

CORRIDOR SAFETY STUDY

CUY-43-10.61 (PID 85360)

Broadway Avenue to Warrensville Heights Corporation Line

City of Cleveland, Cuyahoga County, Ohio

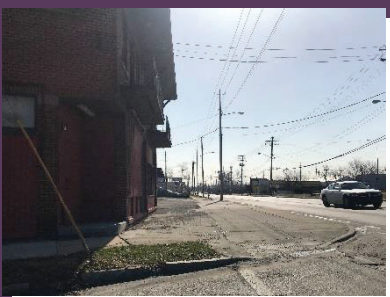
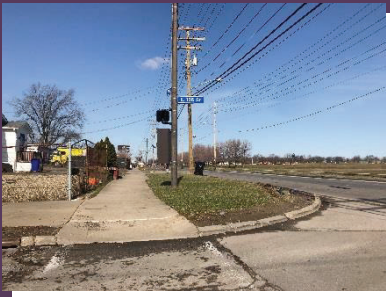


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601 Lakeside Avenue
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December 2018

CORRIDOR AND SAFETY STUDY
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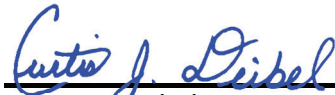
December 2018

Engineer's Seal



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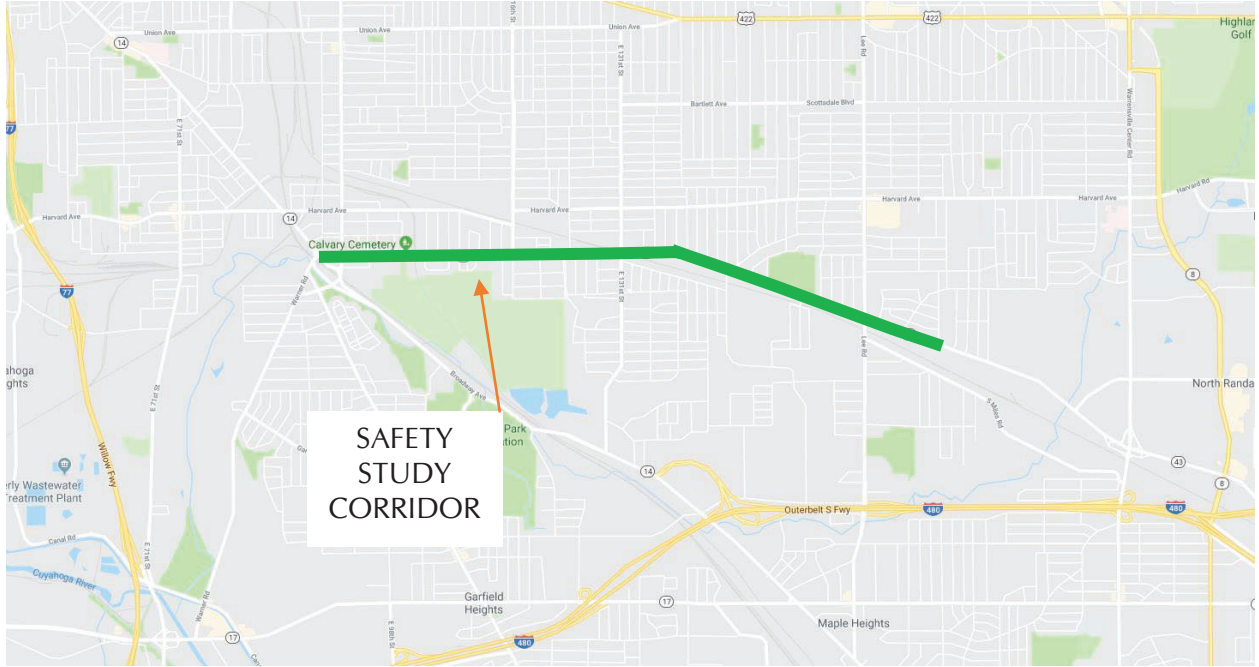
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I. Study Area

Traffic Safety Study ODOT District 12, City of Cleveland Miles Avenue



**SAFETY
STUDY
CORRIDOR**

Completed by:
GPD Group

Completion Date:
December 2018



LEGEND

— Safety Study Corridor

II. Executive Summary

Purpose & Need:

At the request of the City of Cleveland, GPD Group was tasked with completing a Safety Study for Miles Avenue (State Route 43). This study will determine if any operational or safety deficiencies exist within the study area and what improvements are necessary to correct any deficiencies that are identified. This corridor includes Miles Avenue from the Broadway Avenue intersection to the City of Warrensville Heights Corporation Line.

The Ohio Department of Transportation (ODOT) has released its current Safety Priority List for the current crash year. The following intersections are listed on the 2017 ODOT Highway Safety Program Safety Priority List:

- Miles Avenue / Broadway Avenue intersection (#66)
- Miles Avenue / East 93rd Street intersection (#292)
- Miles Avenue / East 139th Street intersection (#299)
- Miles Avenue / East 146th Street intersection (#283)
- Miles Avenue / Lee Road intersection (#21)

In addition to the ODOT intersection rankings, the following segments are listed on the 2017 ODOT Highway Safety Program Safety Priority List:

- Miles Avenue between Lotus Drive and East 151st Street (#534)
- Miles Avenue between East 162nd Street and East 164th Street (#334)

Background:

In December 2018, GPD Group completed a comprehensive tabulation of the crashes for the (3) most recent years of crash data (2015 – 2017) along the Miles Avenue corridor in the City of Cleveland, Ohio. This crash data showed a large number of crashes along the corridor, suggesting that there were safety issues along the corridor and a more detailed analysis was needed to determine the extent of the problem(s) and what could be done to address them.

Brief Overview of Possible Causes:

A review of the crash patterns indicates that safety and operational issues exist within the study area. The large number of rear-end crashes occurring along the corridor suggests that turning vehicles in thru lanes impede following traffic, resulting in these rear-end crashes. The presence of sideswipe – passing crashes also points to this occurring. Lastly, there is a large number of left turn crashes which appears to be related to the negative offset that currently exists between the left turn lanes.

