City of Kirkland's Market Neighborhood

Kirkland Market Street Access Study

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Kirkland Market Street Access Study

The Market Neighborhood funded the Market Street Access Study to address traffic and access issues along the corridor. This report summarizes the findings of Mirai Transportation Planning & Engineering (the consultant) and the recommendations of the Market Neighborhood Task Force (Task Force).

OVERVIEW

The Market Neighborhood is located on the water-side (west) of Market Street, a principal arterial that runs north-south from Downtown Kirkland (Central Avenue) to Forbes Creek Drive. The Market Neighborhood is one of 13 neighborhoods in the City of Kirkland (**Figure 1**). Access to and from the neighborhood occurs exclusively on Market Street. Market Street is a principal arterial carrying 22,000 vehicle trips during the day. Traffic volumes along this corridor during commute hours make it difficult for Market Neighborhood residents to easily and safely enter and exit their neighborhood.

Corner of Market Street/20th Avenue W showing typical angled street approaches at intersections.

Stakeholders and Issues

There are a number of stakeholders with varying issues and interests to be considered in this analysis. All of the stakeholders have valid issues and perspectives that need to be addressed.

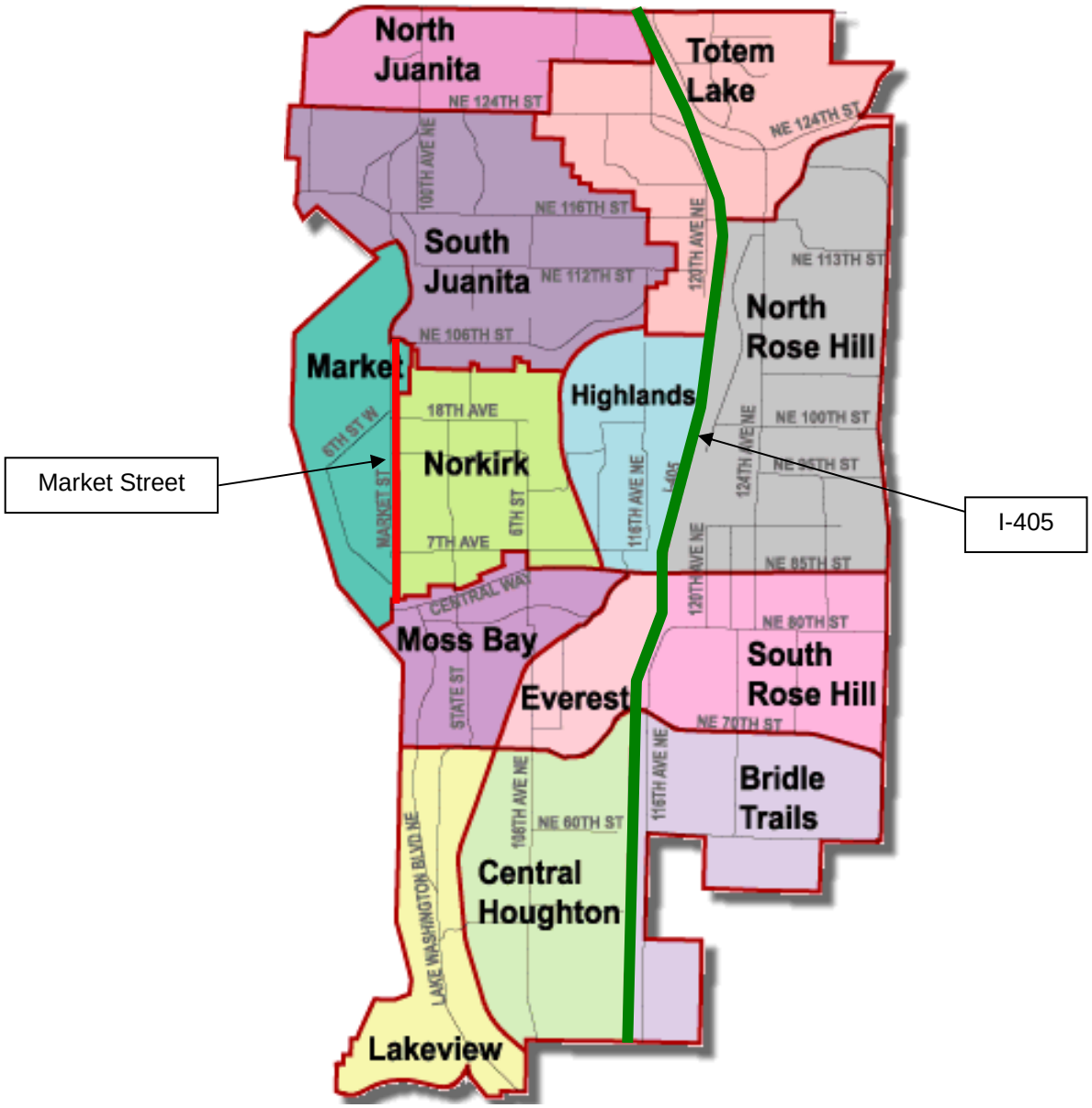
Market Neighborhood

The focus of the Market Neighborhood is to increase the ability of residents to safely enter and exit the neighborhood.

Major issues for the Market Neighborhood include:

- Turning maneuvers entering and exiting neighborhood streets
- Conflicting traffic flows caused by Market Neighborhood "off-angle" grid (example: 18th Avenue W/6th Street W)
- Lack of gaps in traffic that allow turns onto or off of Market Street
- Off-peak vehicle speeding
- Pedestrian crossing safety

Figure 1. Market and other Kirkland Neighborhoods



Source: City of Kirkland

Norkirk Neighborhood

The Norkirk Neighborhood's concern is to prevent increases in traffic volumes on residential streets within Norkirk Neighborhood. The neighborhood is concerned that changes on Market Street could result in more traffic diverting ("cutting-through") residential areas in Norkirk Neighborhood.

Major issues of the Norkirk Neighborhood include:

- Cut-through traffic
- Redistribution of traffic flows from Market Street to parallel Norkirk Neighborhood streets
- Pedestrian crossing safety
- Lack of gaps in traffic to allow turns onto or off of Market Street

Commuters

Commuters travel on Market Street because of perceived or real travel time savings over alternate routes. Their interest is to avoid changes that cause congestion that lengthens their commute trips.

Major issues of the commuters include:

- Travel time
- Congestion
- Safety

City of Kirkland

The City of Kirkland's interest is to increase safety and mobility without creating impacts to the system's roadways and intersections.

Major issues of the City of Kirkland include:

