# BACKGROUND CONDITIONS

The background conditions are those that currently exist or would exist in the study area in the future if no improvements were made to the roadway network. This study evaluates year 2001 and year 2012 conditions—just over a 10-year horizon period.

## Land Use

The South Ballard Transportation Corridor is located within the Ballard Interbay Northend Manufacturing and Industrial Center (BINMIC) and the Ballard Hub Urban Village, and is a critical transportation link for both. Figure 1 shows the study area, including the industrial center and urban village boundaries.

BINIMIC is one of two manufacturing/industrial centers designated in the Comprehensive Plan and one of five manufacturing/industrial centers recognized in the King County Countywide Planning Policies. The purpose of the manufacturing/industrial designation is to preserve industrial land and employment and encourage economic development in the manufacturing and industrial centers. The 20-year growth target (1994 to 2014) for BINMIC is 3,800 jobs.

The Ballard Hub Urban Village is one of seven hub urban villages designated in the Comprehensive Plan. Hub urban villages are targeted to accommodate housing and employment growth to help meet the City of Seattle's growth management goals and policies. Hub urban villages are intended to be mixed-use, pedestrian-friendly neighborhoods with retail and other services that serve the immediate and surrounding neighborhoods. Transportation connections, especially transit, to other urban villages and centers in the city and region are vital to supporting growth under the Comprehensive Plan. The Ballard Hub Urban Village has a 20-year growth target of 1,520 households and 3,700 jobs.

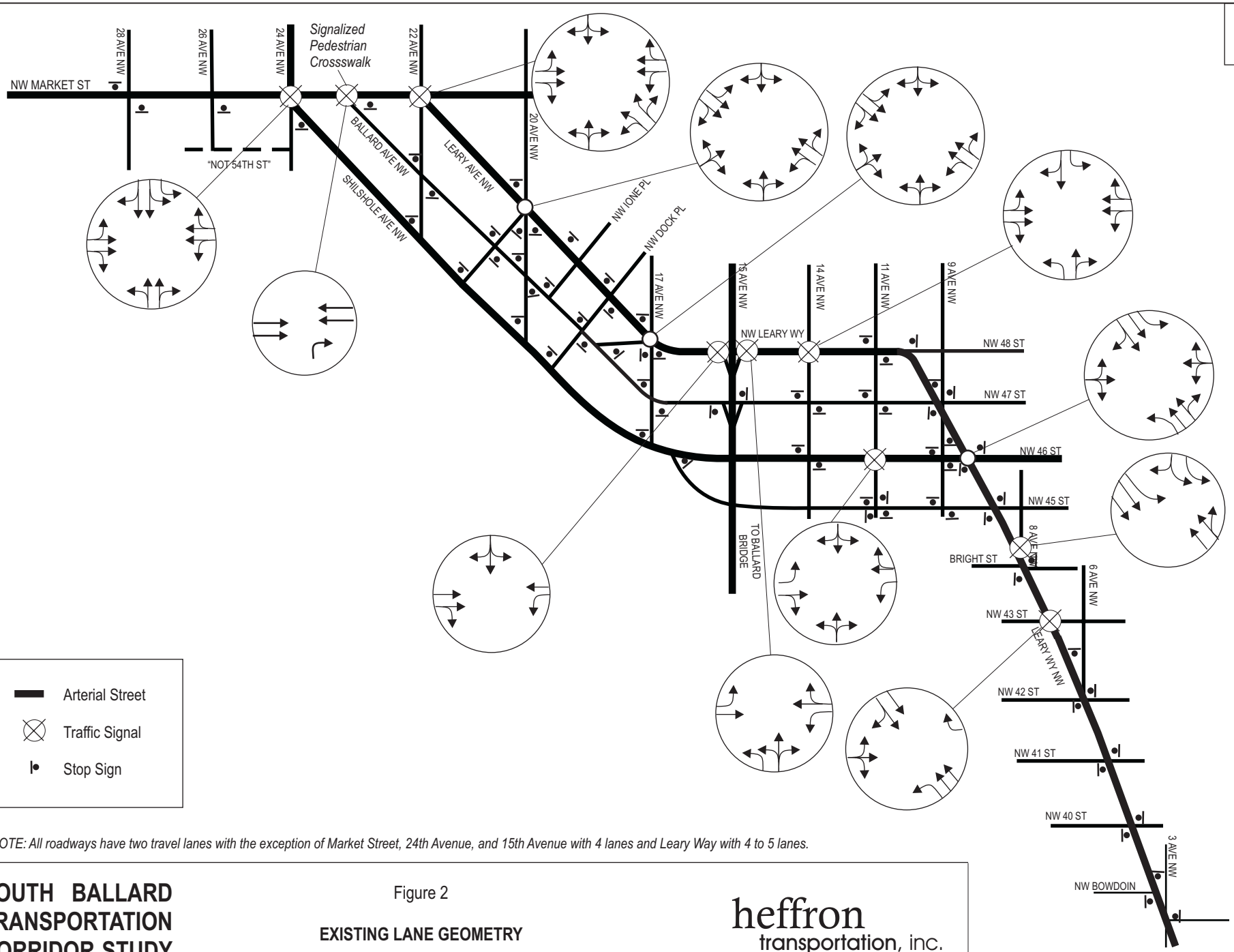
This plan evaluates future growth in the BINMIC and Ballard Hub Urban Village that were anticipated in the City's Comprehensive Plan. No changes in zoning were evaluated for this study.

## Roadway Network

City of Seattle roadways are designated as principle arterials, minor arterials, collector arterials, and local access streets depending upon the street's function in the roadway network. Arterials within the study area include NW Market Street, Leary Way/Leary Avenue NW (henceforth referred to only as Leary Way NW), Shilshole Avenue NW, NW 46th Street, 24th Avenue NW, and 15th Avenue NW. These are shown with the bold lines on Figure 2. It should be noted that all streets and avenues in this study area have a "Northwest" or "NW" designation. This designation has been dropped from the text for brevity.

The *Seattle Comprehensive Plan* also designates major truck streets in the city. Although all arterials are designated as truck streets, "major truck streets" may be given special consideration in making capital investments to improve truck mobility. Designated truck streets within the study area include:

- 15th Avenue
- Leary Way between 3rd and 15th Avenues
- Shilshole Avenue between 46th Street and Market Street
- 46th Street between Shilshole Avenue and Leary Way




*NOTE: All roadways have two travel lanes with the exception of Market Street, 24th Avenue, and 15th Avenue with 4 lanes and Leary Way with 4 to 5 lanes.*

**SOUTH BALLARD TRANSPORTATION CORRIDOR STUDY**

Figure 2

**EXISTING LANE GEOMETRY**

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Intersection traffic control and lane geometry are shown on Figure 2. Traffic signals are located at eight intersections in the study area:

- 24th Avenue/Market Street
- 22nd Avenue/Market Street
- NB 15th Avenue/Leary Way
- SB 15th Avenue/Leary Way
- 14th Avenue/Leary Way
- 11th Avenue/46th Street
- 8th Avenue/Leary Way
- 43rd Street/Leary Way

There is a pedestrian signal at the Ballard Avenue/Market Street intersection. The remaining intersections are controlled with stop signs on the minor streets, as shown on Figure 2. Most roadways within the study area have two travel lanes (one in each direction), with the exception of Market Street, 24th Avenue, and 15th Avenue with four travel lanes, and Leary Way with four to five lanes. All roadways in the study area have two-way traffic except Ballard Avenue, which is a one-way street in the northwest-bound direction between Market Street and 22nd Avenue. The existing lane geometries for several of the study area's more complicated intersections are also shown on Figure 2.

There are several transportation improvements proposed in or near the study area that could affect traffic. Information about these projects was obtained from project scopes of work obtained from SeaTran. Major projects include:

- **Market Street Optimization (14th Avenue NW to 24th Avenue).** This project is a joint effort between King County Metro and SeaTran, and is intended to improve the speed and reliability of transit routes within the Market Street Corridor. The project includes signal optimization and interconnection through the corridor, signal hardware and controller upgrades, pedestrian crossing improvements, transit zone changes, and other improvements. One of the elements of this project includes the transit enhancements near Ballard Avenue, which will consolidate the pedestrian crosswalks on the west side of the intersection, and extend the sidewalk to enlarge the transit zone.

