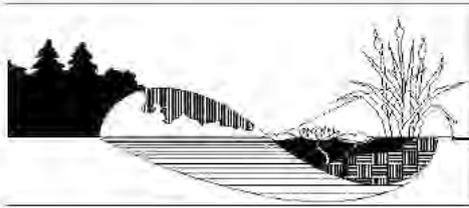


Enclosure 13



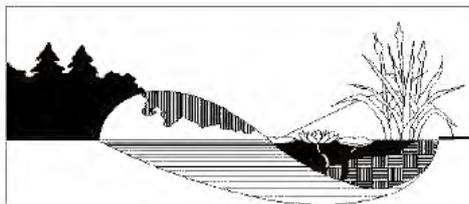
**COSTCO WHOLESALE
KIRKLAND WAREHOUSE GAS STATION &
SIDEWALK IMPROVEMENT PROJECTS
CRITICAL AREAS REPORT
CITY OF KIRKLAND, WASHINGTON**

Prepared For:

**Costco Wholesale
999 Lake Drive
Issaquah, Washington 98027**

Attn: Kim Katz

**September 19, 2011
Job#11-147**

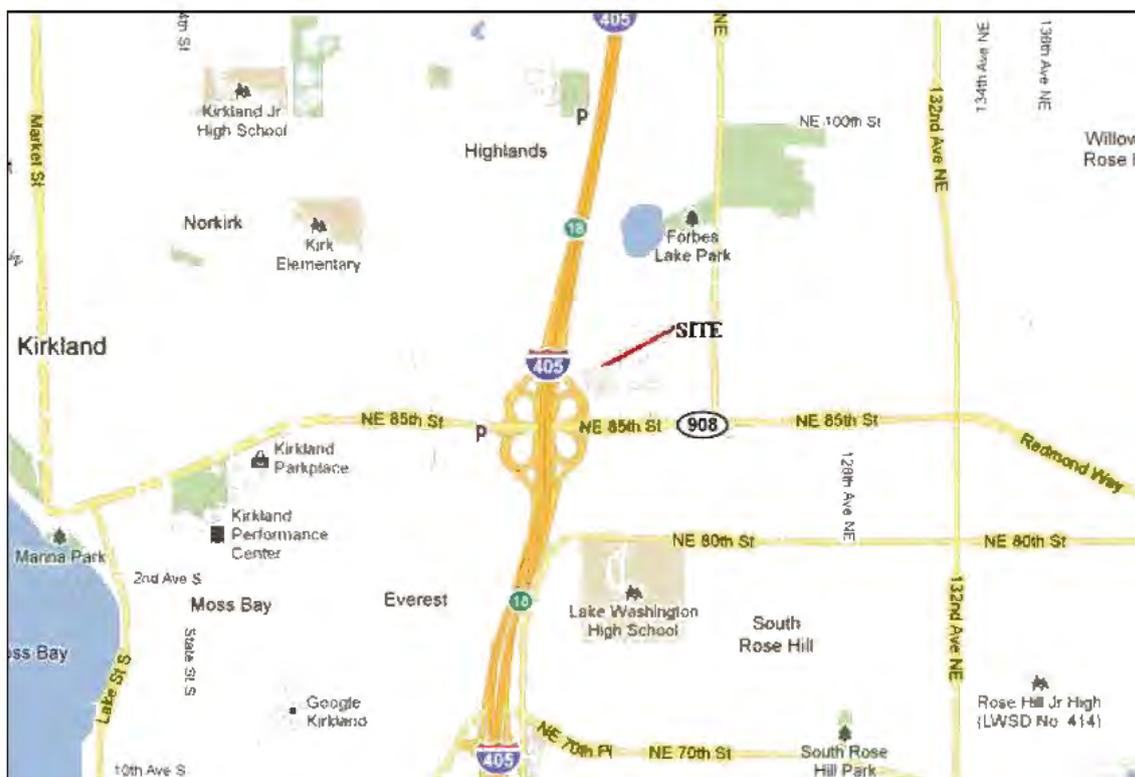


**COSTCO WHOLESALE
KIRKLAND WAREHOUSE GAS STATION &
SIDEWALK IMPROVEMENT PROJECT
CRITICAL AREA REPORT
CITY OF KIRKLAND, WASHINGTON**

1.0 INTRODUCTION

1.1 Location

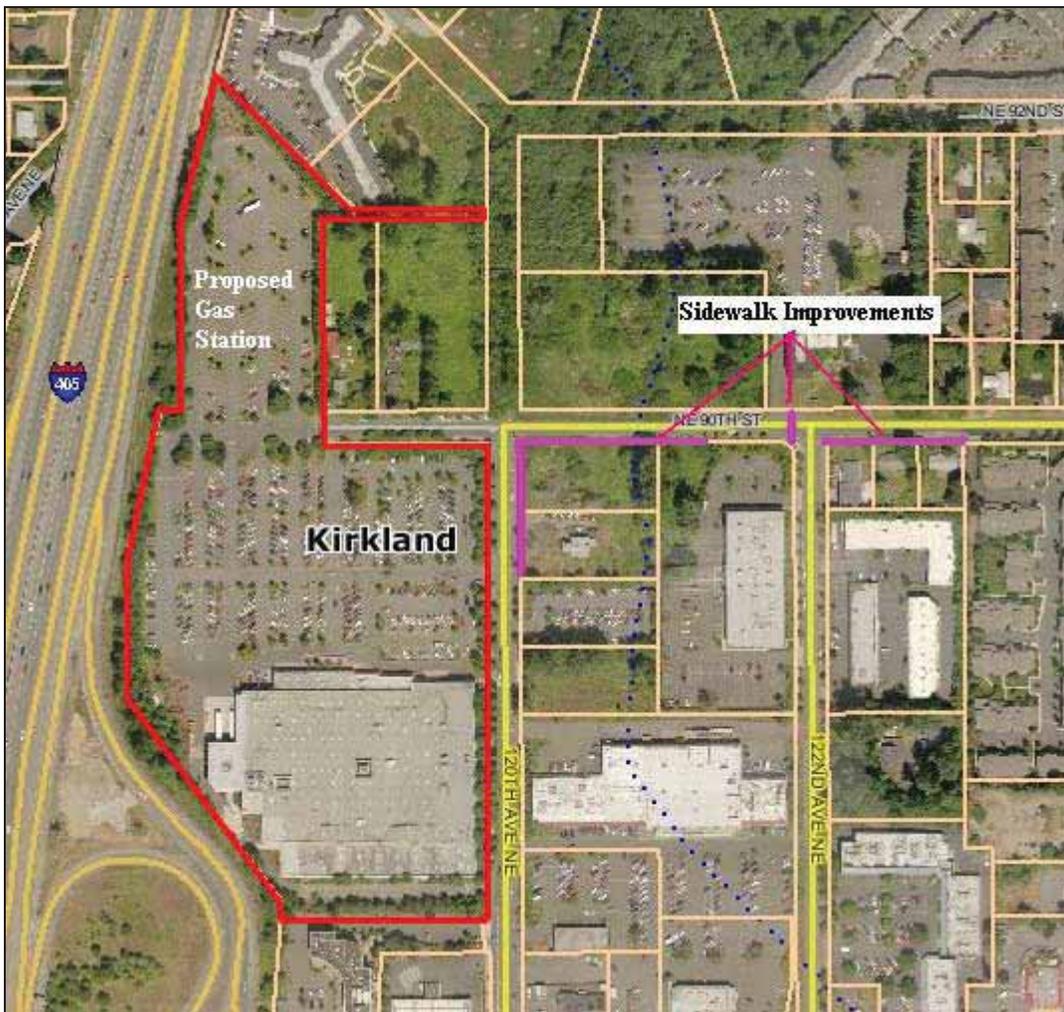
This report describes jurisdictional wetlands, streams and buffers located on or near the Kirkland Costco Wholesale Warehouse, in the City of Kirkland, Washington. The Costco property is a 15.19 acre irregularly shaped parcel (Parcel #123850-0035) which contains a 3.6 acre single story warehouse structure, with the remainder of the site consisting of paved parking (with landscaped areas) and paved driving surface. The site is located in a portion of Section 4, Township 25 North, Range 5 East of the W.M. and is at approximately 47.6823 degrees north latitude and 122.1727 degrees east longitude.



Vicinity Map

1.2 Proposed Project

The proposed project is the construction of a gas station on the north end of the existing Costco parking lot. The project will also include the construction of off-site curb, gutter and sidewalk (the “sidewalk improvements”) along the portions of 120th Avenue NE and NE 90th Street depicted below in purple.



Above: Aerial photograph (2007) depicting location of the Costco Warehouse Parcel and the area of the required sidewalk improvements.

2.0 METHODOLOGY

In July and August of 2011, Sewall Wetland Consulting Inc. inspected the site for jurisdictional wetlands and streams using the methodology described in the *Washington State Wetlands Identification Manual* (WADOE, March 1997). This is the methodology currently recognized by the City of Kirkland and the State of Washington for wetland determinations and delineations. The site was also reviewed using the methodology described in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987), and the *Western Mountains, Valleys and Coast region Supplement (Version 2.0)* dated June 24, 2010, as required by the US Army Corps of Engineers. Soil colors were identified using the 1990 Edited and Revised Edition of the *Munsell Soil Color Charts* (Kollmorgen Instruments Corp. 1990).

The *Washington State Wetlands Identification and Delineation Manual* and the *Corps of Engineers Wetlands Delineation Manual* both requires the use of the three-parameter approach in identifying and delineating wetlands. A wetland should support a predominance of hydrophytic vegetation, have hydric soils and display wetland hydrology. To be considered hydrophytic vegetation, over 50% of the dominant species in an area must have an indicator status of facultative (FAC), facultative wetland (FACW), or obligate wetland (OBL), according to the National List of Plant Species That Occur in Wetlands: Northwest (Region 9) (Reed, 1988). A hydric soil is "a soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part". Anaerobic conditions are indicated in the field by soils with low chromas (2 or less), as determined by using the Munsell Soil Color Charts; iron oxide mottles; hydrogen sulfide odor and other indicators. Generally, wetland hydrology is defined by inundation or saturation to the surface for a consecutive period of 12.5% or greater of the growing season. Areas that contain indicators of wetland hydrology between 5%-12.5% of the growing season may or may not be wetlands depending upon other indicators. Field indicators include visual observation of soil inundation, saturation, oxidized rhizospheres, water marks on trees or other fixed objects, drift lines, etc. Under normal circumstances, indicators of all three parameters will be present in wetland areas.

