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PLANNING DEPT.

ROCHESTER HILLS
MICHIGAN

BUILDING DEPARTMENT
[Scott Cope Director]

From: Dick Lange, P.E., Building Inspector/Plan Reviewer D. L.
To: Jim Breuckman, Planning Department
Date: February 4, 2014
Re: Campus Corners Retail Review #3, 15-15-101-024 City File #13-012

The site plan review for Campus Corners Retail Review #3, 15-15-101-024 City File #13-012 was based on the following drawings and information submitted:

Sheet # SP.101, A.101, Elevation Sheet

Building code comments: Dick Lange

References are based on the Michigan Building Code 2009.

Approval recommended based on the following conditions being satisfied prior to issuance of a Building Permit.

The following information is required on plans submitted for Site Plan Review. References are based on the Michigan Building Code – 2009. (MBC – 2009) unless otherwise noted.

BUILDING CODE REQUIREMENTS

1. Accessible parking including parking and access aisle surface slope details-
    a. Indicate the proposed surfaces slopes of accessible parking spaces and their access aisles. Provide sufficient point elevations on the plan at the perimeter of such spaces to clearly verify the provisions of ICC/ANSI A117.1-2003, Section 502.5 have been satisfied (1:48 max slope).
    b. Provide details of required accessible parking signage per the requirements of ICC/ANSI A117.1-2003, Section 502.7. Signs identifying van parking spaces shall contain the designation "van accessible."
2. The proposed curb ramp at the accessible parking does not appear to comply with ICC/ANSI A117.1 – 2003, Section 406. Curb ramps require a minimum 36" landing at the top. See Figure 406.3. I would suggest relocating the curb ramp directly adjacent to the north side of the van accessible parking space.
3. Exterior accessible route including slope details-
    a. Indicate on the Site Plan the following proposed accessible route/routes to the accessible entrances as applicable.
        i. 1104.1 Site arrival points. Accessible routes within the site shall be provided from public transportation stops, accessible parking and accessible passenger loading zones and public streets or sidewalks to the accessible building entrance served.

            Exception: An accessible route shall not be required between site arrival points and the building or facility entrance if the only means of access between them is a vehicular way not providing for pedestrian access.

ii. The proposed route from the public sidewalk to the building does not appear to have a required curb ramp at the exterior outdoor seating area. I would suggest relocating this route to align with the accessible parking curb ramp.

b. Provide sufficient grade information on the plans along the proposed accessible route/routes to verify compliance with the requirements of ICC/ANSI A117.1-2003, Section 402.

c. Provide details (as applicable) of the following components along the proposed accessible route/routes to verify compliance with ICC/ANSI A117.1-2003:
   i. Door maneuvering clearance and ground surface slope per Section 404.
   ii. Ramps per Section 405.
   iii. Curb Ramps per Section 406.

4. Provide sufficient grade information on the plan to verity compliance with Section 1804.3 for site grading away from the building (2% minimum).

If there are any questions, please call the Building Department at 248-656-4615. Office hours are 8 a.m. to 5 p.m. Monday through Friday.

ROCHESTER HILLS
MICHIGAN

FIRE DEPARTMENT
Ronald D. Crowell

From: William Cooke, Lieutenant/Inspector
To: Planning Department
Date: January 27, 2014
Re: Campus Corners Retail

SITE PLAN REVIEW

FILE NO: 13-012 **REVIEW NO: 3**

APPROVED_____ **DISAPPROVED_____X_____**

1. Provide documentation, including calculations that a flow of 2000 GPM can be provided.

IFC 2006 508.4

- This information can be obtained by contacting the Rochester Hills Engineering Department at (248) 656-4685.

Lt. William A. Cooke
Fire Inspector

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JAN 27 2014
PLANNING DEPT.

ROCHESTER HILLS
MICHIGAN

DPS/Engineering
Allan E. Schneck, P.E., Director

From: Jason Boughton JB
To: Jim Breuckman
Date: February 4, 2014
Re: Campus Corner Retail, City File #13-012, Section #15
Site Plan Review #3

Engineering Services has reviewed the site plan received by the Department of Public Services on January 21, 2014, for the above referenced project. Engineering Services does not recommend site plan approval due to the following comments:

Sanitary Sewer

1. A sanitary sewer basis of design is needed to show there is adequate capacity for the proposed development.

Storm Sewer

1. A storm water pretreatment device is required for the development and should be installed inline with the existing storm water system.

Traffic

1. Provide a striped solid white traffic separation line adjacent to the easterly drive thru lane, similar to the proposed striped line along the westerly drive thru.
2. The Livernois drive approach, immediately north of site, needs to be reconstructed due to pedestrian safety concerns and increased vehicular trips resulting from change in use.
3. Based upon the traffic impact study provided by Clearzoning, Inc. for proposed development, there are concerns regarding potential for ingress/egress traffic conflicts within the Livernois drive approach (see attached marked up drawing). The length of the existing drive approach throat is not adequate to accommodate the increased number of generated site trips during morning & afternoon peak hours.

The applicant needs to submit a Land Improvement Permit (LIP) application with engineer's estimate, fee and construction plans to get the construction plan review process started.

JB/jf

c: Allan E. Schneck, P.E.; DPS Director
Paul Davis, P.E., Deputy Director/City Engineer; DPS
Tracey Balint, P.E., Public Utilities Engineer; DPS
Paul Shumejko, P.E., PTOE, Transportation Engineer; DPS
File
Sheryl McIsaac, Office Coordinator; DPS
Joe Aprile, Engineering Aide; DPS
Marc G. Matich, Traffic Technician
Sandi DiSipio; Planning & Development Dept.

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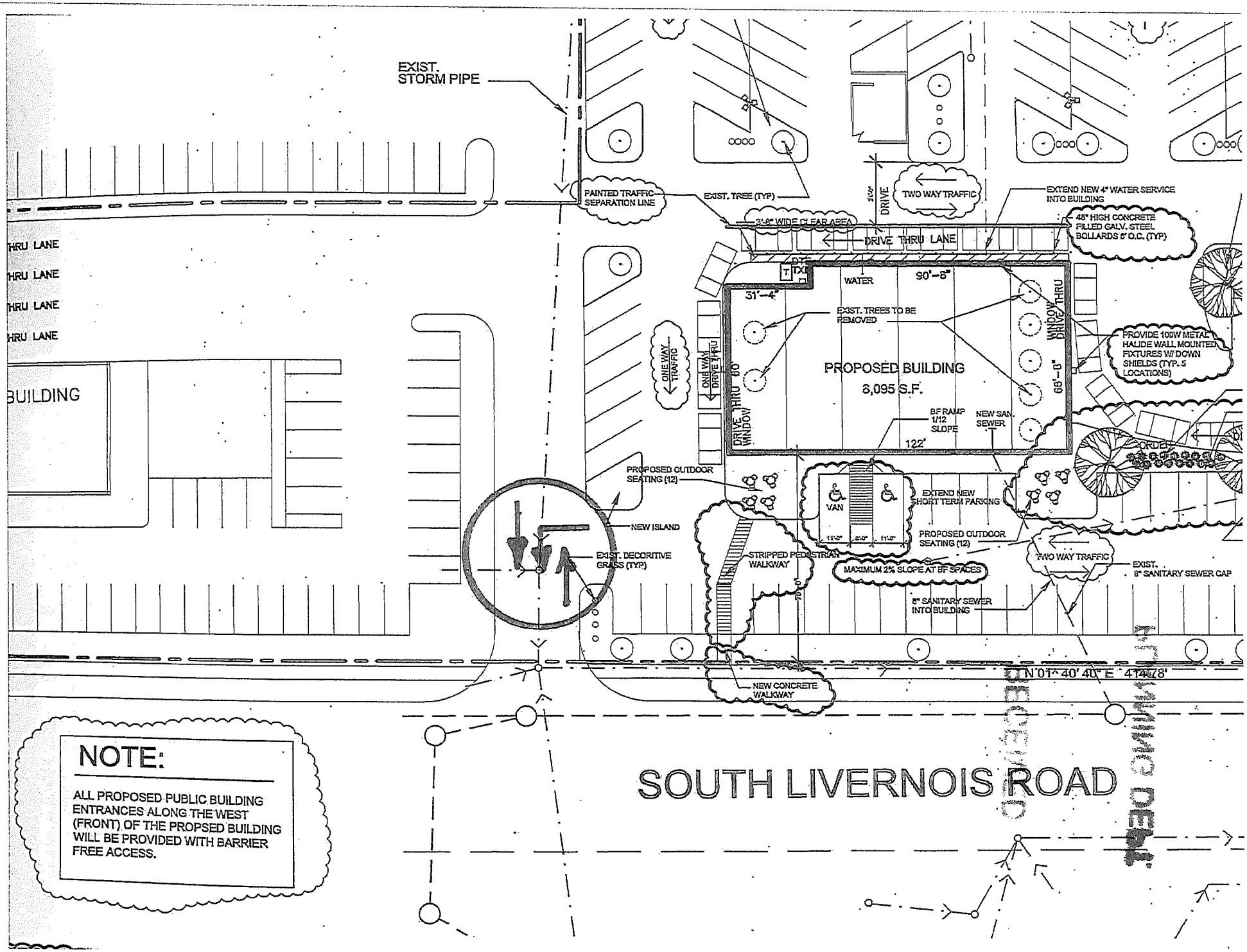

NOTE:

ALL PROPOSED PUBLIC BUILDING ENTRANCES ALONG THE WEST (FRONT) OF THE PROPSED BUILDING WILL BE PROVIDED WITH BARRIER FREE ACCESS.