- **Leary Way and 46th Street Multi-modal Transportation Improvement Project.** This project extends from 36th Street to 15th Avenue along Leary Way, and from Leary Way to 9th Avenue along 46th Street. This project is intended to improve safety and mobility for general traffic by installing a traffic signal at Leary Way and 46th Street, upgrading the signal controllers and interconnecting the signals along Leary Way. The project also includes street resurfacing, drainage improvements, street lighting upgrades, and new curb, gutter and sidewalk on some sections of 46th Street. The estimated design and construction cost for this project (as of May 9, 2001) was approximately $2.7 million.

- **Elliott/15th Avenue Multi-modal Transportation Improvement Project.** This project would improve the safety, convenience, and mobility for all modes of transportation along this corridor by providing transit signal prioritization and other transit facility improvements, upgrading the traffic signal system at 12 locations, resurfacing a portion of the roadway, and upgrading drainage and lighting. As of June 2000, the estimated design and construction costs for this project were $4.67 million.

The City of Seattle's Capital Improvement Program (CIP) for 2000 through 2006 includes several transportation infrastructure improvements within the study area. These projects are briefly summarized below:

- **2001 Neighborhood Street Fund.** This program includes many street improvement projects throughout the City of Seattle. One project within the study area will repair broken sidewalks along Market Street. Another project, proposed by the Ballard District Council but not selected for funding, would improve pedestrian crossings at the Market Street/28th Avenue intersection.

- **Burke-Gilman Trail Extension (8th to 67th).** This project extends the Burke-Gilman Trail from its terminus at 8th Avenue to Golden Gardens Park. The route between 11th Avenue and the Locks has not been determined.

- **Intelligent Transportation Services (ITS) Plan Implementation.** This project provides funding from 2003 through 2006 for implementation of traffic management strategies throughout the City, including the study area, consistent with the City's ITS Plan. Some of these funds are being allocated to the 15th Avenue and Leary Way projects listed above.

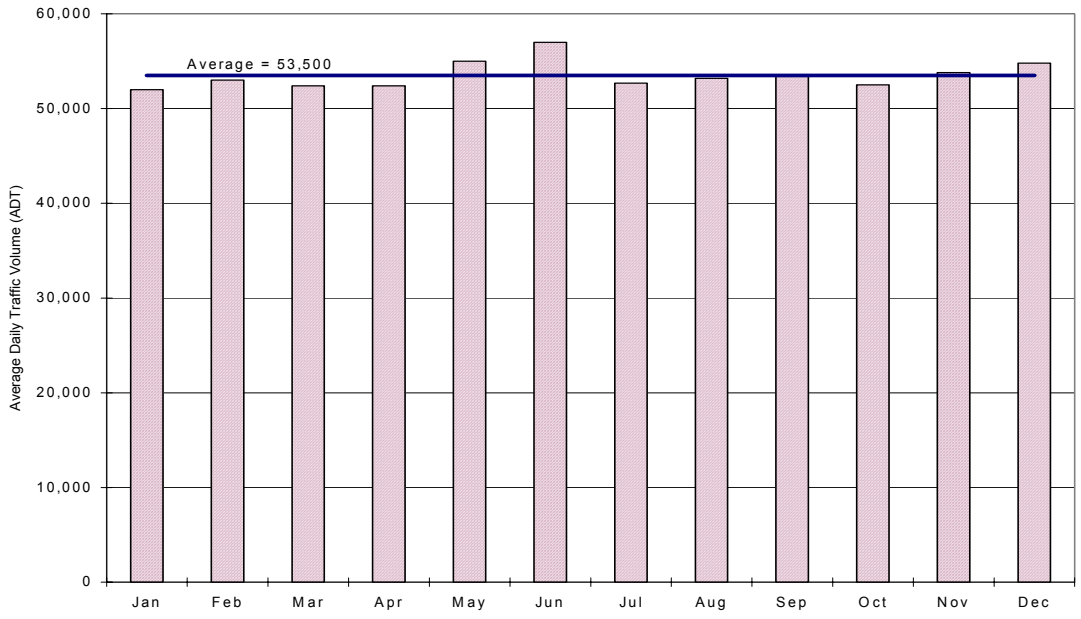
In addition to the above specific improvements, the CIP also allocates funds for citywide programs to make spot improvements or maintain infrastructure. Some of these programs include: new traffic signals, left turn signals, arterial resurfacing, non-arterial resurfacing or rehabilitation, bridge seismic retrofit, and signage.

# Traffic Volumes

## *Existing Traffic Volumes*

Seattle Transportation (SeaTran) performs seven-day traffic counts on the Ballard Bridge every month. Data were compiled for all of 2000 to show how the average daily traffic (ADT) volumes fluctuate month to month. Figure 3 shows the ADT for each month and that the average of all months was approximately 53,500 vehicles per day. The ADT does not fluctuate substantially during the year. Peak daily traffic volumes occur in June, which are approximately 6% higher than the annual average daily traffic volume.

Figure 3. Average Daily Traffic on Ballard Bridge – 2000

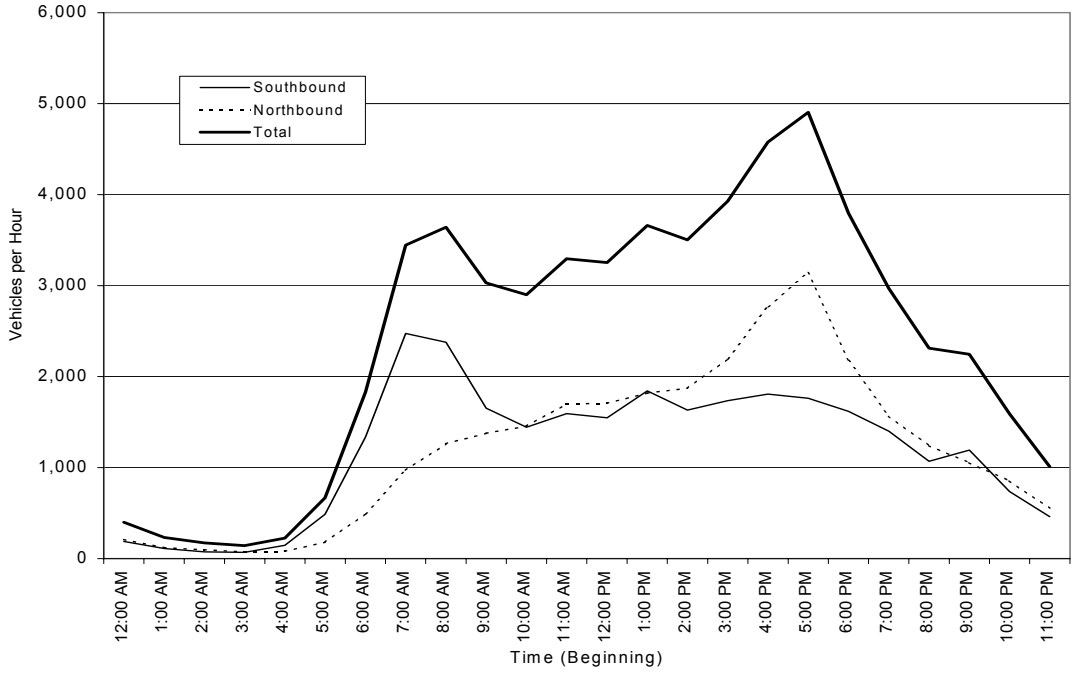



*Source: Sea\Tran, 2000.*

To determine when traffic volumes peak in Ballard, the seven-day traffic count on the Ballard Bridge obtained in August 2000 was reviewed. As shown above, traffic volumes in August represent average traffic conditions on the bridge. Figure 4 shows how traffic volumes on the Ballard Bridge fluctuate by time of day. The peak traffic volumes occurred between 5:00 and 6:00 P.M. when approximately 4,900 vehicles crossed the Ballard Bridge (3,140 in the northbound direction and 1,760 in the southbound direction). The PM peak hour traffic