Following delineations of Wetlands on the site, the flags were surveyed by Barghausen Engineers and placed upon the site plan.

3.0 OBSERVATIONS

3.1 Existing Site Documentation

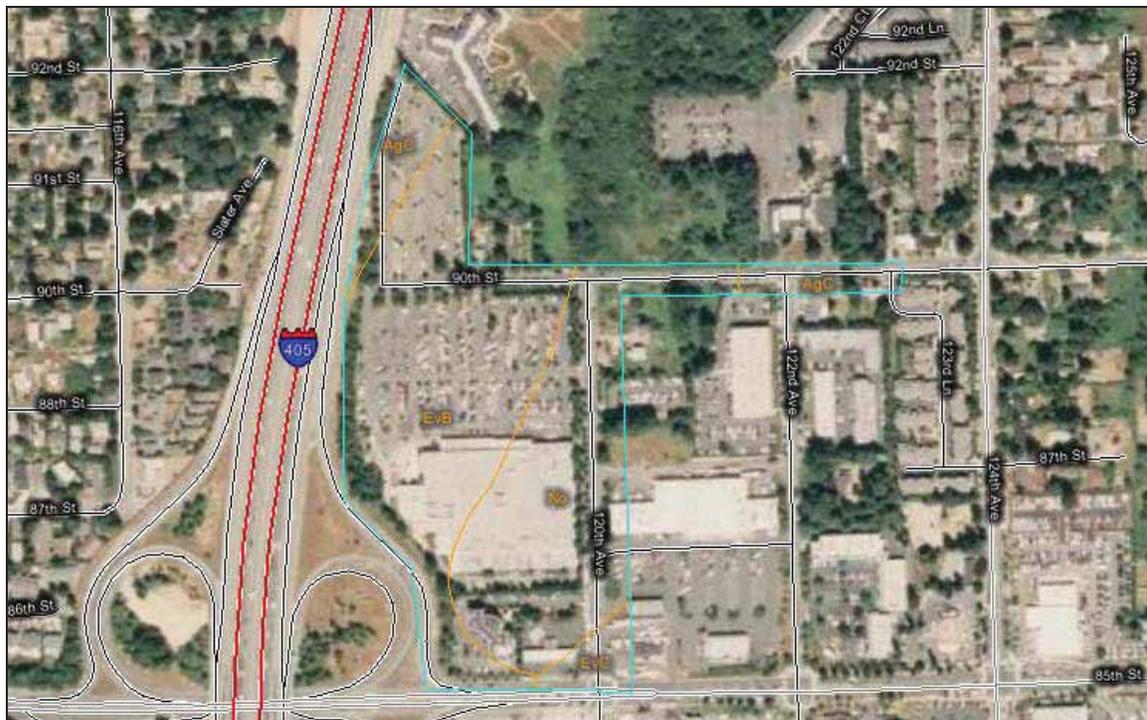
Prior to visiting the site, a review of several natural resource inventory maps was conducted. Resources reviewed included the NRCS Soil Mapper website, Department of Natural Resources FPARS website, the USFWS National Wetland Inventory website, and the City of Kirkland Sensitive Areas Map. In addition, portions of the previous wetland

study prepared by AC Kindig & Co. (120th NE & 90th Street Sidewalk Improvements, 2-11-09) were reviewed.

3.1.1 NRCS Soil Mapper Website Soil Survey

According to information on file with the NRCS Soil Mapper website, the site contains three soils types, Alderwood gravelly sandy loam (map unit AgC), Everett gravelly sandy loam (Map unit EvB), and Norma loam (Map unit No).

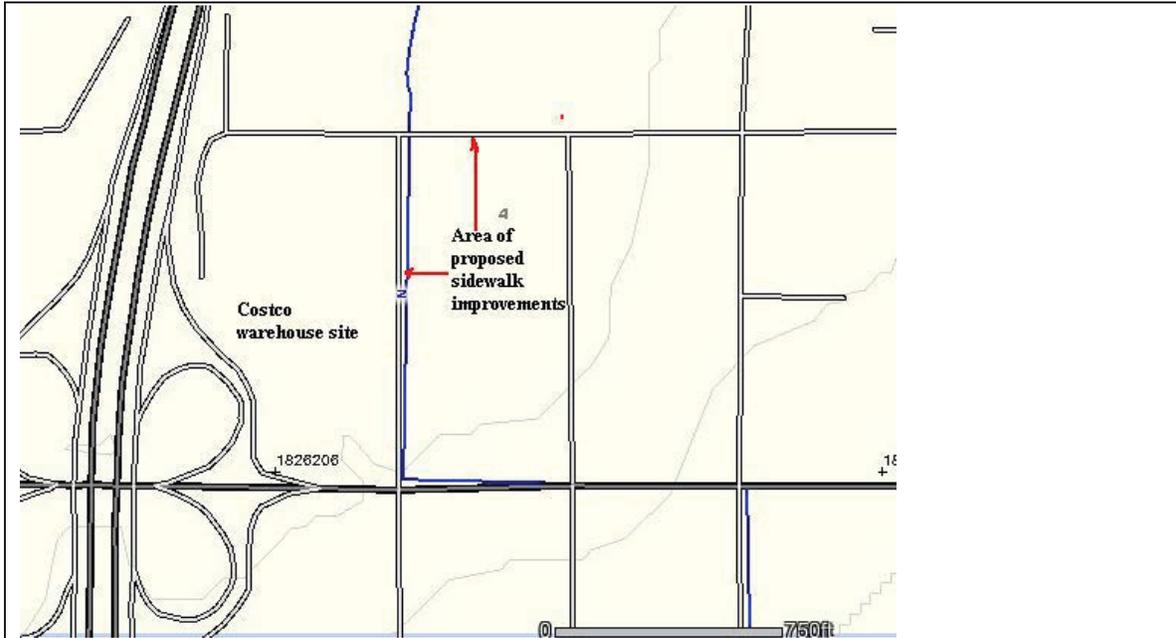
Alderwood gravelly sandy loam soils are moderately well drained soils formed in under conifers in glacial deposits. Everett gravelly sandy loams are somewhat excessively drained soils formed in gravelly glacial outwash under conifers. Normal soils are poorly drained soils formed under grasses and sedges in alluvium. Only the Norma soils are considered hydric or wetland soils according to the publication, “*Hydric Soils of the United States*”. Norma soils are depicted under the southeast part of the warehouse site as well as under 120th Avenue NE and NE 90th Street in the vicinity of the sidewalk improvements.



NRCS Soil Mapper Soil map of the site

3.1.2 Department of Natural Resources FPARS

According to the Department of Natural Resources Forest Practice Application Review System (FPARS), there is a Type N water that is located along the east side of 120th Avenue NE and extending north past 90th Street towards Forbes Lake.



Department of Natural Resources FPARS map of the site

3.1.3 National Wetland Inventory

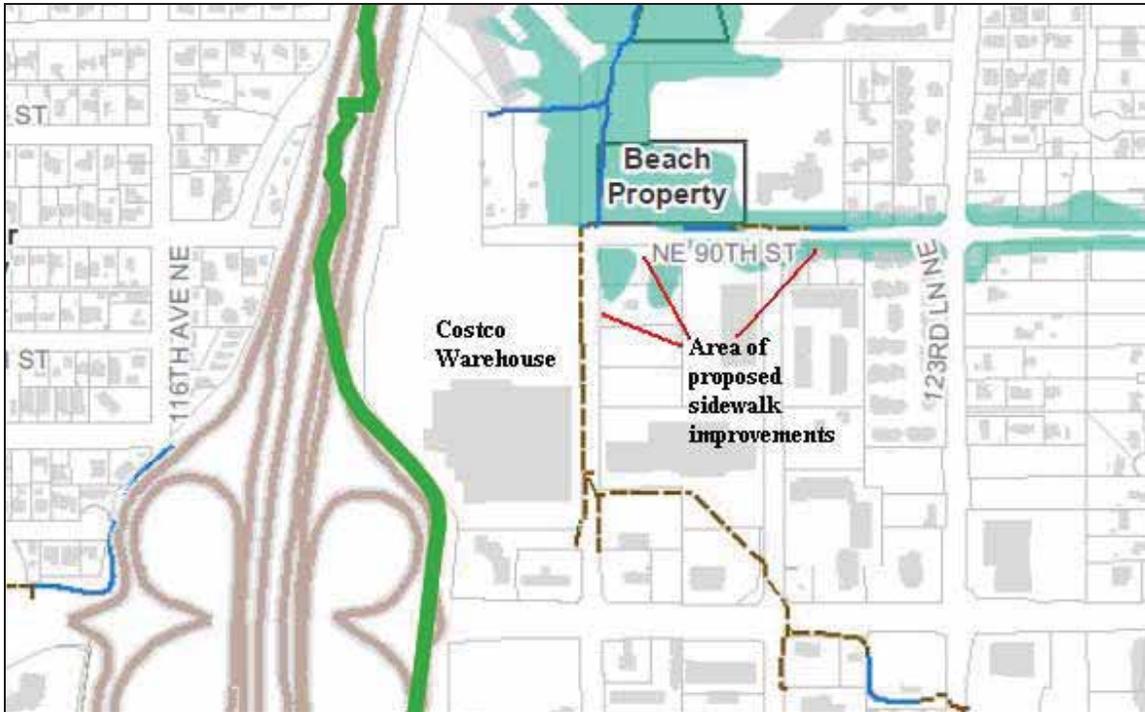
According to the National Wetland Inventory, there is a large forested and scrub-shrub wetland located north of 90th Street along the edges of Forbes Lake. No wetlands are depicted on the site.



National Wetland Inventory

3.1.4 City of Kirkland Sensitive Areas Map

The City of Kirkland Sensitive Areas map depicts a piped stream (brown dashed line) along the west side of 120th Avenue NE, as well as several small wetland areas (light blue shading) along the south side of NE 90th Street. There is also a large wetland area depicted north of NE 90th Street that is associated with Forbes Lake.