- Overall system operations
- Feasibility
- Safety
- Engineering best practices

CORRIDOR CHARACTERISTICS

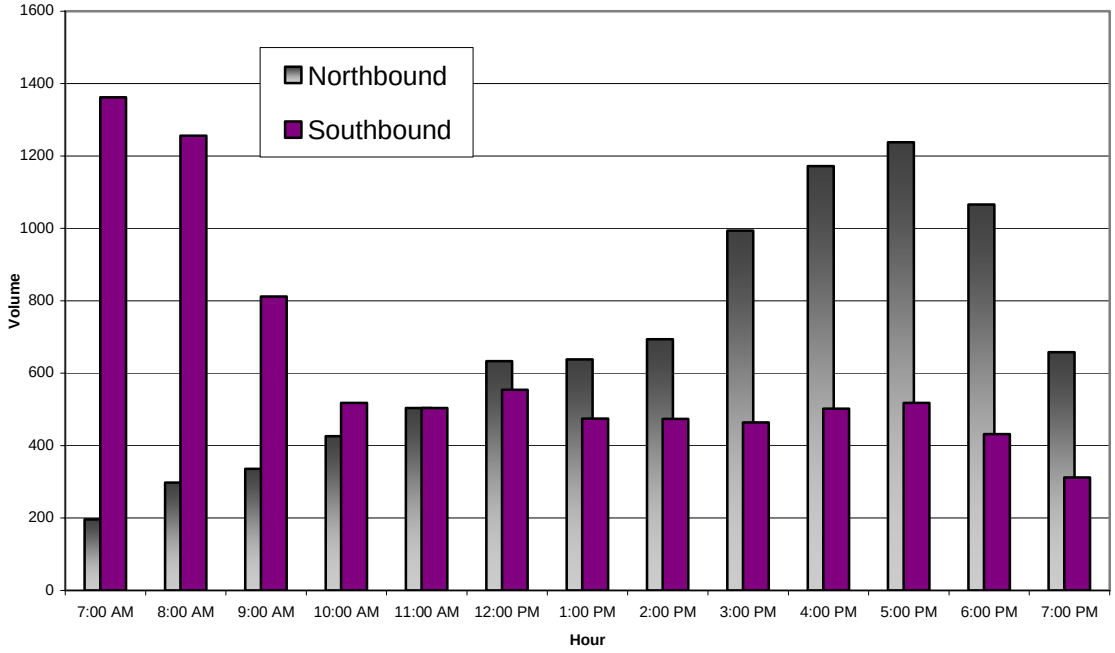
Market Street is the only through north-south route west of I-405 between NE 116th Street and Central Avenue in Downtown Kirkland. Users of the corridor include both local and regional travelers. Regionally, the route is used as a bypass to congestion on I-405 and as a route to access SR 520. Congestion at the NE 116th Street/I-405 interchange may also divert vehicles to Market Street, which then can access I-405 at NE 85th Street. Locally, the route provides a north-

south connection from residential areas to Peter Kirk Elementary School, Kirkland Junior High School and jobs and services in downtown Kirkland.

Traffic Flows

The level and direction of traffic varies depending on the time of day. **Figure 2** shows the northbound and southbound traffic volumes along Market Street by hour of the day. Volunteers from the Market Neighborhood collected turning movement traffic counts at primary intersections. Data collected included the morning commute, midday and the evening peak hour periods to provide an understanding of the differences in traffic flows during each period.

Figure 2. Traffic Volumes by Direction on Market Street by Hour of Day



Morning Commute

During the morning commute, traffic along Market Street is primarily headed south. Traffic from the Juanita area and regional traffic along the 98th Avenue NE-100th Avenue NE corridor travels south towards downtown Kirkland, either to access the Central Way (to NE 85th Street and I-405) or continues down Lakeview/Lake Washington Boulevard towards SR 520. During the peak hour of the morning commute, approximately 1,350 vehicles per hour travel southbound. This southbound volume exceeds the capacity (approximately 1,200 vehicles per hour per direction for an arterial roadway) of the roadway, resulting in

congested conditions that extend into the Juanita Neighborhood to the north. Within the Market Neighborhood, the high traffic volumes on Market Street result in few breaks in the southbound traffic flow, making it difficult for vehicles to turn on to or off of Market Street. Access to the Norkirk Neighborhood is also difficult, but its residents have the option to access the arterial system on Central Way.

Corner of Market Street/Lake Avenue W and Central Way. Access to/from Lake Avenue W can be difficult during peak hours due to the intersection configuration and high southbound volumes.

Source: www.livelocal.com

Evening Commute

During the evening commute, traffic levels are heavy both northbound and southbound. There are approximately 1,200 vehicles per hour traveling in the northbound direction and 500 vehicles per hour headed southbound during the peak hour of the evening commute. Vehicles waiting to make turns can back up beyond the length of turn lanes resulting in blocking of the mainline traffic on Market Street.

Off-Peak Hours

Outside of the peak commuter hours, traffic volumes drop considerably. The lower traffic volumes create more gaps in the traffic flow, allowing vehicles to more easily enter and exit Market Street from the surrounding neighborhoods. However, the lack of congested conditions allows drivers to travel at higher speeds along the corridor.

Traffic Controls

With the exception of the signal at Forbes Creek Drive, minor street approaches at intersections along Market Street are stop-controlled, giving the right-of-way to the north and south movements along the corridor. The Forbes Creek Drive signal is vehicle-actuated, meaning that the north-south movement has a green light unless there are vehicles waiting on Forbes Creek Drive or in the parking lot of the Juanita Bay Park.

Left Turn Restrictions

The City of Kirkland has used left turn controls to reduce delay and improve safety along Market Street. **Figure 3** shows the locations of left-turn restrictions along the corridor. There are two types of left-turn restrictions on Market Street:

landscaped medians that create a physical barrier to turning movements and signed left-turn restrictions. Signed left-turn restrictions also occur at seven locations along the corridor: 16th Avenue, 15th Avenue, 14th Avenue, 12th Avenue, 11th Avenue, 9th Avenue and 8th Avenue. Where turns are permitted, the City has constructed left-turn pockets to facilitate traffic movements.

Travel Speeds

Figure 4 indicates the speed limits and travel speeds along the corridor. In the southbound direction, the posted speed limit is 35 miles per hour until approximately 8th Avenue where it decreases to 25 mph. Analysis of 24-hour speed data found that vehicles regularly exceed the speed limit by 2-4 mph in the 35 mph zone, averaging between 37-39 mph. In the 25 mph zone, vehicles tend to decrease their speed to below 35 mph, but the average speed is 7-8 mph above the posted speed limit. Approximately 85 percent of vehicles exceed the 25 mph speed limit between Waverly Way and Central Way. This data illustrates travel speeds over a 24-hour period, and speed will vary by time of day and levels of congestion.

Intersection Operations

Level of Service (LOS) is a measure of the quality of traffic operations at an intersection. LOS uses an A to F scale, with LOS A representing minimal traffic delays and LOS F representing severe congestion and long delays. The LOS is the measured average control delay per vehicle and is reported for the worst movement, if a study intersection is unsignalized or for the overall average of all approaches if it is signalized. The consultant used the traffic counts collected for this study to calculate the LOS for intersections along Market Street. **Table 1** indicates the LOS definitions for signalized and unsignalized intersections.

Table 1. Level of Service Definitions

LOS	Signalized Delay per Vehicle (sec/veh)	Unsignalized Delay per Vehicle (sec/veh)
A	0-10	0-10
B	>10-20	>10-15
C	>20-35	>15-25
D	>35-55	>25-35
E	>55-80	>35-50
F	>80	>50

Source: Highway Capacity Manual (HCM 2000, Transportation Research Board)

