11788 TECUMSEH ROAD EAST
MIXED-USE DEVELOPMENT
WINDSOR, ON

TRAFFIC IMPACT / PARKING BRIEF

Prepared by:

RC SPENCER ASSOCIATES INC.
Consulting Engineers
Windsor: 800 University Avenue W. - Windsor ON N9A 5R9
Leamington: 18 Talbot Street W. - Leamington ON N8H 1M4
Chatham-Kent: 49 Raleigh Street - Chatham ON N7M 2M6

File No.: 23-1383 June 2023

11788 TECUMSEH ROAD EAST MIXED-USE DEVELOPMENT, WINDSOR, ON

TRAFFIC IMPACT / PARKING BRIEF (JUNE 2023)

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Appendix E: ITE Parking Generation References

- Mid-Rise Multifamily Housing Weekday (Per Dwelling Unit)
- Shopping Center Non-December Weekday (Per 1000 sq. ft.)

INTRODUCTION AND BACKGROUND

A mixed-use development has been proposed for lands situated at 11788 Tecumseh Road East, in the City of Windsor, Ontario; the site is currently occupied by a residence. As noted on Figure 1, the proposed development site is located on the north side of Tecumseh Road East, approximately 275m east of Banwell Road. At the subject site, Tecumseh Road East is a four-lane, east / west collector roadway; it is part of the arterial grid system in Tecumseh and Windsor, and it is a principal means of external access to and from the area. The study area is limited to the intersection of the proposed site access at Tecumseh Road East. Within the study area, there are sidewalks on both sides of the subject roadway.

The proposed site plan, provided on Figure 2, includes a six-storey, mixed-use building with approximately 2,160 sq. ft. of dedicated retail space on the ground floor and dwelling units on the above five stories. The development team is hoping to accommodate 50 units within the mid-rise building; therefore, it was requested that the traffic study determine the potential impact of a 50-unit mid-rise residential building on Tecumseh Road operations. A single site access is proposed at Tecumseh Road East (to be located west of the current residential site access). Furthermore, a total of 58 parking spaces, including four accessible spaces, are proposed to accommodate the mixed-use development.

The purpose of this brief is to examine the potential traffic impact of the proposed development on area traffic operations, particularly on Tecumseh Road East at the proposed site access. Furthermore, to evaluate whether the proposed parking supply will adequately service the peak parking demand, a theoretical peak parking supply / demand analysis is also included within the context of this report.

TRAFFIC DATA COLLECTION

As provided in Appendix A, turning movement counts were collected by RC Spencer Associates Inc. at Southfield Drive at Tecumseh Road East (30 March 2023). These counts were compared to available historical data within the Tecumseh Road East corridor; the volumes are comparable.

METHODOLOGY

The collected turning movement counts provided the basis for industry-standard traffic operations analysis; the software package utilized for the analysis (Synchro 11) calculates various parameters of intersection performance, such as level of service (LOS), intersection capacity utilization (ICU), control delay, and queue lengths on individual approaches. The software package references the Highway Capacity Manual (6th Ed.), when reporting the metrics.

Unsignalized level of service results are reported based on the following industry standard:

Level of Service	Average Control Delay (sec/veh)
A	0 - 10
B	>10 - 15
C	>15 - 25
D	>25 - 35
E	>35 - 50
F	>50

TRIP GENERATION AND DISTRIBUTION

Although City of Windsor public transportation is available within the immediate area, to be conservative, it was assumed that all trips generated by the proposed development will be auto-dependent trips; a modal split reduction was not applied.

Trip generation for the proposed development was estimated from the Institute of Transportation Engineers (ITE) Trip Generation Manual (11th Edition). The dataset's average rate was used instead of the fitted curve because the value of the independent variable is in the lower range of the dataset, and the fitted curve equation does not pass through the origin.

Land Use Code 221 (Mid-Rise Multifamily Housing) provides average generation rates of 0.37 trips per unit in the AM peak hour, with 23% entering and 77% exiting and 0.39 trips per unit in the PM peak hour, with 61% entering and 39% exiting. Land Use Code 820 (Shopping Center) provides average generation rates 0.84 trips per 1000 sq. ft. GLA in the AM peak hour, with 62% entering and 38% exiting and 3.40 trips per 1000 sq. ft. GLA in the PM peak hour, with 48% entering and 52% exiting. The resulting trip generation estimates are contained in Appendix B.

When combined, the total trips generated by the proposed development are estimated to be 21 during the AM peak hour, with 5 entering and 16 exiting, and 27 during the PM peak hour in the PM peak hour, with 15 entering and 12 exiting. Site generated traffic was distributed to and from Tecumseh Road East based on the eastbound / westbound directional split derived from the collected turning movement counts. The resulting turning movement projections are illustrated on Figure 3.

Although site generated traffic volumes are low, since the proposed development accesses an arterial road, a review of Tecumseh Road traffic operations was requested. For this development, the critical peak hour is expected to occur on a weekday during the PM peak hour (with 15 trips entering and 12 trips exiting); effectively, approximately one site generated trip can be expected every two minutes.

CAPACITY AND LEVEL OF SERVICE ANALYSIS

Detailed analysis was carried out at the site access with respect to the Existing + Site Generated Traffic peak hour scenarios. The resulting Synchro 11 simulation reports, which showcase the effect of adding site generated traffic to the existing traffic volumes, can be found in Appendix C. These results quantify and qualify the effective traffic impact of the proposed development on area traffic operations. The level of service results are summarized as follows:

Site Access at Tecumseh Road East

The proposed intersection of the site access at Tecumseh Road East is to be stop-controlled on the southbound approach. Tecumseh Road East is a four-lane undivided roadway with no dedicated turning lanes at this location. Based on the Synchro results summarized in Table 1, it is anticipated that this intersection will perform satisfactorily in both AM and PM peak hours.

Table 1: Level of Service by Approach – Site Access at Tecumseh Road East

Scenario	Site Access at Tecumseh Road East							
	AM Peak Hour				PM Peak Hour			
	E/B	W/B	N/B	S/B	E/B	W/B	N/B	S/B
Existing + Site Generated Traffic	A	A	-	B	A	A	-	C

SIGHT LINE ANALYSIS

For the proposed site access at Tecumseh Road East, a sight line analysis was completed in accordance with the TAC Geometric Design Guide for Canadian Roads (2017). On Tecumseh Road East, the posted speed limit is 50 km/h, so the analysis was completed for a 60 km/h design speed. As calculated in Appendix D, the minimum intersection sight distance is determined to be 125m for the worst-case left turn egress maneuver and 108m for the less-critical right turn egress maneuver. Based on the sight lines illustrated on Figure 4, it is the engineers' opinion that there is sufficient sight distance in both directions for safe egress from the proposed site access.

ITE PARKING GENERATION MANUAL VS. WINDSOR BYLAW REQUIREMENTS

A total of 58 parking spaces (including four accessible spaces) are proposed to accommodate the mixed-use development. The City of Windsor bylaw states that 1.25 parking spaces per unit are required for a multifamily mid-rise housing land use, and 1 space per 22.5 sq. m. is required for a commercial / retail land use. For a 50-unit mid-rise residential building with 2,160 sq. ft. of commercial space, the City's zoning by-law requires a minimum of 72 (63 + 9) parking spaces; accordingly, the bylaw requires 14 more parking spaces than what is provided.

To evaluate whether the proposed parking supply will accommodate the anticipated peak parking demand, the ITE Parking Generation Manual (5th Edition) was consulted; these references are provided in Appendix E. According to the ITE, peak parking demand for multifamily mid-rise housing can be estimated based on the number of dwelling units within the building. Land Use Code 221 (Multifamily Housing: Mid-Rise) provides a peak parking demand rate of 1.31 spaces per dwelling unit, which suggests that a parking supply of 66 parking spaces could sufficiently accommodate the peak parking demand generated the proposed dwelling units. Additionally, the ITE suggests that the retail land use's peak parking demand can be estimated based on square footage; Land Use Code 820 (Shopping Center) provides peak parking demand rates of 1.95 spaces per 1000 sq. ft. GLA during the weekday peak. This rate suggests that the proposed 2,160 sq. ft. commercial space should be serviced by four dedicated parking spaces during the weekday peak hour. Accordingly, these technical references suggest that a minimum of 70 parking spaces would be required to accommodate the proposed development's peak parking demand; this is 12 more than the current parking supply proposal. Therefore, since the proposed parking supply does not satisfy the City's nor the ITE's peak parking metrics, transit and active transportation options (ie. modal split options) were further explored.

MODAL SPLIT CONSIDERATIONS

The auto-dependency ratio could be lower than projected. The site is located on or nearby quality active transportation facilities and transit routes. Currently, Windsor Transit Route 10 is provided along Banwell Road, which is approximately 275m west of the site access. Active transportation facilities are also provided within the study area; existing sidewalks provided on both sides of Tecumseh Road East are conducive to good area walkability, and several destinations are within walking distance of the development (such as coffee shops, fast-food venues, walk-in clinics, grocers, commercial establishments, etc.). Therefore, it is anticipated that increased pedestrian activity could potentially result in an increased modal split that would minimize the need for on-site parking. To discourage reliance on personal automobiles and to encourage increased use of public transit / active transportation, many cities across Ontario have adopted parking supply rates of one space per unit, especially in higher density residential areas. If this rate were applied to the subject site, the 50 proposed residential units would require 50 parking spaces (plus another four to accommodate the small ground-level commercial use). Accordingly, it is the engineers' opinion that the proposed development's parking supply (of 58 spaces) is consistent with provincial trends aimed at encouraging increased use of sustainable active transportation and transit options; the proposed on-site parking supply could adequately accommodate the subject development's peak parking demand.

SUMMARY AND CONCLUSIONS

A mixed-use development has been proposed for lands situated at 11788 Tecumseh Road East, in the City of Windsor, Ontario; the site is currently occupied by a residence. At the subject site, Tecumseh Road East is a four-lane, east / west collector roadway; it is part of the arterial grid system in Tecumseh and Windsor, and it is a principal means of external access to and from the area. The proposed site plan includes a six-storey, mixed-use building with approximately 2,160 sq. ft. of dedicated retail space on the ground floor and dwelling units on the above five stories. The development team is hoping to accommodate 50 units within the mid-rise building. A single site access is proposed at Tecumseh Road East (to be located west of the current residential site access). Furthermore, a total of 58 parking spaces, including four accessible spaces, are proposed to accommodate the mixed-use development.