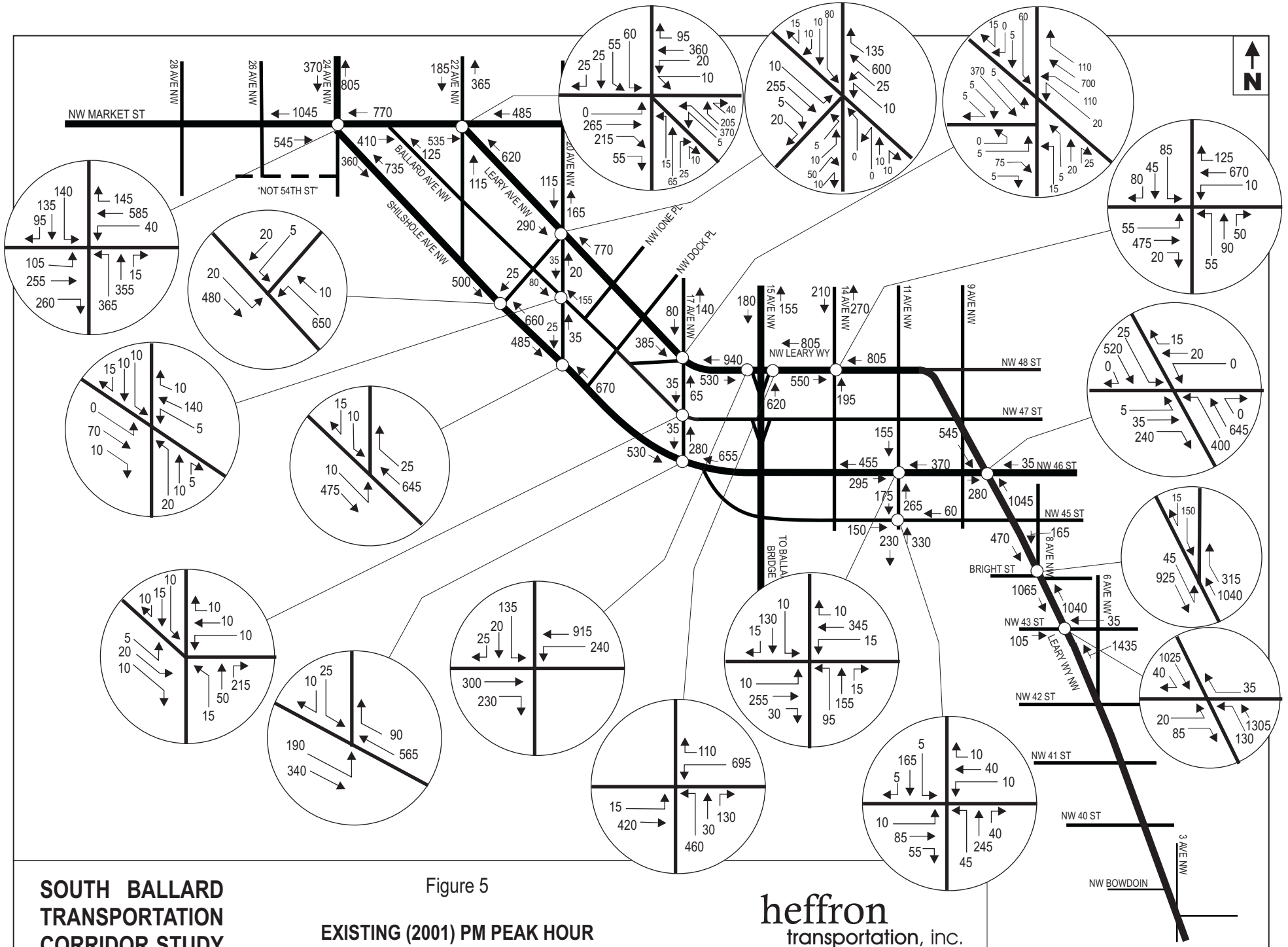
volumes were about 35% higher than the AM peak hour traffic volumes—4,900 vehicles during the PM peak hour versus 3,640 during the AM peak hour. For this reason, the PM peak hour was the primary focus for the traffic operations analyses in this study. AM peak hour traffic operations analyses were performed at a few key locations that experience high traffic volumes during the morning commute. These include the intersections of Market Street/Shilshole Avenue/24th Avenue and Shilshole Avenue/17th Avenue.

Figure 4. Hourly Traffic Volumes on Ballard Bridge – August 2000




*Source: SeaTran, 24-hour counts performed on Thursday, August 10, 2000 and Tuesday, August 15, 2000.*

New PM peak hour intersection turning movement counts were performed at all of the signalized intersections and at selected unsignalized intersections within the study area in August 2001, and are shown on Figure 5.




**SOUTH BALLARD TRANSPORTATION CORRIDOR STUDY**

Figure 5

**EXISTING (2001) PM PEAK HOUR TRAFFIC VOLUMES**

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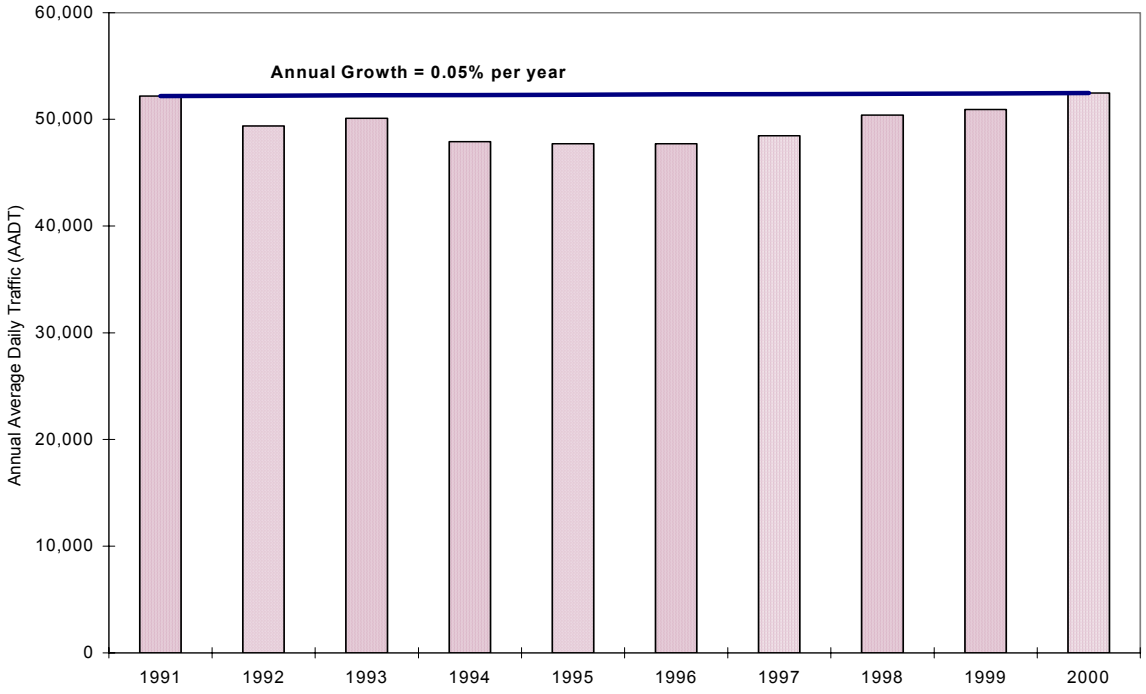
## Future Traffic Volumes

Year 2012 traffic volume estimates include traffic generated by new developments that will be constructed in the near future and growth in background traffic that may be generated by other local and regional growth. A list of future development projects in Ballard was compiled from records at the City's Department of Design Construction and Land Use (DCLU). Table 1 lists the projects that were included in the future traffic volumes.

Separate traffic impact analyses were prepared for the largest of these development projects. Trip generation and trip distribution information from these analyses were used to determine changes in traffic volumes associated with the large developments. Traffic from these analyses was explicitly included in the future traffic volumes. To account for the many smaller development projects and other growth that may occur in the future, a background growth rate of 1.5% per year was applied to existing traffic volumes. This rate of growth is much higher than has traditionally occurred in Ballard. Historic traffic volumes on the Ballard Bridge (see Figure 6) show that daily traffic volumes on the bridge increased by about 0.05% per year between 1991 and 2000. Therefore, the 1.5% growth rate plus traffic generated by the major developments may be high, but is reasonable for use in this study.

