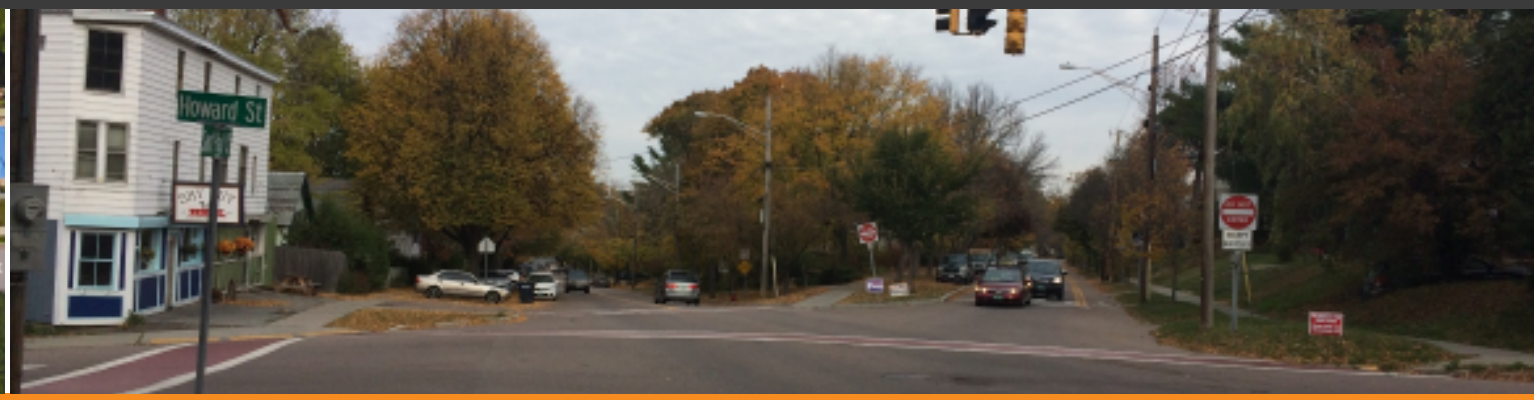
FINAL

# BURLINGTON BP15(17)
# WINOOSKI – HOWARD – ST PAUL INTERSECTION SCOPING STUDY

## EXISTING CONDITIONS REPORT

**6/16/2017**


**PREPARED FOR:**
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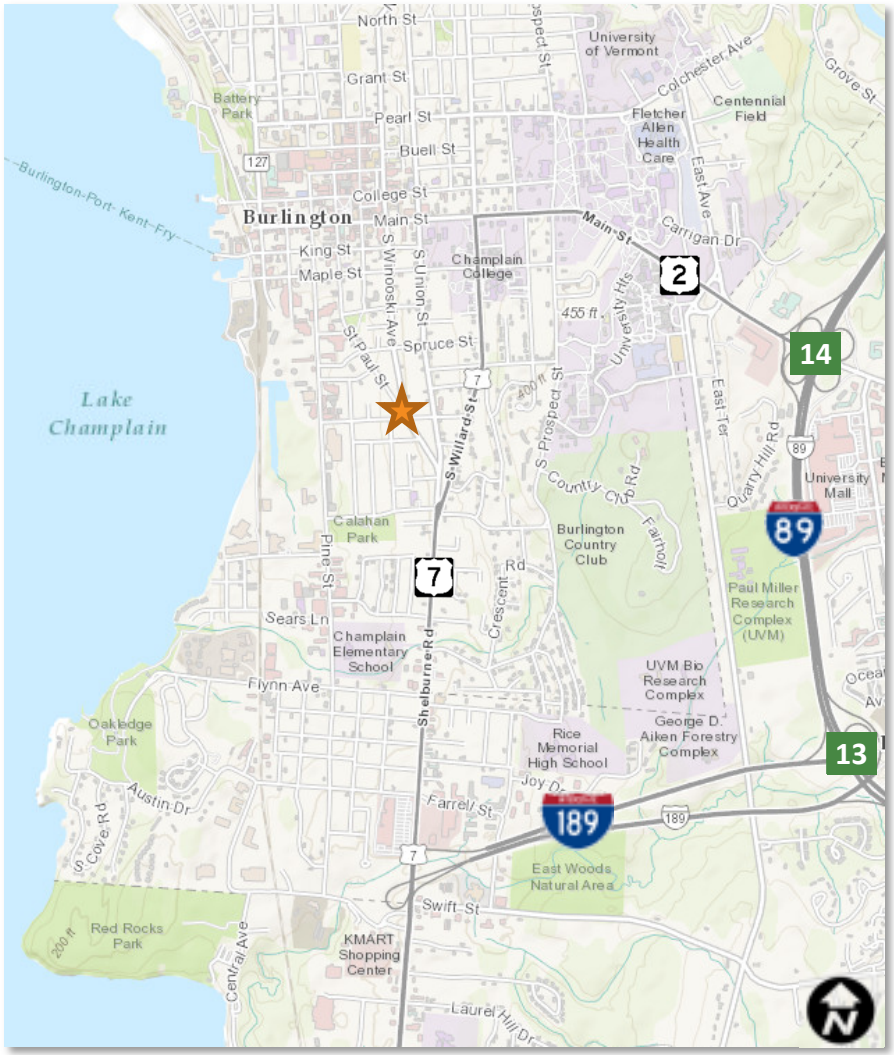
## 1.0 BURLINGTON'S FIVE CORNERS

The intersection of St Paul Street, Howard Street, and South Winooski Avenue has many roles. It is a gateway to several neighborhoods, including the Five Sisters, the Hill Section, and the South End Arts and Business District, and it is an emerging neighborhood hotspot of its own. It is along a primary vehicle route between downtown Burlington and points south, and it is a major pedestrian crossing point for nearby destinations like Calahan Park, the Pine Street corridor, and Christ the King and Edmunds School Campuses, as well as the four businesses located at the intersection.

Above all, the intersection is hub of activity where pedestrians, vehicles, bicycles and transit meet and interact. Residential neighborhoods surround the commercial intersection very near to the burgeoning Pine Street corridor. The goal of this scoping study is to evaluate various ways to **improve the safety for people walking, bicycling, driving and taking transit**, to **meet accessibility standards**, and to **foster the emerging neighborhood** by supporting enhancements to pedestrian, bicyclist, and motorist travel.

The acronym "WHSP" will be used to describe the Winooski – Howard – St Paul intersection study area throughout this document.

**FIGURE 1: STUDY AREA WITHIN BURLINGTON**



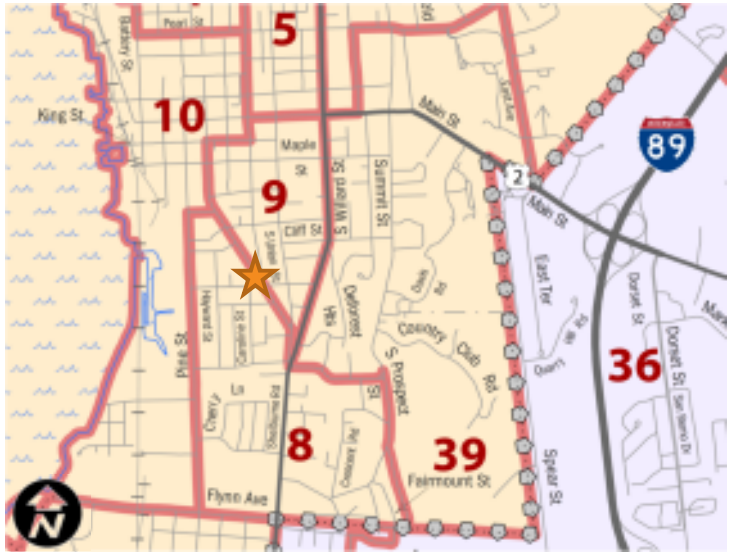
The character of this intersection is defined by the roadway and the adjacent land use. The paved width consists of motor vehicle lanes, crosswalks, on-street parking spaces, and areas where buses stop for passengers. South Winooski Avenue is one-way southbound, with bike lanes in both directions. Off the pavement are businesses, houses, sidewalks, parking areas, driveways, a park, and bus stops. A traffic signal controls the movement of vehicles. The landscape generally slopes east to west.

## 1.1 | STUDY AREA DEMOGRAPHICS

The WHSP study area straddles two census tracts within Burlington:

1. Chittenden Tract 8, roughly bounded by Pine Street, St Paul Street, Ledge Street, South Prospect Street, and Flynn Ave; and
2. Chittenden Tract 9, roughly bounded by St Paul Street, Main Street, and Willard Street.

**FIGURE 2: CENSUS TRACTS WITHIN BURLINGTON**




Several key demographics of the surrounding census tracts include:

| American Community Survey Demographic and Housing Estimates, 2011-2015 | Tract 8 | Tract 9 |
|---|---|---|
| **Population** | 2,723 | 2,627 |
| **Non-White Population, Percentage** | 9.5% | 6.9% |
| **Under age of 15, Percentage** | 17.7% | 7.1% |
| **Over age of 65, Percent** | 9.4% | 13.0% |

| American Community Survey Demographic and Housing Estimates, 2011-2015 | Tract 8 | Tract 9 |
|---|---|---|
| **Commute Share, Percentage** | Drive Alone – 50.8%<br>Drive, Carpool – 8.0%<br>Transit – 8.3%<br>Walk – 18.8%<br>Other – 4.7% | Drive Alone – 40.6%<br>Drive, Carpool – 6.7%<br>Transit – 1.8%<br>Walk – 29.5%<br>Other – 8.2% |
| **Percentage of Families whose income in the past 12 months is below the poverty level** | 17.4% | 21.4% |

## 1.2 | ADJACENT LAND USE

Immediately adjacent to the WHSP intersection are four commercial spaces straddling Howard on the west side of St Paul, with the remaining land use as residential. The four businesses include:

- The **Neighborhood Market** sells groceries, wine, and beer, and is open between 10 am and 9 pm.
- **Shy Guy Gelato** sells servings of gelato at their storefront Fridays through Sundays from 11 am to 9 pm, with no indoor seating.
- **Tomgirl Juice** sells juice, coffee and tea, and prepared foods. The shop has a seating area and is open Mondays through Saturdays during the day.
- **South End Style** is a hair and beauty salon.