WRC
WATER RESOURCES COMMISSIONER
Jim Nash

September 18, 2013

Mr. Jim Breuckman, Manager of Planning
Planning and Economic Development Department
City of Rochester Hills
1000 Rochester Hills Drive
Rochester Hills, MI 48309

Reference: **Campus Corners Assoc.**
Part of the Northwest ¼ of Section 15, City of Rochester Hills

Dear Mr. Breuckman:

This office has received one (1) set of drawings for the referenced projects. These plans were submitted by your office for review.

Our review indicates that the proposed project has no direct involvement with any legally established County Drain under the jurisdiction of this office. However, the project does lie within the Hoot Drainage District. Runoff for this section of the district should be restricted to 0.2 cfs/acre. Therefore, a storm drainage permit will not be required from this office. It shall be the responsibility of the local municipality, in their review and approval of the site plan, to ensure compliance with their runoff and detention requirements.

The sanitary sewer is within the Clinton-Oakland Sewage District System. Any proposed sewers of 8" or greater will require a permit through this office.

Furthermore, permits, approvals or clearances from federal, state or local authorities, the public utilities and private property owners must be obtained as may be required.

Related earth disruption must conform to applicable requirements of Part 91, Soil Erosion and Sedimentation Control of the Natural Resource and Environmental Protection Act, Act 451 of the Public Acts of 1994. **An application should be submitted to this office for the required soil erosion permit.**

If there are any questions regarding this matter, contact Joel Kohn at 248-858-5565.

Sincerely,

Glenn R. Appel., P.E.
Chief Engineer

C: City of Rochester Hills

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SEP 25 2013

One Public Works Drive • Building 95 West • Waterford, MI 48328-1907
Phone: 248.858.0958 • Fax: 248.858.1066 • www.oakgov.com/drain

TRAFFIC IMPACT STUDY OF PROPOSED NEW OUTLOT BUILDING AT CAMPUS CORNERS SHOPPING CENTER ROCHESTER HILLS, MI

Prepared for
STUART FRANKEL DEVELOPMENT COMPANY
Troy, MI

By
CLEARZONING, INC.
Lathrup Village, MI

January 2014

CONTENTS

TRAFFIC IMPACT STUDY OF PROPOSED NEW OUTLOT BUILDING
AT CAMPUS CORNERS SHOPPING CENTER
ROCHESTER HILLS, MI

EXECUTIVE SUMMARY

Stuart Frankel Development is proposing a new 8,095-s.f. commercial building on the site of the former Big Boy Restaurant in the Campus Corners Shopping Center. Although a specific mix of tenant types has yet to be confirmed, it is currently expected to consist of one of the following three combinations (with gross floor areas estimated by Clearzoning to nearest 100 s.f.):

2,000-s.f. "fast casual" restaurant with drive-through + 4,100-s.f. "fast casual" restaurant with drive-through + 2,000-s.f. "high-turnover sit-down" restaurant	2,000-s.f. "fast casual" restaurant with drive-through + 4,100-s.f. "fast casual" restaurant with drive-through + 2,000-s.f. specialty retail shop	2,700-s.f. "fast casual" restaurant with drive-through + 2,700-s.f. "high-turnover sit-down" restaurant + 2,700-s.f. specialty retail shop

The site is directly across Livernois from Rochester High School. Given the location, prospective new uses, and typical trip generation of those uses by time of day, it was determined that two critical hours should be further evaluated in this traffic study: the weekday morning peak hour (7:00-8:00 a.m., given that high school classes start at 7:35 a.m.) and the weekday midday peak hour (12:00-1:00 p.m.).

Trip generation forecasts prepared in this study for the above three combinations showed that the first (all-restaurant) mix would generate the most traffic during the weekday morning and midday peak hours. The traffic impacts of the proposed building were therefore evaluated for the first (left-most) combination shown above.

This traffic study produced the following key findings, conclusions, and recommendations:

- The potential building uses generating the most peak-hour traffic – the all-restaurant option – would not significantly impact existing off-site traffic conditions.

- The all-restaurant option can be expected to generate about 93 and 144 new one-way vehicle trips, respectively (approximately half in and half out). Another 86 and 124 one-way driveway trips, respectively, would derive from existing traffic already passing the site (i.e., be so-called pass-by/diverted trips).

- Assigning the above trip generation to existing driveways and Livernois crossovers based on existing traffic patterns and professional judgment, and then adding that traffic to existing traffic, it was found that the levels of service at Livernois and the North Shopping Center

Drive/High School Drive would remain F in the AM peak hour and A in the midday peak hour. The corresponding overall average intersection delays would increase about 5-7%, an amount likely imperceptible to most motorists.

- The poor level of service in the AM peak hour at the above intersection is due to the very long delays experienced by vehicles waiting to turn left into the high school driveway. This movement is currently undetectorized and allowed to proceed only during the green time called by the southbound left-turn/U-turn movement. Although morning site traffic would increase the movement's average delay by about 7%, the associated 95th-percentile queue length – 16 vehicles – is not predicted to change significantly.

- The levels of service at Livernois and the Middle Shopping Center Drive/associated southbound crossover are and will remain predominately B. No more than 2-3 cars can be expected to queue up for this crossover during the peak hours.

- The first northbound-to-southbound crossover north of the South Shopping Center Drive is expected to operate at level of service C under future traffic (a modest reduction from the current level B). No more than 3-4 cars are expected to queue up for this crossover in the peak hours, well short of the left-turn pocket's 8-car stacking capacity.

- The levels of service at Livernois and the South Shopping Center Drive are now B and not expected to fall below a still very satisfactory C with the addition of site traffic.

TRAFFIC IMPACT STUDY OF PROPOSED NEW OUTLOT BUILDING AT CAMPUS CORNERS SHOPPING CENTER ROCHESTER HILLS, MI

INTRODUCTION

Stuart Frankel Development is proposing a new 8,095-s.f. commercial building on the site of the former Big Boy Restaurant in the Campus Corners Shopping Center (Figure 1). Although a specific mix of tenant types has yet to be confirmed, it is currently expected to consist of one of the following three combinations (with gross floor areas estimated by Clearzoning to nearest 100 s.f.):

2,000-s.f. "fast casual" restaurant with drive-through + 4,100-s.f. "fast casual" restaurant with drive-through + 2,000-s.f. "high-turnover sit-down" restaurant	2,000-s.f. "fast casual" restaurant with drive-through + 4,100-s.f. "fast casual" restaurant with drive-through + 2,000-s.f. specialty retail shop	2,700-s.f. "fast casual" restaurant with drive-through + 2,700-s.f. "high-turnover sit-down" restaurant + 2,700-s.f. specialty retail shop

As can be seen in Figure 1, the site is directly across Livernois from Rochester High School. Given the location, prospective new uses, and typical trip generation of those uses by time of day, it was determined that two critical hours should be further evaluated in this traffic study: the weekday morning peak hour (7:00-8:00 a.m., given that high school classes start at 7:35 a.m.) and the weekday midday peak hour (12:00-1:00 p.m.).

Trip generation forecasts prepared in this study for the above three combinations showed that the first (all-restaurant) mix would generate the most traffic during the weekday morning and midday peak hours. The traffic impacts of the proposed building were therefore evaluated for the first (left-most) combination shown above.