The City of Windsor's zoning bylaw requires a minimum of 72 parking spaces, while the ITE Parking Generation Manual (5th Edition) suggests that a minimum parking supply of 70 spaces could adequately accommodate the proposed development's peak parking demand. Since the proposed parking supply does not satisfy the City's nor the ITE's peak parking metrics, transit and active transportation options (i.e. modal split options) were further explored. The site is located on or nearby quality active transportation facilities and transit routes, and several destinations are within walking distance of the development (such as coffee shops, fast-food venues, walk-in clinics, grocers, commercial establishments, etc.). Therefore, it is anticipated that increased modal split would minimize the need for on-site parking.

To discourage reliance on personal automobiles and to encourage increased use of public transit / active transportation, many cities across Ontario have adopted parking supply rates of one space per unit, especially in higher density residential areas. If this rate were applied to the subject site, the 50 proposed residential units would require 50 parking spaces (plus another four to accommodate the small ground-level commercial use). Accordingly, it is the engineers' opinion that the proposed development's parking supply (of 58 spaces) is consistent with provincial trends aimed at encouraging increased use of sustainable active transportation and transit options; the proposed on-site parking supply could adequately accommodate the subject development's peak parking demand.

Therefore, based on the results of the technical work, it is the engineers' opinion that the proposed development will not adversely impact area traffic operations; no on-street improvements are required, and the proposed on-site parking supply could adequately service the proposed development's peak parking demands.

All of which is respectfully submitted,

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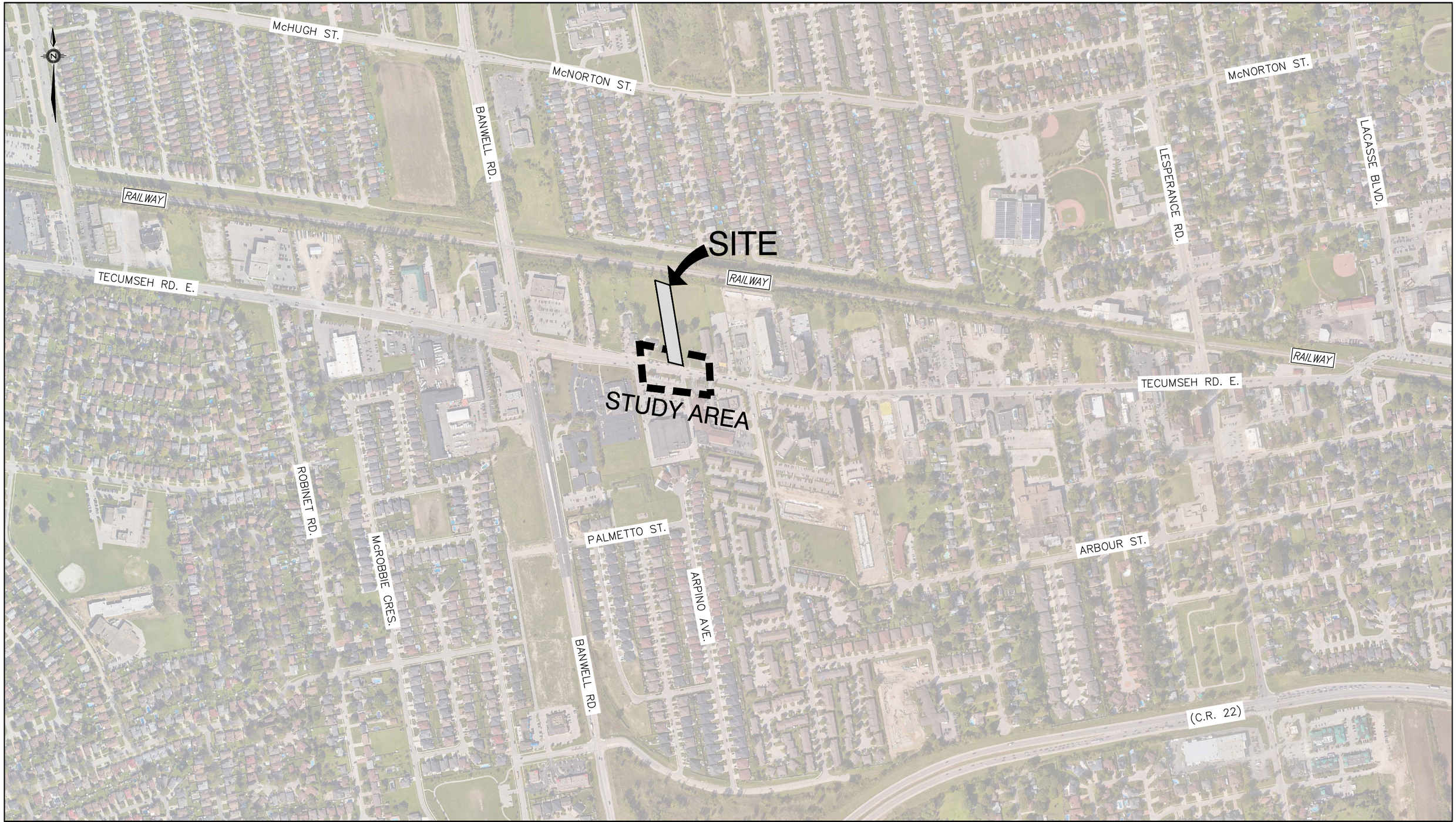
President / Windsor Office Manager



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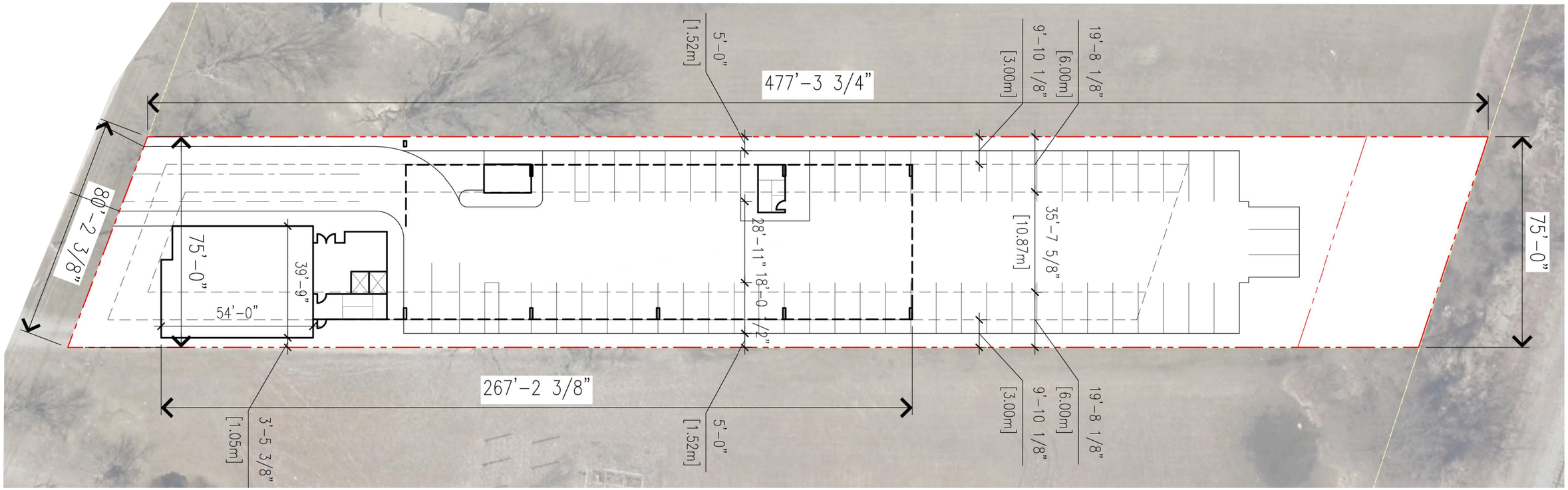
NO.	REVISION	DATE	BY	APP
2.	COMPLETED REPORT FIGURES	18 MAY 2023	M.M.	A.D.B.
1.	COMPLETED REPORT FIGURES	25 NOV. 2022	F.C.	A.D.B.

DESIGN A.D.B.
CHECKED A.D.B.
DRAWN F.C.
CHECKED A.D.B.
DATE MAY 2023
SCALE N.T.S.

11788 TECUMSEH ROAD EAST – T.I.S.

AREA PLAN

PROJECT NO. 23–1383
FIGURE NO. 1
OF 4



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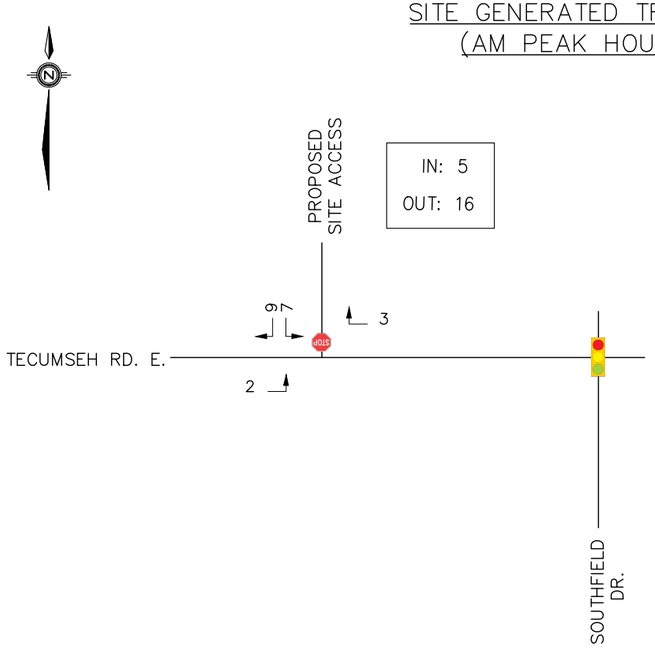
11788 TECUMSEH ROAD EAST – T.I.S.