Recommended Countermeasures and Related Costs:

This study has identified long-term improvement recommendations that would reduce the number of crashes occurring within the study area. The following list outlines these improvements:



Long Term Improvements:

1. Perform a road diet along Miles Avenue along the entire study corridor.
2. Resurface Miles Avenue along the entire study corridor.
3. Add bike lanes on the north and south sides of Miles Avenue between East 131st Street and Broadway Avenue.
4. Remove six (6) traffic signal along the study corridor.
5. Reconstruct six (6) traffic signals along the study corridor.
6. Rehabilitate four (4) traffic signals along the study corridor.

All long term improvements will occur simultaneously throughout the study area. The existing crash patterns and capacity analyses along Miles Avenue support the conclusion that left turn lanes at the signalized intersections and a center two-way left turn lane would be beneficial along the study corridor and the existing capacity analysis shows that capacity is not a concern along the corridor. Because Miles Avenue is currently a four (4) lane roadway, with no left turn lanes, a road diet has been recommended as a solution for the existing crash patterns that were identified. A road diet would provide a center two way left turn lane while maintaining one (1) travel lane in the eastbound and westbound directions, as well as introduce dedicated left turn lanes at the signalized intersections throughout the corridor. This center two-way left turn lane will provide motorists the opportunity to move out of the thru traffic stream to make left turns and the dedicated left turn lanes at all signalized intersections will make those turns safer by improving sight distance to oncoming traffic and removing these left turners from the thru traffic stream. To ensure that the proposed pavement markings are clearly discernable and properly placed along the corridor, Miles Avenue should also be resurfaced as part of this project.

Bike lanes are being proposed on each side of Miles Avenue between East 131st Street and Broadway Avenue with sharrows being proposed between East 175th Street and East 131st Street. These bike lanes will be a minimum of 5 feet in width, separating bicyclists from the traffic stream, while still allowing them to ride on the roadway and not on a sidewalk.

In conjunction with the road diet, signal work will have to be performed at the sixteen (16) signalized intersections along the project corridor. Six (6) of the existing traffic signal installations are at intersections where traffic signals are not warranted and are recommended to be removed with this project. These six (6) intersections include the signals at East 100th Street, East 104th Street, East 110th Street, East 123rd Street, East 142nd Street, and East 175th Street.

The remaining ten (10) traffic signals along the Miles Avenue corridor are recommended to be reconstructed or rehabilitated as part of this project. The signalized intersections at East 113th Street and East 156th Street do not meet a traffic signal warrant and will be constructed using 100% local funds. All traffic signal installations should be upgraded to include full vehicle detection, meet current standards and incorporate current technology. All traffic signals should be designed to accommodate signal backplates on all approaches to increase



signal visibility and add target value to the signal heads. In addition, the upgraded signal installations should also provide pedestrian push-buttons and countdown displays.

The estimated cost for this project is approximately 7.6 million dollars (not including construction inspection or inflation)



III. Purpose and Need:

At the request of the City of Cleveland, GPD Group was tasked with completing a Safety Study for Miles Avenue (State Route 43). This study will determine if any operational or safety deficiencies exist within the study area and what improvements are necessary to correct any deficiencies that are identified. This corridor includes Miles Avenue from the Broadway Avenue intersection to the City of Warrensville Heights Corporation Line.

The Ohio Department of Transportation (ODOT) has released its current Safety Priority List for the current crash year. The following intersections are listed on the 2017 ODOT Highway Safety Program Safety Priority List:

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In addition to the ODOT intersection rankings, the following segments are listed on the 2017 ODOT Highway Safety Program Safety Priority List:

- Miles Avenue between Lotus Drive and East 151st Street (#534)
- Miles Avenue between East 162nd Street and East 164th Street (#334)

IV. Existing Conditions:

The safety study corridor is located within the City of Cleveland and includes Miles Avenue (State Route 43) from Broadway Avenue to the City of Warrensville Corporation Line (just east of the East 175th Street intersection). This study corridor is approximately 3.6 miles in length. The land use surrounding the study area on Miles Avenue is a mix residential single family housing and commercial properties along the corridor. See **Figure 1** for aerial photograph of the study area.

The existing roadway geometries for the study intersections are detailed below. Refer to **Figure 2** for the existing condition diagrams of the study area.

Miles Avenue is a four (4) lane asphalt roadway with two (2) lanes for eastbound traffic and two (2) lanes for westbound traffic throughout the corridor. Left turn lanes currently exist at the Lee Road intersection along the corridor. The posted speed limit along Miles Avenue is 35 mph throughout the study area. According to information obtained from the Ohio Department of Transportation's website, Miles Avenue is classified as an Urban Principal Arterial through the entire corridor. Miles Avenue within the study area is on the National Highway System but is not a Federal Aid Primary Route. Miles Avenue within the study area has an existing right-of-way width that ranges between 65' and 85'. Miles Avenue has straight curb with sidewalks along both sides of the roadway throughout the corridor. The corridor has street lighting at all intersections and along the mainline throughout the entire study area.



Miles Avenue / Broadway Avenue Intersection:

The intersection is currently signalized using a typical mast arm configuration with signal poles located on the northwest, northeast and southeast corners of the intersection. The intersection consists of three (3) approaches with the following configurations: WB Miles Avenue – three (3) lanes (thru, thru, right), NB Broadway Avenue – two (2) lanes (left-thru, thru-right) and SB Broadway Avenue – three (3) lanes (left, right, right). It should be noted that NB Broadway Avenue approaching this intersection is a one-way only NB roadway. There is a fourth leg to this intersection, which is one-way WB exit-only.

Miles Avenue / East 93rd Street Intersection:

The intersection is currently signalized using a typical mast arm configuration with signal poles located on all four (4) corners of the intersection. The intersection consists of four (4) approaches with the following configurations: EB and WB Miles Avenue – two (2) lanes (left-thru, thru-right), NB East 93rd Street – three (3) lanes (left, thru, thru-right) and SB East 93rd Street – two (2) lanes (left, thru-right).

