

**Cedar–Fairmount District Parking Study  
and  
Top-of-the-Hill Mixed Use Development Project  
Parking & Traffic Assessment  
City of Cleveland Heights, OH**



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**DECEMBER 20, 2018**



# **CEDAR–FAIRMOUNT COMMERCIAL DISTRICT PARKING STUDY AND TOP-OF-THE-HILL PROJECT PARKING & TRAFFIC ASSESSMENT**

**CITY OF CLEVELAND HEIGHTS  
OHIO**

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## **EXECUTIVE SUMMARY**

This report commissioned jointly by the City of Cleveland Heights and Flaherty Collins examines the existing and future parking and traffic conditions of the Cedar Fairmount Commercial District and specifically at and surrounding the site of the Top-of-the-Hill (TOH) Mixed Use Development Site. Through the study process DESMAN, the parking consultant and WSP, the traffic consultant worked closely with City staff and participated in several City-sponsored community meetings about the project.

From a parking standpoint the TOH development has been found to include enough parking to satisfy the projected peak period parking demand to be generated by the proposed project land uses and to replace the 225 existing City-owned on-site. However, it will be important to cap the number of parking spaces designated for resident permit holders to 456 (i.e. 1 per unit for the 282 residential units in the project and for the 174 existing resident permits issued by City). This will be necessary to ensure that a minimum of approximately 112 spaces will be available to accommodate the transient demand for parking to be generated by project and the other commercial businesses in the immediate vicinity of the project.

The parking scheme for the project has been well conceived and is considered to functionally solid and efficiently configured.

From a traffic impact standpoint, the proposed development with three site access drives will have good access. The traffic analysis considers several potential site access alternatives that would produce a varied series of traffic circulation and flow outcomes that affect the project and the surrounding neighborhood. Based on the recommended configuration for the site access drives and the anticipated trip generation for the proposed development, the site is not expected to cause negative impacts to traffic operations on the roadway network surrounding the site.



## **INTRODUCTION**

DESMAN Inc., a nationally recognized Parking Consultancy, has been jointly retained by the City of Cleveland Heights and Flaherty Collins Properties Inc., an Indiana-based developer and asset manager of multifamily housing properties throughout the Midwest. DESMAN was tasked with completing a parking and traffic review of the proposed Top-of-the-Hill (TOH) mixed use development and the impact of the TOH on the Cedar-Fairmount Commercial District (CFCD) where the project will be located.

While DESMAN's focus is on the parking needs, issues and impacts that may result from the proposed mixed-use development, WSP, an international engineering firm with a Cleveland office was retained to serve as a subconsultant to DESMAN to complete a traffic impact assessment of the TOH development. WSP's traffic engineer assigned to lead the traffic analysis for this project has experience in the study area, including the 2009 Cedar-Fairmount Transportation Study. That study included the assumption that a similarly-sized mixed-use project would be developed at the City-owned site where this Top-of-the-Hill project is being proposed.

The DESMAN/WSP team's scope of work for this engagement was two-fold:

- first, complete an area-wide parking study of the Cedar-Fairmount Commercial District, and
- second, conduct an independent due diligence assessment of the parking needs and traffic impacts of the planned development to inform and guide the City as it works through its formal review and approval process for the project.

Part I of this document is “**The Cedar Fairmount Commercial District Parking Study**” report and Part II of this document is the “**The Top-of-the-Hill Project Parking & Traffic Assessment**”.

## **PART 1: THE CEDAR FAIRMOUNT COMMERCIAL DISTRICT PARKING STUDY**

### **EXISTING CONDITIONS**

#### **District Study Area**

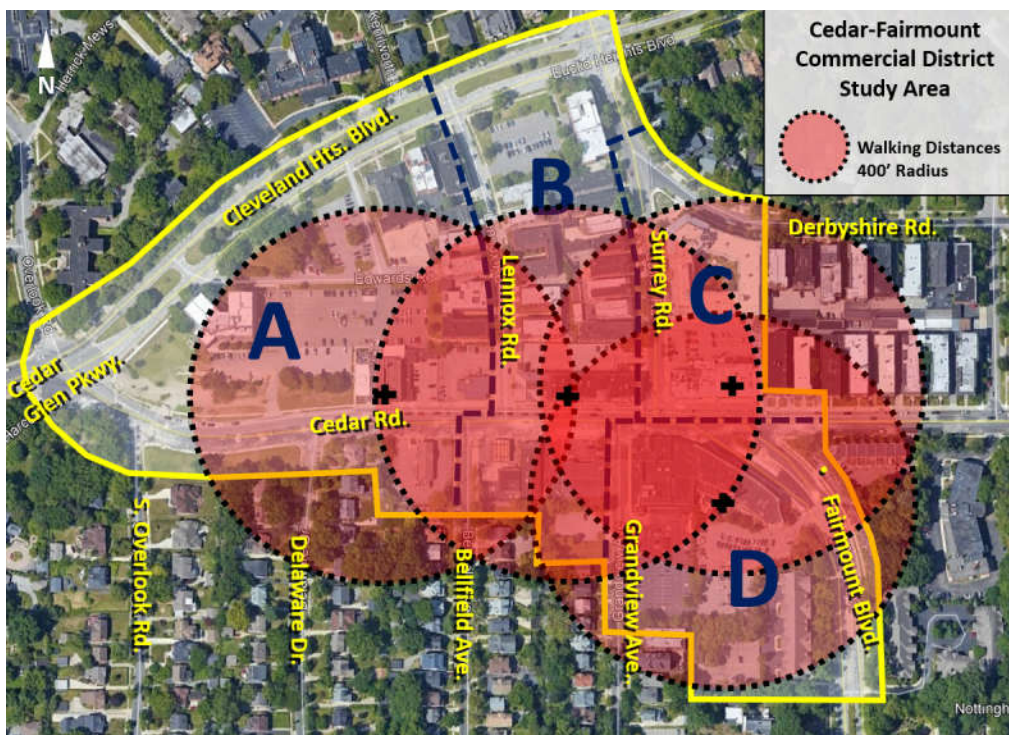
The boundary of the CFCD study area encompasses all of the commercial establishments that line Cedar Road and Fairmount Boulevard, the existing public and private off-street parking facilities that serve the area and all of the legal on-street spaces that line Surrey and Lennox Roads.

**Exhibit 1** depicts the study area boundary and four sub-areas. The subareas were established to examine the parking supply and demand variances in different parts of the CFCD and, in particular, at the proposed Top-of-the-Hill development site (Sub-Area A). Each of the Sub-Areas are anchored by a cluster of commercial land uses with frontage along Cedar Road and Fairmount Boulevard. The circles on the exhibit are intended to represent a 400-foot radius walking distances from the primary parking demand generators in each Sub-Area. This distance is widely considered to be acceptable by the average pedestrian when exposed to uncovered outdoor conditions.





## Exhibit 1 Study Area Boundary



Prepared by DESMAN

## Existing Parking Inventory

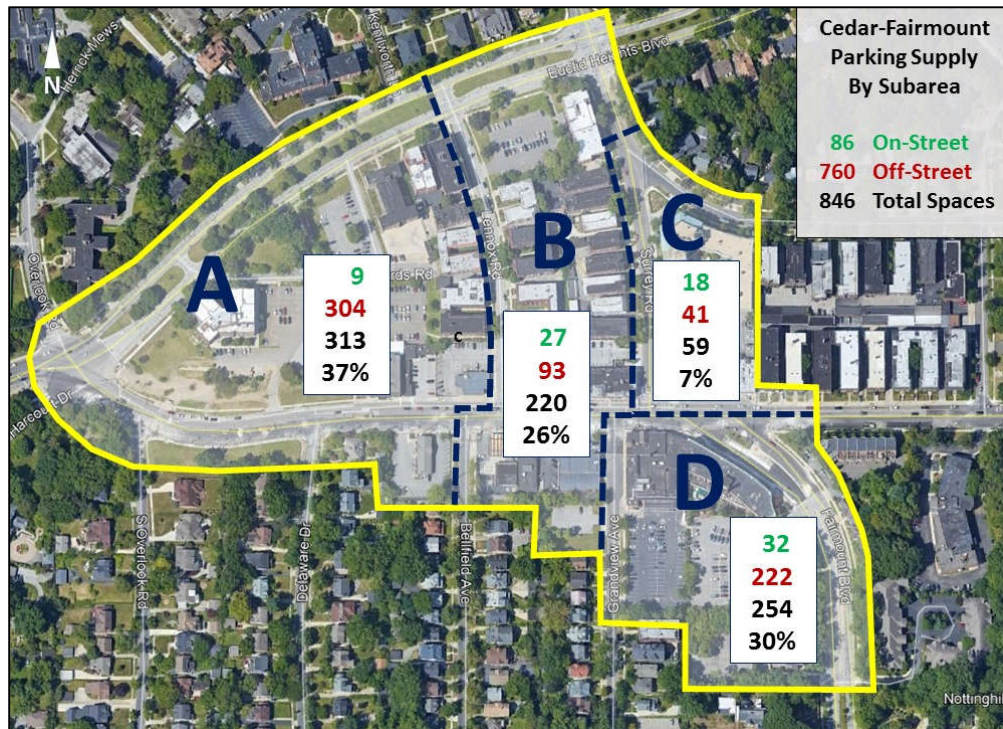
DESMAN verified the existing inventory of on- and off-street parking throughout the CFCD on Thursday, April 26<sup>th</sup>, 2018. For the purposes of this study, the existing parking supply for the CFCD takes into account all of the on- and off-street spaces and facilities under the control of both the public and private sector.

A total of 846 parking spaces serve the District's businesses, residents and visitors. **Exhibit 2** shows that over 90% of the total parking supply is collectively situated in Sub-Areas A, B and D, while only 7% of the supply is situated in Sub-Area C. The same exhibit also shows that parking supply subtotals in Sub-Areas A and D together account for 67% (567 spaces) of all the parking in the CFCD.

**On-Street Parking Inventory** **Exhibit 3** provides a graphic depiction of the locations of the existing on-street parking zones and the current restrictions the City has imposed on on-street parking.

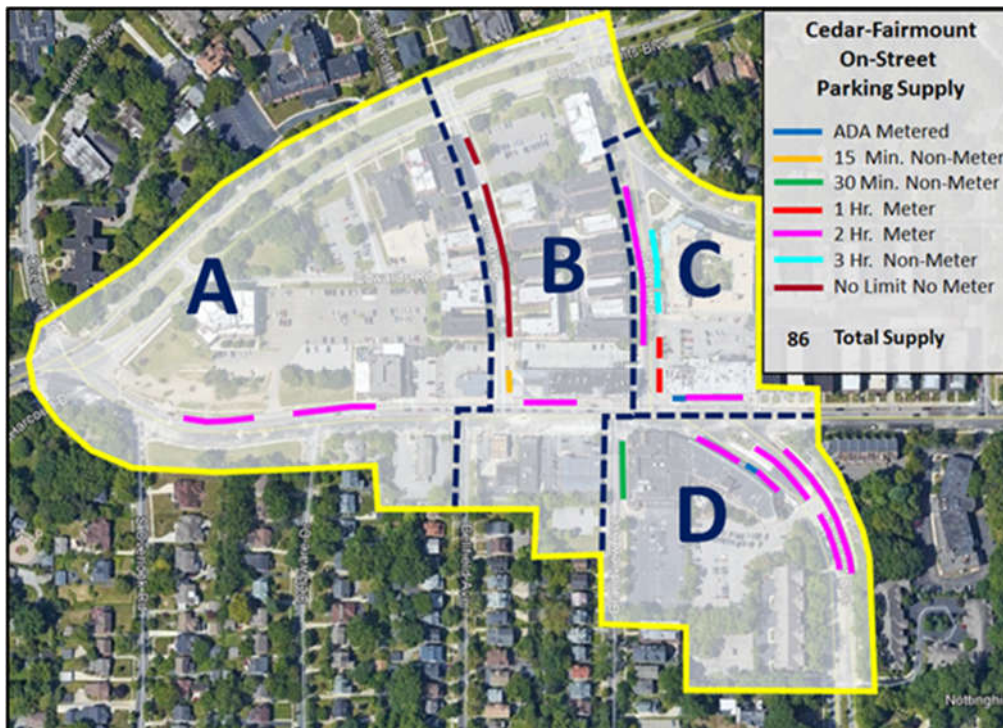


**Exhibit 2 Existing Supply Parking Distribution by Study Sub-Area**



Prepared by DESMAN

**Exhibit 3 On-Street Parking Zone Map**



Prepared by DESMAN

**Table 1** provides a detailed inventory of the various classifications of parking spaces throughout the CFCD by Sub-Area. As shown in the Table, there are only 86 spaces on-street and all but 18 of those spaces are unrestricted relative to parking time limits and/or class of users (i.e. handicapped permit holders). The majority of the on-street spaces (59%), whether metered or not, are currently limited to a maximum of 2-hours. The rest of the on-street spaces have time limits ranging from 15 minutes up to 3 hours and only 2 on-street metered spaces are designated for handicapped permit holders.

**Table 1** Existing CFCD Parking Inventory by Space Type and Sub-Area

	<b>Total</b>	<b>Subarea A</b>	<b>Subarea B</b>	<b>Subarea C</b>	<b>Subarea D</b>
On-Street Spaces	86 10%	9 10%	27 31%	18 21%	32 37%
Off-Street Spaces	760 90%	304 40%	193 25%	41 5%	222 29%
<b>Total Spaces</b>	<b>846 100%</b>	<b>313 37%</b>	<b>220 26%</b>	<b>59 7%</b>	<b>254 30%</b>
<b>On-Street Parking Supply</b>					
<b>Subtotal: On-Street Spaces</b>	<b>86</b>	<b>9</b>	<b>27</b>	<b>18</b>	<b>32</b>
<b>Non-Metered Spaces</b>	<b>30 35%</b>	<b>0 0%</b>	<b>21 78%</b>	<b>5 28%</b>	<b>4 13%</b>
15 min. Non-Metered	3 3%	0 0%	3 11%	0 0%	0 0%
30 min. Non-Metered	4 5%	0 0%	0 0%	0 0%	4 13%
3 Hr Non-Metered	5 6%	0 0%	0 0%	5 28%	0 0%
No Limit Non-Metered	18 21%	0 0%	18 67%	0 0%	0 0%
<b>Metered Spaces</b>	<b>56 65%</b>	<b>9 100%</b>	<b>6 22%</b>	<b>13 72%</b>	<b>28 88%</b>
HC Metered	2 2%	0 0%	0 0%	1 6%	1 3%
1 Hr Metered	3 3%	0 0%	0 0%	3 17%	0 0%
2 Hr Metered	51 59%	9 100%	6 22%	9 50%	27 84%
<b>Off-Street Parking Supply</b>					
<b>Subtotal: Off-Street Spaces</b>	<b>760</b>	<b>304</b>	<b>193</b>	<b>41</b>	<b>222</b>
<b>Non-Metered Spaces</b>	<b>613 81%</b>	<b>235 77%</b>	<b>115 60%</b>	<b>41 100%</b>	<b>222 100%</b>
HC	11 1%	5 2%	1 1%	2 5%	3 1%
Unmarked	345 45%	66 22%	29 15%	31 76%	219 99%
Reserved	11 1%	3 1%	0 0%	8 20%	0 0%
Permit	246 32%	161 53%	85 44%	0 0%	0 0%
<b>Metered Spaces</b>	<b>147 19%</b>	<b>69 23%</b>	<b>78 40%</b>	<b>0 0%</b>	<b>0 0%</b>
HC Metered	4 1%	0 0%	4 2%	0 0%	0 0%
HC 5-Hr Metered	2 0%	1 0%	1 1%	0 0%	0 0%
HC 24-Hr Metered	2 0%	2 1%	0 0%	0 0%	0 0%
5-Hr Metered	33 4%	29 10%	4 2%	0 0%	0 0%
5-Hr Metered/Permit	27 4%	2 1%	25 13%	0 0%	0 0%
24-Hr Metered	45 6%	21 7%	24 12%	0 0%	0 0%
24-Hr Metered/Permit	34 4%	14 5%	20 10%	0 0%	0 0%

Source: DESMAN

### Off-Street Parking Inventory

The existing off-street parking lot and garage spaces account for ninety percent (760 spaces) of the total supply of parking throughout the CFCD. The City owns four off-street lots and one parking deck, while the private sector owns eight off-street lots. All of the private lots are unmetered and, except for the set aside of a few spaces for specific users, the majority of the private lots do not have signed parking restrictions and are available for use by business patrons and employees on a first come, first served basis. Conversely, the City relies on a combination signage and meters to dictate how all of its off-street parking supply can be used and by whom. The parking meters installed in the City's off-street facilities allow users to park for

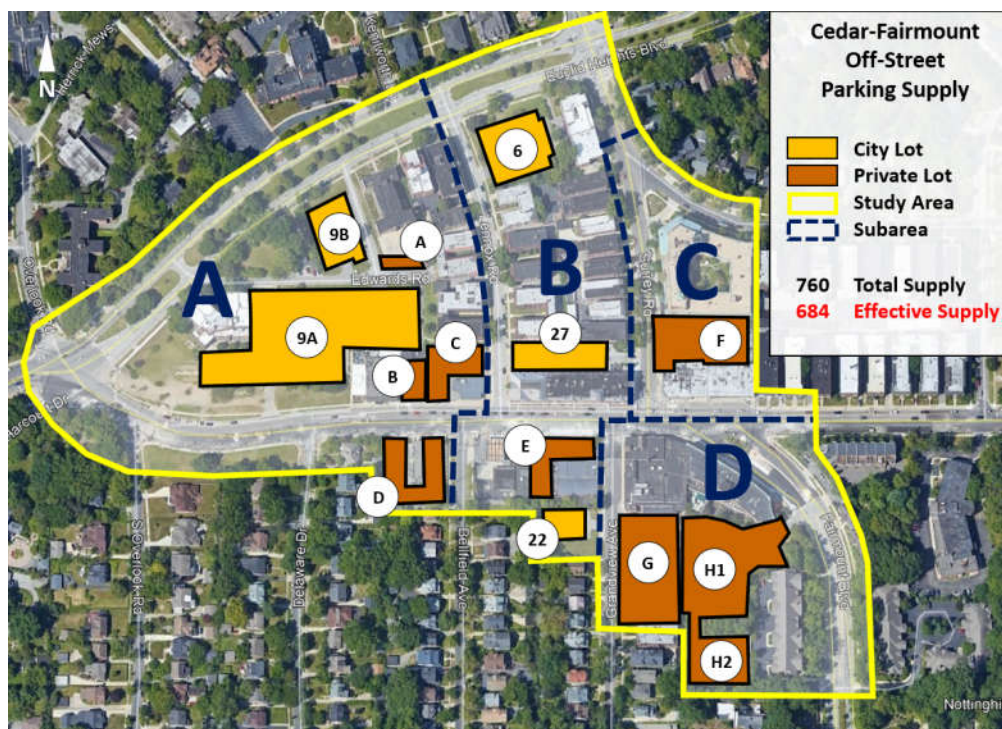




a maximum of either 5 hours or 24 hours and signs are posted to inform City parking permits holders where they are allowed to park.

**Exhibit 4** depicts the locations of the City-owned and privately-owned off-street parking facilities within the study area and **Table 2** provides the existing space counts for these 14 off-street parking

**Exhibit 4** Existing Off-Street Parking Facility Map



Prepared by DESMAN



**Table 2 Existing Off-Street Parking Facility Space Inventory**

	<b>Spaces</b>	<b>% of TL</b>	<b>Effective Supply</b>
<b>City-Owned Facilities</b>	<b>388</b>	<b>51%</b>	<b>349</b>
Lot: 6 2091 Lennox Rd.	51	7%	46
Lot: 9A South of Edwards Rd.	183	24%	165
Lot: 9B North of Edwards Rd.	42	6%	38
Lot: 22 2162 Grandview Ave.	19	3%	17
Lot: 27 Surrey Deck (Upper Level)	46	6%	41
Surrey Deck (Lower Level)	47	6%	42
<b>Private-Owned Facilities</b>	<b>372</b>	<b>49%</b>	<b>335</b>
Lot: A 2364 Euclid Hts. Blvd. (Apartment Bldg. Lot)	10	1%	9
Lot: B 12395 Cedar Rd. (Fifth Third Bank)	19	3%	17
Lot: C 12401 Cedar Rd. (Woodside Cedar Properties)	22	3%	20
Lot: D 12388 Cedar Rd. (Chase Bank)	28	4%	25
Lot: E 12416 Cedar Rd. (Bridgestone Tire)	30	4%	27
Lot: F 12451 Cedar Rd. (Cedar Fairmount Properties)	41	5%	37
Lot: G 12426 Cedar Rd. (Dave's Market)	80	11%	72
Lot: H1 2460 Fairmount Blvd. (Heights Medical Ctr. Bldg.)	100	13%	90
Lot: H2 2461 Fairmount Blvd. (Heights Medical Ctr. Bldg.)	42	6%	38
<b>TOTAL OFF-STREET PARKING SUPPLY</b>	<b>760</b>	<b>100%</b>	<b>684</b>

*Note: The "Effective Supply Factor" equals 90% of actual off-street parking supply total.*

*Source: DESMAN*

### Effective Parking Supply

The Effective Parking Supply is the number of spaces calculated to be usable after taking into account factors including a parking area's user groups, the parking area's traffic circulation patterns, mis-parked cars, routine maintenance, and even snow build-up that can render some spaces temporarily unavailable.

In the case of the CFCD, the effective supply adjustment is only applicable to the off-street parking space inventory because there are so few on-street spaces in the area and meter placement and pavement striping tends to minimize mis-parking.