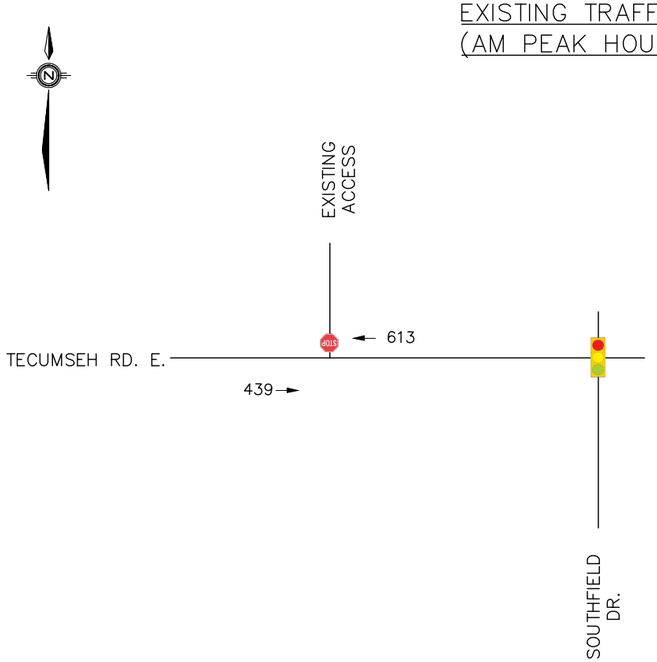
SITE PLAN

PROJECT NO. 23-1383
FIGURE NO. 2
OF 4

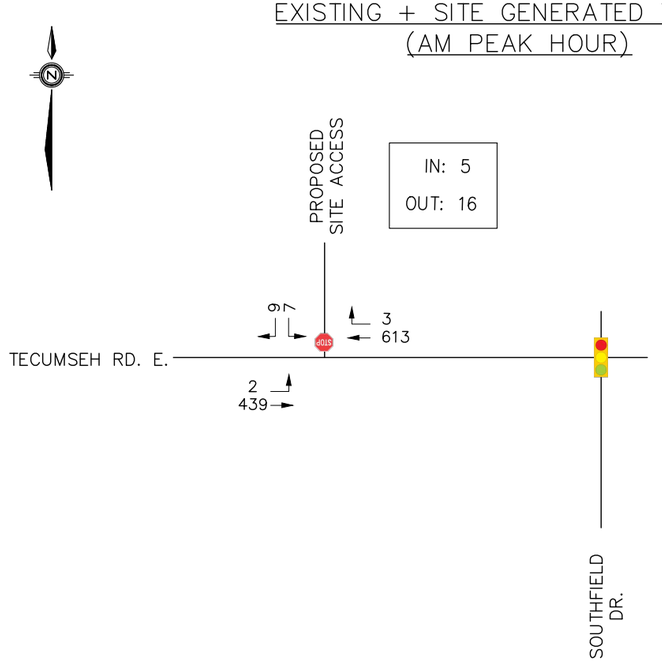
SITE GENERATED TRAFFIC (AM PEAK HOUR)



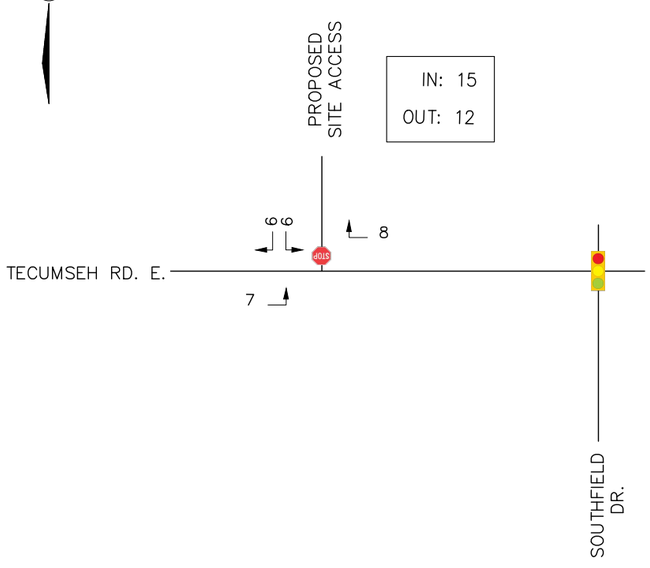
EXISTING TRAFFIC (AM PEAK HOUR)



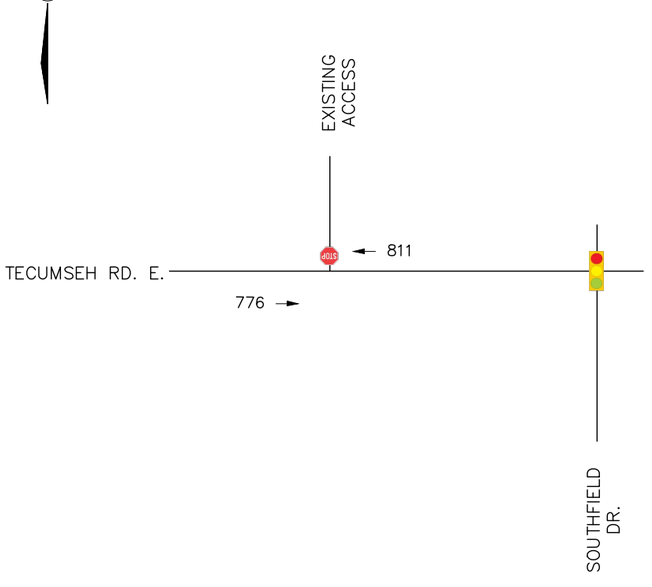
EXISTING + SITE GENERATED TRAFFIC (AM PEAK HOUR)



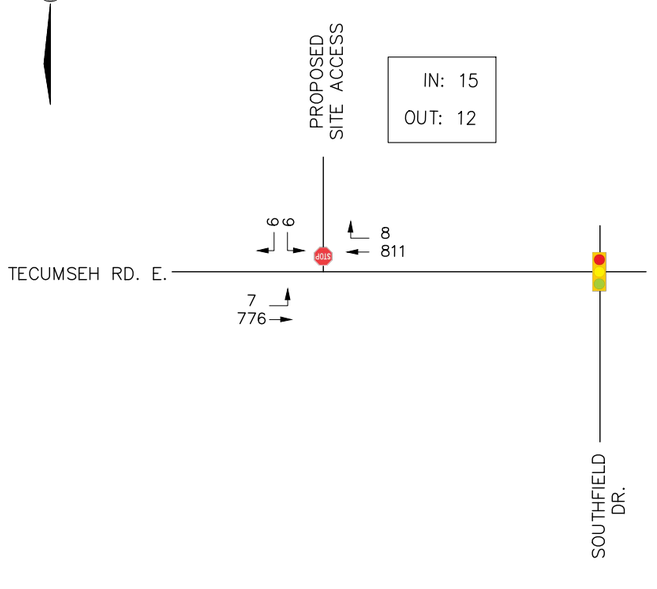
SITE GENERATED TRAFFIC (PM PEAK HOUR)



EXISTING TRAFFIC (PM PEAK HOUR)



EXISTING + SITE GENERATED TRAFFIC (AM PEAK HOUR)



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CHECKED	A.D.B.
DATE	MAY 2023
SCALE	N.T.S.

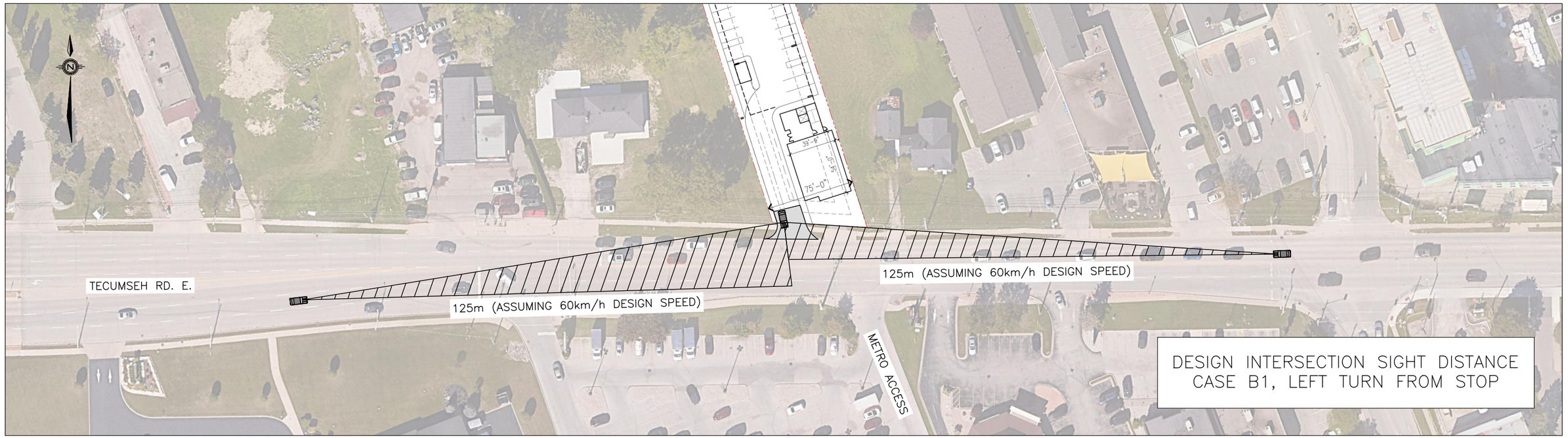
11788 TECUMSEH ROAD EAST – T.I.S.

TURNING MOVEMENTS (AM/PM PEAK HOUR)

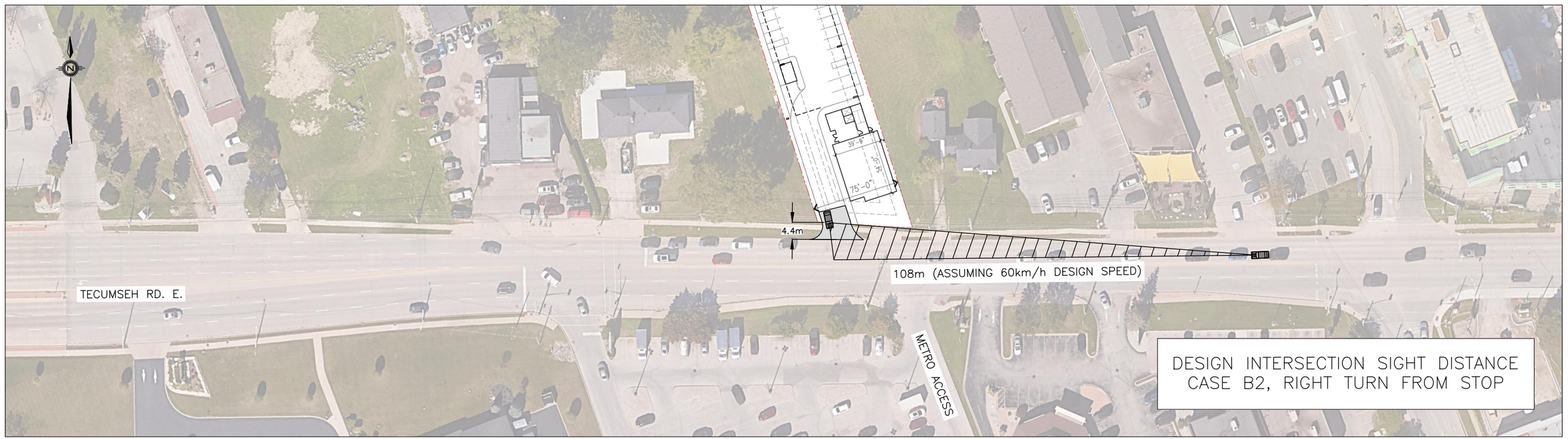
PROJECT NO. 23–1383

FIGURE NO. 3

OF 4



DESIGN INTERSECTION SIGHT DISTANCE
CASE B1, LEFT TURN FROM STOP



DESIGN INTERSECTION SIGHT DISTANCE
CASE B2, RIGHT TURN FROM STOP

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11788 TECUMSEH ROAD EAST – T.I.S.