City of Kirkland Sensitive Areas Map.

3.1.5 A.C. Kindig Wetland Study February 11, 2009

AC Kindig conducted a prior study of the wetlands near the Costco site. Their findings are detailed in a report entitled "120th Ave. NE & NE 90th Street Sidewalk Improvements" dated February 11, 2009. This report identified two wetlands within the study limits, Wetland #1, a Type 1 wetland was identified north of NE 90th Street, and Wetland #2, a Type 3 wetland was identified along the east side of 120th Avenue NE, and along the south side of NE 90th Street. The report also proposed mitigation for partial fill in these wetland areas to accommodate proposed sidewalk improvements. This mitigation is no longer necessary because the project has since been re-designed to avoid all wetland impacts through the use of retaining walls and limiting the project impacts to areas within the existing developed road prism.

3.2 Topography

The site is a relatively flat with a slight slope to the east and north. The general drainage pattern of the study area is to the north towards Forbes Lake.

3.3 Uplands

The entire warehouse site is developed with a large warehouse structure, paved driving and parking surfaces, as well as landscaped islands within and surrounding the pavement. A small, narrow finger of land extends from the northeast portion of the site towards Forbes Lake. This portion of the site is undeveloped and extends to wetland surrounding Forbes Lake. The areas of proposed off-site sidewalk improvements are located within the general prism of the existing fill that was placed when 120th Avenue NE and NE 90th Street were constructed. These areas are primarily grass and weed-covered and in portions, are covered only with gravel.

3.4 Wetlands

A total of 2 wetland areas were identified in the area of the proposed offsite sidewalk improvements. These wetlands are identical in location and rating as those found in the previously submitted AC Kindig study in 2009. These wetlands have been flagged, and labeled as Wetlands 1 & 2, as they were in the AC Kindig report.



Above: Map depicting approximate location of Wetlands #1 & #2.

3.4.1 Wetland #1

Wetland #1 consists of a large complex wetland associated with Forbes Lake. This wetland contains emergent, scrub-shrub, forested and aquatic bed wetland classes and is also known as “Forbes Lake #17” as identified in the Kirkland Streams, Wetlands and Wildlife Study prepared by the Watershed Company for the City. The edge of Wetland #1 along NE 90th Street was flagged with flags 1-1 through 1-11.

The south edge of Wetland #1 abuts the fill prism of NE 90th Street. In this area, a mix of scrub-shrub and forested vegetation including hardhack (*Spirea douglasii*), reed canary grass (*Phalaris arundinacea*), sitka and pacific willow (*Salix sitchensis* and *S. lasiandra*), black cottonwood (*Populus balsamifera*) and Himalayan blackberry is present.

Soil pits excavated within the edge of this wetland revealed black sapric muck soils that were saturated to the surface. The upland soils immediately next to the wetland consists of mixed gravelly fill of the road prism.

Utilizing the United States Fish and Wildlife Service (USFWS) wetland classification system (Cowardin et al. 1979), Wetland #1 contains areas that would be classified as PFO1C (Palustrine, forested, broad-leaved deciduous, seasonally flooded), PSS1C (palustrine, scrub-shrub, broad leaved deciduous, seasonally flooded) and PEM1C (Palustrine, emergent, persistent, seasonally flooded).

There is no functional buffer of this wetland along NE 90th Street as the wetland edge abuts the existing fill material for NE 90th Street.

Using the City of Kirkland Field Data form, Wetland #1 meets the criteria of a Type 1 wetland due to the fact it has at least ¼ acre of organic soils. Under City of Kirkland Code, Type 1 wetlands within the “primary basin” have a 100’ buffer measured from the wetland edge. As previously stated, there is no functional buffer along the area of the proposed off-site sidewalk improvements as the buffer area is the fill prism of 120th Avenue NE and NE 90th Street.

3.4.2 Wetland #2

Wetland #2 consists of a small wetland containing a small area of forested, scrub shrub and emergent wetland, all located south of NE 90th Street and east of 120th Avenue NE. The wetland edge was flagged with flags 2-1 through 2-16, and the wetlands northern and western boundaries are formed by the edges of the wetland meeting existing road and driveway fill prisms. The wetland is characterized by a small forested area on its northeast corner vegetated with a mix of Himalayan blackberry and cottonwoods, and scrub shrub areas vegetated with pacific willow, sitka willow and reed canary grass, and emergent areas of reed canary grass, small fruited bulrush (*Scirpus microcarpos*) and lady fern (*Athyrium filix-femina*).

Soil pits excavated within the edge of this wetland revealed black silty loam soils that were moist during our site inspection in July. The upland soils immediately next to the wetland consist of mixed gravelly fill of the road prism as well as a residential driveway on the south.

Utilizing the United States Fish and Wildlife Service (USFWS) wetland classification system (Cowardin et al. 1979), Wetland #2 contains areas that would be classified as PFO1C (Palustrine, forested, broad-leaved deciduous, seasonally flooded), PSS1C (palustrine, scrub-shrub, broad leaved deciduous, seasonally flooded) and PEM1C (Palustrine, emergent, persistent, seasonally flooded).

Using the City of Kirkland Field Data form, Wetland #2 meets the criteria of a Type 3 wetland as it received a total of 17 points. Under City of Kirkland Code, Type 3 wetlands within the “primary basin” have a 50’ buffer measured from the wetland edge. As previously stated, there is no functional buffer along the area of the proposed improvements as the buffer area is the fill prism of 120th Avenue NE and NE 90th Street.

3.5 Streams

As depicted in the City of Kirkland Sensitive Areas Map, there is a non-fish bearing stream located under 120th Avenue NE in a culvert. This differs from the FPARS map which incorrectly shows the stream above ground, and on the east side of 120th. This stream exits the culvert under the north side of NE 90th Street and discharges into a north south running ditch.

As this stream has no above ground channel in the vicinity of the project, there is no functional buffer nor is a buffer required from a piped feature by Code.

4.0 REGULATIONS

In addition to the wetland regulations previously described for wetlands, certain activities (filling and dredging) within "waters of the United States" may fall under the jurisdiction of the U.S. Army Corps of Engineers (USACOE). The USACOE regulates all discharges into "waters of the United States" (wetlands) under Section 404(b) of the Clean Water Act. Wetlands that are hydrologically isolated are not regulated by the USACOE, per the 2001 U.S. Supreme Court decision *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers* (“SWANCC”) as interpreted by the Corps and EPA in their Regulatory Guidance Letter.

Discharges (fills) into any wetlands that are not considered “isolated” are regulated by the Corps. However, only the Corps can make that determination.

For this project, no fill is proposed in any jurisdictional wetland or “water of the US” so no permit is required from the US Army Corps of Engineers.

5.0 PROPOSED PROJECT

The proposed project includes the construction of a gas station within the existing paved parking area on the north end of the warehouse site, as well as the installation of off-site sidewalk improvements along a portion of 120th Avenue NE on its east side, and along the south side of NE 90th Street.

5.1 Gas Station

The proposed gas station will be located within an existing developed area and outside of all buffer areas. Therefore, no impacts to any critical areas or their associated buffers are anticipated from this portion of the project.

5.2 Sidewalk Improvements

To fulfill City of Kirkland requirements for the project, Costco must install a curb and gutter as well as a 5' sidewalk along the south side of NE 90th Street and the east side of 120th Avenue NE, as depicted on the attached Costco Gasoline Off-site Road Improvement Plan, prepared by Barghausen Consulting Engineers and shown on Sheet C6.0. As previously described, Wetland #2, a Type 3 wetland is located in this area. The wetland edge of Wetland #2 in the vicinity of the improvements is located at the toe of the existing, legally established fill slope for these two roads. As a result, all of the proposed sidewalk improvements are within the existing legally established road prism. This is an area where wetland abuts an existing improvement, the road prism, in an area where the wetland adjoins the road prism and no functional buffer exists. In order to avoid any impacts to critical areas, the sidewalk has been designed using small retaining walls within the prism of the existing road. Therefore, the sidewalk improvements will not impact any critical areas.

The City of Kirkland Municipal Code (Chapter 90.20 "General Exceptions") exempts certain development activities within the established rights-of-ways and provides:

The following activities or conditions shall be exempt from this chapter:

4. All utility work in improved City rights-of-way; and all normal and routine maintenance, operation and reconstruction of existing roads, streets, and associated rights-of-way and structures; and construction of sewer or water lines that connect to existing lines in a sensitive area or buffer where no feasible alternative location exists based on an analysis of technology and system efficiency; provided, in each case, that (1) such activities will not increase the impervious area or reduce flood storage capacity, and (2) the construction drawings specify that all affected sensitive areas and buffers will be expeditiously restored to their pre-project condition or better. For purposes of this subsection only, "improved City rights-of-way" include those rights-of-way that have improvements only underground, as well as those with surface improvements.

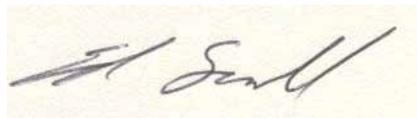
Costco's proposed off-site sidewalk improvements meet KMC Chapter 90.20 exemption criteria because the sidewalk improvements:

- 1) Will not increase impervious surface over the existing impervious fill prism. or reduce flood storage capacity.
- 2) No sensitive areas or buffers are expected to be impacted by the improvements. Even if some unforeseen, incidental impact was to occur, the affected sensitive area and/or buffers would be expeditiously restored to their pre-construction condition or better.

If any area of wetland is temporarily impacted from the improvements during construction, a restoration plan will be prepared and submitted to the City for review and approval prior to restoring the area.

If you have any questions in regards to this report or need additional information, please feel free to contact me at (253) 859-0515 or at esewall@sewallwc.com .

SEWALL WETLAND CONSULTING, INC.