The Effective Supply Factor is the percentage by which the actual number of parking spaces in each parking facility is multiplied in order to determine the total Effective Parking Supply. In the case of the CFCD, DESMAN used an Effective Supply Factor of 90% for each of the 14 off-street parking facilities in order to determine the total Effective Parking Supply of 684 spaces.

The subject of Effective Parking Supply will resurface later in this report when the analysis of the prevailing demand for parking is correlated with the available parking supply.

### Parking Facility Ownership and User Access

When considering the supply of parking within any study it is important to understand the ownership of, and user access to, the available parking inventory. In the CFCD, the public sector (i.e. the City) owns and controls 56% (475 spaces) of the total supply of parking. This total includes the 86 on-street spaces, as well as the 388 off-street spaces in the four City-owned parking lots and one parking deck. The private



sector owns and controls remaining 44% (371 spaces) of the total supply of existing spaces. These spaces are all located in the nine privately-owned off-street parking lots.

Not every City-controlled parking is open to any and every parker; nor is every privately-owned parking space off-limits to non-business affiliated customers. Understanding the existing restrictions that apply to an inventory of parking helps to comprehend the degree to which the parking supply serves an area. To do this, we counted every existing parking space as being in one of four basic categories – namely “Public/Public”, “Public/Private”, “Private/Private” and “Private/ Public” defined as follows:

Public/Public - refers to parking spaces which are publicly-owned and also accessible to the general public on a first come first served basis either for free or for a charge. These spaces can be situated on-street or in off-street parking lots. There are 239 (28%) of these spaces within the CFCD.

Public/Private - refers to parking spaces which are publicly-owned but exclusively designated or earmarked to serve a certain individual or members of a group. Examples of Public/Private spaces would be any on- or off-street spaces designated for use by only the “Police”, “ADA Placard Holders” or “Resident Permit Holders”. There are 236 (28%) of these spaces within the CFCD.

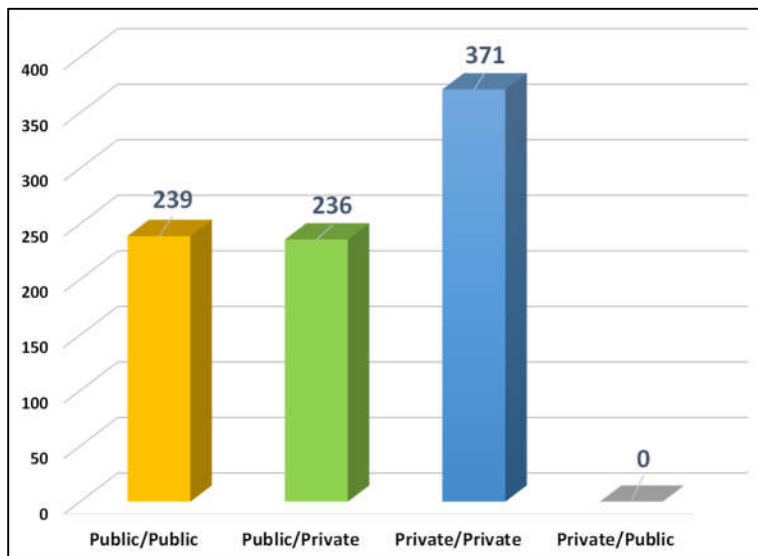
Private/Private - refers to parking spaces which are privately-owned and exclusively designated to serve a certain individual or a qualified group of individuals. An example of a Private/Private space would be the “customer only” parking at the Fifth-Third Bank lot or the Dave’s Market Lot. There are 371 (44%) of these spaces within the CFCD.

Private/Public - refers to parking which is privately-owned and also accessible to the general public on a first come first served basis usually for a charge. While there is no Private/Public parking in the CFCD, an example of such parking would be a privately and operated parking lot or garage that offers monthly and/or transient parking to the general public at prevailing market rates.



**Exhibit 5** graphically depicts the existing makeup of the parking supply based on the four previously described ownership and user access categories.

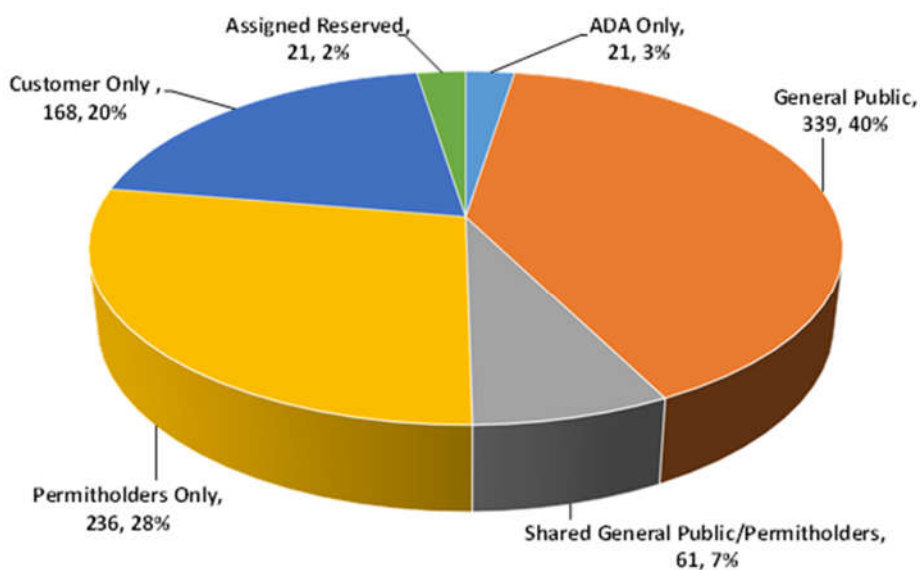
**Exhibit 5** Study Area Parking Supply Ownership and Access



Prepared by DESMAN

Another important way of grasping the utilization of the CFCD parking supply is in how the spaces are allocated to serve various user groups. The **Exhibit 6** pie chart illustrates how the existing parking supply is allocated to accommodate different user groups.

**Exhibit 6** Parking Supply Users Allocation



Prepared by DESMAN



The “General Public” is free to use 339 spaces (40% of the supply) on a first come, first served basis. These spaces include metered and legal unmetered on-street spaces, as well as the metered spaces located in the off-street lots and the parking deck owned by the City. The next largest portion of the CFCD parking supply (236 spaces/28%) is designated for “Permitholders”. According to the City, there is a total of 225 such permits currently in circulation and issued to residents and businesses in the area. Sixty-one metered spaces (7% of the supply) are located in the City-owned off-street lots. These spaces can be used by the general public for a fee or City permitholders can park without having to pay.

The balance of the parking supply is comprised of “Customers Only” spaces dedicated to privately-owned businesses (168 spaces/20% of the supply), “Signed as Reserved” spaces for specific individual users (21 spaces/2% of the supply), and “ADA Only” spaces for users that possess a valid handicapped hangtag or placard (21 spaces/3% of the supply).

As one would expect, the majority of the privately-owned off-street parking (340 spaces) is intended for use solely by the customers and employees of commercial establishments during normal business hours. However, after normal business hours, several of the privately-owned lots are either formally or casually used to accommodate the spillover parking generated by other area businesses that continue to operate into the evening. For example, both Lots B and C are formally used to store valet-parked vehicles of Nighttown customers, while other Nighttown customers voluntarily chose to park at Lot D on the opposite side of Cedar Road from the night club.

### Existing Parking Utilization

DESMAN conducted parking utilization surveys throughout the CFCD between April 27<sup>th</sup>, 2018 and May 1<sup>st</sup>, 2018. The objective of the survey effort was to capture the prevailing levels of parking activity during key time periods on a typical Friday and Saturday, namely during lunch hour, mid-afternoon following the lunch hour and during the peak dinner/happy hour period. Parking levels were also documented on Monday and Tuesday at 5:00pm and 8:00am, respectively, to get a sense of the parking levels during the PM rush hour and overnight. During these surveys, DESMAN documented not only the number of vehicles parked in the on- and off-street spaces, but also the type or category of the occupied spaces (i.e. meter, non-meter, permit, ADA, etc.). This was done in order gauge how the current spaces classifications were being consumed during the different time periods.

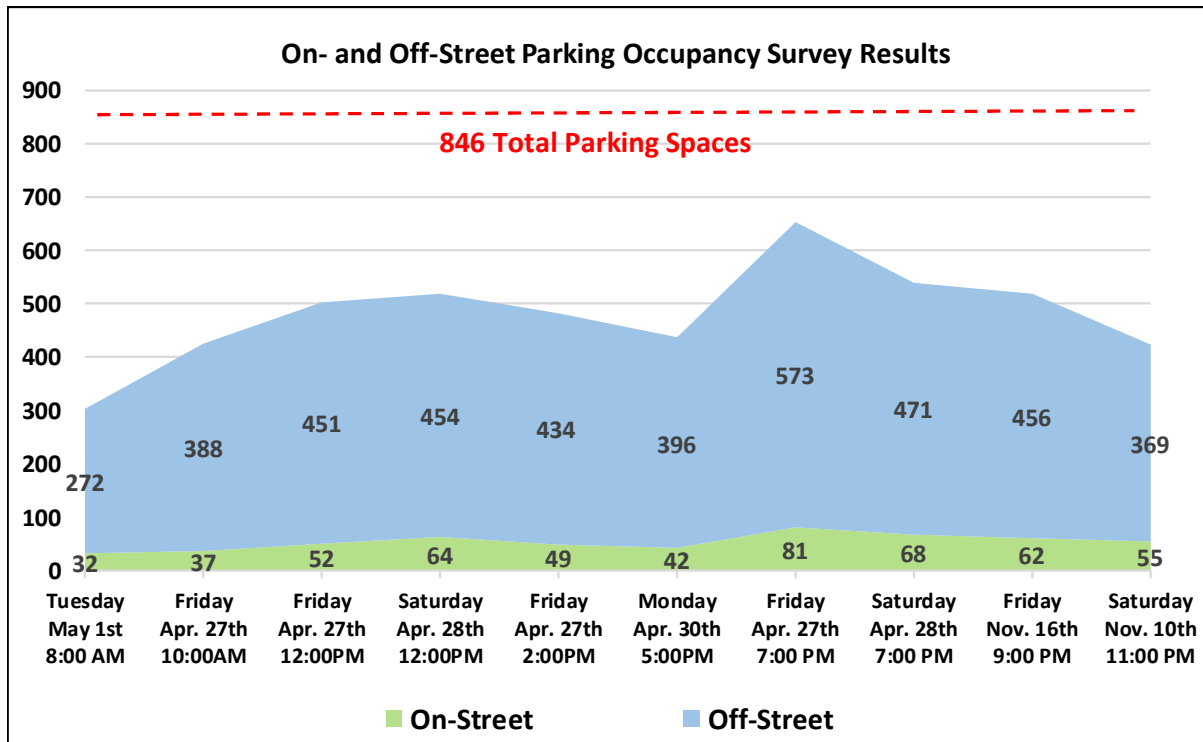
On Friday, April 27<sup>th</sup>, parking occupancy counts were performed at 10:00am, 12:00noon, 2:00pm, and 7:00pm. On Saturday, April 28<sup>th</sup>, parking occupancy was recorded at 8:00am, 10:00am 12:00noon, 2:00pm, 5:00pm, and 7:00pm. Additionally, parking occupancy was recorded at 5:00pm on Monday, April 30<sup>th</sup> and at 8:00am on Tuesday, May 1<sup>st</sup>.

While the detailed breakdown of this survey data is provided in the **Appendix** of this report, the following maps, charts and tables focus on selected key time periods when the district-wide level of parking activity for both on- and off-street parking spaces peaked, which was at 7:00pm on Friday evening. Parking activity levels on Saturday also peaked during the 7:00pm hour, but the total count of parked vehicles on Saturday was below that on Friday.

**Exhibits 7 and 8** graphically compares the peak weekday and weekend parking activity levels for the entire CFCD with selected off-peak periods.

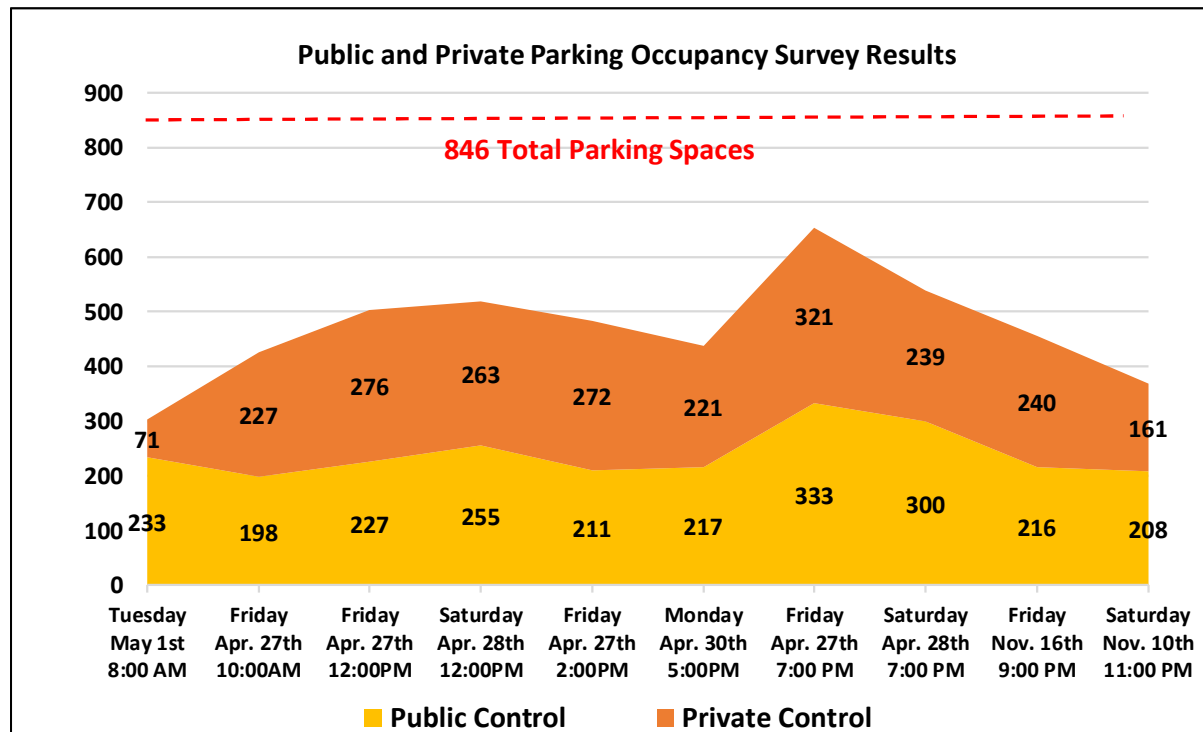


**Exhibit 7** District-Wide Utilization of On- and Off-Street Parking Spaces



Prepared by DESMAN

**Exhibit 8** District-Wide Utilization of Publicly- and Privately-Controlled Parking Spaces

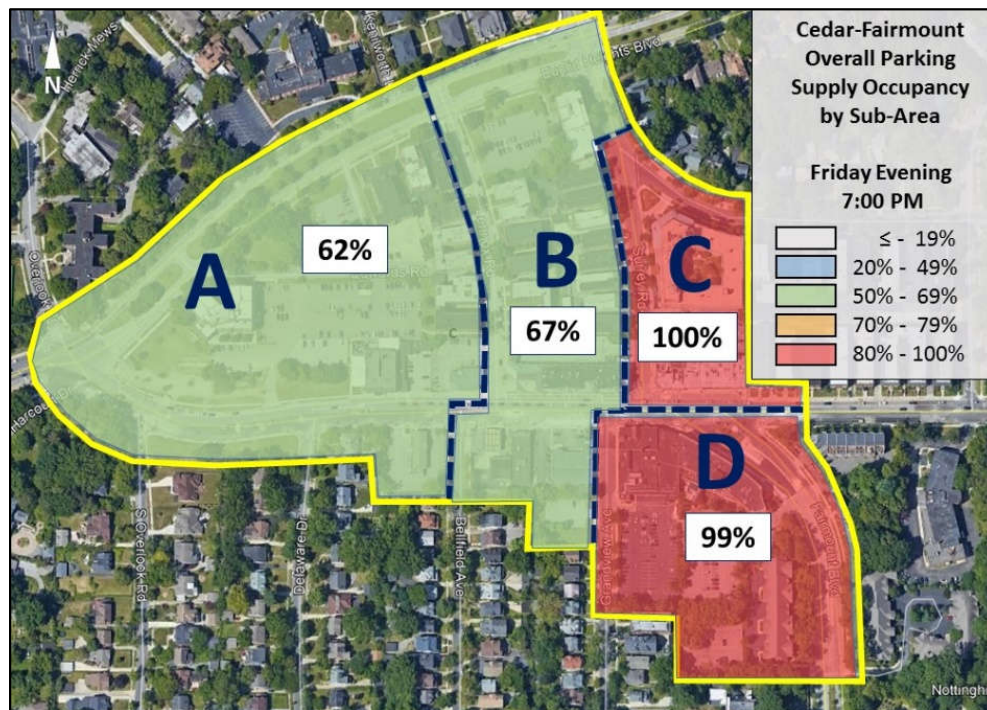


Prepared by DESMAN

These graphics clearly indicate that the district-wide peak count of parked vehicles did not approach the total supply of parking in the CFCD. In fact, during the peak demand period, only 77% (654 of 846 spaces) of the parking supply was occupied. This finding reveals that, district-wide, there seems to be an adequate supply of parking to serve the existing land uses in the CFCD.

While there appears to be an ample supply of parking district-wide, there is a widely held perception that there are localized parking deficits in certain segments of the CFCD during peak periods. To examine this issue, DESMAN organized the parking survey results by the previously defined Sub-Areas. **Exhibits 9** and **10** present the peak hour parking space occupancy by Sub-Area on Friday and Saturday evening, respectively.

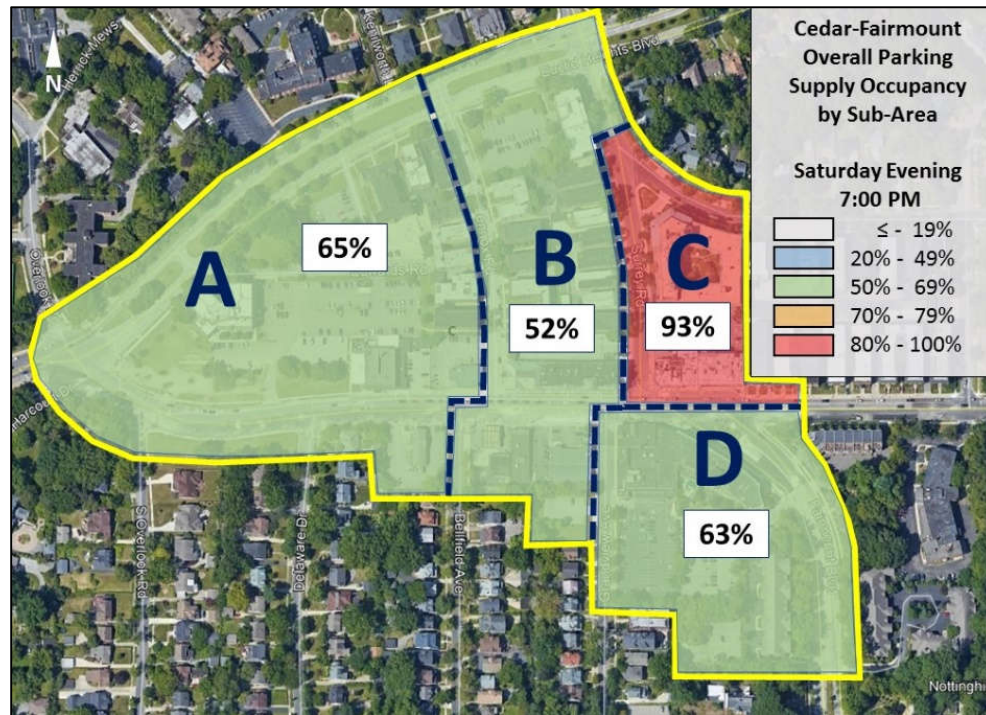
**Exhibit 9** Peak Period Occupancy by Sub-Area (Friday 7:00 PM)



Prepared by DESMAN



**Exhibit 10** Weekend Peak Period Occupancy by Sub-Area (Saturday 7:00 PM)



Prepared by DESMAN

As shown in the above exhibits, parking in certain of the Sub-Areas in the CFCD can become fully or nearly fully occupied during periods of peak demand. While the high utilization of parking in Sub-Area C is mainly attributed to the fact that there are only 59 spaces in this area, while Sub-Area D experiences unusually high parking demand surges during the peak hour, largely attributable to the popularity of the restaurant Barrio.