Figure 3. Existing Left-Turn Restrictions

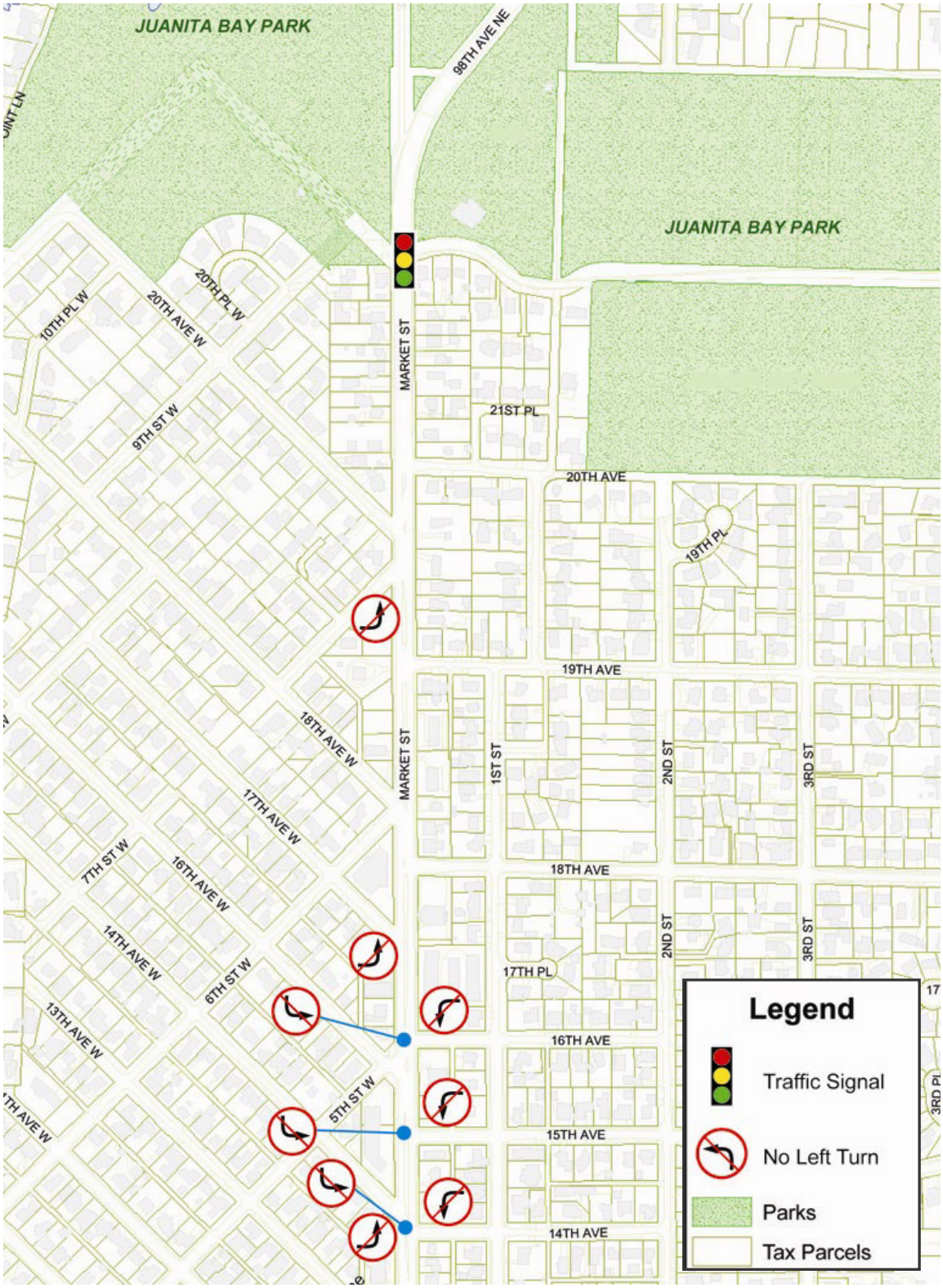


Figure 3. Existing Left-Turn Restrictions (continued)

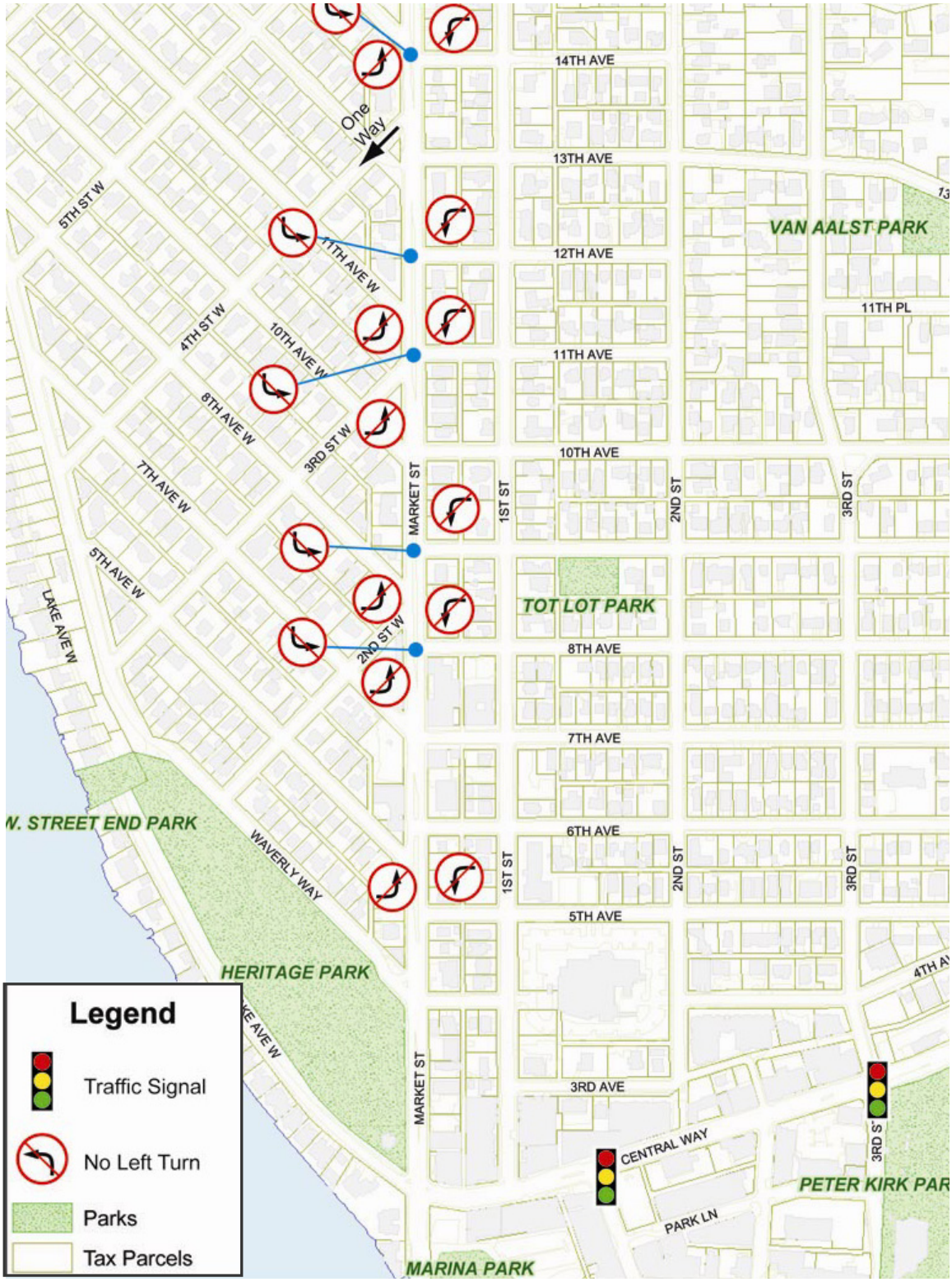


Figure 4. Corridor Travel Speeds and Speed Limits

Table 2 shows the LOS for each intersection during the morning commute, midday and evening commuter peak hours. During the morning and evening peak commute hour, most intersections along Market Street operate poorly, with many operating at LOS E or F. The LOS results during the commute hours have little to do with the volume of traffic on the sidestreet, but mainly reflect the high volumes on Market Street. Midday intersection operation is generally good, allowing vehicles to more easily maneuver into or out of the Market Neighborhood.