Ed Sewall
Senior Wetland Ecologist PWS #212

Attached: Data Sheets
 City of Kirkland Wetland Rating Forms
 Site Plan Sheet C6.0

Plate 26
WETLAND FIELD DATA FORM

(Note: Applicable to Chapter 90 KZC, but not Chapter 63 KZC)



Wetland #1

100' Buffer
Primary Inflow

WETLAND FIELD DATA FORM

BEGIN BY CHECKING ANY OF THE FOLLOWING (a. - e.) THAT APPLY:

- a. The wetland is contiguous to Lake Washington;
- b. The wetland contains at least 1/4 acre of organic soils such as peat bogs or mucky soils. ✓
- c. The wetland is equal to or greater than 10 acres in size and having three or more wetland classes, as defined by the U.S. Fish & Wildlife Service (Cowardin et al. 1979), one of which is open water;
- d. The wetland has significant habitat value to state or federally listed threatened or endangered wildlife species; or
- e. The wetland contains state or federally listed threatened or endangered plant species.

IF ANY OF THE CRITERIA LISTED ABOVE ARE MET, THEN THE WETLAND IS CONSIDERED TO BE TYPE 1. IF THAT IS THE CASE, PLEASE CONTINUE TO COMPLETE THE ENTIRE FORM, BUT DO NOT ASSIGN POINTS.

IF THE WETLAND DOES NOT MEET THE CRITERIA LISTED ABOVE FOR TYPE 1, COMPLETE THE ENTIRE FORM, USING THE ASSIGNED POINTS TO DETERMINE IF IT IS A TYPE 2 OR TYPE 3 WETLAND.

Type 2 wetlands typically have at least two wetland vegetation classes, are at least partially surrounded by buffers of native vegetation, connected by surface water flow (perennial or intermittent) to other wetlands or streams, and contain or are associated with forested habitat.

1. Total wetland area

Estimate wetland area and score from choices	Acres	Point Value	Points
	>20.00	= 6	
	10-19.99	= 5	
	5-9.99	= 4	
	1-4.99	= 3	
	0.1-0.99	= 2	
	<0.1	= 1	

2. Wetland classes: Determine the number of wetland classes that qualify, and score according to the table.

	# of Classes	Points
Open Water: if the area of open water is >1/3 acre or >10% of the total wetland area	1	= 1
Aquatic Beds: if the area of aquatic beds is >10% of the open water area or >1/2 acre	2	= 3
Emergent: if the area of emergent class is >1/2 acre or >10% of the total wetland area	3	= 5
Scrub-Shrub: if the area of scrub-shrub class is >1/2 acre or >10% of the total wetland area	4	= 7
Forested: if the area of forested class is >1/2 acre or >10% of the total wetland area	8	= 10

3. Plant species diversity.

For all wetland classes which qualified in 2 above, count the number of different plant species and score according to the table below. You do not have to name them.

e.g., if a wetland has an aquatic bed class with 3 species, and emergent class with 4 species and a scrub-shrub class with 2 species, you would circle 2, 2, and 1 in the second column (below).

Class	# of Species	Point Value	Class	# of Species	Point Value
Aquatic Bed	1-2	= 1	Scrub-Shrub	1-2	= 1
	3	= 2		3-4	= 2
	>3	= 3		>4	= 3
Emergent	1-2	= 1	Forested	1-2	= 1
	3-4	= 2		3-4	= 2
	>4	= 3		>4	= 3

4. Structural diversity.

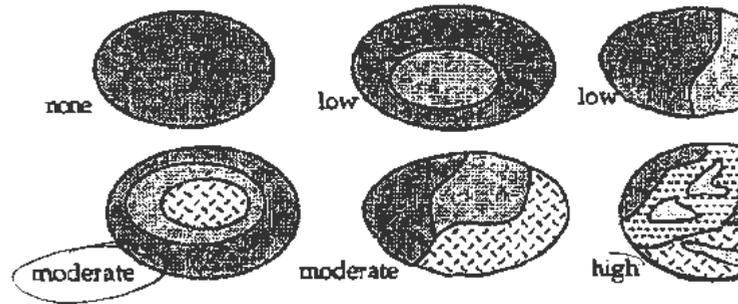
If the wetland has a forested class, add 1 point for each of the following attributes present:

- Trees >60' tall = 1
- Trees 20' to 49' tall = 1
- shrubs = 1
- Herbaceous ground cover = 1

5. Interspection between wetland classes.

Decide from the diagrams below whether interspection between wetland classes is high, moderate, low or none

- 3 = High
- 2 = Moderate
- 1 = Low
- 0 = None



6. Habitat features

- Add points associated with each habitat feature listed:
- Is there evidence of current use by beavers? = 3
 - Is a heron rookery located within 300'? = 2
 - Are raptor nest(s) located within 300'? = 1
 - Are there at least 2 standing dead trees (snags) per acre? = 1
 - Are there any other perches (wires, poles, or posts)? = 1
 - Are there at least 3 downed logs per acre? = 1

7. Connection to streams

- Is the wetland connected at any time of the year via surface water? (score one answer only)
- Is the wetland connected at any time of the year via surface water?
 - To a perennial stream or a seasonal stream with fish = 5
 - To a seasonal stream without fish = 3
 - Is not connected to any stream = 0

8. Buffers

Step 1: Estimate (to the nearest 5%) the percentage of each buffer or land-use type (below) that adjoins the wetland boundary. Then multiply these percentages by the factor(s) below and enter result in the column to the right.

	% of Buffer	Step 1	Width Factor	Step 2
Roads, buildings or parking lots	% X 0 =		=	
Lawn, grazed pasture, vineyards or annual crops	% X 1 =		=	
Ungrazed grassland or orchards	% X 2 =		=	
Open water or native grasslands	% X 3 =		=	
Forest or shrub	% X 4 =		=	
			Add buffer total	

- Step 2: Multiply result(s) of step 1:
- By 1 if buffer width is 25-50'
 - By 2 if buffer width is 50-100'
 - By 3 if buffer width is >100'

Enter results and add subscores

Step 3. Score points according to the following table.

Buffer Total

900-1200	= 4
600-899	= 3
300-599	= 2
100-299	= 1

9. Connection to other habitat areas:

- Is there a riparian corridor to other wetlands within 0.25 of a mile, or a corridor >100' wide with good forest or shrub cover to any other habitat area? = 5
- Is there a narrow corridor <100' wide with good cover or a wide corridor >100' wide with low cover to any other habitat area? = 3
- Is there a narrow corridor <100' wide with low cover or a significant habitat area within 0.25 mile but no corridor? = 1
- Is the wetland and buffer completely isolated by development and/or cultivated agricultural land? = 0

10. Scoring

Add the scores to get a total. _____

Question: Is the total greater than or equal to 22 points?

Answer

Yes = Type 2

No = Type 3

Wetland #2
Type 3
50' b-r Pen

Plate 26
WETLAND FIELD DATA FORM

(Note: Applicable to Chapter 90 KZC, but not Chapter 83 KZC)



WETLAND FIELD DATA FORM

BEGIN BY CHECKING ANY OF THE FOLLOWING (a - e.) THAT APPLY:

- a. The wetland is contiguous to Lake Washington.
- b. The wetland contains at least 1/4 acre of organic soils, such as peat bogs or mucky soils.
- c. The wetland is equal to or greater than 10 acres in size and having three or more wetland classes, as defined by the U.S. Fish & Wildlife Service (Cowardin et al. 1979), one of which is open water;
- d. The wetland has significant habitat value to state or federally listed threatened or endangered wildlife species; or
- e. The wetland contains state or federally listed threatened or endangered plant species.

IF ANY OF THE CRITERIA LISTED ABOVE ARE MET, THEN THE WETLAND IS CONSIDERED TO BE TYPE 1. IF THAT IS THE CASE, PLEASE CONTINUE TO COMPLETE THE ENTIRE FORM, BUT DO NOT ASSIGN POINTS.

IF THE WETLAND DOES NOT MEET THE CRITERIA LISTED ABOVE FOR TYPE 1, COMPLETE THE ENTIRE FORM, USING THE ASSIGNED POINTS TO DETERMINE IF IT IS A TYPE 2 OR TYPE 3 WETLAND

Type 2 wetlands typically have at least two wetland vegetation classes, are at least partially surrounded by buffers of native vegetation, connected by surface water flow (perennial or intermittent) to other wetlands or streams, and contain or are associated with forested habitat.

1. Total wetland area

Estimate wetland area and score from choices	Acres	Point Value	Points
	>20.00	= 6	
	10-19.99	= 5	
	5-9.99	= 4	
	1-4.99	= 3	
	0.1-0.99	= 2	
	<0.1	= 1	

2. Wetland classes: Determine the number of wetland classes that qualify, and score according to the table.

	# of Classes	Points
Open Water: if the area of open water is >1/3 acre or >10% of the total wetland area	1	= 1
Aquatic Beds: if the area of aquatic beds is >10% of the open water area or >1/2 acre	2	= 3
Emergent: if the area of emergent class is >1/2 acre or >10% of the total wetland area	3	= 5
Scrub-Shrub: if the area of scrub-shrub class is >1/2 acre or >10% of the total wetland area	4	= 7
Forested: if the area of forested class is >1/2 acre or >10% of the total wetland area	5	= 10

3. Plant species diversity.

For all wetland classes which qualified in 2 above, count the number of different plant species and score according to the table below. You do not have to name them.

e.g., if a wetland has an aquatic bed class with 3 species, and emergent class with 4 species and a scrub-shrub class with 2 species, you would circle 2, 2, and 1 in the second column (below).