## On-Street Parking Utilization

**Table 3** breaks down the peak period parking survey results for all on-street spaces throughout the CFCD.

**Table 3** On-Street Parking Utilization by Space Classification

ON-STREET PARKING SPACE CLASSIFICATIONS	On-Street Spaces	Tuesday May 1st 8:00 AM	Friday Apr. 27th 10:00AM	Friday Apr. 27th 12:00PM	Saturday Apr. 28th 12:00PM	Friday Apr. 27th 2:00PM	Monday Apr. 30th 5:00PM	Friday Apr. 27th 7:00PM	Saturday Apr. 28th 7:00PM	Friday Nov. 16th 9:00PM	Saturday Nov. 10th 11:00PM
<b>Metered Space Subtotals</b>	<b>56</b>	<b>6 11%</b>	<b>16 29%</b>	<b>29 52%</b>	<b>45 80%</b>	<b>26 46%</b>	<b>20 36%</b>	<b>53 95%</b>	<b>39 70%</b>	<b>43 77%</b>	<b>40 71%</b>
HC Metered Spaces	2	0 0%	0 0%	2 100%	0 0%	1 50%	0 0%	2 100%	1 50%	1 50%	1 50%
1-hr Metered Spaces	3	3 100%	1 33%	3 100%	2 67%	3 100%	0 0%	3 100%	3 100%	0 0%	0 0%
2-hr Metered Spaces	51	3 6%	15 29%	24 47%	43 84%	22 43%	20 39%	48 94%	35 69%	42 82%	39 76%
<b>Non-Metered Spaces Subtotals</b>	<b>30</b>	<b>26 87%</b>	<b>21 70%</b>	<b>23 77%</b>	<b>23 77%</b>	<b>23 77%</b>	<b>22 73%</b>	<b>28 93%</b>	<b>25 83%</b>	<b>17 57%</b>	<b>15 50%</b>
15-min. Non-Metered Spaces	3	1 33%	1 33%	1 33%	2 67%	2 67%	0 0%	3 100%	2 67%	2 67%	1 33%
30-min. Non-Metered Spaces	4	2 50%	0 0%	0 0%	0 0%	0 0%	0 0%	2 50%	0 0%	0 0%	0 0%
3-hr Non-Metered Spaces	5	8 160%	7 140%	6 120%	5 100%	6 120%	5 100%	8 160%	7 140%	5 100%	5 100%
Non-Metered Spaces	18	15 83%	13 72%	16 89%	16 89%	15 83%	17 94%	15 83%	16 89%	12 67%	9 50%
<b>TOTALS ON-STREET SPACES</b>	<b>86</b>	<b>32 37%</b>	<b>37 43%</b>	<b>52 60%</b>	<b>68 79%</b>	<b>49 57%</b>	<b>42 49%</b>	<b>81 94%</b>	<b>64 74%</b>	<b>60 70%</b>	<b>55 64%</b>

Daytime Peak

Evening Peak

Prepared by DESMAN

During normal daytime business hours on Saturday April 28th, the occupancy of all the on-street parking spaces only reached 68%. However, nearly all of the on-street parking spaces, regardless of space classification, were over 90% occupied at the 7:00pm hour of Friday April 27th. Additionally, the high utilization of the 3-hour, non-metered on-street spaces located on the east side of Surrey Road is a reflection of bumper-to-bumper parking of mostly small and mid-sized vehicles. Wherever pole-mounted meters are absent, on-street parkers tend to squeeze into open curb areas, resulting in greater numbers of parked vehicles than would exist where parking meters are present.

## Off-Street Parking Facility Utilization

As discussed previously, the space capacities of the off-street parking facilities were adjusted to be 90% of the actual space capacity in order to reflect the Effective Parking Supply. This 10% difference between the actual space capacity and effective supply figure represents a capacity cushion needed to ensure that the facilities can be effectively operated at all times.

**Table 4** highlights each instance when the occupancy of an individual off-street parking facility reached or surpassed 90% of the available supply (i.e. Effective Supply), as this is when it becomes difficult and time consuming to find an unoccupied parking space. Whenever occupancy levels reach or surpass 90%, drivers tend to cruise the facility looking for and open space or wait in drive aisles or double park, waiting for a parking space to be vacated. This behavior exacerbates an already frustrating circumstance and sometimes can cause hazardous situations for drivers, as well as pedestrians.

It is important to note that the original parking occupancy surveys conducted by DESMAN in late April and early May of 2018 did not capture the area's parking activity after 7:00pm. However, as a result of feedback from area residents DESMAN expanded upon the original survey data by documenting the occupancy of the area's off-street parking facilities at 11:00pm on Saturday November 10<sup>th</sup> and again at 9:00pm on Friday November 16<sup>th</sup>.

While it could be argued that peak period parking activity levels in the spring might typically be higher than in late fall, the actual late evening survey results from November for the off-street parking facilities were not as high as the 7:00pm survey results from April.



**Table 4 Off-Street Parking Utilization by Facility**

OFF-STREET FACILITIES	Actual Supply	Effective Supply	Tuesday May 1st 8:00 AM	Friday Apr. 27th 10:00AM	Friday Apr. 27th 12:00PM	Saturday Apr. 28th 12:00PM	Friday Apr. 27th 2:00PM	Monday Apr. 30th 5:00PM	Friday Apr. 27th 7:00PM	Saturday Apr. 28th 7:00PM	Friday Nov. 16th 9:00PM	Saturday Nov. 10th 11:00PM
Lot: 6	51	46	23 50%	21 46%	21 46%	23 50%	16 35%	16 35%	25 54%	18 39%	31 67%	32 70%
Lot: 9A	183	165	98 59%	62 38%	73 44%	119 72%	61 37%	73 44%	100 61%	81 49%	101 61%	100 61%
Lot: 9B	42	38	35 93%	15 40%	15 40%	30 79%	16 42%	25 66%	34 90%	26 69%	31 82%	24 63%
Lot: 22	19	17	6 35%	15 87%	14 81%	7 41%	14 81%	11 64%	14 81%	10 58%	2 12%	2 12%
Lot: 27	Upper Lv.	46	41	9 22%	20 48%	18 43%	21 51%	23 56%	26 63%	39 94%	17 41%	19 46%
	Lower Lv.	47	47	30 64%	28 60%	33 70%	31 66%	31 66%	23 49%	39 83%	39 83%	32 68%
Lot: A	10	10	10 100%	4 40%	5 50%	7 70%	5 50%	6 60%	7 70%	5 50%	6 60%	7 70%
Lot: B	19	17	3 17%	2 11%	8 46%	10 57%	10 57%	5 29%	15 86%	18 103%	14 80%	2 11%
Lot: C	22	20	5 25%	11 55%	8 40%	24 119%	9 45%	8 40%	24 119%	7 35%	24 119%	16 80%
Lot: D	28	25	1 4%	16 63%	22 87%	12 47%	14 55%	13 51%	6 24%	21 83%	17 67%	8 31%
Lot: E	30	27	12 44%	26 96%	22 81%	8 30%	22 81%	16 59%	6 22%	25 92%	8 30%	3 11%
Lot: F	41	38	12 32%	24 63%	26 69%	38 100%	30 79%	23 61%	39 103%	38 100%	33 87%	30 79%
Lot: G	80	72	7 10%	35 48%	42 58%	26 36%	41 57%	38 53%	64 89%	30 42%	21 29%	5 7%
Lot:+B4::Lower Lot	100	90	18 20%	99 110%	102 113%	83 92%	102 113%	94 104%	114 127%	92 102%	92 102%	80 89%
Lot: H2 Upper Lot	42	38	3 8%	10 26%	42 111%	38 101%	40 106%	19 50%	47 124%	42 111%	33 87%	2 5%
<b>TOTALS</b>	<b>760</b>	<b>693</b>	<b>272 39%</b>	<b>388 56%</b>	<b>451 65%</b>	<b>477 69%</b>	<b>434 63%</b>	<b>396 57%</b>	<b>573 83%</b>	<b>469 68%</b>	<b>464 67%</b>	<b>361 52%</b>

Daytime Peak

Evening Peak

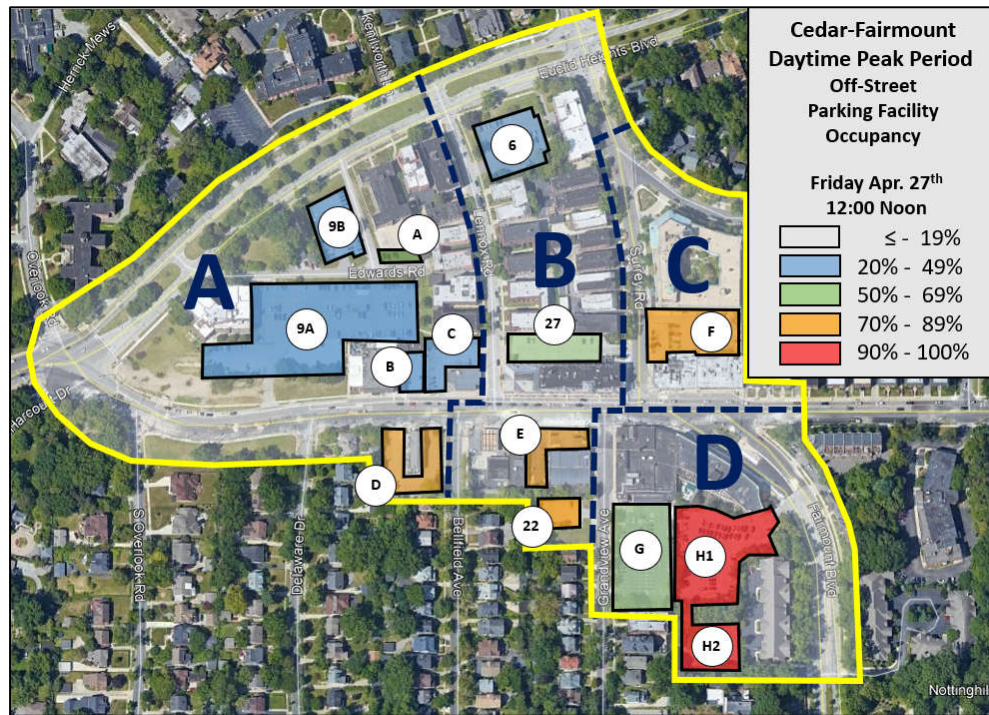
Prepared by DESMAN

**Exhibits 11 and 12** provide a graphic depiction of the off-street parking facility occupancy levels during the daytime (i.e. 12:00 noon on Friday April 27th) and evening (i.e. 7:00pm on Friday April 27<sup>th</sup>).



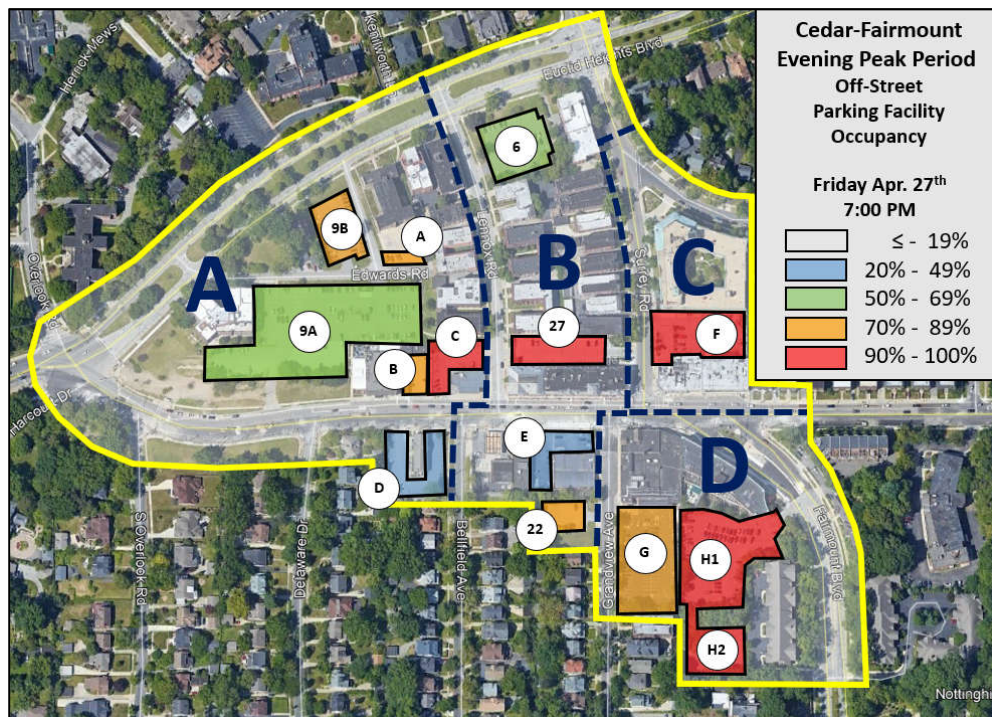


**Exhibit 11** Peak Period Parking Occupancy (Friday April 27<sup>th</sup> 12:00 Noon)



Prepared by DESMAN

**Exhibit 12** Peak Period Parking Occupancy (Friday April 27<sup>th</sup> 7:00 PM)



Prepared by DESMAN



### Summary of Existing Parking Supply & Demand Conditions

Overall, the Cedar Fairmount Commercial District was found to have an adequate supply of parking at most times of the day. Based on DESMAN's observations, the only real exception to this finding occurs in Sub-Areas C and D during the Friday evening dinner/happy hour period. During these times, the restaurant/bar patronage and area workers drive the demand up to and beyond the capacity of the existing parking in those areas. Within these Sub-Areas, the privately-owned Lot H was the facility that was most heavily utilized.

Fortunately, the proposed Top-of the Hill development is not expected to worsen this localized peak period parking shortfall given its distance from Sub-Areas C and D.

### FUTURE PARKING CONDITIONS

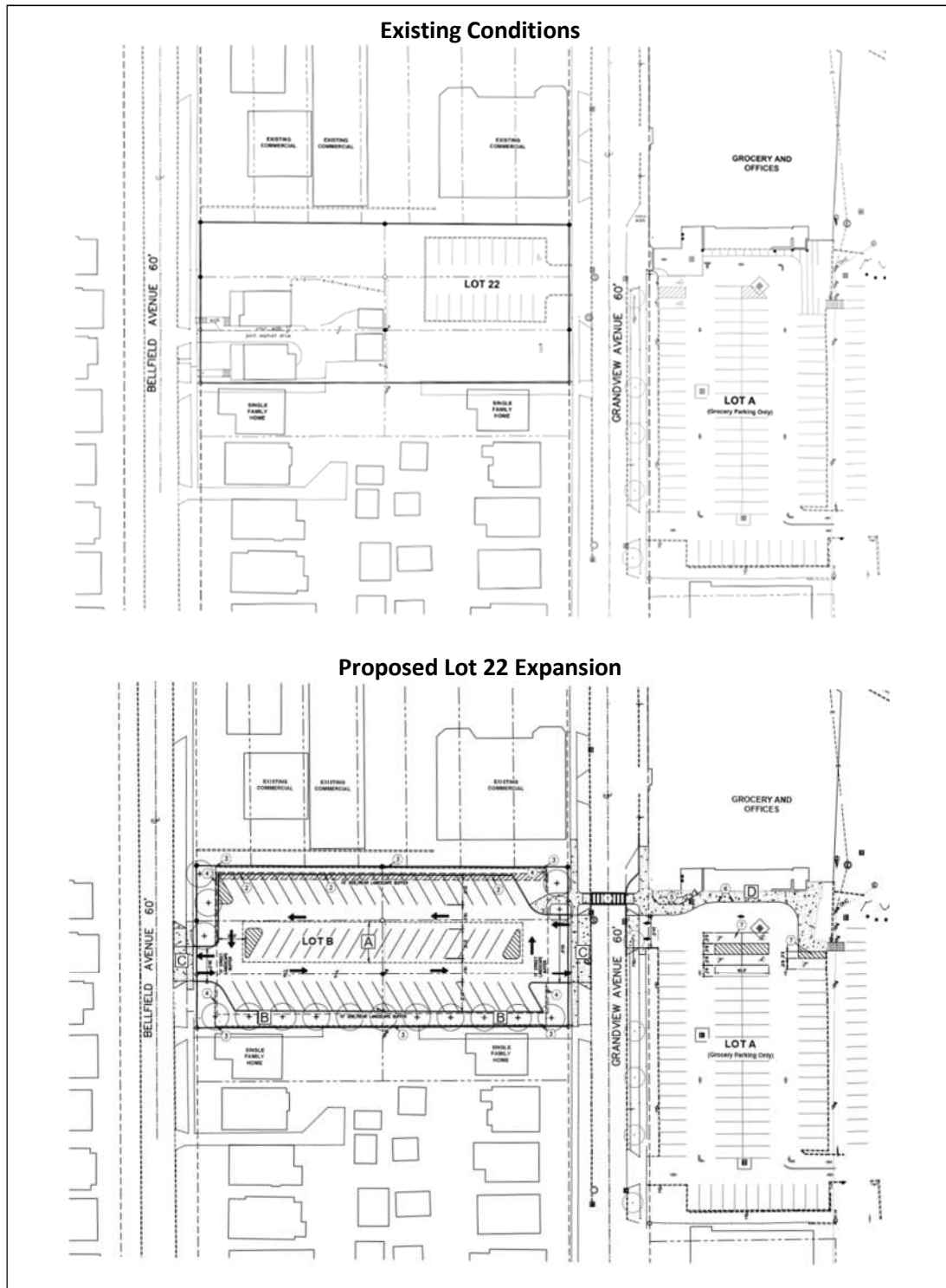
According to City officials, the Cedar Fairmount Commercial District has reached its maximum effective commercial occupancy level in terms of both the existing commercial storefronts and the upper floor office and residential uses. Aside from the new TOH development project, the City is unaware of any other development plans that would result in significant changes to the types and square footages of land uses in the area.

While there are no known development projects that are expected to negatively impact parking in the CFCD, the City has made DESMAN aware of one potential project which would alter the existing supply of off-street parking in the District. This project, which is proposed by the owners of the Cedar-Grandview Building located at 12426 Cedar Road, will enlarge the City-owned Lot 22 located at 2162 Grandview Avenue. **Exhibit 13** depicts the existing site conditions and the proposed lot expansion which will require the demolition and clearance of two residential buildings on Bellfield Avenue. If and when this project is approved and constructed, it will be accessible from both Grandview and Bellfield Avenues and it will yield at net gain of 42 spaces.

While this proposed lot is expected to be privately owned, it may be possible that the gain in parking spaces might help to relieve the prevailing peak period parking supply deficit in this Sub-Area.



**Exhibit 13 A Private Sector Proposal to Expand City-Owned Lot 22**



Drawings by NEFF & ASSOCIATES





## **PART 2: TOP-OF-THE-HILL PROJECT PARKING & TRAFFIC ASSESSMENT**

### **BACKGROUND**

The development plan and program for the Top-of-the-Hill mixed-use development has been revised and refined since DESMAN and WSP were retained to assess how the project's parking plan and traffic generation will service the development and impact the surrounding community. As the project plan has evolved, the supply of and access to the on-site parking, as well as the traffic generation, access and circulation at and surrounding the development have continued to be examined. The parking and traffic assessment which follows is based on the latest version of the project site plan and building data dated 10/19/18. However, our findings and opinions are a reflection of a series of productive exchanges and suggestions by and between the developer, the City and the community over the past few months that have led to the latest design for the project.

### **PROJECT DESCRIPTION**

The Top-of-the-Hill (TOH) project has been designed to respect the abutting property limits and massing of the Buckingham Condominium building to the northwest, the existing apartment buildings to the east and northeast, and the commercial properties to east along Cedar Road. The mixed-use development will comprise 484,946 total gross square feet (GSF). The land uses for the project include 282 units of market rate rental apartments, 10,249 GSF of ground level retail space, and a total of 568 parking spaces (i.e. 544 garage spaces and 24 surface spaces). It is important to note (and the project developer concedes) that, although the project building data table labels the 10,249 GSF of ground level leasable area as being "Retail Space", the term "Commercial", which could include restaurants and office space, in addition to retail shops, better defines the potential range of land uses which might end up occupying the space.

The main parking garage planned for the TOH project is structurally designed to be free standing, but is adjoined to the occupiable building area to the north and east. This main garage, which contains 523 spaces, is a 2-bay, single helix structure with 5 supported parking levels above grade. This massing of the main parking structure is almost entirely concealed from view when passing the site via the bordering streets. There are two vehicular ingress/egress points to the main garage, one from Edwards Road, which is to be extended southward to Cedar Road, and a second at the northwest corner of the structure that can be accessed from an existing service drive from Euclid Heights Boulevard.

The secondary structured parking area is vertically integrated into the nine-story commercial/residential tower at the west side of the site, near the intersection of Euclid Heights Boulevard and Cedar Road. This grade level area of the structure is designed to accommodate 21 parking spaces.

The project parking plan also includes 24 surface lot spaces to be located on the south side of the Buckingham condominium building.

**Exhibit 14** is an aerial view rendering of the Cedar Road frontage of the project and **Table 5** summarizes the Building Data for the project. **Exhibits 15** through **20** on the following pages illustrate the project's ground level site plan and the next four building levels above grade that are partly allocated to structured parking.





