

## **316 Flynn Avenue – Zoning Permit Application Narrative**

### Description of the Proposed Development and Proposed Use:

The proposed project consists of the redevelopment of a parcel in the Neighborhood Mixed Use zone at 316 Flynn Avenue. The property is a 0.61 acre parcel, or approximately 26,428 square feet of land, with three existing structures totaling approximately 6,304 finished square feet above ground. The current development intensity represents a FAR (floor area ratio) of only 0.24 in a zoning district that encourages dense mixed-use development of up to 2.0 FAR. The majority of the parcel is paved for parking and driveway access with two existing curb cuts- onto Flynn Avenue and Pine Street. At the northern end of the site the paved parking gives way to gravel which ends at a vegetated slope down to Engelsby Brook.

The Pine Street corridor is an important mixed-use spine in the South End neighborhood of Burlington and the gateway into the City of Burlington from many destinations south of the city center. A number of positive redevelopment projects have occurred along the Pine Street corridor over the past 20 years or so including the reuse of numerous formerly industrial and commercial buildings to house retail businesses, office space and artists' studios. Dealer.com, Zero Gravity Brewery, Citizen Cider, Arts Riot, Feldman's Bagels, Wind & Waves and Conant Metal & Light are just some of the businesses contributing to the revitalization of a former industrial corridor. A new branch of the successful City Market co-op grocery store is presently being permitted west down Flynn Avenue from the proposed project location.

This project endeavors to continue the ongoing evolution of Pine Street into a vibrant mixed-use district creating neighborhood oriented retail and new residences. The project adds density in a mixed-use zone that seeks compact transit/bike/pedestrian oriented development. The development involves demolition of the existing approximately 2,800 SF Pine Street Deli building and construction of an approximately 26,000 SF, four-story, flat-roofed building.

The primary use of the new building will be for 30 apartments (anticipated to be 14 efficiency units, 12 one-bedroom units and 4 two-bedroom units) located on the second, third and fourth floors, with elevator service and common room located in the southern portion of the ground floor to be used for laundry. Indoor bike storage will be accommodated at the ground floor with a lockable bike room, while exterior open bike rack storage will be at the front of the building along Flynn Avenue and under the cover of the parking garage.

Two commercial spaces of 1,500 SF proposed for restaurant use will be located in the west and southwest portions of the ground floor, with the main entrance to both commercial spaces located off the sidewalk running along Pine Street. The main entrance to the residences will be off the sidewalk along Flynn Avenue. A partial basement is proposed to be located under the building to provide additional storage and possibly mechanical/electrical room space.

The existing site is almost completely impervious, covered by parking areas to the north and east of the existing building footprint. The proposed site plan better defines the access drive from Flynn Ave by narrowing it and moving it to the east away from the intersection. The Pine Street access drive is shifted to the north, also away from the intersection. Green strips of lawn and landscape plantings will be created along the southern, Flynn Avenue, side of the proposed building footprint as well as at the western, Pine Street side.

Proposed Days and Hours of Operation:

The proposed commercial space is anticipated to be utilized as a restaurant, with operations 7 days a week and hours of operation from 5:30am to 11pm Sunday through Thursday and from 5:30am to 1:00am on Fridays and Saturdays.

Estimated Number of Employees:

The small commercial spaces are each anticipated to have approximately three employees working during their hours of operation. Leasing and management of the residential units will not entail any full-time, on-site employees based out of the property. Marketing and maintenance functions will be conducted on a part-time basis by employees who are based off-site.

Traffic Generation and Parking Analysis:

The property is located in the shared use parking district within the Neighborhood Mixed-Use District and based on the owners' experience, the close proximity to downtown is expected to attract tenants that are more apt to bike/walk, use public transportation, and use CarShare. The proposed site plan includes a total of 34 off-street parking spaces with access from curb cuts, slightly altered from the existing, to the south from Flynn Avenue and the west from Pine Street.

Under separate cover is a copy of our traffic impact and parking impact analysis prepared by Stantec. The intent of the report is to fully address the traffic and parking issues raised by Public Works at the TRC meeting. More specifically it demonstrates that:

- The project has adequate parking to serve site generated demands and should not significantly impact the unrestricted parking on Flynn Avenue; and,
- Use of the Flynn Avenue on-street spaces by site visitors, if any, would likely occur during the midday, off-peak traffic hours and have no significant impact on operations at the Pine Street and Flynn Avenue intersection.

The study constitutes a "full traffic study" as requested by DPW. It does not include reference to the City Market project as the traffic study has not been completed for that project. It also does not reference the Champlain Parkway project although that project will likely draw traffic away from the Pine Street and Flynn Avenue intersection. More importantly, the traffic study has demonstrated that the proposed development will have no measurable impact on intersection operations and that conclusion remains valid whether or not the City Market and/or Champlain Parkway projects are completed.

The restaurant use requires 3 parking spaces per 1,000 square feet, yielding a requirement of 9 parking spaces for the proposed project. 1 parking space is required for each apartment, yielding a requirement of 30 parking spaces for the apartments. The total parking requirement is therefore:

- Restaurant – 9 parking spaces
- Apartments – 30 parking spaces
- Total – 39 parking spaces

#### Parking Waiver:

We are requesting a parking waiver of 5 parking spaces in light of site's walkable and bikable location, bus stop located adjacent to the site and nearby opportunities for on-street parking. Our site plan accommodates 34 total parking spaces with the configuration presented. We have studied alternative parking layouts and have determined that the current site plan accommodates the most parking possible.

Our management experience shows that a dense neighborhood mixed use location in close proximity to downtown requires less parking. Many sites in the neighborhood function without dedicated off-street parking and there is ample on-street parking in the vicinity along Flynn Ave, Richardson Street and Ferguson Street to accommodate short-term parking for restaurant patrons.

We are also providing bike storage at the ground level, and promote CarShare and CCTA to our tenants. The proposed parking lot is slated to host a CarShare pod. The Pine Street CCTA bus route passes in front of the proposed building on Pine Street, providing easy access to the Cherry Street hub and routes covering Chittenden County and points beyond.

In summary:

1. Mixed use location close to downtown/promotion of public transportation and CarShare
2. Adequate secure bike storage
3. Direct access to CCTA bus route

#### 316 Flynn Avenue Parking Management Plan:

Given the neighborhood mixed use location in close proximity to downtown we are confident the project will attract tenants that are more apt to bike/walk, use public transportation and/or use CarShare. Parking will be shared between the restaurant and residents. It will be explicit in all leases that parking is first come, first served during weekday daytime hours from 9am-5pm and that during nights and weekends each apartment will be permitted to use one parking space. While the 34 off-street spaces are sufficient to provide at least one space per apartment, parking will be made available as an option- and if some tenants choose not to rent the parking space assigned to their unit it may be re-assigned to another tenant who chooses to rent an extra space.

The vehicular access is from Flynn Avenue with traffic entering the site at the curb cut east of the building, and from Pine Street with traffic entering the site at the curb cut south of the building. The proposed building will have entries off Flynn Avenue and the parking lot that allow for easy access to the secure bike storage located on the ground floor, as well as additional storage located in the building's partial basement. Exterior bike storage will be located at the front of the building along Flynn Avenue and under cover in the lot. Depending on the specific retail tenant's needs, DPW is open to potentially creating short-term on-street parking to the east of the building and/or a loading zone for deliveries along Flynn Avenue.

#### Phasing and Construction Schedule:

The redevelopment is proposed to occur in a single phase with demolition and initial site work occurring first, immediately followed by construction of the new building, with final utility connections and finish site work including landscaping to occur last. The overall construction schedule is anticipated to take approximately 11 months, with a target start date of Spring 2017 (dependent on zoning approval, Act 250 approval, and issuance of a building permit).

#### Storm water management:

The approach to long-term stormwater management is to reduce the amount of impervious surfaces from the current level and to employ infiltration where possible and to reduce the peak discharge rate of the remaining runoff into the existing connection to the municipal system under Flynn Avenue. Stormwater flow into Engelsby Brook will be reduced from present levels and controlled by filtering through a bioswale to a flow reducing tank and level spreader into the brook. A construction period stormwater and erosion control plan will be employed that complies with the City of Burlington Department of Public Works and Planning & Zoning guidelines. Additional information on stormwater and erosion control is included in the materials from our civil engineer, Doug Hewitt of Summit Engineering, Inc.

#### Capacity of municipal utilities, services & existing or planned community facilities:

Based on the similarity of the proposed uses to recently approved projects, the stated planning goals of the Neighborhood Mixed Use District and initial feedback obtained from the Technical Review Committee the applicant's understanding is that there is sufficient capacity of municipal utilities, services and existing or planned community facilities to accommodate the proposed new development.

#### Utilization of renewable energy resources:

The applicant will be working with BED, Vermont Gas and Efficiency Vermont to minimize energy usage in the proposed building through EnergyStar certification and installation of the most energy efficient available technology for primary space heating and cooling (cold-climate air source heat pumps). The building's design will also provide for future installation of rooftop solar through adequate structural load capacity and conduit run from the basement utility room to the roof when it becomes economically feasible to do so.

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#### Utilization of renewable energy resources:

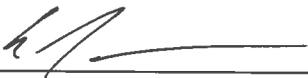
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**SAMPLE**

**Pre-Application Public Neighborhood Meeting Certification**

I, Erik Hoekstra, certify that that the Pre-Application Public Neighborhood Meeting requirement pursuant to Sec. 3.2.1(d) of the *Burlington Comprehensive Development Ordinance* has been satisfied in accordance with the procedures and requirements set forth by the Department of Planning and Zoning for a public neighborhood meeting held on March 17, 2016 at DPW building.

A copy of the meeting date, time and location; list of attendees with contact information; NPA meeting minutes or meeting notes summarizing the discussion; and method and copy of public notice is attached and made a part of this Certification.

Signature: 

STATE OF VERMONT

COUNTY OF CHITTENDEN

The above and foregoing Affidavit as subscribed before me this 29 day of JUNE, A.D., 2016 personally by JIM BRAULT.



NotaryPublic

Seal

My Commission expires: 6/29/16

March 3, 2016

Re: New Residential Building to be presented at Ward 5 Neighborhood Meeting  
Project Location: 316 Flynn Avenue, Burlington, VT

Dear Sir or Madam:

The City of Burlington has a relatively new requirement that any proposed new development project be presented at a Neighborhood Planning Assembly meeting to give neighbors an opportunity to become aware of the project at the early stage of conceptual design. We are on the Ward 5 NPA agenda for their March 17<sup>th</sup> meeting, to be held at the Department of Public Works building at 645 Pine St. The NPA meeting begins at approximately 7:00pm, though we ask that you please check with the City of Burlington website to confirm time and location.

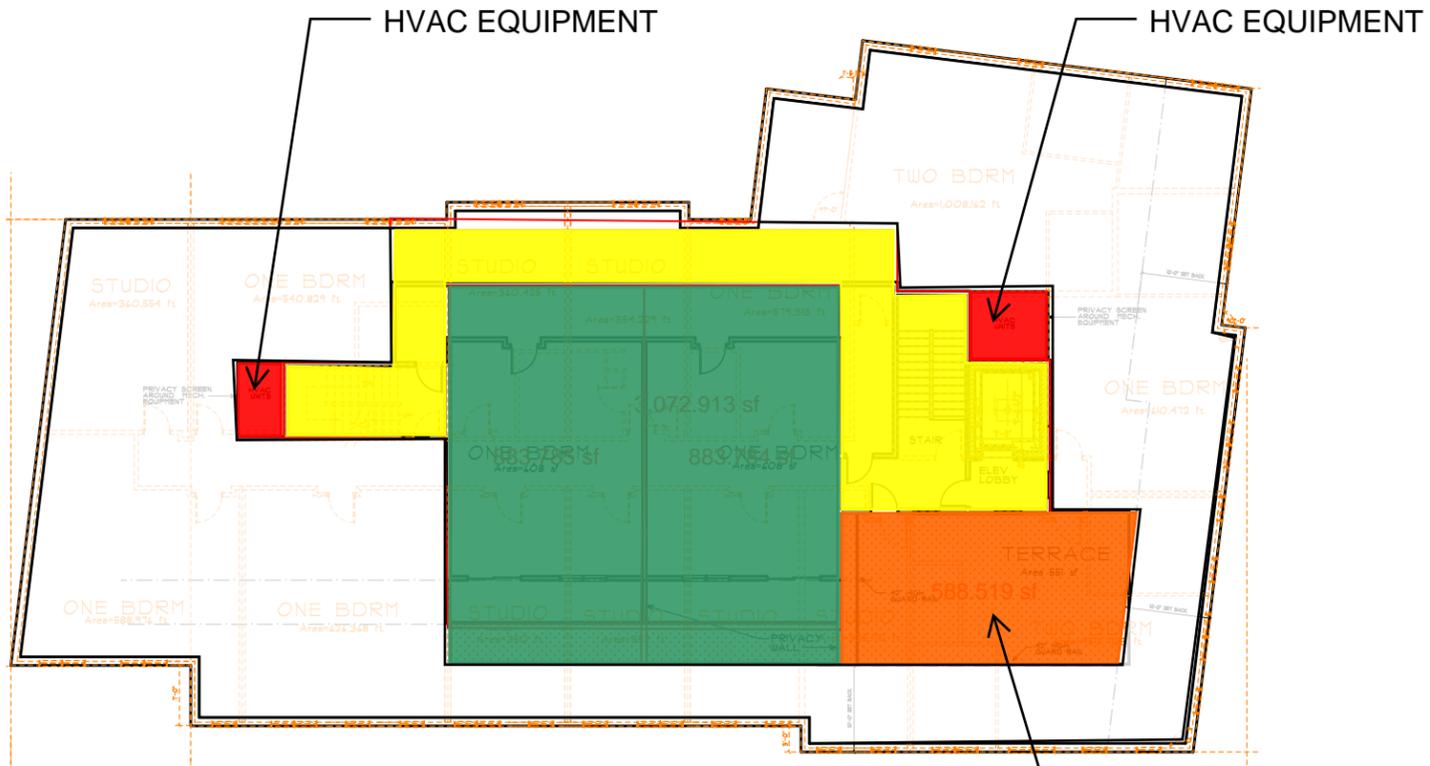
The proposed project is an approximately 25,000 square foot residential building. The property is the current location of the Pine Street Deli.