There is a head-in perpendicular parking outside of the Neighborhood Market with room for approximately five cars; two spaces reserved to the house immediately to the north of the market, leaving three for public use.

FIGURE 3: DESTINATIONS AT THE WHSP INTERSECTION


FIGURE 4: OUTDOOR SEATING FOR COMMERCIAL USES AT THE WHSP INTERSECTION. POTVIN PARK IS IN THE BACKGROUND.

FIGURE 5: POTVIN PARK

**Potvin Park** is a small park managed by the City of Burlington located between St. Paul Street and South Winooski Ave. It contains a stepped seating area with a platform and is spotted with trees and shrubs. A stairway running through it connects the two streets.

## 1.3 | MOTOR VEHICLE MOBILITY

Each leg of the intersection has one lane in each direction except for S. Winooski Ave, which is one-way in the southbound direction, towards the intersection. Thus, for vehicles, there are five approach routes and four exit routes. There are no dedicated turn lanes or turn signal phases. Hard right turns from South Winooski Avenue onto St. Paul Street are legal movements. Right turns on red lights are permitted.

St. Paul Street is a designated truck route; trucks are prohibited on S. Winooski Ave. South Winooski Avenue and St. Paul Street south of the intersections are principal arterials designated as Alternate US-7.

Surrounding the intersection, on-street parallel parking is located on the west side of South Winooski Ave, the north side of Howard Street (both east and west legs), and the west side of St. Paul Street (both north and south legs).

FIGURE 7: BUS STOP ON ST PAUL STREET


FIGURE 6: PARKING AND BUS STOPS

## 1.4 | TRANSIT MOBILITY

The Route 5 (Pine Street) Green Mountain Transit bus makes two stops at the Study intersection: on the eastbound side of Howard Street west of the intersection, and on the northbound side of St. Paul Street north of the intersection. School Tripper buses also stop on St. Paul Street; these buses help students and other passengers travel to school, and they are also open to the general public. There are no bus shelters or designated waiting areas for passengers waiting for the bus.

## 1.5 | PEDESTRIAN MOBILITY

All five legs of the intersection are lined by a sidewalk on both sides.

Close to the center of the intersection, red crosswalks provide a guided connection from corner to corner. Where St. Paul Street and South Winooski Avenue first meet at the tip of Potvin Park, a crosswalk connects the southwest tip of the park across St. Paul Street to the sidewalk in front of 457 St. Paul Street (the building containing the Neighborhood Market and Shy Guy Gelato). There is no crosswalk between the park and the opposite side of S. Winooski Ave.

The intersection does not have pedestrian signals. Pedestrians must pay attention to which directions have a green light and be aware of turning vehicles to safely cross the street.

FIGURE 8: PEDESTRIAN CHALLENGES

## 1.6 | BICYCLE MOBILITY

Bike lanes are striped and signed on South Winooski Ave in both directions; double yellow striping allows bicyclists to ride northbound on this street that is one-way southbound for motor vehicles. The other streets approaching the WHSP intersection do not have bicycle facilities. The northbound lane of St Paul Street has a striped shoulder, but not a marked bicycle lane.

Although identified as a Bike Route in various planning documents and the Burlington Bike Map, Howard Street does not have any designated bicycle infrastructure or amenities.

The steep grades, particularly along eastbound Howard Street and southbound St Paul Street, create challenges for many bicyclists to build momentum and traverse the expanse of pavement.


FIGURE 9: CONTRAFLOW BICYCLE LANE

# 2.0 STUDY AREA MAPS

Zoning districts, historic districts, and natural resource boundaries have been reviewed in the vicinity of the Study intersection to understand the context of the Study intersection and features that will need to be considered when designing and comparing potential alternatives.

## 2.1 | ZONING

The Study intersection is at the convergence of two residential zoning districts: Medium Density Residential (northwest of the intersection) and Low Density Residential (surrounding the remainder of the intersection). To the west, along Pine Street, is an Enterprise - Light Manufacturing district. The Main Street boundary of downtown Burlington is approximately 0.6 miles north of the Study intersection along S. Winooski Avenue.

According to Walk Score (walkscore.com), the intersection has a Walk Score of 67 - "Somewhat Walkable"; this means that "some errands can be accomplished on foot." Walk Score rates locations with a score of 1 (least walkable) to 100 (most walkable) by the destinations within walking distance.

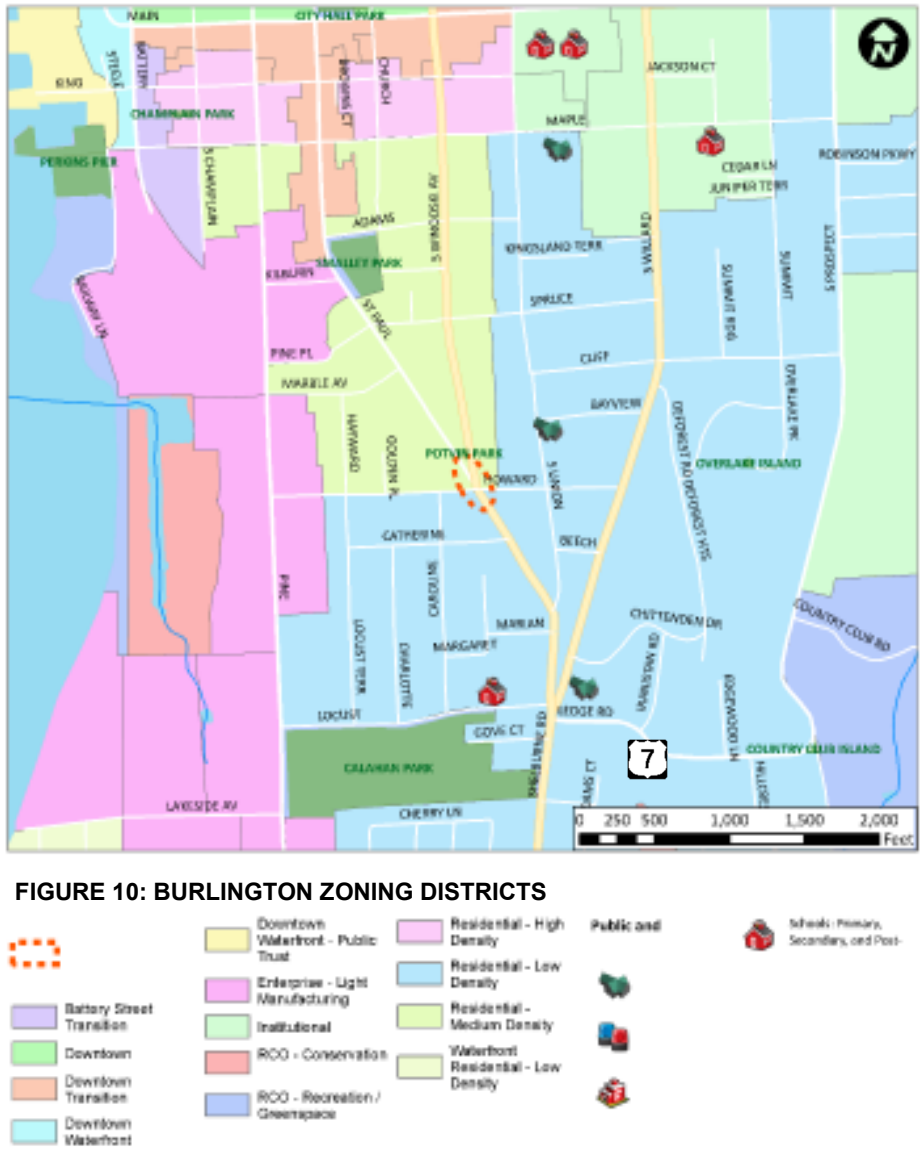



**FIGURE 10: BURLINGTON ZONING DISTRICTS**

## 2.2 | NEARBY DESTINATIONS

The WHSP study intersection is within one mile of many different community destinations, giving them potential to be both walkable and bikeable.

**To the north** is downtown Burlington and the shared campus of Edmunds Elementary and Middle Schools. Smalley Park has a basketball court, baseball field, and natural playground.

**To the west** is the Pine Street corridor, home to art and music venues, shops, cafes, and breweries. Along Pine Street is Dealer.com, one of the largest employers in Burlington.

**To the south** is Christ the King School, Calahan Park, and Champlain Elementary School (not pictured). Calahan Park, approximately 16 acres in size, has baseball diamonds, soccer fields, tennis courts, a basketball court, an outdoor ice rink and sledding hill in the winter, and a community garden managed by Burlington Parks and Recreation.



**FIGURE 11: NEARBY DESTINATIONS**

## 2.3 | HISTORIC DISTRICTS

The Study intersection is near, but not within, a designated historic district. It lies closest to the South Union Street historic district, which includes over 100 houses built between 1835 and 1938 that represent a variety of architectural styles.

Additional detail regarding the history and development of this intersection can be found in the Archaeological Resource and Historic Preservation Assessment.


**FIGURE 12: BURLINGTON HISTORIC DISTRICTS**

## 2.4 | NATURAL RESOURCES

The WHSP study intersection is not within any wetlands buffer zones, endangered/sensitive species' habitats, or Special Flood Hazard Areas (lands that are at high risk of flooding). Thus, future changes to the intersection will not impact or be impacted by these things. The nearest sensitive areas are located in and near the Barge Canal, including wetlands and a rare-to-Vermont plant species. A flood hazard zone runs along the shore of Lake Champlain and surrounds the Barge Canal.

Stormwater is currently directed into the Main Plant Combined Sewer System. "Green Streets" concepts to slow and reduce reduce peak stormwater flow volumes are recommended.


**FIGURE 13: NEARBY NATURAL RESOURCES**


## 2.5 | SITE SPECIFIC CONSTRAINTS

The WHSP study intersection is a gateway into downtown Burlington and a more pedestrianized environment. Proposed intersection improvements should reflect the higher volumes of non-motorized traffic and pedestrian activity. The intersection should be designed for slower speeds, which may include roundabouts, mini-roundabouts, or traffic signal pedestals (as opposed to mast arms), as appropriate.