**Exhibit 14** Aerial Rendering of the Top-of-the-Hill Development



Source: Flaherty Collins – Eppstein Uhen 10/19/18

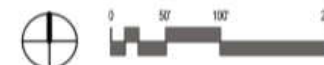
**Table 5** TOH Building Data

Building Data											
	Residential							Retail	Covered Parking		TOTALS
floor	GSF	NSF	common & circ.	efficiency	ave. unit	Total# of units		GSF	GSF	cars	Total GSF
lower level	4,099	-	4,099								4,099
ground floor	37,454	26,324	11,130	70.3%	880	30		10,249	42,396	120	90,099
floor 2	11,078	5,006	6,072	45.2%	880	6			33,550	106	44,628
floor 3	60,806	53,655	7,151	88.2%	880	61			33,550	106	94,356
floor 4	62,525	55,349	7,176	88.5%	880	63			33,550	106	96,075
floor 5	62,704	54,782	7,922	87.4%	880	62			33,550	106	96,254
floor 6	23,120	21,279	1,841	92.0%	880	24					23,120
floor 7	12,872	11,392	1,480	88.5%	880	13					12,872
floor 8	12,872	11,392	1,480	88.5%	880	13					12,872
floor 9	10,571	8,573	1,998	81.1%	880	10					10,571
<b>totals</b>	<b>298,101</b>	<b>247,752</b>	<b>50,349</b>	<b>83.1%</b>	<b>880</b>	<b>282</b>		<b>10,249</b>	<b>176,596</b>	<b>544</b>	<b>484,946</b>
ave GSF per unit						1,059					
ave per key											
<b>PARKING</b>											
residential parking										282	
parking ratio per unit										1.00	
surface parking										34	
public parking										296	
ave GSF per parking space									325		

Source: Flaherty Collins – Eppstein Uhen 10/19/18



**Exhibit 15** TOH Development: Ground Level Site Plan



GROUND FLOOR



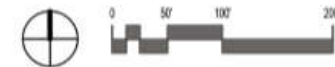
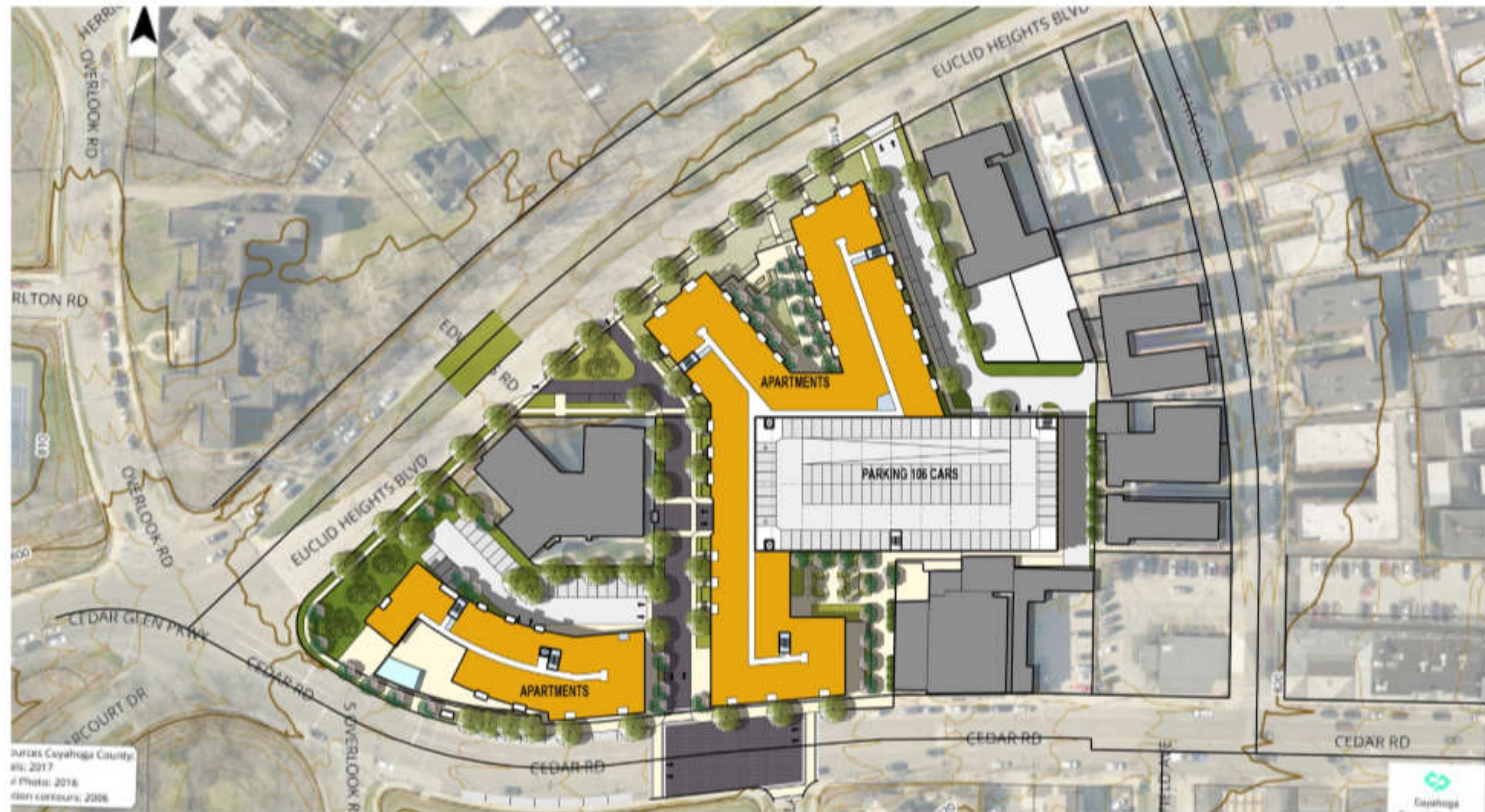


Map of Cedar Glen Park development in Cayuga County, New York. The map shows the proposed building layout, including a large parking lot for 106 cars, a common area, a terrace, and a pool. The development is situated along Euclid Heights Blvd and Cedar Rd. The map includes a north arrow, a scale bar (0 to 250 feet), and a legend. The map is dated 2017 and is a public map of Cayuga County, New York.

LEVEL 2

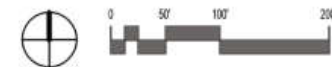
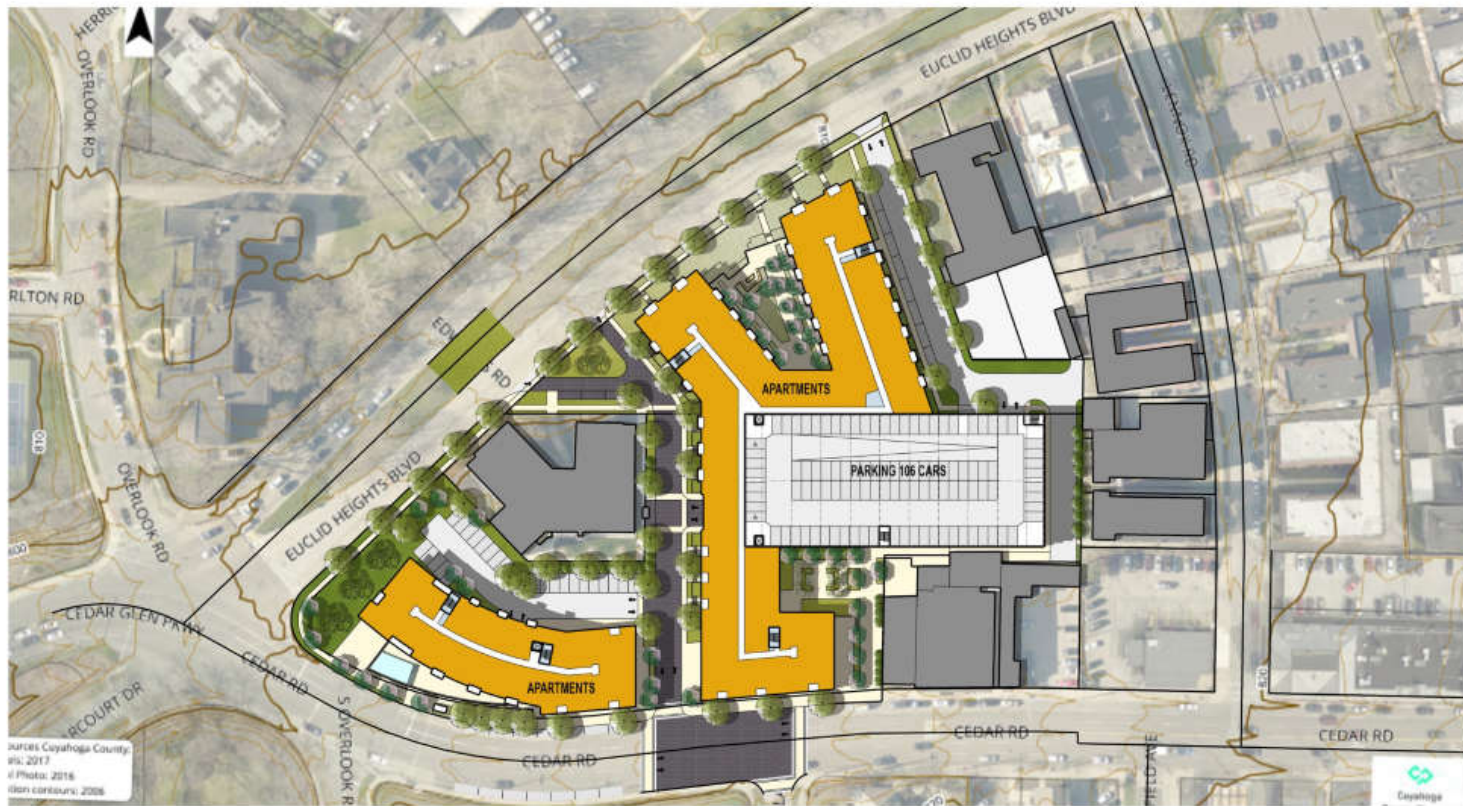


### Exhibit 17 TOH Development: Level 3





**Exhibit 18 TOH Development: Level 4**



LEVEL 4



engineering urban architects

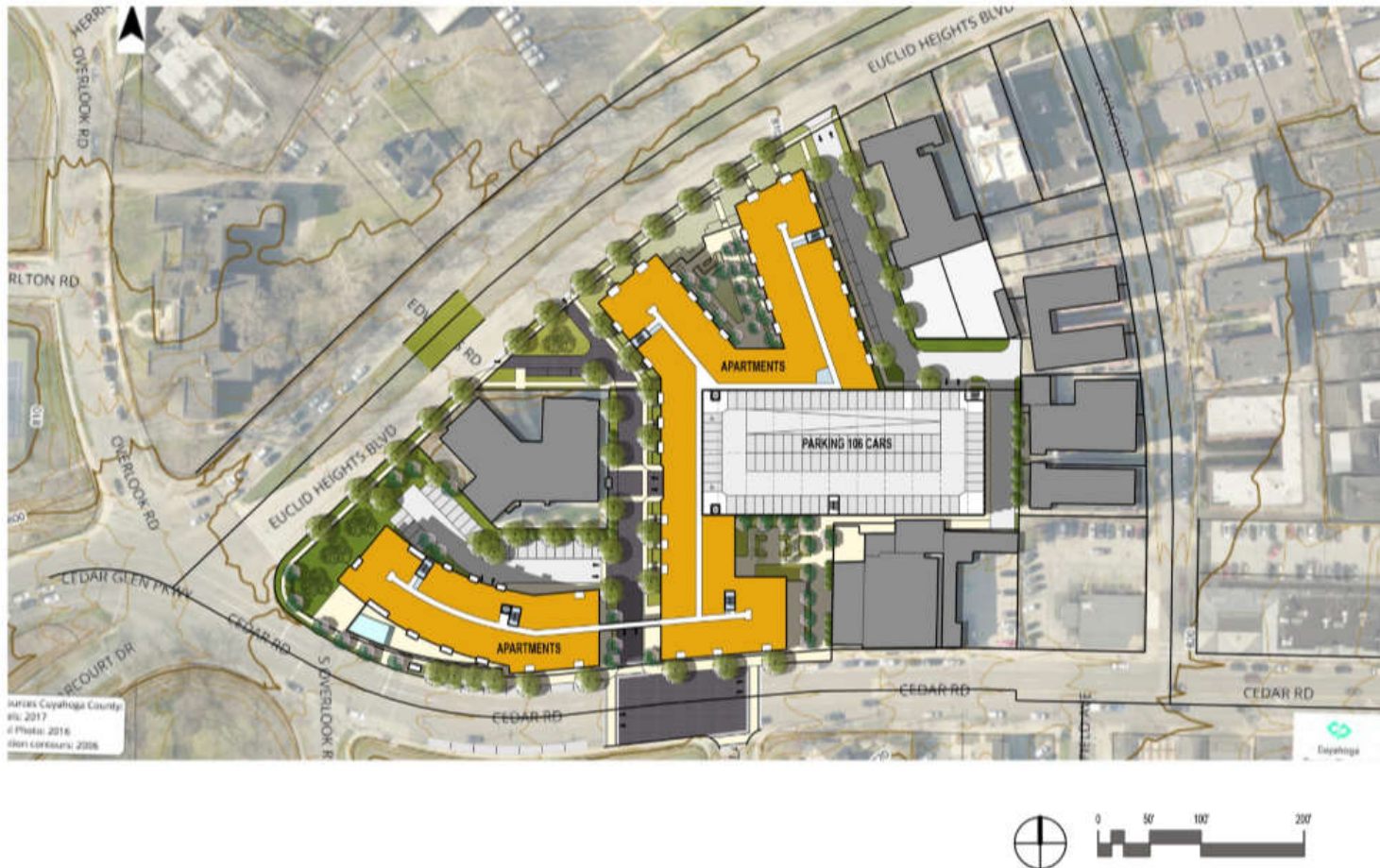


TOP OF THE HILL

16200  
10/19/2018



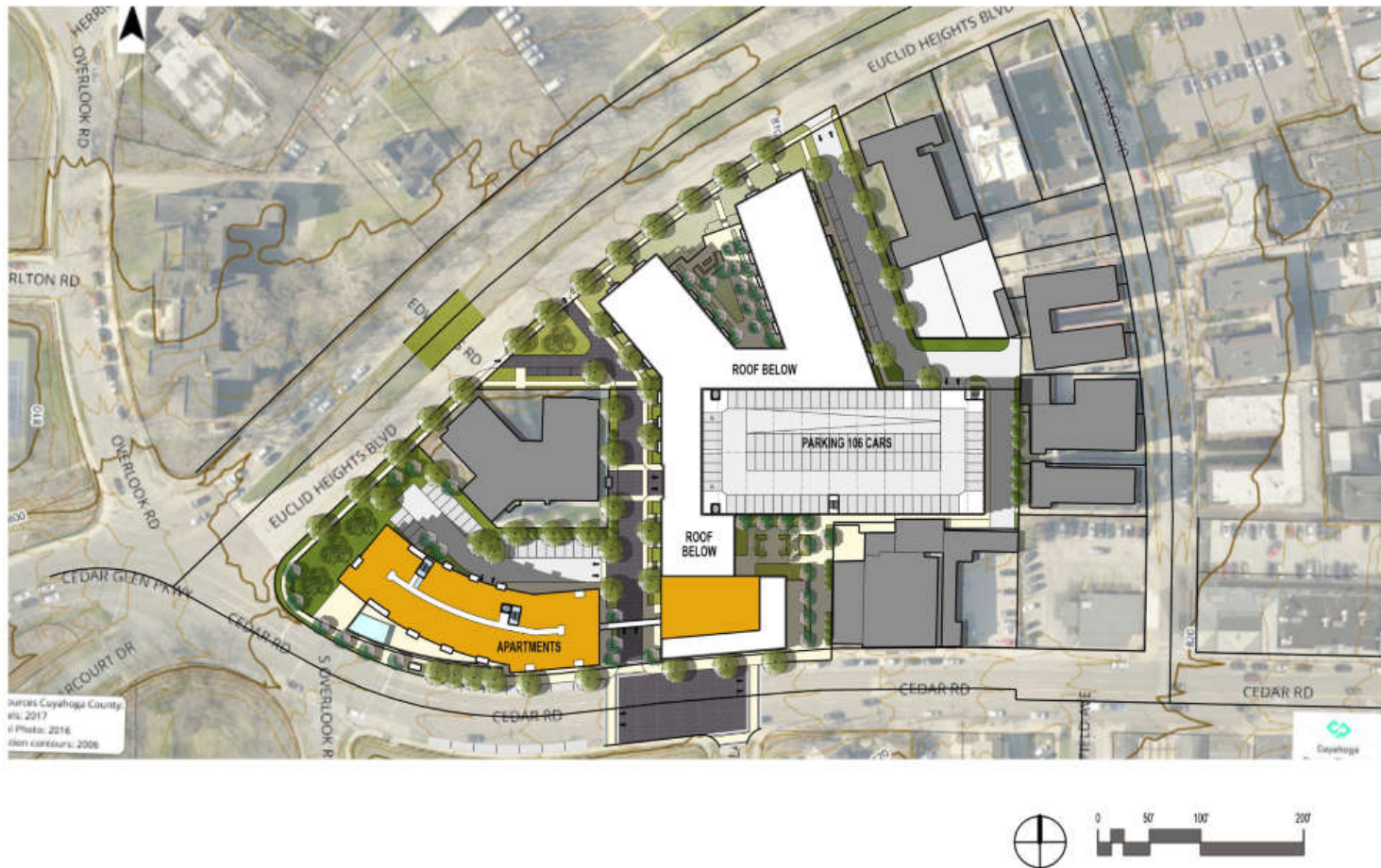
**Exhibit 19** TOH Development: Level 5



LEVEL 5



**Exhibit 20** TOH Development: Level 6



LEVEL 6



robertson + architects



TOP OF THE HILL

16200  
10/19/2018



## TOH DEVELOPMENT SHARED USE PARKING ANALYSIS

A shared parking analysis is typically conducted to determine a realistic estimate of the parking needs and characteristics of a development comprised of at least two or more land uses. The fundamental basis for sharing parking is that the parking activity associated with various land uses does not occur during the same timeframes. For example, an office land use generates parking demand usually between 8:00am and 5:00pm. During this same timeframe, the parking demand associated with residential land use declines, so office parkers could occupy some of the supply of parking vacated by residents.

The Urban Land Institute (ULI) 2<sup>nd</sup> edition (2005) of *Shared Parking* was utilized in performing the shared parking analysis. The base parking demand factors and mode of travel patterns in this book were adjusted to reflect the characteristics of Cleveland Heights. The ULI 2<sup>nd</sup> Edition of *Shared Parking* uses a significant amount of national information for estimating parking demand. ULI defines shared parking as parking spaces that can be used to serve two or more individual land uses without conflict or encroachment. They define that in order to share parking two conditions must exist:

*“Variations in the accumulation of vehicles by hour, by day, or by season at the individual land uses, and Relationships among the land uses that result in visiting multiple land uses on the same auto trip”.*

In addition to the ULI data, this analysis relied in part on data obtained from *Parking Generation*, 4<sup>th</sup> Edition and American Community Survey 2010-2014 data by census tract level.

### Methodology

The shared parking analysis methodology consisted of four steps:

1. Identification of the development assumptions;
2. Development of a shared parking model based on local conditions;
3. Applying the land use assumptions to the model, and;
4. Identifying the peak month, day and hour of parking demand.

### TOH Development Program Assumptions

Flaherty Collins, the developer of the proposed TOH project, indicated that the development will be comprised of 282 rental apartment units, 10,249 GSF of retail land use and 568 parking spaces. Since the developer has indicated that there were not yet commitments by commercial tenants to occupy the available ground level retail space, it was assumed that some of the space would be occupied by restaurants. The rationale behind this assumption was that restaurant land uses usually generate greater demands for parking than retail land uses. Therefore, by assuming that approximately 30% of the 10,294 GSF total ground level retail space would be occupied by restaurant tenants, a worst-case parking demand scenario could be examined. To this end, DESMAN defined the total amount of retail GSF to include a 2,200 GSF family restaurant and an 800 GSF fast food restaurant, thereby reducing the amount of retail land use to 7,249 GSF.

Based on the anticipated residential population density of the TOH project and of the surrounding neighborhood, DESMAN slightly reduced the ULI recommended Base Parking Ratio for the patrons of two assumed restaurant land uses for the project, but not for the general shopping center land use. This adjustment was based on the belief that the two restaurant land uses would be largely supported by





residents from the project and surrounding neighborhood much like the existing restaurants in the area are. Conversely, no such adjustment was made for the shopping center land use because very little could be assumed about the probably types of tenant which would likely occupy that space. However, as more information about the type of commercial tenants that would occupy the shopping center space this shared use analysis could be revised, if necessary. The ULI recommended base parking ratio for all project employees was unchanged because it is assumed that most if not the project generated employees would reside outside the CFCD.

In addition to this assumption, the total count of residential units for the development was increased to include the 174 City of Cleveland Heights permit holders that currently park at the TOH site. While these permits holders are not part of the development, the TOH development will include parking accommodations for these users, who are condominium owners from the Buckingham or apartment renters from the surrounding area. Because the parking patterns of these permit holders will likely mirror those of the TOH residents, they have been counted in the shared use model as if they were part of the TOH development.

**Table 5** TOH Development Land Use Assumptions

<b>Top of the Hill Project Development Program</b>	<b>Project Data</b>	
	<b>#</b>	<b>Unit</b>
<b>Project Land Uses/Users</b>		
Community Shopping Center (<400 ksf) Employees/Patrons	7,249	sf GLA
Family Restaurant Employees/Patrons	2,200	sf GLA
Fast Food Restaurant Employees/Patrons	800	sf GLA
Residential, Rental, Shared Spaces	282	units
Guests	282	units
Residential Existing CH Permits Holders	174	units

*Prepared by DESMAN*

Other key assumptions were made as part of the shared parking analysis which deal with modal split and non-captive ratios. Modal split is the percentage of persons arriving at a destination in different modes of transportation other than by car. Among the modes that may be used to make trips to the TOH site include public transportation, bicycle, carpool/vanpool, taxi, or by walking.

The non-captive ratio is an estimate of the percentage of patrons/visitors attracted to the various land uses at a development who are not already counted as being parked at another one of the land uses. An example of this would be an employee of a retail store who drives to work and parks on site and then decides to eat at a restaurant on-site. As a customer of the restaurant, the retail employee will not generate any additional parking demand because they are already captive at the site.



