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Mr. Anthony Zumbo, P.E., P.S.
Planning & Design Engineer
5000 Newton Falls Road
Ravenna, Ohio 44266

December 9, 2016
2016175.02

**Trip Generation Evaluation
Proposed Maplecrest Development
Tallmadge Road, Portage County, Ohio**

Dear Mr. Zumbo:

This letter is being prepared for Lemmon & Lemmon Inc. in association with the planned Maplecrest development to be built on the north side of Tallmadge Road, opposite the Cascades of Brimfield shopping center, in Brimfield Township, Portage County, Ohio. The purpose of this letter is to estimate the amount of trips that the proposed Maplecrest development will be expected to generate based upon industry standard practices and regional population density and demographics.

Proposed Action

The proposed Maplecrest development will consist of the following land uses: Home Improvement Superstore, Free-Standing Discount Superstore, 76,450 square feet of additional retail space and approximately 48 acres for light industrial uses. From an access standpoint, the proposed development will utilize two (2) full movement driveways and two (2) right-in/right-out driveways. The two (2) full movement driveways will tie in opposite of the existing signalized driveways of the Cascades of Brimfield shopping center. The two (2) right-in/right-out driveways will be located on Tallmadge Road with one being located on the east side of the site and the other on the west side of the site. See **Attachment A** for a preliminary site plan.

Certified Traffic Volumes

Certified traffic volumes were developed along Tallmadge Road from Parliament Drive to Sunnybrook Road for use in the *POR-Tallmadge Road Corridor Study*, performed by GPD Group in March 2014. When the certified traffic volumes were developed, it was taken into consideration that the existing Maplecrest Golf Club would likely be re-zoned from Residential / Office use to Integrated Commercial use to allow for future redevelopment. It should be noted that the Institute of Transportation Engineers (ITE) Trip Generation Manual, 9th Edition had not been used for calculating the future trips that would be generated by the Maplecrest site due to the uncertainty of the specific type and density of this commercial development since no site plan was available at that time. There was also concern related to the potential for overestimating trips that could occur when looking at the large number of acres available for development without knowing how much of the property was useable. With the Maplecrest site being similar in size to the Cascades of Brimfield shopping center and expected to yield similar land uses, it was assumed at that time that the Maplecrest development would be expected to generate the same amount of traffic as the Cascades of Brimfield Shopping Center had currently been generating. See **Attachment B** for the approved certified traffic plates that display the estimated trip generation of the Maplecrest development that had been used in the previous traffic evaluations.

ITE Trip Generation

For purposes of this new evaluation, trip generation calculations were performed for the proposed land uses of the Maplecrest development utilizing the ITE Trip Generation Manual, 9th Edition as a preliminary site plan has now been developed. The ITE manual includes data from numerous trip generation studies of different land uses that have been performed by public agencies, developers, consulting firms and associations and submitted to ITE. It serves as a tool for estimating the number of vehicle trips generated by a proposed development. For this letter, the trip generation calculations will evaluate the AM and PM peak periods.

According to information contained in the ITE Trip Generation Manual, 9th Edition, the proposed area for development of light industrial uses is expected to generate the following 'raw' trip ends:

LAND USE 110 – General Light Industrial

- i. Weekday AM Peak Hour (i.e. morning rush hour):
=363 trip ends (301 enter and 62 exit)
- ii. Weekday PM Peak Hour (i.e. afternoon rush hour):
=295 trip ends (65 enter and 230 exit)

Note that the variable utilized in the trip generation calculations was 'Acres of Development', which in this particular case is forty-eight (48). See **Attachment C** for the detailed trip generation calculations for the proposed development of light industrial.

According to information contained in the ITE Trip Generation Manual, 9th Edition, the proposed Free-Standing Discount Superstore is expected to generate the following 'raw' trip ends:

LAND USE 813 – Free-Standing Discount Superstore

- i. Weekday AM Peak Hour (i.e. morning rush hour):
=416 trip ends (233 enter and 183 exit)
- ii. Weekday PM Peak Hour (i.e. afternoon rush hour):
=977 trip ends (479 enter and 498 exit)

Note that the variable utilized in the trip generation calculations was 'square feet of gross floor area', which in this particular case is 224,500 square feet. See **Attachment C** for the detailed trip generation calculations for the proposed Free-Standing Discount Superstore.

According to information contained in the ITE Trip Generation Manual, 9th Edition, the proposed retail space is expected to generate the following 'raw' trip ends:

LAND USE 820 – Shopping Center

- i. Weekday AM Peak Hour (i.e. morning rush hour):
=132 trip ends (82 enter and 50 exit)
- ii. Weekday PM Peak Hour (i.e. afternoon rush hour):
=500 trip ends (240 enter and 260 exit)

Note that the variable utilized in the trip generation calculations was 'square feet of gross leasable area', which in this particular case is 76,450 square feet. See **Attachment C** for the detailed trip generation calculations for the proposed retail space.

According to information contained in the ITE Trip Generation Manual, 9th Edition, the proposed Home Improvement Superstore is expected to generate the following 'raw' trip ends:

LAND USE 862 – Home Improvement Superstore

- i. Weekday AM Peak Hour (i.e. morning rush hour):
=317 trip ends (181 enter and 136 exit)
- ii. Weekday PM Peak Hour (i.e. afternoon rush hour):
=495 trip ends (243 enter and 252 exit)

Note that the variable utilized in the trip generation calculations was 'square feet of gross floor area', which in this particular case is 212,500 square feet. See **Attachment C** for the detailed trip generation calculations for the proposed Home Improvement Superstore.

Table 1 below provides a summary of the certified traffic trip generation volumes that had previously been used for this development compared against the ITE trip generation calculations for what is currently being considered for the Maplecrest development project.

Table 1: Trip Generation Summary		
Time Period / Movement	Certified Traffic Trip Generation	ITE Trip Generation
AM Peak Hour		
Enter:	280	797
Exit:	190	431
Total Trip Ends:	470	1,228
PM Peak Hour		
Enter:	780	1,027
Exit:	670	1,240
Total Trip Ends:	1,450	2,267

As shown in **Table 1** above, the ITE method shows that more trip ends would be expected to be generated than what was originally anticipated as used in the certified traffic projections. Upon taking a closer look at the numbers, however, there are several characteristics of the ITE approach that may not be applicable to this particular development that would be expected to result in an overestimation of projected trips.