Miles Avenue / East 100th Street Intersection:

The intersection is currently signalized using a diagonal span wire configuration to support the traffic signal heads with signal poles located on the northeast and southwest corners of the intersection. The intersection consists of four (4) approaches with the following configurations: EB and WB Miles Avenue – two (2) lanes (left-thru, thru-right) and NB & SB East 100th Street – one (1) lane (left-thru-right).

Miles Avenue / East 104th Street Intersection:

The intersection is currently signalized using a span wire configuration to support the traffic signal heads with signal poles located on the northeast, northwest and southeast corners of the intersection. The intersection consists of four (4) approaches with the following configurations: EB and WB Miles Avenue – two (2) lanes (left-thru, thru-right) and NB & SB East 104th Street – one (1) lane (left-thru-right). It should be noted that the East 104th Street approach to this intersection are offset by approximately 30'.

Miles Avenue / East 110th Street Intersection:

The intersection is currently signalized using a diagonal span wire configuration to support the traffic signal heads with signal poles located on the northeast and southwest corners of the intersection. The intersection consists of four (4) approaches with the following configurations: EB and WB Miles Avenue – two (2) lanes (left-thru, thru-right) and NB & SB East 110th Street – one (1) lane (left-thru-right).



| Table 1: HCS Intersection Capacity Analysis Summary – Existing Year 2018 Conditions – Signalized Intersections (Cont.) | | | | |
|--|----------|-------------|----------|-------------|
| Intersection / Movement | AM Peak | | PM Peak | |
| | LOS | Delay (sec) | LOS | Delay (sec) |
| Miles Avenue / East 93rd Street Intersection | | | | |
| Eastbound Left-Thru | C | 20.1 | C | 20.4 |
| Eastbound Thru-Right | C | 20.2 | C | 20.4 |
| <i>Eastbound Approach</i> | C | 20.2 | C | 20.4 |
| Westbound Left-Thru | C | 22.3 | C | 22.5 |
| Westbound Thru-Right | C | 22.4 | C | 220.6 |
| <i>Westbound Approach</i> | C | 22.4 | C | 22.5 |
| Northbound Left | C | 22.7 | D | 49.7 |
| Northbound Thru | B | 18.0 | B | 15.1 |
| Northbound Thru-Right | B | 18.0 | B | 15.2 |
| <i>Northbound Approach</i> | B | 18.1 | B | 16.6 |
| Southbound Left | C | 29.2 | C | 21.6 |
| Southbound Thru-Right | B | 17.2 | D | 50.9 |
| <i>Southbound Approach</i> | B | 19.6 | D | 45.8 |
| Intersection Total | B | 19.7 | C | 30.2 |
| Miles Avenue / East 100th Street Intersection | | | | |
| Eastbound Left-Thru | B | 11.3 | B | 11.7 |
| Eastbound Thru-Right | B | 11.4 | B | 11.8 |
| <i>Eastbound Approach</i> | B | 11.3 | B | 11.8 |
| Westbound Left-Thru | B | 11.7 | B | 11.8 |
| Westbound Thru-Right | B | 11.7 | B | 11.8 |
| <i>Westbound Approach</i> | B | 11.7 | B | 11.8 |
| Northbound Left-Thru-Right | D | 43.0 | D | 45.1 |
| <i>Northbound Approach</i> | D | 43.0 | D | 45.1 |
| Southbound Left-Thru-Right | C | 29.9 | C | 30.2 |
| <i>Southbound Approach</i> | C | 29.9 | C | 30.2 |
| Intersection Total | B | 13.0 | B | 13.6 |

Note: Orange highlighted cells indicate a Level of Service E.
Red highlighted cells indicate a Level of Service F.

Opening Year 2020 Capacity Analyses

Table 6 summarizes the HCS Intersection Capacity Analysis and details the Levels-of-Service and delay experienced under the Opening Year 2020 'No-Build' and 'Build' traffic conditions at the signalized intersections within the study area. The 'Build' scenario incorporates all of the transportation improvements listed in Section VII. See **Appendix K** for the HCS Intersection Capacity Analysis printouts.

| Intersection / Movement | 'No-Build' Conditions | | | | 'Build' Conditions | | | |
|--|-----------------------|-------------|----------|-------------|--------------------|-------------|----------|-------------|
| | AM Peak | | PM Peak | | AM Peak | | PM Peak | |
| | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) |
| Miles Avenue / Broadway Avenue Intersection | | | | | | | | |
| Westbound Thru | C | 28.3 | C | 24.8 | D | 36.3 | C | 26.1 |
| Westbound Right | C | 20.2 | B | 12.9 | D | 36.9 | C | 26.4 |
| Westbound Approach | C | 25.7 | C | 22.8 | D | 36.6 | C | 26.3 |
| Northbound Thru | C | 25.9 | C | 22.8 | D | 36.7 | C | 26.4 |
| Northbound Thru-Right | C | 25.9 | C | 22.8 | D | 36.8 | C | 26.5 |
| Northbound Approach | C | 25.9 | C | 22.8 | D | 36.7 | C | 26.4 |
| Southbound Left | C | 26.4 | B | 16.7 | C | 24.1 | C | 21.8 |
| Southbound Right | A | 9.1 | B | 19.5 | A | 9.6 | C | 23.6 |
| Southbound Approach | B | 15.3 | B | 18.8 | B | 14.8 | C | 23.2 |
| Intersection Total | C | 23.2 | C | 21.1 | C | 31.1 | C | 25.0 |
| Miles Avenue / East 93rd Street Intersection | | | | | | | | |
| Eastbound Left | B | 18.8 | C | 24.6 | C | 32.9 | D | 45.9 |
| Eastbound Thru | | | | | N/A | --- | N/A | --- |
| Eastbound Thru-Right | B | 18.9 | C | 24.6 | B | 17.8 | C | 24.3 |
| Eastbound Approach | B | 18.9 | C | 24.6 | B | 18.4 | C | 25.1 |
| Westbound Left | C | 20.9 | C | 27.3 | C | 20.9 | C | 29.2 |
| Westbound Thru | | | | | N/A | --- | N/A | --- |
| Westbound Thru-Right | C | 21.0 | C | 27.7 | C | 24.2 | D | 42.0 |
| Westbound Approach | C | 21.0 | C | 27.5 | C | 24.1 | D | 41.8 |
| Northbound Left | C | 24.6 | D | 39.5 | C | 28.1 | D | 50.5 |
| Northbound Thru | B | 19.7 | B | 11.8 | C | 21.8 | B | 12.7 |
| Northbound Thru-Right | B | 19.7 | B | 11.8 | C | 21.9 | B | 12.8 |
| Northbound Approach | B | 19.8 | B | 13.0 | C | 22.0 | B | 14.3 |
| Southbound Left | C | 31.9 | B | 17.1 | D | 35.7 | B | 18.6 |
| Southbound Thru-Right | B | 18.6 | C | 29.6 | C | 21.1 | D | 46.3 |
| Southbound Approach | C | 21.3 | C | 27.3 | C | 24.1 | D | 41.2 |
| Intersection Total | C | 20.3 | C | 23.9 | C | 22.5 | C | 33.4 |