EXISTING CONDITIONS

Roadway

Livernois Road is a 40-mph, four-lane boulevard with a relatively narrow median. Abutting Campus Corners Shopping Center has three access drives on this road (Figure 1), with the north and middle drives served by crossovers permitting direct left turns into the center (further detail in appendix Figure C-1). The northern driveway/crossover is controlled by an actuated traffic signal, since it also serves as a turnaround for southbound Livernois drivers wishing to proceed east on Walton/ University. The crossover signal also stops southbound Livernois, primarily to aid northbound traffic wishing to enter the north high school drive that is nominally aligned with the north shopping center drive. This signal also aids NB-to-SB U turns, such as those leaving Campus Corners for points south.

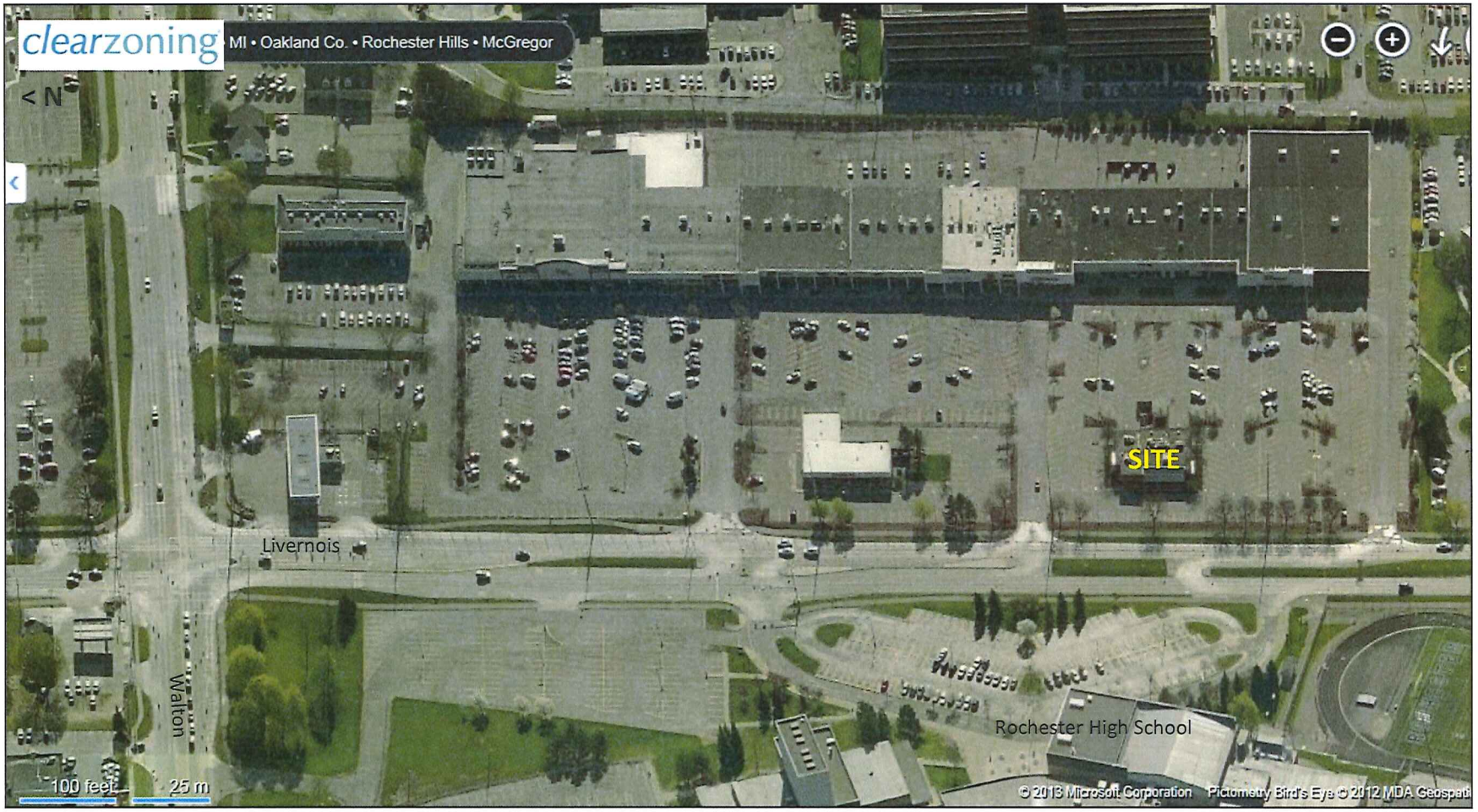


Figure 1. Campus Corners Shopping Center

Traffic Volumes

Clearzoning (CZ) staff made manual turning-movement counts along Campus Corners' Livernois frontage during the 7:00-9:00 a.m. and 11:30 a.m.-1:30 p.m. peak periods on Wednesday, December 4, 2013. Rochester High School was operating its normal weekday schedule at the time, with no special events listed on the school's website. The traffic counts are detailed in Appendix B, and the volumes for the corresponding 7:00-8:00 a.m. and 12:00-1:00 p.m. peak hours are illustrated in Figure 2.

Queuing for Livernois Crossovers

Due to City concerns regarding the adequacy of the three crossovers expected to serve the proposed new building (Figure C-1), CZ also observed the current queuing in those crossovers in the 7:00-8:00 a.m., 11:30 a.m.-12:30 p.m., and 2:00-3:00 p.m. (high school dismissal) peak hours. During most of the time observations were made, the numbers of queued vehicles were determined every two minutes, effectively constituting a 30-point random sample at each location. The queuing observations are detailed in appendix Tables C-1, C-2, and C-3 for the northern NB-to-SB crossover, SB-to-NB crossover, and southern NB-to-SB crossover, respectively. These data permitted the following estimates of high-percentile queues:

Table 1. Observed High-Percentile Existing Queues for Livernois Crossovers (in Vehicles)

Crossover	7:00-8:00 a.m.	11:30 a.m.-12:30 p.m.	2:00-3:00 p.m.
Northern NB-to-SB	85^{th} %tile = 15-20	87^{th} %tile = 1	87^{th} %tile = 4
	95^{th} %tile = > 20	97^{th} %tile = 2	95^{th} %tile = 7
SB-to-NB	-	-	-
	97^{th} %tile = 1	100^{th} %tile = 0	97^{th} %tile = 1
Southern NB-to-SB	-	83^{rd} %tile = 1	-
	100^{th} %tile = 0	90^{th} %tile = 2	97^{th} %tile = 3

The very long queues at the northern crossover occurred intermittently over only a 10-minute period (7:21-7:31 a.m.) within which a very large share of high school students arrive. Throughout the entire morning peak hour – including that 10-minute period – no queues were observed at the southern NB-to-SB crossover that would be available to motorists exiting Campus Corners. There likely were occasional times when vehicles stopped to use that crossover, but their delays were so brief that none were actually observed by the sampling done at two-minute intervals. Delays at the southern crossover are minimal due to the gaps created in the southbound traffic flow by the signal at the northern crossover/high school drive.

Arrivals prior to high school dismissal are spread out more in time than those occurring just before the start of the school day. Even with the significant number of entering school buses, queuing for the northern crossover approximated the stacking capacity of the associated left-turn lane during less than a five minute period (2:20-2:24 p.m., relative to the school dismissal time of 2:28 p.m.).