It is important to note that the trip generation rates for the specific land uses contained within the ITE Trip Generation Manual, 9th Edition, are based upon national averages from studies performed on the corresponding land use. These studies are performed in varying geographic areas ranging from small, lightly populated areas to larger more densely populated areas. Although the calculations typically use building size or acreage as the independent variable when estimating trips, it shouldn't be difficult to believe that any random site located along a heavily traveled roadway in a densely populated area would generate far more trips than the same exact development located in a sparsely populated rural area with little pass-by traffic, even if they are of the exact same footprint. Although average rates are typically used when calculated the expected trip generation, the charts in the manual confirm that the data used to develop these rates does vary quite a bit regardless of use, thus confirming that there are likely other variables that come into play. The ITE manual even suggests that local trip generation studies can be performed in situations where it is felt that the provided data might not properly account for the given situation.

The other reason why the ITE generated trips are likely higher than the certified traffic numbers is due to internal capture and that no subsequent reduction was applied to account for it. Internal capture is a key characteristic of multi-use developments and reflects those trips that occur between the various land uses within the development. The trip calculations provided with this evaluation represent the total number of trips expected for each land use independently, but overlook the fact that trips to multiple land uses occurring within the site would likely exist as a single new trip external to the site. It is very common for people to plan shopping trips where they can stop at multiple locations within the same trip, thus reducing the traffic impact to the external roadway network. In a large commercial development such as this, many retail stores will rely on the traffic generated by the larger anchor tenants as they would never be able to draw sufficient traffic on their own.

Volume Comparison

To support the reasoning stated in the previous section, GPD also performed ITE trip generation calculations for the Cascades of Brimfield shopping center in order to compare its ITE generated trip ends versus the trip ends obtained from actual traffic counts (as reflected in the certified traffic volumes) as this site has similar land uses and size as the proposed Maplecrest development. Building sizes were acquired from the Portage County Auditor's website and it was determined that the Cascades of Brimfield shopping center consists of the following land uses and sizes: apartments (216 Units), a Wal-Mart discount superstore (215,382 SF), various retail space (185,594 SF) and a Lowe's home improvement store (138,154 SF). Trip generation calculations were performed for the Cascades of Brimfield shopping center land uses utilizing the Institute of Transportation Engineers (ITE) Trip Generation Manual, 9th Edition. **Table 2** on the following page displays the certified traffic volumes and ITE trip ends for both developments.

Table 2: Trip Generation Comparison				
Time Period / Movement	Cascades of Brimfield		Maplecrest Development	
	Certified Traffic Trip Generation	ITE Trip Generation	Certified Traffic Trip Generation	ITE Trip Generation
Daily:				
Enter:	7,440	13,383	7,330	12,969
Exit:	6,930	13,379	7,330	12,967
Total Trip Ends:	14,370	26,762	14,660	25,936
AM Peak Hour				
Enter:	230	503	280	797
Exit:	200	439	190	431
Total Trip Ends:	430	942	470	1,228
PM Peak Hour				
Enter:	760	1,141	780	1,027
Exit:	670	1,162	670	1,240
Total Trip Ends:	1,430	2,303	1,450	2,267

As shown in **Table 2**, the Cascades of Brimfield shopping center was found to only be generating about 50-60% of the traffic that would have been expected based in the ITE trip generation calculations. It is believed that the reduced number of trips being generated by the existing development is a direct reflection of the reasoning discussed previously - regional population density and demographics as well as the impact of internal capture. Coincidentally, the expected number of trips that would be generated by each development based on the ITE approach was found to be essentially the same over an entire day and during the PM peak hour which is the critical hour for design considerations. So if the Cascades of Brimfield shopping center has been found to be generating 40-50% less traffic than what the ITE manual projects, then it is reasonable to assume that a similar development at the same location (Maplecrest) would experience a similar reduction in the ITE numbers. And given that the trip generation potential of each development is essentially the same, the use of the actual trip generation from the Cascades of Brimfield shopping center traffic counts to estimate more realistic trip generation projections for the future Maplecrest development as done in previous studies would appear to be a valid approach. As such, the previously developed Maplecrest traffic volumes that were certified by ODOT do not need to be altered when assessing the impact of this planned development.

Summary

This letter is being prepared for Lemmon & Lemmon Inc. in association with the planned Maplecrest development to be built on the north side of Tallmadge Road, opposite the Cascades of Brimfield shopping center, in Brimfield Township, Portage County, Ohio. This evaluation analyzed and compared the trip generation potential of the future Maplecrest development and existing Cascades of Brimfield shopping center based on traffic counts and certified traffic volumes previously developed for the *POR – Tallmadge Road Corridor Study* versus the trips calculated from the Institute of Transportation Engineers (ITE) Trip Generation Manual, 9th Edition. The analysis contained within this letter confirmed that the ITE Trip Generation Manual, 9th Edition rates overestimate the number of trips that would be generated for large commercial developments in this area. These differences are believed to be due to the regional population density and demographics of this area as well as the impact of internal capture within large commercial developments. Therefore, the previously developed traffic projections for the Maplecrest development that were used in the *POR – Tallmadge Road Corridor Study* were found to be valid and require no alteration based on the preliminary site plan and proposed land uses.

If you have any questions, please feel free to contact me at (330) 572-2210 or via e-mail at rgillespie@gpdgroup.com. Thank you for your assistance with this project.