The urban environment indicates that many utilities should be expected underground, including water, sewer, and natural gas.

# 3.0 PAST STUDIES

In recent years, the WHSP intersection has been considered for improvement twice. These studies included a VTrans reconstruction project and a neighborhood study to explore accessibility challenges. Several recent and ongoing planning studies managed by the City also provide insight to the greater neighborhood and various elements of the intersection, including planBTV South End, planBTV Walk Bike, the Open Space Protection Plan, and the Winooski Avenue Corridor Study.

## 3.1 | 2009 VTRANS RECONSTRUCTION

As of 2009, Potvin Park did not extend as far south into the intersection as it currently does; it ended approximately 40 feet north of its current tip. At that time, the crosswalk across the north leg of St. Paul Street connected the park to the current crossing point in front of the Neighborhood Market, resulting in a significantly longer pedestrian crossing than the existing crosswalk. There were no bicycle lanes on S. Winooski Ave.

In 2009, VTrans initiated a construction project (STP 2722) along US Alternate Route 7, which includes S. Winooski Ave to the north of the Study intersection and St. Paul Street to the south of the Study intersection. Results of this project at the Study intersection included:

- Installation of bicycle lanes on South Winooski Avenue;
- Extension of Potvin Park further south into the intersection;
- Revised striping to align with the extended park; and
- Reconstruction of sidewalk ramps.

The final construction did not include a crosswalk across S. Winooski Avenue, presumably due to no existing sidewalk landings and steep slopes creating a challenge for construction of an ADA-compliant landing area.

**FIGURE 14: WHSP STUDY AREA INTERSECTION IN 2004.**

## 3.2 | AARP LIVABLE COMMUNITIES GRANT STUDY

In 2012, a group of residents living near the Study intersection applied for and secured an AARP Livable Communities Grant to better understand accessibility challenges for all users at the intersection. AARP's Livable Communities "supports the efforts of neighborhoods, towns, cities and rural areas to become great places for people of all ages." Safe, walkable streets and access to community life and important services are key to the mission of this program.

The study considered a number of concerns from neighbors, and a safe crossing of S Winooski Ave emerged as a priority. A crosswalk at this location is challenging due to the steep grade of Potvin Park with respect to an ADA-compliant landing space and connection to the existing sidewalk network.

The City of Burlington Department of Public Works reviewed several crosswalk options, one of which was developed into a proposed construction improvement, shown below. The proposed plan would involve a diagonal crossing of South Winooski Avenue, from the east side of Potvin Park southeast across South Winooski Avenue. Further development of the crosswalk installation was postponed for a more comprehensive study of the intersection.

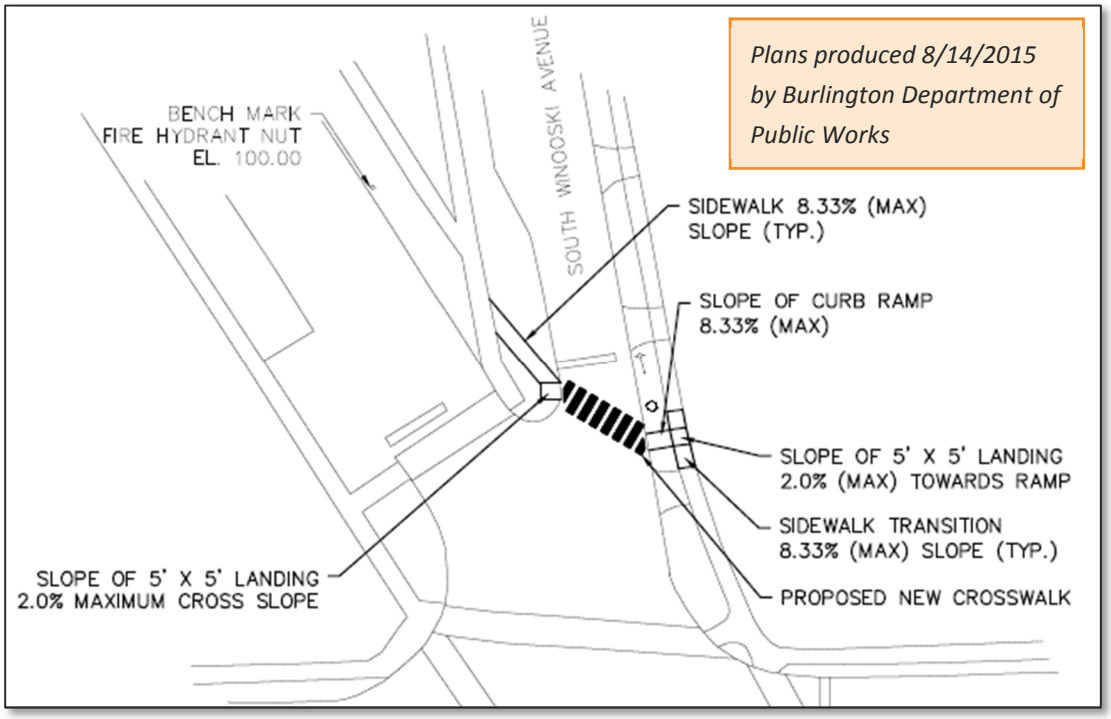



**FIGURE 15: S. WINOOSKI AVE CROSSWALK PLANS**

## 3.3 | PLAN BTV SOUTH END

planBTV South End is a master plan for the southwestern quarter of Burlington. The WHSP Study Intersection is located within the planBTV South End "Broader Study Area". The latest version is a draft plan from June 2015.

planBTV South End focuses on the South End Enterprise Zone - a zoning district encompassing the arts and business district along Pine Street, but many of its goals apply to the South End as a whole. Overarching goals in planBTV relevant to the Study intersection relate to **mobility** (also a focus of Walk Bike planBTV), **parks**, and **stormwater management**.

### MOBILITY

**Overarching goal:** Increase walkability and bikeability and improving transit service in the South End. Goals and strategies relevant to the Study intersection include:

**Goal:** Design for Lower Speeds and Many Modes

- Reinforce the target speed of 25 mph, and incorporate traffic calming principles into every project.
- Consider expanded use of roundabouts and mini roundabouts.

**Goal:** Serve the full range of cyclists

- Continue to expand and enhance bike infrastructure within the South End

**Goal:** Improve transit service.

- Provide amenity-rich / artful bus stop areas.

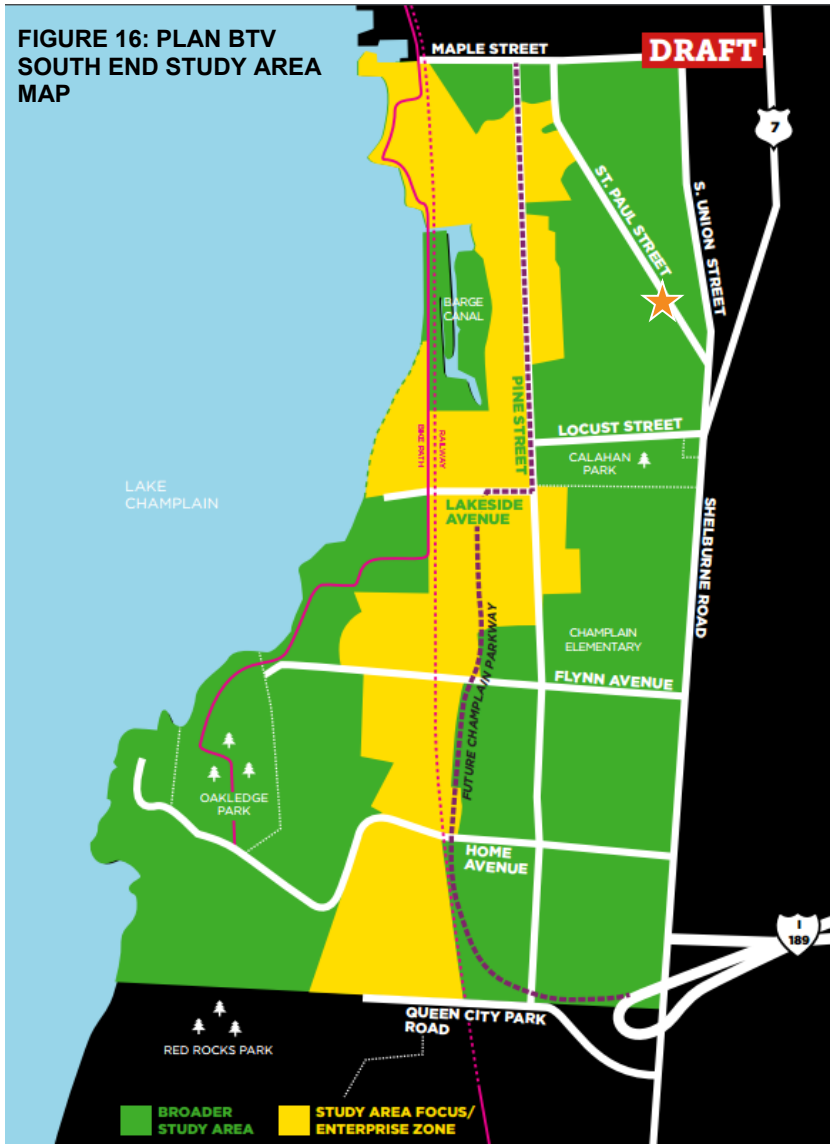


FIGURE 16: PLAN BTV SOUTH END STUDY AREA MAP

## PARKS AND POCKET PARKS

**Overarching goal:** Increase green spaces and accessibility to them in the South End. Goals and strategies relevant to the Study intersection include:

**Goal:** Create new parks within the South End; make existing parks more accessible.

- Incorporate pocket parks and plazas into new development in the Lakeside Ave area. (The Study intersection is not in the Lakeside Ave area, but it presents a potential opportunity for a pocket park or plaza.)

## STORMWATER MANAGEMENT

**Overarching goal:** Reduce the City's impact on Lake Champlain through stormwater management. Strategies relevant to the Study intersection include:

- Minimize paved areas;
- Slow the flow of stormwater by dispersing runoff; and
- Treat the water before it heads to the lake through infrastructure such as bioretention cells and bioswales.