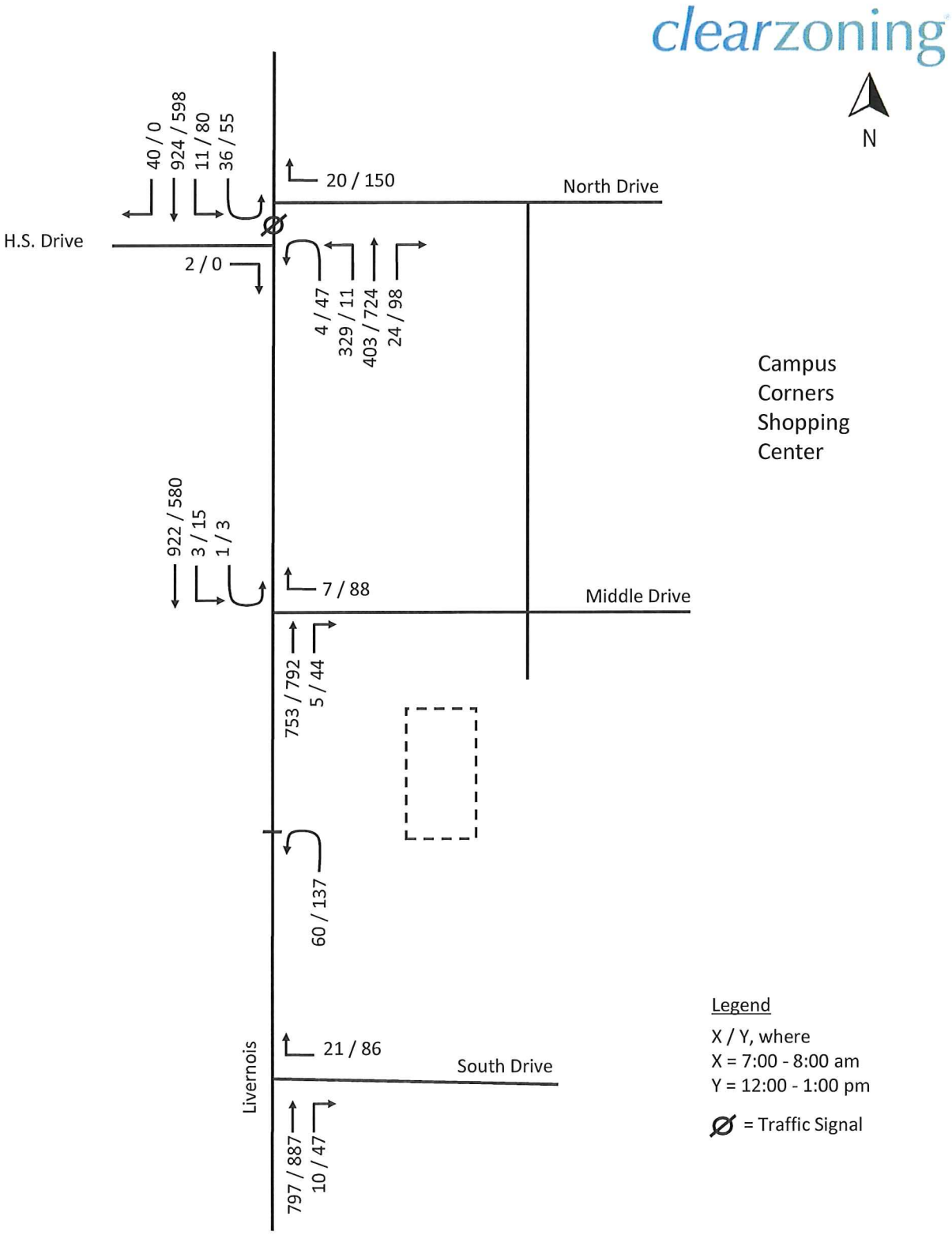


Figure 2. Current Peak-Hour Volumes

FUTURE CONDITIONS

Background Traffic

Clearzoning assumes that the proposed building will be constructed and fully occupied within one year. Accordingly, consistent with standard traffic engineering practice, the current peak-hour volumes are assumed to remain unchanged at the time of full occupancy but in its hypothetical absence.

Trip Generation

To the extent possible, trip generation rates published by the Institute of Transportation Engineers have been applied in this study. However, despite the increasing prevalence in recent years of the land use type characterized here as "fast casual," ITE has not collected or provided data for that specific use. To deal with this situation, CZ blended data from several sources to approximate what it believes would best describe the contemplated uses. As detailed in appendix Tables D-1a and D-1b, trip rates for the following uses were blended as indicated:

- The potential 4,100-s.f. fast-casual restaurant with drive-through window is assumed to generate trips averaging those for the same size coffee/donut shop with drive-through (ITE use 937), bread/donut/bagel shop with drive-through (ITE use 940), fast-food restaurant with drive-through (ITE use 934), and Panera Bread with drive-through (as sampled at "comparable" uses by another consulting firm).

- The potential 2,000-2,700-s.f. fast-casual restaurant with drive-through window is assumed to generate trips averaging those for a bread/donut/bagel shop with drive-through (ITE use 940) and a fast-food restaurant with drive-through (ITE use 934), except that the specific use contemplated here would not be open prior to 10:00 a.m.

- The potential 2,000-2,700-s.f. high-turnover (sit-down) restaurant is assumed to generate trips at the average rates for ITE use 932.

- The potential 2,000-2,700-s.f. specialty retail shop is assumed to generate trips at the average rates for ITE use 826. ITE has no rates for this use's early-AM peak hour, since most such shops are not yet open at that time of day.

It is important to note that the trips forecasted in the above manner are potential external driveway trips; that is, those that might be generated by the individual uses if they were isolated from other uses and did not draw any existing motorists into the site. To more accurately assess the amount and directionality of site-related traffic, however, it is important to account for:

- Internal Capture – Given the proposed building's location within the Campus Corners Shopping Center, it is reasonable to assume that some of its visitors will come from and/or later return to other uses within the center. Some may also "filter through" the center from/to its drives on Walton (which are not evaluated in this study). Both types of traffic

are considered here as "internal capture," and are collectively assumed to constitute 15% of the potential external driveway trips.

- Pass-by/Diverted Trips – Experience has shown that a significant percentage of the driveway trips generated by restaurant and other retail uses are already on the road and passing the site en route to primary destinations elsewhere just before entering. Hence, they do not constitute new traffic at locations remote to the site. An example of pass-by trips would be those made by commuters visiting a coffee shop on their way to work. An example of diverted trips in this case would be those potentially made by high school students just before entering the campus. ITE- average percentages of pass-by/diverted trips for comparable uses are assumed here.

Table 2 presents the "worst-case" trip generation forecast for the proposed new building (i.e., that associated with the "all-restaurant" development option). This forecast first lists the potential external driveway trips (in the shaded rows), followed (in successive rows) by the associated internal capture, pass-by/diverted trips, and finally, the net new (aka primary) trips. Since pass-by/diverted trips and new trips are assigned to the access drives and abutting road network according to separate trip distribution models, the values for these trip types in the weekday morning and midday peak hours have been highlighted in the table in red.

Trip Distribution

The trip distribution models for new external trips (Figure 3) reflects the following assumptions:

- The percent of trips approaching the site from the north versus south will correspond to the directional split of current total traffic passing the site (i.e., 45% NB and 55% SB in the AM peak hour, and 56% NB and 44% SB in the midday peak hour).

- Of the trips arriving from the south, 80% will enter via the first (south) drive and 20% will enter via the second (middle) drive. Conversely, of the trips arriving from the north, 20% will enter via the first (north) drive and 80% will enter via the second (middle) drive.

- Since new trips are assumed to return to the direction from whence they came, the percentage of trips exiting in a given direction will equal the percentage arriving from that direction.

- Of the trips departing to the north, 80% will use the middle drive and 20% will use the north drive. Departing to the south, 90% will use the south drive and south crossover, and 10% will use the middle drive and north crossover (the out-of-direction travel being justified by the convenience of U turning at a signal).

The trip distribution models for pass-by/diverted trips (Figures 4a-4b) reflect most of the above assumptions, except as follows:

Table 2. Summary of Trip Generation Forecast for Most Trip-Intensive Combination of Possible Uses[1]

Use	Weekday Morning Peak Hour			Weekday Midday Peak Hour			Weekday Evening Peak Hour			Saturday Midday Peak Hour		
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total
Restaurant A: 4,100-s.f. "Fast Casual" w/Drive-Through Window	96	92	188	96	89	185	62	59	121	95	94	189
	-14	-14	-28	-14	-14	-28	-9	-9	-18	-14	-14	-28
	-39	-39	-78	-37	-37	-74	-25	-25	-50	-40	-40	-80
	43	39	82	45	38	83	28	25	53	41	40	81
Restaurant B: 2,000-s.f. "Fast Casual" w/Drive-Through Window	0	0	0	49	45	94	26	25	51	59	59	118
	0	0	0	-7	-7	-14	-4	-4	-8	-9	-9	-18
	0	0	0	-19	-19	-38	-10	-10	-20	-25	-25	-50
	0	0	0	23	19	42	12	11	23	25	25	50
Restaurant C: 2,000-s.f. "High-Turnover Sit-Down"	12	10	22	20	17	37	12	8	20	15	13	28
	-2	-1	-3	-3	-3	-6	-2	-1	-3	-2	-2	-4
	-4	-4	-8	-6	-6	-12	-3	-3	-6	-5	-5	-10
	6	5	11	11	8	19	7	4	11	8	6	14
Total Potential Trips	108	102	210	165	151	316	100	92	192	169	166	335
- 15% Internal Capture	16	15	31	24	24	48	15	14	29	25	25	50
- Pass-By Trips	**43**	**43**	**86**	**62**	**62**	**124**	**38**	**38**	**76**	**70**	**70**	**140**
= New Trips	**49**	**44**	**93**	**79**	**65**	**144**	**47**	**40**	**87**	**74**	**71**	**145**