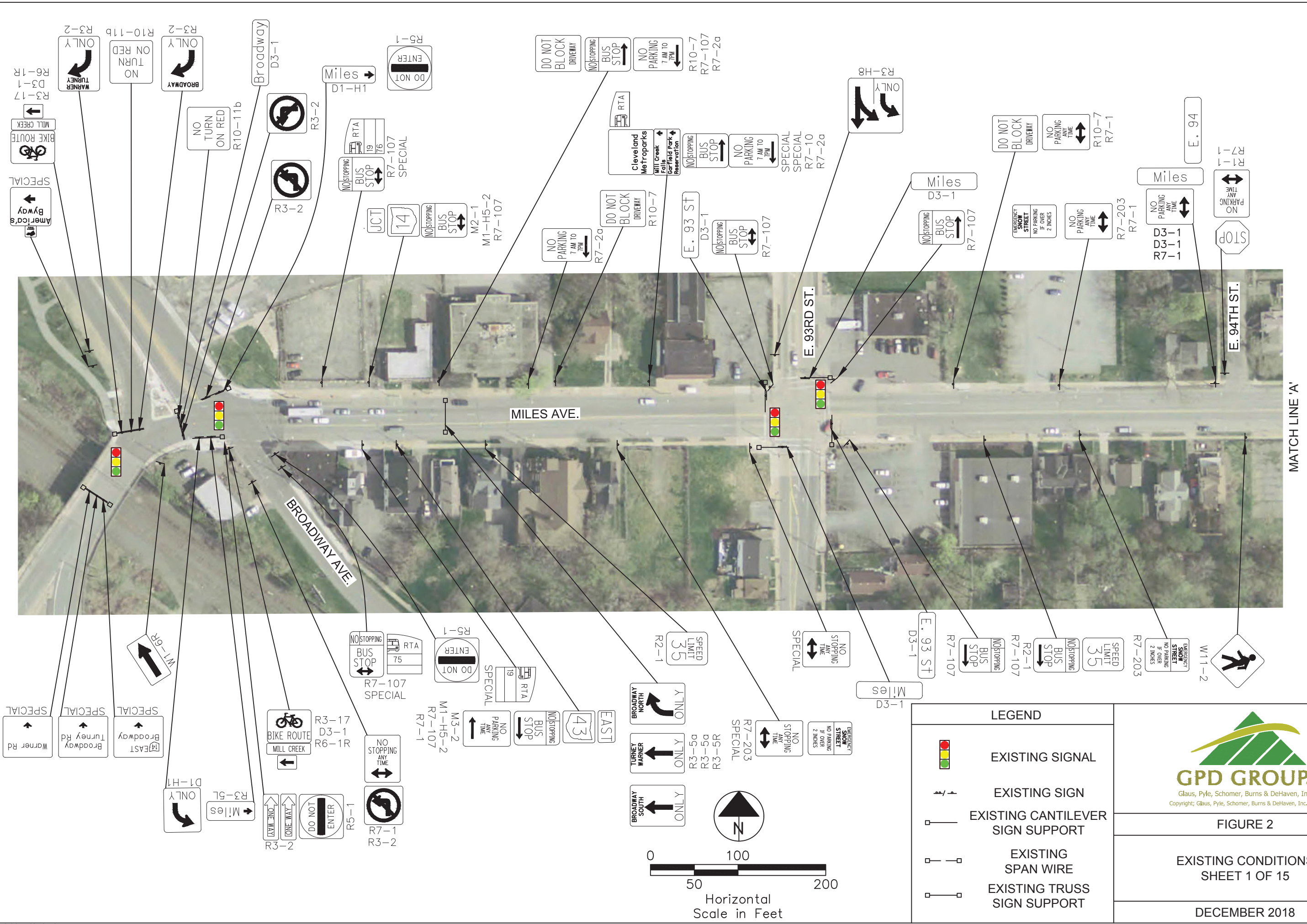
Note: Orange highlighted cells indicate a Level of Service E.
Red highlighted cells indicate a Level of Service F.