The modal split percentages used in this analysis are based on American Community Survey 2010-2014 data. The U.S. Census Data has been collected at a census tract level, focusing on census tracts of and bordering the development site. **Table 6** shows the modal split for workers in the three City of Cleveland Heights census tracts that will be impacted by the TOH development. According to this census data, an average of 72 percent of employees drive alone or carpool to work. Also significant is the fact that an average 15 percent of employees from the examined census tracks walk to work, which is understandable given the fact that the University Circle neighborhood, a major employment center of the region, is located less than a half mile away to the southeast. Only around 3% of people in these census tracts bike or take public transportation to work.

Lastly, it was assumed that the TOH residents would generate visiting guests at a rate of 0.10 per unit. While 174 existing City permit holders were counted as residents, no visiting guests were attributed to these permit holders. Any guests these permit holders might generate have been viewed as being part of the exiting background demand from the land uses surrounding the TOH development.

**Table 6** Modal Split for Workers in the Impacted Census Tracts in Cleveland Heights

Subject	Cleveland Hts., Cuyahoga County, Ohio Census Tracts			
	Tract 1411	Tract 1412	Tract 1413	Total/ Averages
Workers 16 years and over	2,487	1,842	1,472	<b>5801</b>
MEANS OF TRANSPORTATION TO WORK				
Car, truck, or van	70.6%	81.4%	64.9%	<b>72.3%</b>
Drove alone	65.2%	75.2%	57.2%	<b>65.9%</b>
Carpooled	5.4%	6.2%	7.7%	<b>6.4%</b>
Public transportation (excluding taxicab)	7.9%	1.3%	2.0%	<b>3.7%</b>
Walked	17.0%	9.7%	19.2%	<b>15.3%</b>
Bicycle	2.9%	2.0%	4.6%	<b>3.2%</b>
Taxicab, motorcycle, or other means	0.0%	0.0%	0.4%	<b>0.1%</b>
Worked at home	1.6%	5.5%	9.0%	<b>5.4%</b>

*American Community Survey, 2010-14 Census Tracts:  
1411, 1412, 1413 City of Cleveland Hts., Cuyahoga County, OH*

## SHARED USE PARKING ANALYSIS RESULTS

**Table 7** shows the assumptions and factors that were included as inputs to the shared use model. The model results indicate that, given the previously discussed land use, modal split and non-captive assumptions, the TOH development can be expected to generate a peak period demand for approximately 338 parking spaces at the 7:00pm hour on a typical weekend evening. This peak period parking demand total assumes a residential unit parking factor of one space per unit, which is comparable to the per unit parking accommodations provided at the recently developed and opened One University Circle located at 10730 Euclid Avenue. It also does not take into account the 174 City permit holders that will also continue to be accommodated at the site.

In addition to the anticipated peak demand, this shared parking analysis reveals that the assumed mix of land uses planned will yield a 10% and 9% shared parking reduction for the TOH project respectively on weekdays and weekends. The 568 parking spaces planned for the project should be sufficient to



accommodate the peak demands of the TOH development land uses and to accommodate the existing 174 City permit holders. In addition, there is expected to be a peak hour surplus of at least 66 spaces to serve the surrounding Cedar Fairmount Commercial District.

The following exhibits graphically depict the degree to which the proposed TOH parking supply will be utilized when the project generated parking demand peak during the month of December. **Exhibit 21** shows the projected hour to hour accumulation of parked vehicles at the project site during December. When the project-generated parking demand peaks during the 7:00pm hour on weekdays and weekends between 66 and 70 parking spaces should be available to serve the other on-site land uses in the immediate areas.

**Exhibit 22** is intended to represent a user breakdown of the overall volumes of project-generated vehicles expected to be parked on-site during the weekday and weekend peak demand period in December.



**Table 7 TOH Shared Parking Demand Summary**

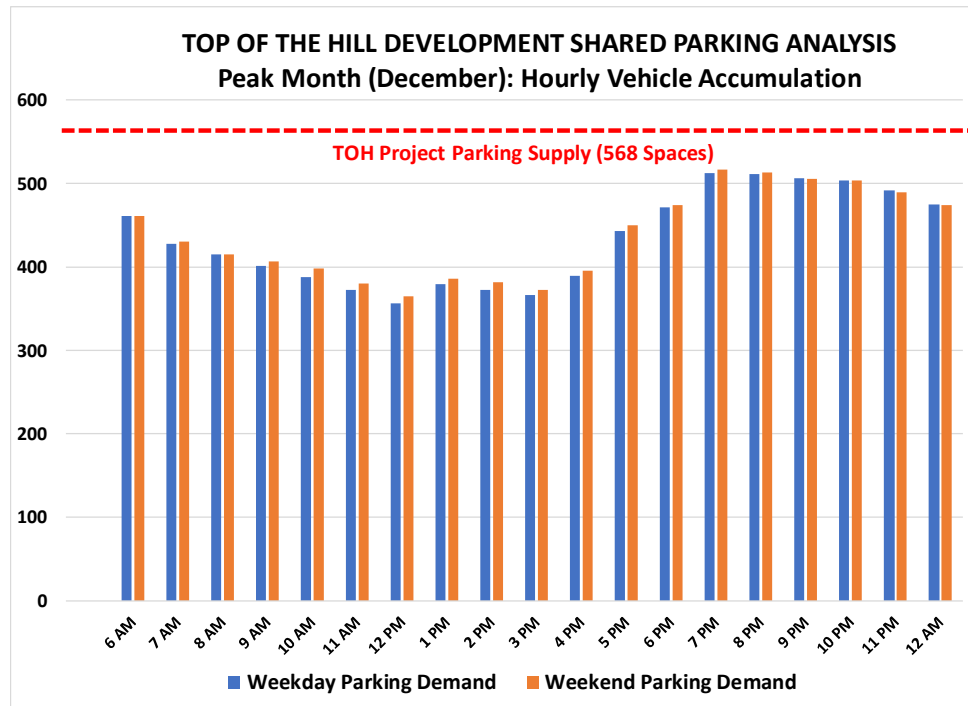
PEAK MONTH: DECEMBER -- PEAK PERIOD: 7 PM, WEEKEND																
Top of the Hill Project Development Program Project Land Uses/Users	Project Data # Unit		Weekday					Weekend					Weekday		Weekend	
			Base Parking Ratio	Mode Split	Non- Captive Ratio	Applied Project Rate	Unit	Base Parking Ratio	Mode Split	Non- Captive Ratio	Applied Project Rate	Unit	Peak Hr. Adj. 7 PM	Estimated Parking Demand	Peak Hr. Adj. 7 PM	Estimated Parking Demand
Community Shopping Center (<400 ksf) Employees	7,249	sf GLA	2.90 0.70	0.90 0.97	0.95 1.00	2.48 0.68	/ksf GLA /ksf GLA	3.20 0.80	0.85 0.97	0.95 1.00	2.58 0.78	/ksf GLA /ksf GLA	0.75 0.95	13 5	0.75 0.80	14 5
Family Restaurant Employees	2,200	sf GLA	8.00 1.50	0.90 0.97	0.95 1.00	6.84 1.46	/ksf GLA /ksf GLA	11.00 2.25	0.85 0.97	0.95 1.00	8.88 2.18	/ksf GLA /ksf GLA	0.80 0.95	12 3	0.70 0.95	14 5
Fast Food Restaurant Employees	800	sf GLA	10.75 2.25	0.90 0.97	0.95 1.00	9.19 2.18	/ksf GLA /ksf GLA	10.00 2.00	0.85 0.97	0.95 1.00	8.08 1.94	/ksf GLA /ksf GLA	0.80 0.90	6 2	0.80 0.90	5 2
Residential, Rental, Shared Spaces Guests	282 282	units units	1.00 0.10	0.97 1.00	1.00 1.00	0.97 0.10	/unit /unit	1.00 0.10	0.97 1.00	1.00 1.00	0.97 0.10	/unit /unit	0.97 1.00	265 28	0.97 1.00	265 28
Residential Existing CH Permits Holders	174	units	1.00	0.97	1.00	0.97	/unit	1.00	0.97	1.00	0.97	/unit	0.97	164	0.97	164
ULI base data have been modified from default values.													TOH Customers		31	
													TOH Employees		10	
													TOH Residents		265	
													TOH Resident Guests		28	
													<b>TOH Peak Demand</b>		<b>334</b>	
													CH Permit Holders		164	
													<b>OVERALL PEAK DEMAND</b>		<b>498</b>	
													TOH Parking Supply		568	
													<b>Peak Surplus</b>		<b>70</b>	
													Shared Parking Reduction		10%	
															9%	

Prepared by DESMAN



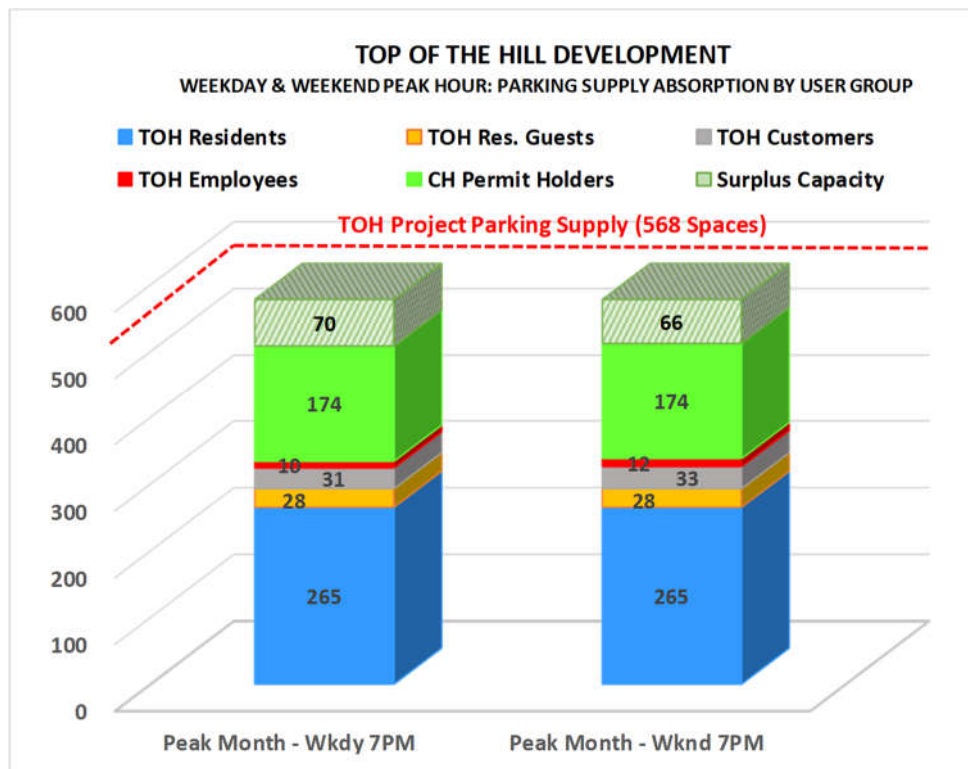


**Exhibit 21** TOH Peak Month Hourly Vehicle Accumulation Projections for Weekdays and Weekends



Prepared by DESMAN

**Exhibit 22** TOH Weekday and Weekend Peak Hour Parking Demand Projections by User Group



Prepared by DESMAN



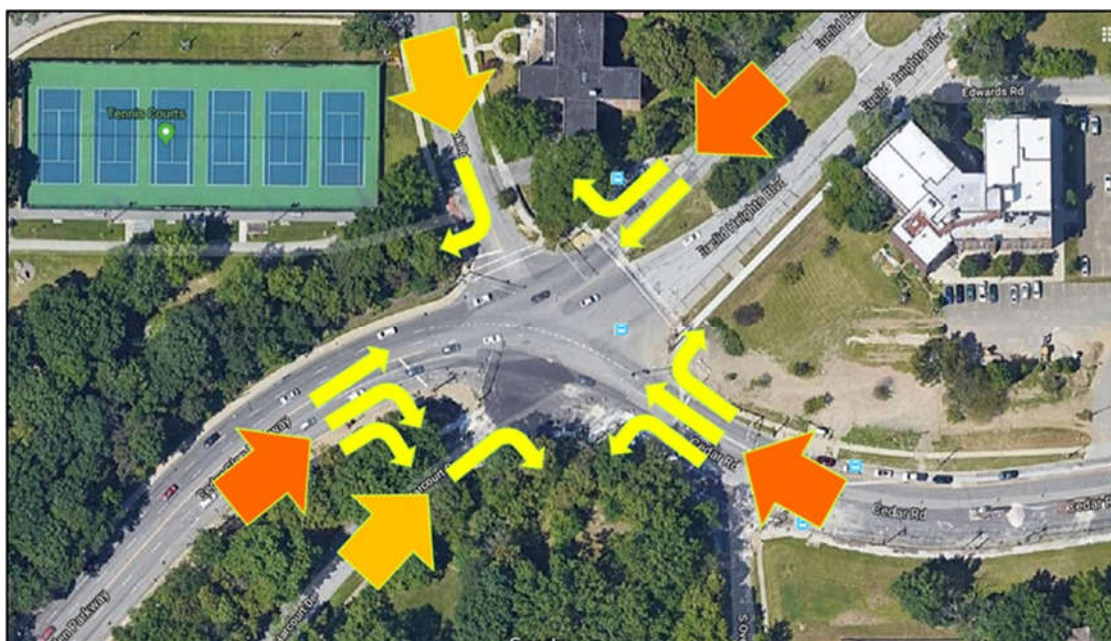
## EXISTING TRAFFIC CONDITIONS

At the outset of this assignment, WSP needed to determine whether or not any significant changes in traffic patterns and volumes have occurred in the CFCD, and particularly in the immediate vicinity of the TOH, since the last major traffic study was completed in 2008. To this end, the traffic data and findings from the 2008 study were reviewed and new traffic counts were completed at selected intersections nearest to the TOH development site. WSP's ultimate objective was to determine whether additional and more extensive traffic counts were going to be necessary to assess the impact of the proposed TOH development.

Based on the comparison of the 2018 to the 2008 traffic count data, as well as other variables that may have influenced driver behaviors, along with the temporary nature of the most significant contributors, the analysis results indicated that it would be reasonable to use the 2008 traffic volumes from the Cedar-Fairmount Transportation and Streetscape Plan to assess potential impacts associated with the proposed TOH development.

In 2009, Cleveland Heights completed the Cedar-Fairmount Transportation and Streetscape Plan for the Cedar-Fairmount Commercial District, which included traffic data collection and analysis at six intersections. Traffic counts for that study were collected on April 28, 2008, just prior to the last day of regularly scheduled classes for nearby Case Western Reserve University (CWRU). The current TOH development project is located within the same study area of the 2009 study, therefore to be cost effective, Flaherty Collins the development entity behind the TOH development project and WSP agreed that the traffic data from the 2009 study could be again used to assess the anticipated impacts of the TOH development. As such, a focused study of peak hour traffic volumes was completed to compare the 2008 traffic volumes with current year (2018) traffic volumes at the busy Top-of-the-Hill intersection (Cedar Glen-Euclid Heights Boulevard/ Cedar Road-Overlook Road/Harcourt Drive) shown in **Exhibit 23**.

**Exhibit 23** Top-of-the-Hill Intersection Lane Configuration and Turn Movements



Prepared by WSP



Current turning movement counts were collected on Wednesday, May 2, 2018. The timing of this count coincided with exam week at CWRU. The AM peak hour was identified as 07:00-08:00 and the PM peak hour was identified as 17:00-18:00. The 2008 turning movement counts for those same periods were identified and compared to the 2018 counts, examining traffic volumes for the individual approach movements (i.e., left, thru, right), the volumes for each approach, and the total intersection volumes. The results of the AM and PM peak hour comparisons are provided in **Tables 8 and 9**.

Although there are some variations in individual approach turning movement volumes and the approach volumes, the variation for overall intersection volume is low, as reflected by the difference in volume of vehicles (84 and 79 vph in the AM and PM peak hours, respectively) as well as the percent difference (2.6% and 2.1% in the AM and PM peak hours, respectively). This reflects negligible change in total traffic volume traveling through the Top-of-the-Hill intersection between 2008 and 2018.

In addition to overall intersection volume, it is important to also assess traffic volumes on the intersection approaches. Of the five intersection approaches, Cedar Road, Euclid Heights Boulevard and Cedar Glen Parkway are more relevant than Overlook Road and Harcourt Drive based on the traffic volumes on each of the approaches. In evaluating the changes in approach volumes, vehicle volumes must be considered along with the percent differences. Changes in traffic on the low volume approaches of Overlook and Harcourt may reflect large changes in percentages while the actual change in volume of vehicles may not be significant. For example, Overlook Road during the PM peak hour shows a 150% growth in traffic but the change in vehicle volume is 24 vph which is quite small relative to the overall intersection volume of more than 3,700 vph. Examination of the approach movements emphasizes the difference in volume over the percent difference. The approaches that exhibit the greatest variation in traffic volume are listed below, reflecting changes of more than 50 vehicles per hour (vph).

#### AM Peak

- Increase in westbound traffic on Cedar (approximately 150 vehicles)
- Decrease in southwest bound traffic on Euclid Heights (approximately 130 vehicles)
- Decrease in eastbound traffic on Cedar (approximately 60 vehicles)

#### PM Peak

- Increase in westbound traffic on Cedar (approximately 340 vehicles)
- Increase in southwest bound traffic on Euclid Heights (approximately 60 vehicles)
- Decrease in eastbound traffic on Cedar (approximately 500 vehicles)

Changes in traffic volumes on Cedar Glen Parkway, Cedar Road and Euclid Heights Boulevard have the greatest impact on traffic operations in and around the Cedar-Fairmount District and the Top-of-the-Hill development because these are the higher volume roads at the Top-of-the-Hill intersection. The Harcourt Drive and Overlook Road are not significant. It is important to note that on any given day or week, there will be some variation in peak hour traffic volumes. Analysis of the traffic volumes and associated indications of travel patterns for the AM and PM peak hours for the primary roads traveling through the Top-of-the-Hill intersection are summarized below.



**Table 8** 2008 and 2018 Comparison of AM Peak Traffic Summary for the Top-of-the-Hill Intersections

AM PEAK – TOP OF THE HILL INTERSECTION														
	2008 Traffic Volume			2018 Traffic Volume			Difference in Traffic Volumes Δ Vol = 2018 – 2008			Percent Difference in Traffic Volumes = Δ Vol / 2008 Vol				
	Movement	Approach	Intersection	Movement	Approach	Intersection	Movement	Approach	Intersection	Movement	Approach	Intersection		
Cedar Glen Parkway			3226			3142			81			2.6%		
Left		578		1	521		1	-57			16% -31% 450%		-10%	
Thru	236			273			37							
Right	340			236			-104							
Harcourt	2			11			9							
Harcourt Drive														
Left		23			20			-3			13% -17%			
Thru				1			1							
Right	23			19			-4							
Cedar Road														
Left	1278	1302		1372	1446		94	144		7%	11%			
Thru	17			68			51			300%				
Right	7			6			-1			-14%				
Euclid Heights Blvd														
Left		1265			1133			-132			-11% 38%		-10%	
Thru	1257			1122			-135							
Right	8			11			3							
Overlook Road														
Left		58			22			-36			-62% -64%			
Thru				1			1							
Right	58		21	-37										

Prepared by WSP





**Table 9** 2008 and 2018 Comparison of PM Peak Traffic Summary for the Top-of-the-Hill Intersection

PM PEAK – TOP OF THE HILL INTERSECTION														
	2008 Traffic Volume			2018 Traffic Volume			Difference In Traffic Volumes Δ Vol = 2018 – 2008			Percent Difference in Traffic Volumes = Δ Vol / 2008 Vol				
	Movement	Approach	Intersection	Movement	Approach	Intersection	Movement	Approach	Intersection	Movement	Approach	Intersection		
Cedar Glen Parkway			3790			3710			80			2.1%		
Left		2822		2	2321		2	501			13%			
Thru	1197			1289			92			8%				
Right	1607			1024			-583			-36%				
Harcourt	18			6			-12			-67%				
Harcourt Drive														
Left		16		2	13		2	-3			-19%			
Thru				11			5			31%				
Right	16													
Cedar Road														
Left	451	497		791	836		340	339		75%	68%			
Thru	20			21			1			5%				
Right	26			24			-2			-8%				
Euclid Heights Blvd														
Left		439			501			62			14%			
Thru	405			479			74			18%				
Right	34			22			12			35%				
Overlook Road														
Left		16			39			23			144%			
Thru														
Right	16		39	23		144%								

Prepared by WSP

### AM Peak

Euclid Heights Boulevard and Cedar Road both send most of their traffic to westbound Cedar Glen Parkway. During the AM peak hour, Euclid Heights shows a decrease in volume of 132 vph while Cedar shows an increase of 144 vph, with both changes representing roughly 10% of the approach volume. These volume changes almost balance each other. Although some of the variation, it could also reflect



a small change in travel patterns with a preference for travel on Cedar Road over Euclid Heights Boulevard.

Cedar Glen Parkway shows a decrease in eastbound traffic volume of approximately 10%. Interestingly, there is a 16% (37 vph) increase in vehicles that turn onto Euclid Heights Boulevard and a 31% (104 vph) decrease in vehicles that continue east on Cedar Road. The decrease in eastbound traffic to Cedar Road contrasts with the increase in the westbound traffic, discussed above, and may reflect a change in travel patterns with some eastbound vehicles choosing to travel via another route, like Stokes Boulevard-Fairhill Road.

#### PM Peak

Euclid Heights Boulevard and Cedar Road both exhibit measurable increases in westbound traffic during the PM peak hour, with a 14% (62 vph) increase on Euclid Heights Boulevard and a 68% (339 vph) increase on Cedar Road. The increase on Cedar exceeds normal daily variations in traffic or variations connected to impacts associated with the CWRU academic calendar and data collection dates.