Table 2. Existing Intersection Level of Service

Cross Street	Critical Approach	AM Peak	Mid-Day Peak	PM Peak
Forbes Creek Dr	All approaches	D 50.0	A 3.4	A 3.8
20th Ave W 7th St W	Eastbound	F *	 n/a	C 18.6
18th Ave W 6th St W	Eastbound	F 55.5	B 12.3	D 26.5
16th Ave W 5th St W	Eastbound	E 47.2	B 11.9	F 61.9
 13th Ave W	AM: Eastbound PM: Westbound	F 52.2	 n/a	F 55.9
 10th Ave W	Westbound	 n/a	C 17.6	 n/a
7th Ave W 7th Ave	Eastbound	D 29.7	C 19.4	F *
Waverly Way 4th Ave	Westbound	F 234.1	C 17.6	F 60.9
Lake Ave W Central Way	AM&PM: Eastbound Mid-Day: Westbound	F *	E 36.8	F 474.0

* = Delay falls outside of model limits. n/a = No data collected.

Sight Distance

The consultant completed sight distance measurements at all intersections along the west side of Market Street. Providing adequate sight distance allows drivers to see on-coming traffic and to judge if they may safely pull into the flow of traffic. **Table 3** identifies the locations where on-street parking, topography or other object and factors limit the available sight distance.

Table 3. Sight Distance

Intersection	Viewing Direction	Adequate Sight Distance?	Recommendation
20th Ave W	North	No	40 foot red zone
18th Ave W	North	No	40 foot red zone
16th Ave W	North	Yes	No change
14th Ave W	North	No	Relocate bus stop
10th Ave W	North	No	40 foot red zone
7th Ave W	North	Yes	No change
Waverly Ave W	North	Yes	No change
Lake Ave W	North	Yes	Extend existing red zone 20 feet

Vehicle Collisions

Historical data about vehicle collisions (accidents) provide an understanding of the safety of the corridor. Higher collision rates may also identify locations where drivers make risky maneuvers in order to enter or exit the flow of traffic. The City provided collision data for January 1, 2000 to April 1, 2005. **Table 4** shows the number of reported collisions at each of the study intersections. Market Street/Lake Avenue W (Central Way) had the highest number of collisions with 3.2 collisions per year.

The City of Kirkland measures the collisions per million approaching vehicles to determine a rate. The average collision rate for intersections in the City is 0.72 collisions per million entering vehicles. Using this standard, Market Street/Lake Avenue W would have a collision rate of 0.42, below but approaching the City average.

Table 4. Reported Collision Summary (1/2000-3/2005)

N/S Street	E/W Street	Total	Annual Average
Market Street	Lake Ave W	15	3.2
Market Street	Waverly Way	3	0.6
Market Street	7th Ave	2	0.4
Market Street	13th Ave	1	0.2
Market Street	16th Ave W	1	0.2
Market Street	20th Ave W	2	0.4
Totals		24	

Table 5 shows the type of collision by location. The high number of angle collisions at Market Street/Central Way is indicative of vehicles attempting to pull out into on-coming traffic. The rear-end collisions are indicative of traffic suddenly coming to a stop.

Table 5. Reported Collisions by Type (1/2000-3/2005)

Location		Collision Type							
N/S Street	E/W Street	Rear End	Turn	Head On	Angle	Fixed Object	Side swipe	Ped / Bicycle	Total
Market Street	Lake Ave W	4	1	0	5	2	2	1	15
Market Street	Waverly Way	1	0	0	0	2	0	0	3
Market Street	7th Ave	1	0	0	1	0	0	0	2
Market Street	13th Ave	0	0	0	0	1	0	0	1
Market Street	16th Ave W	1	0	0	0	0	0	0	1
Market Street	20th Ave W	1	0	0	0	0	1	0	2
Totals		8	1	0	6	5	3	1	24

Conflict Points

Conflict points represent the number of ways vehicle pathways cross at an intersection, with each conflict point at a location where a potential crash could occur. As the number of conflict points increase, drivers must be more aware of other vehicles, increasing the difficulty for drivers to make maneuvers. Making these maneuvers is further compounded by the acute angles of many of the streets approaches to Market Street. Intersections with high numbers of conflict points include 18th Avenue W/6th Street W (32), 16th Avenue W (25), 13th Avenue W (32), 10th Avenue W (32), Waverly Way (32) and Lake Avenue W (32). Reducing the number of conflict points could aide in the ability of Market Neighborhood residents to gain access onto Market Street. **Figure 5** shows the how the conflict points apply at the 18th Avenue W/6th Avenue intersection**.** **Figure 6** lists the number of conflict points at each major intersection along Market Street.

Figure 5. Conflict Points at 18th Avenue W/6th Street and Market Street Intersection

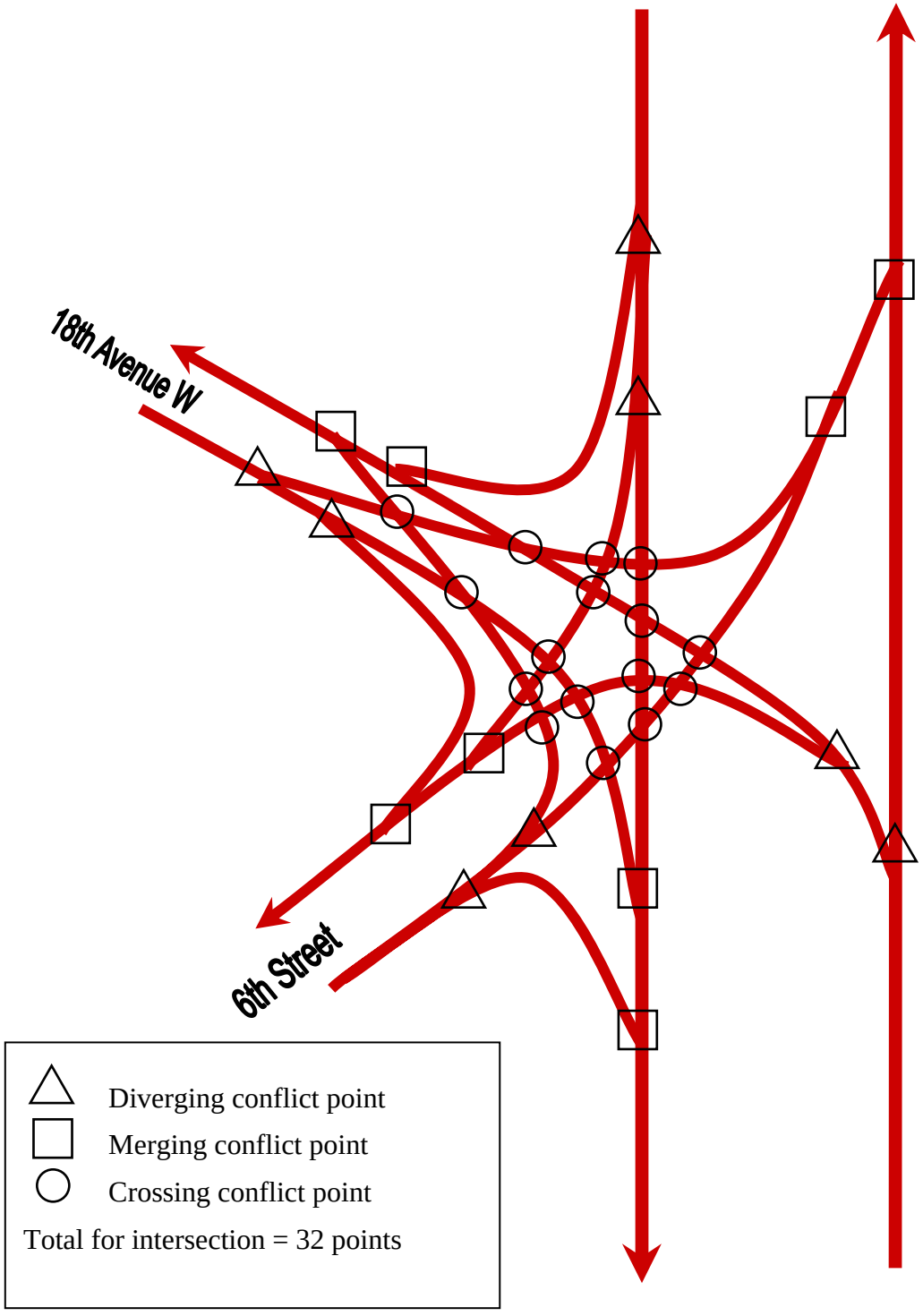


Figure 6. Intersection Conflict Points

Pedestrian Facilities

Figure 7 shows the location of crosswalks on Market Street. There are also crosswalks on all minor street approaches on Market Street. Most of the crosswalks along Market Street consist of simple striping, while others have curb bulbs, crossing flags, in-pavement or signed crossing lights to help improve pedestrian crossing visibility and to stop on-coming traffic. Pedestrian activity along the corridor is generally moderate, with higher levels of pedestrian crossings occurring at south end of Market near Central Avenue and near the retail area near 16th Avenue. Pedestrian activity is typically higher during the warmer and drier months of the spring and summer.