Figure 6. Historic Traffic Volumes on the Ballard Bridge




*Source: SeaTran Historic Traffic Counts.*

Table 1. Future Development Projects

| Address | Description | Size of Use | | | |
|---|---|---|---|---|---|
| | | New Res. (units) | Retail (sf) | Office (sf) | Manuf. (sf) |
| 5912 14th Avenue NW | Demolish existing single-family house, construct 6-unit townhouse | 5 | | | |
| 5600 24th Avenue NW | Demolish existing buildings, construct a 5-story commercial building of 107,000 sf with retail, private club, and offices | | 7,000 | 92,000 | |
| 5615 24th Avenue NW | Construct a 29-unit apartment building | 29 | | | |
| 5803 24th Avenue NW | Demolish two structures, and construct a 31-unit apartment building | 31 | | | |
| 5355 28th Avenue NW | Construct a new pre-fabricated building for manufacturing use. | | | | 3,000 |
| 810 NW 50th Street | Demolish existing single-family house, construct 3-unit townhouse | 2 | | | |
| 918 NW 52nd Street | Demolish existing single-family house, construct 3-unit townhouse | 2 | | | |
| 1103 NW 52nd Street | Demolish existing single-family house and establish use as general manufacturing. | | | | 0 |
| 1400 NW 53rd Street | Demolish existing manufacturing building, construction new warehouse building. | | | | 0 |
| 1130 NW 54th Street | Construct six-story building with 55 dwelling units, and ground-level retail space. | 55 | 5,000 | | |
| 1521 NW 54th Street | Demolish 4 existing houses, and construct a mixed-use building with residential and customer service office. | 47 | | | |
| 3257 NW 54th Street | Construct 3-story structure with marine sales, service, vessel repair and caretaker unit. | 1 | 830 | | 860 |
| 1146 NW 56th Street | Demolish duplex, construct a 3-unit townhouse | 1 | | | |
| 1532 NW 56th Street | Construct new 5-story apartments with retail | 163 | 3,783 | | |
| 1753 NW 56th Street | Construct a 6-story mixed-use building for residential and office use. | 35 | | | |
| 1408 NW 57th Street | Demolish existing house and construct 6-unit apartments. | 5 | | | |
| 1536 NW 58th Street | Demolish existing house and construct 4-unit townhouse | 3 | | | |
| 2410 NW 58th Street | Demolish existing house and construct 6-unit apartment building. | 5 | | | |
| 826 NW 62nd Street | Demolish existing house and construct 3-unit townhouse. | 2 | | | |

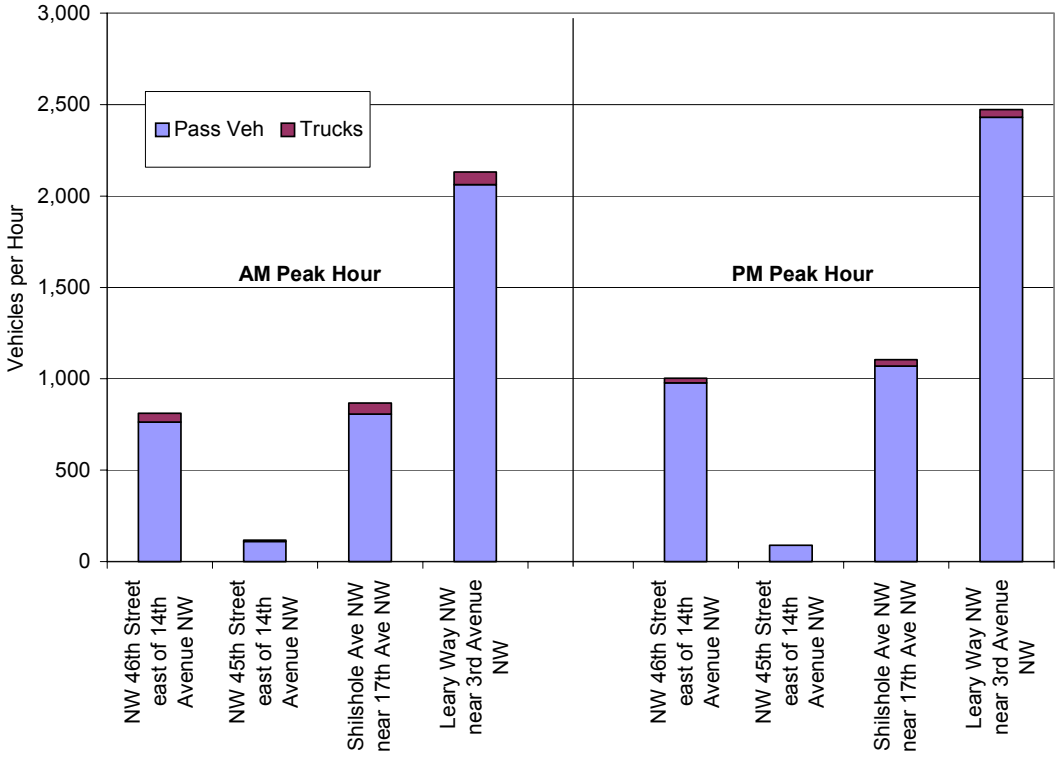
| Address | Description | Size of Use | | | |
|---|---|---|---|---|---|
| | | New Res. (units) | Retail (sf) | Office (sf) | Manuf. (sf) |
| 1440 NW 64th Street | Demolish existing house and construct 6-unit apartment building. | 5 | | | |
| 5004 9th Avenue NW | Demolish existing house and construct 7-unit apartment building. | 6 | | | |
| 999 NW Leary Way | Construct 2,000-sf fast-food restaurant, 2,000-sf convenience store, and 6 pump gas station | | 4,000 | | |
| 1455 NW Leary Way | Construct new commercial building with 17,010 sf of retail space, 19,790 sf of light industrial space, and 20,497 sf of office space. | | 17,010 | 20,497 | 19,790 |
| 4027 Leary Way NW | Construct new 3-story retail/office use | | 8,000 | 16,000 | |
| 4213 Leary Way NW | Construct mini-warehouse with caretaker's quarters. | 1 | | | |
| 5433/5440 Leary Avenue NW | Construct two, 6-story customer service office/retail/residential buildings. | 440 | 19,035 | | |
| 5300 Tallman Avenue NW | Construct a 4-story medical office building | | | 57,680 | |
| 5330 15th Avenue NW | Construct 107-room “extended stay” hotel | 107 | | | |
| 1144 NW 54th Street | Construct 65-unit mixed use structure | 65 | | | |

*Source: City of Seattle Department of Design Construction and Land Use (DCLU), November 2001*

## Truck Volumes

SeaTran performed vehicle classification counts on several of the study area roadways in 1995. The counts were either full-day counts (midnight to midnight) or between 6:00 A.M. and 8:00 P.M., and were used to determine the percentage of trucks on the various roadways. Figure 7 shows the traffic volumes on 45th Street, 46th Street, Shilshole Avenue, and Leary Way during the AM and PM peak hours, and also shows the proportion of the volume that are trucks or passenger vehicles (cars). Truck volumes on these roadways range from 3% to 7% of the AM peak hour traffic volume and 0% to 3% of the PM peak hour traffic volume.

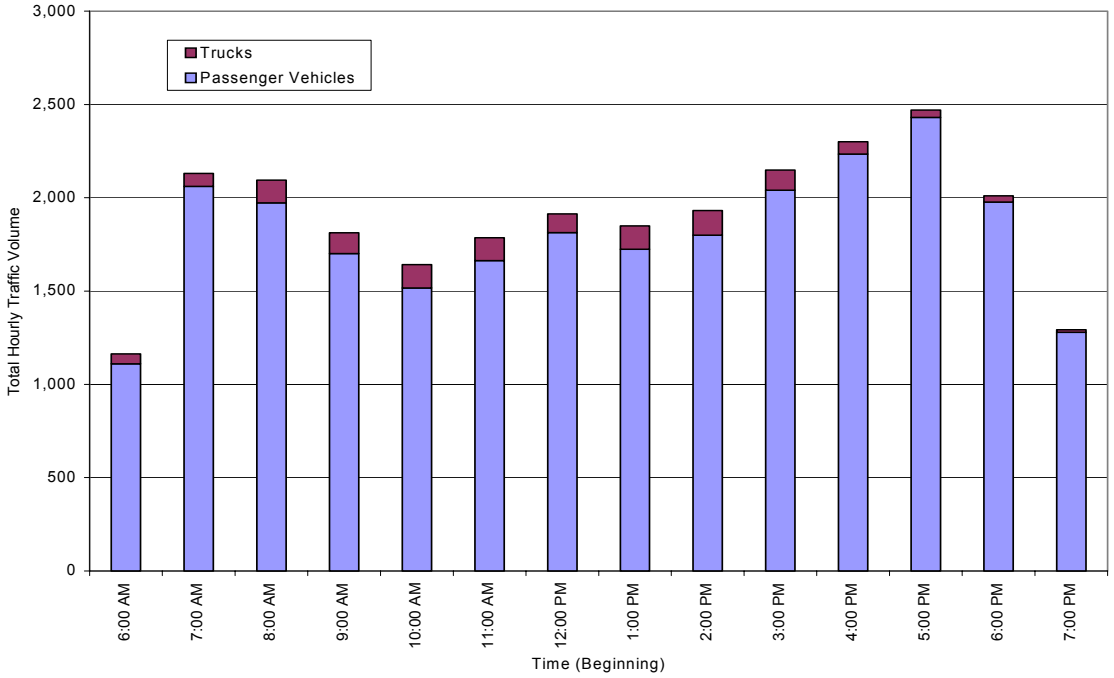
Figure 7. Peak Hour Truck Volumes on Study Area Roadways