Mirroring the AM peak trend, Cedar Glen Parkway shows a decrease in PM peak traffic volume, with an 18% (501 vph) reduction. Similar to the AM peak, there is an 8% (92 vph) increase in traffic that turns onto Euclid Heights Boulevard and a 36% (583 vph) decrease in traffic continuing east on Cedar Road. Like the AM peak, the decrease in eastbound traffic to Cedar Road contrasts with the increase in the westbound traffic. It also contrasts with the increase in westbound traffic on Cedar Road during the AM peak. These factors indicate shifts in travel patterns, with some drivers choosing to travel west toward University Circle and downtown Cleveland using Cedar but traveling east via another route, like Stokes Boulevard-Fairhill Road.

To clearly assess the apparent changes in travel patterns, it is important to understand data collection periods and other projects and activities that could influence travel patterns in the Cedar-Fairmount District and may contribute to differences in traffic volumes. Based on conversations with Cleveland Heights' staff, the following factors may have had an influence on the observed changes in traffic patterns between 2008 and 2018:

- Some traffic volume variations could be related to the timing of the data collection with respect to the CWRU academic calendar. The 2018 data collection was completed during CWRU exam week while the 2008 data collection occurred during the last week of regular classes during the spring semester. Although only a few days apart on the Gregorian calendar, the difference in where the counts fell on the CWRU academic calendar may have affected peak hour traffic volumes.
- 2018 Mayfield Road construction is underway. This project began prior to the 2018 count and it could potentially divert traffic from Mayfield Road to Euclid Heights Boulevard or Cedar Road. This possible traffic diversion is a temporary condition and could contribute to the increases in volume on westbound Cedar Road in the AM and PM peaks and on southbound Euclid Heights Boulevard in the PM peak.
- The right lane of eastbound Cedar Glen Parkway to the east of the Ambleside Drive-West Murray Hill Road/Cedar Glen Parkway intersection is blocked. This lane closure is a temporary condition



to address a Cleveland Water issue. Although the lane closure does not extend to the Top-of-the-Hill intersection, it is expected to have a negative impact on the volume of vehicles per hour that can access the intersection on the westbound approach. This impact is a likely contributor to the reduction in traffic volume on eastbound Cedar Glen Parkway in the AM and PM peaks.

- The pavement condition on eastbound Cedar Glen Parkway is quite rough. This may cause some traffic diversions which would contribute to the reduction in traffic volume on eastbound Cedar Glen Parkway in the AM and PM peaks.
- After the 2008 traffic count was conducted, RTA modified their transit service with changes that could affect mode choice and associated traffic volumes. Route 32 service frequency has been reduced and it no longer provides direct service into downtown Cleveland. Now riders of Route 32 must transfer at University Circle and pay additional fare (unless they have a transit pass good for one day or more service). This change would likely have a negative impact on ridership which could increase the number of people choosing to drive rather than take the bus. Mode choice impacts would likely have the most impact on commuter trips, specifically westbound trips during the AM peak and eastbound trips during the PM peak.
- Cedar Trail, the multiuse trail that runs along the south side of Cedar Glen Parkway between MLK and the Top-of-the-Hill intersection, was built after the 2008 data collection. This trail facilitates bicycle and pedestrian travel between the Top-of-the-Hill intersection and RTA's University-Cedar Station at the bottom of the hill, where MLK intersects Cedar and Carnegie Avenues and it could contribute to a mode shift from auto to bicycle travel between Cleveland Heights and University Circle.

Considering the observed changes in traffic volumes on the individual approaches to the Top-of-the-Hill intersection, and understanding the relative differences in approach volumes and potential contributing causes to the observed changes in volumes and the temporary nature of the most significant causes, it is reasonable to use the 2008 traffic counts to assess the travel patterns and potential impacts associated with the proposed redevelopment of the Top-of-the-Hill site. Comparison of 2009 and 2018 intersection volumes shows some variation in approach turning movements, which are caused by temporary constraints (such as lane closures due to construction on eastbound Cedar Glen and northbound MLK) which result in a reduction in eastbound traffic volumes on Cedar Glen and Cedar Road through the study area. Furthermore, as the traffic data is used to determine trip distribution rather than signalized capacity analysis, it is important that the data reflect travel patterns within and through the study area. As such, the 2009 volumes are likely to more accurately represent travel patterns and traffic distribution as compared to the 2018 volumes.

## **TOH DEVELOPMENT TRIP GENERATION ANALYSIS**

Trip generation analysis was completed for the proposed TOH development project is based on land use data provided by Flaherty & Collins (the developer) and the ITE Trip Generation Manual, 10th Edition. The projected land use type and sizes, as shown in Table 10, reflect the anticipated development program as of September 2018, with the understanding that there may be some adjustments in the program as the development plan is refined and finalized. The mix of use within the commercial space is based on a division of roughly one-third office and two-thirds shopping/retail. The office space that is part of the final development plan may be less than the 35 percent reflected in the trip generation analysis. However, given that office land use has a bigger impact on peak hour traffic demand (generates more peak hour



trips) than shopping/retail, the trip generation analysis may be viewed as assessing the anticipated worst-case scenario for the commercial space within the development site.

**Table 10** Proposed Land Use for the Top-of-the-Hill Development

LAND-USE	SIZE
Residential (Mid-Rise Apartments)	282 Dwelling Units
Commercial (35% Office and 65% Shopping/Retail)	13,609 SF
Office	4,763 SF
Shopping/Retail	8,846 SF

Prepared by WSP

The ITE Trip Generation Manual provides trip generation data plots and statistics for specific land uses located within various settings, from cities to rural areas. The land use settings or contexts included in the ITE trip generation database are Center City Core, Dense Multi-Use Urban, General Urban/Suburban and Rural. The trip generation analysis for the Top-of-the-Hill development considered both Dense Multi-Use Urban and General Urban/Suburban.

*An area designated as Dense Multi-Use Urban in the Trip Generation Manual is a fully developed area (or nearly so), with diverse and complementary land uses, good pedestrian connectivity, and convenient and frequent transit. This area type can be a well-developed urban area outside a major metropolitan downtown or a moderate size urban area downtown.*

*The land use mix typically includes office, retail, residential, and often entertainment, hotel, and other commercial uses. The residential uses are typically multifamily or single-family on lots no larger than one fourth acre. The commercial uses often have little or no setback from the sidewalk. Because the motor vehicle still represents the primary mode of travel to and from the area, there typically is on-street parking and often public off-street parking.*

*The complementary land uses provide the opportunity for short trips within the Dense Multi-Use Urban area, made conveniently by walking, biking, or transit. The area is served by significant transit (either rail or bus) that enables a high level of transit usage to and from area development.*

*An area designated as General Urban/Suburban in the Trip Generation Manual is an area associated with almost homogeneous vehicle-centered access. Nearly all person trips that enter or exit a development site are by personal passenger or commercial vehicle.*

*The area can be fully developed (or nearly so) at low-medium density with a mix of residential and commercial uses. The commercial land uses are typically concentrated at intersections or spread along commercial corridors, often surrounded by low-density, almost entirely residential development. Most commercial buildings are located behind or surrounded by parking.*

*The mixing of land uses is only in terms of their proximity, not in terms of function. A retail land use may focus on serving a regional clientele or a services land use may target motorists or passby vehicle trips for its customers. Even if the land uses are complementary, a lack of pedestrian, bicycling, and transit facilities or services limit non-vehicle travel.*





Projected peak hour trips for the development in a Dense, Multi-Use Urban setting are shown in Table 11 and the projected peak hour trips in a General Urban/Suburban setting are shown in Table 12. Discussions with city staff resulted in the determination that the predicted site-generated trips should be midway between the trips predicted by the Dense, Multi-Use Urban setting and the General Urban/Suburban setting. The Dense, Multi-Use Urban setting is likely to under-predict trips generated because it is based on transit-oriented style development with “frequent and convenient transit service” and although the Top-of-the-Hill site is served by transit, it is not representative of transit-oriented development given the frequency of service, the disconnected service to downtown, and the distance from the Red Line rail station. However, the General Urban/Suburban setting would over-predict trips because the Cedar-Fairmount District is very walkable and it is not reasonable to assume that all trips to and from the site would be made by car. Using trip projections that are midway between the Dense, Multi-Use Urban and General Urban/Suburban settings is roughly equivalent to a 25 percent reduction in trips for the General Urban/Suburban setting would account for linked, transit, bicycle and pedestrian trips. The predicted trips for the proposed Top-of-the-Hill redevelopment are shown in Table 13.

**Table 11** Proposed Land Use for the Top-of-the-Hill Development

LAND USE	ITE CODE	SIZE	TOTAL TRIPS (veh/hr)	IN (veh/hr)	OUT (veh/hr)
<b>AM PEAK</b>					
Residential	221	282 DUs	57	7	50
Office	710	4.763 KSF	25	22	3
Shopping/Retail	820	8.846 KSF	21	11	10
		<b>AM TOTAL</b>	<b>103</b>	<b>40</b>	<b>63</b>
<b>PM PEAK</b>					
Residential	221	282 DUs	46	33	13
Office	710	4.763 KSF	12	2	10
Shopping/Retail	820	8.846 KSF	44	21	23
		<b>PM TOTAL</b>	<b>102</b>	<b>56</b>	<b>46</b>

Prepared by WSP



**Table 12** Projected Peak Hour Traffic in General Urban/Suburban Setting

LAND USE	ITE CODE	SIZE	TOTAL TRIPS (veh/hr)	IN (veh/hr)	OUT (veh/hr)
<b>AM PEAK</b>					
Residential	221	282 DUs	95	25	70
Office	710	4.763 KSF	31	27	4
Shopping/Retail	820	8.846 KSF	156	97	59
		<b>AM TOTAL</b>	<b>282</b>	<b>149</b>	<b>133</b>
<b>PM PEAK</b>					
Residential	221	282 DUs	120	73	47
Office	710	4.763 KSF	6	1	5
Shopping/Retail	820	8.846 KSF	166	83	83
		<b>PM TOTAL</b>	<b>292</b>	<b>157</b>	<b>135</b>

Prepared by WSP

**Table 13** Projected Peak Hour Traffic in General Urban/Suburban Setting

PEAK HOUR	TOTAL SITE TRIPS (veh/hr)	IN (veh/hr)	OUT (veh/hr)
<b>AM Peak Hour</b>	<b>193</b>	<b>94</b>	<b>99</b>
<b>PM Peak Hour</b>	<b>197</b>	<b>107</b>	<b>91</b>

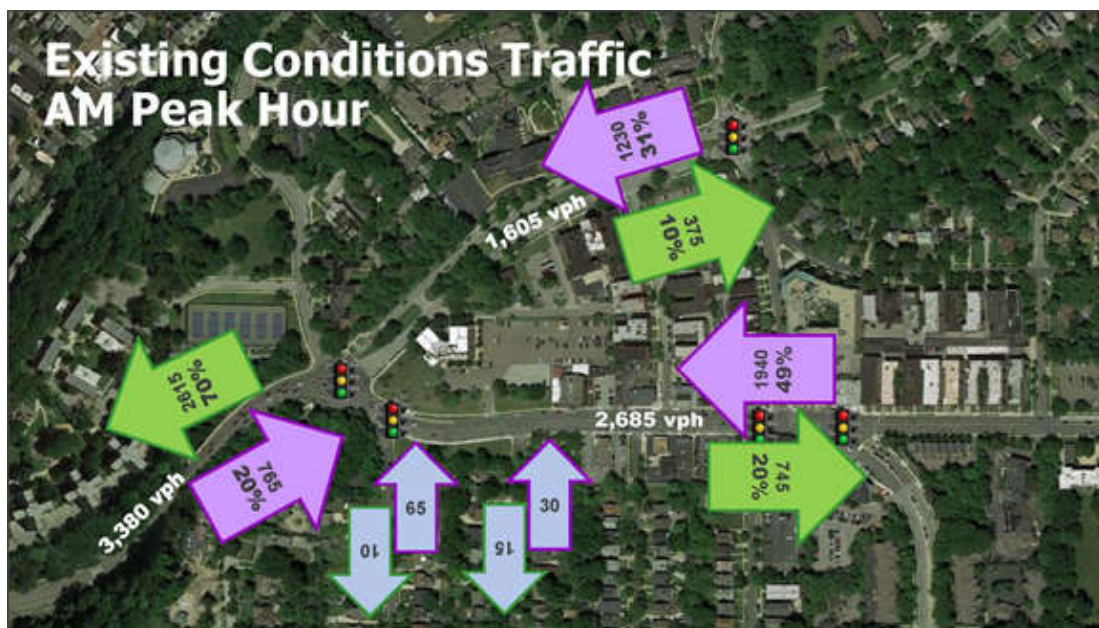
Prepared by WSP

### Top-of-the-Hill Development Traffic Distribution

The peak hour traffic that is expected to be generated by the Top-of-the-Hill development is distributed on the surrounding roadway network in accordance with the existing roadway travel patterns in the Cedar-Fairmount district. The inbound and outbound travel patterns are illustrated in **Exhibits 24, 25, 26** and **27**.

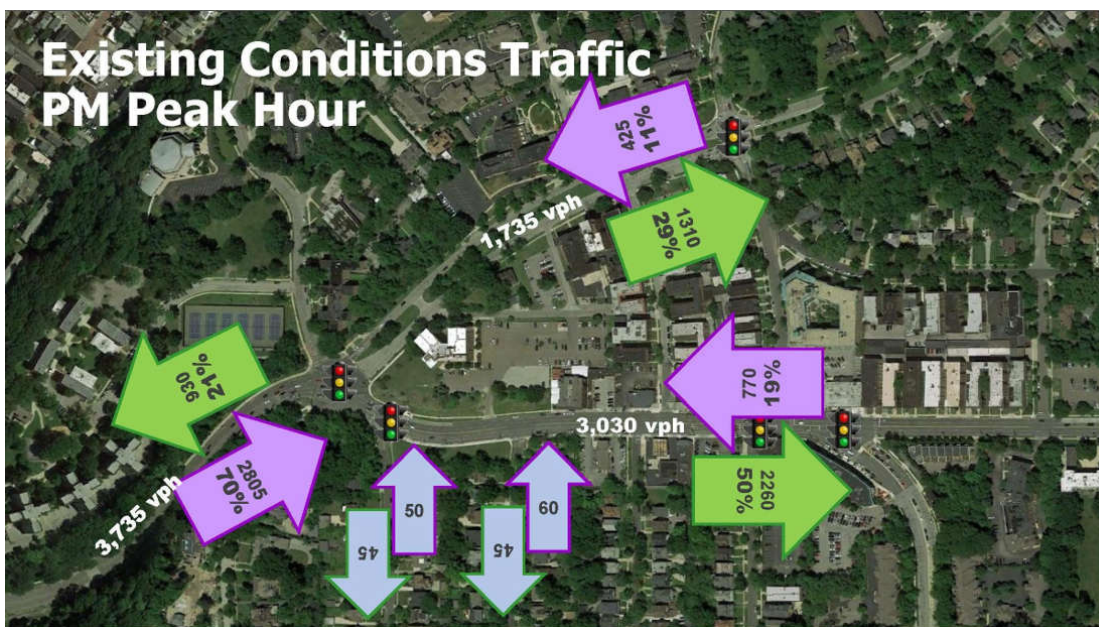


**Exhibits 24 AM Peak Inbound and Outbound Travel Patterns**



Prepared by WSP

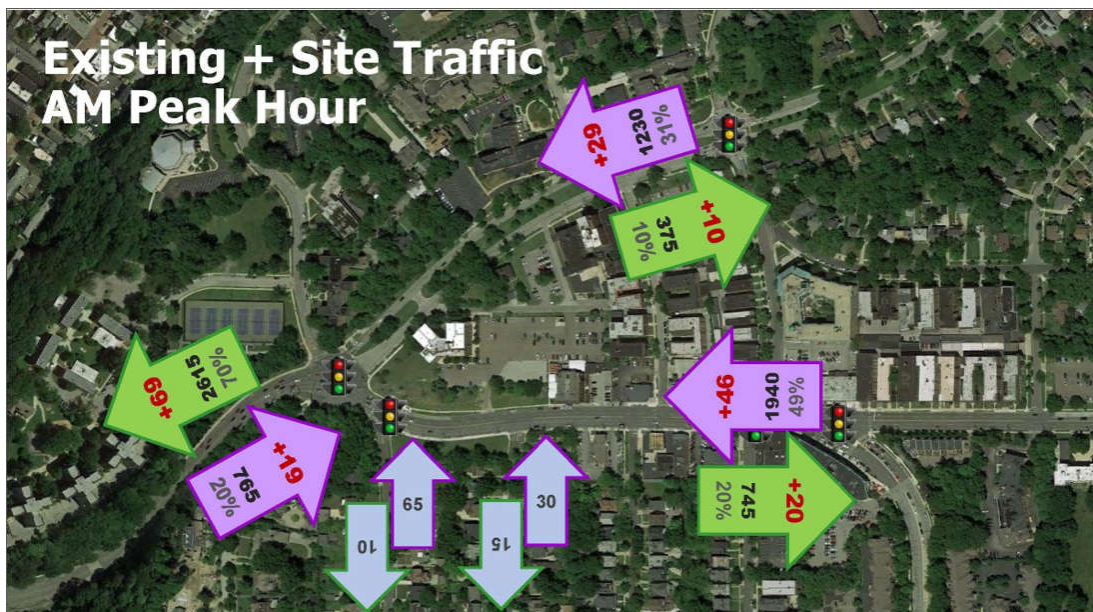
**Exhibits 25 PM Peak Inbound and Outbound Travel Patterns**



Prepared by WSP

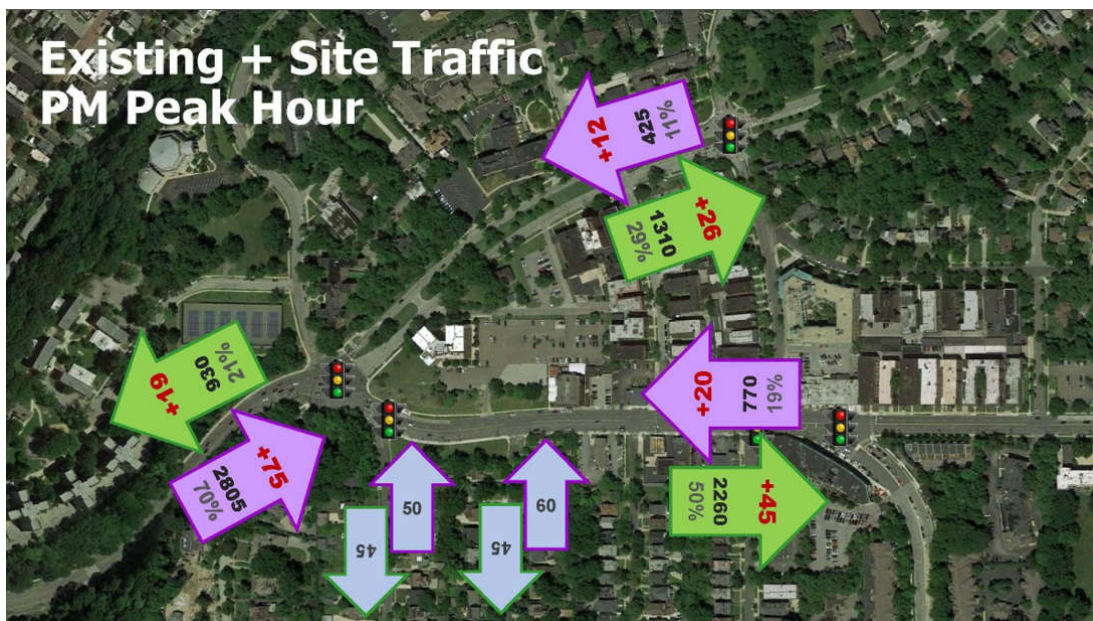


**Exhibits 26 AM Peak Inbound and Outbound Site-Generated Traffic**



Prepared by WSP

**Exhibits 27 PM Peak Inbound and Outbound Site-Generated Traffic**



Prepared by WSP

## **TRAFFIC ASSIGNMENT AND SITE ACCESS CAPACITY ANALYSIS**

### **TOH Site Access and Traffic Operations**

The proposed redevelopment of the Top of the Hill site includes three access drives, with two located on Euclid Heights Boulevard and one on Cedar Road. The configuration and operations for the access drives on Euclid Heights Boulevard were determined based on operational considerations. A series of alternatives were developed and assessed to determine feasible configuration and operations for the Cedar Road site access.

### **Euclid Heights Boulevard Site Access**

Both access drives on Euclid Heights Boulevard (Edwards Road and the access drive located between Edwards Road and Lennox Road) will prohibit outbound left turns; all other movements will be permitted. The outbound left turns will be prohibited to mitigate the potential for excessive queuing within the Euclid Heights Boulevard median which could cause blocking of the travel lanes and associated safety concerns. Drivers desiring to turn left out of the site will be able to make that effective movement by turning right out of the drive then making a U-turn at the Lennox Road median break.

In addition to vehicular access, it would be beneficial to provide a mid-block crossing on Euclid Heights Boulevard to the west of the parking garage access drive to facilitate pedestrian and bicycle access to the site from neighborhoods to the north. It would be appropriate to install a pedestrian crossing with pedestrian-activated flashing beacons (Rectangular Rapid Flash Beacon or RRFB) to warn approaching drivers of the presence of pedestrians in the crosswalk. Approach sidewalks, ADA-compliant curb ramps and a pedestrian refuge in the median should be provided along with the RRFBs to facilitate pedestrian crossings.