The conceptual design for the new building consists of three stories of apartments over two ground-level neighborhood-scaled commercial spaces. The three stories of apartments will partially overhang a surface parking lot containing roughly 30 spaces.

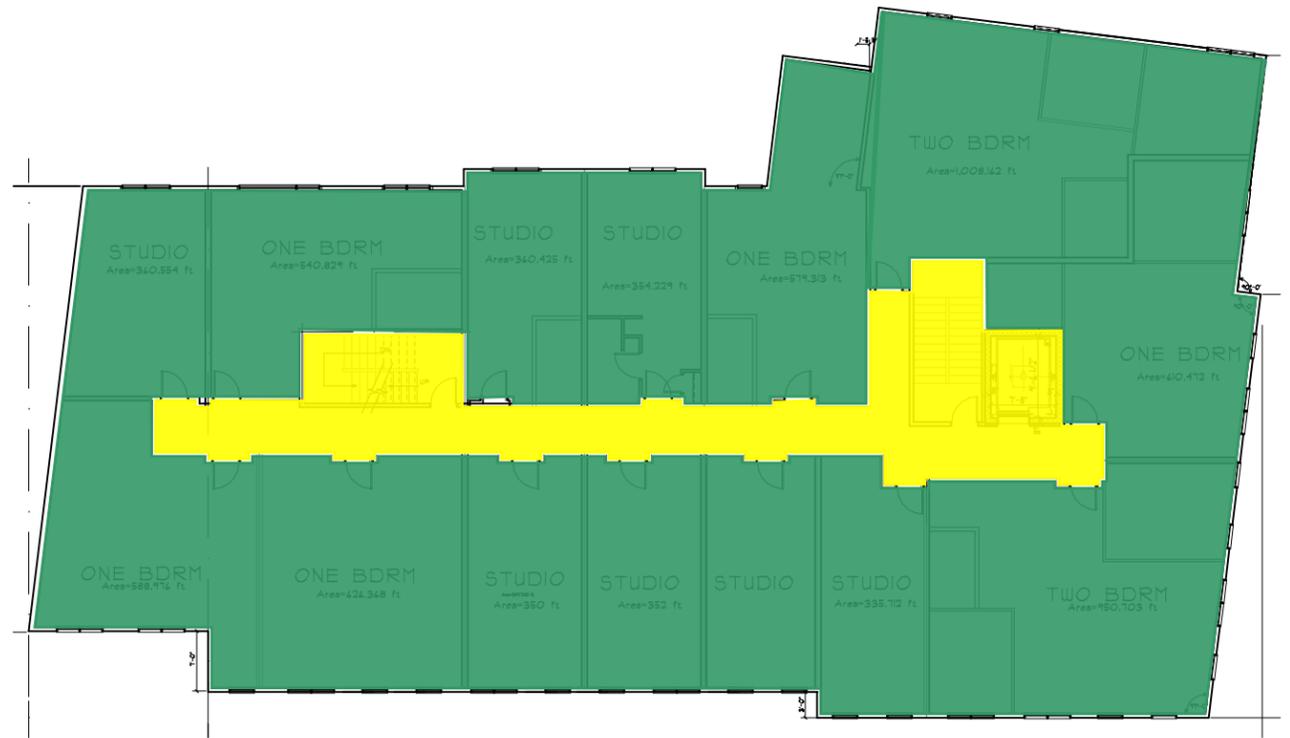
We look forward to hearing any questions or comments you may have.

Sincerely,

Redstone Development Group

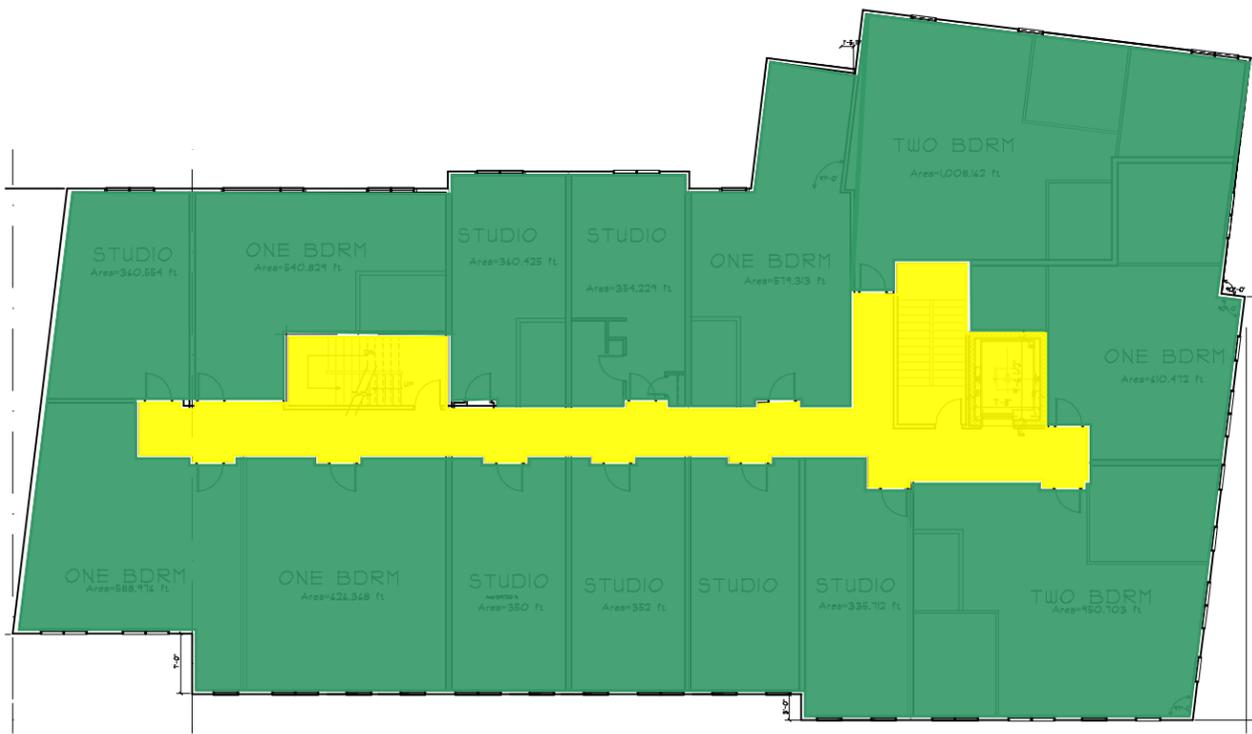


ROOF - RESIDENTIAL- 2,500SF



SECOND FLOOR - RESIDENTIAL- 9,300SF

- CIRCULATION
- MECHANICAL
- TENANT AMENITY
- COMMERCIAL
- RESIDENTIAL



THIRD FLOOR - RESIDENTIAL- 9,300SF



GROUND FLOOR - COMMERCIAL- 3,000SF



55 Green Mountain Drive  
South Burlington, VT 05403

June 28, 2016  
File: 195311267

**Attention: Mr. Dan Goltzman**  
Redstone  
210 College Street, Ste. 201  
Burlington, VT 05401

Dear Dan,

**Reference: Pine Street Deli Site, Burlington, VT**

Per your request we have conducted an investigation of potential traffic and parking impacts associated with the above referenced project. Based on this investigation we conclude that the project will have only nominal impacts on the area roadway system. Furthermore, the roadway system operates at a high level of service under existing conditions and has adequate capacity to also accommodate the project related traffic increases at the same high level of service. Additionally we find that the proposed on-site parking supply is adequate to serve estimated peak demands. More specifically we find that:

- The project will generate only ten to twelve peak hour vehicle trips;
- The project will add only one or two new peak hour vehicle trips through the Pine Street and Flynn Avenue intersection; and,
- The project will generate a peak parking demand of 30 vehicles compared to a proposed parking supply of 34 spaces.

**PROJECT DESCRIPTION**

The proposed project is a mixed-used development to be located on the site of the existing Pine Street Deli and bottle redemption center at the intersection of Pine Street and Flynn Avenue in Burlington, Vermont. The current use consists of an approximately 2,800 square feet deli/convenience store, an approximate 1,000 square bottle redemption center and a three-unit apartment building. These uses are supported by 16 marked and approximately ten informal (unmarked) parking spaces on the site. Vehicular access is available by way of curb cuts on both Pine Street and Flynn Avenue. The proposed project includes demolition of the existing buildings on the site. In their place, a multi-story building will be constructed housing 30 residential apartment units on the upper floors and 3,000 square feet of commercial space at street level. Approximately 34 shared parking spaces will be provided. The two existing vehicular access points will be reconstructed and maintained. The conceptual site plan is shown in Figure 1.



June 28, 2016  
Mr. Dan Goltzman

Page 2 of 15

Reference: Pine Street Deli Site, Burlington, VT

## EXISTING CONDITIONS

The project study is principally limited to the Pine Street and Flynn Avenue intersection. Existing conditions in the study area are described below.

### Site and Roadways

The project site is located adjacent to the signalized Pine Street and Flynn Avenue intersection. Two-way, two-lane site driveways are provided on both streets. The Pine Street driveway is located approximately 200 feet north of the centerline of Flynn Avenue and the Flynn Avenue driveway is located approximately 80 feet east of the centerline of Pine Street. The site locus is shown in Figure 2.

The Pine Street and Flynn Avenue intersection operates with single lane approaches northbound and eastbound. The southbound approach provides a shared through/right-turn lane and a dedicated left-turn lane. The southbound left-turn movement operates with an advance signal phase. Green and yellow left-turn arrows are provided on this approach. The westbound approach is striped as a single lane; however, traffic informally stacks in two-lanes on occasion with the right lane dedicated to right-turn movements. No "right-turn-on-red" is allowed from Flynn Avenue westbound when pedestrians are crossing Pine Street. Special signage is provided to control this movement. Sidewalks are provided on both sides of both streets. Pedestrian signals with "push button" actuation are also provided crossing each leg of the intersection.

Pine Street and Flynn Avenue serve commuter traffic headed into and out of Burlington. Inbound traffic will turn left from Shelburne Street (US Route 7) northbound at a signalized intersection located approximately one-quarter mile east of Pine Street and then turn right on Pine Street to continue northbound. Flynn Avenue is wide enough to provide one travel lane in each direction and on-street parking on this segment. West of Pine Street Flynn Avenue terminates at Oakledge Park and Lake Champlain. This section also includes on-street parking however the roadway is not as wide here. Pine Street at the intersection draws northbound commuter traffic from both Flynn Avenue and Pine Street south of the intersection. In the site vicinity no parking is allowed on Pine Street. North of the site and south of the intersection a single lane is provided in each direction. There is a bus stop and shelter located on the east side of Pine Street just north of the Pine Street site driveway. North of the bus stop is the Champlain Elementary School.

### Public Transportation

The Chittenden County Transit Authority (CCTA) operates several bus routes along Pine Street adjacent to the project site. Route 3, Pine Street, provides frequent local service. Three commuter routes originating outside the City, including the LINK Express service between Burlington and Montpelier, also operate along Pine Street however, with many fewer trips. Commuter route operations are generally limited to commuter hours. As noted there is a sheltered bus stop at the north end of the project site on the east side of Pine Street. Other stops are located along Pine Street and Flynn Avenue.