*Source: SeaTran Vehicle Classification Counts, 1995.*

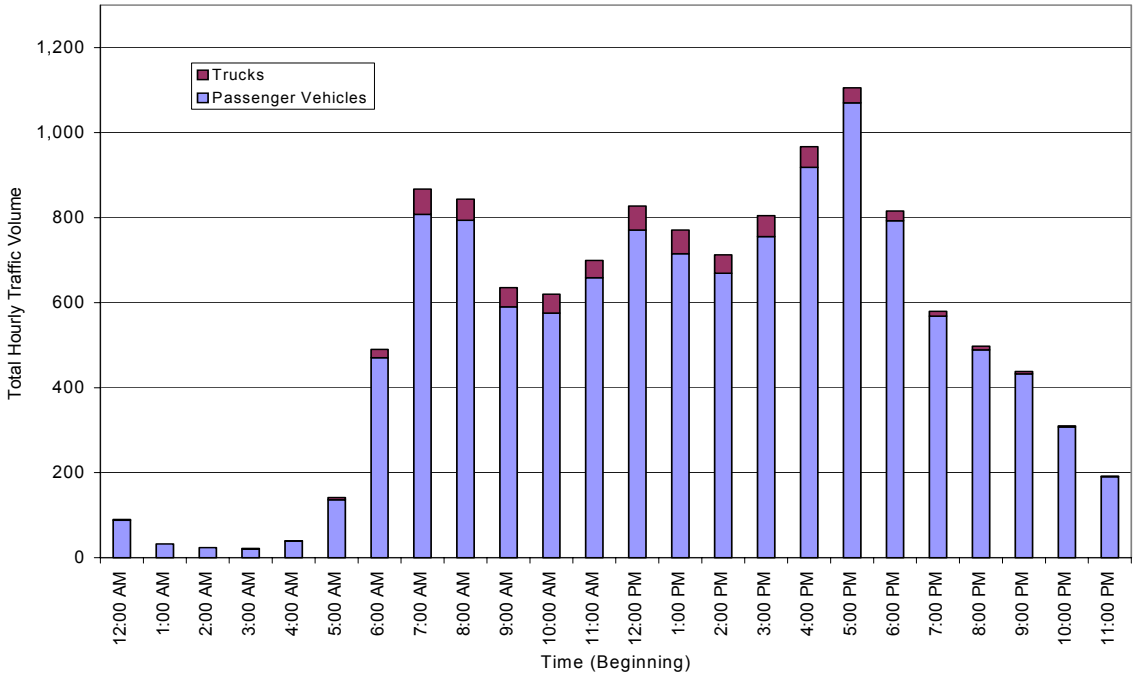
Leary Way and Shilshole Avenue have the highest volume of truck traffic. Figure 8 and Figure 9 show truck and passenger vehicle traffic volumes on each of these roadways for an average weekday. Most truck travel occurs between 6:00 A.M. and 7:00 P.M. with peak hourly truck volumes occurring around noon. Midday truck volumes on these roadways account for approximately 5% to 8% of the total traffic volume on Leary Way and approximately 6% to 7% of the traffic volume on Shilshole Avenue.

Figure 8. Truck and Passenger Vehicle Traffic Volumes on Leary Way North of 3rd Avenue




*Source: City of Seattle Vehicle Classification Count, May 1995.*

Figure 9. Passenger Cars and Trucks on Shilshole Avenue




*Source: City of Seattle Vehicle Classification Count, August 1995.*

## Transit Facilities and Service

Transit routes in the south Ballard neighborhood are shown on Figure 10. The core area of Ballard is served by Metro transit routes 15, 17, 18, 44, 46, and 75. Route 28 serves the eastern edge of the study area. These routes are described below.

- Route 15 operates on 15th Avenue. This route and a peak-period express variant provide service between downtown and Blue Ridge every 10-30 minutes. Midday service frequency is 20 minutes Monday through Saturday.

- Route 17 operates on Market Street and Leary Avenue. This route and a peak-hour express variant provide service between downtown and Loyal Heights every 20-30 minutes. Midday service frequency is 30 minutes seven days per week.

- Route 18 provides service between downtown and North Beach, traveling on 24th Avenue, Market Street, Leary Avenue, and 15th Avenue. Service intervals range between 10 and 30 minutes, with 20-minute midday service frequency Monday through Saturday.

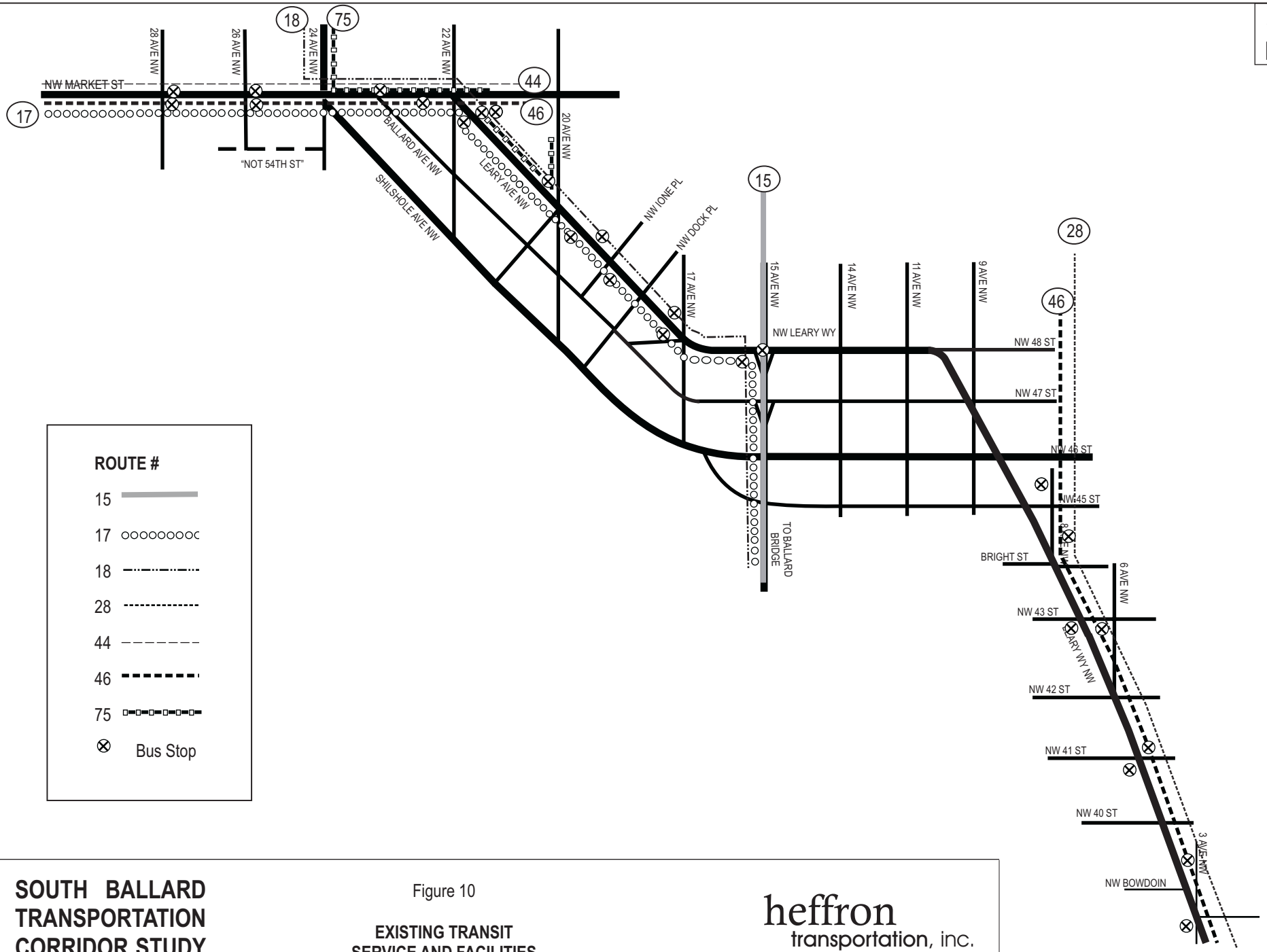
- Route 28 travels on 8th Avenue and Leary Way, providing service between downtown and Broadview. This route operates with approximately 30-minute headways with a night shuttle service available on weekdays and Saturdays until approximately 2:00 A.M. Route 28 Express also travels through Ballard stopping only at the Market Street/8th Avenue transfer point.