Corner of Market Street/3rd Street West showing vehicle parking, bicycle and main traffic lanes.

Bicycle Facilities

There are bicycle lanes on both sides of Market Street between Forbes Creek Drive and Central Way. These lanes are between the traffic lanes and the parking lane and provide a traffic calming benefit by narrowing the traffic lanes. The bicycle lane also allows bicyclists a "climbing lane" for managing the topographic changes along Market Street. The addition of bike lanes further complicates turning maneuvers for Market Neighborhood residents who have to look both for a break in the mainline traffic and be aware of cyclists who may be approaching around a parked vehicle.

Summary of Existing Conditions

The only access for the Market Neighborhood of Kirkland is to Market Street. During commute hours, residents of the Market Neighborhood have difficulty making turns to get into or out of their neighborhood. High traffic volumes and congested conditions provide few breaks in the traffic flow, resulting in long delays to make turning movements.

Similarly, buses may have difficultly entering the flow of traffic from bus stops and pedestrians may have difficultly crossing the road.

Figure 7. Pedestrian Facilities

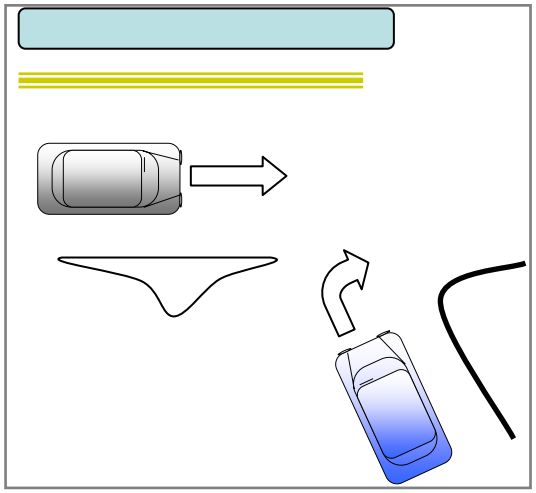
ACTION STRATEGIES

Action Strategies are approaches to address the issues along Market Street. Issues include access, safety and reduction of speeds. Action strategies for Market Street fall into four categories each of which represents a strategy to improve the access, safety and mobility of the Market Neighborhood.

Simplify

The first set of action is designed to simplify the number of movements at an intersection. Actions that fall under this category include actions that reduce the number of conflict points and allow drivers to better be able to use the available gaps in traffic. These actions include:

- Left-turn restrictions
- Right-turn restrictions
- New medians



Restricting turn movements can simply an intersection's operation

Creating Spaces

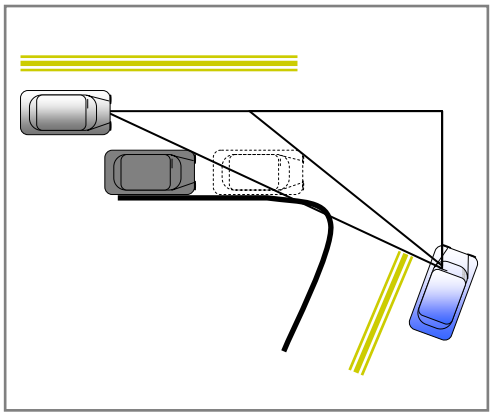
This set of actions is focused on creating breaks or gaps in the flow of traffic. With larger gaps, more neighborhood traffic would be able to make turning maneuvers. Examples of these actions include:

- Signal timing changes
- New traffic signals

Facilitate

This set of actions makes maneuvers easier for neighborhood traffic and improves safety. Market Street currently uses median turn lanes and refuge lanes to aid making left turns. Other improvements that would facilitate mobility include:

- Sight distance improvements
- Curb bulbs and improved crosswalks for pedestrians
- Bus bulbs for transit for in-roadway passenger loading



Parked vehicles and acute angles of streets reduce available sight distances.

Calm

The final type of actions is those designed to slow traffic and to signal a change the character of the street. Market Street has many calming measures in its current design including medians, street trees, bicycle lanes and on-street parking. Examples of other calming measures considered in this analysis include:

- Gateway features to change the roadway character
- Speed display signs to provide direct driver feedback

COMMUNITY INPUT

This study is community-based and community-funded through an allocation of $15,000 from the Neighborhood Connections Program, sixty percent of the neighborhood's available funding. This level of funding reflects the importance of this issue to the Market Neighborhood and its strong desire to address this problem. This study's focus was to investigate innovative and effective ways to improve access to the Market Neighborhood during peak hours. Throughout the study, the neighborhood, consultant and city worked closely to analyze the issues and to develop solutions.

Task Force

Throughout this process, the Market Neighborhood Task Force played an instrumental role. They participated in identifying issues, collecting data, providing oversight and feedback and selecting the final recommendations. This plan reflects their thoughts and vision of how best to approach the issues facing their neighborhood and the community at large. The Task Force included representatives of all areas of the Market Neighborhood as well as a representative of the Norkirk Neighborhood, who spoke to the concerns of the Norkirk residents.

Open House

On June 11, 2006, a community open house presented conceptual solutions for the Market Street corridor and sought to gain input and reaction to the ideas presented. The attendees at the event provided thoughtful insight and new perspectives for the consultant, City and Task Force. A survey captured the attendees' thoughts and concerns about the information presented. This input is summarized in the appendix.

TASK FORCE RECOMMENDATIONS

Following the Open House, the Task Force reviewed the recommendations, discussed the merits of each and prioritized the list to reflect the best interest of the Market Neighborhood. The Task Force used a four-level priority ranking system to reflect the level of support and feasibility:

- Priority 1: The element received general consensus; it is feasible; can be implemented quickly.
- Priority 2: General agreement; but requires more time and funding to accomplish.
- Priority 3: Some disagreement; worth exploring further.
- Priority 4: Interesting ideas, but do not include in the plan.

Priority 1

Improvements that received top priority where those projects that could be implemented easily, at a low cost and that had general support from the community and Task Force.

Forbes Creek Drive Signal Timing

The Forbes Creek Drive signal could be used to control the flow of traffic particularly in the morning commute period. During the morning commute, traffic volumes are predominantly southbound. By creating a longer all-red phase at this signal, larger gaps in the traffic flow could be created, improving the ability of Market Neighborhood traffic to more easily make left-turn maneuvers.

CONSULTANT ANALYSIS

Videotaped tests and computer model simulation were completed to understand the potential gaps that could be created. Results of the videotape analysis are found in **Table 6**. The field test compared a three-second to the standard one-second all-red phase to identify if the created gaps could benefit the downstream intersections that serve the Market Neighborhood. While the results were based on a small sample, the observations revealed a reduction in wait times for vehicles making right turns from 18th Avenue W and 6th Street W during the AM peak hour.