## REFERENCE TO WHSP INTERSECTION

The planBTV South End study specifically references the Winooski / Howard / St Paul intersection in the Connectivity and Mobility element of the study:

> **Address key intersections to improve safety and alleviate traffic congestion**. Consider appropriate locations for new traffic signals, roundabouts or mini-roundabouts to address traffic congestion, and reinforce lower, safer speeds at intersections.
>
> **Explore potential for a redesigned intersection at Howard/St. Paul/Winooski**, where improvements could help foster an emerging neighborhood activity center.

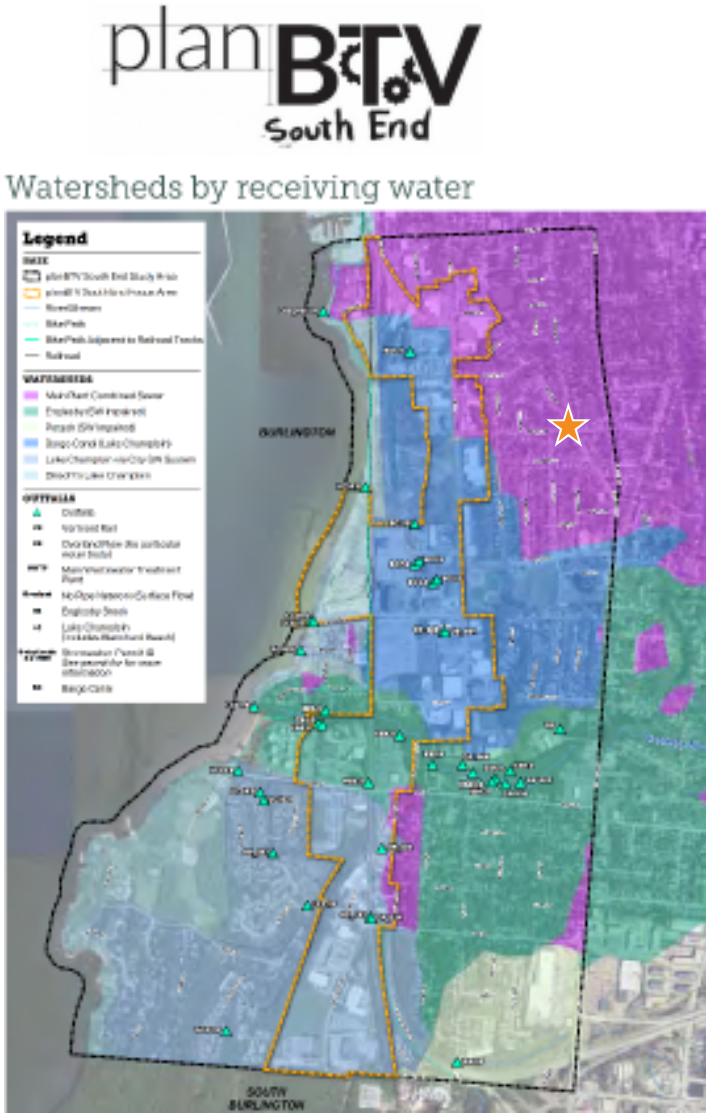



**FIGURE 17: STORMWATER WATERSHED MAP FROM THE PLANBTV SOUTH END STUDY**

## 3.4 | PLAN BTV WALK BIKE

Plan BTV Walk Bike, currently in draft mode for public review, summarizes existing conditions of walking and bicycling conditions in Burlington, and it offers design recommendations for intersections, street segments, and amenities (such as bike parking). It has two overarching goals:

1. Create safer streets for everyone.
2. Make walking and biking a viable (and enjoyable) way to get around town.

The plan identifies the S. Winooski-Howard-St. Paul intersection as **one of 20 priority intersections**. Specific recommendations to consider for this intersection within the next 2 to 5 years include a mini-roundabout or signal phasing changes, high visibility crosswalks, and curb extensions with creative materials.

The plan also recommends **nine city-wide actions** as part of its Action Plan. The following five actions are particularly relevant to the S. Winooski-Howard-St. Paul intersection:

1. Engineer and design city streets to self-enforce appropriate target speeds.
2. Improve safety at all 20 priority intersections. (The S. Winooski-Howard-St. Paul intersection is one of the 20 priority intersections.)
3. Provide a connected network of sidewalks and safe intersections.
4. Create a dense, interconnected bicycle network that serves the needs of people of all ages and abilities.
5. Leverage walk/bike projects to add green infrastructure to Burlington's streets.

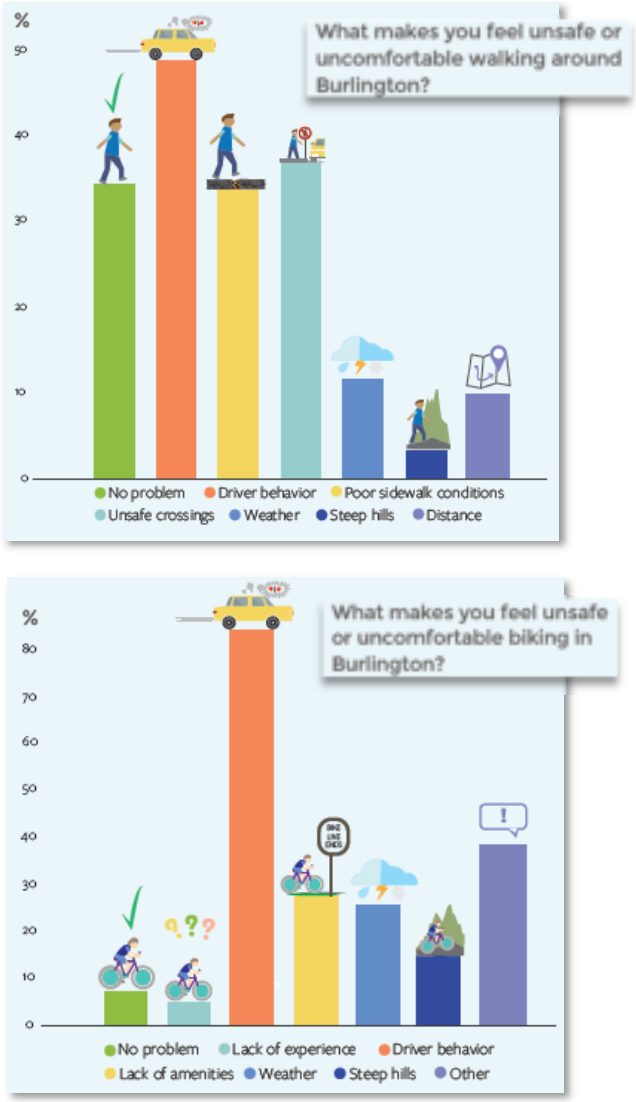



**FIGURE 18: WALK BIKE SURVEY RESULTS; 540 PARTICIPANTS**

## 3.5 | OPEN SPACE PROTECTION PLAN

The 2014 Open Space Protection Plan (OSPP) is an update of the first OSPP completed in 2000. The OSPP includes an inventory of open spaces within the City, summarizes comments from the public, and recommends actions. The overarching goals of the OSPP are to:

1. Protect and preserve natural areas and open spaces of local, regional, and statewide significance for the benefit of future generations.
2. Maintain and improve the integrity of natural and recreational systems within the City.
3. Ensure long-term stewardship and appropriate public access to natural areas and open space, including improved opportunities for pedestrian access and interaction throughout the City.

The OSPP focuses on four types of open space and sets a goal for each of them: natural areas, urban agriculture, parklands, and green infrastructure/stormwater management. The latter two open spaces types are particularly relevant to the S. Winooski-Howard-St. Paul intersection due to the presence of Potvin Park at the intersection, the proximity to other open spaces, and the potential for significant stormwater runoff mitigation.

**FIGURE 19: COMMUNITY GARDEN AT CALAHAN PARK, A HALF-MILE WALK OR BIKE RIDE FROM THE WHSP INTERSECTION**

**Photo: Vermont Community Garden Network**

## 3.6 | WINOOSKI AVENUE CIRCULATION STUDY

The Winooski Avenue Circulation Study, completed in December 2016, evaluated five alternative traffic patterns along Winooski Avenue between Howard Street and N. Union Street in Burlington. All alternatives reviewed would fit within the existing paved width of the roadway. The purpose of the study was to find a connection between the Old North End and the South End that improves safety and the flow of traffic for both bicycles and vehicles. Currently, both Winooski Ave and S. Union Street have segments of one-way vehicle traffic. When present, bicycle facilities are also limited to one direction except along S. Winooski Ave between Howard Street and Maple Street.