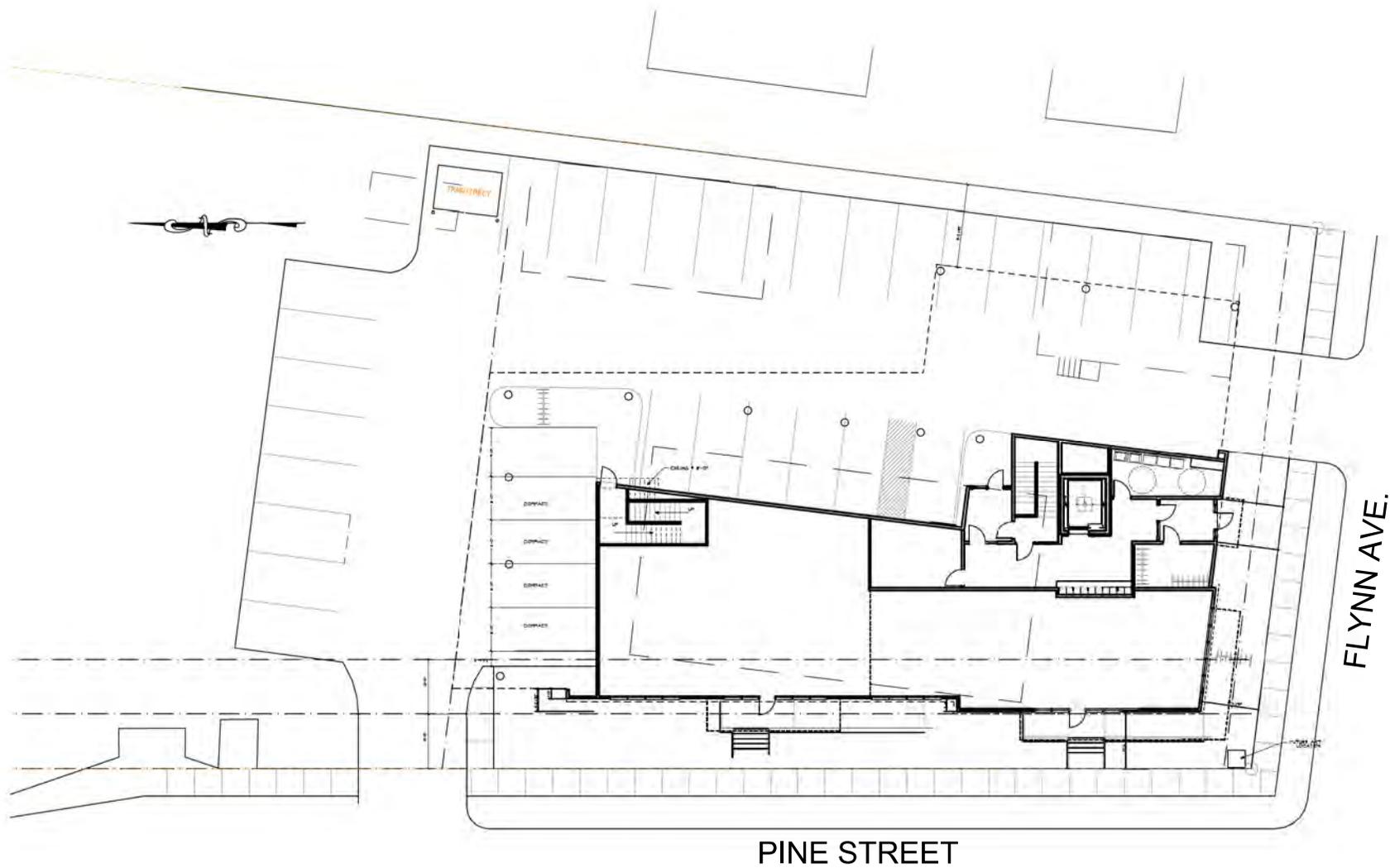


FIGURE 1  
CONCEPTUAL SITE PLAN



June 28, 2016  
Mr. Dan Goltzman  
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Reference: Pine Street Deli Site, Burlington, VT

### Traffic Volumes

Traffic volume data are collected periodically by the Vermont Agency of Transportation (VTTrans) and by the Chittenden County Regional Planning Commission (CCRPC) at major intersections in the region. Vehicle classification counts taken before 2014 were compiled and reviewed most recently for *Plan BTV-South End*. The Transportation section of the *Plan BTV-South End* February 9, 2015 report was used to identify 2014 Design Hour Volumes for the Pine Street and Flynn Avenue intersection. Design Hour Volumes are calculated to represent the 30<sup>th</sup> highest volume hour of the year and therefore represent a conservative design condition. The Plan BTV volumes are attached to this report. The volumes define existing commuter patterns with the heaviest flows during the morning peak hour headed northbound on Pine Street and during the evening peak hour headed southbound on Pine Street.

Stantec conducted peak period traffic counts at or adjacent to the project site in early June 2016 prior to the end of the school year at the Champlain School. Volumes were collected for a variety of purposes. Weekday counts were done from 7 to 9 AM and from 4 to 6 PM to determine: existing traffic generation at the project site; existing through traffic volumes on three legs of the Pine Street and Flynn Avenue intersection; and existing trip generation and trip distribution for two existing residential projects in the site vicinity. The collected data are attached. The collected data are described below.

Vehicle turning movement counts were taken at both of the site driveways and at the driveways to the Flynn Housing Co-op located on Flynn Avenue a few hundred feet west of Pine Street and at the Champlain School Apartments located just north and west of the deli site. In addition to counting vehicles turning at each driveway, traffic volumes were also counted on the adjacent streets. A comparison of peak hour volumes on three legs of the intersection measured in June 2016 to the reported 2014 Design Hour Volumes in *Plan BTV, South End* showed that the 2016 volumes were six percent higher during the AM peak hour and 15 percent higher during the PM peak hour or ten percent higher on average. As such, the Pine Street and Flynn Avenue intersection volumes reported in *Plan BTV, South End* were increased by ten percent and then combined with the volumes measured at the site driveways in 2016 to develop the Existing 2016 traffic networks. These networks are shown in Figures 3 and 4. As shown, the site generates 77 vehicle trips during the AM peak traffic hour and 61 vehicle trips during the PM peak traffic hour. Traffic is fairly evenly split between the two driveways. The balance of incoming and outgoing trips also is consistent with the short-duration visits associated with the existing deli.

### Parking

Parking demands at the subject site are assumed to peak at midday when the deli workers are busy serving lunchtime customers. Measurements were made of the on-site parking demands in early June 2016 from 11:30 AM to 12:30 PM on a typical weekday. Similar observations were made at the above referenced residential developments. The collected data are attached. The observations indicate a peak parking demand at the deli of 15 vehicles occurring at 12:30 PM. This demand includes three vehicles associated with the non-deli uses on the site. As such, the existing peak parking demand for the deli is estimated at 12 vehicles or approximately 4.3 spaces per 1000