Table 6. Videotape Results of Forbes Creek Drive 3-Second All-Red Phase

Analyzed Movement	Change in Delay with 3 second all-red
Right-turn Exit: 18th Avenue W to Market Street Southbound	-1 to -70 seconds
Right-turn Exit: 6th Street W to Market Street Southbound	+ 1 to -22 seconds
Left-turn Exit: 18th Avenue W to Market Street Northbound (Note: very small data sample)	- 22 to +96 seconds
Left-turn Exit: 6th Street W to Market Street Northbound	+1 to -17 seconds
Left-turn Entering: Northbound Market Street to 18th Avenue W	-1 to-57 seconds
Left-turn Entering: Northbound Market Street to 6th Street W	-1 to-13 seconds

The consultant completed a SimTraffic simulation of the corridor to assess the benefit of a 3-second all-red phase at the intersection. The SimTraffic model uses traffic count data, signal timing and characteristics of drivers and vehicles to develop microsimulation of the inter-relationships between the corridor's intersections. Five 15-minute simulation periods were used to assess the change in delay. **Table 7** shows the results of the traffic simulation.

Table 7. Simulation Results of Forbes Creek Drive 3 Second All-Red Timing Change

	Approach	1 sec	3 sec	Change in seconds
Forbes Creek Dr & Market St	All	21.2	32.2	11.0
Market St & 20th Ave W	Southeast	97.2	73.5	-23.7
Market St & 7th St W	Northeast	44.0	63.2	19.2
Market St & 18th Ave W	Southeast	439.6	143.3	-296.3
Market St & 6th St W*	Northeast	114.2	83.5	-30.7
16th Ave W & Market St	Eastbound	41.9	44.4	2.5
13th Ave W & Market St	Eastbound	12.0	20.9	8.9
7th Ave W & Market St	Southeast	44.1	32.6	-11.5
4th Ave W & Market St	Westbound	86.6	108.3	21.7
Waverly Way & Market Street	Southeast	133.3	86.7	-46.6
Lake Ave W & Market St	Eastbound	156.4	105.2	-51.2
Lake Shore Plaza & Market St	Northbound	48.3	47.7	-0.6

*Includes proposed left turn restriction on 6th Street W.

The traffic simulation shows the greatest benefit at 20th Avenue W and 18th Avenue W and 6th Street W. Beyond this intersection, there appeared to be a mix of results with some intersections showing gains and others losses. The combination of upstream traffic filling in the available gaps, plus the tendency for traffic to spread out once it leaves a signal.

The two evaluations provide only an indication of actual day-in/day-out experiences by residents. The videotape is limited by the size of the sample; while the simulation is limited by the model's underlying assumption and inability to fully reflect human behavior. In both cases, the results do show that a change in the signal timing at Forbes Creek Drive would improve access to the Market Street Neighborhood.

TASK FORCE RECOMMENDATION

- Further test and analyze the effect of an extended all-red signal timing phase at this signal. The first videotape tests showed reduced wait times at 18th Avenue W, but additional field tests are needed to confirm the results of the videotape and computer simulations.
- Have the City set up a trail period of not less than one week to further analyze the performance of the signal timing change and to obtain public feedback.

No-Parking Zones

Add no-parking (red zones) at key locations along Market Street to improve visibility between southbound traffic and vehicles turning onto Market Street.

CONSULTANT ANALYSIS

The addition of no-parking areas to the north of key corridor intersection would improve sight distance at locations where the orientation of the intersection or topographic changes limit the ability to have a clear view towards on-coming traffic. Adding a no-parking zone can improve the sight distance for vehicles entering the stream of traffic and for vehicles on the mainline to see waiting vehicles. The consultant recommended extending the existing no-parking zone adjacent to Lake Avenue W intersection.

16th Avenue W and Market Street no parking zone improves the visibility of on-coming traffic.

TASK FORCE RECOMMENDATIONS

The Task Force in developing these recommendations considered and weighed the need for on-street parking with the improved access and safety on Market Street.

- 7th Street W. Stripe a 40-foot no-parking zone on the west side of Market Street north of 7th Street W.

- 18th Avenue W. Stripe a 40-foot no-parking zone on the west side of Market Street north of 18th Avenue W.
- 14th Avenue W. Stripe a 40-foot no-parking zone on the west side of Market Street north of 14th Avenue W.
- 10th Avenue W. Stripe a 40-foot no-parking zone on the west side of Market Street north of 10th Avenue W.
- Lake Avenue W. Extend the existing no-parking zone on the west side of Market Street by approximately 25 feet (additional consultant recommendation).

6th Street W Turn Restriction

Turn restrictions can simplify an intersection by reducing the number of conflict points and improving the intersection's operation and safety.

CONSULTANT ANALYSIS

Restricting the few motorists who turn left from 6th Street W to northbound on Market Street during commute hours would reduce the number of conflict points between 6th Street West and 18th Avenue W intersections and improve the operation of the intersections, particularly during the AM peak hour. Parallel routes such as 5th Street W may see small increases in traffic, as well as the intersection of 16th Avenue W/Market Street.

TASK FORCE RECOMMENDATIONS

- Prohibit left turns from 6th Street W to northbound on Market Street.

18th Avenue W U-Turn Restriction

This turn restriction would prohibit U-turns occurring at 18th Avenue W for northbound and southbound traffic on Market Street.

CONSULTANT ANALYSIS

Restricting U-turns for northbound and southbound traffic on Market Street at 18th Avenue W would reduce the number of conflict points. No U-turn signs would be posted for the left turn movements. Enforcement may be required if voluntary compliance is not successful.

TASK FORCE RECOMMENDATIONS

- Prohibit U-turns northbound and southbound on Market Street at the intersection of 18th Avenue W.

NE Juanita Drive Turn Restriction

This turn restrictions would eliminate right turns on red from NE Juanita Drive to southbound on 98th Avenue NE.

CONSULTANT ANALYSIS

Approximately 530 vehicles make a right turn at NE Juanita Drive during the peak hour of the morning commute. This restriction would cause the LOS operation of the NE Juanita Dr/98th Avenue NE intersection to degrade from LOS D to LOS E and result in long vehicle queues for eastbound traffic. This turn restriction may increase congestion on alternative routes and would require enforcement by the City's traffic patrol officers to be effective. From the perspective of the Market Neighborhood this action would have the positive effect of spreading the traffic load more evenly among other communities and lessening the burden on the Market Street corridor.

TASK FORCE RECOMMENDATIONS

- Prohibit free right turns on red during the peak hours. Obtain additional analysis to identify the number of users, impacts and the benefit to Market Street Access. If practical, this would be a low-cost item.

Education/Courtesy Campaign

Education campaigns typically focus on changing driver behavior. The envisioned program would include signage and pavement markings to lower speeds and reduce intersection blockage. Other actions could include roadway banners, bumper stickers or roadway signs to encourage courteous behavior and reductions in travel speeds.

CONSULTANT ANALYSIS

An education campaign could result in drivers allowing vehicles to enter and reducing intersection blocking as long as actions are actively promoted. After a time, courtesy signs and banners will become less effective as drivers become accustomed to the signs. Pavement striping may reduce intersection blocking but must be regularly maintained to be effective. Bumper stickers ("I brake for my Neighbors") may provide a degree of long-term effectiveness due to the "peer-pressure" effect.