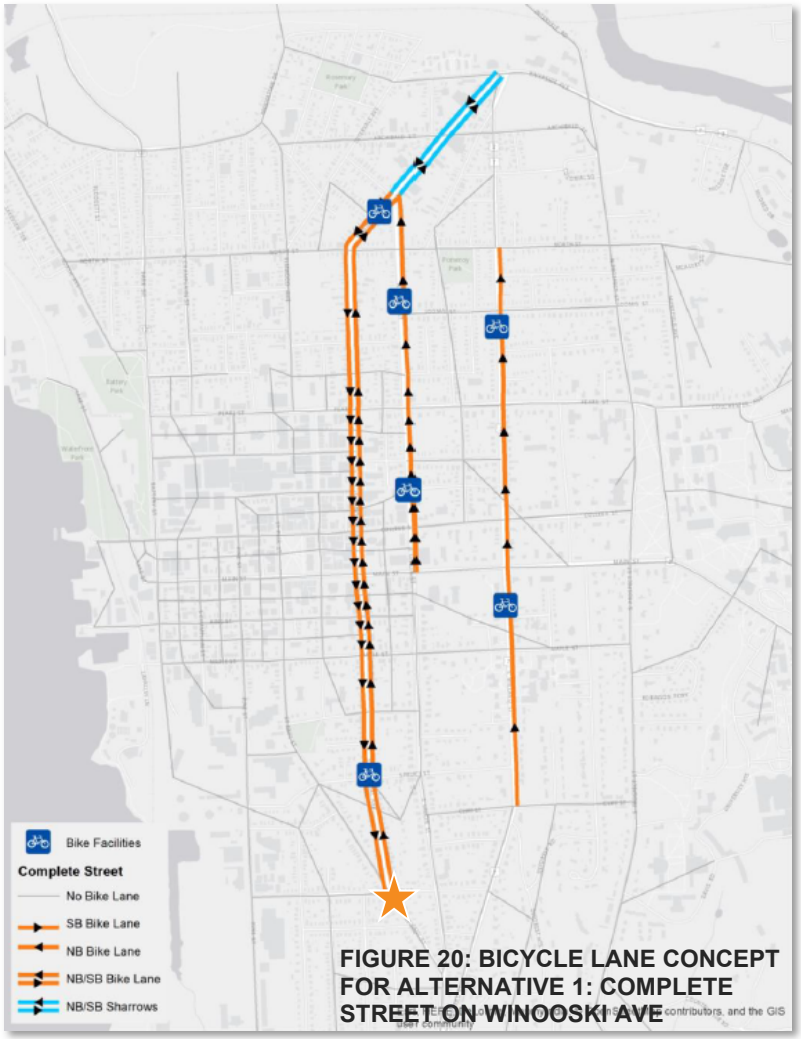



FIGURE 20: BICYCLE LANE CONCEPT FOR ALTERNATIVE 1: COMPLETE STREET ON WINOOSKI AVE

The following alternatives were modeled in a microsimulation model:

1. Complete Street on Winooski Avenue; Winooski Avenue as primary bicycle corridor
2. Two-Way Flow on North Winooski Avenue
3. Two-Way Flow on all of Winooski Avenue; Union Street as primary bicycle corridor
4. One-Way Pair: Counter-Clockwise Flow
5. One-Way Pair: Clockwise Flow

The Complete Street on Winooski Ave was found to have the least amount of impact on traffic compared to the other four alternatives. This alternative would include bike lanes on both sides of Winooski Avenue from Union Street (to the north) to the S. Winooski-Howard-St. Paul intersection. The existing vehicular traffic directions would remain the same, but a conversion from four lanes to three lanes would be required between Pearl Street and Main Street. Some on-street parking would need to be removed.

# 4.0 ROADWAY CHARACTERISTICS AND TRAFFIC VOLUMES

The average annual daily traffic (AADT) of the St Paul Street and South Winooski Avenue approach legs of the Study intersection are shown to the right.

Roadway classifications for each approach leg include:

**St Paul Street South** – FAU A007 (Alt US Route 7) – Class 1 Town Highway (TH-4) – Functional Class: Urban Principal Arterial

**St Paul Street North** – FAU S5046 – Class 2 Town Highway (TH-15) – Functional Class: Urban Collector

**South Winooski Avenue** – FAU A007 (Alt US Route 7) Class 1 Town Highway (TH-4) – Functional Class: Urban Principal Arterial

**Howard Street** – not on the Federal Aid system – Functional Class: Urban Local

The speed limit for all roads is 25 mph.


**FIGURE 21: AVERAGE ANNUAL DAILY TRAFFIC ALONG THE PRIMARY APPROACH LEGS TO THE WHSP INTERSECTION**

## PAST COUNTS

VTrans conducted a twelve hour count from 6 AM to 6 PM on August 4, 2016 (PM hours) and August 5, 2016 (AM hours). The raw turning movement traffic volumes from this count are presented in Figure 22.

Notably in this count, only 18 pedestrians were tallied throughout the day. Much higher pedestrian volumes should be expected. Bicycles were not differentiated from vehicles, if they were counted at all. Beyond confirming traffic volumes and heavy vehicle percentages, the count appears to offer minimal value to a Bicycle and Pedestrian study.

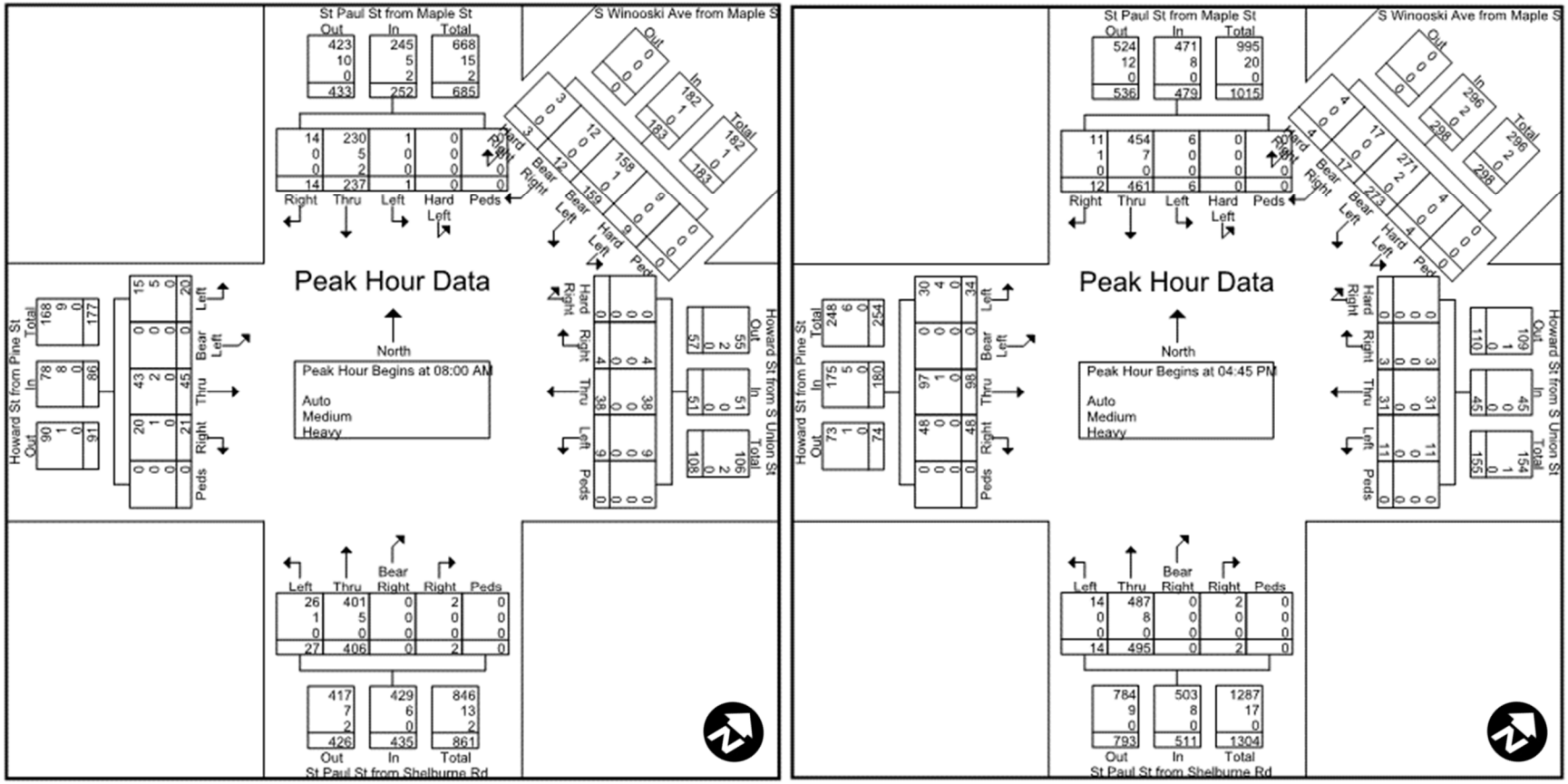



**FIGURE 22: AM (LEFT) AND PM (RIGHT) PEAK HOUR VOLUMES FROM 2016 VTRANS TURNING MOVEMENT COUNT.**

## SUPPLEMENTAL 2016 COUNT

RSG performed a 12-hour turning movement count on October 26, 2016 (6AM to 6PM) at the Study intersection using digital video equipment. The movements of motorized vehicles, bicycles, and pedestrians were counted. The weather was noted to be overcast and cool, with a maximum temperature of 39-degrees. Light precipitation was noted.

## MOTORIZED VEHICLES

The observed morning and evening peak hours of motorized traffic were determined to be 7:45-8:45 am and 4:45-5:45 pm, respectively.

Following VTrans traffic study guidelines, observed peak hour traffic volumes were adjusted to represent the design hour volume (DHV)[1]. Design hour adjustment factors are based on VTrans automatic traffic recorder (ATR) **D157**, located on St. Paul Street approximately 750 feet north of the Study intersection. The calculations to adjust observed traffic volumes to the DHV are as follows:

1. The most recently observed AADT at ATR D157 was 9,472 vehicles in 2002. This AADT was adjusted to 2016 based on observed growth at ATR D163, located 0.4 miles north of the Study intersection. ATR D163 had counts in 2005 and 2016. An assumption was made that volumes in 2005 were similar to volumes in 2002. ATR D163 saw no growth between 2005 and 2016, so a growth factor of 1.00 was applied to ATR D157. Thus, ATR D157 is assumed to have a **2016 volume of 9,472.**
2. The k factor of VT-15 is 0.1061 (the VTrans k factor for urban areas). Plugging this k factor and the 2016 AADT into the equation DHV = AADT * k leads to a **DHV** of 9,472 * 0.1061 = **1,000 vehicles.**
3. Because ATR D157 is north of the Study intersection along St. Paul Street, vehicles in the 2016 RSG traffic count that entered the intersection from the north along St. Paul Street or exited the intersection heading north were added together. The total number of **vehicles from the peak hour of this count that likely passed ATR D121** are **985 vehicles.**
4. The adjustment factor between 985 and 1,000 is 1.02. Therefore, the observed traffic volumes at the Study intersection in the morning and evening peak hours were **increased by 2%** to adjust to the DHV.

The raw and adjusted volumes are shown in the following figures.