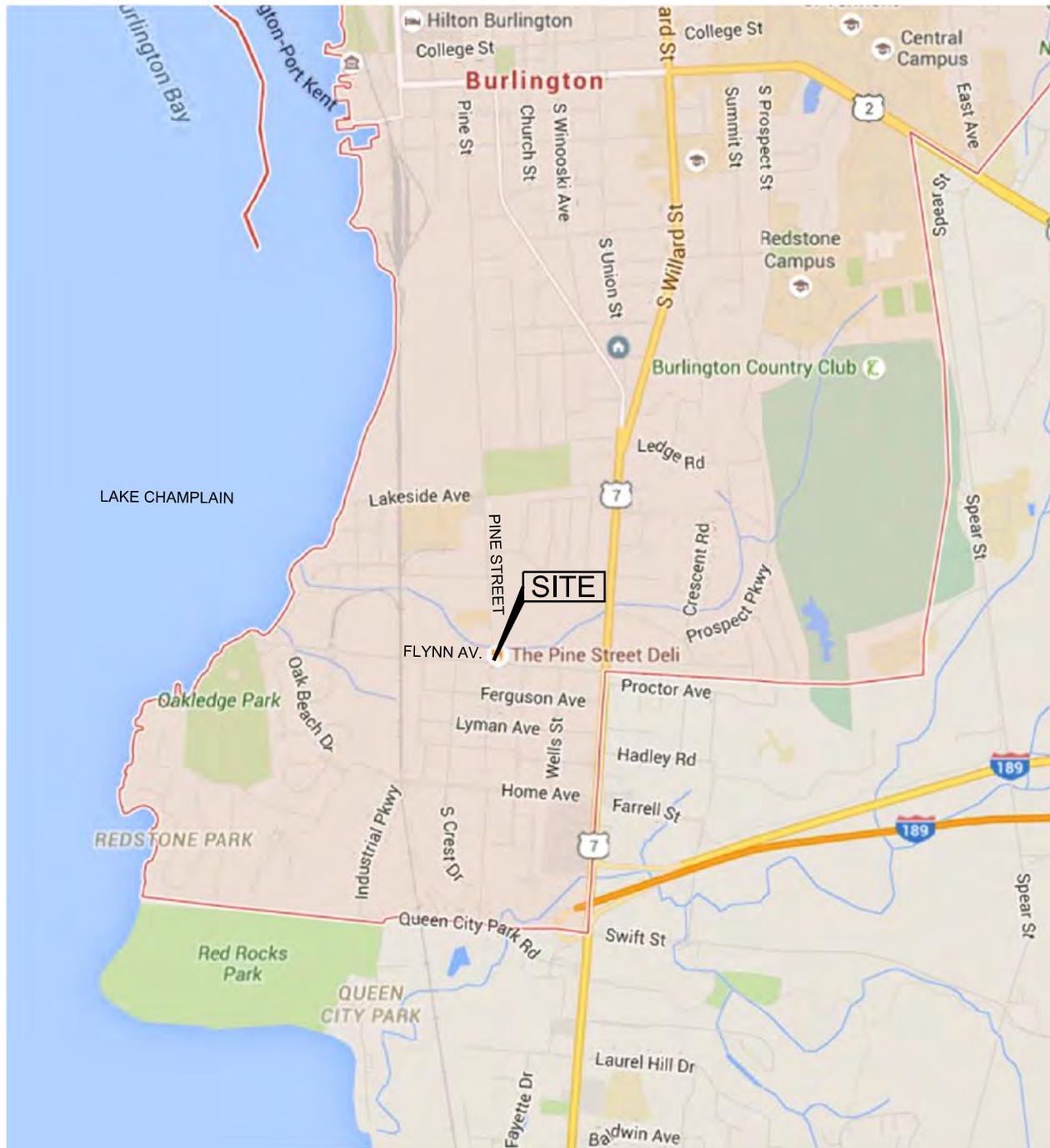


FIGURE 2  
SITE LOCATION MAP

N

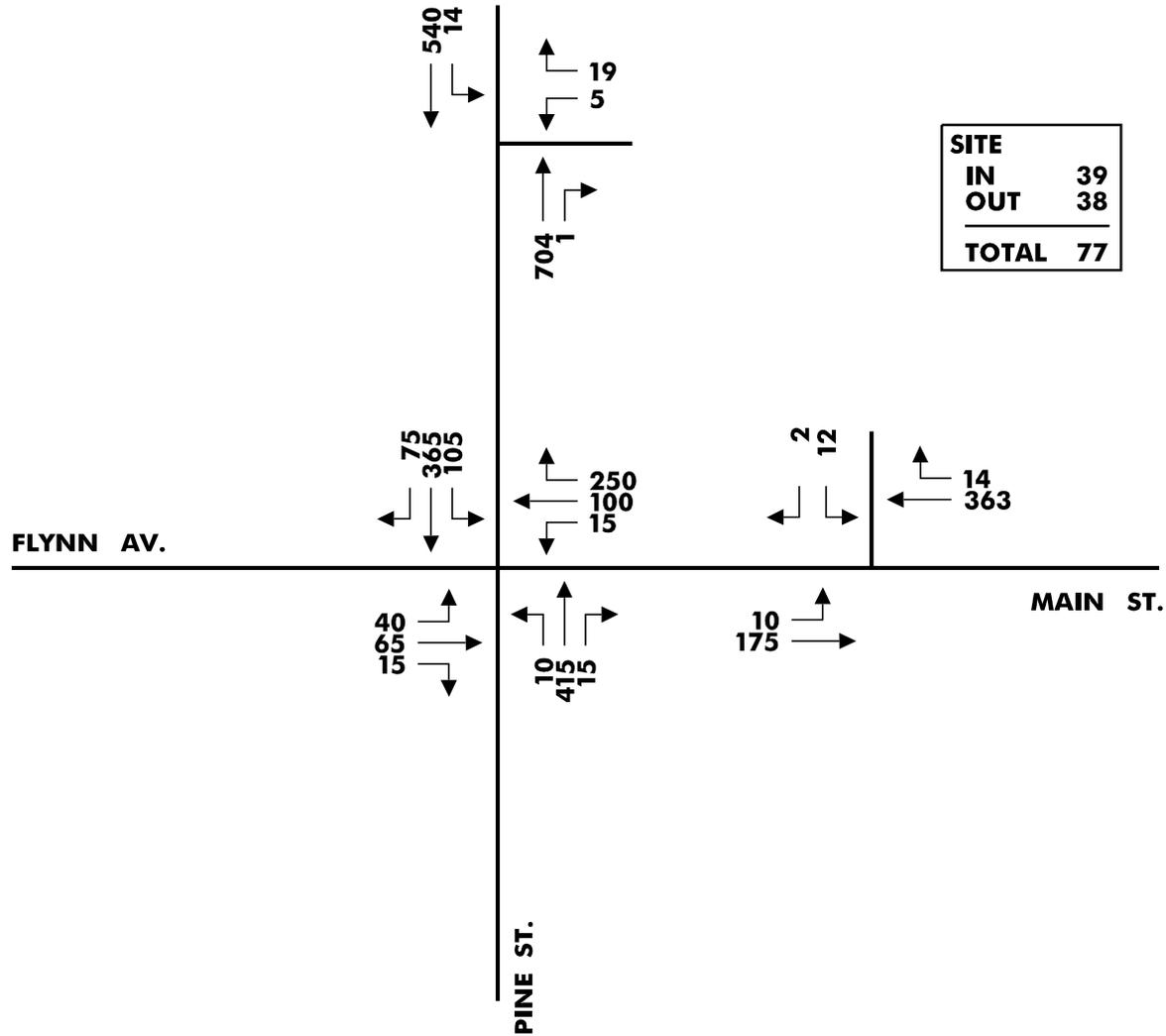


FIGURE 3  
2016 EXISTING AM PEAK HOUR TRAFFIC VOLUMES

N

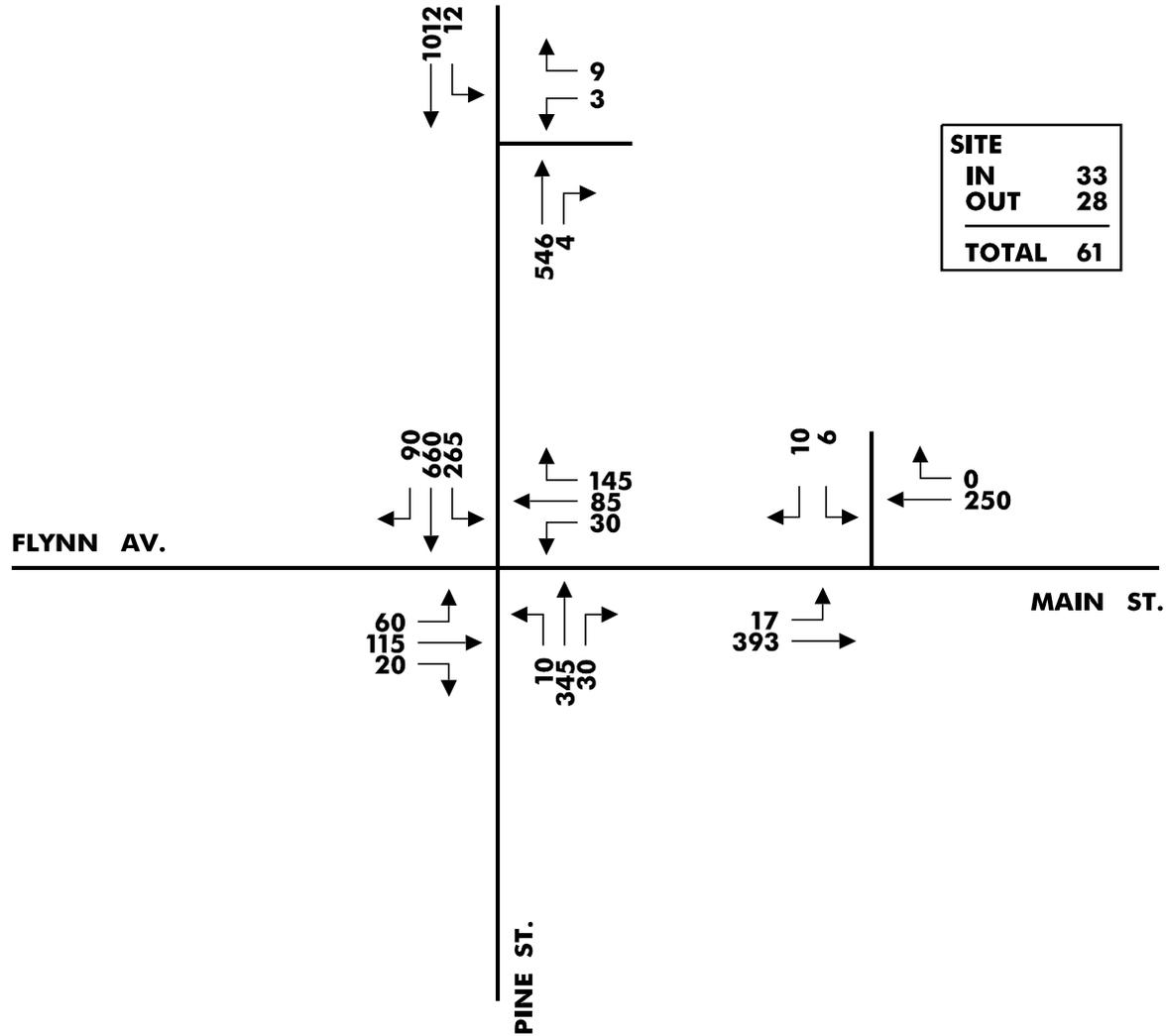


FIGURE 4  
2016 EXISTING PM PEAK HOUR TRAFFIC VOLUMES



June 28, 2016  
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Reference: Pine Street Deli Site, Burlington, VT

square feet of floor area for the 2800 square-foot deli. Parking demand for the two residential apartment buildings is discussed in a later section of this report.

### Operations

Existing intersection peak hour operating levels of service were calculated for the Pine Street and Flynn Avenue Street intersection following procedures described in the latest edition of the *Highway Capacity Manual*. Operating level of service (LOS) is a term used to describe the quality of traffic flow on a roadway. It is an aggregate measure of travel delay, travel speed, congestion, driver discomfort, convenience, and safety based on a comparison of roadway capacity to travel demand. Operating levels of service are reported on a scale of A to F with LOS A representing the best operating conditions (little or no delay to motorists) and LOS F representing the worst operating conditions (long delays and with traffic demands sometimes exceeding roadway capacity.) As noted in Table 1, the study intersection presently operates at LOS B during the AM and PM peak hours. Operating conditions reported in *Plan BTV, South End* are also shown in Table 1. As expected, the higher traffic volumes used in the 2016 analysis indicate slightly longer vehicle delays than reported for 2014 conditions.

Peak Hour	Existing 2016			2014 Design Hour		
	Stantec			Plan BTV, South End		
	LOS <sup>1</sup>	Delay <sup>2</sup>	V/C <sup>3</sup>	LOS	Delay	V/C
AM	B	18	0.76	B	12	0.60
PM	B	20	0.89	B	12	0.70

<sup>1</sup> LOS= Level of Service

<sup>2</sup> Delay = Average delay expressed in seconds per vehicle

<sup>3</sup> V/C = Volume-to-capacity ratio for critical movements

Table 1 Existing Pine Street/Flynn Avenue Intersection Operations

### **FUTURE CONDITIONS**

Traffic volume conditions on the area roadway system were developed for a future Build scenario. The "Build" scenario assumes that traffic generated by the proposed development is combined with the Existing 2016 traffic volumes. Future traffic conditions at the Pine Street and Flynn Avenue intersection were analyzed and compared to 2016 Conditions to quantify the impact of project traffic on operations.

### Site Traffic

Traffic forecasts for the proposed development project were developed considering the proposed change in land use conditions at the site. As noted above, the project will include 30 residential apartment units and 3000 square feet of commercial space. All existing uses on the site will be removed.



Reference: Pine Street Deli Site, Burlington, VT

In order to estimate project related traffic increases on the roadway system it was assumed that all existing site traffic will remain and only traffic associated with the proposed residential use would be treated as new traffic. This is considered a conservative analysis given the uncertainty regarding the future use of the commercial space. The commercial space could be used as office and/or retail, uses that generate substantially less traffic per square foot floor space than the existing deli. A "worst case" scenario would assume that another food service business replaces the existing deli and generates the same vehicular traffic that is now generated by the deli, bottle redemption service and three apartments located on the site.

The second part of the traffic forecasting requires estimating the number of vehicle trips associated with the proposed 30 apartment units. Typically, trip generation rates published by the Institute of Transportation Engineers (ITE) in *Trip Generation* could be applied. ITE trip rates for Land Use Code 220-Apartment indicate that apartments generate 0.51 AM peak hour vehicle trips per dwelling unit and 0.62 PM peak hour vehicle trips per dwelling unit. These trip rates however, are based on data generally collected at suburban sites where pedestrian, bike and transit trips are nominal. Downward adjustments to the ITE rates are appropriate where alternative travel modes may represent a significant portion of all site trips. Given the proximity of the project site to downtown Burlington and its convenient access to transit, local data were collected to determine an appropriate trip generation rate for this site.

As noted above, peak period traffic counts were conducted at the 28-unit Flynn Housing Co-op on Flynn Avenue and at the 76-unit Champlain School Apartments. The proposed residential use would be expected to exhibit vehicle trip generation characteristics similar to these residential properties given their proximity to the project site. Counts done at these two sites indicate that they generate vehicle trips at rates that amount to only 62 to 75 percent of the applicable ITE rates as shown in Table 2.

Site	Dwelling Units	Peak Hour	Vehicle Trips	Trip Rate <sup>1</sup>	ITE Rate <sup>2</sup>	Local Rate as % of ITE Rate
Champlain School	76	AM	24	0.32	0.51	62%
		PM	29	0.38	0.62	62%
Flynn Ave. Co-op	28	AM	9	0.32	0.51	63%
		PM	13	0.46	0.62	75%

<sup>1</sup>Vehicle trips per dwelling unit.

<sup>2</sup>Source: ITE, *Trip Generation*, 9<sup>th</sup> Edition, Land Use Code 220 – Apartment.

Local trip rates based on driveway counts conducted by Stantec June 2016.

Table 2 Locally Observed Trip Generation Rates

In consideration of the locally observed data, trip estimates developed for the proposed residential use using ITE trip rates were reduced to 65 percent of their calculated value for this study. The estimated vehicle trip generation is shown in Table 3. The proposed new residential use at the site is only expected to generate ten new AM peak hour vehicle trips and 12 new PM peak hour vehicle trips.



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Reference: Pine Street Deli Site, Burlington, VT

Peak	Direction	Trip Rate <sup>1</sup>	Unadjusted Trips	Adjusted Trips
AM	IN	0.10	3	2
	OUT	0.41	12	8
	<b>TOTAL</b>	<b>0.51</b>	<b>15</b>	<b>10</b>
PM	IN	0.40	12	8
	OUT	0.22	7	4
	<b>TOTAL</b>	<b>0.62</b>	<b>19</b>	<b>12</b>
Daily	IN	3.33	100	65
	OUT	3.33	100	65
	<b>TOTAL</b>	<b>6.65</b>	<b>200</b>	<b>130</b>

<sup>1</sup>Source: ITE, *Trip Generation, 9<sup>th</sup> Edition*, Land Use Code 220 – Apartment. Vehicle trips per dwelling unit. Adjusted Trips reflect 65 percent of the unadjusted trips.

Table 3 Estimated New Site Traffic (Residential Trips)

### Trip Assignments

Anticipated new site generated vehicle trips were assigned to the site driveways and area roadway network. It was assumed that approximately half of the trips would be oriented to north of the site and approximately half of the trips would be oriented to the south and Flynn Avenue. This distribution is based on the observed traffic patterns at the Champlain School Apartments driveway. The resulting traffic assignments for the AM and PM peak hours are shown in Figure 5. As shown, the two site driveways provided allow traffic to disperse with nominal impacts on the Pine Street and Flynn Avenue intersection. Only one or two peak hour vehicles are added to the intersection resulting in traffic increases that are well below one percent of the existing volume through the intersection. Traffic increases of only 0.2 percent during the AM peak hour and 0.1 percent during the PM peak hour are expected.

### Future Traffic Networks

The combined project traffic and existing traffic volumes represent the Build condition traffic volumes. The Build volumes are shown in Figures 6 and 7, respectively.

### Future Traffic Operations

The traffic operations analyses completed above for existing traffic conditions were repeated for Build conditions for the Pine Street and Flynn Avenue intersection. The results are presented in Table 4. As shown, the subject intersection will experience no measurable decline in operations due to the proposed development. The calculated level of services under Build conditions remain the same as reported for Existing conditions. Capacity analysis worksheets for all analysis conditions are attached.