TASK FORCE RECOMMENDATIONS

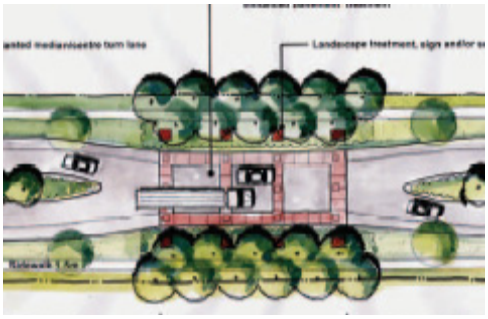
- Include signage and pavement striping to encourage motorists on Market Street to let side traffic in ("Do not block intersection") at intersections that routinely experience blockage from stopped traffic. Other actions could include roadway banners, bumper stickers or roadway signs to encourage courteous behavior and reductions in travel speeds.

Priority 2

The Priority 2 projects are those that received general support; however, these projects are expected to require more time and funding to accomplish.

Gateway Treatment on Market Street/98th Avenue NE

A gateway north of Market Street on 98th Avenue NE may provide visual and possibly tactile cues to lower speeds.



Example of a Gateway Treatment

Source: Binbrook Village Community Core Urban Design Guidelines

CONSULTANT ANALYSIS

Gateways are visual queues that let drivers know that there is a change in the character of the roadway ahead. Gateways and the adjacent corridor should have a continuity of visual themes (street lighting, banners) to reinforce the measure. Impact to emergency vehicle response should be considered. The effectiveness of a Gateway as a speed control would be low to moderate.

TASK FORCE RECOMMENDATION

- Create a gateway north of Market Street on 98th Avenue NE.

Enhanced Crosswalks

The enhanced crosswalks concept would include curb bulbs, pedestrian scale lighting, crosswalk stop bars, differing pavement materials and other features to improve the visibility of pedestrians and to change the atmosphere of the corridor.

Example of an enhanced crosswalk with distinct paving materials.

Source: WSDOT

CONSULTANT ANALYSIS

Actions that narrow the paved width of the street, such as curb bulbs, tend to provide some slowing of traffic by creating a more neighborhood-scale to the arterial. Pedestrian-scale lighting near crosswalks can improve the visibility of waiting pedestrians to drivers during low-light conditions.

TASK FORCE RECOMMENDATIONS

Place improved crosswalks with curb bulbs and lighting at the following locations:

- 20th Avenue W
- 18th Avenue, north of 17th Avenue W
- South side of 14th Avenue W
- North side of 12th Avenue
- South side of 9th Avenue
- 7th Avenue W/7th Avenue
- Waverly Way

Speed Radar Sign

A speed radar sign indicates the speed at which an approaching vehicle is traveling and provides a comparison to the posted speed limit. The proposed location would be near 2nd Street W where the speed limit drops to 25 mph.

Radar speed limit sign on Lake Washington Boulevard.

CONSULTANT ANALYSIS

These types of signs can provide a visual reminder to drivers about their travel speed and may result in drivers adjusting their speeds. The signs are most effective when they only display when speeds exceed the posted limit. Care should be taken not to place speed radar sign close to crosswalks or other locations requiring a high degree of driver attention.

TASK FORCE RECOMMENDATION

- Install a radar sign on the west side of Market Street at 2nd Street W, where the southbound speed limit changes to 25 mph.

Traffic Signal at Lake Avenue W/Market Street

Traffic signals control the main street traffic and allow designated times for side street traffic and pedestrian movements.

CONSULTANT ANALYSIS

Traffic signals should be used only after other actions have been considered. Typically, the signal warrants established by the Manual of Uniform Traffic Control Devices should be met prior to consideration of a signal. A traffic signal at the proposed location would improve pedestrian safety and would improve access to Marina Park and Lake Avenue W. The signal should be coordinated

with the Central Way/Lake Street signal to minimize vehicle delay. Vehicle queues should be expected after signal installation on Central Way (westbound) and Market Street (southbound). The City should consider an exception to the standard warrant analysis at this location because of the unique characteristics of the Central Way/Lake Avenue W intersection:

1. The primary traffic flows are southbound to eastbound and westbound to northbound. The current intersection configuration is confusing and movements could be better controlled with a signal.
2. There are high levels of pedestrian activity in the area (downtown Kirkland) and the pedestrian crossing just east of the intersection is not easily visible for southbound traffic. While typical volumes are less than the 100 pedestrian crossings per hour required to meet the MUTCD pedestrian warrant, a signal control should improve the safety for pedestrians at this intersection.
3. Minor movements at this intersection are severely impacted by traffic at this intersection. A signal would allow movements to and from Lake Avenue W and Lake Shore Plaza the opportunity to safely make maneuvers. Drivers are often observed to "give up" their initial turn direction because of the difficulty of making the turns during peak hours.

TASK FORCE RECOMMENDATION

- Install a new traffic signal at Central Way and Market Street to improve pedestrian safety and improve access to/from Marina Park and Lake Avenue W.

Priority 3

Priority 3 projects received mixed support. Some members of the task force and attendees at the open house favored these projects, while others opposed them. The Task Force recommends further exploration of these actions in the future.

Example of a Bus Bulb facility.

Source: Transit Cooperative Research Program - Project A-10A: An Evaluation of Bus Bulbs on Transit, Traffic and Pedestrian Operations

- 16th Avenue W/5th Street W traffic signal – Provides positive access to Market Street from the neighborhood.
- Bus bulbs on the west side of Market Street south of 2nd Street W (and other locations) – Allows buses to stop in the moving lane of traffic to load and unload passengers. Create gaps to the south and to enhance bus operations. The low frequency of buses may only provide a small benefit.
- Speed limit reduction on Market Street – Reduces the posted speed limit from 35 mph to 30 mph north of 8th Avenue W on Market Street. The 25 mph speed zone south of 8th Avenue W would remain unchanged. The Task Force recommends revisiting this action after physical changes have been made to Market Street that will encourage lower speeds.
- Improve I-405 connections – Develops routes to I-405 to encourage use of the freeway rather than Market Street. The Task Force and attendees of the Open House thought this was a good idea, but the specifics and evaluation on 'how' to do this was beyond the scope of this project. Projects like the turn improvements at the intersection of 100th Avenue NE/NE 124th Street and the freeway improvements on I-405 are a good start. We encourage the City to look for other opportunities to accomplish this objective.

NEXT STEPS

The next step in the process is to secure the funding and support necessary to implement the plan.

Community Support and Advocacy

The Market Neighborhood will need to advocate for the support of this plan's actions by keeping the neighborhood's issues in the forefront of the City's decision making process. Areas of advocacy would include:

- Development applications
- Planning and policy documents (Transportation Element, Non-Motorized Plan)
- Road maintenance activities
- City of Kirkland Capital Improvement Plan and Transportation Improvement Plan
- Annual Budget review
- School Walk Route Advisory Committee
- Kirkland Transportation Commission Meetings

Funding

Most of the funding for these projects would be scheduled as part of the City of Kirkland's transportation funds. Projects would be prioritized against other priority projects within the City. The City uses a prioritization process that ranks projects on six criteria:

- Fiscal - Comparison of unit project cost to standard costs for a similar project. Anticipated maintenance costs. Opportunities to leverage funds with other funding sources such as planned roadway construction and maintenance projects, developer frontage improvements and the applicability of grant funding sources.
- Plan Consistency - Consistency of the project with the neighborhood plans, City Comprehensive Plan or regional improvement plans.
- Neighborhood Integrity – Level of public support, consistency with neighborhood plans and consistency with surrounding facilities
- Transportation Connections - Degree that project completes existing transportation system, provides connections to schools, park, transit, and business districts.
- Multimodal – Degree that the project encourages use of pedestrian, bicycle and transit modes of travel

- Safety – Consistency with design standards, measurement of pedestrian activity and serves population that are at higher risk.