SIGHT LINE ANALYSIS: SITE ACCESS AT TECUMSEH RD. E.

PROJECT NO. 23–1383

FIGURE NO. 4

OF 4

Appendix A

TRAFFIC DATA COLLECTION

Southfield Drive at Tecumseh Road East

Date: 30 March 2023
Counted By: Kristian R.
Weather Conditions: Cloudy
Southfield Dr. at Tecumseh Road E.

RC SPENCER ASSOCIATES INC.
Consulting Engineers

Groups Printed- P. Veh. - Trucks - Buses

	Tecumseh Road E. E/B					Tecumseh Road E. W/B					Southfield Dr. N/B					Tecumseh Square S/B							
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	11	29	0	(0)	40	0	40	9	(1)	49	5	2	8	(0)	15	1	1	0	(0)	2	1	106	107
07:15 AM	21	54	1	(0)	76	0	64	17	(0)	81	8	0	17	(0)	25	0	0	0	(0)	0	0	182	182
07:30 AM	22	58	0	(2)	80	2	85	21	(0)	108	13	0	32	(0)	45	2	0	0	(0)	2	2	235	237
07:45 AM	34	78	0	(1)	112	2	97	17	(2)	116	28	1	25	(0)	54	4	1	0	(0)	5	3	287	290
Total	88	219	1	(3)	308	4	286	64	(3)	354	54	3	82	(0)	139	7	2	0	(0)	9	6	810	816
08:00 AM	31	66	0	(1)	97	0	125	24	(0)	149	21	0	18	(1)	39	0	0	0	(0)	0	2	285	287
08:15 AM	34	95	0	(1)	129	0	120	21	(0)	141	27	0	33	(1)	60	1	0	0	(0)	1	2	331	333
08:30 AM	19	82	0	(0)	101	0	156	29	(1)	185	19	0	34	(1)	53	0	0	0	(0)	0	2	339	341
08:45 AM	23	89	0	(0)	112	1	105	19	(0)	125	17	0	15	(0)	32	0	0	0	(0)	0	0	269	269
Total	107	332	0	(2)	439	1	506	93	(1)	600	84	0	100	(3)	184	1	0	0	(0)	1	6	1224	1230
*** BREAK ***																							
11:00 AM	18	125	0	(0)	143	1	133	11	(0)	145	18	0	27	(0)	45	3	0	1	(0)	4	0	337	337
11:15 AM	22	117	1	(1)	140	1	154	6	(0)	161	17	1	30	(0)	48	2	0	0	(1)	2	2	351	353
11:30 AM	23	161	0	(1)	184	2	114	7	(0)	123	18	0	22	(1)	40	2	0	2	(0)	4	2	351	353
11:45 AM	24	154	0	(2)	178	1	142	7	(0)	150	14	0	22	(0)	36	2	0	1	(0)	3	2	367	369
Total	87	557	1	(4)	645	5	543	31	(0)	579	67	1	101	(1)	169	9	0	4	(1)	13	6	1406	1412
12:00 PM	23	140	1	(0)	164	1	142	15	(0)	158	17	0	37	(0)	54	0	0	0	(1)	0	1	376	377
12:15 PM	17	123	1	(2)	141	2	122	6	(2)	130	7	0	24	(0)	31	1	0	1	(2)	2	6	304	310
12:30 PM	47	145	0	(2)	192	1	138	5	(1)	144	11	0	21	(0)	32	2	0	1	(1)	3	4	371	375
12:45 PM	25	146	0	(0)	171	1	143	10	(0)	154	16	1	17	(0)	34	1	0	0	(0)	1	0	360	360
Total	112	554	2	(4)	668	5	545	36	(3)	586	51	1	99	(0)	151	4	0	2	(4)	6	11	1411	1422
01:00 PM	26	142	2	(0)	170	0	160	11	(0)	171	10	0	22	(0)	32	0	1	1	(0)	2	0	375	375
01:15 PM	27	140	0	(0)	167	0	138	15	(0)	153	19	0	23	(0)	42	1	0	0	(0)	1	0	363	363
01:30 PM	13	157	1	(2)	171	1	149	13	(1)	163	14	1	28	(0)	43	1	1	0	(0)	2	3	379	382
01:45 PM	15	160	2	(0)	177	1	123	13	(0)	137	15	0	22	(0)	37	1	0	0	(0)	1	0	352	352
Total	81	599	5	(2)	685	2	570	52	(1)	624	58	1	95	(0)	154	3	2	1	(0)	6	3	1469	1472
*** BREAK ***																							
03:00 PM	35	148	0	(2)	183	3	166	18	(0)	187	25	0	27	(1)	52	0	0	2	(0)	2	3	424	427
03:15 PM	26	163	1	(2)	190	0	195	10	(0)	205	26	0	37	(0)	63	1	1	0	(1)	2	3	460	463
03:30 PM	28	186	2	(1)	216	0	170	14	(0)	184	16	0	34	(1)	50	0	0	0	(0)	0	2	450	452
03:45 PM	29	156	2	(1)	187	1	160	7	(0)	168	20	0	21	(1)	41	0	0	0	(1)	0	3	396	399
Total	118	653	5	(6)	776	4	691	49	(0)	744	87	0	119	(3)	206	1	1	2	(2)	4	11	1730	1741
04:00 PM	18	175	0	(1)	193	2	169	9	(0)	180	23	0	14	(0)	37	0	0	1	(0)	1	1	411	412
04:15 PM	17	171	3	(0)	191	2	128	10	(0)	140	13	0	20	(0)	33	1	1	2	(0)	4	0	368	368
04:30 PM	15	153	1	(0)	169	1	163	13	(0)	177	24	2	32	(0)	58	4	1	1	(0)	6	0	410	410
04:45 PM	21	180	0	(1)	201	0	123	9	(0)	132	12	1	16	(0)	29	2	0	0	(0)	2	1	364	365
Total	71	679	4	(2)	754	5	583	41	(0)	629	72	3	82	(0)	157	7	2	4	(0)	13	2	1553	1555
05:00 PM	22	176	2	(0)	200	1	149	13	(0)	163	15	0	19	(0)	34	0	0	0	(0)	0	0	397	397
05:15 PM	19	176	3	(1)	198	0	145	11	(0)	156	20	1	16	(0)	37	0	0	1	(0)	1	1	392	393
05:30 PM	20	154	2	(0)	176	1	114	15	(0)	130	14	0	18	(0)	32	0	0	1	(0)	1	0	339	339
05:45 PM	18	138	1	(0)	157	0	130	8	(0)	138	18	2	20	(0)	40	3	0	0	(1)	3	1	338	339
Total	79	644	8	(1)	731	2	538	47	(0)	587	67	3	73	(0)	143	3	0	2	(1)	5	2	1466	1468
Grand Total	743	4237	26	(24)	5006	28	4262	413	(8)	4703	540	12	751	(7)	1303	35	7	15	(8)	57	47	11069	11116
Apprch %	14.8	84.6	0.5			0.6	90.6	8.8			41.4	0.9	57.6			61.4	12.3	26.3					
Total %	6.7	38.3	0.2		45.2	0.3	38.5	3.7		42.5	4.9	0.1	6.8		11.8	0.3	0.1	0.1		0.5	0.4	99.6	
P. Veh.	731	4224	26		5005	28	4243	409		4688	537	12	741		1297	35	7	14		64	0	0	11054
% P. Veh.	98.4	99.7	100	100	99.5	100	99.6	99	100	99.5	99.4	100	98.7	100	99	100	100	93.3	100	98.5	0	0	99.4

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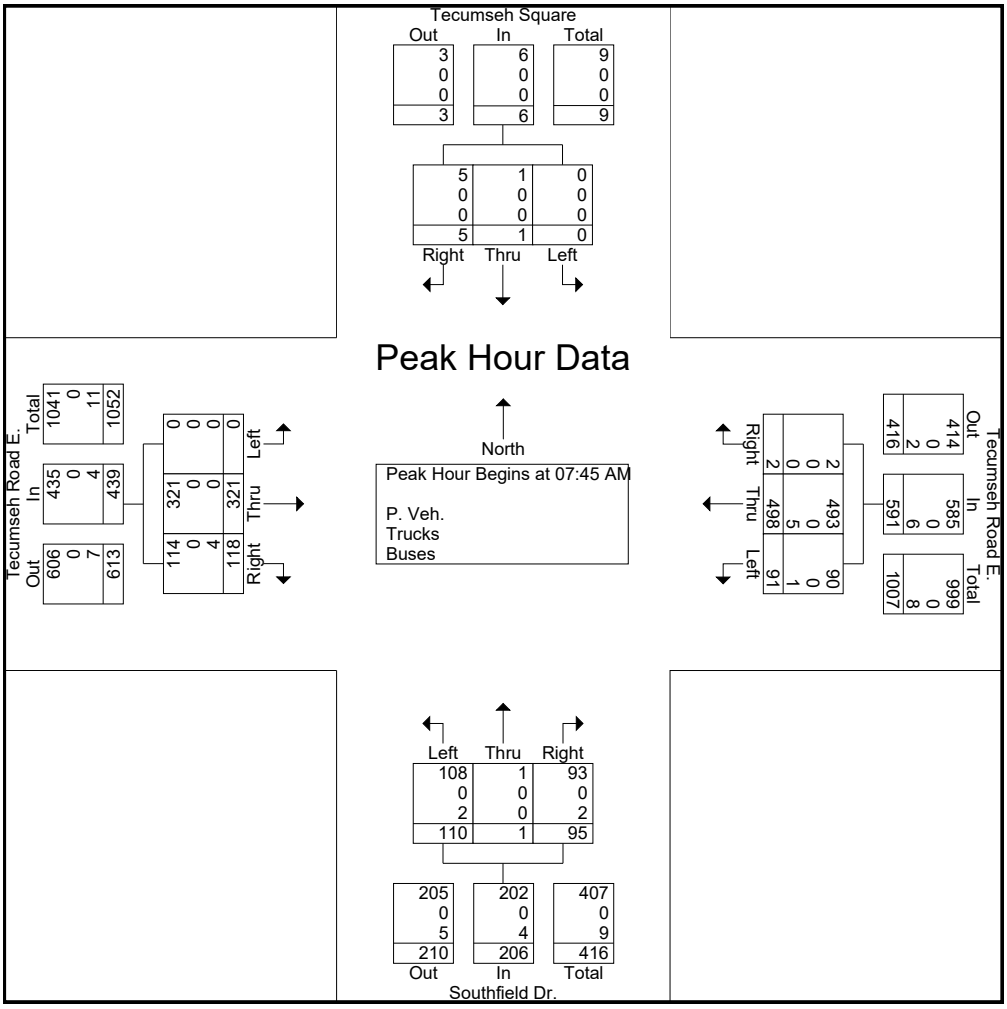
Groups Printed- P. Veh. - Trucks - Buses