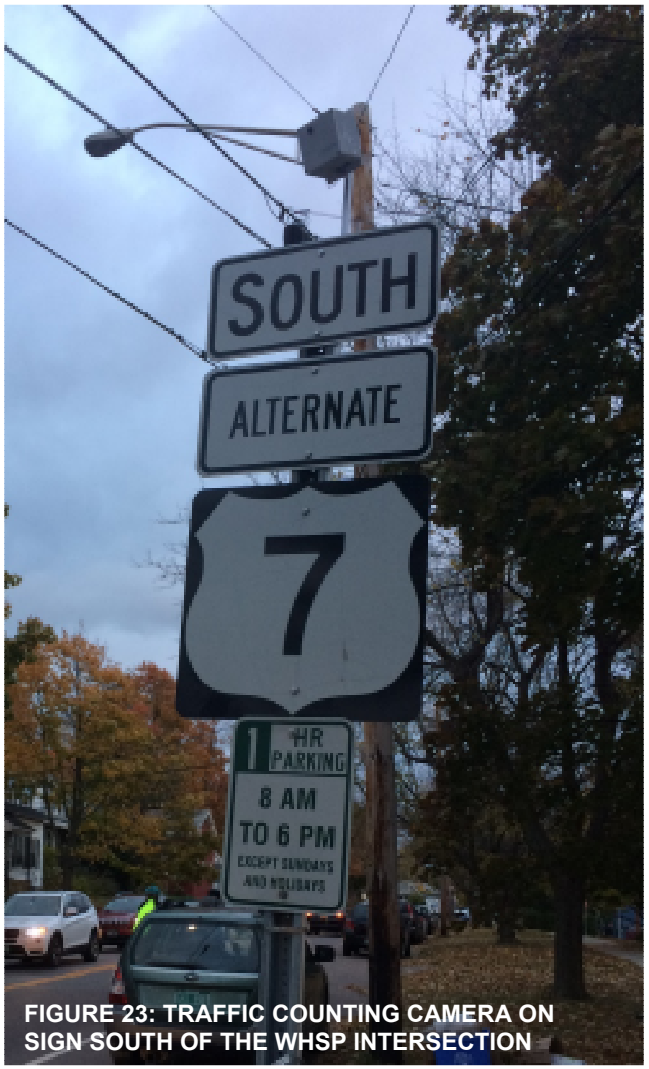


FIGURE 23: TRAFFIC COUNTING CAMERA ON SIGN SOUTH OF THE WHSP INTERSECTION

[1] The DHV is the 30th highest hour of traffic for the year and is used as the design standard in Vermont.

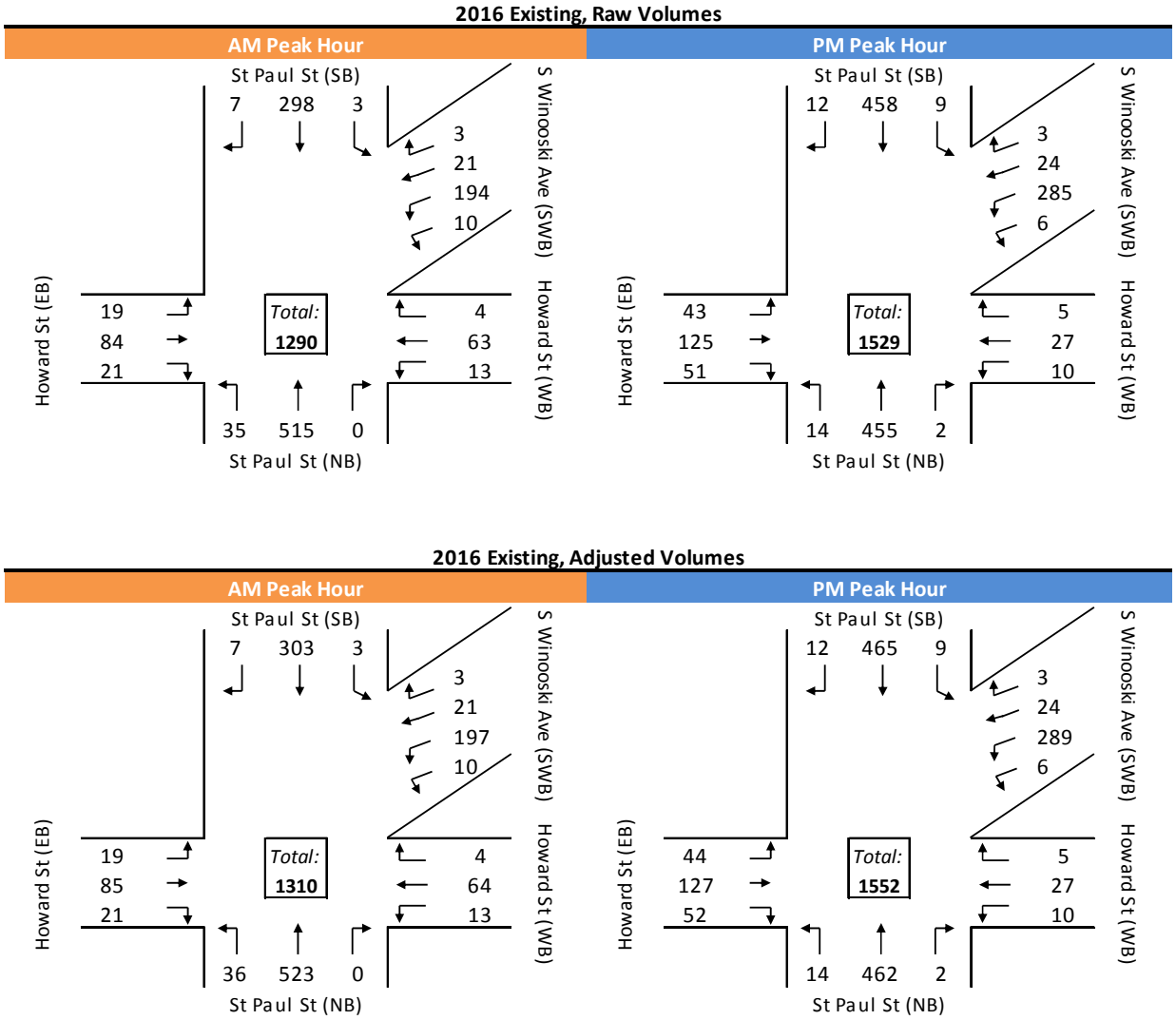



**FIGURE 24: RAW AND ADJUSTED PEAK HOUR VOLUMES FROM 2016 TURNING MOVEMENT COUNT**

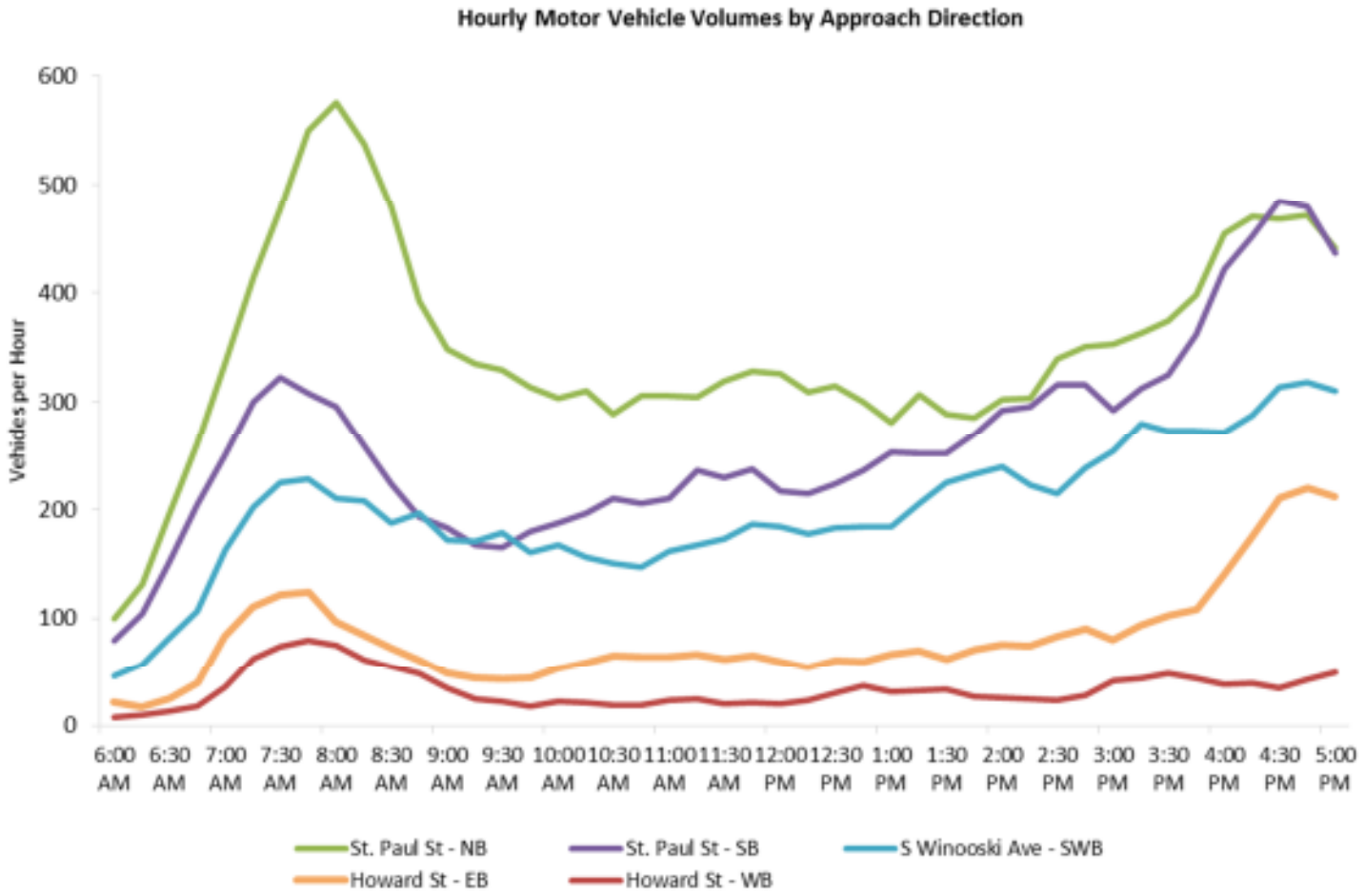



**FIGURE 25: HOURLY MOTOR VEHICLE VOLUMES BY APPROACH DIRECTION**

## PEDESTRIANS

Pedestrian crossings occurred at the intersection in several peaks over the course of the day rather than experiencing distinct peak times. During the AM and PM peak hours, there were 12 and 26 pedestrian crossings at the Study intersection, respectively. In the entire 12-hour period, there were 263 pedestrians. The day of the count was in the mid-thirties and there were light snow flurries in the morning. Schools were in session.