Class	# of Species	Point Value	Class	# of Species	Point Value
Aquatic Bed	1-2	= 1	Scrub-Shrub	1-2	= 1
	3	= 2		3-4	= 2
	>3	= 3		>4	= 3
Emergent	1-2	= 1	Forested	1-2	= 1
	3-4	= 2		3-4	= 2
	>4	= 3		>4	= 3

4. Structural diversity.

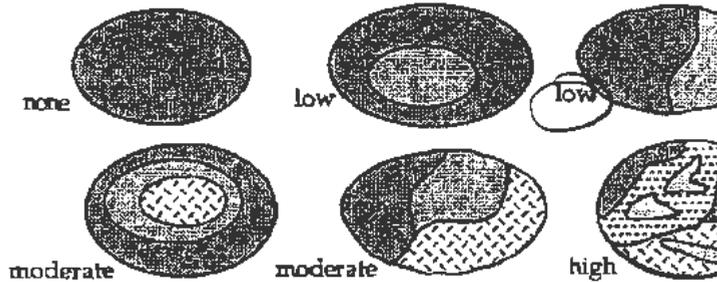
If the wetland has a forested class, add 1 point for each of the following attributes present:

Trees >50' tall	= 1
Trees 20' to 49' tall	= 1
shrubs	= 1
Herbaceous ground cover	= 1

5. Interspection between wetland classes.

Decide from the diagrams below whether interspection between wetland classes is high, moderate, low or none

- 3 = High
- 2 = Moderate
- 1 = Low
- 0 = None



6. Habitat features

- Add points associated with each habitat feature listed. = 3
- Is there evidence of current use by beavers? = 2
- Is a heron rookery located within 300'? = 1
- Are raptor nest(s) located within 300'? = 1
- Are there at least 2 standing dead trees (snags) per acre? = 1
- Are there any other perches (wires, poles, or posts)? = 0
- Are there at least 3 downed logs per acre? = 0

7. Connection to streams

- Is the wetland connected at any time of the year via surface water? (score one answer only)
- Is the wetland connected at any time of the year via surface water? = 5
- To a perennial stream or a seasonal stream with fish = 3
- To a seasonal stream without fish = 0
- Is not connected to any stream

8. Buffers

Step 1: Estimate (to the nearest 5%) the percentage of each buffer or land-use type (below) that adjoins the wetland boundary. Then multiply these percentages by the factor(s) below and enter result in the column to the right.

	% of Buffer	Step 1	Width Factor	Step 2
Roads, buildings or parking lots	50% X 0 =	0	=	0
Lawn, grazed pasture, vineyards or annual crops	50% X 1 =	50	=	
Ungrazed grassland or orchards	% X 2 =		=	
Open water or native grasslands	% X 3 =		=	
Forest or shrub	% X 4 =		=	
				Add buffer total

- Step 2: Multiply result(s) of step 1:
 - By 1 if buffer width is 25-50'
 - By 2 if buffer width is 50-100'
 - By 3 if buffer width is >100'

Enter results and add subscores

Step 3: Score points according to the following table:

- Buffer Total
- 900-1200 = 4
- 600-899 = 3
- 300-599 = 2
- 100-299 = 1

9. Connection to other habitat areas:

- Is there a riparian corridor to other wetlands within 0.25 of a mile, or a corridor >100' wide with good forest or shrub cover to any other habitat area? = 5
- Is there a narrow corridor <100' wide with good cover or a wide corridor >100' wide with low cover to any other habitat area? = 3
- Is there a narrow corridor <100' wide with low cover or a significant habitat area within 0.25 mile but no corridor? = 1
- Is the wetland and buffer completely isolated by development and/or cultivated agricultural land? = 0

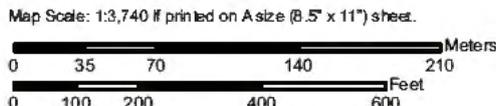
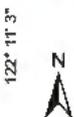
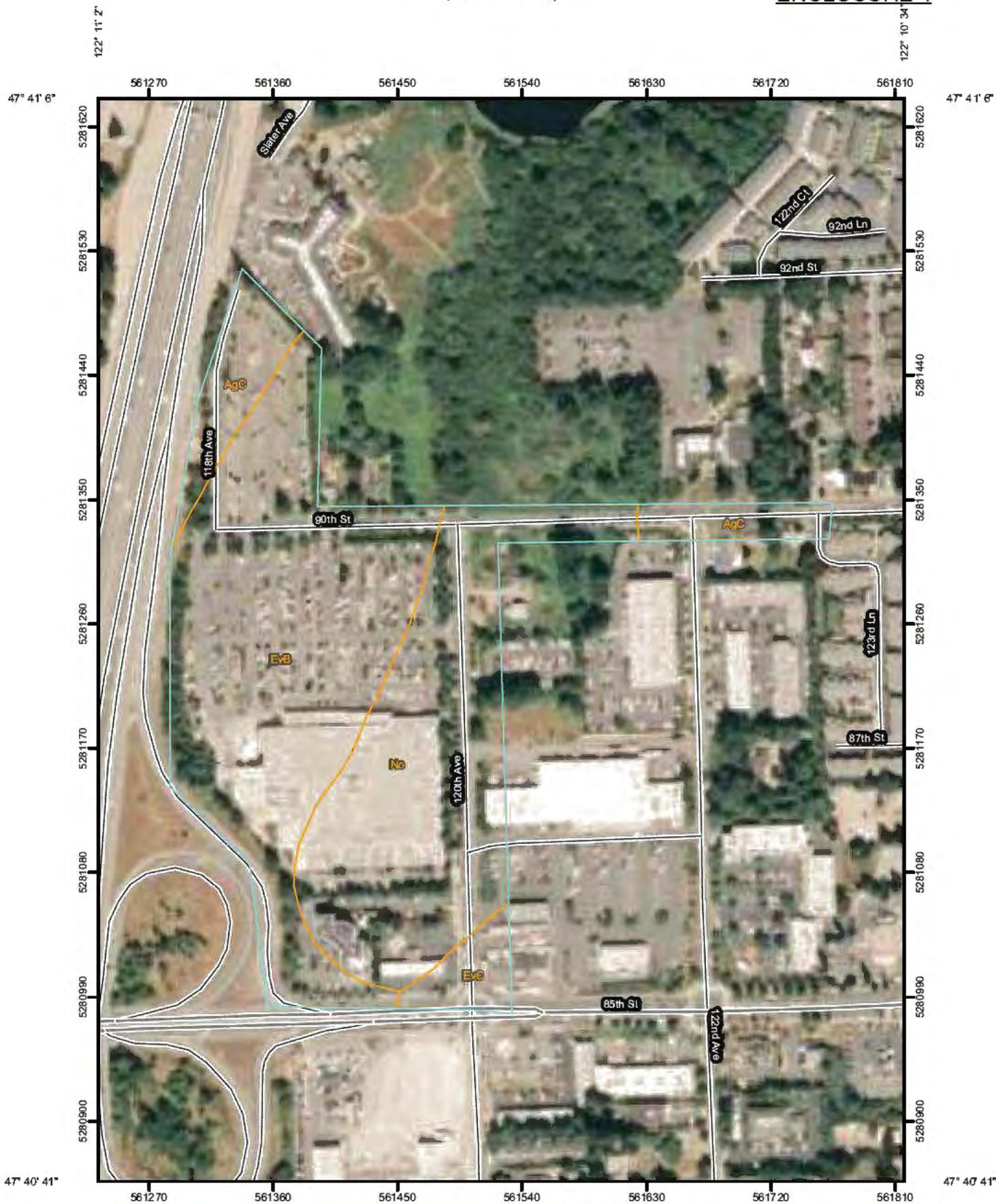
10. Scoring

Add the scores to get a total: 17
 Question: is the total greater than or equal to 22 points?

Answer:

Yes = Type 2

No = Type 3



MAP LEGEND

- Area of Interest (AOI)
- Area of Interest (AOI)
- Soils**
- Soil Map Units
- Special Point Features**
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot

- Very Stony Spot
- Wet Spot
- Other
- Special Line Features**
- Gully
- Short Steep Slope
- Other
- Political Features**
- Cities
- Water Features**
- Streams and Canals
- Transportation**
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:3,740 if printed on A size (8.5" x 11") sheet.
The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.
Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: UTM Zone 10N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: King County Area, Washington
Survey Area Data: Version 6, Sep 22, 2009

Date(s) aerial images were photographed: 7/24/2006

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

King County Area, Washington (WA633)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AgC	Alderwood gravelly sandy loam, 6 to 15 percent slopes	2.4	9.9%
EvB	Everett gravelly sandy loam, 0 to 5 percent slopes	12.0	49.3%
EvC	Everett gravelly sandy loam, 5 to 15 percent slopes	0.9	3.7%
No	Norma sandy loam	9.0	37.1%
Totals for Area of Interest		24.3	100.0%

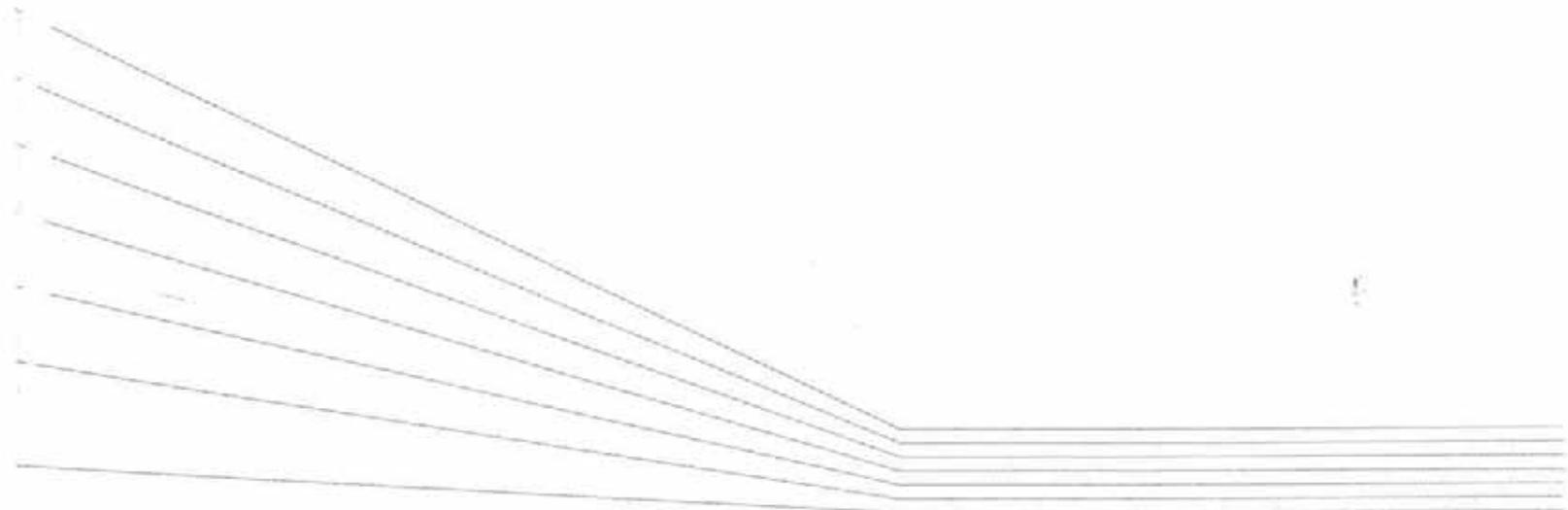
Enclosure 14



Transportation Impact Analysis

Kirkland Costco Gas Station

September 2011



Transportation Impact Analysis

KIRKLAND COSTCO GAS
STATION

Prepared for:
Costco

September 2011

Prepared by:



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Executive Summary

This section provides an executive summary of the Transportation Impact Analysis through a set of frequently asked questions (FAQs).