Respectfully Submitted,



Ryan M. Gillespie, P.E., PTOE
Project Manager / Traffic Engineer

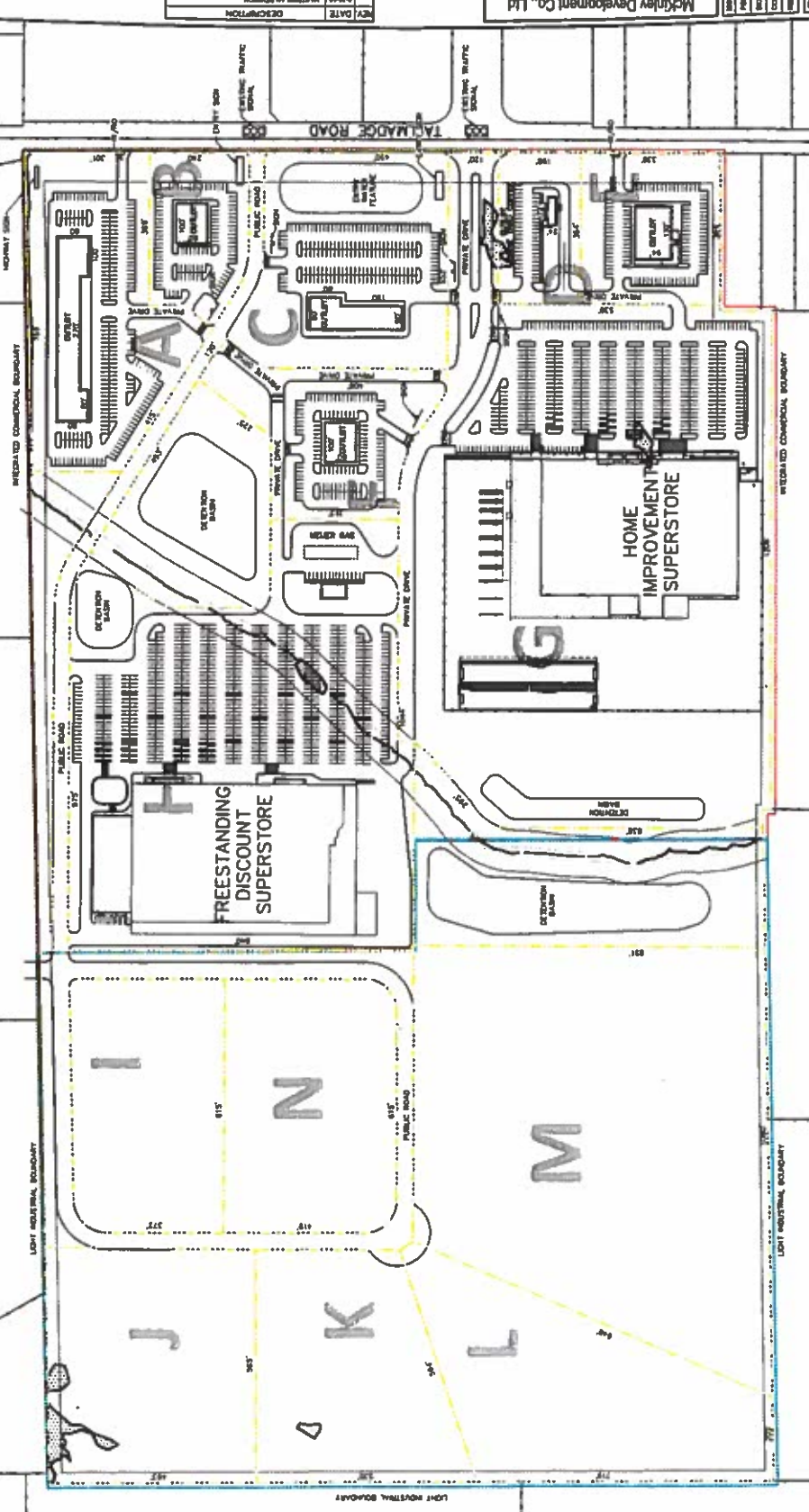
RMG/bmf

Cc: Mr. Todd Westover, AIA, LEED AP BD+C, (GPD Group)
File

ATTACHMENT A



AREA	AREA ACRES	BUILDING SQUARE FT.	PARKING COUNT	RATIO (STALLS/1,000 SF)	AREA ACRES	BUILDING SQUARE FT.	PARKING COUNT	RATIO (STALLS/1,000 SF)
A	5.7	30,600	203	6.63	H	17.6	721	3.21
B	2.1	8,000	100	12.50	I	5.2	N/A	N/A
C	5.6	15,400	167	10.84	J	6.6	N/A	N/A
D	1.7	1,885	44	23.34	K	5.8	N/A	N/A
E	2.8	12,565	101	8.04	L	7.1	N/A	N/A
F	3.5	8,000	113	14.13	M	17.8	N/A	N/A
G	24.7	212,500	425	2.00	N	5.9	N/A	N/A

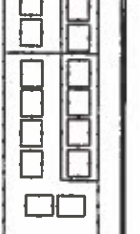


McKinley Development Co., Ltd
219 Talmadge Road
Brimfield Township, Ohio 44240

NO.	DATE	DESCRIPTION
1	10-1-08	INITIAL DESIGN
2	10-1-08	REVISIONS
3	10-1-08	REVISIONS
4	10-1-08	REVISIONS
5	10-1-08	REVISIONS
6	10-1-08	REVISIONS
7	10-1-08	REVISIONS
8	10-1-08	REVISIONS
9	10-1-08	REVISIONS
10	10-1-08	REVISIONS

2016175.02
MP-1

NOTE:
BACKGROUND INFORMATION
BASED ON AERIAL IMAGES AND
PORTAGE COUNTY GIS DATA



ATTACHMENT B



GPD GROUP.
Chris P. G. Schaefer, P.E., Director, Inc.
Company: 1000 West 15th Street, Suite 201, Denver, CO 80202

