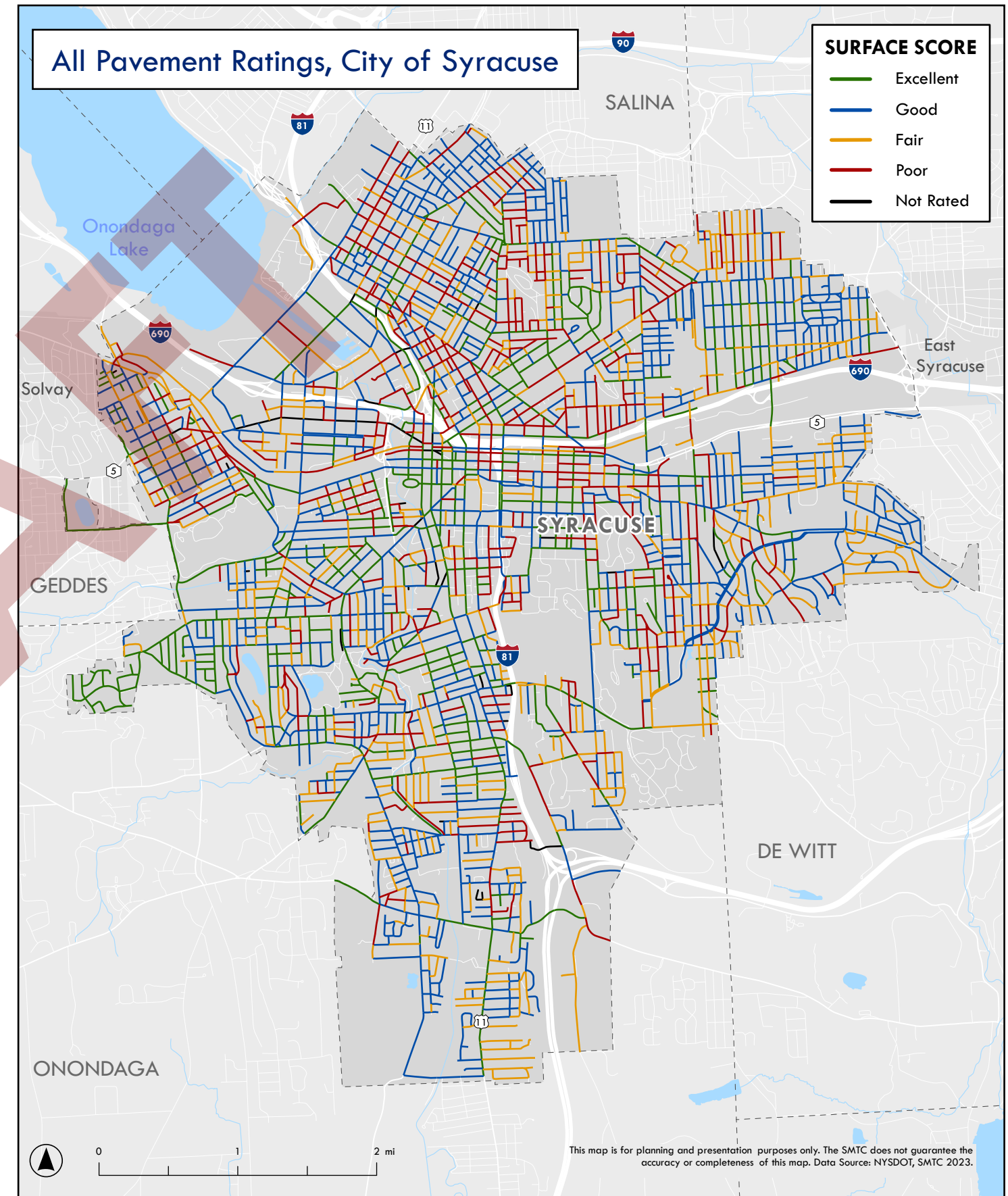
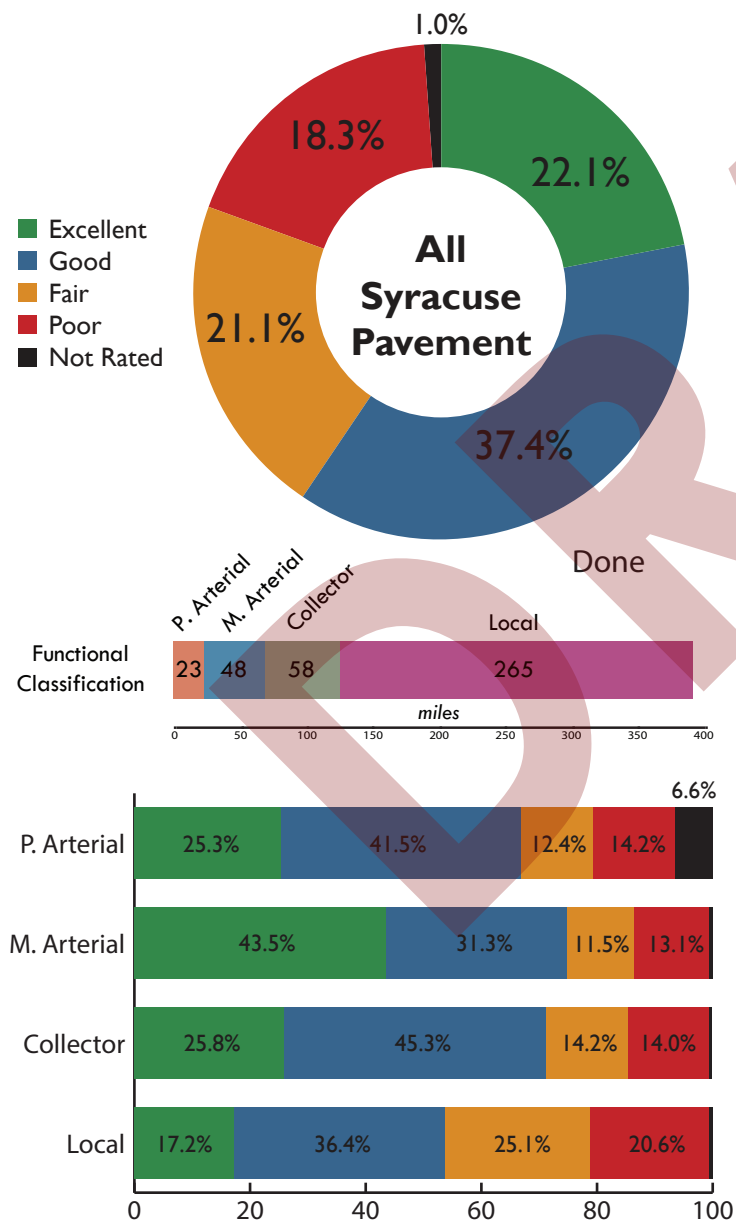
In 2019, in addition to compiling data on federal-aid eligible roads, the SMTC undertook a new effort – providing ratings on the entirety of the City of Syracuse’s road system. In keeping with past data collection efforts by the City, roads were rated on a block-by-block basis. The City indicated that having consistent pavement ratings will allow the Department of Public Works and other City entities to make data-driven decisions for street repair, reconstruction, and preventative maintenance. These ratings inform the Syracuse Pavement Prioritization Program - where the SMTC suggests roads for repair based on a number of existing conditions. That program is outlined in a technical memo available on the SMTC’s website.

In addition to this document, the SMTC published the pavement ratings collected onto a web-based application using the ESRI ArcGIS Online platform. City officials and members of the public are able to visit the web application and select any road segment, and find the rating, additional information, and a picture of the pavement on that segment at the time of data collection. 2023 pavement ratings now accompany the 2019-2022 ratings in the application.

Syracuse Pavement Ratings Application



Individual Rating	Miles	Percent
10 (Excellent)	17.6	4.5%
9 (Excellent)	69.7	17.7%
8 (Good)	54.8	13.9%
7 (Good)	92.7	23.5%
6 (Fair)	83.1	21.1%
5 (Poor)	51.3	13.0%
4 (Poor)	19.1	4.9%
3 (Poor)	1.7	0.1%
Not Rated	4.1	1.0%



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