### **Cedar Road Site Access**

There are several intersection configuration alternatives and treatments to provide access to the site via Cedar Road, as identified below. The first four alternatives provide stop control for the site access drive; these alternatives were analyzed to understand their anticipated performance and identify which alternatives would be operationally feasible. The other three alternatives were eliminated based on anticipated operations and impacts.

- Alternative 1: Construct the Site Access-Delaware/Cedar intersection stop control and full movement access for the site access drive and Delaware Drive (northbound, southbound and eastbound left turns permitted).
- Alternative 2: Construct the Site Access-Delaware/Cedar intersection stop control and full movement for the site access drive and left turn restriction for Delaware Drive (southbound and eastbound left turns permitted; northbound left turns prohibited).
- Alternative 3: Construct the Site Access-Delaware/Cedar intersection stop control with left turn restrictions for the site access drive and Delaware Drive (eastbound left turns permitted; northbound and southbound left turns prohibited).
- Alternative 4: Construct the Site Access-Delaware/Cedar intersection stop control with left turn restrictions for all inbound and outbound approaches (northbound, southbound and eastbound left turns prohibited).



Alternative 5: Relocate the traffic signal at the South Overlook/Cedar intersection to the Site Access/Delaware/Cedar intersection. This alternative is not feasible based on impacts to South Overlook and Cedar Road operations.

Removal of the signal at South Overlook/Cedar and its conversion to stop control for the northbound approach would necessitate the prohibition of northbound left turns to mitigate anticipated crash potential resulting from limited sight distance to the west. This would significantly impact the surrounding residential neighborhood.

Eastbound drivers tend to increase their speed as they travel through the Top of the Hill intersection and enter the Cedar-Fairmount District because an additional travel lane is provided on the far side of the intersection. The existing signal at South Overlook/Cedar serves as a gateway to the district and helps to calm (slow) eastbound traffic. Removal of this signal would likely result in an increase in travel speed for eastbound vehicles during uncongested periods until they reach the Edwards-Delaware/Cedar intersection which is well into the District.

Alternative 6: Install a new traffic signal at the Site Access-Delaware/Cedar intersection; retain the existing signal at the South Overlook/Cedar intersection. This alternative is not feasible based on impacts to Cedar Road operations. The Site Access-Delaware/Cedar intersection is located approximately 300 feet east of the signalized South Overlook/Cedar intersection and roughly 650 feet west of the signalized Surrey-Grandview/Cedar intersection. Due to the proximity of the adjacent signalized intersections, it is not operationally feasible to install a signal at the Site Access-Delaware intersection along the Cedar Road corridor.

Alternative 7: Install a signalized mid-block pedestrian crossing on Cedar Road between the signalized intersections at South Overlook Road and Surrey-Grandview to facilitate pedestrian crossings.

*To operate safely, a signalized mid-block pedestrian crossing must be located at a sufficient distance from adjacent intersections to allow space for safe intersection operations. Although desirable, installation of a signalized mid-block pedestrian crossing is not possible due to the spacing of signalized and unsignalized intersections along the Cedar Road corridor.*

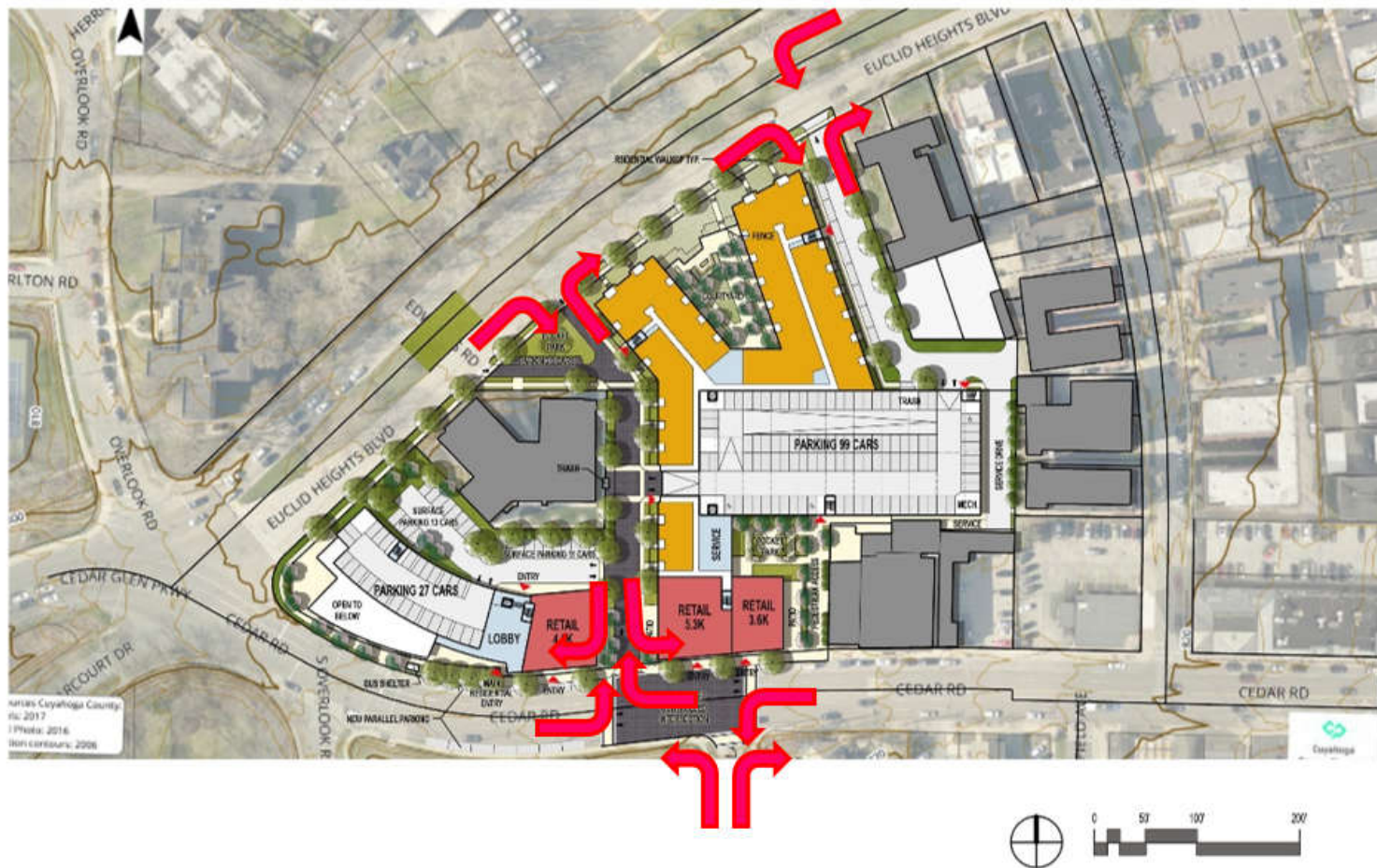
### **Traffic Assignment and Capacity Analysis**

The analysis related to traffic volumes and patterns in the vicinity of the project site, together with the results of the trip generation analysis were used to develop traffic assignment projections for Alternatives 1 through 4 (see **Exhibits 28, 29, 30 and 31**). These alternatives were then analyzed using Synchro microsimulation traffic modeling (Version 10) to assess the anticipated performance of each of the alternatives. The capacity analysis results showing operational performance indicated by levels of service (LOS) and delay are provided in **Table 14**. In addition, the anticipated queuing at the site access intersections for each alternative is provided in **Table 15**.

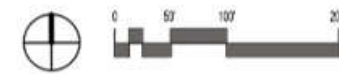




**Exhibit 28** Alternative 1 Site Access Movements



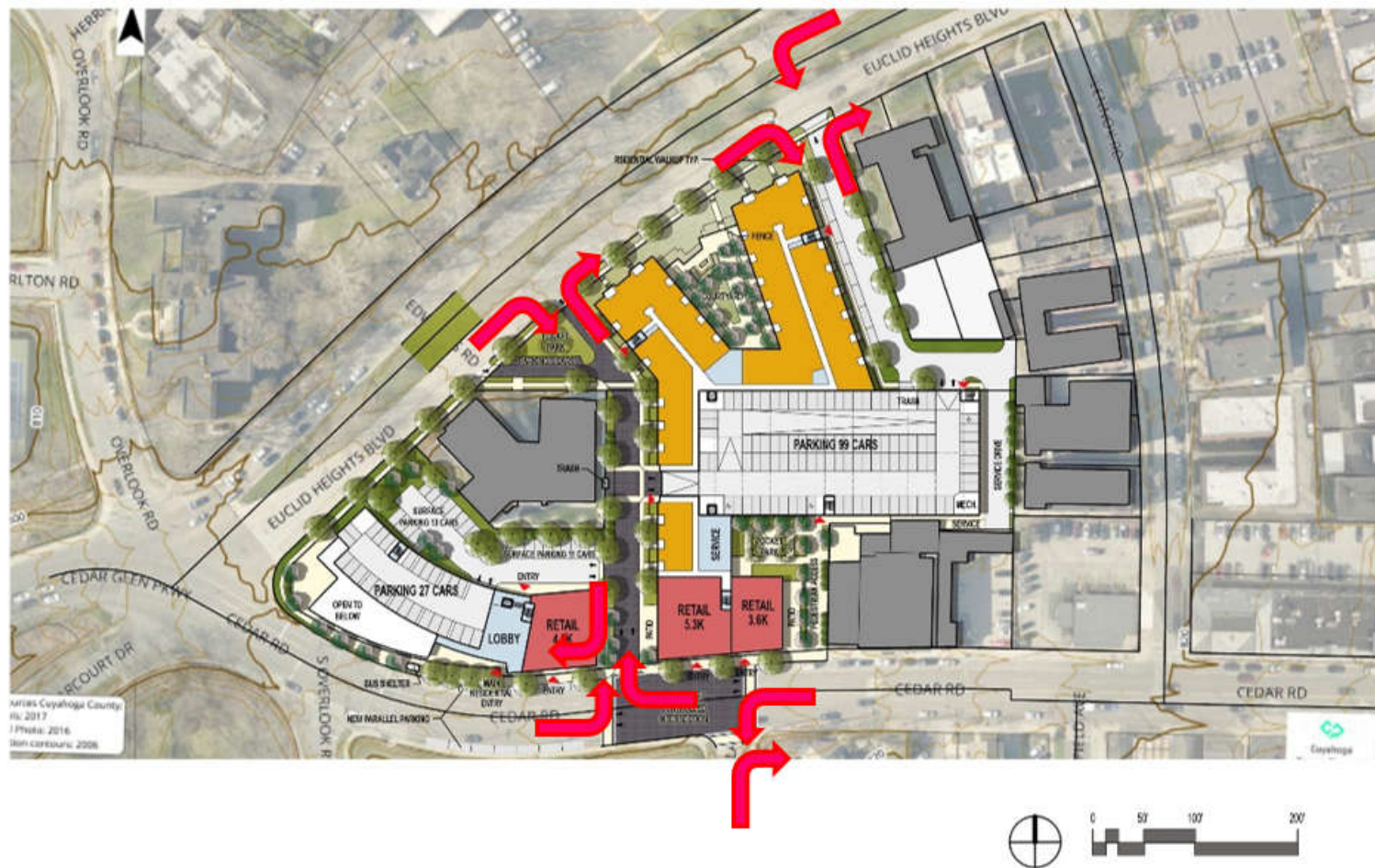
GROUND FLOOR



16200  
10/15/2018

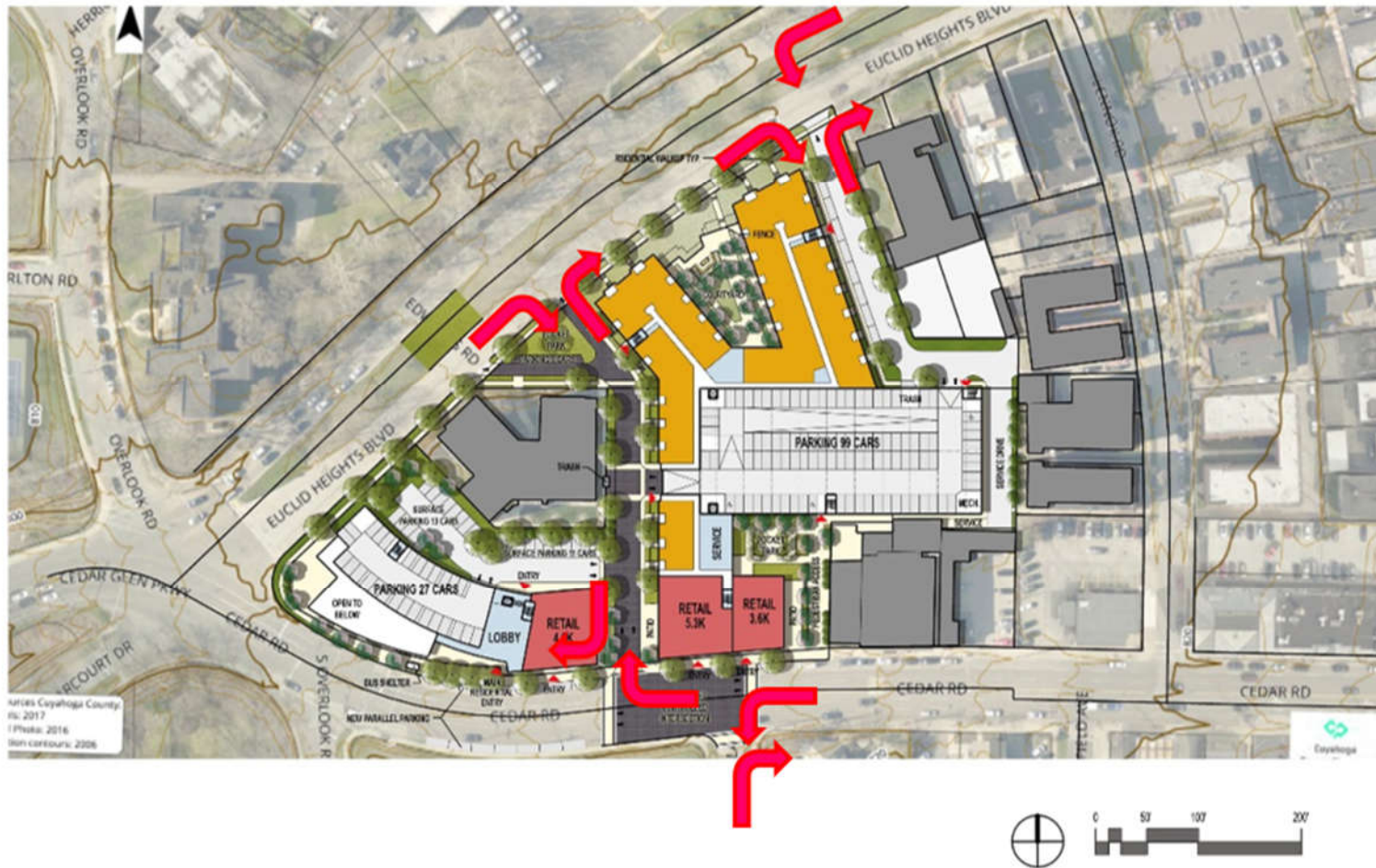


**Exhibit 30** Alternative 3 Site Access Movements



GROUND FLOOR

**Exhibit 31** Alternative 4 Site Access Movements



GROUND FLOOR



approach urban | architecture



TOP OF THE HILL

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10/15/2018





**Table 14** Capacity Analysis Results for Top of the Hill Site Access Drives

Intersection	Approach Direction & Movement		Existing				Alternative 1				Alternative 2				Alternative 3				Alternative 4			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
			LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
Cedar/Delaware	NB	Left	B	12.5	E	40.6	B	12.5	E	41.2												
		Right									B	10.8	C	24.9	B	10.8	C	24.9	B	10.8	C	24.9
	WB	Left	B	10.3	D	27.7	B	10.3	D	27.7	B	10.3	D	27.7	B	10.3	D	27.7	B	10.3	D	27.7
Cedar/Site Access	EB	Left					C	22.7	B	11.8	C	22.7	B	11.8	C	22.7	B	11.8				
	SB	Left																				
		Right					D	31.1	B	12.0	D	31.1	B	12.0for	C	19.7	B	11.7	C	19.7	B	11.7
Euclid Heights/Edwards	NWB	Left																				
		Right	C	19.8	C	24.4	A	9.5	B	14.6	A	9.5	B	14.6	A	9.6	C	15	A	9.6	C	15.4
	SWB	Left	A	8.0	B	12																
Euclid Heights/Site Access	NB	Right	A	9.4	B	14.3	A	9.6	C	15.2	A	9.7	C	15.2	A	9.7	C	15.5	A	9.7	C	15.7
	WB	Left					A	8.1	B	12.2	A	8.1	B	12.2	A	8.1	B	12.2	A	8.2	B	12.3

Prepared by WSP



**Table 15** Projected Queuing for Top of the Hill Site Access Drives

Intersection	Approach Direction & Movement		Existing		Alternative 1		Alternative 2		Alternative 3		Alternative 4	
			95% Queue (ft)		95% Queue (ft)		95% Queue (ft)		95% Queue (ft)		95% Queue (ft)	
			AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Cedar/Delaware	Northbound	Left	5.0	52.5	5.0	52.5						
		Right					5.0	32.5	5.0	32.5	5.0	32.5
	Westbound	Left	2.5	7.5	2.5	7.5	2.5	7.5	2.5	7.5	2.5	7.5
Cedar/Site Access	Eastbound	Left	-	-	5.0	7.5	5.0	7.5	5.0	7.5		
	Southbound	Left			32.5	10.0	32.5	10.0				
		Right							15.0	5.0	15.0	5.0
Euclid Heights/ Edwards	Northwestbound	Left	5.0	2.5								
		Right	5.0	2.5	2.5	5.0	2.5	5.0	2.5	7.5	2.5	7.5
	Southwestbound	Left	0	0								
Euclid Heights/ Site Access	Northbound	Right	2.5	5.0	5.0	10.0	5.0	10.0	5.0	12.5	15.0	5.0
	Westbound	Left			2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5

Prepared by WSP



The capacity analysis results show that the site access driveways will perform acceptably for all alternatives based on anticipated delay and projected queuing. The configuration of the two site access drives on Euclid Heights Boulevard remain constant; the relatively minor variations in anticipated delay and queuing are due to differences in traffic volumes associated with the configuration of the Cedar Road site access and accompanying ingress and egress volumes. Analysis of the site access drive on Cedar Road shows that some movements are expected to experience more delay than others; that is due to the direction of movement and the conflicting (through) traffic movements on Cedar Road. In addition to delay, a qualitative assessment of crash potential is also evaluated for each alternative.

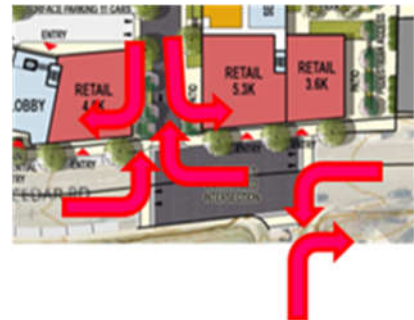
Note: The Edwards Drive site access was analyzed as right in/right out. The preferred configuration was subsequently modified to allow inbound left turns to accommodate residents of the Buckingham, allowing them easy access from the east to use the drop off area on the north side of the building. This change will result in the diversion of a small number of vehicles from the parking garage access drive and is not expected to affect the results of the capacity analysis. It would likely cause a minimal reduction in the queue for inbound (westbound) left turns.

Given that the capacity and operational performance are expected to be acceptable for the four analyzed alternatives, crash potential and ease of access will be key factors in determining the preferred Cedar Road site access drive. The features, considerations and anticipated performance for the Cedar Road site access drive for each of the four scenarios are summarized below.

Alternative 1: The full movement alternative is anticipated to function at an acceptable level of service for the Cedar Road site access drive; the northbound Delaware approach is expected to function at LOS E, which is consistent with existing conditions. There is a safety concern with this alternative: Permitting southbound left turns out of the site and northbound left turns from Delaware will occur in the same general space on Cedar Road between the two streets. Additionally, executing a left turn across the six-lane Cedar Road will be challenging for vehicles exiting both Delaware Road and the site access drive. Additionally, it will be difficult for drivers to perceive the potential presence of another driver trying to turn left from the other street, resulting in head on crash potential between these two movements. As such, it would be wise to prohibit at least one of the left turn movements. Even without the conflicting northbound and southbound left turn movements, drivers exiting the site will likely feel that it is difficult to make the left turn onto eastbound Cedar Road during peak hours due to the volume of traffic traveling eastbound and westbound on Cedar Road. In addition, provision of the eastbound left turn into the site from the inside (left-most) eastbound travel lane will create the potential for rear-end collisions, since an eastbound vehicle waiting to turn left into the



**Alternative 2:** This alternative prohibits the northbound left turn from Delaware Road to mitigate the head-on crash potential between northbound and southbound left turning vehicles associated with Alternative 1. The eastbound left turn rear-end crash potential remains, along with the possible driver perception of difficulty making southbound left turns during peak hours.



**Alternative 3:** Both northbound left turns from Delaware Road and southbound left turns from the site access drive are prohibited with this alternative. These turning movement prohibitions mitigate the head-on crash potential between northbound and southbound left turning vehicles as well as the possible driver perception of difficulty making southbound left turns during peak hours. The eastbound left turn rear-end crash potential remains. Note: With the prohibition of the southbound left turn, the northbound left turn from Delaware could be accommodated.