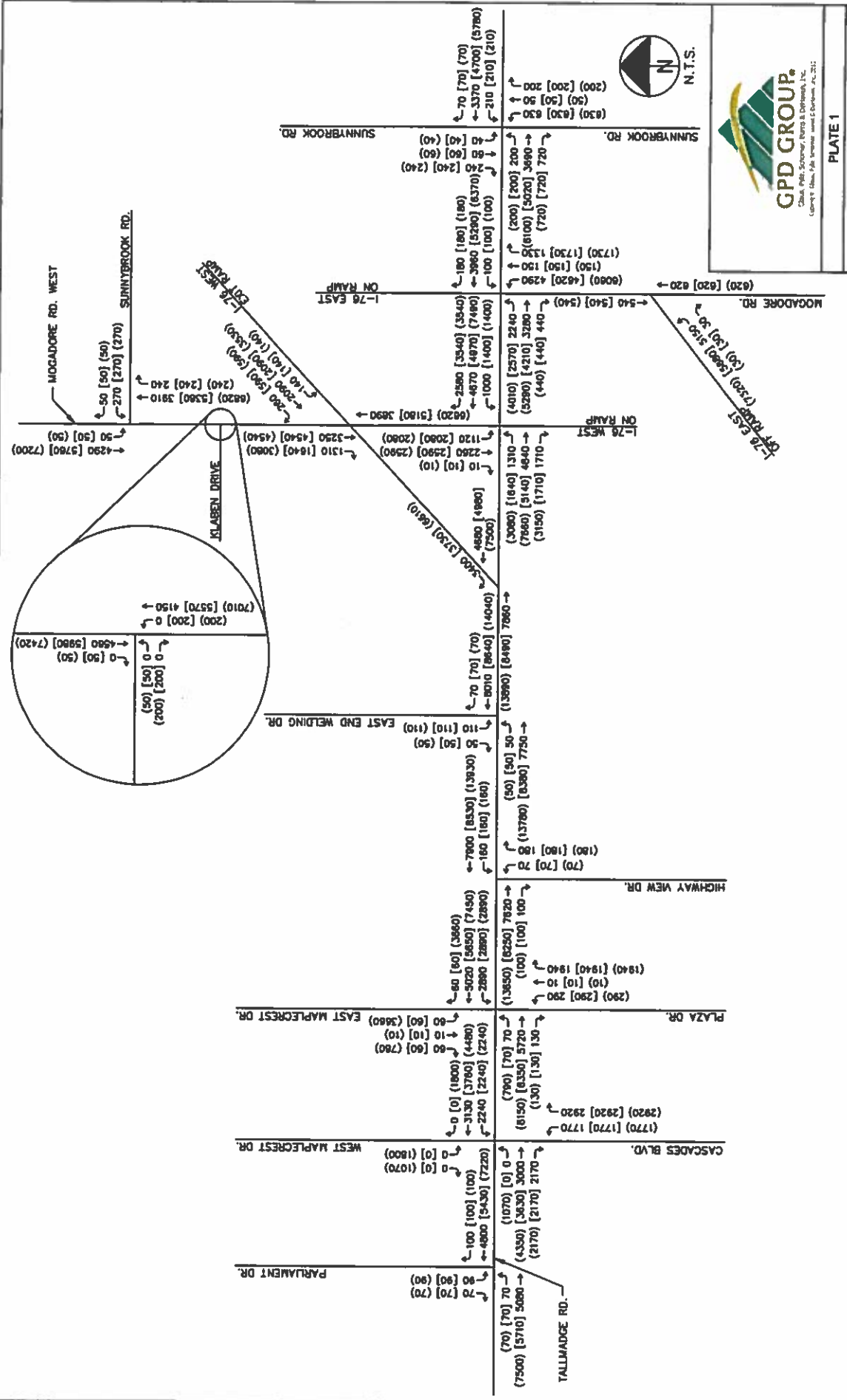
PLATE 1

YEAR 2018/2019/2039
ADT TRAFFIC PLATE
SHEET 1 OF 2

APRIL 2018

LEGEND

XX - OPENING YEAR 2019
[XX] - INTERIM YEAR 2029
(XX) - DESIGN YEAR 2039



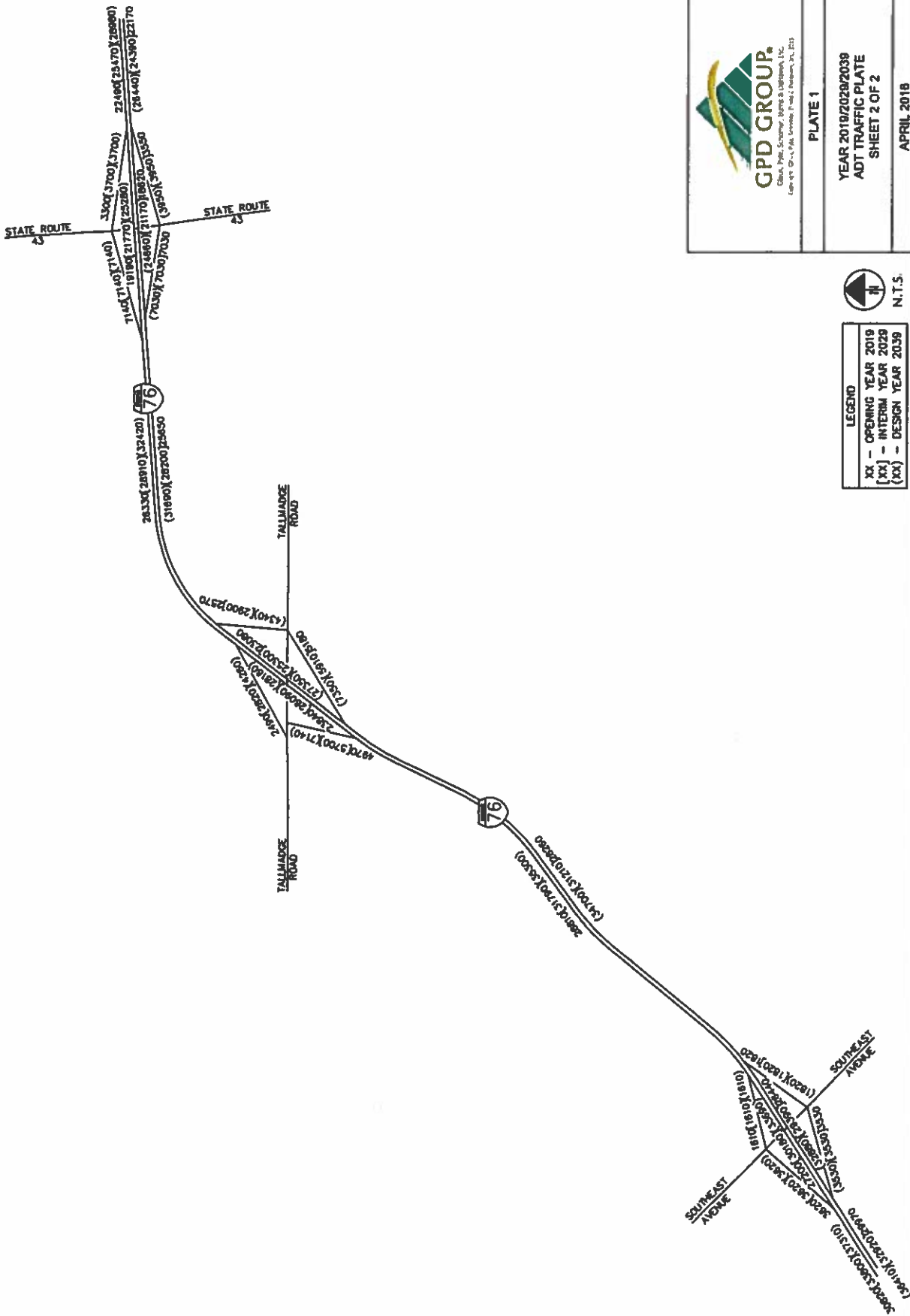


PLATE 1

YEAR 2019/2020/2039
 ADT TRAFFIC PLATE
 SHEET 2 OF 2

APRIL 2018

LEGEND

- XX - OPENING YEAR 2019
- [XX] - INTERIM YEAR 2020
- (XX) - DESIGN YEAR 2039

N.T.S.