- Route 44 travels along Market Street. This route provides service between Ballard and the University District. Service intervals range between 10 and 30 minutes, with 15-minute midday service frequency seven days per week.

- Route 46 operates on Market Street, 8th Avenue, Leary Way and 39th Street, providing weekday peak hour, peak direction service between Ballard and the University of Washington with extra off-peak direction peak service between Ballard and Shilshole.

- Route 75 provides service between Ballard and the University District via Northgate, traveling on Market Street, 24th Avenue, Ballard Avenue, and Leary Avenue. This route operates with approximately 30-minute headways on weekdays and Saturdays and 60-minute headways on Sundays.

Several service changes for the routes listed above have been made. As mentioned above, Route 46 between Ballard and the University District operates during the peak periods in the peak direction. This route makes three trips from Ballard to the University District in the morning, and four return trips to Ballard in the afternoon. The midday service was discontinued in Fall 1998 due to low ridership. Starting in September 2001, this route was extended to Shilshole. Beginning in February 2002, a limited number of reverse-direction trips between Ballard and Shilshole were added to allow Shilshole residents to make shopping trips into Ballard.




**SOUTH BALLARD TRANSPORTATION CORRIDOR STUDY**

Figure 10

**EXISTING TRANSIT SERVICE AND FACILITIES**

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Evening and night service on Route 15 were also improved in February 2002. Since 1979, this route has operated as a shuttle after 8:00 P.M., which required a transfer at 15th Avenue/Leary Way in order to access Lower Queen Anne or downtown Seattle from 15th Avenue. In February 2002, service frequency was increased to downtown, eliminating the need to transfer and, combined with Route 18, providing 15-minute night frequency between Ballard and Downtown.

Route 44 service was also improved in February 2002. Service on Saturday evenings has been increased to match the excellent weekday service. This increases service to 15-minute headways for the period between 7:30 P.M. and 10:00 P.M. on Saturdays.

## Pedestrian and Bicycle Facilities and Volumes

According to City of Seattle records (GIS database), there are many locations where sidewalks are missing in the study area. The locations without sidewalks include:

- Both sides of Shilshole Avenue between 15th Avenue and Market Street.
- One side of Leary Way between 40th Street and 15th Avenue
- Both sides of 46th Street between Leary Way and Shilshole Avenue.
- Both sides of 45th Street between 11th Avenue and 15th Avenue.
- Both sides of 11th Avenue between 45th Street and Ballard Avenue.

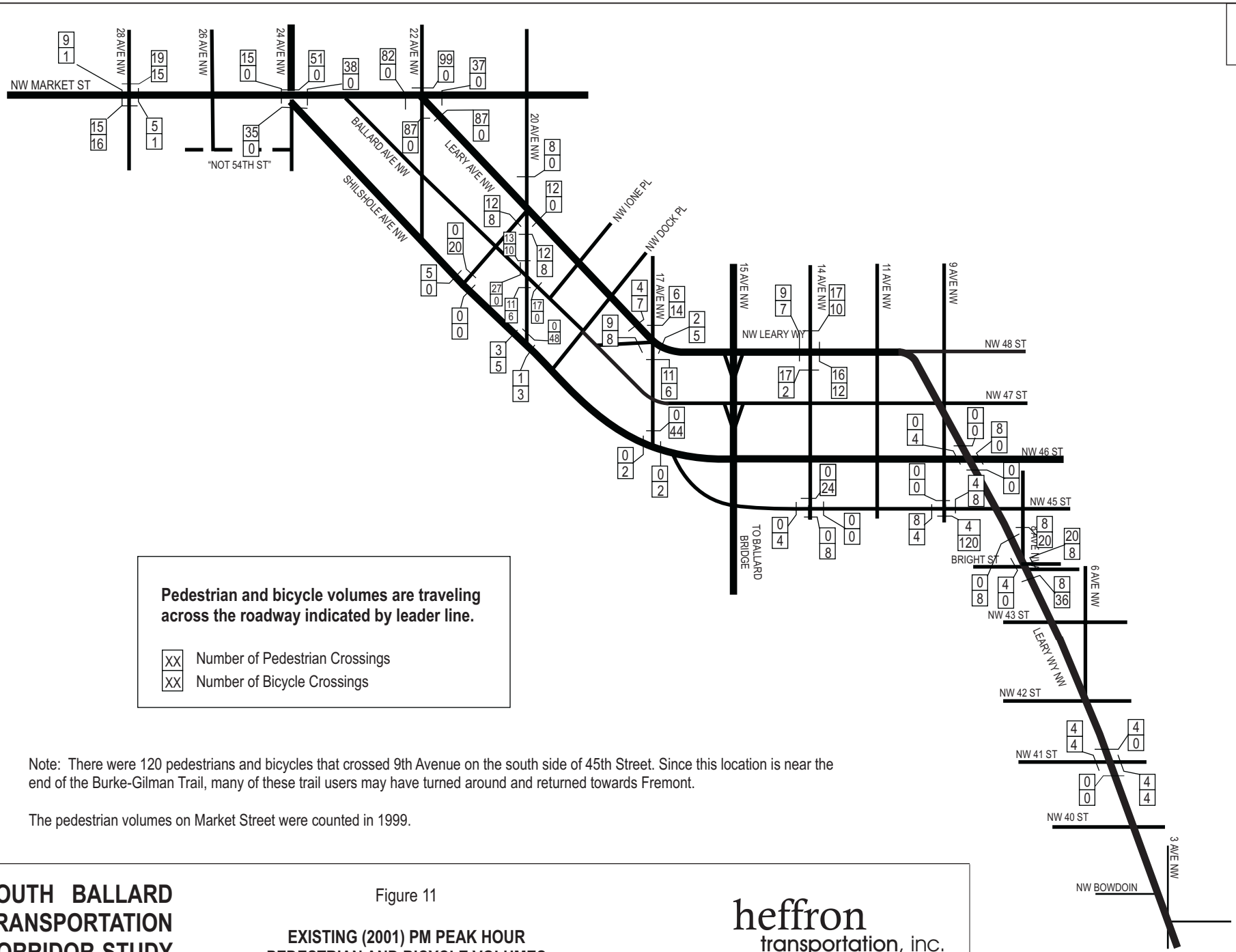
Most of the streets in the core commercial area of Ballard have good pedestrian facilities, which include good sidewalks, crosswalks, and pedestrian crossing signals. Traffic signals in the Market Street corridor have pedestrian signals that are activated every cycle. There is also a pedestrian signal and crosswalk on Market Street at Ballard Avenue. Traffic signals off of the Market Street corridor require a pedestrian to push a button before the pedestrian signal will be activated.

Existing bicycle facilities within the study area include the Burke-Gilman Trail, which extends from the north end of Lake Washington to 11th Avenue, and the Locks Trail across the Locks to 54th Street. In addition to these bicycle facilities, the Seattle Bicycling Guidemap, published by SeaTran, identifies arterials and other streets commonly used by bicyclists. The streets identified in the study area include 45th Street and Ballard Avenue.

Several deficiencies in the existing pedestrian and bicycle network were noted in past studies and public meetings for this project. These include narrow pedestrian/bicycle ways on the Ballard Bridge that make crossing this bridge difficult on a bicycle. Difficult streets to cross include Leary Way, Shilshole Avenue, and Market Street west of 24th Avenue due to limited crossing locations and high traffic volumes.