N

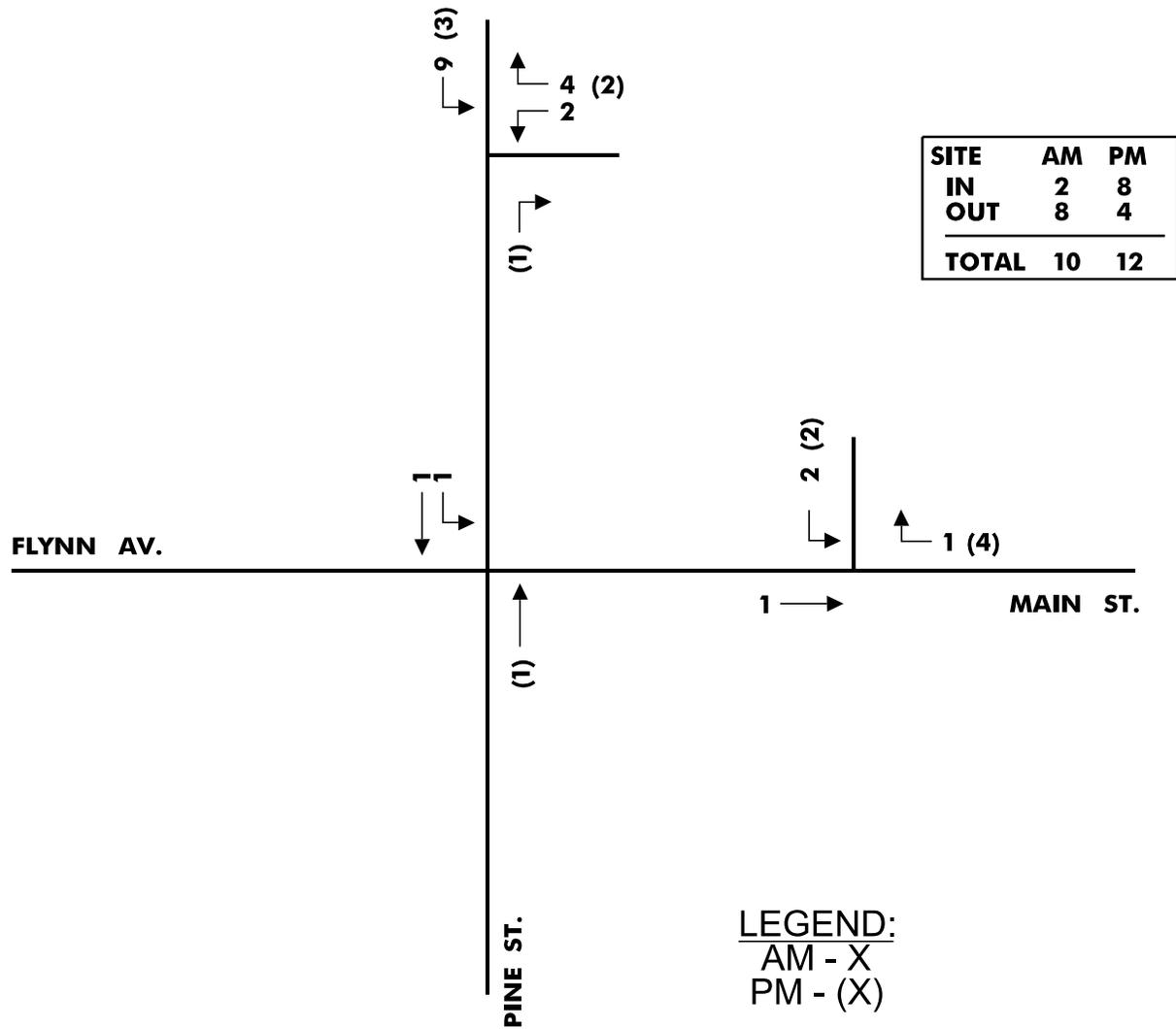


FIGURE 5  
NEW SITE GENERATED TRAFFIC VOLUMES

N

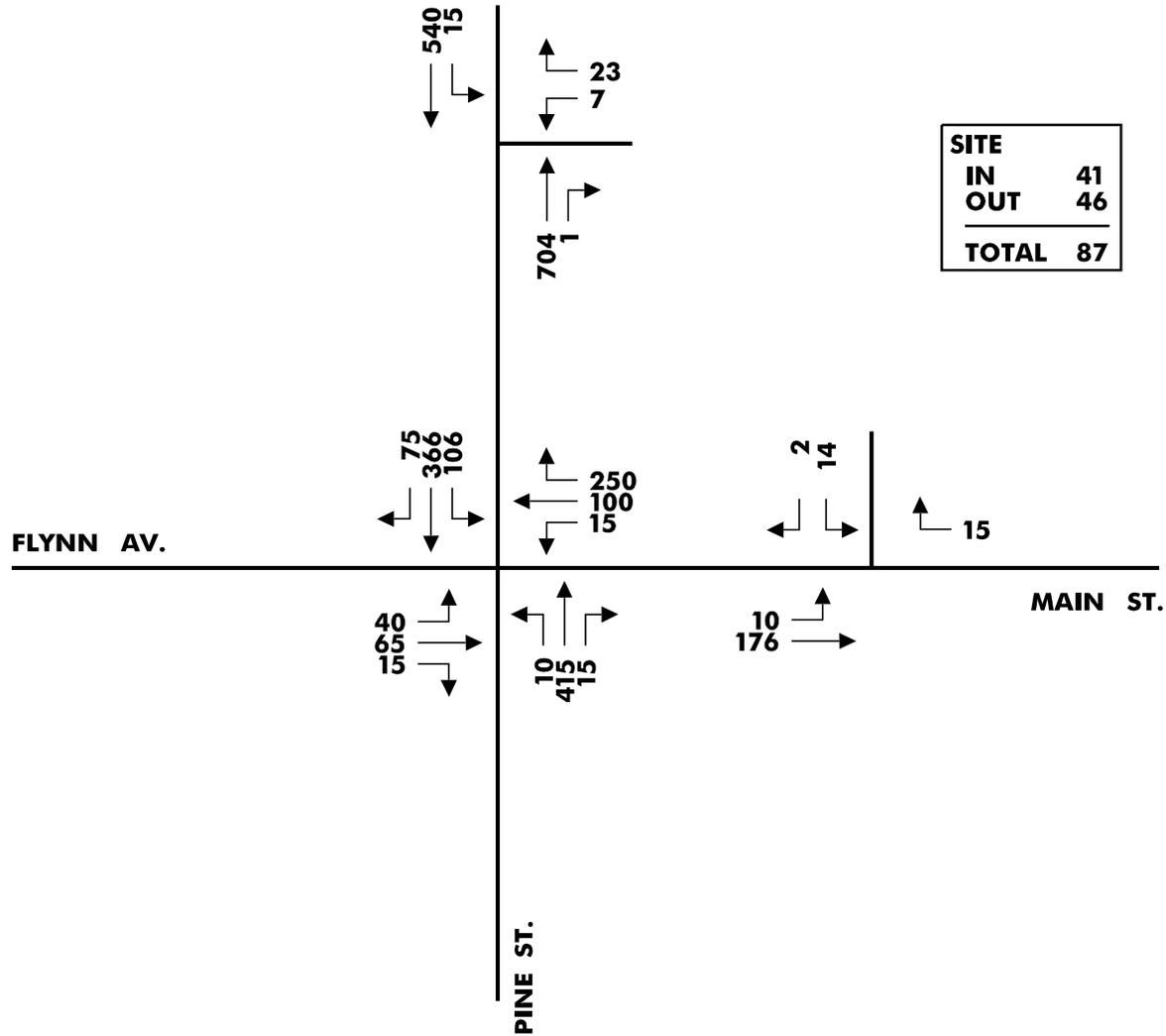


FIGURE 6  
2016 AM PEAK HOUR BUILD TRAFFIC VOLUMES

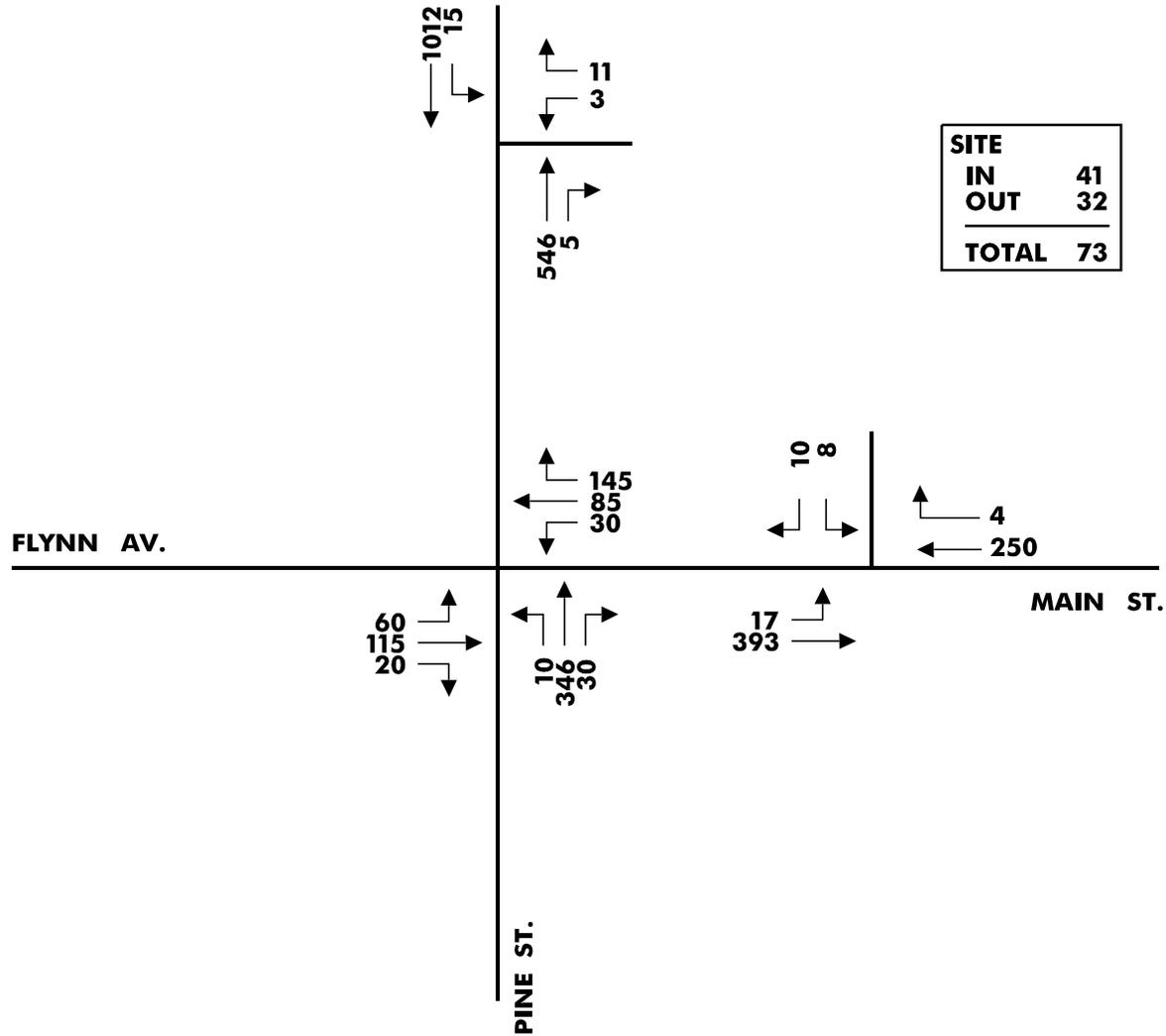


FIGURE 7  
2016 PM PEAK HOUR BUILD TRAFFIC VOLUMES



Reference: Pine Street Deli Site, Burlington, VT

Peak Hour	Existing 2016			2016 Build		
	LOS <sup>1</sup>	Delay <sup>2</sup>	V/C <sup>3</sup>	LOS	Delay	V/C
AM	B	18	0.76	B	18	0.76
PM	B	20	0.89	B	20	0.89

<sup>1</sup> LOS= Level of Service

<sup>2</sup> Delay = Average delay expressed in seconds per vehicle

<sup>3</sup> V/C = Volume-to-capacity ratio for critical movements

Table 4 Future Pine Street/Flynn Avenue Intersection Operations

#### Future Parking Conditions

The parking analysis for this project was conducted consistent with the traffic analysis. It was generally assumed that the future commercial use would generate parking demands similar to those of the existing deli use at the site. As such, the future parking demand represents the combined parking demand of the deli and the proposed residential use.

The parking analysis considered midday peak parking demands as food service demands will peak at lunch time. Residential parking demands typically peak at midnight or later. The critical analysis period is therefore midday when the proposed 34 on-site parking spaces must serve the midday food service demand while simultaneously accommodating residents' vehicles which may be left at the site during the day.

As noted above, the midday parking demand for the existing deli is approximately 12 vehicles. Parking demand for the proposed residential use was again determined by examining conditions at nearby, comparable residential developments. Measurements taken in June 2016 indicate that the 28-unit Flynn Housing Coop development uses a peak of 14 spaces at midday or 0.50 spaces per dwelling unit. The 76-unit Champlain School Apartments uses 41 spaces at midday or 0.54 spaces per dwelling unit. Applying the higher ratio (0.54) to the proposed project indicates that the residential component of the project will require 16 parking spaces at midday. The expected combined midday parking demand at the project site is there 30 vehicles. The proposed on-site parking supply will include 34 spaces.

#### **RECOMMENDATIONS**

As noted above, the proposed development will not have a significant impact on traffic operations at the Pine Street and Flynn Avenue intersection. Proposed construction at the site will alter the existing site driveways and move the Flynn Avenue driveway slightly closer to the existing CCTA bus stop. Future parking demands at the site should be met with a reserve capacity of four spaces at midday based on the assumption that future commercial tenants at the project generate no more midday parking demand than the existing deli. In light of the above findings it is recommended that:



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Reference: Pine Street Deli Site, Burlington, VT

- The applicant work closely with the CCTA in the development of final design plans to ensure that adequate and appropriate access is provided for the existing bus stop;
- The applicant reassess expected site parking demands when tenants for the proposed commercial space are identified; and,
- The applicant will monitor and manage future on-site parking to ensure that all users' needs are being adequately met.

## CONCLUSION

The proposed development will not have a significant impact on area traffic operations. It will add negligible volume to Pine Street and Flynn Avenue intersection. The intersection presently operates well below its capacity during commuter peak hours and will continue to do so after the project is built.