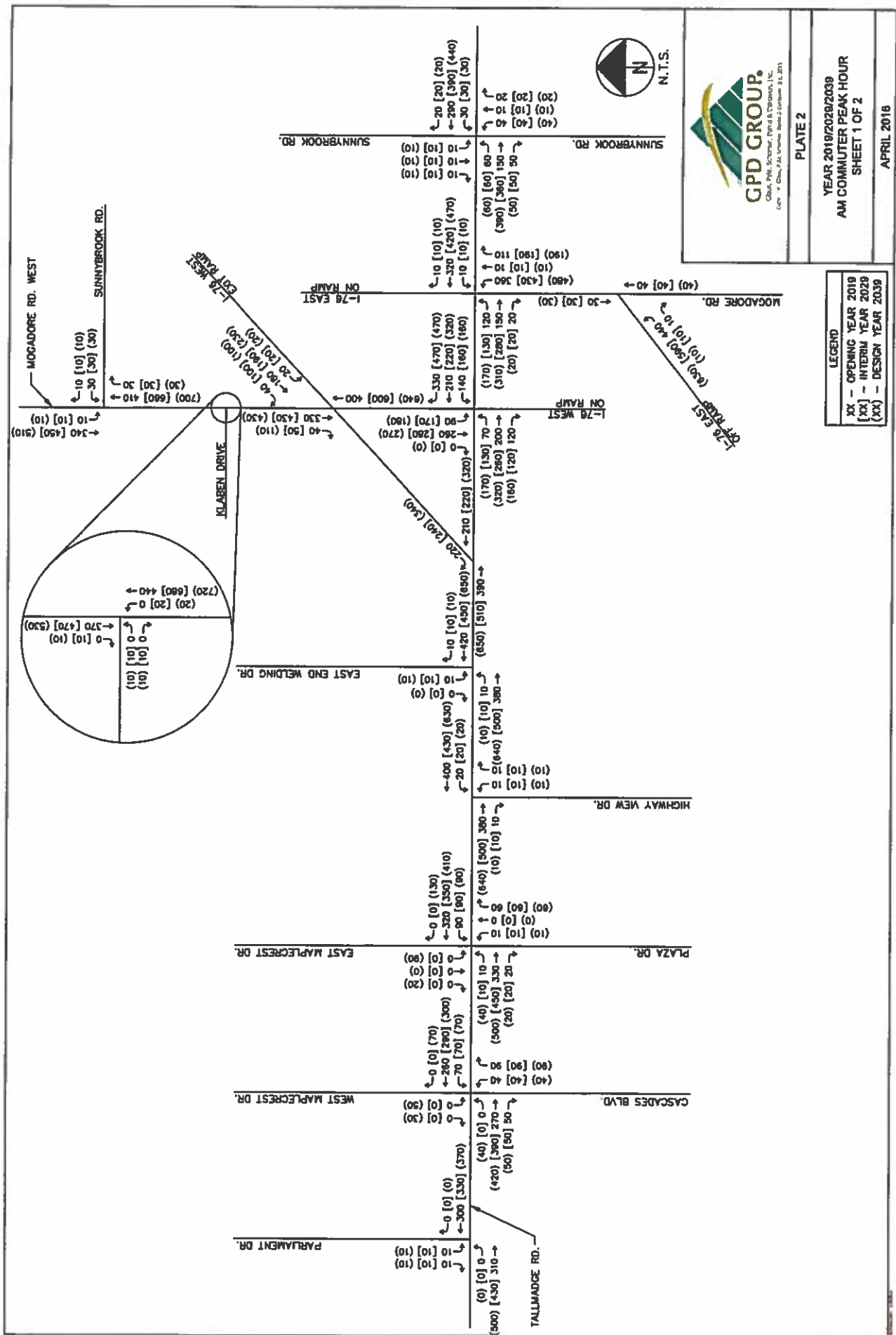


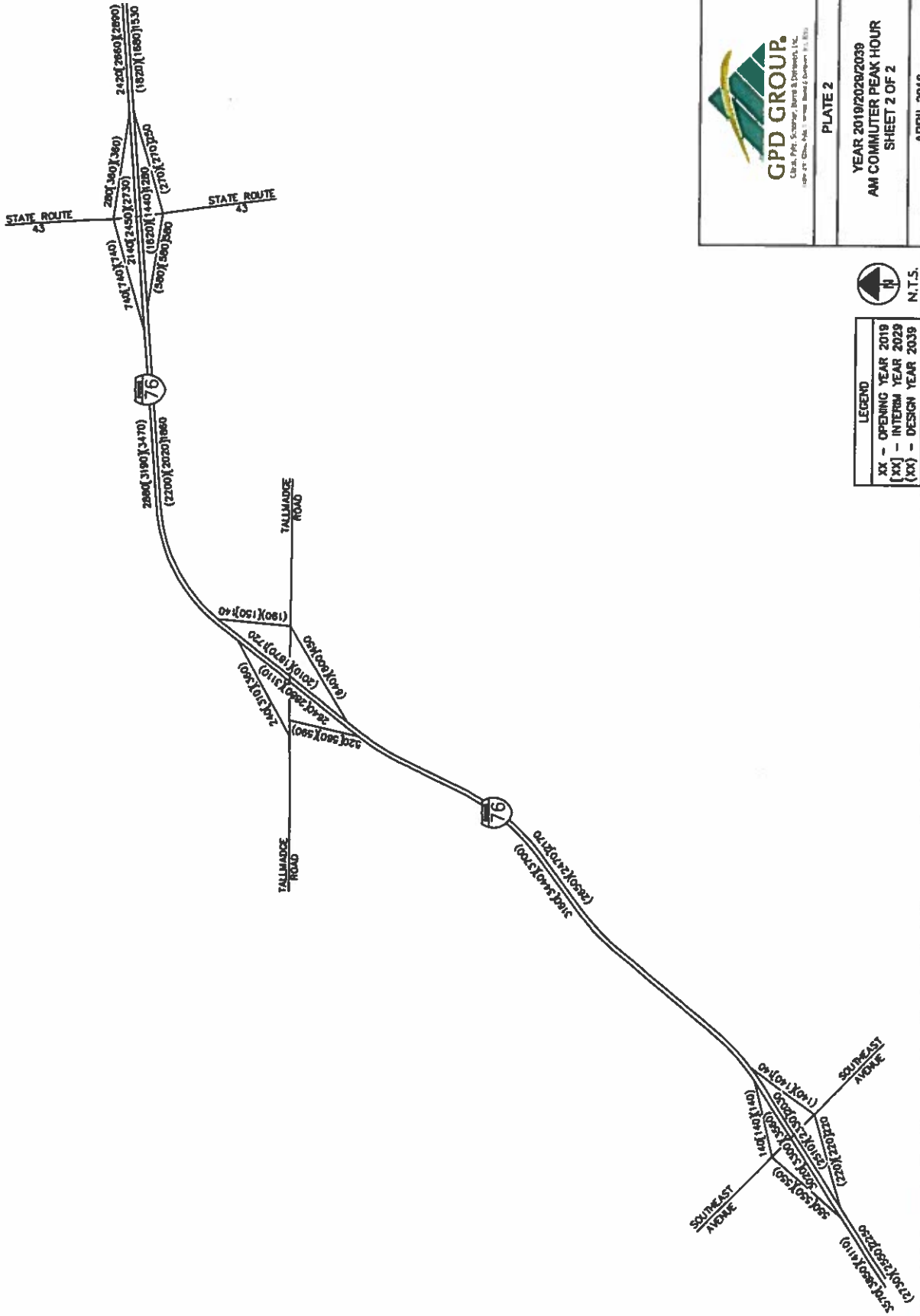
PLATE 2

YEAR 2019/2029/2039
AM COMMUTER PEAK HOUR
SHEET 1 OF 2

APRIL 2016

LEGEND
XX - OPENING YEAR 2019
[XX] - INTERIM YEAR 2029