| Table 8: HCS Intersection Capacity Analysis Summary – Design Year 2040 ‘No-Build’ vs. ‘Build’ Conditions – Signalized Intersections | | | | | | | | |
|--|-----------------------|-------------|----------|-------------|--------------------|-------------|----------|-------------|
| Intersection / Movement | ‘No-Build’ Conditions | | | | ‘Build’ Conditions | | | |
| | AM Peak | | PM Peak | | AM Peak | | PM Peak | |
| | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) | LOS | Delay (sec) |
| Miles Avenue / Broadway Avenue Intersection | | | | | | | | |
| Westbound Thru | C | 30.6 | C | 25.9 | D | 43.6 | C | 28.2 |
| Westbound Right | C | 21.7 | B | 12.6 | D | 44.7 | C | 28.9 |
| <i>Westbound Approach</i> | C | 27.7 | C | 23.6 | D | 44.2 | C | 28.6 |
| Northbound Thru | C | 28.3 | C | 23.7 | D | 43.9 | C | 23.8 |
| Northbound Thru-Right | C | 28.4 | C | 23.8 | D | 44.0 | C | 23.8 |
| <i>Northbound Approach</i> | C | 28.4 | C | 23.7 | D | 44.0 | C | 23.8 |
| Southbound Left | D | 47.1 | B | 19.5 | D | 38.3 | C | 34.8 |
| Southbound Right | A | 8.8 | C | 22.2 | A | 9.5 | C | 26.7 |
| <i>Southbound Approach</i> | C | 22.6 | C | 21.5 | B | 19.9 | C | 28.7 |
| Intersection Total | C | 26.7 | C | 22.8 | D | 37.8 | C | 27.9 |
| Miles Avenue / East 93rd Street Intersection | | | | | | | | |
| Eastbound Left | B | 19.7 | C | 26.6 | D | 36.2 | D | 48.1 |
| Eastbound Thru | | | | | N/A | --- | N/A | --- |
| Eastbound Thru-Right | B | 19.7 | C | 26.7 | B | 18.3 | C | 24.1 |
| <i>Eastbound Approach</i> | B | 19.7 | C | 26.7 | B | 18.9 | C | 24.9 |
| Westbound Left | C | 22.1 | C | 30.5 | C | 21.9 | C | 29.3 |
| Westbound Thru | | | | | N/A | --- | N/A | --- |
| Westbound Thru-Right | C | 22.2 | C | 31.5 | C | 26.8 | D | 47.0 |
| <i>Westbound Approach</i> | C | 22.1 | C | 30.9 | C | 26.7 | D | 46.7 |
| Northbound Left | C | 25.4 | D | 43.1 | C | 30.4 | D | 53.0 |
| Northbound Thru | B | 20.0 | B | 10.7 | C | 23.2 | B | 13.3 |
| Northbound Thru-Right | C | 20.0 | B | 10.8 | C | 23.3 | B | 13.3 |
| <i>Northbound Approach</i> | C | 20.1 | B | 12.0 | C | 23.4 | B | 14.8 |
| Southbound Left | D | 35.0 | B | 16.3 | D | 42.7 | C | 22.5 |
| Southbound Thru-Right | B | 18.8 | C | 34.2 | C | 22.5 | D | 52.0 |
| <i>Southbound Approach</i> | C | 22.1 | C | 31.0 | C | 26.6 | D | 46.8 |
| Intersection Total | C | 21.0 | C | 26.2 | C | 24.3 | D | 36.9 |

Note: Orange highlighted cells indicate a Level of Service E.
Red highlighted cells indicate a Level of Service F.





| LEGEND | |
|--------|----------------------------------|
| | EXISTING SIGNAL |
| | EXISTING SIGN |
| | EXISTING CANTILEVER SIGN SUPPORT |
| | EXISTING SPAN WIRE |
| | EXISTING TRUSS SIGN SUPPORT |



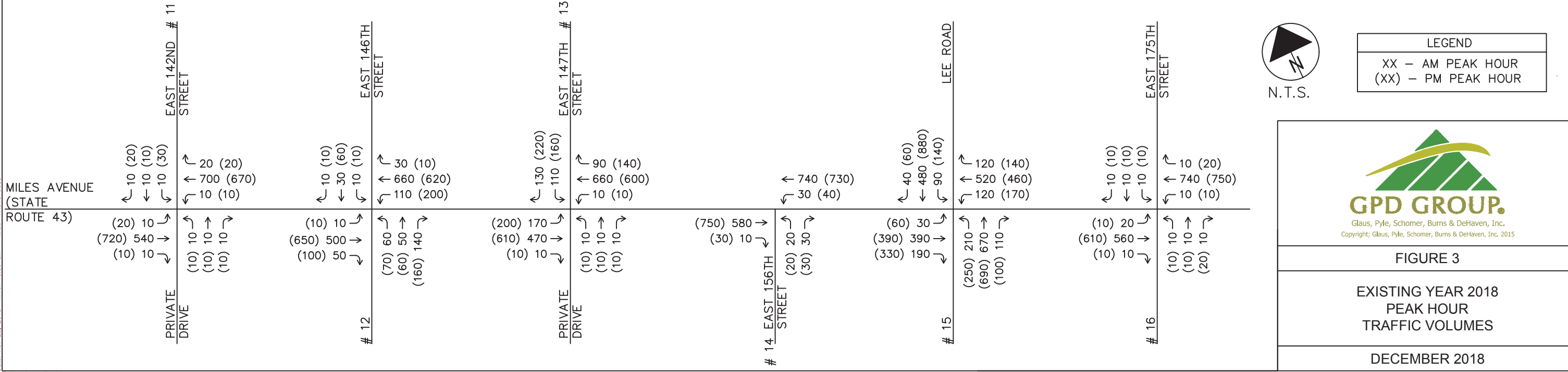
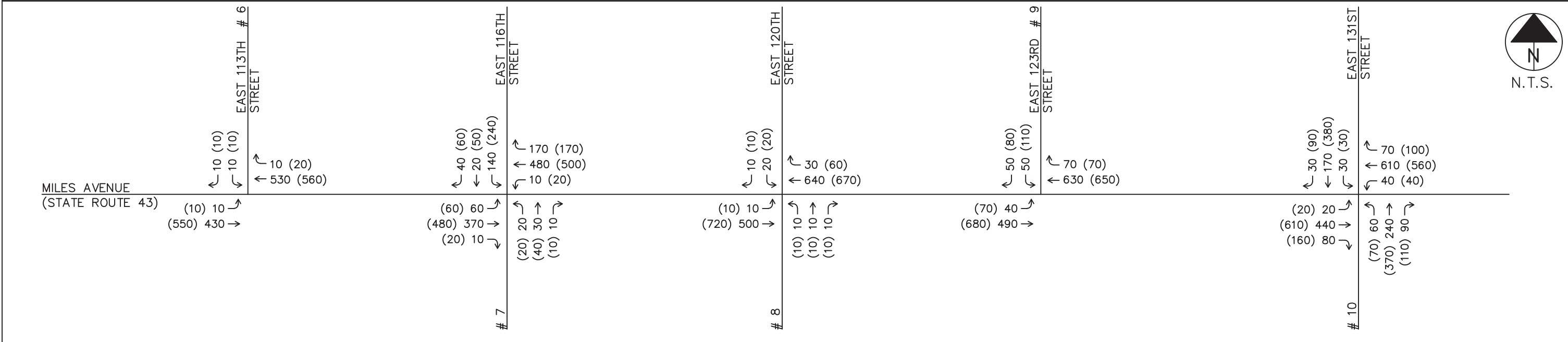
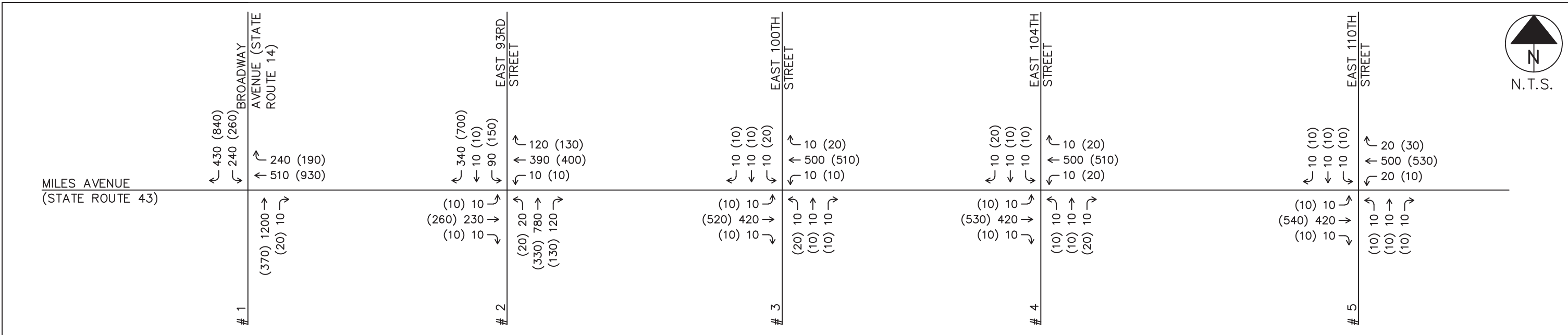
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FIGURE 2