[1] The first row in each use-specific block lists total potential external driveway trips; i.e., the driveway trips that would result if each use within the building attracted traffic only from the abutting arterial road (Livernois). See appendix Tables D-1a and D-1b for the derivation of these values. The main source for the applied trip rates is the *Trip Generation Manual – 9th Edition,* ITE, 2012. The second row in each block lists the number of trips corresponding to an assumed 15% internal capture/alternative entry-exit; i.e., trips from/to other parts of Campus Corners or filtering through the center from/to access drives on Walton (which were not evaluated in this study). The third row lists pass-by/diverted trips; i.e., those made by vehicles already on their way to primary destinations elsewhere (such as the high school or other retail centers in the area) before their drivers decided to visit the site. The assumed percentages of this trip type are the average values also found in the above ITE source for the most comparable land use types. The total number of pass-by/diverted trips has been rounded to an even value, and then equally divided between entering and exiting trips, to facilitate the application of the trip distribution models. Finally, the fourth row lists the net new (primary) trips. In this case, only the last category of trips will constitute new traffic on Livernois north and south of the site.

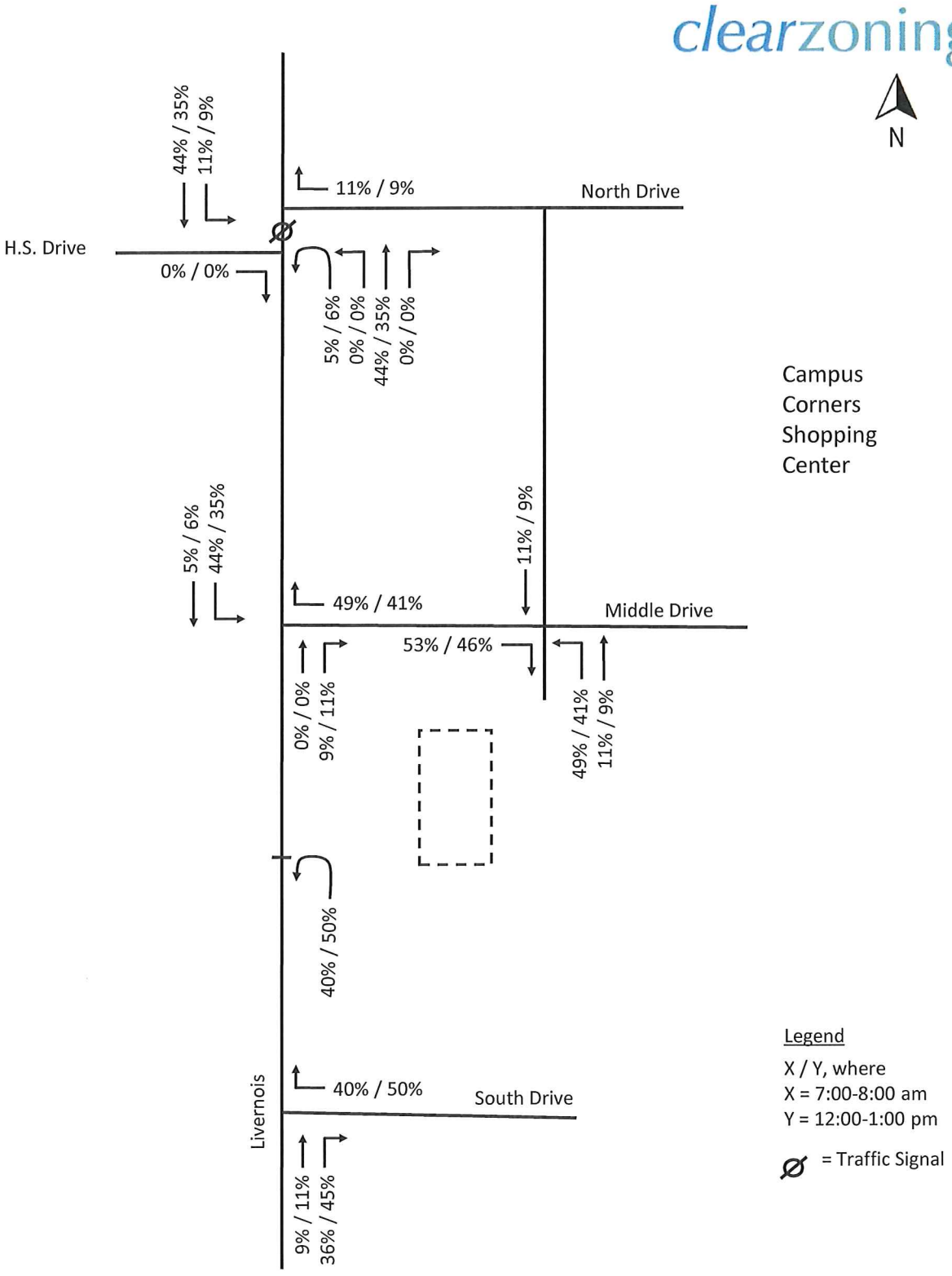


Figure 3. Distribution of New External Trips

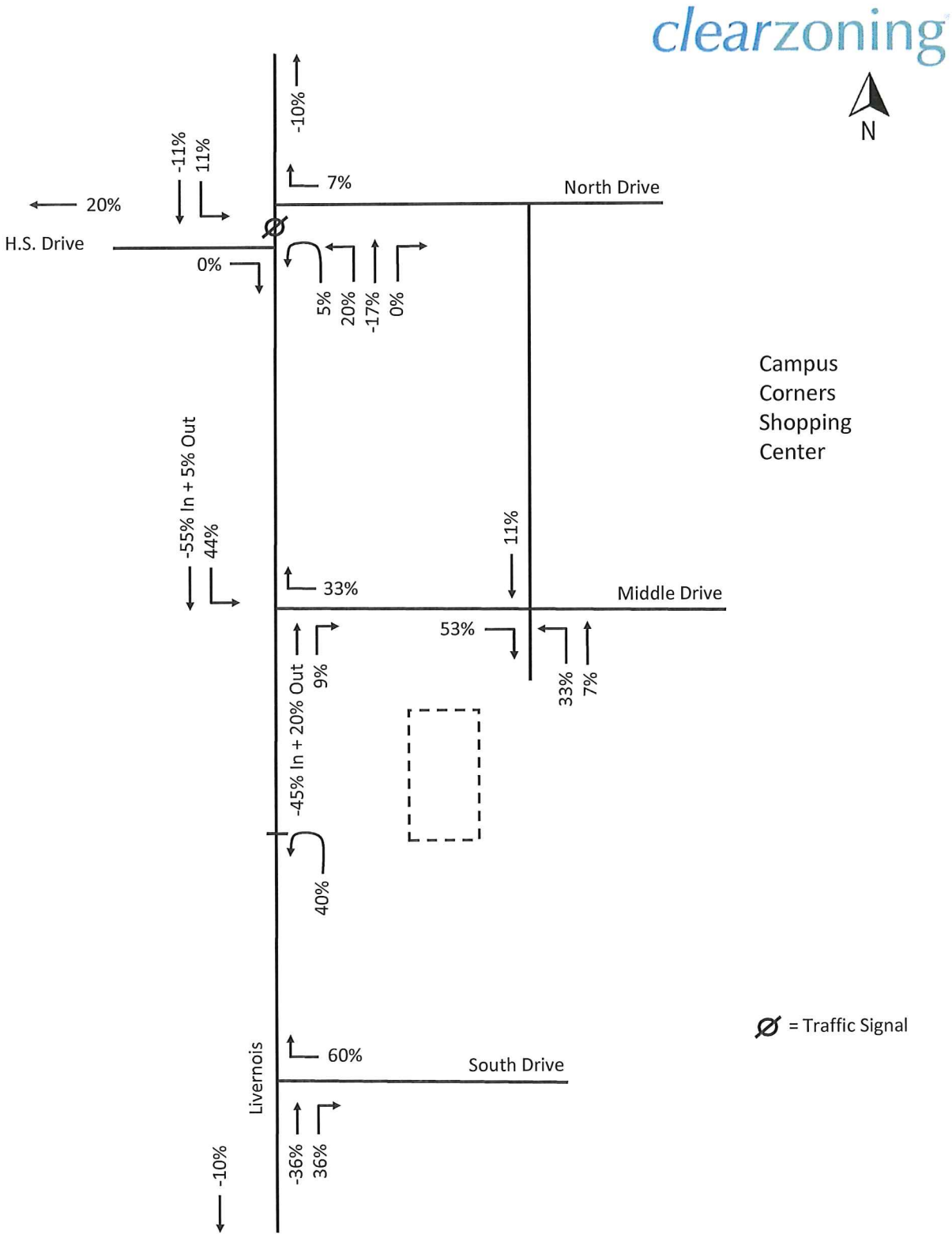


Figure 4a. Distribution of Pass-By / Diverted Trips in AM Peak Hour

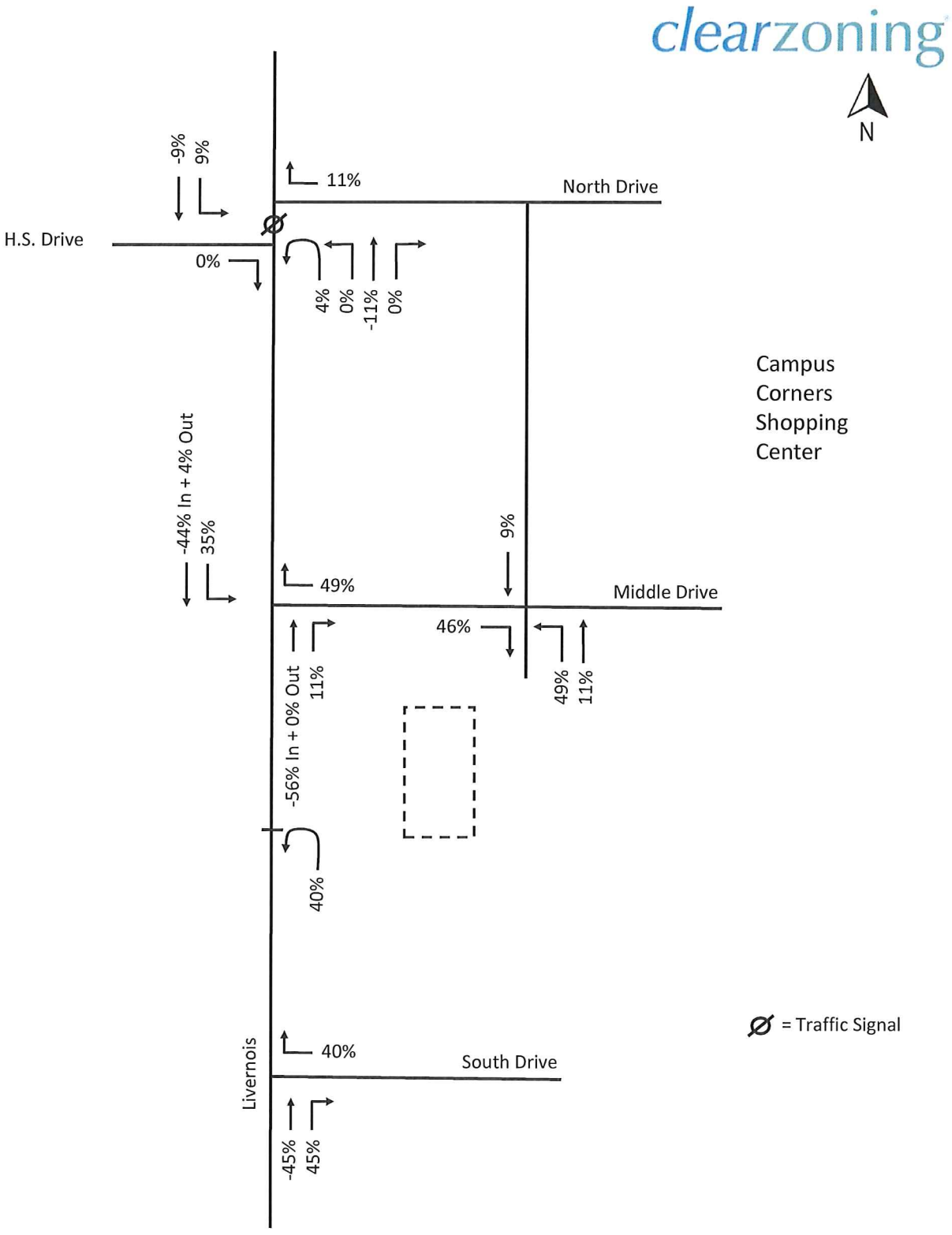


Figure 4b. Distribution of Pass-By / Diverted Trips in Midday Peak Hour

- Pass-by/diverted trips are assumed to exit a site (often via a different driveway than used to enter) and continue traveling in the direction being followed before entering.

- In this particular case, it is assumed that 20% of the pass-by/diverted trips in the morning peak hour will divert into the site from Livernois before exiting the site to Rochester High School (all via the south drive and north crossover, due to the existing traffic backups for that crossover). This will not happen at the midday peak hour, when any visitation from students will likely occur on foot.