What is the proposed development?

The proposed project would develop a *Costco Gasoline* fueling station with 20 fueling positions. The project would be located in Kirkland, Washington in the existing north parking lot of *Costco Wholesale* and be used as an ancillary use to the warehouse.

How many additional peak hour trips will the proposed project generate?

The gasoline fueling station is an ancillary use to *Costco Wholesale* with approximately one-third of the trips originating from the existing patrons already at the warehouse and approximately one-quarter of the project generated trips coming from vehicles that would normally be passing-by the site on NE 85th Street or 124th Avenue NE. The net number of new trips generated by the site is approximately 170 (85 in / 85 out) trips during the PM peak hour and 150 (75 in / 75 out) during the AM peak hour.

What are the existing and future without-project conditions in the study area?

During the existing and 2012 without-project weekday AM & PM peak hour all study intersections operate at or above the City's adopted standard of LOS D.

Did the project pass the City's Transportation Concurrency test?

The City of Kirkland conducted a concurrency test based on its travel demand model which the project passed. This indicates the increased traffic volumes and operational impacts caused by the project would be concurrent with the level of transportation improvements planned for the study area.

Will the project install any traffic calming devices or create any cut-through traffic in the adjacent neighborhood?

The project will increase traffic volumes on the roadways adjacent to it, including: NE 90th Street, and 122nd Avenue NE. These roadways are classified as collector streets and are designed to accommodate additional traffic demand. Due to their classification, the City is unlikely to allow neighborhood traffic calming measures to be installed along these roadways.

The amount of vehicles cutting from arterial streets to neighborhood streets to reach the site (such as NE 90th Street and 128th Avenue NE east of 124th Avenue NE) is anticipated to be minimal. There are currently traffic calming measures, including speed humps and speed cushions, in place to deter cut-through traffic in the project vicinity. In addition, the City is currently designing several improvements along the NE 85th Street corridor, including access management, signal priority, signal optimization, additional turning, and additional travel lanes, that will improve traffic flow along the corridor and minimize or eliminate cut-through traffic on neighborhood streets.

Will there be sufficient parking on-site to meet the typical peak demands?

The proposed project is located in the north parking lot of Costco Wholesale where parking is furthest from the main store entrance and is the least utilized. The proposed project is not anticipated to require any additional parking spaces due to unique characteristics of Costco Gasoline fueling stations. With development of the project, the north parking lot and main parking lot will be restriped from angled to ninety-degree parking spaces and would include an expansion of the east parking lot located on 120th Avenue NE. The proposed supply of parking spaces with the project is 803 stalls which is approximately 100 stalls more than currently exist. Existing parking counts during weekday and weekend peak periods indicate there is currently sufficient parking during typical peak operations. As no increase in demand is anticipated from the proposed project, the future parking supply is also anticipated to be sufficient.

What is being proposed to mitigate the project's traffic impacts?

With the development of the proposed *Costco Gasoline* fueling station, some additional project traffic will be added to the adjacent roadway network; however, the additional traffic volume is not high enough to trigger any intersectional operational issues nor warrant any off-site transportation improvements. The project will be required to pay the City's transportation impact fee which will go toward planned transportation improvements within the City.

It is understood by Costco, that the North Rose Hill neighborhood where the project is located, currently lacks pedestrian connections to the east of 120th Avenue NE along NE 90th Street and that both the community and Costco would benefit from constructing pedestrian improvements in the area. Costco is volunteering to improve the pedestrian safety and mobility of the area by installing sidewalk to fill some critical gaps, adding new pedestrian crosswalks, and reconstructing an existing trail connection on the Costco property. These items are described in more detail below:

Sidewalk Improvements

The following sidewalk improvements are being proposed by Costco:

- 120th Avenue NE – along the east side off the street between NE 90th Street to the south side of the east parking lot.
- NE 90th Street – along the south side of the street from 120th Avenue NE to connect to the existing sidewalk along the frontage west of 122nd Avenue NE.
- NE 90th Street – along the south side of the street from 122nd Avenue NE to connect to the existing sidewalk at 123rd Lane NE.

These improvements will provide continuous pedestrian connections along NE 90th Street from 124th Avenue NE to 120th Avenue NE and the *Costco Wholesale* entrance. These improvements are part of the City's unfunded NE 90th Street Sidewalk (Phase II) project (NM 0026 000) from their Capital Improvement Project list.

Pedestrian Crossing

New pedestrian crosswalks are proposed at the intersection of 122nd Avenue NE/NE 90th Street on the eastbound and northbound approaches. These will pedestrian connections across streets and to the Rose Hill Presbyterian Church.

On-Site Trail

The portion of the existing trail connecting Slater Avenue NE to NE 90th Street that is on Costco property will be reconstructed with construction of the fueling station. This trail will continue to provide an important connection for bicyclists and pedestrians.

Introduction

This Transportation Impact Analysis (TIA) summarizes the potential transportation-related impacts associated with the *Costco Gasoline* addition to the existing *Costco Wholesale* in Kirkland, WA. The analysis was conducted to evaluate the project's impacts on roadways and intersections within the vicinity of the site and to recommend, if necessary, mitigation measures that would reduce or otherwise offset these impacts. This report has been prepared in coordination with City of Kirkland staff and complies with the City's *Transportation Impact Analysis Guidelines*.

Project Description

As shown in [Figure 1](#), the proposed project is located north of NE 90th Street in the northern most portion of the existing *Costco Wholesale* parking lot in the City of Kirkland. The proposed project would develop a member's only fuel station with 20 fueling positions and reconfigure the remaining *Costco Wholesale* parking lot. The project is expected to be constructed and in use by the end of 2012. A preliminary site plan of the fueling station and parking lot is shown in [Figure 2](#).

Costco Gasoline fuel stations function as an ancillary use to Costco warehouse developments and are not like traditional gasoline stations. These fuel stations are self-serve, only available to Costco members, and do not provide any other automotive services (automobile repair) or sales (including food or convenience items).

Analysis Approach and Study Area

The scope and approach of this analysis was identified through coordination with City of Kirkland staff. In addition to the site access driveways accessed via 120th Avenue NE, nine off-site intersections during the weekday PM peak hour and three intersections during the weekday AM peak hour were identified for analysis. The study intersections include those identified as significant based on the City's proportional share impact worksheets shown in [Appendix A](#), as well as other closely spaced intersection that may impact operations at adjacent significant intersections. The off-site study intersections include:

1. 124th Avenue NE/NE 116th Street (PM only)
2. 124th Avenue NE/NE 100th Street (PM only)
3. 124th Avenue NE/NE 90th Street (AM and PM)
4. 122nd Avenue NE/NE 90th Street (PM only)
5. 120th Avenue NE/NE 90th Street (AM and PM)
6. 120th Avenue NE/NE 85th Street (AM and PM)
7. 122nd Avenue NE/NE 85th Street (PM only)
8. 124th Avenue NE/NE 85th Street (PM only)
9. 128th Avenue NE/NE 85th Street (PM only)

Additionally, the site access driveways to the main parking lot and east parking lot, located on 120th Avenue NE, were also evaluated. The study intersections are shown in [Figure 1](#).

Consistent with the City's TIA guidelines, the analysis evaluates operations at each of the study intersections during the weekday AM peak period (7:00 AM to 9:00 AM) and during the weekday PM peak period (4:00 PM to 6:00 PM). The TIA begins by describing the conditions in the site vicinity, including roadway network, existing and future (2012) weekday AM and PM peak hour traffic volumes, traffic operations, traffic safety, transit, and non-motorized facilities. Future with-project conditions are evaluated by adding site-generated traffic to future baseline volumes. Analysis of future conditions addresses cumulative impacts of the proposed project and traffic growth in the study area caused by background growth and approved planned projects. Site-generated impacts are identified based on differences in transportation conditions between with- and without-project conditions.