**Total pedestrians observed: 263**

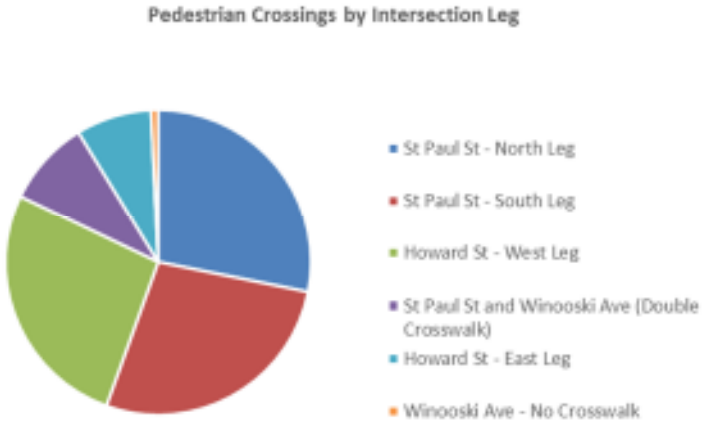



**FIGURE 26: PEDESTRIAN CROSSINGS BY INTERSECTION LEG**

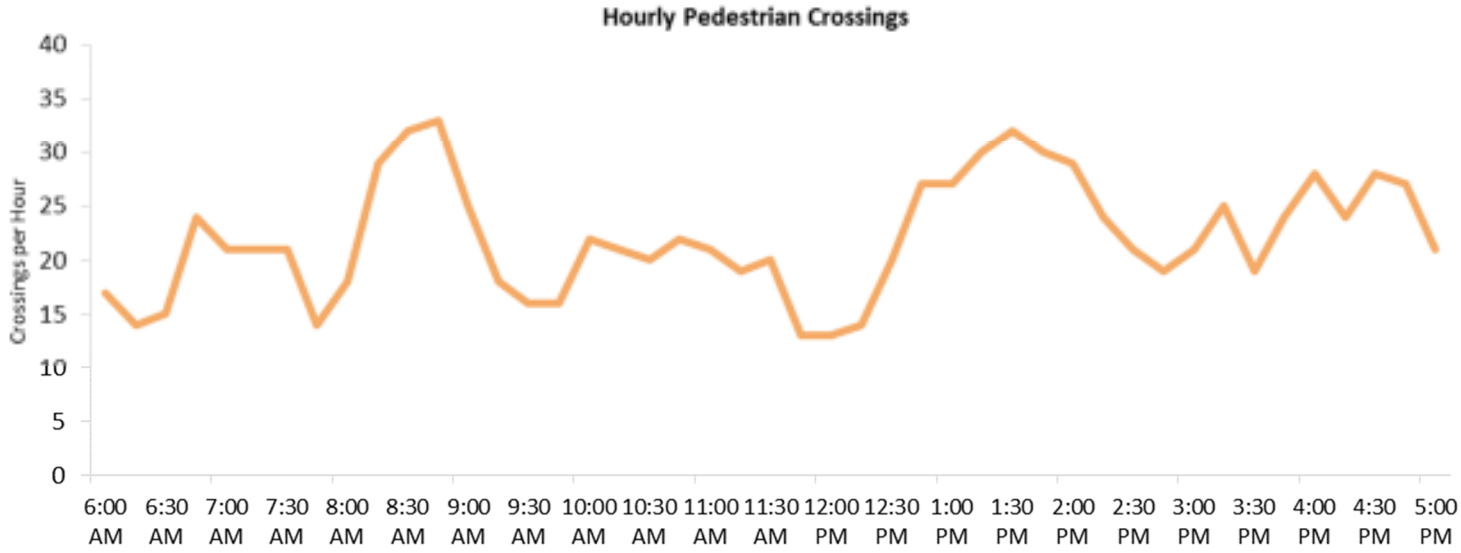



**FIGURE 27: HOURLY PEDESTRIAN CROSSINGS**

## BICYCLES

61 people on bicycles passed through the Study intersection during the 12-hour count. This number does not include bicyclists riding on the sidewalk. No bicyclists were observed on the north leg of St. Paul Street, except for those using the sidewalk.

Bicyclists riding in the street were all adults. Several elementary school-age kids were on bicycles, but did not ride through the intersection, instead using sidewalks and crosswalks.

**Total bicyclists observed: 61**

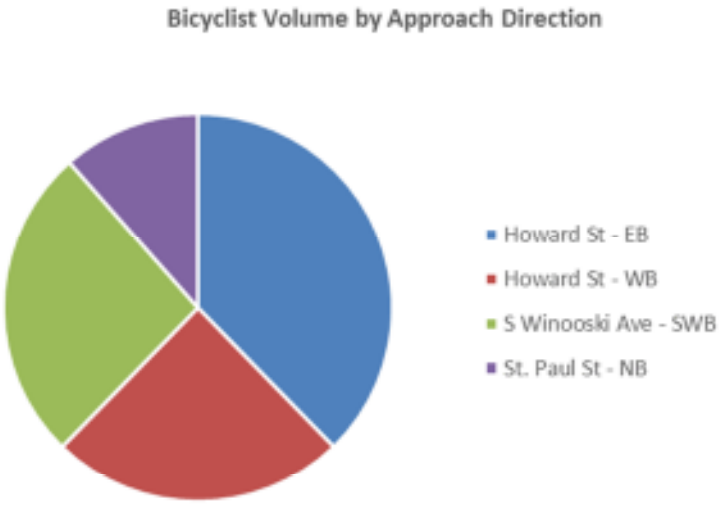



**FIGURE 29: BICYCLIST VOLUME BY APPROACH DIRECTION**

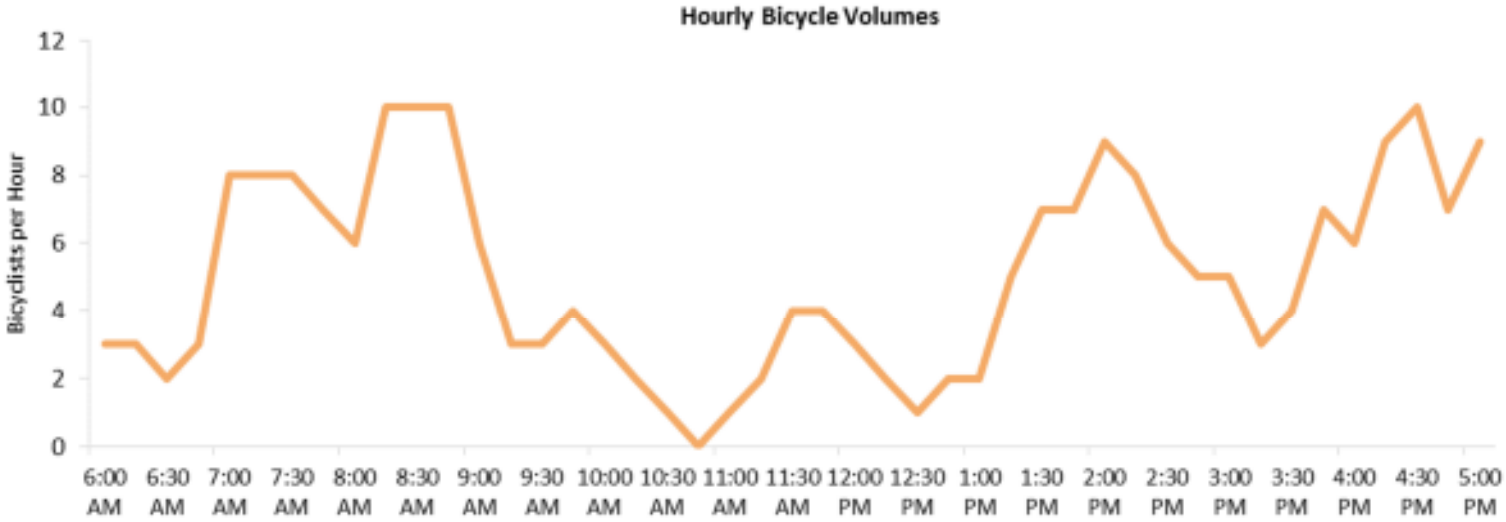



**FIGURE 28: HOURLY BICYCLE VOLUMES**

## 5.0 CRASH ANALYSIS

Crashes at the Study intersection were compiled using the VTrans Public Crash Data Query Tool and by contacting VTrans directly. Crashes were reviewed in the five-year period between October 15, 2011 and October 15, 2016. During this time, there were 33 crashes, two of which resulted in injury with the remaining crashes causing property damage only.

**Rear end crashes and sideswipes** were markedly the most common type of crash.

Most crashes occurred during daylight hours, between 6:00 AM and 6:00 PM; this is unsurprising given that most traffic occurs during this time period.