EXISTING CONDITIONS
 SHEET 1 OF 15

DECEMBER 2018

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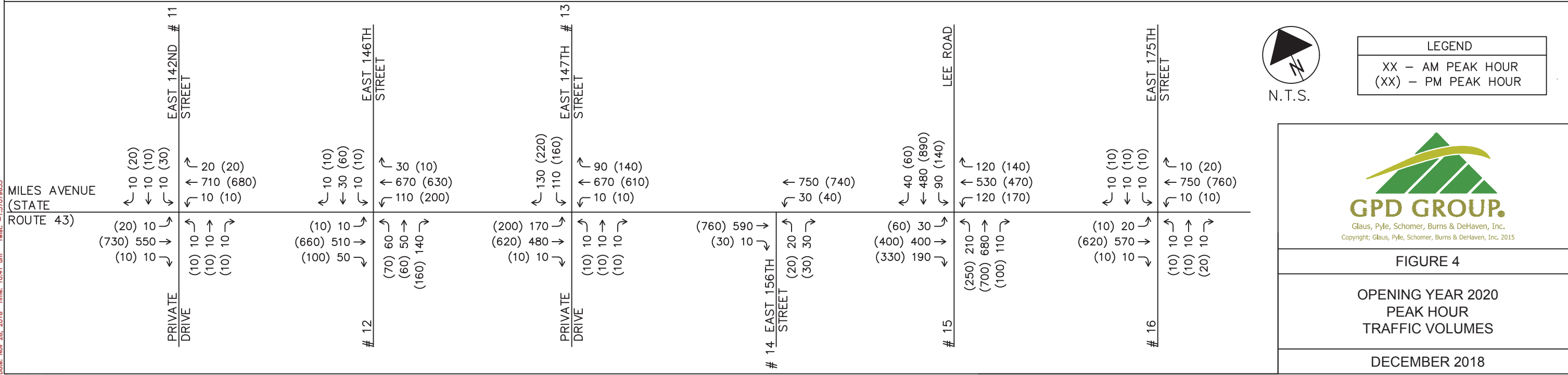
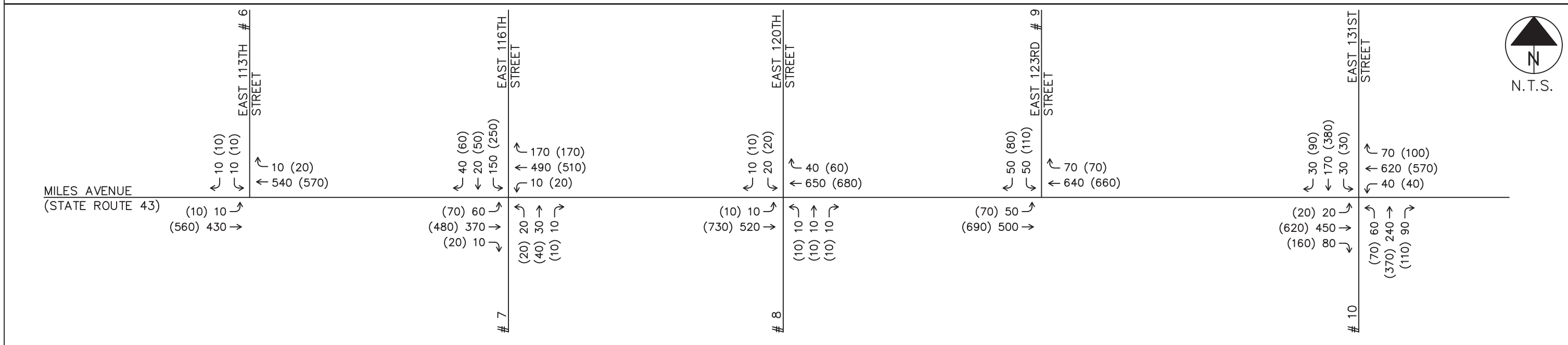
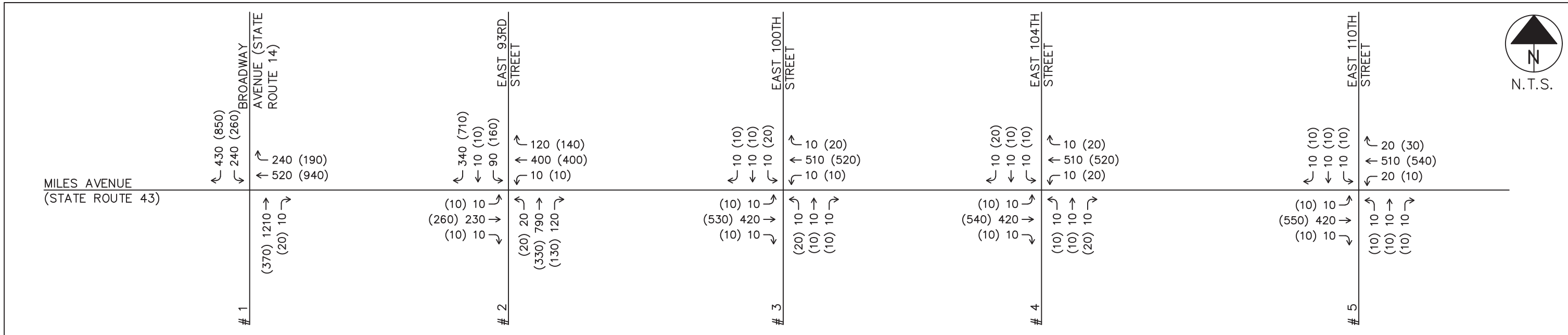
| LEGEND | |
|--------|----------------|
| XX | - AM PEAK HOUR |
| (XX) | - PM PEAK HOUR |