Thank you for the opportunity in assisting you with this project. Please do not hesitate to call if you have questions regarding the above.

Regards,

**Stantec Consulting Services Inc.**

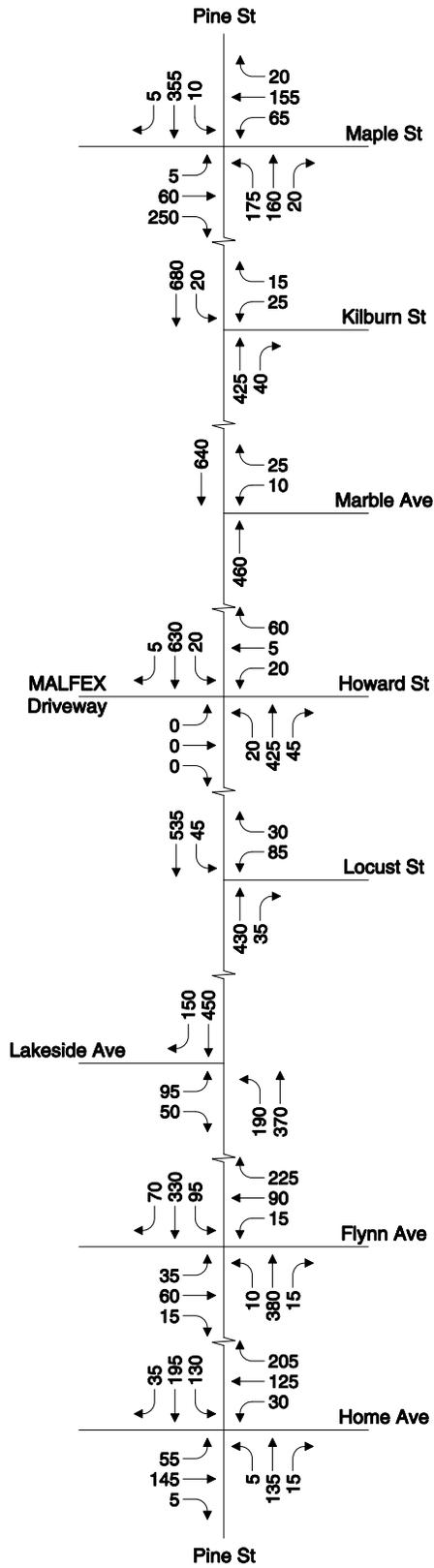
A handwritten signature in blue ink that reads "Richard S. Bryant".

Richard S. Bryant  
Associate  
Phone:802 864 0223  
Fax:802 864 0165  
Richard.Bryant@stantec.com

Attachments: Plan BTV, South End Traffic Volumes, Stantec June 2016 Traffic and Parking Counts, Capacity Analysis Worksheets

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**Plan BTV, South End**  
**Traffic Volumes**

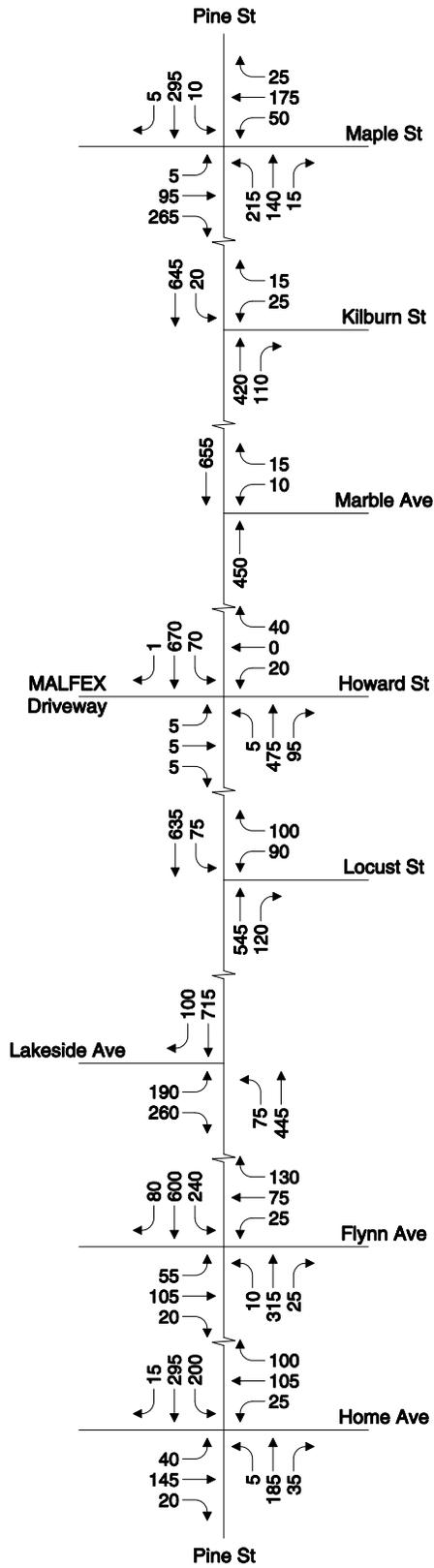


Not to Scale

Vanasse Hangen Brustlin, Inc.

2014 Weekday Morning  
Peak Hour Traffic Volumes

Figure 1



Not to Scale

Vanasse Hangen Brustlin, Inc.

2014 Weekday Evening  
Peak Hour (DHV) Traffic Volumes

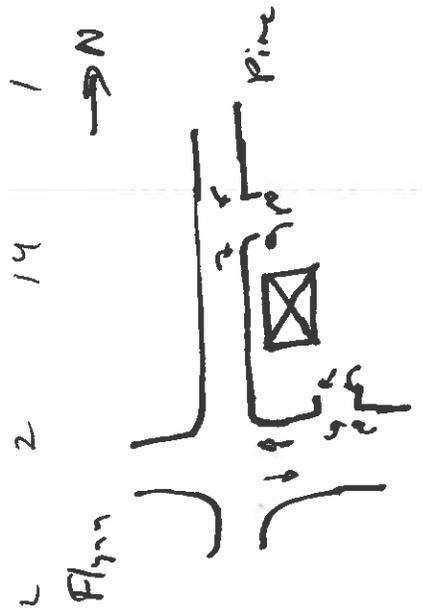
Figure 2

**Stantec, June 2016**  
**Traffic and Parking Counts**

Pine Street Dell - Traffic Counts AM

Date: 6/7/2016 Done By: G. B. [Signature]

Time Slot	Flynn Ave.				Pine Street				Flynn Ave. @ Stop Bar		
	In		Out		In		Out		Westbound	Eastbound	
	Left	Right	Left	Right	Left	Right	Left	Right			
7:00 - 7:15 AM	3	1	1	1	1	2	1	1	44	30	74
7:15 - 7:30 AM	6/3	1/φ	5/4	1/φ	2/1	5/3	3/2	4/3	80/44	56/26	70
7:30 - 7:45 AM	6/φ	3/2	7/2	3/2	7/5	5/φ	3/φ	9/5	140/60	70/20	90
7:45 - 8:00 AM	8/2	3/φ	10/3	4/1	10/3	7/2	4/1	12/3	205/77	106/30	107
8:00 - 8:15 AM	12/4	13/10	14/4	5/1	14/4	7/φ	6/2	18/6	331/106	146/40	146
8:15 - 8:30 AM	13/1	14/1	19/5	5/φ	15/1	8/1	7/1	23/5	394/63	194/48	111
8:30 - 8:45 AM	16/3	14/φ	20/1	6/1	19/4	8/φ	8/1	26/3	446/52	225/31	83
8:45 - 9:00 AM	18/2	17/3	22/2	6/φ	24/5	8/φ	9/1	31/5	553/107	267/42	151
	10	14	12	2	14	1	5	19	328	161	



8-9 Peak

Pine Street Dell - Traffic Counts PM

Date: 6/5/2016 Done By: C. B. [Signature]

Time Slot	Flynn Ave.				Pine Street				Flynn Ave. @ Stop Bar		
	In		Out		In		Out		Westbound	Eastbound	
									OK/Gap	Part 27	
4:00 - 4:15 PM	0	1	4	0	1	3	1	3	44	83	127
4:15 - 4:30 PM	7/7	1/0	5/1	2/2	2/1	4/1	2/1	5/2	94/50	167/84	134
4:30 - 4:45 PM	8/1	1/0	7/2	3/1	5/3	5/1	2/0	7/2	133/39	262/95	134
4:45 - 5:00 PM	12/4	1/0	7/0	3/0	6/1	5/0	3/1	12/5	185/52	340/78	130
5:00 - 5:15 PM	10/6	1/0	10/3	4/1	9/3	5/0	5/2	15/3	233/48	445/105	153
5:15 - 5:30 PM	22/4	1/0	12/2	6/2	14/5	6/1	6/1	19/4	292/59	531/86	145
5:30 - 5:45 PM	24/2	1/0	13/1	10/4	16/2	7/1	6/0	20/1	350/58	627/96	154
5:45 - 6:00 PM	29/5	1/0	13/0	13/3	18/2	9/2	6/0	21/1	461/51	694/67	138

17      0      6      10      17      4      3      9      216      354

Flynn Ave. Development - Traffic Counts AM (7AM - 9AM)

Date: 6/1/2016

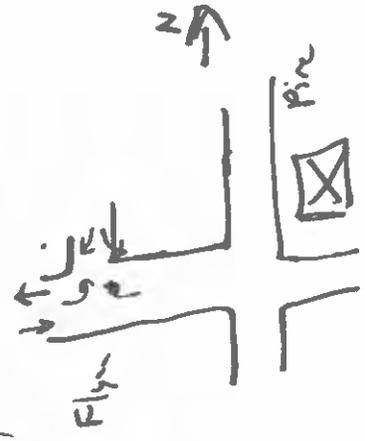
Done By: G. BURGMEIER

Time Slot	Flynn Ave. Development Drive		Flynn Ave Through traffic	
	In	Out	West Bound To Foster	East Bound To West
7:00 - 7:15 AM			19	24
7:15 - 7:30 AM	1/1	2/2	60/41	36/12
7:30 - 7:45 AM	0/0	3/1	100/40	51/15
7:45 - 8:00 AM	2/1	4/1	167/67	85/34
8:00 - 8:15 AM	3/1	5/1	228/61	121/36
8:15 - 8:30 AM	3/0	6/1	208/60	141/20
8:30 - 8:45 AM	4/1	8/2	349/61	159/18
8:45 - 9:00 AM	4/0	9/1	409/60	180/29

#/# TOTAL COUNT  
DEDUCTED INTERVAL COUNT

43 53 55 111 97 80 79 49

7:45 - 8:45



\* NOTE: 30-40% OF WESTBOUND TRAFFIC W/TS FROM LT TURNS OFF OF FOSTER STREET

Flynn Ave. Development - Traffic Counts PM (4 PM - 6 PM)

Date: 6/1/2016 Done By: G. BURGMEIER

Time Slot	Flynn Ave. Development Drive		Flynn Ave Through traffic		TOTAL COUNT
	In	Out	West Bound	East Bound	
4:00 - 4:15 PM	4	1	36	32	88
4:15 - 4:30 PM	6/2	5/4	70/34	86/54	117
4:30 - 4:45 PM	8/2	6/1	113/43	160/74	102
4:45 - 5:00 PM	11/3	7/1	159/46	216/56	118
5:00 - 5:15 PM	11/φ	10/3	210/51	283/67	126
5:15 - 5:30 PM	12/1	11/1	272/62	347/64	102
5:30 - 5:45 PM	13/1	12/1	317/45	404/57	88
5:45 - 6:00 PM	14/1	13/1	375/58	434/30	

# / #  
DEDUCTED  
INTERVAL  
COUNT

4:30 - 5:30

~~Notes: 30~~ 6 1 702 261

NOTE: TRAFFIC FLOW OFF FOSTAL ST. WAS EASTBOUND TOWARD RITE ST. (NO EFFECT ON COUNTS)

8:00-6 parked  
 8:03-6 parked  
 8:05-8 parked  
 8:06 9 parked  
 8:08 9 parked

busses: Champlain College  
 CCTA  
 MT Transit  
 7 30 CCTA School buses

Pine Street Development - Traffic Counts AM  
 Date: 10/11/19 Done By: Nora Varhue

Time Slot	Pine Street Development Drive				Pine Street Through traffic	
	In	Out	North	Bound	West	Bound
7:00 - 7:15 AM	1	1	69	106	99	106
7:15 - 7:30 AM	2	3	95	96	87	96
7:30 - 7:45 AM	3	7	112	141	139	141
7:45 - 8:00 AM	4	2	113	196	191	196
8:00 - 8:15 AM	1	0	98	213	207	213
8:15 - 8:30 AM	3	1	90	183	173	183
8:30 - 8:45 AM	0	5	111	162	159	162
8:45 - 9:00 AM	3	2	126	198	192	198