Table 8 shows how each of the Task Force Priority 1 and 2 recommendations responds the funding criteria of the City. The table indicates the degree (high, medium or low) the action would meet each criterion. This is a guide only and not all of these projects are large enough to become capital projects. Smaller projects might be done through existing City programs.

CONCLUSIONS

The Market Neighborhood Access Plan identifies a series of actions that may improve the accessibility of the neighborhood for pedestrian and vehicle traffic. The Task Force, in conjunction with community input, has prioritized these projects based on the level of support and ability to fund and implement these projects. Further analysis for the design and construction of these proposals will need to be completed prior to the implementation of the projects.

Table 8. Priority 1 and 2 Project Consistency with Funding Criteria

	Fiscal	Plan Consistency	Neighborhood Integrity	Transportation Connections	Multimodal	Safety
Forbes Creek Drive Signal Timing	+	+	+	O	O	√
No-Parking Zones	+	+	+	O	√	√
6th Street W Turn Restriction	+	+	+	O	O	+
18th Avenue W U-Turn Restriction	√	+	+	O	O	+
NE Juanita Drive Turn Restriction	+	√	O	--	O	--
Education/Courtesy Campaign	√	+	+	+	+	+
Gateway Treatment on Market Street/98th Avenue NE	√	+	+	+	O	+
Enhanced Crosswalks	+	+	+	+	+	+
Speed Radar Sign	+	+	+	+	O	+
Traffic Signal at Lake Avenue W/Market Street	√	+	+	+	+	+

+ High degree of match to criterion
√ Partially meets criterion
O Neutral
-- Low degree of match to criterion

Appendix

Market Street Access Project
Comments from the Open House of June 8, 2006
as of July 6, 2006; comments 'due back to the City by June 26, 2006'

Residents of the Market Neighborhood

1. Need to provide routes other than Market Street to link Juanita Drive and I-405. Suggest reversible one-way of NE 116th Street.
2. I think that sight triangles that allow one to see further down Market Street when entering would be very helpful.
3. Adjust the Forbes Creek signal; add bus bulbs with support from Metro; lower the speed limit to 25 mph for the full length of Market Street; add curb bulbs at crosswalks for pedestrians; add eye-level flashing lights at the on-pavement crosswalk lights.
4. I approve the entire plan. My top priorities are traffic signals at Market and Central and at Market and NE 16th Street; speed reduction on Market Street, adjusting the timing of the signal at Forbes Creek Drive.
5. Reduce speed to 30 mph using traffic calming measures and permanent radar signs; I am wary of reducing left turn lane access. During peak hours this makes sense, but most of the time it is perfectly safe to make left turns. I like the 'neighborhood transition' idea. A traffic signal would create more problems that it fixes.
6. Thank you for looking at this issue. I think the signals at NE 124th, NE 116th, and Forbes Creek lights should be changed to encourage traffic to use new lanes and improvements on NE 124th St and on I-405 and combine that with an education program consisting of mailers and other measures to promote the new routes. Prohibit free right turns from Juanita Drive and delay the signal timing to force traffic to use NE 116th Street. Prohibit parking on the west side of Market Street during the morning peak hour.
7. **Market Street works fine except for one hour in the morning and one hour in the evening. Forget the bulbs and narrowing of lanes – it doesn't work. Permanent radar signs make sense. Try enforcing existing traffic laws and requiring landowners to keep landscaping cut back for proper line of sight. Signal at Market and Central makes sense.
8. Change the signal timing at Forbes Creek Drive to make the red longer and evaluate the benefit. Add a traffic signal at Central and Market. Use photo speed ticketing on southbound Market Street.
9. Add a signal at Central and Market – the wiring is already in place.
10. Install a signal at Central and Market. Safety is a major concern here. Add on-street parking to both sides of Waverly Ave to assist the reduction of parking on Market St to improve sight distances. Install 3 bollards in the crosswalk at Lake Street and Central on the south side of the intersection in the crosswalk between Tripple J's and the public parking lot – that would significantly reduce traffic volumes, making downtown Kirkland more safe, more attractive to pedestrians, and less a major traffic corridor.
11. Install a signal at Central and Market. I use that intersection 4 – 8 times a day. It is very difficult to get from Lake Ave W to Central or Market. It is also extremely dangerous for pedestrians. The newest crosswalk on Central is

especially dangerous for pedestrians. A signal would also help get visitors turning left to the park, businesses and to the boat ramp. Also, lower the speed limit and enforce it – I never see police on Market Street.

12. Consider making streets like NE 132nd St. one-way to encourage motorists to use I-405 instead of Market St and downtown streets. Consider limiting car access on downtown streets at peak hours – it seems to work for the Wednesday market. Traffic signals would delay traffic even more. Coming into the city after 4 pm can be very frustration – I have to be creative just to get home. Don't allow any more apartments or homes for 6 months.
13. Install a turn prohibition at 6th Street West; install a permanent radar signs, particularly at the 25 mph zone; prohibit parking to improve sight distances, and add curb bulbs.
14. Thank you for the Open House. I support/suggest changing the signal timing at Forbes Creek Drive;; adding a gateway treatment and other traffic calming measures to Market Street; parking prohibitions on Market St to improve the visibility of on-coming traffic; 'right turn only' from 6th Street W to simplify the operation at that complex intersection; curb bulbs, lighting, etc to improve crosswalks; a radar sign might be effective; New ideas: prohibiting 'right turn on red' from Juanita Drive to Market Street; allow a 2-lane left turns from southbound Market St to eastbound Central Way – will need to prohibit parking to do this; enhancing the capacity of NE 116th Street. I don't support adding a traffic signal at 16th Ave W or adding a signal at Market Street and Central Way – they will cause backups that will encourage cut-through traffic, probably in Norkirk; bus bulbs – they will only irritate drivers and encourage them to cut through the neighborhoods – probably Norkirk.
15. Thank you for the Open House. Same comments as #14 from a different address.
16. I like the traffic signal ideas for Market @ 16th Ave W./5th St. W. and at Central and Lake St (Lake Ave W.?) best. I like the other suggestions, but the signals seem to be the most effective.
17. The plan does not address the traffic problem, but deals with details of making Market Street "pretty". Most of the ideas slowed traffic rather than keeping it out. (no address provided)

Residents of the Norkirk Neighborhood

1. Thank you for this project; Suggest reducing the speed using speed reducers, narrowing, and possible stop signs at appropriate locations. No traffic signals as they would change the charm/village feel of Kirkland; Use a roundabout instead of a signal at Central Way and Market Street; let motorists know they are entering a neighborhood and to drive carefully. Keep the charm and keep traffic flowing.
2. Slow or reduce traffic on Market St. I am very concerned about improving line-of-sight to facilitate left turns onto Market St from 7th Ave from Norkirk.
3. Support the work of the Task Force, but do not want traffic signals on Market Street because they will attract more cut-through traffic. Concerned about livability, noise and air pollution, traffic conflicts with pedestrians and bicyclists, and safety. Recommend adding "No Through Street" signs in East of Market and enforcing them. Also, we need to limit the volume of cars using our streets, even

Central, Market, and Lake Washington Blvd that have no origin or destination in our downtown. Our streets were not intended as substitutes for I-405.

4. Signals on Market Street would be a very bad idea – it would increase traffic short-cutting through the neighborhood: just look at the amount of traffic that moves to Market Street when an accident happens on I-405. Such cut-through traffic volume is bad enough, but those motorists are speeding to 'beat the flow'. Restricting flow on Market Street in any manner seems ill fated.

<u>Comments from those who did not indicate an address</u>

1. Create gaps; add a traffic signal; allow for connectivity between neighborhoods and allow for north/south inner-city traffic.
2. Encourage high occupancy vehicles to get fewer vehicles on the roads. Encourage smaller cars; provide passenger train service.