	Tecumseh Road E. E/B					Tecumseh Road E. W/B					Southfield Dr. N/B					Tecumseh Square S/B							
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Exclu. Total	Inclu. Total	Int. Total
Trucks	2	9	0		11	0	9	1		10	0	0	1		1	0	0	1		1	0	0	23
% Trucks	0.3	0.2	0	0	0.2	0	0.2	0.2	0	0.2	0	0	0.1	0	0.1	0	0	6.7	0	1.5	0	0	0.2
Buses	10	4	0		14	0	10	3		13	3	0	9		12	0	0	0		0	0	0	39
% Buses	1.3	0.1	0	0	0.3	0	0.2	0.7	0	0.3	0.6	0	1.2	0	0.9	0	0	0	0	0	0	0	0.4

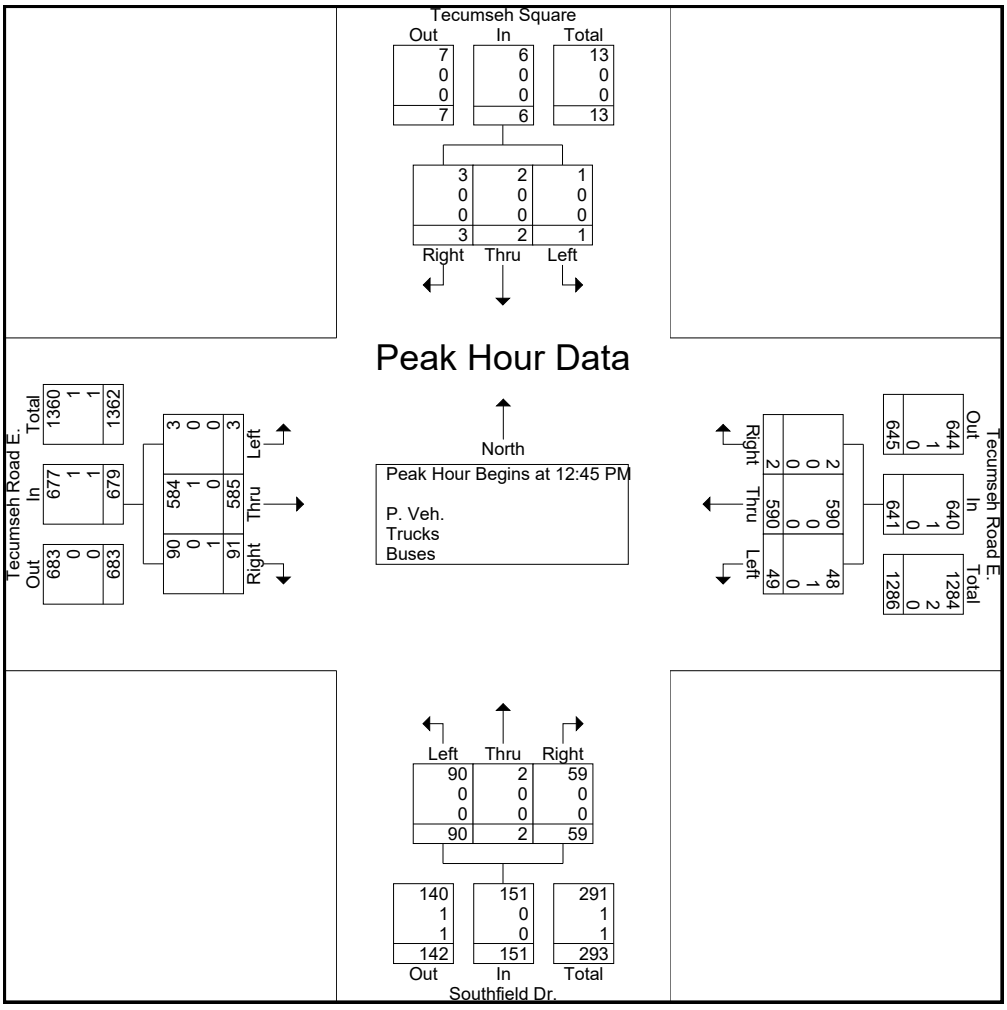
RC SPENCER ASSOCIATES INC.
Consulting Engineers

	Tecumseh Road E. E/B				Tecumseh Road E. W/B				Southfield Dr. N/B				Tecumseh Square S/B				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	**34**	78	0	112	**2**	97	17	116	**28**	**1**	25	54	**4**	**1**	0	**5**	287
08:00 AM	31	66	0	97	0	125	24	149	21	0	18	39	0	0	0	0	285
08:15 AM	34	**95**	0	**129**	0	120	21	141	27	0	33	**60**	1	0	0	1	331
08:30 AM	19	82	0	101	0	**156**	**29**	**185**	19	0	**34**	53	0	0	0	0	**339**
Total Volume	118	321	0	439	2	498	91	591	95	1	110	206	5	1	0	6	1242
% App. Total	26.9	73.1	0		0.3	84.3	15.4		46.1	0.5	53.4		83.3	16.7	0		
PHF	.868	.845	.000	.851	.250	.798	.784	.799	.848	.250	.809	.858	.313	.250	.000	.300	.916
P. Veh.	114	321	0	435	2	493	90	585	93	1	108	202	5	1	0	6	1228
% P. Veh.	96.6	100	0	99.1	100	99.0	98.9	99.0	97.9	100	98.2	98.1	100	100	0	100	98.9
Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Buses	4	0	0	4	0	5	1	6	2	0	2	4	0	0	0	0	14
% Buses	3.4	0	0	0.9	0	1.0	1.1	1.0	2.1	0	1.8	1.9	0	0	0	0	1.1



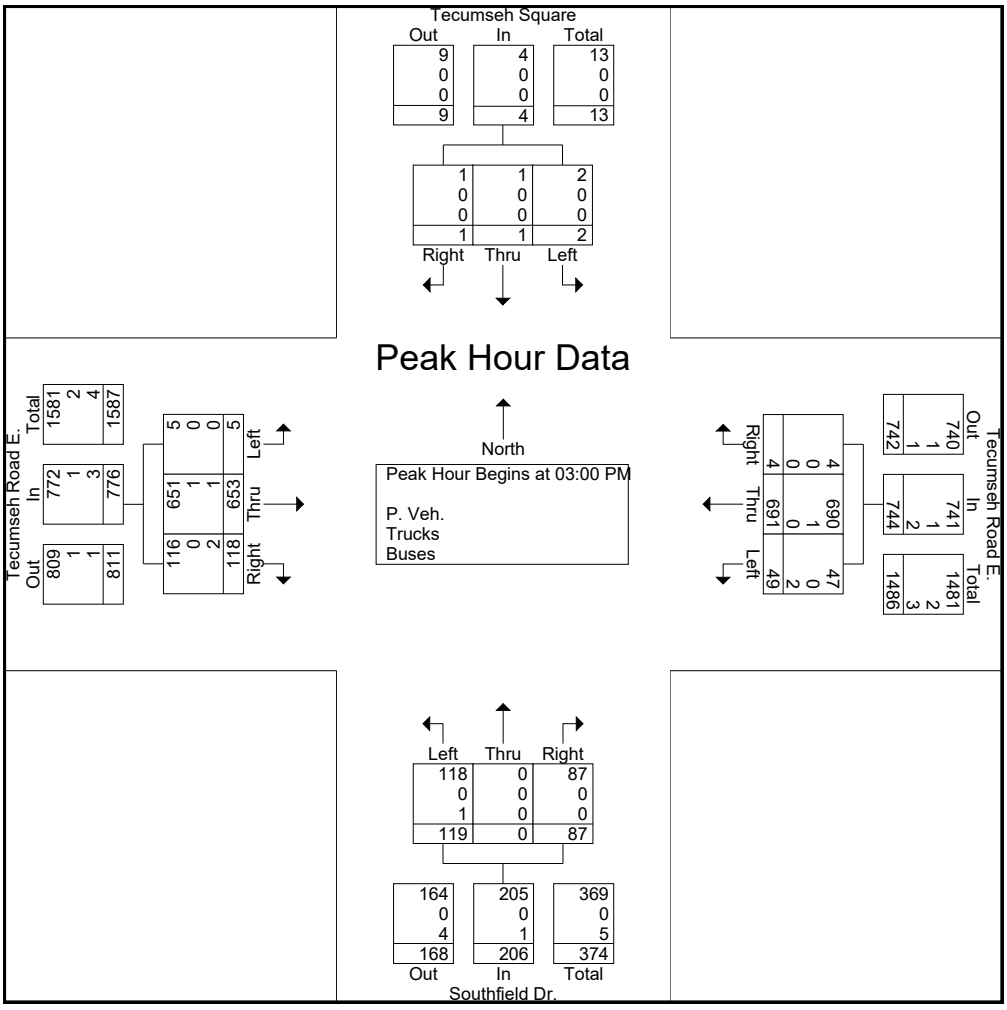
RC SPENCER ASSOCIATES INC.
Consulting Engineers

	Tecumseh Road E. E/B				Tecumseh Road E. W/B				Southfield Dr. N/B				Tecumseh Square S/B				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:45 PM																	
12:45 PM	25	146	0	**171**	**1**	143	10	154	16	**1**	17	34	**1**	0	0	1	360
01:00 PM	26	142	**2**	170	0	**160**	11	**171**	10	0	22	32	0	**1**	**1**	**2**	375
01:15 PM	**27**	140	0	167	0	138	**15**	153	**19**	0	23	42	1	0	0	1	363
01:30 PM	13	**157**	1	171	1	149	13	163	14	1	**28**	**43**	1	1	0	2	**379**
Total Volume	91	585	3	679	2	590	49	641	59	2	90	151	3	2	1	6	1477
% App. Total	13.4	86.2	0.4		0.3	92	7.6		39.1	1.3	59.6		50	33.3	16.7		
PHF	.843	.932	.375	.993	.500	.922	.817	.937	.776	.500	.804	.878	.750	.500	.250	.750	.974
P. Veh.	90	584	3	677	2	590	48	640	59	2	90	151	3	2	1	6	1474
% P. Veh.	98.9	99.8	100	99.7	100	100	98.0	99.8	100	100	100	100	100	100	100	100	99.8
Trucks	0	1	0	1	0	0	1	1	0	0	0	0	0	0	0	0	2
% Trucks	0	0.2	0	0.1	0	0	2.0	0.2	0	0	0	0	0	0	0	0	0.1
Buses	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
% Buses	1.1	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0.1