(XX) - DESIGN YEAR 2039

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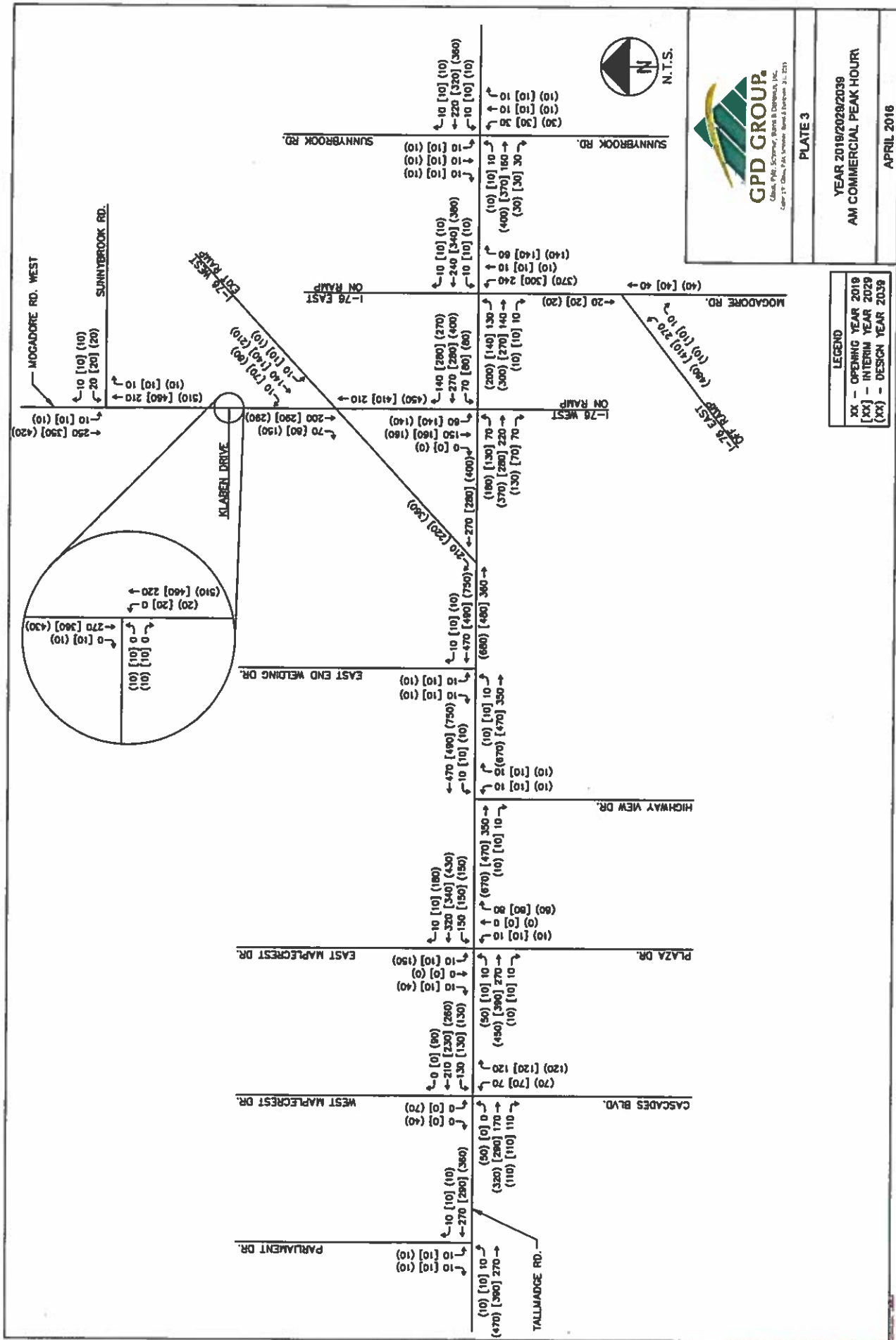
GPD GROUP
 Civil, PE, Survey, Planning, Engineering, Inc.
 10000 11th Street, Suite 100, Columbus, OH 43240