FIGURE 3

**EXISTING YEAR 2018
PEAK HOUR
TRAFFIC VOLUMES**

DECEMBER 2018



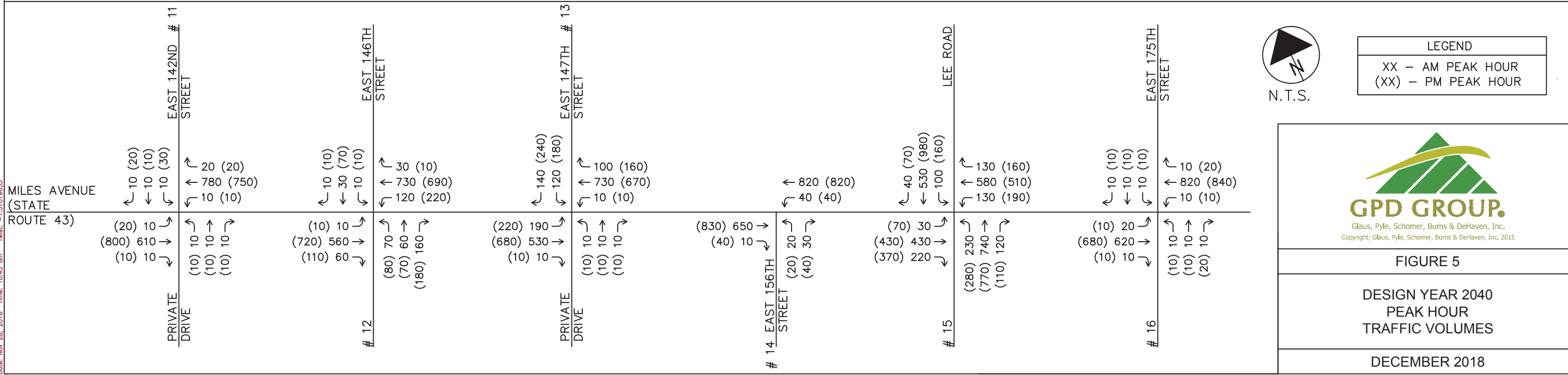
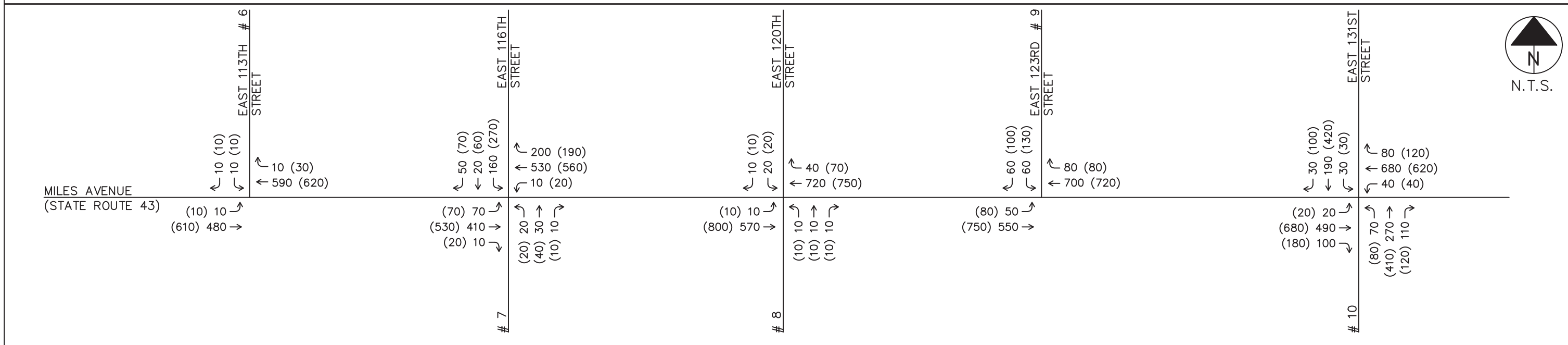
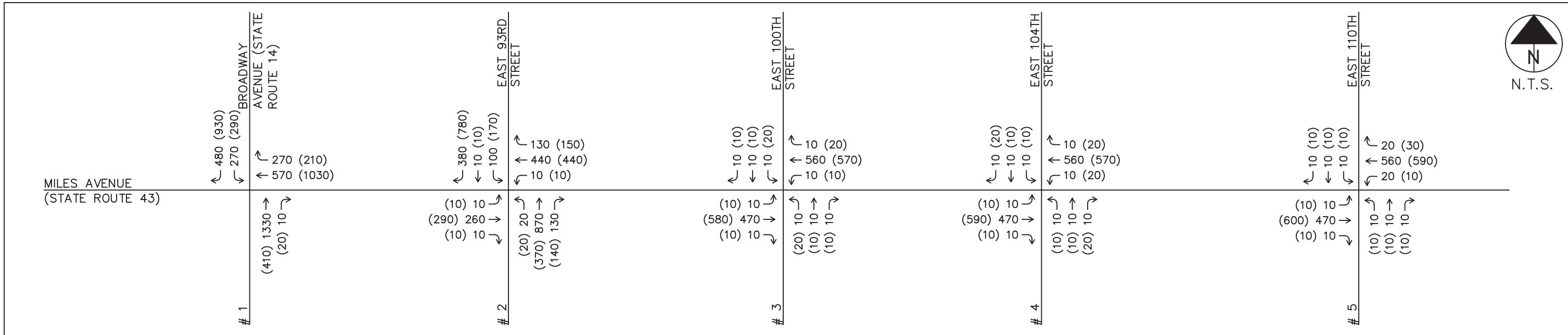
| LEGEND | |
|--------|----------------|
| XX | - AM PEAK HOUR |
| (XX) | - PM PEAK HOUR |