175

191

253

309

311

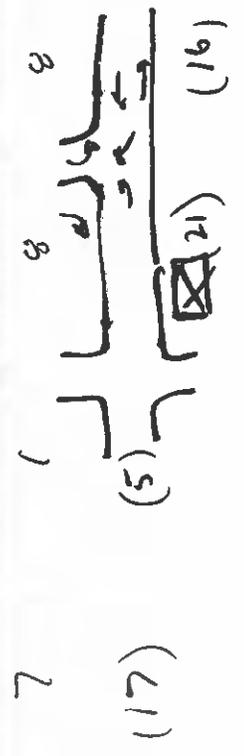
273

273

324

0-9

425 756



Pine Street Development - Traffic Counts PM

Date: 6/7/16 Done By: Norah Varvay

scattered Shoppers

Time Slot	Flynn Ave. Development Drive			Flynn Ave Through traffic				
	In	Out		North	Bound	South West	Bound	
	LT	RT	RT	↑	←	↓	↓	
4:00 - 4:15 PM	3	3	2	C 195 T 2 B 1	P 5 198 B 3	C 116 T 0 B 3	P 0 119 B 2	317
4:15 - 4:30 PM	3	1	0	C 208 T 3 B 1	P 4 212 B 0	C 113 T 0 B 3	P 2 116 B 0	328
4:30 - 4:45 PM	3	3	2	C 246 T 0 B 1	P 6 297 B 3	C 84 T 1 B 3	P 0 88 B 1	385
4:45 - 5:00 PM	0	2	0	C 227 T 0 B 2	P 5 231 B 3	C 117 T 0 B 1	P 2 118 B 3	349
5:00 - 5:15 PM	7	4	0	C 274 T 0 B 1	P 3 275 B 3	C 132 T 2 B 5	P 3 159 B 1	414
5:15 - 5:30 PM	1	0	4	C 292 T 1 B 1	P 11 65 B 2	C 112 T 0 B 1	P 6 113 B 2	467
5:30 - 5:45 PM	7	1	1	C 241 T 1 B 2	P 3 294 B 2	C 112 T 1 B 2	P 8 115 B 1	409
5:45 - 6:00 PM	4	2	2	C 200 T 1 B 2	P 5 208 B 2	C 104 T 0 B 0	P 6 109 B 3	307

15 7 2 5 1099 485  
 (28) (16) (8) (11)

Pine Street Deli - Parking Count

Date: 6/7 Done By: Glen

Peak

	Time Slot	Number of spaces	Number of Parked Cars
Pine Street Deli	11:30 AM	22 (6) DIRT	41
	12:00 PM		8
	12:30 PM		15
	1:00 PM		12
	1:30 PM		13

15

Date: 6/7 Done By: Glen

Flynn Ave. Development Lot	11:30 AM	42	14
	12:00 PM		10
	12:30 PM		10
	1:00 PM		11
	1:30 PM		13

14

Date: 6/7 Done By: Glen

Pine Street Development Lot	11:30 AM	84	<del>33</del> 33
	12:00 PM		38
	12:30 PM		39
	1:00 PM		40
	1:30 PM		41

41

**Intersection Capacity  
Analysis Worksheets**

Queues  
3: Pine Street & Flynn Avenue

Existing Conditions  
AM Peak Hour



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	ø3	ø7
Lane Configurations		↕		↕		↕	↗	↘		
Traffic Volume (vph)	40	65	15	100	10	415	105	365		
Future Volume (vph)	40	65	15	100	10	415	105	365		
Lane Group Flow (vph)	0	120	0	365	0	440	105	440		
Turn Type	Perm	NA	Perm	NA	Perm	NA	pm+pt	NA		
Protected Phases		4		8		2	1	6	3	7
Permitted Phases	4		8		2		6			
Detector Phase	4	4	8	8	2	2	1	6		
Switch Phase										
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	18.0	18.0	18.0	18.0	23.0	23.0	10.0	18.0	6.0	6.0
Total Split (s)	23.0	23.0	23.0	23.0	27.0	27.0	10.0	37.0	6.0	6.0
Total Split (%)	34.8%	34.8%	34.8%	34.8%	40.9%	40.9%	15.2%	56.1%	9%	9%
Maximum Green (s)	17.0	17.0	17.0	17.0	21.0	21.0	4.0	31.0	4.0	4.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	2.0	2.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	0.0
Lost Time Adjust (s)		0.0		0.0		0.0	0.0	0.0		
Total Lost Time (s)		6.0		6.0		6.0	6.0	6.0		
Lead/Lag	Lag	Lag	Lag	Lag	Lag	Lag	Lead		Lead	Lead
Lead-Lag Optimize?	Yes		Yes	Yes						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	Min	Min	None	Min	None	None
Walk Time (s)									2.0	2.0
Flash Dont Walk (s)									2.0	2.0
Pedestrian Calls (#/hr)									5	5
Act Effct Green (s)		13.4		13.4		17.1	24.4	24.4		
Actuated g/C Ratio		0.26		0.26		0.33	0.47	0.47		
v/c Ratio		0.45		0.76		0.73	0.31	0.54		
Control Delay		23.4		23.9		25.9	10.9	12.6		
Queue Delay		0.0		0.0		0.0	0.0	0.0		
Total Delay		23.4		23.9		25.9	10.9	12.6		
LOS		C		C		C	B	B		
Approach Delay		23.4		23.9		25.9		12.2		
Approach LOS		C		C		C		B		
Queue Length 50th (ft)		30		59		126	17	83		
Queue Length 95th (ft)		84		#204		#289	47	191		
Internal Link Dist (ft)		397		21		284		90		
Turn Bay Length (ft)										
Base Capacity (vph)		370		604		810	339	1087		
Starvation Cap Reductn		0		0		0	0	0		
Spillback Cap Reductn		0		0		0	0	0		
Storage Cap Reductn		0		0		0	0	0		
Reduced v/c Ratio		0.32		0.60		0.54	0.31	0.40		

Intersection Summary

Cycle Length: 66  
 Actuated Cycle Length: 51.9  
 Natural Cycle: 60  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.76

Queues

3: Pine Street & Flynn Avenue

Existing Conditions

AM Peak Hour

Intersection Signal Delay: 20.1 Intersection LOS: C

Intersection Capacity Utilization 85.4% ICU Level of Service E

Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 3: Pine Street & Flynn Avenue

 φ1	 φ2	 φ3	 φ4
10 s	27 s	6 s	23 s
 φ6		 φ7	 φ8
37 s		6 s	23 s

# HCM Signalized Intersection Capacity Analysis

## 3: Pine Street & Flynn Avenue

Existing Conditions  
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	65	15	15	100	250	10	415	15	105	365	75
Future Volume (vph)	40	65	15	15	100	250	10	415	15	105	365	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0			6.0		6.0	6.0	
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00	
Frb, ped/bikes		1.00			0.97			1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00			1.00		1.00	1.00	
Frt		0.98			0.91			1.00		1.00	0.97	
Flt Protected		0.98			1.00			1.00		0.95	1.00	
Satd. Flow (prot)		1413			1417			1850		1667	1703	
Flt Permitted		0.71			0.98			0.99		0.29	1.00	
Satd. Flow (perm)		1013			1397			1824		517	1703	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	40	65	15	15	100	250	10	415	15	105	365	75
RTOR Reduction (vph)	0	8	0	0	120	0	0	2	0	0	11	0
Lane Group Flow (vph)	0	112	0	0	245	0	0	438	0	105	429	0
Confl. Peds. (#/hr)	10		5	7		12	5		7	12		10
Heavy Vehicles (%)	13%	13%	13%	3%	3%	3%	2%	2%	2%	6%	6%	6%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	5	5	5
Parking (#/hr)	5	5	5	5	5	5						
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		13.4			13.4			17.1		26.0	26.0	
Effective Green, g (s)		13.4			13.4			17.1		26.0	26.0	
Actuated g/C Ratio		0.25			0.25			0.32		0.48	0.48	
Clearance Time (s)		6.0			6.0			6.0		6.0	6.0	
Vehicle Extension (s)		3.0			3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)		251			346			577		310	819	
v/s Ratio Prot										0.02	c0.25	
v/s Ratio Perm		0.11			c0.18			c0.24		0.14		
v/c Ratio		0.45			0.71			0.76		0.34	0.52	
Uniform Delay, d1		17.2			18.5			16.6		9.7	9.7	
Progression Factor		1.00			1.00			1.00		1.00	1.00	
Incremental Delay, d2		1.3			6.5			5.7		0.7	0.6	
Delay (s)		18.4			25.0			22.3		10.3	10.3	
Level of Service		B			C			C		B	B	
Approach Delay (s)		18.4			25.0			22.3			10.3	
Approach LOS		B			C			C			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			18.2									B
HCM 2000 Volume to Capacity ratio			0.76									
Actuated Cycle Length (s)			54.0							20.0		
Intersection Capacity Utilization			85.4%									E
Analysis Period (min)			15									

c Critical Lane Group

Queues  
3: Pine Street & Flynn Avenue

Build Conditions  
AM Peak Hour



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	ø3	ø7
Lane Configurations		↕		↕		↕	↗	↘		
Traffic Volume (vph)	40	65	15	100	10	415	106	366		
Future Volume (vph)	40	65	15	100	10	415	106	366		
Lane Group Flow (vph)	0	120	0	365	0	440	106	441		
Turn Type	Perm	NA	Perm	NA	Perm	NA	pm+pt	NA		
Protected Phases		4		8		2	1	6	3	7
Permitted Phases	4		8		2		6			
Detector Phase	4	4	8	8	2	2	1	6		
Switch Phase										
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	18.0	18.0	18.0	18.0	23.0	23.0	10.0	18.0	6.0	6.0
Total Split (s)	23.0	23.0	23.0	23.0	27.0	27.0	10.0	37.0	6.0	6.0
Total Split (%)	34.8%	34.8%	34.8%	34.8%	40.9%	40.9%	15.2%	56.1%	9%	9%
Maximum Green (s)	17.0	17.0	17.0	17.0	21.0	21.0	4.0	31.0	4.0	4.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	2.0	2.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	0.0
Lost Time Adjust (s)		0.0		0.0		0.0	0.0	0.0		
Total Lost Time (s)		6.0		6.0		6.0	6.0	6.0		
Lead/Lag	Lag	Lag	Lag	Lag	Lag	Lag	Lead		Lead	Lead
Lead-Lag Optimize?	Yes		Yes	Yes						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	Min	Min	None	Min	None	None
Walk Time (s)									2.0	2.0
Flash Dont Walk (s)									2.0	2.0
Pedestrian Calls (#/hr)									5	5
Act Effct Green (s)		13.4		13.4		17.1	24.4	24.4		
Actuated g/C Ratio		0.26		0.26		0.33	0.47	0.47		
v/c Ratio		0.45		0.76		0.73	0.31	0.54		
Control Delay		23.4		23.9		25.9	10.9	12.6		
Queue Delay		0.0		0.0		0.0	0.0	0.0		
Total Delay		23.4		23.9		25.9	10.9	12.6		
LOS		C		C		C	B	B		
Approach Delay		23.4		23.9		25.9		12.3		
Approach LOS		C		C		C		B		
Queue Length 50th (ft)		30		59		126	17	83		
Queue Length 95th (ft)		84		#204		#289	48	191		
Internal Link Dist (ft)		397		21		284		90		
Turn Bay Length (ft)										
Base Capacity (vph)		370		604		810	339	1087		
Starvation Cap Reductn		0		0		0	0	0		
Spillback Cap Reductn		0		0		0	0	0		
Storage Cap Reductn		0		0		0	0	0		
Reduced v/c Ratio		0.32		0.60		0.54	0.31	0.41		

Intersection Summary

Cycle Length: 66  
 Actuated Cycle Length: 51.9  
 Natural Cycle: 60  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.76

# Queues

## 3: Pine Street & Flynn Avenue

Build Conditions

AM Peak Hour

Intersection Signal Delay: 20.1 Intersection LOS: C

Intersection Capacity Utilization 85.5% ICU Level of Service E

Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 3: Pine Street & Flynn Avenue