RC SPENCER ASSOCIATES INC.
Consulting Engineers

	Tecumseh Road E. E/B				Tecumseh Road E. W/B				Southfield Dr. N/B				Tecumseh Square S/B				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:00 PM																	
03:00 PM	**35**	148	0	183	**3**	166	**18**	187	25	0	27	52	0	0	**2**	**2**	424
03:15 PM	26	163	1	190	0	**195**	10	**205**	**26**	0	**37**	**63**	**1**	**1**	0	2	**460**
03:30 PM	28	**186**	**2**	**216**	0	170	14	184	16	0	34	50	0	0	0	0	450
03:45 PM	29	156	2	187	1	160	7	168	20	0	21	41	0	0	0	0	396
Total Volume	118	653	5	776	4	691	49	744	87	0	119	206	1	1	2	4	1730
% App. Total	15.2	84.1	0.6		0.5	92.9	6.6		42.2	0	57.8		25	25	50		
PHF	.843	.878	.625	.898	.333	.886	.681	.907	.837	.000	.804	.817	.250	.250	.250	.500	.940
P. Veh.	116	651	5	772	4	690	47	741	87	0	118	205	1	1	2	4	1722
% P. Veh.	98.3	99.7	100	99.5	100	99.9	95.9	99.6	100	0	99.2	99.5	100	100	100	100	99.5
Trucks	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	2
% Trucks	0	0.2	0	0.1	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0.1
Buses	2	1	0	3	0	0	2	2	0	0	1	1	0	0	0	0	6
% Buses	1.7	0.2	0	0.4	0	0	4.1	0.3	0	0	0.8	0.5	0	0	0	0	0.3



Appendix B

ITE TRIP GENERATION MANUAL – 11TH EDITION REFERENCES

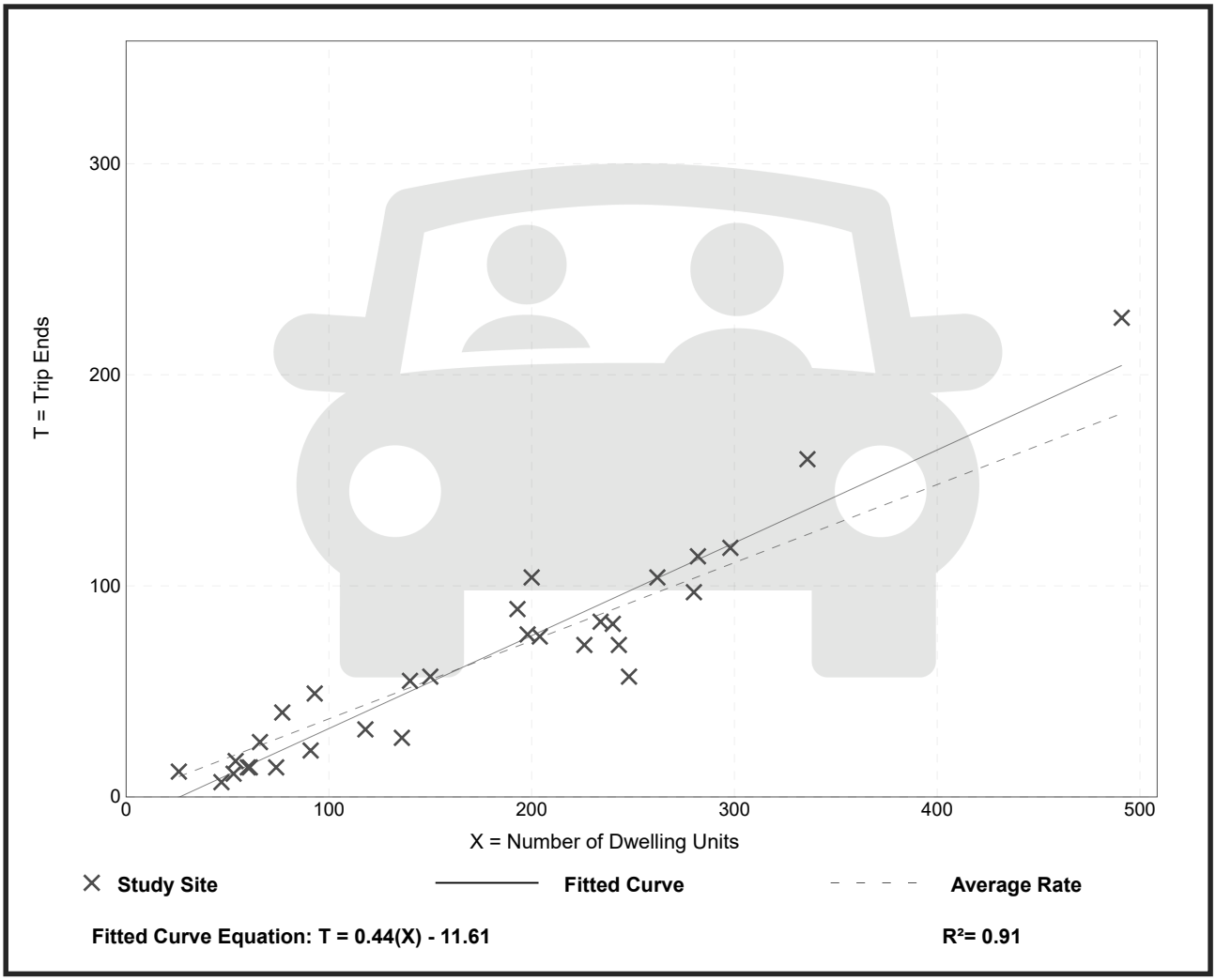
Multifamily Housing (Mid-Rise)
Not Close to Rail Transit (221)

Vehicle Trip Ends vs:	**Dwelling Units**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 7 and 9 a.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	30
Avg. Num. of Dwelling Units:	173
Directional Distribution:	23% entering, 77% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.37	0.15 - 0.53	0.09

Data Plot and Equation



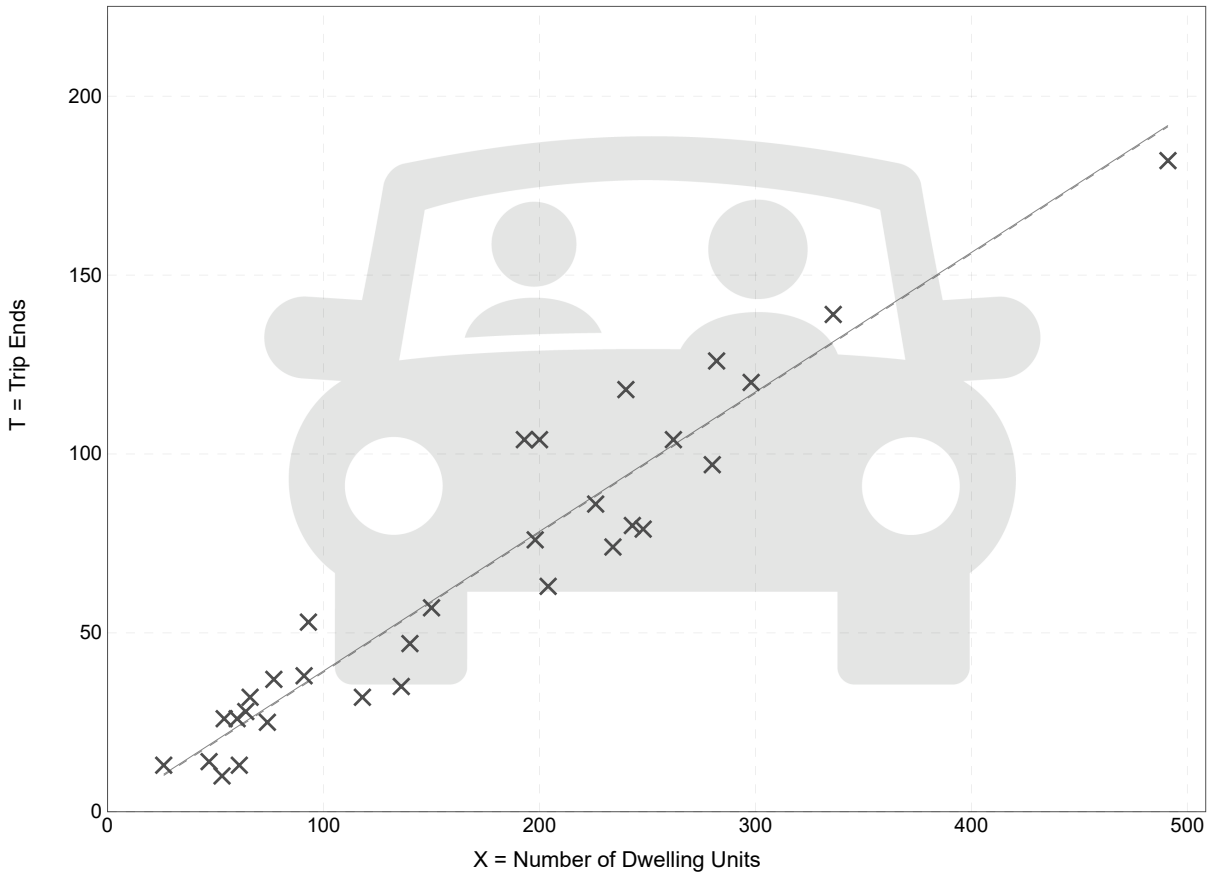
Multifamily Housing (Mid-Rise)
Not Close to Rail Transit (221)

Vehicle Trip Ends vs:	**Dwelling Units**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 4 and 6 p.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	31
Avg. Num. of Dwelling Units:	169
Directional Distribution:	61% entering, 39% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.39	0.19 - 0.57	0.08