A major issue is the need for a safe, convenient connection for bicycles and pedestrians between the current terminus of the Burke-Gilman Trail (45th Street at 11th Ave) and the Ballard Locks. The City plans to design and construct the trail between the Locks and Golden Gardens in the next few years.

Peak hour pedestrian and bicycle counts were performed at most signalized intersections and selected unsignalized intersections in the study area in August 2001. Pedestrian volume counts in the Market Street corridor were performed in 1999. The peak hour pedestrian and bicycle volumes throughout the study area are summarized on Figure 11.




Note: There were 120 pedestrians and bicycles that crossed 9th Avenue on the south side of 45th Street. Since this location is near the end of the Burke-Gilman Trail, many of these trail users may have turned around and returned towards Fremont.

The pedestrian volumes on Market Street were counted in 1999.

**SOUTH BALLARD TRANSPORTATION CORRIDOR STUDY**

Figure 11

**EXISTING (2001) PM PEAK HOUR PEDESTRIAN AND BICYCLE VOLUMES**

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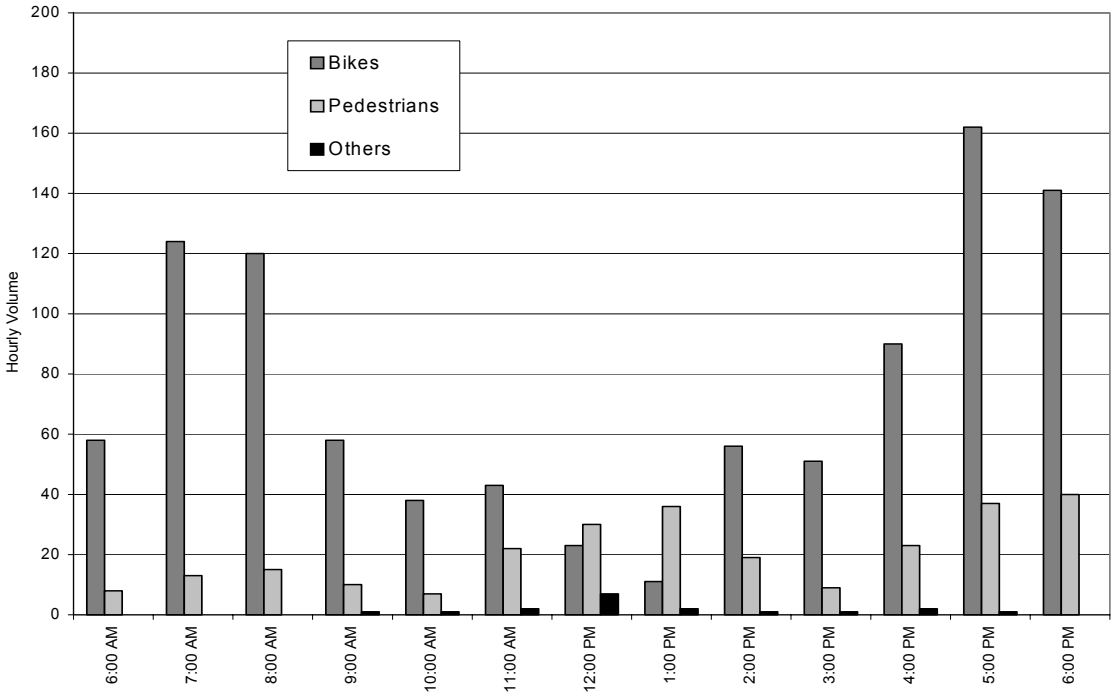
Volunteers from the Cascade Bicycle Club organize counts at key locations on the Burke-Gilman Trail, which have been taken every five years since 1980. Counts near 3rd Avenue were performed the third week in May 2000, and included both a Tuesday and a Saturday. Figure 12 presents bicycle, pedestrian and other human powered (roller blades, etc.) volumes on Tuesday, May 23, 2000 at 3rd Avenue. There were a total of 975 bicycles, 269 pedestrians, and 18 using other human powered modes. Bicycle traffic peaked between 7:00 and 9:00 A.M. and between 5:00 and 7:00 P.M., with the afternoon peak being more pronounced. These peaks reflect the large number of bicycle commuters. Pedestrian volumes were highest during the lunch hour and between 5:00 and 7:00 P.M.

Figure 12. Burke-Gilman Trail Counts at 3rd Avenue NW - Tuesday, May 23, 2000




*Source: Cascade Bicycle Club.*

## Traffic Operations

Traffic operations analysis for this study was performed using the VISSIM software, which is a microscopic traffic and transit simulation model. The model evaluates various traffic operating parameters such as vehicle delay and travel time, and provides a high-quality animation to visually show how traffic operates.

Traffic simulations were performed for the existing, year 2012 No Action condition, plus several improvement alternatives. Data used in the simulation analysis included:

- Traffic volumes for all major intersections and minor intersections along arterials,
- Truck volumes,
- Bus volumes and bus stop locations,
- Pedestrian volumes,
- Bicycle volumes,
- Traffic signal phasing and signal timing information, and
- Roadway geometry.

The existing model was calibrated to replicate existing observations in the field. The models of future traffic conditions were then prepared by updating the traffic volumes and roadway network conditions. This allowed for comparisons among the various improvement alternatives.

VISSIM was used to determine the average delay per vehicle at each major intersection in the study area. These delay measures were then related to a level of service category using the thresholds in the *Highway Capacity Manual (HCM) 2000* (Transportation Research Board, 2000). The level of service thresholds for signalized and unsignalized intersections are summarized in Table 2 and Table 3

Table 2. Level of Service Thresholds for Signalized Intersections

| Level of Service | Average Delay Per Vehicle | General Description |
|---|---|---|
| A | Less than 10.0 Seconds | Free flow |
| B | 10.1 to 20.0 seconds | Stable flow (slight delays) |
| C | 20.1 to 35.0 seconds | Stable flow (acceptable delays) |
| D | 35.1 to 55.0 seconds | Approaching unstable flow (tolerable delay—occasionally wait through more than one signal cycle before proceeding. |
| E | 55.1 to 80.0 seconds | Unstable flow (approaching intolerable delay) |
| F | Greater than 80.0 seconds | Forced flow (jammed) |

*Source: Transportation Research Board, Highway Capacity Manual, 2000.*

Table 3. Level of Service Thresholds for Unsignalized Intersections

| Level of Service | Average Delay per Vehicle on Minor Street |
|---|---|
| A | Less than 10.0 seconds |
| B | 10.1 to 15.0 seconds |
| C | 15.1 to 25.0 seconds |
| D | 25.1 to 35.0 seconds |
| E | 35.1 to 50.0 seconds |
| F | Greater than 50.0 seconds |

*Source: Transportation Research Board, Highway Capacity Manual, 2000.*

Because the model is based on random arrival of traffic, the simulation will change each time it is run. To account for this sensitivity, five runs with varying random seeds were performed for each alternative. The average delays from these five runs are reported in Table 4. Level of service values that correspond to the delay are also shown in the table.

Table 4. PM Peak Hour Intersection Level of Service - Background Conditions

| | 2001 Existing | | 2012 No Build | |
|---|---|---|---|---|
| **Signalized Intersections** | LOS | Delay1 | LOS | Delay1 |
| Market Street/24th Avenue | D | 43.9 | E | 60.7 |
| Market Street/Ballard Avenue | A | 7.2 | B | 10.3 |
| Market Street/Leary Way/22nd Avenue | D | 43.6 | D | 48.0 |
| Leary Way/15th Avenue | D | 44.1 | D | 54.3 |
| Leary Way/14th Avenue | B | 17.0 | B | 19.6 |
| 46th Street/Leary Way | n/a | n/a | C | 22.9 |
| 45th Street/Leary Way | n/a | n/a | n/a | n/a |
| Leary Way/8th Avenue | B | 10.5 | B | 10.0 |
| Leary Way/20th Avenue | n/a | n/a | n/a | n/a |
| **Unsignalized Intersections** | | | | |
| Leary Way/20th Avenue | A | 3.1 | A | 3.3 |
| Leary Way/17th Avenue | C | 29.3 | E | 58.3 |
| Shilshole Avenue/17th Avenue | B | 18.4 | F | 67.1 |
| 45th Street/11th Avenue | B | 10.4 | B | 14.5 |
| Leary Way/46th Street | C | 21.9 | n/a | n/a |
| Leary Way/45th Street | C | 31.9 | D | 48.3 |

1. *Average vehicle delay. These values are comparable to Intersection Control Delay (decel+stop+accel delay) in the Highway Capacity Manual that are used to determine level of service.*

The level of service analysis shows that most intersections in Ballard currently operate at an acceptable level of service (LOS D or better). Three intersections are projected to operate below LOS D under future conditions: Market Street/24th Street, which is signalized, and the intersections at Leary Way/17th Avenue and Shilshole Avenue/17th Avenue, both of which are unsignalized. Poor operations at the Market Street/24th Avenue intersection will occur, because of the "merry-go-round" signal phasing that provides a separate green phase to each intersection approach. As discussed later, it is also due to the fact that the traffic flows change dramatically between the morning and afternoon peak periods. In the morning, the peak flow is southbound to eastbound, and in the afternoon it is northbound to westbound. Thus, some of the poor level of service experienced during the afternoon peak period is because the intersection is also set to accommodate peak morning flows. Further analysis of the morning condition is presented later in the report.