 ϕ1	 ϕ2	 ϕ3	 ϕ4
10 s	27 s	6 s	23 s
 ϕ6		 ϕ7	 ϕ8
37 s		6 s	23 s

# HCM Signalized Intersection Capacity Analysis

## 3: Pine Street & Flynn Avenue

Build Conditions  
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	65	15	15	100	250	10	415	15	106	366	75
Future Volume (vph)	40	65	15	15	100	250	10	415	15	106	366	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0			6.0		6.0	6.0	
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00	
Frb, ped/bikes		1.00			0.97			1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00			1.00		1.00	1.00	
Frt		0.98			0.91			1.00		1.00	0.97	
Flt Protected		0.98			1.00			1.00		0.95	1.00	
Satd. Flow (prot)		1413			1417			1850		1667	1703	
Flt Permitted		0.71			0.98			0.98		0.29	1.00	
Satd. Flow (perm)		1013			1397			1824		517	1703	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	40	65	15	15	100	250	10	415	15	106	366	75
RTOR Reduction (vph)	0	8	0	0	120	0	0	2	0	0	11	0
Lane Group Flow (vph)	0	112	0	0	245	0	0	438	0	106	430	0
Confl. Peds. (#/hr)	10		5	7		12	5		7	12		10
Heavy Vehicles (%)	13%	13%	13%	3%	3%	3%	2%	2%	2%	6%	6%	6%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	5	5	5
Parking (#/hr)	5	5	5	5	5	5						
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		13.4			13.4			17.1		26.0	26.0	
Effective Green, g (s)		13.4			13.4			17.1		26.0	26.0	
Actuated g/C Ratio		0.25			0.25			0.32		0.48	0.48	
Clearance Time (s)		6.0			6.0			6.0		6.0	6.0	
Vehicle Extension (s)		3.0			3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)		251			346			577		310	819	
v/s Ratio Prot										0.02	c0.25	
v/s Ratio Perm		0.11			c0.18			c0.24		0.15		
v/c Ratio		0.45			0.71			0.76		0.34	0.53	
Uniform Delay, d1		17.2			18.5			16.6		9.7	9.7	
Progression Factor		1.00			1.00			1.00		1.00	1.00	
Incremental Delay, d2		1.3			6.5			5.7		0.7	0.6	
Delay (s)		18.4			25.0			22.3		10.4	10.3	
Level of Service		B			C			C		B	B	
Approach Delay (s)		18.4			25.0			22.3			10.3	
Approach LOS		B			C			C			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			18.2									B
HCM 2000 Volume to Capacity ratio			0.76									
Actuated Cycle Length (s)			54.0							20.0		
Intersection Capacity Utilization			85.5%									E
Analysis Period (min)			15									

c Critical Lane Group

**Queues**  
**3: Pine Street & Flynn Avenue**

**Existing Conditions**  
 PM Peak Hour



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	ø3	ø7
Lane Configurations		↕		↕		↕	↕	↕		
Traffic Volume (vph)	60	115	30	85	10	345	265	660		
Future Volume (vph)	60	115	30	85	10	345	265	660		
Lane Group Flow (vph)	0	195	0	260	0	385	265	750		
Turn Type	Perm	NA	Perm	NA	Perm	NA	pm+pt	NA		
Protected Phases		4		8		2	1	6	3	7
Permitted Phases	4		8		2		6			
Detector Phase	4	4	8	8	2	2	1	6		
Switch Phase										
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	18.0	18.0	18.0	18.0	23.0	23.0	10.0	18.0	6.0	6.0
Total Split (s)	20.0	20.0	20.0	20.0	28.0	28.0	12.0	40.0	6.0	6.0
Total Split (%)	30.3%	30.3%	30.3%	30.3%	42.4%	42.4%	18.2%	60.6%	9%	9%
Maximum Green (s)	14.0	14.0	14.0	14.0	22.0	22.0	6.0	34.0	4.0	4.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	2.0	2.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	0.0
Lost Time Adjust (s)		0.0		0.0		0.0	0.0	0.0		
Total Lost Time (s)		6.0		6.0		6.0	6.0	6.0		
Lead/Lag	Lag	Lag	Lag	Lag	Lag	Lag	Lead		Lead	Lead
Lead-Lag Optimize?	Yes		Yes	Yes						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	Min	Min	None	Min	None	None
Walk Time (s)									2.0	2.0
Flash Dont Walk (s)									2.0	2.0
Pedestrian Calls (#/hr)									5	5
Act Effct Green (s)		12.8		12.8		16.6	28.9	28.9		
Actuated g/C Ratio		0.23		0.23		0.30	0.53	0.53		
v/c Ratio		0.67		0.70		0.71	0.62	0.79		
Control Delay		34.9		27.2		25.2	15.9	19.1		
Queue Delay		0.0		0.0		0.0	0.0	0.0		
Total Delay		34.9		27.2		25.2	15.9	19.1		
LOS		C		C		C	B	B		
Approach Delay		34.9		27.2		25.2		18.2		
Approach LOS		C		C		C		B		
Queue Length 50th (ft)		54		49		107	44	175		
Queue Length 95th (ft)		#169		#175		214	#108	#439		
Internal Link Dist (ft)		397		21		284		90		
Turn Bay Length (ft)										
Base Capacity (vph)		323		403		728	429	1133		
Starvation Cap Reductn		0		0		0	0	0		
Spillback Cap Reductn		0		0		0	0	0		
Storage Cap Reductn		0		0		0	0	0		
Reduced v/c Ratio		0.60		0.65		0.53	0.62	0.66		

**Intersection Summary**

Cycle Length: 66  
 Actuated Cycle Length: 54.9  
 Natural Cycle: 60  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.79

Queues

3: Pine Street & Flynn Avenue

Existing Conditions

PM Peak Hour

Intersection Signal Delay: 22.7 Intersection LOS: C

Intersection Capacity Utilization 98.3% ICU Level of Service F

Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 3: Pine Street & Flynn Avenue

 <p>ø1</p>	 <p>ø2</p>	 <p>ø3</p>	 <p>ø4</p>
12 s	28 s	6 s	20 s
 <p>ø6</p>	 <p>ø7</p>	 <p>ø8</p>	
40 s	6 s	20 s	

# HCM Signalized Intersection Capacity Analysis

## 3: Pine Street & Flynn Avenue

Existing Conditions  
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	115	20	30	85	145	10	345	30	265	660	90
Future Volume (vph)	60	115	20	30	85	145	10	345	30	265	660	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0			6.0		6.0	6.0	
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00	
Frb, ped/bikes		0.99			0.96			1.00		1.00	0.99	
Flpb, ped/bikes		0.99			1.00			1.00		1.00	1.00	
Frt		0.99			0.92			0.99		1.00	0.98	
Flt Protected		0.98			0.99			1.00		0.95	1.00	
Satd. Flow (prot)		1559			1370			1817		1729	1783	
Flt Permitted		0.77			0.95			0.97		0.32	1.00	
Satd. Flow (perm)		1217			1304			1768		574	1783	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	60	115	20	30	85	145	10	345	30	265	660	90
RTOR Reduction (vph)	0	6	0	0	67	0	0	5	0	0	7	0
Lane Group Flow (vph)	0	189	0	0	193	0	0	380	0	265	743	0
Confl. Peds. (#/hr)	26		14	11		23	14		11	23		26
Heavy Vehicles (%)	2%	2%	2%	7%	7%	7%	3%	3%	3%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	5	5	5
Parking (#/hr)	5	5	5	5	5	5						
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		12.8			12.8			16.8		28.9	28.9	
Effective Green, g (s)		12.8			12.8			16.8		28.9	28.9	
Actuated g/C Ratio		0.23			0.23			0.30		0.51	0.51	
Clearance Time (s)		6.0			6.0			6.0		6.0	6.0	
Vehicle Extension (s)		3.0			3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)		276			295			526		419	913	
v/s Ratio Prot										0.07	c0.42	
v/s Ratio Perm		c0.16			0.15			0.21		0.26		
v/c Ratio		0.68			0.65			0.72		0.63	0.81	
Uniform Delay, d1		19.9			19.8			17.7		9.9	11.5	
Progression Factor		1.00			1.00			1.00		1.00	1.00	
Incremental Delay, d2		6.8			5.1			4.9		3.1	5.6	
Delay (s)		26.8			24.9			22.6		13.0	17.1	
Level of Service		C			C			C		B	B	
Approach Delay (s)		26.8			24.9			22.6			16.0	
Approach LOS		C			C			C			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			19.8									B
HCM 2000 Volume to Capacity ratio			0.89									
Actuated Cycle Length (s)			56.4							20.0		
Intersection Capacity Utilization			98.3%									F
Analysis Period (min)			15									

c Critical Lane Group

Queues  
3: Pine Street & Flynn Avenue

Build Conditions  
PM Peak Hour



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	ø3	ø7
Lane Configurations		↕		↕		↕	↕	↕		
Traffic Volume (vph)	60	115	30	85	10	346	265	660		
Future Volume (vph)	60	115	30	85	10	346	265	660		
Lane Group Flow (vph)	0	195	0	260	0	386	265	750		
Turn Type	Perm	NA	Perm	NA	Perm	NA	pm+pt	NA		
Protected Phases		4		8		2	1	6	3	7
Permitted Phases	4		8		2		6			
Detector Phase	4	4	8	8	2	2	1	6		
Switch Phase										
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	18.0	18.0	18.0	18.0	23.0	23.0	10.0	18.0	6.0	6.0
Total Split (s)	20.0	20.0	20.0	20.0	28.0	28.0	12.0	40.0	6.0	6.0
Total Split (%)	30.3%	30.3%	30.3%	30.3%	42.4%	42.4%	18.2%	60.6%	9%	9%
Maximum Green (s)	14.0	14.0	14.0	14.0	22.0	22.0	6.0	34.0	4.0	4.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	2.0	2.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	0.0
Lost Time Adjust (s)		0.0		0.0		0.0	0.0	0.0		
Total Lost Time (s)		6.0		6.0		6.0	6.0	6.0		
Lead/Lag	Lag	Lag	Lag	Lag	Lag	Lag	Lead		Lead	Lead
Lead-Lag Optimize?	Yes		Yes	Yes						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	Min	Min	None	Min	None	None
Walk Time (s)									2.0	2.0
Flash Dont Walk (s)									2.0	2.0
Pedestrian Calls (#/hr)									5	5
Act Effct Green (s)		12.8		12.8		16.6	28.9	28.9		
Actuated g/C Ratio		0.23		0.23		0.30	0.53	0.53		
v/c Ratio		0.67		0.70		0.71	0.62	0.79		
Control Delay		34.9		27.2		25.3	15.9	19.1		
Queue Delay		0.0		0.0		0.0	0.0	0.0		
Total Delay		34.9		27.2		25.3	15.9	19.1		
LOS		C		C		C	B	B		
Approach Delay		34.9		27.2		25.3		18.2		
Approach LOS		C		C		C		B		
Queue Length 50th (ft)		54		49		107	44	175		
Queue Length 95th (ft)		#169		#175		215	#108	#439		
Internal Link Dist (ft)		397		21		284		90		
Turn Bay Length (ft)										
Base Capacity (vph)		323		403		728	429	1133		
Starvation Cap Reductn		0		0		0	0	0		
Spillback Cap Reductn		0		0		0	0	0		
Storage Cap Reductn		0		0		0	0	0		
Reduced v/c Ratio		0.60		0.65		0.53	0.62	0.66		

Intersection Summary

Cycle Length: 66  
 Actuated Cycle Length: 54.9  
 Natural Cycle: 60  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.79

Queues

3: Pine Street & Flynn Avenue

Build Conditions

PM Peak Hour

Intersection Signal Delay: 22.7 Intersection LOS: C

Intersection Capacity Utilization 98.3% ICU Level of Service F

Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 3: Pine Street & Flynn Avenue

 ϕ1	 ϕ2	 ϕ3	 ϕ4
12 s	28 s	6 s	20 s
 ϕ6		 ϕ7	 ϕ8
40 s		6 s	20 s

# HCM Signalized Intersection Capacity Analysis

## 3: Pine Street & Flynn Avenue

Build Conditions  
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	115	20	30	85	145	10	346	30	265	660	90
Future Volume (vph)	60	115	20	30	85	145	10	346	30	265	660	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0			6.0		6.0	6.0	
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00	
Frbp, ped/bikes		0.99			0.96			1.00		1.00	0.99	
Flpb, ped/bikes		0.99			1.00			1.00		1.00	1.00	
Frt		0.99			0.92			0.99		1.00	0.98	
Flt Protected		0.98			0.99			1.00		0.95	1.00	
Satd. Flow (prot)		1559			1370			1817		1729	1783	
Flt Permitted		0.77			0.95			0.97		0.31	1.00	
Satd. Flow (perm)		1217			1304			1768		573	1783	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	60	115	20	30	85	145	10	346	30	265	660	90
RTOR Reduction (vph)	0	6	0	0	67	0	0	5	0	0	7	0
Lane Group Flow (vph)	0	189	0	0	193	0	0	381	0	265	743	0
Confl. Peds. (#/hr)	26		14	11		23	14		11	23		26
Heavy Vehicles (%)	2%	2%	2%	7%	7%	7%	3%	3%	3%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	5	5	5
Parking (#/hr)	5	5	5	5	5	5						
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		12.8			12.8			16.8		28.9	28.9	
Effective Green, g (s)		12.8			12.8			16.8		28.9	28.9	
Actuated g/C Ratio		0.23			0.23			0.30		0.51	0.51	
Clearance Time (s)		6.0			6.0			6.0		6.0	6.0	
Vehicle Extension (s)		3.0			3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)		276			295			526		418	913	
v/s Ratio Prot										0.07	c0.42	
v/s Ratio Perm		c0.16			0.15			0.22		0.26		
v/c Ratio		0.68			0.65			0.72		0.63	0.81	
Uniform Delay, d1		19.9			19.8			17.7		9.9	11.5	
Progression Factor		1.00			1.00			1.00		1.00	1.00	
Incremental Delay, d2		6.8			5.1			4.9		3.1	5.6	
Delay (s)		26.8			24.9			22.6		13.0	17.1	
Level of Service		C			C			C		B	B	
Approach Delay (s)		26.8			24.9			22.6			16.0	
Approach LOS		C			C			C			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			19.8									B
HCM 2000 Volume to Capacity ratio			0.89									
Actuated Cycle Length (s)			56.4							20.0		
Intersection Capacity Utilization			98.3%									F
Analysis Period (min)			15									

c Critical Lane Group