PLATE 2

YEAR 2019/2029/2039
 AM COMMUTER PEAK HOUR
 SHEET 2 OF 2
 APRIL 2016

LEGEND	
XX	- OPENING YEAR 2019
[XX]	- INTERIM YEAR 2029
(XX)	- DESIGN YEAR 2039





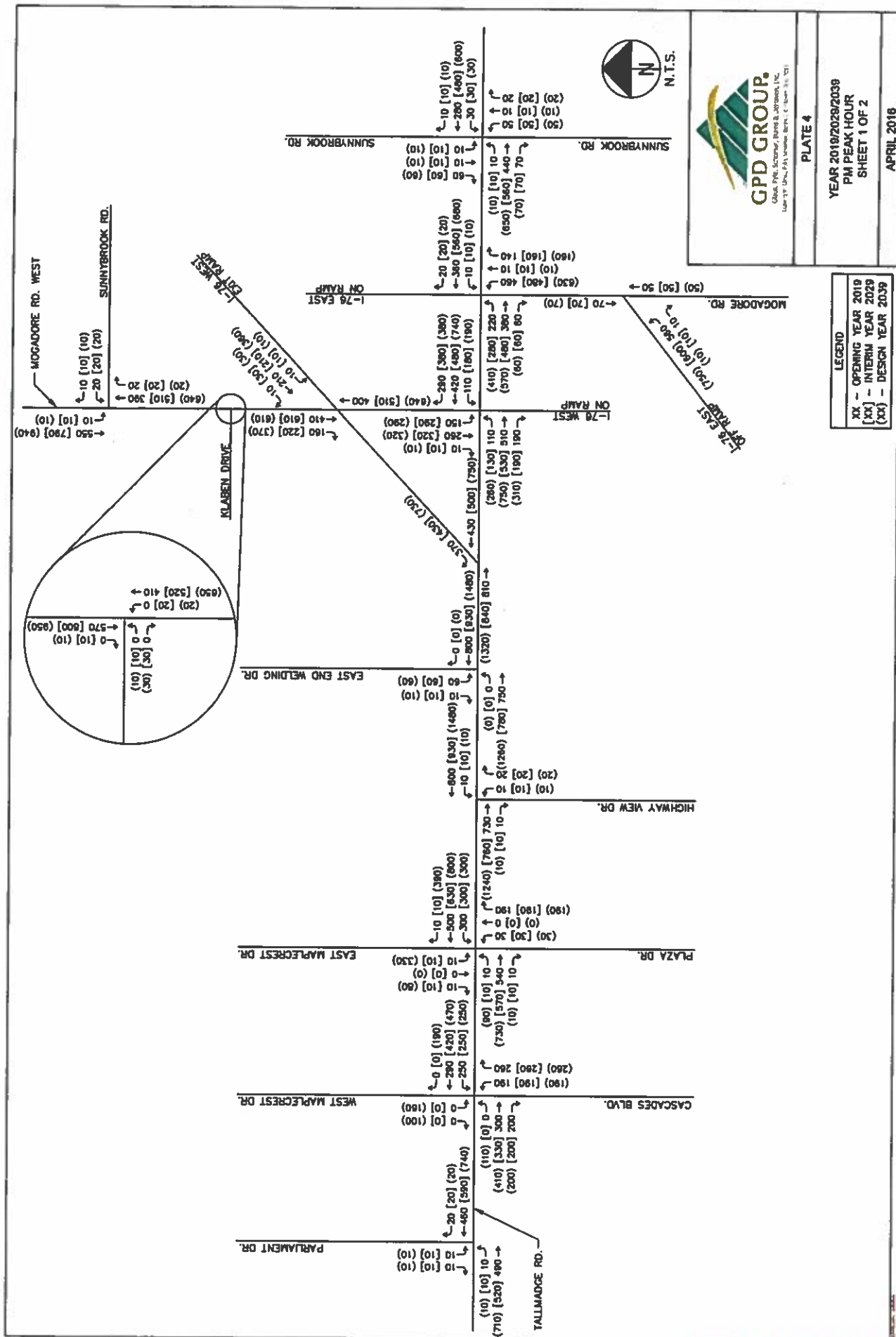


PLATE 4

YEAR 2019/2029/2039
P.M. PEAK HOUR
SHEET 1 OF 2
APRIL 2016

LEGEND

XX	-	OPENING YEAR 2019
XX	-	INTERIM YEAR 2029
XX	-	DESIGN YEAR 2039

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PLATE 4

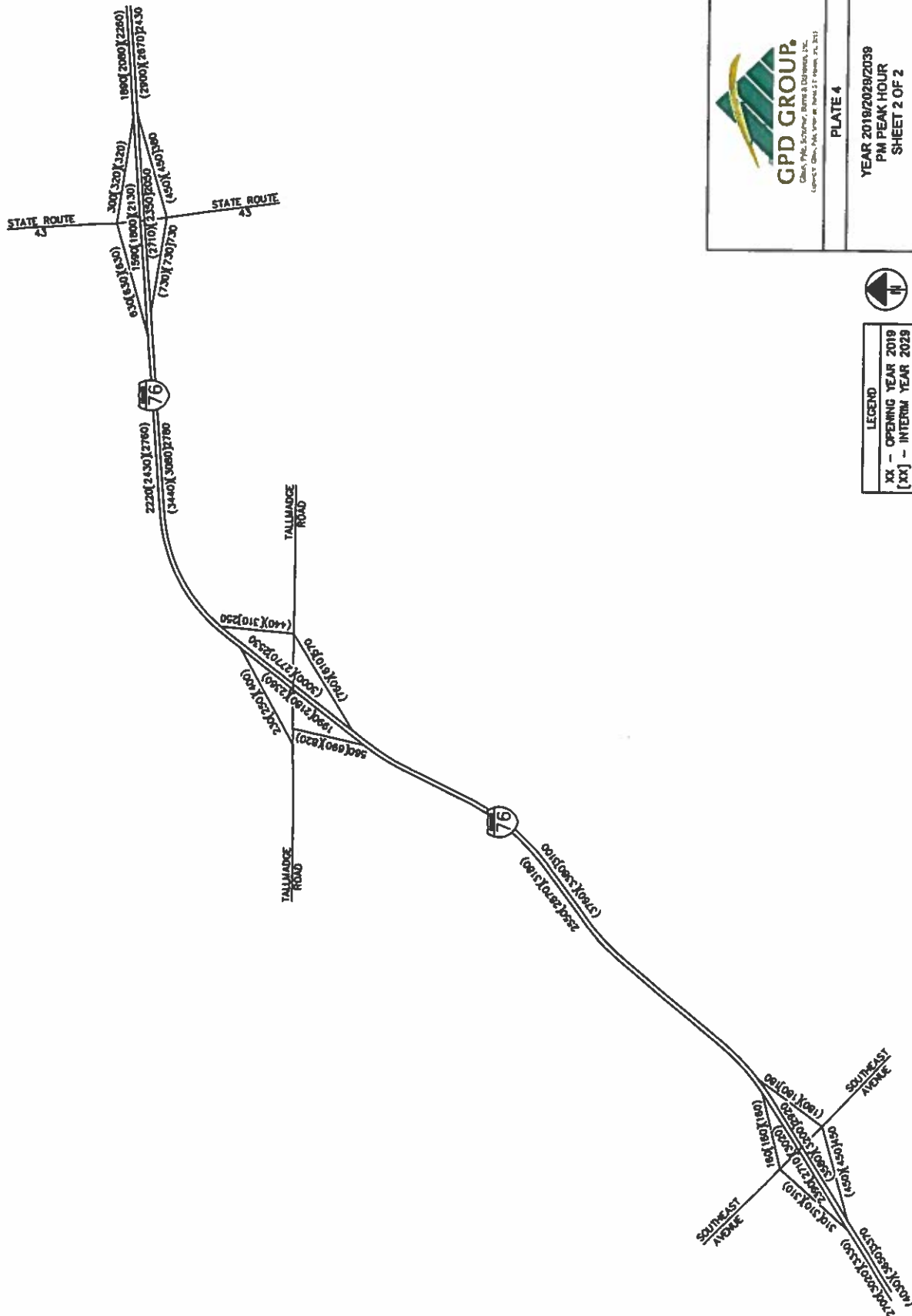
YEAR 2019/2029/2039
 PM PEAK HOUR
 SHEET 2 OF 2

APRIL, 2018



N.T.S.