Data Plot and Equation



Fitted Curve Equation: T = 0.39(X) + 0.34

R^2= 0.91

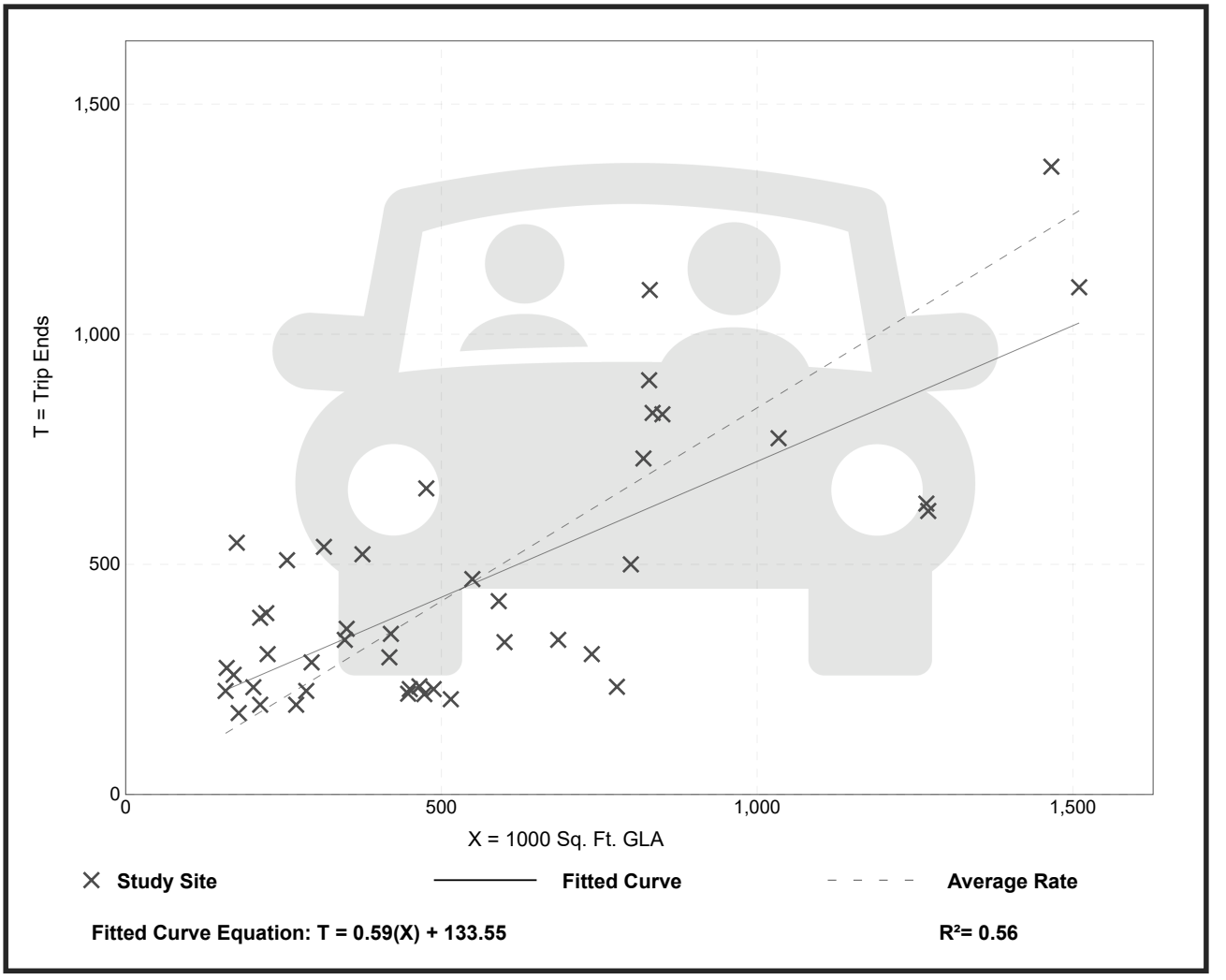
Shopping Center (>150k)
(820)

Vehicle Trip Ends vs: **1000 Sq. Ft. GLA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 44
Avg. 1000 Sq. Ft. GLA: 546
Directional Distribution: 62% entering, 38% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
0.84	0.30 - 3.11	0.42

Data Plot and Equation



Fitted Curve Equation: T = 0.59(X) + 133.55

R^2= 0.56

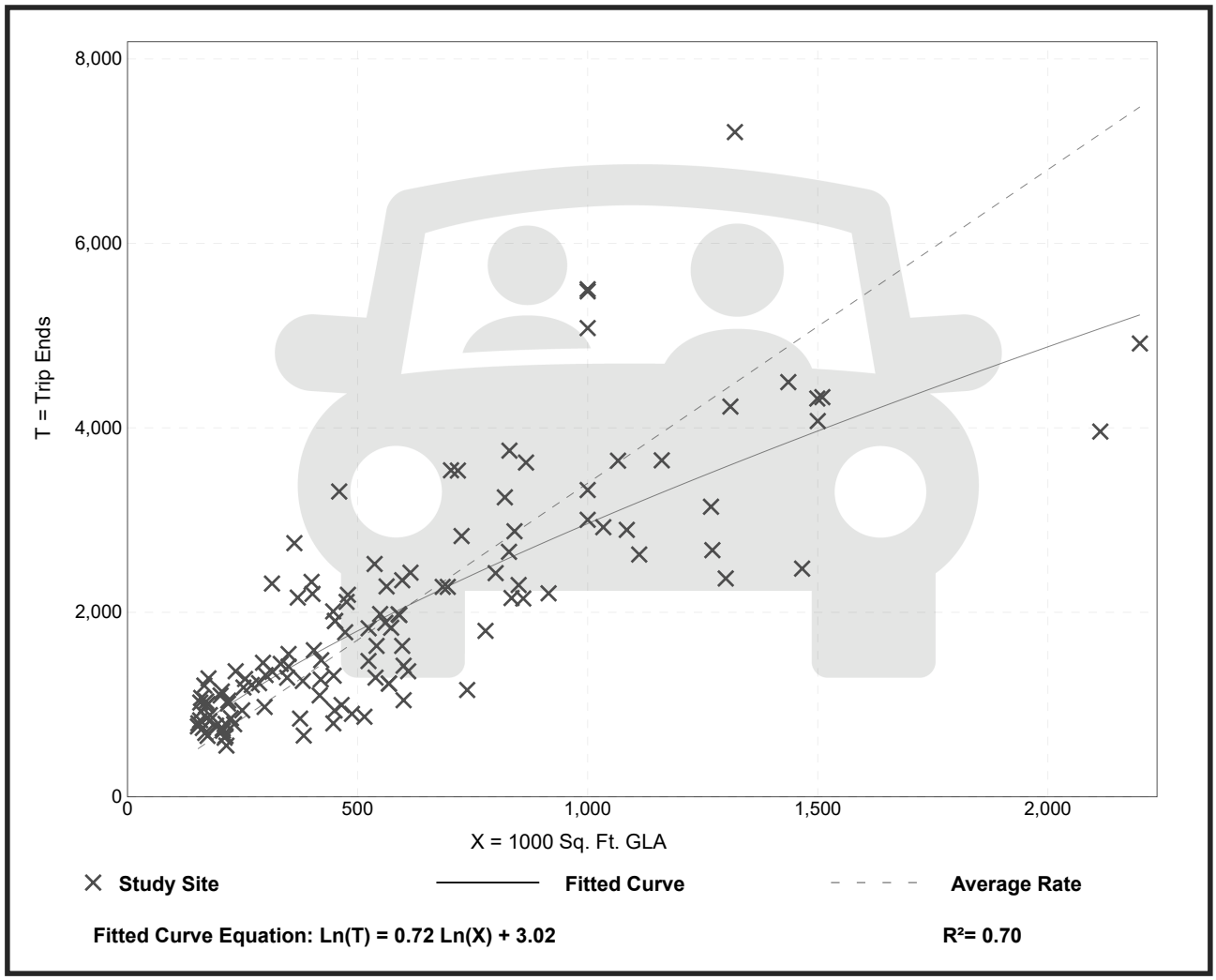
Shopping Center (>150k)
(820)

Vehicle Trip Ends vs:	**1000 Sq. Ft. GLA**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 4 and 6 p.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	126
Avg. 1000 Sq. Ft. GLA:	581
Directional Distribution:	48% entering, 52% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
3.40	1.57 - 7.58	1.26

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.72 Ln(X) + 3.02

R^2= 0.70

Proposed Site Development Trip Generation and Distribution

Project: 11788 Tecumseh Road E. Mixed Use Development

Site: Windsor ON

Assumed Land Use (1): Multifamily Housing (Mid-Rise) - ITE No. 221

Average Vehicle Trip Ends vs.: Dwelling Units

ITE Trip Generation Data collected on a: Weekday / Weekend

AM Peak Hour:	0.37	= Average Rate	23	% Entering
			77	% Exiting
PM Peak Hour:	0.39	= Average Rate	61	% Entering
			39	% Exiting

Assumed Land Use (2): Shopping Center (<150k) - ITE No. 820

Average Vehicle Trip Ends vs.: 1000 Sq. Ft. GLA

ITE Trip Generation Data collected on a: Weekday / Weekend

AM Peak Hour:	0.84	= Average Rate	62	% Entering
			38	% Exiting
PM Peak Hour:	3.40	= Average Rate	48	% Entering
			52	% Exiting

Assumed Land Use (1): Multifamily Housing (Mid-Rise) - ITE No. 221				
	Dwelling Units	**Trips Generated**	**Trips Entering**	**Trips Exiting**
AM Peak	50	19	4	15
PM Peak	50	20	12	8

Assumed Land Use (2): Shopping Center (<150k) - ITE No. 820				
	1000 Sq. Ft. GLA	**Trips Generated**	**Trips Entering**	**Trips Exiting**
AM Peak	2.16	2	1	1
PM Peak	2.16	7	3	4

Total Trips		
	Trips Entering	**Trips Exiting**
AM Peak	5	16
PM Peak	15	12

Appendix C

DETAILED SYNCRO RESULTS

Site Access at Tecumseh Road East

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	2	439	613	3	7	9
Future Vol, veh/h	2	439	613	3	7	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	477	666	3	8	10

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	669	0	-	0	911	335
Stage 1	-	-	-	-	668	-
Stage 2	-	-	-	-	243	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	917	-	-	-	274	661
Stage 1	-	-	-	-	471	-
Stage 2	-	-	-	-	775	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	917	-	-	-	273	661
Mov Cap-2 Maneuver	-	-	-	-	273	-
Stage 1	-	-	-	-	470	-
Stage 2	-	-	-	-	775	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	14.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	917	-	-	-	408
HCM Lane V/C Ratio	0.002	-	-	-	0.043
HCM Control Delay (s)	8.9	0	-	-	14.2
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	7	776	811	8	6	6
Future Vol, veh/h	7	776	811	8	6	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	843	882	9	7	7

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	891	0	-	0	1325	446
Stage 1	-	-	-	-	887	-
Stage 2	-	-	-	-	438	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	757	-	-	-	147	560
Stage 1	-	-	-	-	363	-
Stage 2	-	-	-	-	618	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	757	-	-	-	144	560
Mov Cap-2 Maneuver	-	-	-	-	144	-
Stage 1	-	-	-	-	356	-
Stage 2	-	-	-	-	618	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	21.7
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	757	-	-	-	229
HCM Lane V/C Ratio	0.01	-	-	-	0.057
HCM Control Delay (s)	9.8	0.1	-	-	21.7
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Appendix D