Poor operations at the intersection of Shilshole Avenue/17th Avenue is due to the lack of a left turn lane on Shilshole Avenue, which causes delays to through traffic. Poor operations at the intersection of Leary Way/17th Avenue is due to the high traffic volumes on Leary Way and the odd configuration of the intersection.

## Accident History

SeaTran provided data about accidents in Ballard. SeaTran defines "high accident" locations as signalized intersections with ten or more accidents per year and unsignalized intersections with five or more accidents per year. SeaTran does not have a standard for street segments between intersections.

Table 5 presents the intersections with the highest number of reported accidents within Ballard for each year between 1998 and 2000. Both signalized and unsignalized intersections are included. The records in the table are sorted by the total number of accidents that occurred during the three-year period.

Table 5. Accident Summary (1/1/98 - 12/31/00)

| | Type of Accident (Totals for Three Years) | | | | | | | | Accidents by Year | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Signalized Intersections** | Head-On | Rear-End | Side-Swp | Right Turn | Left Turn | Right Angle | Peds/ Cycl | Other | 1998 | 1999 | 2000 | Total |
| NB 15th Ave/Leary Way | 0 | 1 | 0 | 1 | 15 | 1 | 0 | 1 | 7 | 6 | 6 | 19 |
| 22nd Ave/Market St/Leary Ave | 0 | 1 | 0 | 2 | 5 | 0 | 3 | 0 | 4 | 5 | 2 | 11 |
| 8th Ave/Leary Way | 2 | 0 | 0 | 1 | 3 | 2 | 0 | 0 | 3 | 3 | 2 | 8 |
| 14th Ave/Leary Way | 0 | 0 | 0 | 2 | 2 | 0 | 1 | 1 | 0 | 3 | 3 | 6 |
| 24th Ave/Market St | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 2 | 3 | 0 | 5 |
| SB 15th Ave/Leary Way | 0 | 1 | 0 | 0 | 2 | 1 | 0 | 0 | 1 | 3 | 0 | 4 |
| 11th Ave/46th St | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 2 | 1 | 0 | 3 |
| 43rd St/Leary Way | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 2 |
| **Unsignalized Intersections** | | | | | | | | | | | | |
| 14th Ave/46th St | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 5 | 0 | 4 | 9 |
| 11th Ave/Ballard Wy | 0 | 0 | 0 | 0 | 0 | 7 | 1 | 0 | 0 | 0 | 8 | 8 |
| 17th Ave/Leary Wy | 0 | 0 | 1 | 1 | 2 | 3 | 0 | 0 | 2 | 3 | 2 | 7 |
| Leary Wy/Ballard Wy | 0 | 0 | 0 | 1 | 0 | 6 | 0 | 0 | 1 | 2 | 4 | 7 |
| 20th Ave/Leary Wy/Vernon Pl | 0 | 0 | 1 | 0 | 0 | 3 | 1 | 0 | 2 | 3 | 0 | 5 |
| 17th Ave/Shilshole Ave | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 2 |
| Leary Wy/45th St | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 2 |
| Leary Wy/46th St | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 2 | 0 | 2 |

*Source: City of Seattle, 2001.*

Between 1998 and 2000 the total number of accidents at these intersections remained relatively stable, with a total of 32 accidents in 1998, 35 accidents in 1999, and 33 accidents in 2000. No signalized intersection within the study area met the City of Seattle's threshold for a high accident location. The 15th Avenue northbound ramp/Leary Way intersection experienced the highest number of accidents. Almost 80% of these accidents involved left turning vehicles, which could indicate a high occurrence of red-light-running at this location.

The 11th Avenue/Ballard Way intersection reached the City of Seattle's threshold for an unsignalized intersection with eight accidents in 2000. This represents an increase from zero accidents in 1998 and 1999. Over the three-year period, all accidents at that intersection were right-angle accidents and one involved a cyclist. The 14th Avenue/46th Street had one year with five accidents, which is the threshold for an unsignalized intersection to be added to the high accident list. All accidents were right-angle accidents. No other study area intersection approached the threshold for designation as a high accident location.

Table 5reports only accidents for which a report was filed. A number of bicycle accidents have been witnessed on Shilshole Avenue under the Ballard Bridge where bicyclists cross the railroad tracks. In the past year, Seattle Transportation and the Ballard Terminal Railroad Company made improvements to the configuration in this area to improve bicycle safety.

# Ballard Terminal Railroad Company

The Ballard Terminal Railroad Company (BTRC) operates on tracks that extend from the Burlington Northern Railroad mainline at about 70th Street to about 40th Street just east of 6th Avenue. The City of Seattle purchased the underlying real estate from Burlington Northern in 1997 when BN decided to abandon this segment and granted BTRC a franchise to operate, maintain, and construct rail facilities in this right-of-way.

## Existing and Proposed Rail Facilities

For much of its length, the BTRC is a single track; however, a second parallel track (double track) has been added where the railroad has loading/unloading or car storage needs. This allows the train to bypass cars that are stored or are loading/unloading on the adjacent track. The double track sections exist along Shilshole Avenue between about 22nd Avenue and 15th Avenue, and between about 9th Avenue and 8th Avenue. A double-track section also exists at the north end of the line north of Seaview Avenue where the Burlington Northern transfers cars to the BTRC. This area is known as the "interchange."

There are many side spurs off of the BTRC's track that provide, or provided, access to local businesses. There is a spur located between 14th Avenue and 11th Avenue where the BTRC currently stores its engine (Rudd Paint Spur). This spur does extend north to Leary Way. Another spur exists in the center of 14th Avenue, although some of the track has been removed. This spur is owned by Bardahl Oil, and has been inactive for many years. Another spur extends west from a switch at about 24th Avenue and serves businesses located below the railroad grade.

The BTRC recently constructed a new engine shop near 8th Avenue. It also proposes to improve its facilities located along the Rudd Paint Spur for equipment and construction materials storage. A new transloading facility has recently been constructed along the rail spur west of 24th Avenue. This transloading facility uses the change in grade between lower track and the road and allows level loading of a boxcar or other railcar.

## Railroad Operations

The BTRC shipped 170 carloads of freight in 2001. This represents a dramatic increase in its business over its first three years of operation. Figure 13 shows the annual carloads for the BTRC.

The BTRC currently has several major customers along the line. One is Salmon Bay Sand & Gravel that receives about three carloads of raw cement each week. The BTRC delivers these cars in pairs—two on Wednesday and two on Sunday, and spots (leaves) them on the siding adjacent to Salmon Bay Sand & Gravel. This company owns a small track mover that they use to position each car when they are ready to unload it. Because these cars are left on the siding while waiting to be unloaded, there is a second track parallel Salmon Bay Sand & Gravel that allows other rail traffic to bypass these stored cars.

Another major customer is Western Pioneer, for which BTRC hauls boxcars of frozen fish. These boxcars are positioned on a track along Shilshole Avenue west of the Ballard Bridge. Western Pioneer loads pallets of frozen fish into both sides of the boxcar using a forklift. This work is seasonal and the volume of boxcars needed varies. Again, because the boxcars are stored on the tracks while awaiting loading, the BTRC has constructed a second parallel track as a bypass the stored cars.

Olsen Furniture also receives shipments of goods by rail. Boxcars of furniture are unloaded directly to the back of a truck from the tracks on Shilshole Avenue north of Vernon Street. At this location, the truck can back directly up to the boxcar at a right angle without extending onto the street.

Figure 13. Ballard Terminal Railroad Company - Annual Carloads