Site Vicinity and Study Intersections

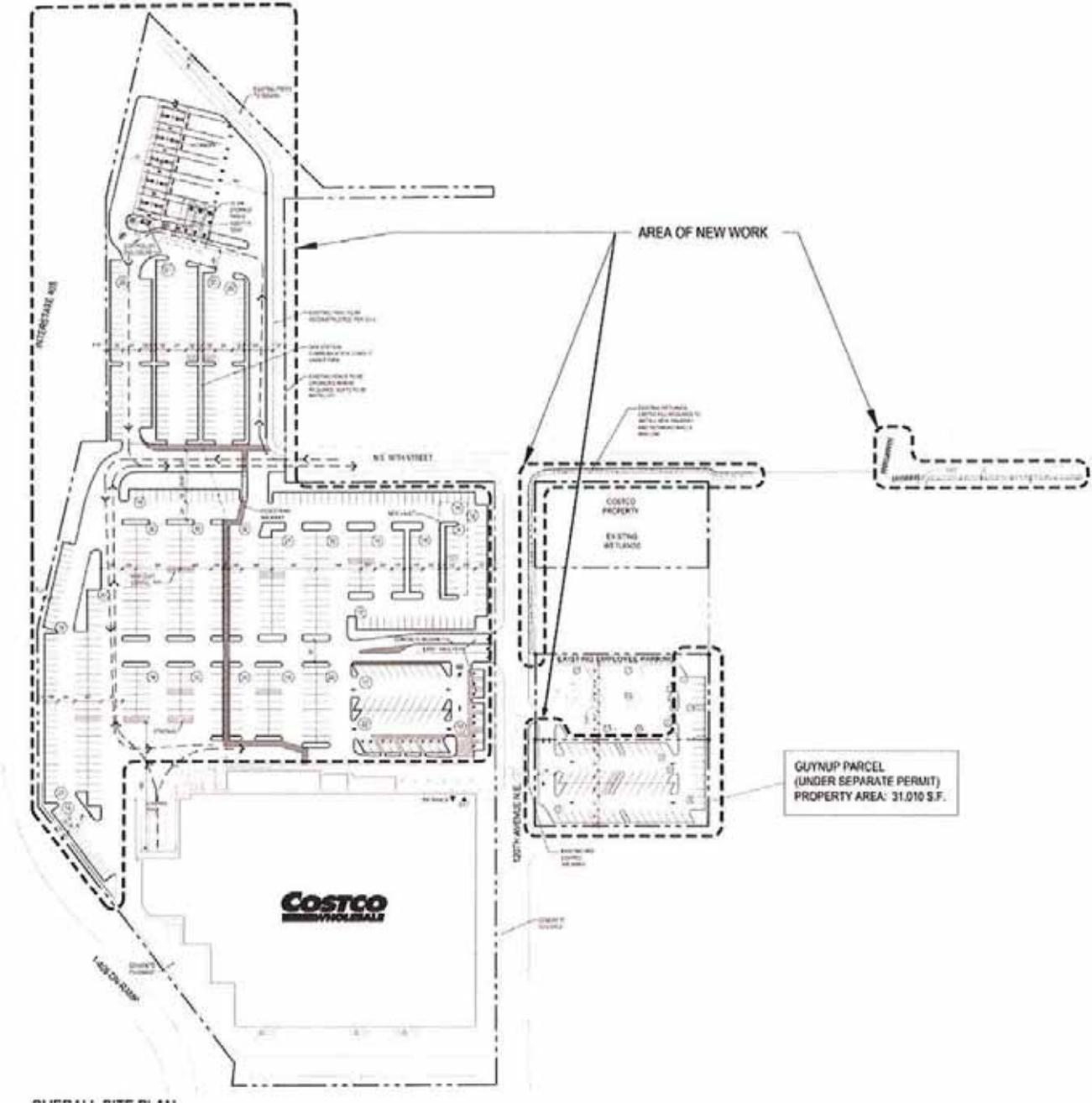
Kirkland Costco Gas Station

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FIGURE

1



Preliminary Site Plan

Kirkland Costco Gas Station

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FIGURE

2

Existing & Future Without-Project Conditions

This section describes the existing and future without-project conditions within the project's study area. Descriptions are provided for the roadway network, planned improvements, traffic volumes, intersection operations, traffic safety, transit service and non-motorized facilities in the study area.

Roadway Network

The primary roadways impacted by project-generated traffic are described below.

NE 85th Street is classified by the City of Kirkland as a principal arterial. It runs east-west from Downtown Kirkland east to the City of Redmond. Within the study area, it has two lanes in each direction with a center two-way left turn lane, curb, gutter, and sidewalks on both sides. The posted speed limit is 35 miles per hour (mph).

NE 90th Street is classified as a collector by the City of Kirkland. It runs east-west from 128th Avenue NE to *Costco Wholesale*. Within the study area, it is a two-lane roadway with intermittent gaps in the sidewalk between 120th Avenue NE and 124th Avenue NE. The posted speed limit is 25 mph.

120th Avenue NE is classified as a collector by the City of Kirkland. The roadway runs north-south from Lake Washington High School at NE 80th Street to *Costco Wholesale* at NE 90th Street. In the study area, the roadway has one lane in each direction with a center two-way left turn lane. There are sidewalks, curb, and gutter on the west side adjacent to the project site between NE 85th Street and NE 90th Street. The posted speed limit is 25 mph.

122nd Avenue NE is classified as a collector by the City of Kirkland. The roadway runs north-south from NE 60th Street to NE 90th Street. In the study area the roadway is two lanes with sidewalks, curb and gutter on the west side between NE 8th Street and NE 90th Street. The posted speed limit is 25 mph.

124th Avenue NE is classified as a principal arterial by the City of Kirkland. The roadway runs north-south from NE 60th Street north through the City of Kirkland. In the study area, the roadway has one lane in each direction with a center two-way left turn lane and intermittent sidewalk, curb and gutter on both sides. The posted speed limit is 35 mph.

Planned Improvements

There are currently two planned improvements to the roadway system that are funded and may impact the project study area. These improvements are identified within the City's *2011-2016 Capital Improvement Program Summary*.

NE 85th Street Preservation Program (ST 0006 003): This project will consist of grinding and overlaying NE 85th Street from I-405 to 132nd Avenue NE. The project is currently funded and construction is anticipated to occur in 2012.

NE 85th Street/124th Avenue NE Intersection Improvements (TR 0080 000): This project will construct an additional eastbound left-turn lane on NE 85th Street as well as a new bike lane, planter strip, and sidewalk. This project is anticipated to be complete in 2012. In the analyses conducted, existing channelization will be used for conservative purposes and to show incremental change between existing and future conditions.

A third project in the study area is currently unfunded but is a candidate of the City's funded Annual Concurrency Traffic Improvements Program Project (TR 8888).

NE 85th Street/120th Avenue NE Intersection Improvements (TR 0088 000): This project will construct a northbound right-turn lane and one additional through lane in the eastbound and westbound directions. Due to the uncertainty of the timing of the project, existing channelization was used for all existing and future analysis.

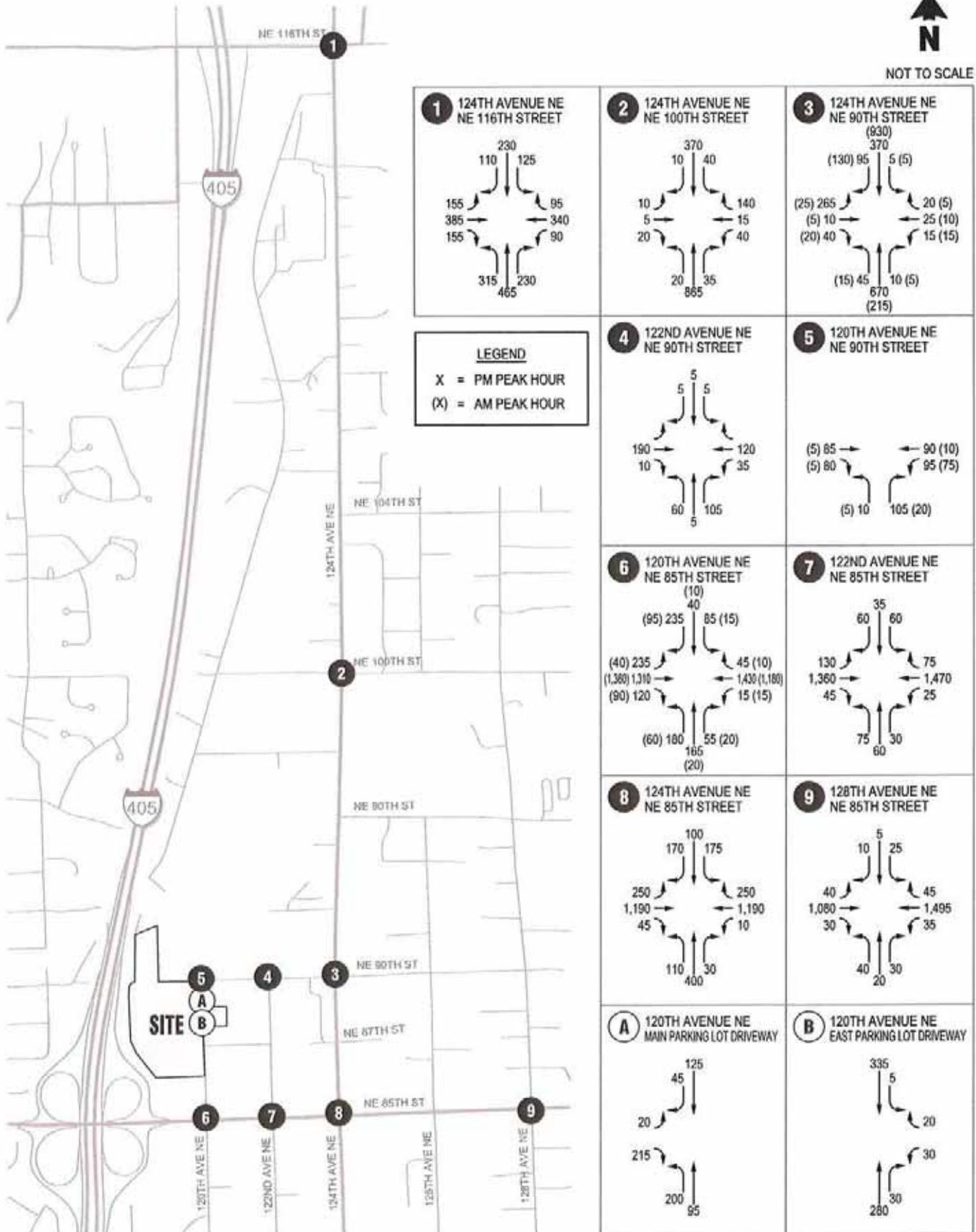
Traffic Volumes

Existing intersection turning movement counts were collected at the study intersections during the weekday AM and PM peak periods in August 2011. Intersection turning movement count data sheets are included in [Appendix B](#). The counts were then rounded to the nearest five vehicles to account for day-to-day fluctuations in traffic volumes. The resulting existing weekday AM and PM peak hour traffic counts used for analysis are shown in [Figure 3](#).

An annual background growth rate of 1.5 percent, provided by City of Kirkland staff, was used for estimating future 2012 without-project traffic volumes. In addition, future traffic generated from the approved Merit Homes Office development located at 132nd Avenue NE/NE 85th Street was included in the without-project traffic volumes. The future 2012 without-project traffic volumes are shown in [Figure 4](#).



NOT TO SCALE



Existing Weekday AM & PM Peak Hour Traffic Volumes

FIGURE

Kirkland Costco Gas Station

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Intersection Operations

A level of service (LOS) analysis was conducted during the study area intersections for the weekday PM peak hour. All study intersections were analyzed using Synchro 7.0. This software program provides an analysis based on methodologies presented in the *Highway Capacity Manual* (HCM) (Transportation Research Board, 2000 Edition).