SIGHT LINE CALCULATIONS

Site Access at Tecumseh Road East

23-1383: Tecumseh Road East Mixed-Use Development, Windsor, Ontario - Sight Line Analysis

Design Intersection Sight Distance (TAC Geometric Design Guide for Canadian Roads)

Design Speed: 60km/h (Posted Speed Limit = 50 km/h)

Table 9.9.3: Time Gap for Case B1, Left Turn from Stop

Design Vehicle	Time Gap (t_g)(s) at Design Speed of Major Road
Passenger car	7.5
Single-unit truck	9.5
Combination truck (WB 19 and WB 20)	11.5
Longer truck	To be established by road authority

Intersection Stopping Distance **(ISD)** = 0.278 V_{major} t_g

Where:

ISD = intersection sight distance (m)
(length of the leg of sight triangle along the major road)
V_{major} = design speed of the major road (km/h)
t_g = time gap for minor road vehicle to enter the major road (s)

ISD $_{passenger\ car}$ (left turn from stop) = 0.278 x 60 x 7.5 = **125 m**

Table 9.9.5: Time Gap for Case B2—Right Turn from Stop and Case B3—Crossing Maneuver

Design Vehicle	Time Gap (t_g)(s) at Design Speed of Major Road
Passenger car	6.5
Single-unit truck	8.5
Combination truck (WB 19 and WB 20)	10.5

ISD $_{passenger\ car}$ (right turn from stop) = 0.278 x 60 x 6.5 = **108 m**

Appendix E

ITE PARKING GENERATION REFERENCES

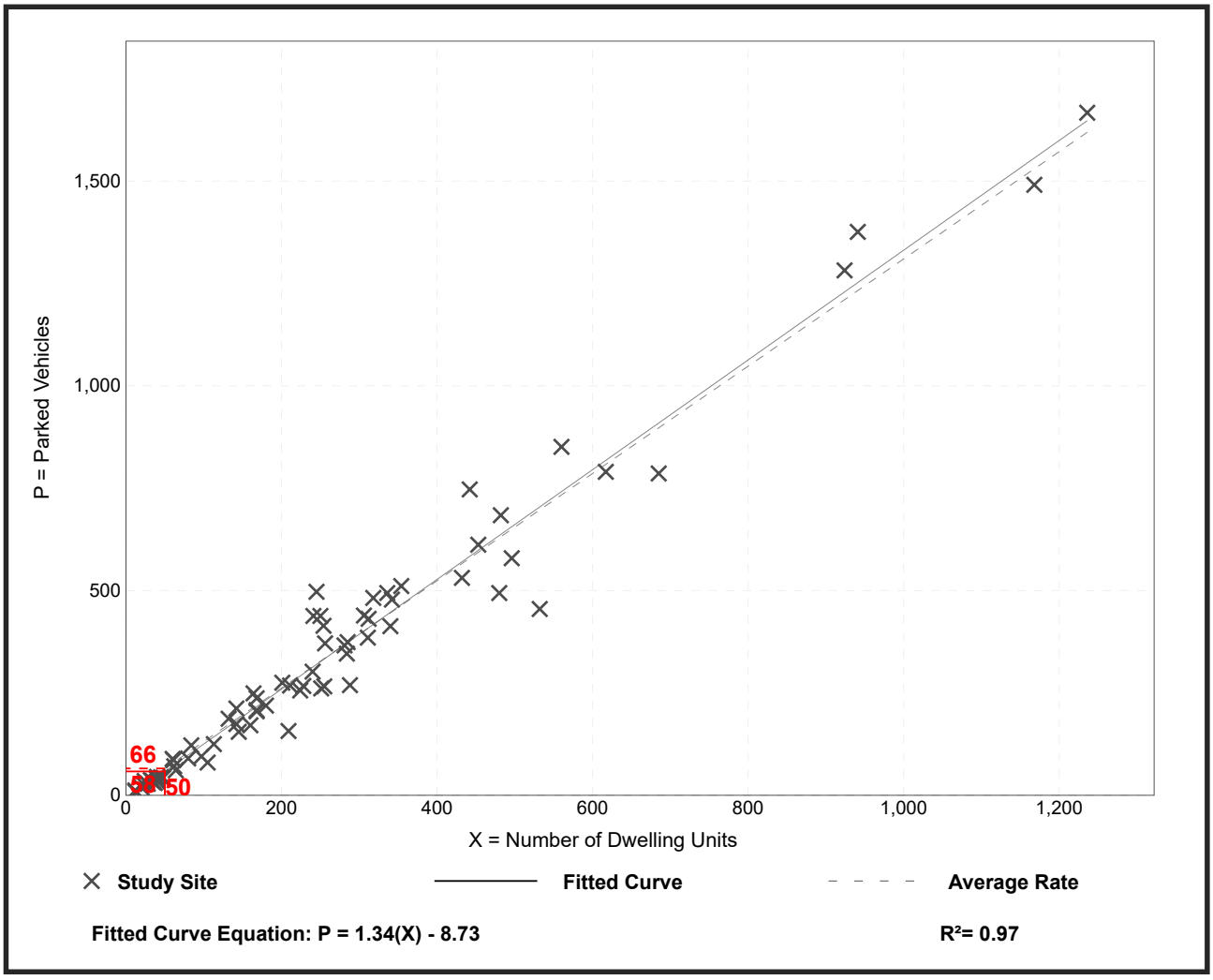
Multifamily Housing (Mid-Rise)
(221)

Peak Period Parking Demand vs: **Dwelling Units**
On a: **Weekday (Monday - Friday)**
Setting/Location: **General Urban/Suburban (no nearby rail transit)**
Peak Period of Parking Demand: **10:00 p.m. - 5:00 a.m.**
Number of Studies: 73
Avg. Num. of Dwelling Units: 261

Peak Period Parking Demand per Dwelling Unit

Average Rate	Range of Rates	33rd / 85th Percentile	95% Confidence Interval	Standard Deviation (Coeff. of Variation)
1.31	0.75 - 2.03	1.13 / 1.47	1.26 - 1.36	0.22 (17%)

Data Plot and Equation



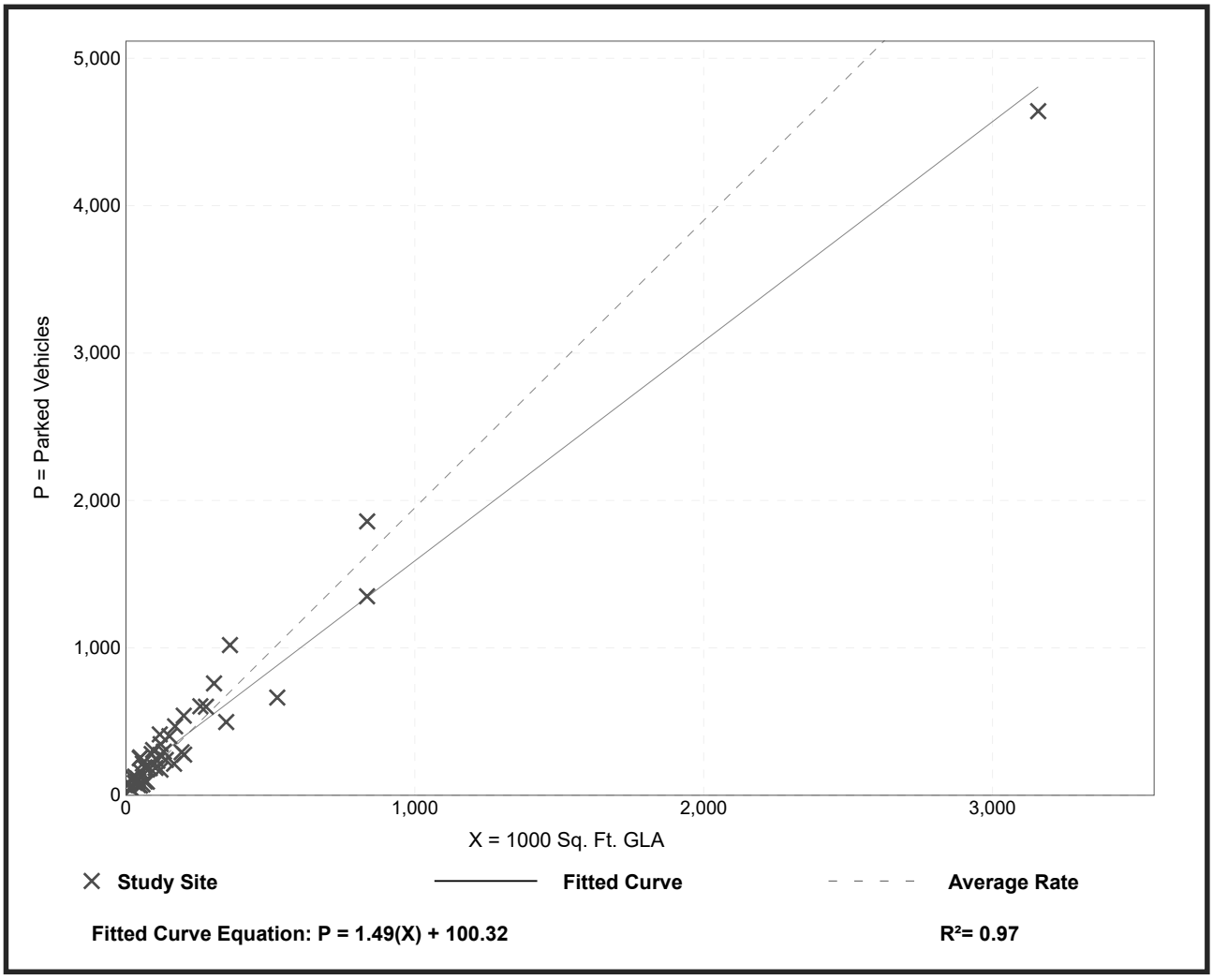
Shopping Center - Non-December
(820)

Peak Period Parking Demand vs: **1000 Sq. Ft. GLA**
On a: **Weekday (Monday - Thursday)**
Setting/Location: **General Urban/Suburban**
Peak Period of Parking Demand: **12:00 - 6:00 p.m.**
Number of Studies: 46
Avg. 1000 Sq. Ft. GLA: 218

Peak Period Parking Demand per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	33rd / 85th Percentile	95% Confidence Interval	Standard Deviation (Coeff. of Variation)
1.95	1.27 - 7.98	1.99 / 3.68	1.73 - 2.17	0.75 (38%)

Data Plot and Equation



Fitted Curve Equation: P = 1.49(X) + 100.32 **R^2= 0.97**