LEGEND	
XX	- OPENING YEAR 2019
[XX]	- INTERIM YEAR 2029
(XX)	- DESIGN YEAR 2039



ATTACHMENT C

MAPLECREST DEVELOPMENT

ITE Trip Generation Procedure

Land Use 110 (General Light Industrial)

Trip Generations Per Acres of Development

Weekday Trip Generation and Trip Distribution

Trip Generation Formula: $T = 42.22(X) + 263.11$
where: T = Number of Trips Generated
X = Number of Acres of Development

Proposed Number of Acres of Development: 48.4

Total Trip Ends in an Average Weekday: 2,307

Distribution Percentages of Entering and Exiting Trips, From ITE Trip Generation Manual, 9th Edition

Entering Trip Percentage: 50%
Exiting Trip Percentage: 50%

Number of Entering Trips: 1154
Number of Exiting Trips: 1153

AM Peak Trip Generation and Trip Distribution (Peak Hour of Adjacent Street)

Trip Generation Formula: $T = 7.51(X)$
Total Trip Ends in the AM Peak Hour: 363

Distribution Percentages of Entering and Exiting Trips, From ITE Trip Generation Manual, 9th Edition

Entering Trip Percentage: 83%
Exiting Trip Percentage: 17%

Number of Entering Trips: 301
Number of Exiting Trips: 62

PM Peak Trip Generation and Trip Distribution (Peak Hour of Adjacent Street)

Trip Generation Formula: $T = 3.68(X) + 116.82$
Total Trip Ends in the PM Peak Hour: 295

Distribution Percentages of Entering and Exiting Trips, From ITE Trip Generation Manual, 9th Edition

Entering Trip Percentage: 22%
Exiting Trip Percentage: 78%

Number of Entering Trips: 65
Number of Exiting Trips: 230

ITE Trip Generation Procedure

Land Use 813 (Free-Standing Discount Superstore)

Trip Generations Per 1000 Square Feet of Gross Floor Area

Weekday Trip Generation and Trip Distribution

Trip Generation Formula: $T = 50.75(X)$
where: T = Number of Trips Generated
X = 1000 Square Feet of Gross Floor Area

Proposed Amount of Gross Floor Area: 224,500

Total Trip Ends in an Average Weekday: 11,394

Distribution Percentages of Entering and Exiting Trips, From ITE Trip Generation Manual, 9th Edition

Entering Trip Percentage: 50%
Exiting Trip Percentage: 50%

Number of Entering Trips: 5697
Number of Exiting Trips: 5697

AM Peak Trip Generation and Trip Distribution (Peak Hour of Adjacent Street)

Trip Generation Formula (AM Peak): $T = 1.85(X)$
Total Trip Ends in the AM Peak Hour: 416

Distribution Percentages of Entering and Exiting Trips, From ITE Trip Generation Manual, 9th Edition

Entering Trip Percentage: 56%
Exiting Trip Percentage: 44%

Number of Entering Trips: 233
Number of Exiting Trips: 183

PM Peak Trip Generation and Trip Distribution (Peak Hour of Adjacent Street)

Trip Generation Formula (PM Peak): $T = 4.35(X)$
Total Trip Ends in the PM Peak Hour: 977

Distribution Percentages of Entering and Exiting Trips, From ITE Trip Generation Manual, 9th Edition

Entering Trip Percentage: 49%
Exiting Trip Percentage: 51%

Number of Entering Trips: 479
Number of Exiting Trips: 498

ITE Trip Generation Procedure

Land Use 820 (Shopping Center)

Trip Generations per Square Feet of Gross Leasable Area

Weekday Trip Generation and Trip Distribution

Trip Generation Formula: $\text{Ln}(T) = 0.65 \text{Ln}(X) + 5.83$

where: T = Number of Trips Generated

X = 1000 Square Feet of Gross Leasable Area

Proposed Square Feet of Leasable Area: 76,450

Total Trip Ends in the Average Weekday: 5,703

Distribution Percentages of Entering and Exiting Trips, From ITE Trip Generation Manual, 9th Edition

Entering Trip Percentage: 50%
Exiting Trip Percentage: 50%

Number of Entering Trips: 2852
Number of Exiting Trips: 2851

AM Peak Trip Generation and Trip Distribution (Peak Hour of Adjacent Street)

Trip Generation Formula (AM Peak): $\text{Ln}(T) = 0.61 \text{Ln}(X) + 2.24$

Total Trip Ends in the AM Peak Hour: 132

Distribution Percentages of Entering and Exiting Trips, From ITE Trip Generation Manual, 9th Edition

Entering Trip Percentage: 62%
Exiting Trip Percentage: 38%

Entering Primary Trips: 82
Exiting Primary Trips: 50

PM Peak Trip Generation and Trip Distribution (Peak Hour of Adjacent Street)

Trip Generation Formula (PM Peak): $\text{Ln}(T) = 0.67 \text{Ln}(X) + 3.31$

Total Trip Ends in the PM Peak Hour: 500

Distribution Percentages of Entering and Exiting Trips, From ITE Trip Generation Manual, 9th Edition

Entering Trip Percentage: 48%
Exiting Trip Percentage: 52%

Entering Primary Trips: 240
Exiting Primary Trips: 260

ITE Trip Generation Procedure

Land Use 862 (Home Improvement Superstore)

Trip Generations per Square Feet of Gross Floor Area

Weekday Trip Generation and Trip Distribution

Trip Generation Formula: $T = 30.74 (X)$
where: T = Number of Trips Generated
X = 1000 Square Feet of Gross Floor Area

Proposed Square Feet of Gross Floor Area: 212,500

Total Trip Ends in the Average Weekday: 6,532

Distribution Percentages of Entering and Exiting Trips, From ITE Trip Generation Manual, 9th Edition

Entering Trip Percentage: 50%
Exiting Trip Percentage: 50%

Number of Entering Trips: 3266
Number of Exiting Trips: 3266

AM Peak Trip Generation and Trip Distribution (Peak Hour of Adjacent Street)

Trip Generation Formula (AM Peak): $T = 1.49 (X)$
Total Trip Ends in the AM Peak Hour: 317

Distribution Percentages of Entering and Exiting Trips, From ITE Trip Generation Manual, 9th Edition

Entering Trip Percentage: 57%
Exiting Trip Percentage: 43%

Entering Primary Trips: 181
Exiting Primary Trips: 136

PM Peak Trip Generation and Trip Distribution (Peak Hour of Adjacent Street)

Trip Generation Formula (PM Peak): $T = 2.33 (X)$
Total Trip Ends in the PM Peak Hour: 495

Distribution Percentages of Entering and Exiting Trips, From ITE Trip Generation Manual, 9th Edition

Entering Trip Percentage: 49%
Exiting Trip Percentage: 51%

Entering Primary Trips: 243
Exiting Primary Trips: 252