Traffic Assignment

The above trip distribution models were applied to the total trips of the corresponding types (Table 2) to assign trips to various movements within the study area. These assignments are detailed in appendix Figure E-1 for new external trips (in both peak hours); Figure E-2 for pass-by/diverted trips in the AM peak hour; and Figure E-3 for pass-by/diverted trips in the midday peak hour. Negative values in the latter two figures reflect cumulative reductions in through-movement volumes resulting from pass-by trips entering the access drives. Finally, all site-generated trips combined, regardless of type, are summarily illustrated in Figure 5.

Future total peak-hour traffic (Figure 6) was forecasted for each movement in the study area by adding the projected volume of site traffic (from Figure 5) to the corresponding volume of current traffic (from Figure 2).

IMPACT ANALYSES

Level of Service and Its Determination

Intersection and driveway capacity analyses were conducted using *Synchro 7* software, based on methodologies contained in the Transportation Research Board's *Highway Capacity Manual.* The primary objective of such analyses is to determine the *level of service,* a qualitative measure of the "ease" of traffic flow based on vehicular delay. Analytical models are used to estimate the average control delay for specific vehicular (through or turning) movements – and in the case of all-way stop-controlled and signalized intersections – each approach and the overall intersection as well. The models account for lane configuration, grade (if any), type of traffic control, traffic volume and composition, and other traffic flow parameters.

Level of service (LOS) is expressed on a letter grading scale, with A being the highest level and F being the lowest level. Achieving an overall intersection and/or approach LOS of D or better is the normal objective in an urban or suburban area; however, LOS of E or worse may be unavoidable for some turning movements on heavily traveled roads, especially when those movements are controlled by stop signs as opposed to signals.

Table 3 defines LOS, in terms of average control delay per vehicle, for signalized intersections and unsignalized intersections, respectively.