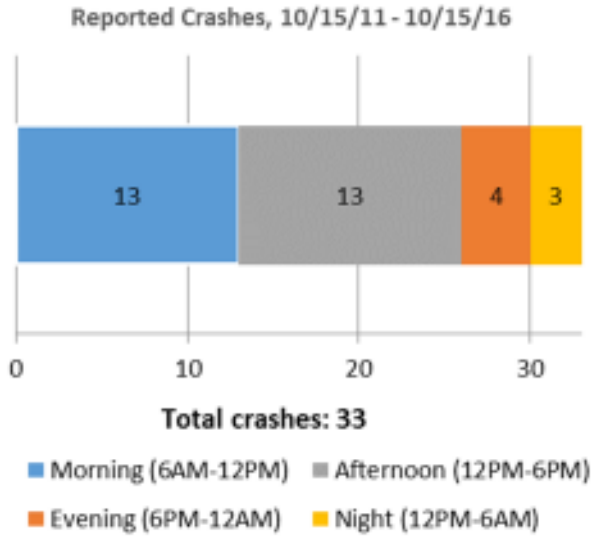



FIGURE 31: CRASHES BY TIME OF DAY

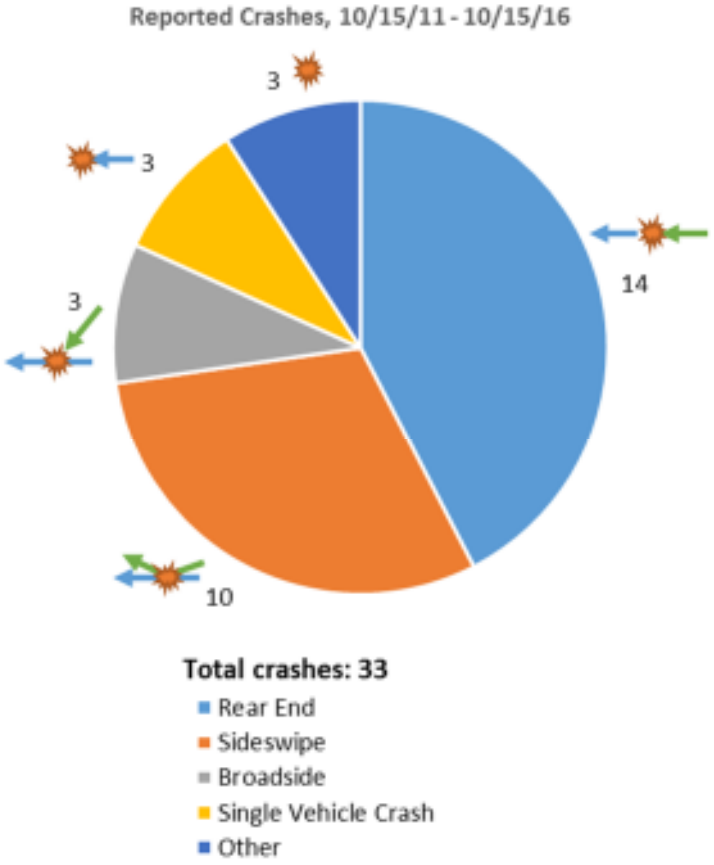



FIGURE 30: CRASHES BY TYPE OF CRASH

## 6.0 PUBLIC MEETING – LOCAL CONCERNS

A public meeting was held on Saturday, November 12, 2016. This meeting was held to gather local residents and experience the intersection as a group. The City's Public Works Staff, RSG consultant team, and 25 residents walked to all five corners, discussed their concerns from their perspective as pedestrians, bicyclists, and motorists, and proposed solutions to improve travel. Notes and the results from this meeting are available as an attachment to this report.

**FIGURE 32: LOCAL CONCERNS MEETING**

# 7.0 PURPOSE AND NEED

The following Purpose and Need statement was developed based on a preliminary review of the study area, concerns articulated at the neighborhood meeting held on November 12, 2016, and comments from the public sent to the project email address.

## PURPOSE

Make the intersection easy and safe to cross for all modes of transportation, including pedestrians, bicycles, transit, and vehicles, while maintaining vehicle capacity. In addition, create an inviting and welcoming environment to foster the emerging neighborhood.

## NEED

The need for this project is documented by the following issues:

a. Expansive pavement makes crossing the intersection unsafe for pedestrians, bicyclists, and vehicles.
    i. Pedestrians must walk over 50 feet (up to 80 feet) to cross several legs.
    ii. Bicyclists must travel from stop through a wide and long distance with no markings. Bicyclists have particular difficulty heading eastbound on Howard Street, when they must stop on a steep uphill grade.
    iii. Vehicles entering during yellow phase may not be able to cross the intersection before the light turns red.

b. There are no pedestrian signals or button actuation; it is not obvious to pedestrians when to safely cross, and motorists do not have guidance to yield to pedestrians.

**FIGURE 33: A WOMAN WAITS FOR THE BUS ON ST. PAUL ST, BY POTVIN PARK**

c. There is no crosswalk across S. Winooski Ave.

d. There have been 33 vehicle crashes in the past five years.

e. Transit facilities are underdeveloped despite serving many people, including students taking the bus to school. There are no bus shelters, dedicated waiting areas, or dedicated bus pull-off zones, and snow can pile up in winter.

f. There is poor visibility to traffic signals for motorists.

    i. Signals are difficult to see in some lighting situations

    ii. Signals do not have back plates.

    iii. The signals are located in the center of the intersection.

g. There are many reports from neighbors that vehicles speed through the intersection. Speed data has not been collected to confirm this perceived issue.

h. There are many reports from neighbors that vehicles run red lights. This issue was confirmed by watching a video recording of the intersection.

i. There is a report from a neighbor that motorists do not always see the "Do Not Enter" sign for S. Winooski Ave and try to drive north on the street.

j. Trucks drive on S. Winooski Ave (Urban Principal Arterial) which is prohibited to trucks (neighborhood envinroment).

k. Right-turn on red rules of the intersection are unclear. Right turns on red from Howard Street westbound and S.


**FIGURE 34: THE S. WINOOSKI AVE BIKE LANES END AT THE WHSP INTERSECTION.**

Winooski southbound are particularly dangerous due to the five legs of the intersection.

l. Potvin Park is underutilized as a public space.

m. Pedestrians do not have space to linger, limiting the possibility of fostering a sense of community.

n. The bicycle lanes on S. Winooski Ave stop at the intersection. Bicyclists do not have dedicated facilities to continue to or from the southern leg of St. Paul Street.

**FIGURE 36: FOOTSTEPS IN THE SNOW SHOW PEDESTRIAN ACTIVITY**

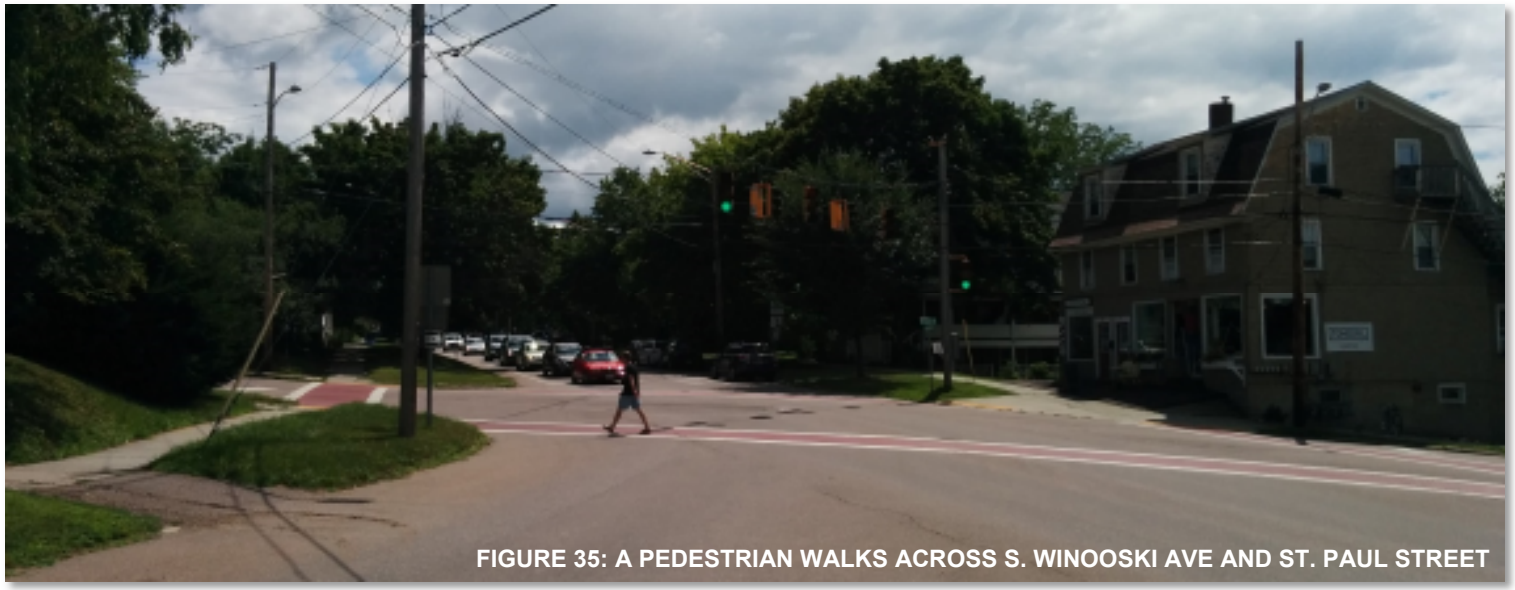


**FIGURE 35: A PEDESTRIAN WALKS ACROSS S. WINOOSKI AVE AND ST. PAUL STREET**

## 8.0 ALTERNATIVES FOR CONSIDERATION

### RECOMMENDATIONS FROM OTHER STUDIES:

**planBTV South End:** Consider appropriate locations for new traffic signals, roundabouts or mini-roundabouts.

**planBTV Walk Bike:** Explore mini-roundabout or signal phasing changes, high visibility crosswalks, and curb extensions with creative materials.

**OSPP**: Incorporate storm water runoff mitigation into open space

The following list of preliminary alternatives is intended to build upon the proposed concepts of past studies and address the needs articulated in the Purpose and Need Statement. These alternatives will be developed in the next phase of the intersection scoping study.

### IMMEDIATE TERM

a. Demonstration project with paint and flexible posts

b. Neighborhood art in remaining asphalt area

c. Bike infrastructure to start from flat

### SHORT TERM

d. Curb extensions

e. Accessible crossing of S. Winooski Ave

f. New signal system – existing geometry

### LONG TERM

g. Roundabout – existing geometry

h. Realigned roadway – traffic signal

i. Realigned roadway – roundabout (traditional / mini / multiple / oblong)


**FIGURE 37: IMMEDIATE TERM DEMONSTRATION PROJECT PROPOSAL (COURTESY: LOCAL MOTION)**