FIGURE 4

OPENING YEAR 2020
 PEAK HOUR
 TRAFFIC VOLUMES

DECEMBER 2018



Drawing File: C:\017\2017\2018\Cleveland\GIS\07 Miles Road Traffic Study\Option 4\Miles Rendering 1 thru 5.dwg Layout: 1 of 15
 Date: Dec 12, 2018 Time: 12:05 pm TWE: G
 Technician: ddombrosky



| LEGEND | |
|--------|----------------------------|
| | NEW/RECONSTRUCTED PAVEMENT |
| | RESURFACING AREA |
| | STRAIGHT CURB |
| | EXISTING RIGHT OF WAY |
| | SIGNAL REHABILITATION |
| | SIGNAL RECONSTRUCTION |
| | SIGNAL REMOVED |

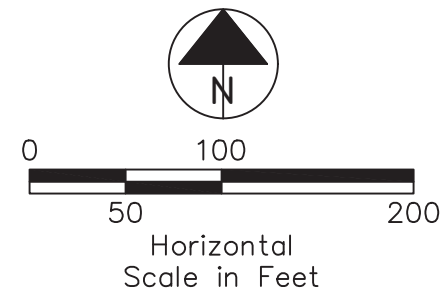
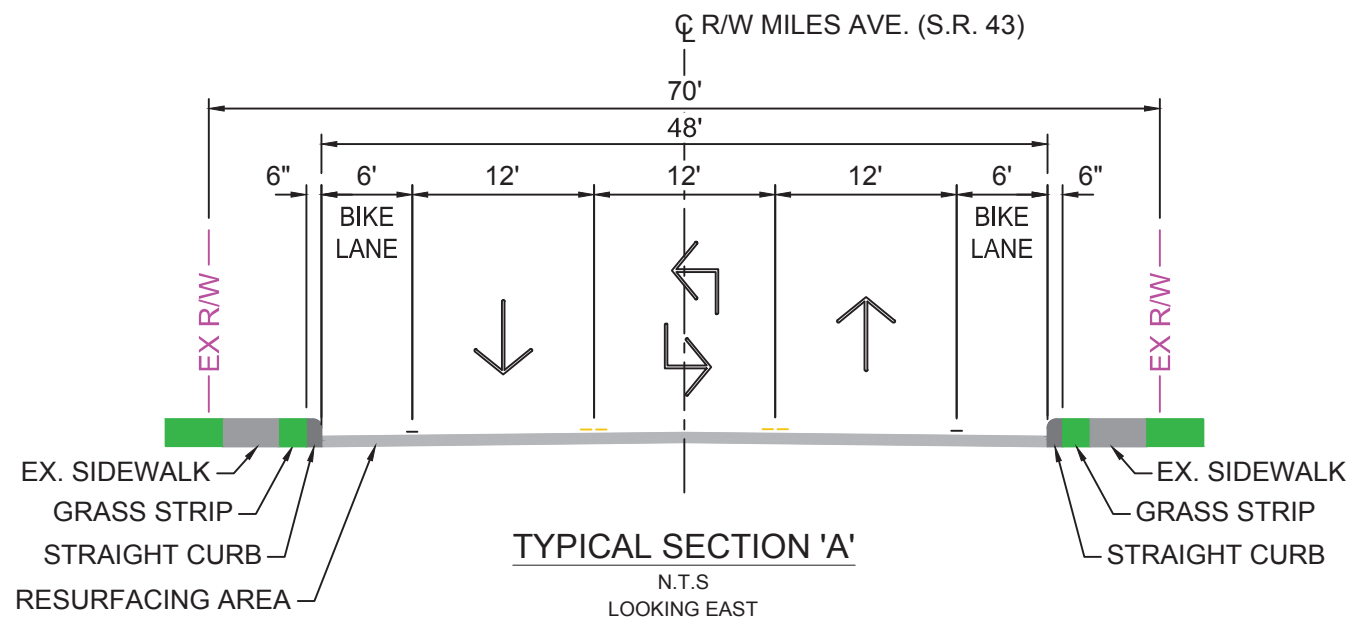


FIGURE 6

PROPOSED IMPROVEMENT RENDERING
SHEET 1 OF 15

DECEMBER 2018