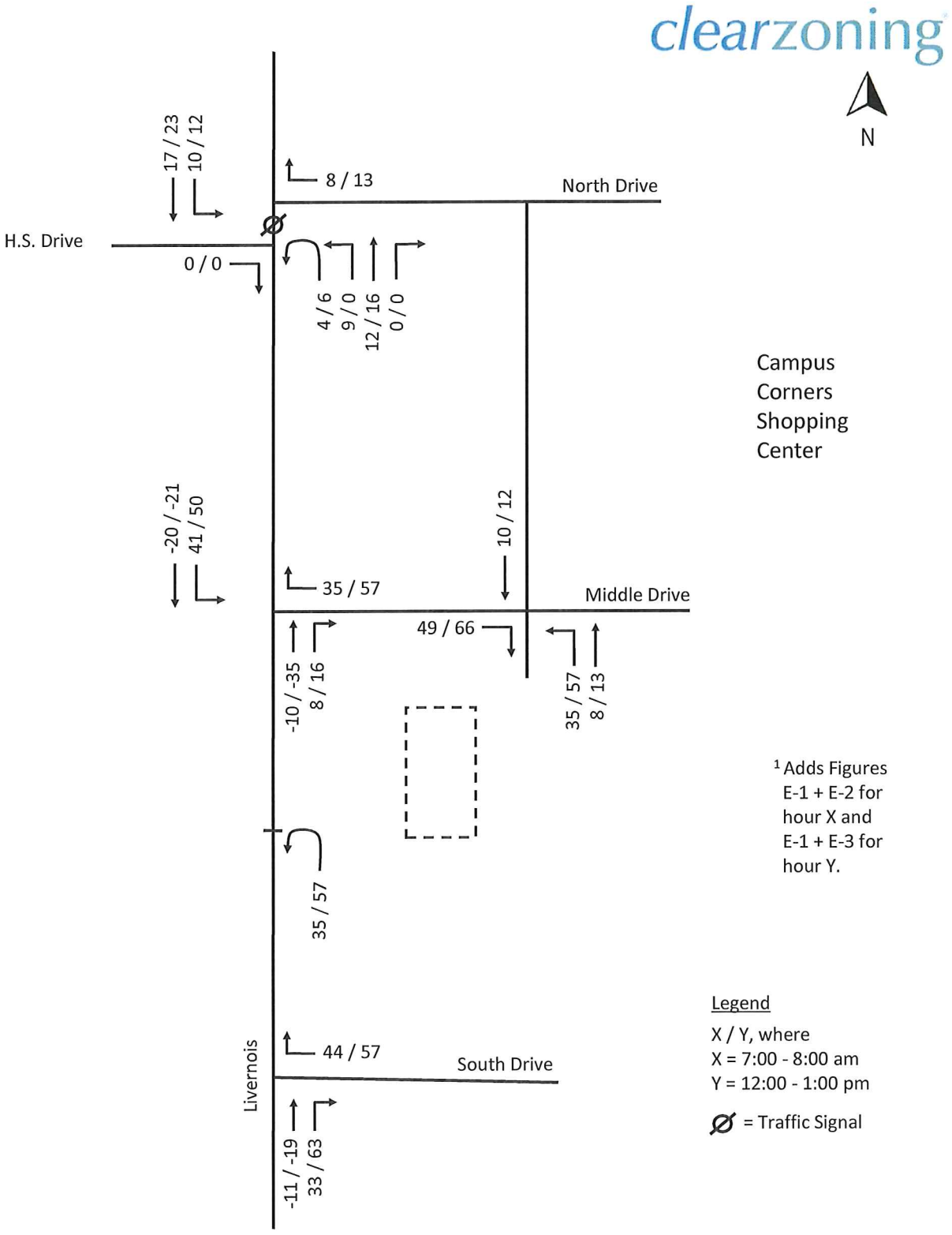


Figure 5. Total Site-Generated Trips[1]

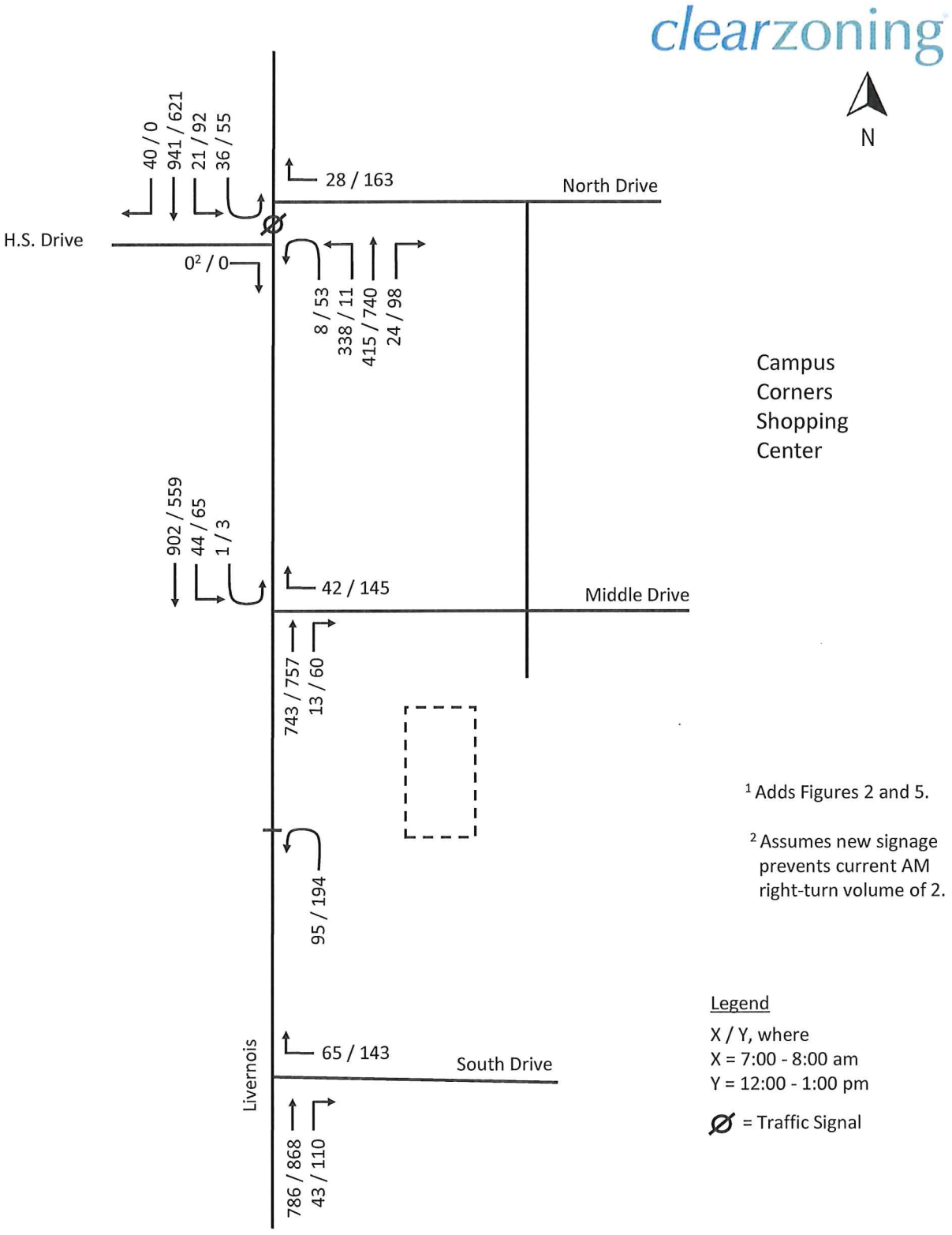


Figure 6. Future Total Peak-Hour Volumes[1]

Table 3. Level of Service Criteria

Level of Service	Control Delay per Vehicle (sec)	
	Signalized Intersections	Unsignalized Intersections
A	≤ 10	≤ 10
B	> 10 and ≤ 20	> 10 and ≤ 15
C	> 20 and ≤ 35	> 15 and ≤ 25
D	> 35 and ≤ 55	> 25 and ≤ 35
E	> 55 and ≤ 80	> 35 and ≤ 50
F	> 80	> 50

SimTraffic Predictions of Crossover Queuing

SimTraffic is a companion software to *Synchro* which provides an animated view of how traffic can be expected to flow based on the various geometric, traffic control, and traffic volume information input to *Synchro*. While *Synchro* produces some queue length estimates of its own, it is generally accepted that *SimTraffic* provides more realistic and reliable queue length estimates.

In this study, *SimTraffic* was first run for the current traffic volume model, and its queue length predictions were validated by comparing them to Clearzoning's manual observations of queuing. *SimTraffic* was then run for the future traffic volume model, to determine how crossover queuing can be expected to change with the addition of site-generated traffic.

Level of Service and Queuing Results

Detailed *Synchro* printouts for the study's level of service evaluations appear in Appendix G. The overall LOS results are summarized in Tables 4-7 (below).

SimTraffic's predictions of 95th-percentile queuing are detailed in Appendix H for future traffic conditions, and results for both current and future traffic are summarized in Table 8 (below). (95th-percentile queue lengths are equaled or exceeded during only three minutes of the peak hour.)

Key findings of the preceding analyses are as follows:

- The addition of site traffic will not change current levels of service at Livernois and the North Shopping Center Drive/High School Drive, which will remain F in the AM peak hour and A in the midday peak hour (Table 4). The corresponding overall average intersection delays would increase about 5-7%, an amount likely imperceptible to most motorists.

- The poor LOS in the AM peak hour at the above intersection is due to the very long delays experienced by vehicles waiting to turn left into the high school driveway. This movement is currently undetectorized and allowed to proceed only during the green time called by the southbound left-turn/U-turn movement. Although morning site traffic would increase the movement's average delay by about 7%, the associated 95th-percentile queue length – 16 vehicles – is not predicted to change significantly (per Tables 4 and 8).