**Alternative 4:** This alternative is the most restrictive; it prohibits the northbound left turn from Delaware Road, the southbound left turn from the site access drive, and the eastbound left turn from Cedar Road. The turn restrictions help to reinforce a safe condition. This configuration will cause drivers that want to head east from the site to drive a more circuitous route from a Euclid Heights Boulevard access drive to reach their destinations. Note: With the prohibition of the southbound left turn, the northbound left turn from Delaware could be accommodated.



Alternative 1 is not recommended due to the crash potential between the opposing left turns from the site access drive and Delaware Road. Alternative 2 is expected to be appropriate and effective during off-peak operations but it would likely be beneficial to employ more restrictive traffic operations (Alternative 3 or Alternative 4) during peak hours. These controls could be implemented through the use of signage that prohibits identified turn movements during specified hours of the day.

## **PARKING AND TRAFFIC ANALYSIS CONCLUSIONS/RECOMMENDATIONS**

### **Parking Plan Design and Accommodations**

From the standpoint parking, the TOH Mixed Use Development has been found to be well designed and adequately accommodated with enough parking to effectively satisfy to the project's anticipated peak period parking demand. The project's peak period demand is expected to consume 498 spaces. This





period parking demand total is based on the results of the shared use parking analysis previous presented on Table 7 restated in the fourth column from the left on **Table 16** below. which noted that 265 permit spaces for project residents 465 spaces.

**Table 16** Projected Queuing for Top of the Hill Site Access Drives

<b>Lot: 9A &amp; 9B</b>	<b>Existing City Lot 9 Space Count</b>	<b>TOH Project Parking Space Count</b>	<b>TOH On-Site Generated Peak Hr. Parking Demand *</b>	<b>Peak Hr. Transient Parking Available With Shared Usage</b>	<b>Peak Hr. Transient Parking Available Without Shared Usage</b>
<b>TOTAL LOT 9 SPACES</b>	<b>225</b>	<b>568</b>	<b>498</b>	<b>139</b>	<b>112</b>
<i>TOH Resid. Permit Spaces</i>	<i>N/A</i>	<i>282</i>	<i>265</i>	<i>17</i>	<i>0</i>
<i>TOH Non-Permit (Transient) Spaces</i>	<i>58</i>	<i>112</i>	<i>69</i>	<i>112</i>	<i>112</i>
<i>City Permits/Spaces</i>	<i>167</i>	<i>174</i>	<i>164</i>	<i>10</i>	<i>0</i>

\* Share Use Parking Analysis findings for weekend evening from on Table 7.

**Table 16** also estimates the amount of transient parking spaces that will be available during peak demand periods when the project parking facility is managed to allow for some sharing of spaces designated for permit parkers and when those same spaces will not to be shared. It is important to note that, in both scenarios, it is assumed that the total number of parking permits will be capped at 282 for residents at development and 174 for the existing City permit holders. Under the shared use operations scenario approximately 139 spaces will be available to accommodate transient demand during the peak period. However; without some shared usage of the permit spaces the estimated number of spaces available for transient parking during the peak demand period is not expected to rise above 112 spaces.

In either case, these calculations support the City of Cleveland Heights goal of having the project replace the 225 on-site parking spaces that will be displaced by the development. Specifically, the City will in essence have control of 174 resident permit spaces and 51 transient spaces.

Lastly, it has been concluded that the parking structures and surface parking areas planned for the project are well placed on the site and with access points that will be both functionally and operationally effective.

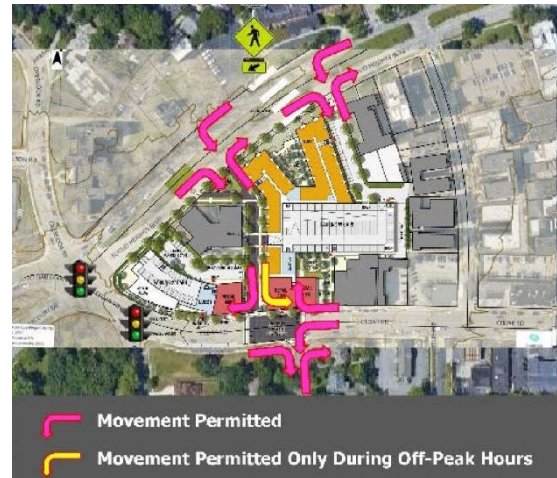
**Euclid Heights Boulevard Site Access** The two access drives on Euclid Heights Boulevard (Edwards Road and the parking garage access drive west of Lennox Road) will prohibit outbound left turns; all other movements will be permitted. In addition, a mid-block crossing with pedestrian-activated flashing beacons (Rectangular Rapid Flash Beacon or RRFB) will be installed on Euclid Heights Boulevard to the west of the parking garage access drive to facilitate pedestrian and bicycle access to the site from neighborhoods to the north.

**Cedar Road Site Access** The recommended configuration and permitted turning movements for the Cedar Road site access is separated by peak hour and off-peak operations:

- **Prohibit northbound left turns from Delaware Road.** This turn prohibition will mitigate potential head-on crashes between northbound and southbound left turns. It will also mitigate the potential for northbound cut-throughs from Delaware Road through the site to Euclid Heights Boulevard.



- **Prohibit eastbound left turns into the site.** This will mitigate the rear-end crash potential associated with inbound left turns from a through travel lane without measurable impact or inconvenience to drivers accessing the site as they can easily use one of the site access drives on Euclid Heights Boulevard.
- **Prohibit southbound left turns out of the site during AM and PM peak hours.** The time of day turn restriction will mitigate crash potential associated with southbound left turns as it is expected that left turns across the 6-lane Cedar Road may be difficult during peak hours and drivers may be tempted to take risks with respect to gap acceptance. Southbound left turns would be permitted during non-peak hours. Ease of southbound left turns during non-peak hours should be monitored to determine whether these turns should be permanently prohibited.



## APPENDICES

### Appendix A

Cedar-Fairmount Commercial District Parking Survey	Street Side	Spaces	Tuesday May 1st 8:00 AM	Friday Apr. 27th 10:00AM	Friday Apr. 27th 12:00PM	Friday Apr. 27th 2:00PM	Monday Apr. 30th 5:00PM	Friday Apr. 27th 7:00PM	Friday Nov. 16th 9:00PM	Saturday Apr. 28th 8:00AM	Saturday Apr. 28th 10:00AM	Saturday Apr. 28th 12:00PM	Saturday Apr. 28th 2:00PM	Saturday Apr. 28th 5:00PM	Saturday Apr. 28th 7:00PM	Saturday Nov. 10th 11:00PM
<b>All On-Street Parking Spaces</b>																
<b>On-Street: Fairmount Blvd. NB - West Median</b>																
2-hr Metered Spaces	W	14	0	7	7	11	4	14	10	0	0	7	0	0	13	8
<b>On-Street: Fairmount Blvd. NB - East Curb</b>																
2-hr Metered Spaces	E	7	0	0	0	0	0	4	6	0	0	3	0	0	0	5
<b>On-Street: Fairmount Blvd. SB - Along South Bound Fairmount Blvd from Cedar Ave</b>																
2-hr Metered Spaces	S	6	0	3	5	4	4	6	5	3	4	4	5	6	5	5
ADA Metered Spaces	S	1	0	0	1	1	0	1	1	1	1	1	1	1	0	0
<b>On-Street: Grandview Ave. NB - East Side Dave's Mkt (All Times Except Trucking Loading 6am-4pm Wkdys)</b>																
30-min. Non-Metered Spaces	E	4	2	0	0	0	0	2	0	1	0	0	0	0	0	0
<b>On-Street: Cedar Rd WB - Along Northside Commercial Frontage on Cedar Rd</b>																
ADA Metered Spaces	N	1	0	0	1	0	0	1	0	0	0	0	0	0	0	1
2-hr Metered Spaces	N	4	0	1	3	3	4	1	4	0	2	3	3	4	4	4
<b>On-Street: Surrey Rd NB - Cedar Rd to Parking Lot Entrance</b>																
1-hr Metered Spaces	E	3	3	1	3	3	0	3	0	3	3	3	2	2	2	0
<b>On-Street: Surrey Rd NB - Parking Lot Entrance to Derbyshire Rd</b>																
3-hr Non-Metered Spaces	E	5	8	7	6	6	5	8	5	6	6	7	7	3	5	5
<b>On-Street: Surrey Rd SB - Cedar Rd to Derbyshire Rd (Enforced 8am - 6pm Mon-Sat)</b>																
2-hr Metered Spaces	W	5	3	0	2	1	3	7	5	4	3	4	6	4	6	5
<b>On-Street: Cedar Rd WB - Between Surrey Rd and Lennox Rd</b>																
2-hr Metered Spaces	N	6	0	4	5	3	3	7	4	6	6	5	6	6	6	6
<b>On-Street: Lennox Rd NB - Between Cedar Rd and Euclid Hts Blvd</b>																
15-Min Non-Metered Spaces	E	3	1	1	1	2	0	3	2	4	3	2	2	2	2	1
<b>On-Street: Lennox Rd NB - Between Cedar Rd and Euclid Hts Blvd</b>																
Non-Metered Spaces	E	18	15	13	16	15	17	15	12	10	16	16	18	14	16	9
<b>On-Street: Cedar Rd WB - Lennox Rd to Euclid Hts Blvd (Enforced 9am - 6pm Mon-Sat)</b>																
2-hr Metered Spaces	N	9	0	0	2	0	2	9	8	0	0	9	7	6	9	6
<b>TOTAL ON-STREET SPACES/OCCUPANCY</b>		<b>86</b>	<b>32</b>	<b>37</b>	<b>52</b>	<b>49</b>	<b>42</b>	<b>81</b>	<b>62</b>	<b>38</b>	<b>44</b>	<b>64</b>	<b>57</b>	<b>48</b>	<b>68</b>	<b>55</b>
<b>% OCCUPIED</b>			<b>37%</b>	<b>43%</b>	<b>60%</b>	<b>57%</b>	<b>49%</b>	<b>94%</b>	<b>72%</b>	<b>44%</b>	<b>51%</b>	<b>74%</b>	<b>66%</b>	<b>56%</b>	<b>79%</b>	<b>64%</b>



## Appendix B

<b>Cedar-Fairmount Commercial District Parking Survey</b>	<b>Actual Space Total</b>	<b>Tuesday May 1st 8:00 AM</b>	<b>Friday Apr. 27th 10:00AM</b>	<b>Friday Apr. 27th 12:00PM</b>	<b>Friday Apr. 27th 2:00PM</b>	<b>Monday Apr. 30th 5:00PM</b>	<b>Friday Apr. 27th 7:00PM</b>	<b>Friday Nov. 16th 9:00PM</b>	<b>Saturday Apr. 28th 8:00AM</b>	<b>Saturday Apr. 28th 10:00AM</b>	<b>Saturday Apr. 28th 12:00PM</b>	<b>Saturday Apr. 28th 2:00PM</b>	<b>Saturday Apr. 28th 5:00PM</b>	<b>Saturday Apr. 28th 7:00PM</b>	<b>Saturday Nov. 10th 11:00PM</b>
<b>All City-Owned Off-Street Parking Facilities</b>															
<b>Lot: 6 City of Cleveland Hts - 2091 Lennox Rd Lot</b>															
24-hr Meter Spaces	8	1	0	2	0	0	3	1	2	1	0	1	1	0	1
ADA 24-hr Meter Spaces	1	0	0	0	0	0	0	1	0	0	0	0	0	3	1
Permit Only Spaces	42	22	21	19	16	16	22	29	27	21	18	21	21	20	30
<b>Lot: 9A City of Cleveland Hts - 2330 Euclid Hts Blvd (North side of Edwards Rd)</b>															
Non-Metered Unmarked	5	2	4	4	4	3	5	2	4	4	4	4	4	4	2
5-hr Meter/ Permit Spaces	2	1	1	2	1	1	1	2	2	1	2	1	1	2	6
5-hr Meter Spaces	29	3	6	13	4	10	20	18	4	2	18	2	2	23	12
ADA 5-hr Meter Spaces	1	0	0	0	1	0	0	1	0	0	1	0	0	1	1
24-hr Meter Spaces	21	7	5	8	5	8	8	12	1	3	12	3	3	19	10
ADA 24-hr Meter Spaces	2	0	1	0	0	0	0	2	0	0	0	0	0	2	1
24-hr Meter/Permit Spaces	14	5	1	3	1	3	14	8	1	2	2	2	2	12	11
Permit Only Spaces	109	80	44	43	45	48	52	56	73	60	42	60	60	56	57
<b>Lot: 9B City of Cleveland Hts - 2330 Euclid Hts Blvd (South side of Edwards Rd)</b>															
Permit Only Lot (North of Edwards Rd)	42	35	15	15	16	25	34	31	32	32	26	32	32	30	24
<b>Lot: 22 City of Cleveland Hts - Grandview Meter/Permit Lot</b>															
5-hr Meter/Permit Spaces	5	3	5	5	4	4	4	0	5	5	4	3	2	4	0
5-hr Meter	4	3	4	4	4	2	4	2	4	3	2	2	2	2	2
5-hr ADA Metered Spaces	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Permit Only Spaces	9	0	6	5	6	5	6	0	2	1	4	2	1	1	0
<b>Lot: 27 City of Cleveland Hts - Surrey Deck (Upper Level)</b>															
5-hr Meter/Permit Spaces	20	4	6	5	10	6	20	9	4	3	8	3	8	14	6
24-hr Meter/Permit Spaces	15	0	5	7	8	12	14	3	2	4	5	6	4	3	4
Permit Only Spaces	11	5	9	6	5	8	5	7	2	6	4	5	3	4	6
<b>Lot: 27 City of Cleveland Hts - Surrey Deck (Lower Level)</b>															
24-hr Meter Spaces	16	4	7	11	11	2	15	8	7	6	16	13	16	13	10
24-hr Meter/Permit Spaces	5	5	2	3	2	2	5	4	5	5	5	4	5	5	5
HC 24-hr Meter Spaces	3	0	2	0	0	0	0	2	0	0	0	0	1	0	0
Permit Only Spaces	23	21	17	19	18	19	19	18	20	22	18	16	12	13	19
<b>TOTAL PUBLIC OFF-STREET SPACES/OCCUPANCY</b>	<b>388</b>	<b>201</b>	<b>161</b>	<b>174</b>	<b>161</b>	<b>174</b>	<b>251</b>	<b>216</b>	<b>197</b>	<b>181</b>	<b>191</b>	<b>180</b>	<b>180</b>	<b>231</b>	<b>208</b>
<b>% OCCUPIED</b>		<b>52%</b>	<b>41%</b>	<b>45%</b>	<b>41%</b>	<b>45%</b>	<b>65%</b>	<b>56%</b>	<b>51%</b>	<b>47%</b>	<b>49%</b>	<b>46%</b>	<b>46%</b>	<b>60%</b>	<b>54%</b>





### Appendix C

<b>Cedar-Fairmount Commercial District Parking Survey</b>	<b>Actual Space Total</b>	<b>Tuesday May 1st 8:00 AM</b>	<b>Friday Apr. 27th 10:00AM</b>	<b>Friday Apr. 27th 12:00PM</b>	<b>Friday Apr. 27th 2:00PM</b>	<b>Monday Apr. 30th 5:00PM</b>	<b>Friday Apr. 27th 7:00PM</b>	<b>Friday Nov. 16th 9:00PM</b>	<b>Saturday Apr. 28th 8:00AM</b>	<b>Saturday Apr. 28th 10:00AM</b>	<b>Saturday Apr. 28th 12:00PM</b>	<b>Saturday Apr. 28th 2:00PM</b>	<b>Saturday Apr. 28th 5:00PM</b>	<b>Saturday Apr. 28th 7:00PM</b>	<b>Saturday Nov. 10th 11:00PM</b>
<b>All Private-Owned Off-Street Parking Facilities</b>															
<b>Lot: A 2374 Euclid Hts. Blvd (North side of Edwards Rd)</b>															
Permit Only Spaces	10	10	4	5	5	6	7	6	8	8	7	8	8	7	7
<b>Lot: B Woodside Cedar Properties 12395 Cedar Rd - Barbershop/Zoss Bakery</b>															
Reserved - Zoss Bakery Customer Spaces	3	0	0	1	0	1	0	1	1	1	0	1	1	0	0
Non-Metered Unmarked	16	3	2	7	10	4	15	13	2	9	4	9	9	10	2
<b>Lot: C Fifth Third Bank, 12401 Cedar Rd</b>															
ADA Non-Metered Spaces	3	0	0	0	1	0	5	3	0	2	1	2	2	5	3
Non-Metered Unmarked	19	5	11	8	8	8	19	21	3	6	18	6	6	19	13
<b>Lot: D Chase Bank, 12388 Cedar Rd</b>															
ADA Non-Metered Spaces	2	0	1	1	0	0	0	0	0	2	0	2	2	0	0
Non-Metered Unmarked	26	1	15	21	14	13	6	17	0	15	6	15	15	6	8
<b>Lot: E Bridgestone Tire 12416 Cedar Rd</b>															
ADA Non-Metered Spaces	1	1	0	1	1	0	0	0	0	1	1	1	1	0	0
Regular Non-Metered Spaces	29	11	26	21	21	16	6	8	11	19	24	19	19	8	3
<b>Lot: F Cedar Fairmount Properties, 12451 Cedar Rd - Buffalo Wild Wings/ATT</b>															
ADA Non-Metered Spaces	2	0	0	1	1	0	0	0	1	0	1	0	0	1	0
ATT Customer Non-Metered Spaces	2	0	2	2	2	2	2	1	1	1	2	1	1	2	1
Montlack Realty Non-Metered Spaces	4	4	2	2	3	2	4	3	3	4	4	4	4	4	3
Alcazar Non-Metered Employee Spaces	2	0	0	0	0	0	2	0	2	1	2	1	1	0	0
Regular Non-Metered Spaces	31	8	20	21	24	19	31	29	11	25	29	25	25	31	26
<b>Lot: G Cedar- Grandview Co./Dave's Market Lot, 12426 Cedar Rd.</b>															
ADA Non-Metered Spaces	2	0	2	1	1	1	2	1	1	0	2	0	0	1	0
Regular Non-Metered Spaces	78	7	33	41	40	37	62	20	6	22	28	22	22	25	5
<b>Lot: H1 Heights Medical Bldg, 2460 Fairmount Blvd. (Lower Lot)</b>															
ADA Non-Metered Spaces	1	0	0	1	1	1	1	1	0	1	0	1	1	1	0
Regular Spaces (Lower Lot)	99	18	99	101	101	93	113	91	15	85	92	85	85	82	80
<b>Lot: H2 Heights Medical Bldg, 2460 Fairmount Blvd. (Upper Lot)</b>															
Regular Spaces (Upper lot)	42	3	10	42	40	19	47	33	4	22	42	22	22	38	2
<b>TOTAL PRIVATE FACILITY SPACES</b>	<b>372</b>	<b>71</b>	<b>227</b>	<b>277</b>	<b>273</b>	<b>222</b>	<b>322</b>	<b>248</b>	<b>69</b>	<b>224</b>	<b>263</b>	<b>224</b>	<b>224</b>	<b>240</b>	<b>153</b>
<b>% OCCUPIED</b>		<b>19%</b>	<b>61%</b>	<b>74%</b>	<b>73%</b>	<b>60%</b>	<b>87%</b>	<b>67%</b>	<b>19%</b>	<b>60%</b>	<b>71%</b>	<b>60%</b>	<b>60%</b>	<b>65%</b>	<b>41%</b>



## Appendix D

<b>Cedar-Fairmount Commercial District Parking Survey Summary</b>	<b>Actual Space Total</b>	<b>Tuesday May 1st 8:00 AM</b>	<b>Friday Apr. 27th 10:00AM</b>	<b>Friday Apr. 27th 12:00PM</b>	<b>Friday Apr. 27th 2:00PM</b>	<b>Monday Apr. 30th 5:00PM</b>	<b>Friday Apr. 27th 7:00PM</b>	<b>Friday Nov. 16th 9:00PM</b>	<b>Saturday Apr. 28th 8:00AM</b>	<b>Saturday Apr. 28th 10:00AM</b>	<b>Saturday Apr. 28th 12:00PM</b>	<b>Saturday Apr. 28th 2:00PM</b>	<b>Saturday Apr. 28th 5:00PM</b>	<b>Saturday Apr. 28th 7:00PM</b>	<b>Saturday Nov. 10th 11:00PM</b>
ON-STREET SPACES/OCCUPANCY % OCCUPIED	86	32 37%	37 43%	52 60%	49 57%	42 49%	81 94%	62 72%	38 44%	44 51%	64 74%	57 66%	48 56%	68 79%	55 64%
CITY-OWNED OFF-STREET SPACES/OCCUPANCY % OCCUPIED	388	201 52%	161 41%	174 45%	161 41%	174 45%	251 65%	216 56%	197 51%	181 47%	191 49%	180 46%	180 46%	231 60%	208 54%
PRIVATE-OWNED OFF-STREET SPACES/OCCUPANCY % OCCUPIED	372	71 19%	227 61%	277 74%	273 73%	222 60%	322 87%	248 67%	69 19%	224 60%	263 71%	224 60%	224 60%	240 65%	153 41%
<b>TOTAL PARKING SPACE SUPPLY/OCCUPANCY % OCCUPIED</b>	<b>846</b>	<b>304 36%</b>	<b>425 50%</b>	<b>503 59%</b>	<b>483 57%</b>	<b>438 52%</b>	<b>654 77%</b>	<b>526 62%</b>	<b>304 36%</b>	<b>449 53%</b>	<b>518 61%</b>	<b>461 54%</b>	<b>452 53%</b>	<b>539 64%</b>	<b>416 49%</b>

Wkdy Peak

Wknd Peak