Table 4. Levels of Service at Livernois and North Shopping Center Drive/High School Drive

Approach	Movement	AM Peak Hour			Midday Peak Hour		
		Volume	Delay	LOS	Volume	Delay	LOS
Current Traffic							
Intersection		1793	97.4	F	1763	8.6	A
EB[1]	R	2	18.7	B	0	-	-
WB	R	20	29.1	C	150	23.2	C
NB	L + U	333	290.3	F	58	30.2	C
	T + R	427	2.9	A	822	5.5	A
SB	L + U	47	31.0	C	135	26.4	C
	T	924	10.7	B	598	3.0	A
	R	40	7.0	A	0	-	-
Future Traffic							
Intersection		1851	104.7	F	1833	9.0	A
EB[1]	R	0	-	-	0	-	-
WB	R	28	30.2	C	163	23.1	C
NB	L + U	346	311.2	F	64	30.3	C
	T + R	439	2.9	A	838	5.8	A
SB	L + U	57	32.6	C	147	26.5	C
	T	941	11.1	B	621	3.1	A
	R	40	7.2	A	0	-	-

[1] Illegal movement. Given the improved regulatory signing proposed by City, this movement is assumed to disappear in future.

Table 5. Levels of Service at Livernois and Middle Shopping Center Drive/SB Crossover

Approach	Movement	AM Peak Hour			Midday Peak Hour		
		Volume	Delay	LOS	Volume	Delay	LOS
Current Traffic							
WB	R	7	13.8	B	88	13.0	B
SB	L + U	4	11.7	B	18	9.9	A
Future Traffic							
WB	R	42	15.2	C	145	14.3	B
SB	L + U	45	12.3	B	68	10.2	B

Table 6. Levels of Service at Southbound Livernois and Southern NB-to-SB Crossover

Approach	Movement	AM Peak Hour			Midday Peak Hour		
		Volume	Delay	LOS	Volume	Delay	LOS
Current Traffic							
WB	L	60	10.9	B	137	9.6	A
Future Traffic							
WB	L	95	10.5	B	194	9.9	A

Table 7. Levels of Service at Northbound Livernois and South Shopping Center Drive

Approach	Movement	AM Peak Hour			Midday Peak Hour		
		Volume	Delay	LOS	Volume	Delay	LOS
Current Traffic							
WB	R	21	14.7	B	86	13.6	B
Future Traffic							
WB	R	65	17.0	C	143	15.7	C

Table 8. SimTraffic Predictions of 95th-Percentile Queue Length (in Cars)[1]

Crossover	Traffic Scenario	7:00-8:00 a.m.	11:30 a.m.-12:30 p.m.
Northern NB-to-SB	Current[2]	16	3
	Future	16[3]	4
SB-to-NB	Current[2]	< 1	1
	Future	2	3
Southern NB-to-SB	Current[2]	< 1	3
	Future	4	3

[1] The model outputs queue length in feet, assuming an average of 25 feet per vehicle. Each of the three cross-overs have 190 lineal feet of storage, about enough to shelter eight cars.

[2] Compare to statistics for manual observations (Table 1, above).

[3] Only 5 feet longer than queue predicted for current traffic.

- The levels of service at Livernois and the Middle Shopping Center Drive/associated south-bound crossover (Table 5) are currently A-B (predominately B), and they are expected to remain – with the addition of site traffic – a very satisfactory B-C (still predominately B). The future 95th-percentile queue length for this crossover is expected to be 2-3 cars long, or well short of its 8-car capacity.

- The first NB-to-SB crossover north of the South Shopping Center Drive is predicted to experience LOS B under current traffic and LOS C under future traffic (Table 6). The future 95th-percentile queue length for this crossover is expected to be 3-4 cars long, or well short of its 8-car capacity. The delays and associated queue lengths here are and will remain minimal due to the gaps in southbound traffic created by the signal at the north drive.

- LOS afforded motorists exiting the South Shopping Center Drive are now B and not expected to fall below a still very satisfactory C with the addition of site traffic (Table 7). Average exiting delay will remain 17 sec or less.

KEY FINDINGS AND CONCLUSIONS

The key findings and recommendations developed in this study are summarized as follows:

- The potential building uses generating the most peak-hour traffic – the all-restaurant option – would not significantly impact existing off-site traffic conditions.

- A potential combination of three restaurants in the proposed new building, including two with drive-through windows, would generate the most peak-hour traffic. In the two most critical hours based on existing traffic conditions – the weekday early-morning and midday hours – the all-restaurant option can be expected to generate about 93 and 144 new one-way vehicle trips, respectively (approximately half in and half out). Another 86 and 124 one-way driveway trips, respectively, would derive from existing traffic already passing the site (i.e., be so-called pass-by/diverted trips).

- Assigning the above trip generation to existing driveways and Livernois crossovers based on existing traffic patterns and professional judgment, and then adding that traffic to existing traffic, it was found that the levels of service at Livernois and the North Shopping Center Drive/High School Drive would remain F in the AM peak hour and A in the midday peak hour. The corresponding overall average intersection delays would increase about 5-7%, an amount likely imperceptible to most motorists.

- The poor level of service in the AM peak hour at the above intersection is due to the very long delays experienced by vehicles waiting to turn left into the high school driveway. This movement is currently undetectorized and allowed to proceed only during the green time called by the southbound left-turn/U-turn movement. Although morning site traffic would increase the movement's average delay by about 7%, the associated 95th-percentile queue length – 16 vehicles – is not predicted to change significantly.

- The levels of service at Livernois and the Middle Shopping Center Drive/associated southbound crossover are and will remain predominately B. No more than 2-3 cars can be expected to queue up for this crossover during the peak hours.

- The first northbound-to-southbound crossover north of the South Shopping Center Drive is expected to operate at level of service C under future traffic (a modest reduction from the current level B). No more than 3-4 cars are expected to queue up for this crossover in the peak hours, well short of the left-turn pocket's 8-car stacking capacity.

- The levels of service at Livernois and the South Shopping Center Drive are now B and not expected to fall below a still very satisfactory C with the addition of site traffic.

City of
ROCHESTER HILLS
1000 Rochester Hills Drive, Rochester Hills, Michigan 48309-3033

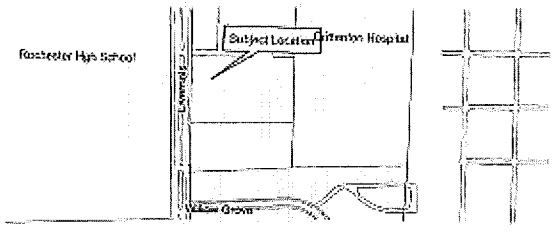
NOTICE OF PUBLIC HEARING

ROCHESTER HILLS PLANNING COMMISSION

REQUEST: **Conditional Land Use Recommendation.** In accordance with the Michigan Zoning Enabling Act, PA 110 of 2006, as amended, and Sections 138-1.203, 138-2.300-2.302 and 138-4.300 of the Code of Ordinances of the City of Rochester Hills, a Public Hearing for a Conditional Land Use Recommendation is required with the review of an application to construct two drive-thru restaurants at a new outlot retail building at Campus Corners Shopping Center on Livernois, north of Avon, zoned B-3, Shopping Center Business, Parcel No. 15-15-101-024 (City File 13-012).

LOCATION: East side of Livernois, between Walton and Avon

APPLICANT: Campus Corner Associates
1334 Maplelawn
Troy, Mi 48084



DATE OF PUBLIC HEARING: Tuesday, February 25, 2014 at 7:00 p.m.

LOCATION OF PUBLIC HEARING: Rochester Hills Municipal Offices
1000 Rochester Hills Drive
Rochester Hills, Michigan 48309

Information concerning this request may be obtained from the Planning Department during regular business hours from 8:00 a.m. to 5:00 p.m., Monday through Friday, or by calling (248) 656-4660. Written comments concerning this request will be received by the City of Rochester Hills Planning Department, 1000 Rochester Hills Drive, Rochester Hills, Michigan 48309, prior to the public hearing or by the Planning Commission at the public hearing. This request will be forwarded to City Council after review and recommendation by the Planning Commission.

William F. Boswell, Chairperson
Rochester Hills Planning Commission

NOTE: Anyone planning to attend the meeting who has need of special assistance under the Americans with Disabilities Act (ADA) is invited to contact the Facilities Division (656-2560) 48 hours prior to the meeting.

Publish February 10, 2014