LOS values range from LOS A, which indicates good operating conditions with little or no delay, to LOS F, which indicates extreme congestion and long vehicle delays. LOS is measured in terms of total average intersection delay for signalized and all-way stop-controlled intersections. LOS is measured in terms of average delay for the worst minor street movement for two-way stop-controlled intersections. A more detailed explanation of LOS criteria is provided in [Appendix C](#).

As described in the City of Kirkland's *Traffic Impact Analysis Guidelines*, the City requires project developers to mitigate intersections operating at LOS E when the project's proportionate share exceeds 15 percent of the intersection's total entering volume. For intersections operating at LOS F, projects are required to mitigate impacts when the project's proportionate share is greater than 5 percent of the total entering volume. Intersections operating at LOS A through D require no mitigation.

LOS results using existing intersection control and current signal timing plans, provided by City of Kirkland staff, are summarized in [Table 1](#) and LOS worksheets are provided in [Appendix D](#). Due to the recent retiming of the signals in the NE 85th Street corridor, the signal timing plans for 2012 future without-project conditions were maintained from existing conditions. Future without-project LOS results are shown in [Table 1](#) to allow comparison between existing and future baseline conditions.

Table 1. Existing & Future AM & PM Peak Hour Without-Project LOS Summary

Intersection	Existing			2012 Without-Project		
	LOS ¹	Delay ²	V/C ³ or W/M ⁴	LOS	Delay	V/C or W/M
Weekday AM Peak Hour						
124th Avenue NE/NE 90th Street	B	14.3	0.82	B	15.0	0.83
120th Avenue NE/NE 90th Street	A	7.5	NA	A	7.5	NA
120th Avenue NE/NE 85th Street	B	15.9	0.57	B	16.0	0.58
Weekday PM Peak Hour						
124th Avenue NE/NE 116th Street	C	30.1	0.76	C	34.0	0.81
124th Avenue NE/NE 100th Street	A	6.5	0.60	A	6.7	0.62
124th Avenue NE/NE 90th Street	B	17.3	0.69	B	19.4	0.68
122nd Avenue NE/NE 90th Street	A	8.9	NA	A	9.0	NA
120th Avenue NE/NE 90th Street	A	8.1	NA	A	8.1	NA
120th Avenue NE/NE 85th Street	D	36.8	0.85	D	38.6	0.80
122nd Avenue NE/NE 85th Street	B	10.2	0.65	B	11.2	0.66
124th Avenue NE/NE 85th Street	D	48.6	0.85	D	52.2	0.82
126th Avenue NE/NE 85th Street	B	10.3	0.59	A	8.2	0.60
Main Parking Lot/120th Avenue NE	B	11.7	EB	B	11.8	EB
East Parking Lot/120th Avenue NE	B	12.0	WB	B	12.0	WB

1. Level of service, based on 2000 Highway Capacity Manual methodology.
2. Average delay in seconds per vehicle.
3. Volume-to-Capacity (V/C) ratio reported for signalized traffic control.
4. Worst movement (WM) reported for two-way stop sign traffic control.

As shown in [Table 1](#), all study intersections currently operate at or above LOS D during the weekday AM and PM peak hours. In the future without-project scenario, all study

intersections are still anticipated to operate at the same LOS as existing during both weekday AM and PM peak hours.

Traffic Safety

Traffic accident records at signalized intersections were provided by the City of Kirkland and the Washington State Department of Transportation (WSDOT). The records contain collision data and accident rates for the most recent complete three-year period (2008-2010). These records are summarized in [Table 2](#).

Table 2. Collision Data Summary

Intersection	Existing Collisions per MEV ¹			Annual Average Collisions Per MEV ¹
	2008	2009	2010	
124th Avenue NE/NE 116th Street ²	1.30	1.21	1.92	1.48
124th Avenue NE/NE 100th Street ²	0.00	0.31	0.32	0.21
124th Avenue NE/NE 90th Street ²	0.00	0.44	0.15	0.20
122nd Avenue NE/NE 90th Street ³	0.00	0.00	0.51	0.17
120th Avenue NE/NE 90th Street ³	0.00	0.00	0.59	0.20
120th Avenue NE/NE 85th Street ²	0.53	0.40	0.81	0.57
122nd Avenue NE/NE 85th Street ²	0.52	0.54	0.44	0.50
124th Avenue NE/NE 85th Street ²	0.57	0.74	0.60	0.63
128th Avenue NE/NE 85th Street ²	0.46	0.61	0.62	0.56
Main Parking Lot/120th Avenue NE ³	0.00	0.38	0.00	0.13
East Parking Lot/120th Avenue NE ³	0.00	0.00	0.00	0.00

1. MEV = Million Entering Vehicles
2. Data provided by City of Kirkland
3. Data provided by WSDOT

Typically, intersection safety becomes a concern if the average collision rate per million entering vehicles (MEV) is at or above 1.0. As shown in the table, the 124th Avenue NE/NE 116th Street intersection has the highest accident rate with an average of 1.48 collisions per MEV and is the only study intersection with an accident rate greater than 1.0 collisions per MEV. This intersection has previously been identified by the City as having potential safety issues. A review of the collision data at this indicates over half of the accidents have historically involved left-turning vehicles. Currently, protected-permitted left-turn phasing exists on each approach and collisions occur from left-turning drivers not yielding to oncoming traffic. The City has an unfunded improvement planned at the intersection that would add an additional northbound left-turn lane and create protected left-turn phasing to reduce or eliminate these types of collisions at the intersection.

Transit Service

King County Metro provides transit service near the project site. It operates the following two routes along NE 85th Street:

- **Routes 230** provides north/south service from Totem Lake, past the project site, and to the Kirkland Transit Center, Bellevue Transit Center, and Redmond Transit Center. The nearest stop to the proposed project is located at 120th Avenue NE on NE 85th Street. Arrival/departure headways are approximately every 30 minutes during weekday commute periods.
- **Routes 248** provides east/west service from the Kirkland Transit Center to the Redmond Transit Center and Avondale along NE 85th Street and NE Redmond Way. The nearest stop to the proposed project is located at 120th Avenue NE on NE 85th

Street. Arrival/departure headways are approximately every 30 minutes during weekday commute periods.

Non-motorized Facilities

Sidewalks are provided within the project vicinity on many of the roadways. Sidewalks are located near the project site along the west side of 120th Avenue NE, both sides of NE 85th Street, both sides of 122nd Avenue NE, and intermittently along NE 90th Street, 124th Avenue NE and the east side of 120th Avenue NE. Bicycle lanes are provided along 124th Avenue NE in both directions and an existing trail is located on the project site connecting NE 90th Street to Slater Avenue NE.

Project Impacts

This section of the report describes the characteristics of the proposed project and identifies the potential transportation-related impacts associated with the proposed development.

Project Characteristics

Costco Gasoline fuel buildings function as an ancillary use to *Costco Wholesale* developments and are unlike traditional gasoline or service stations. Travel to and from Costco is unique due to membership requirements and the nature of Costco sales; this pertains to *Costco Wholesale*, *Costco Gasoline*, and the interaction between the two. Some key characteristics are summarized below and a more detailed list of travel characteristics derived from studies conducted by Kittleson & Associates, Inc. has been attached in [Appendix E](#).

- *Costco Gasoline* fuel stations are an auxiliary use to warehouse, and a large portion of trips generated by the site are shared between the two.
- The fuel stations are self-service and are open to members only by requiring a Costco membership card be inserted.
- All payments are made at the fuel position with debit, *American Express* or Costco cash card. Cash is not accepted.
- The fuel stations do not offer any other services, such as automotive care, food, or convenience items.
- The fuel stations are staffed by a minimum of one attendant. The attendant is trained to help members operate fuel pumps, direct entering vehicles to open fuel positions, and manage on-site queues and circulation.

Trip Generation

Since *Costco Gasoline* fuel stations have unique characteristics, daily and weekday peak hour trip generation varies from published rates from the Institute of Transportation Engineer's *Trip Generation* manual. Trip generation for the proposed Kirkland *Costco Gasoline* development was estimated based on a trip generation study conducted specifically for this type of use by Kittleson & Associates, Inc. A memorandum summarizing the results from the trip generation study is included in [Appendix E](#).

The trip generation rates calculated in the Kittleson & Associates, Inc. study were based on data collected at similar *Costco Gasoline* stations located in Washington, California, and Arizona. The study found that the number of trips generated by *Costco Gasoline* stations is more dependent upon membership base, market area and adjacent warehouse activity rather than the number of fueling positions.

Table 3 summarizes the estimated trip generation for the proposed *Costco Gasoline* fuel station based on the trip generation study conducted by Kittleson & Associates, Inc using the above parameters. The trip generation numbers presented in the table are vehicle trip ends, meaning that each vehicle to the site accounts for two trip ends (one inbound trip and one outbound trip).

Table 3. Estimated Project Trip Generation – Kirkland Costco Gasoline Fuel Station

Description	Weekday Daily Trip Ends		Weekday AM Peak Hour Trip Ends		Weekday PM Peak Hour Trip Ends		Saturday Peak Hour Trip Ends	
	Percent	Trip Ends ¹	Percent	Trip Ends	Percent	Trip Ends	Percent	Trip Ends
Gross Trips Generated		4,530		220		420		450
Less Internal Trips	34%	-1,540	0% ²	-0	35%	-150	34%	-150
Total External Trips		2,990		220		270		300
Less Pass-By Trips	33%	-990	32%	-70	39%	-100	33%	-100
Net New Trips		2,000		150		170		200
		(1,000 in / 1,000 out)		(75 in / 75 out)		(85 in / 85 out)		(100 in / 100 out)

Source: Kittleson & Associates, Inc.

1. Two trip ends equals one vehicle entering and leaving the site.
2. Costco warehouse in not open during the AM peak hour.

The proposed project is anticipated to generate approximately 150 (75 in / 75 out) new trips during the AM peak hour and approximately 170 (85 in / 85 out) new trips during the PM peak hour.

Trip Distribution and Assignment

Traffic associated with the Kirkland Costco Gasoline project was distributed from the site to the adjacent roadways based on information provided by the City based on its travel demand model and as well as observed travel patterns and restrictions in the study area. Figure 5 summarizes the generalized distribution patterns used for the project. The anticipated net new weekday AM and PM peak hour trips were assigned to the study intersections per the distribution as shown in Figure 6 and Figure 7, respectively.

Traffic Volumes

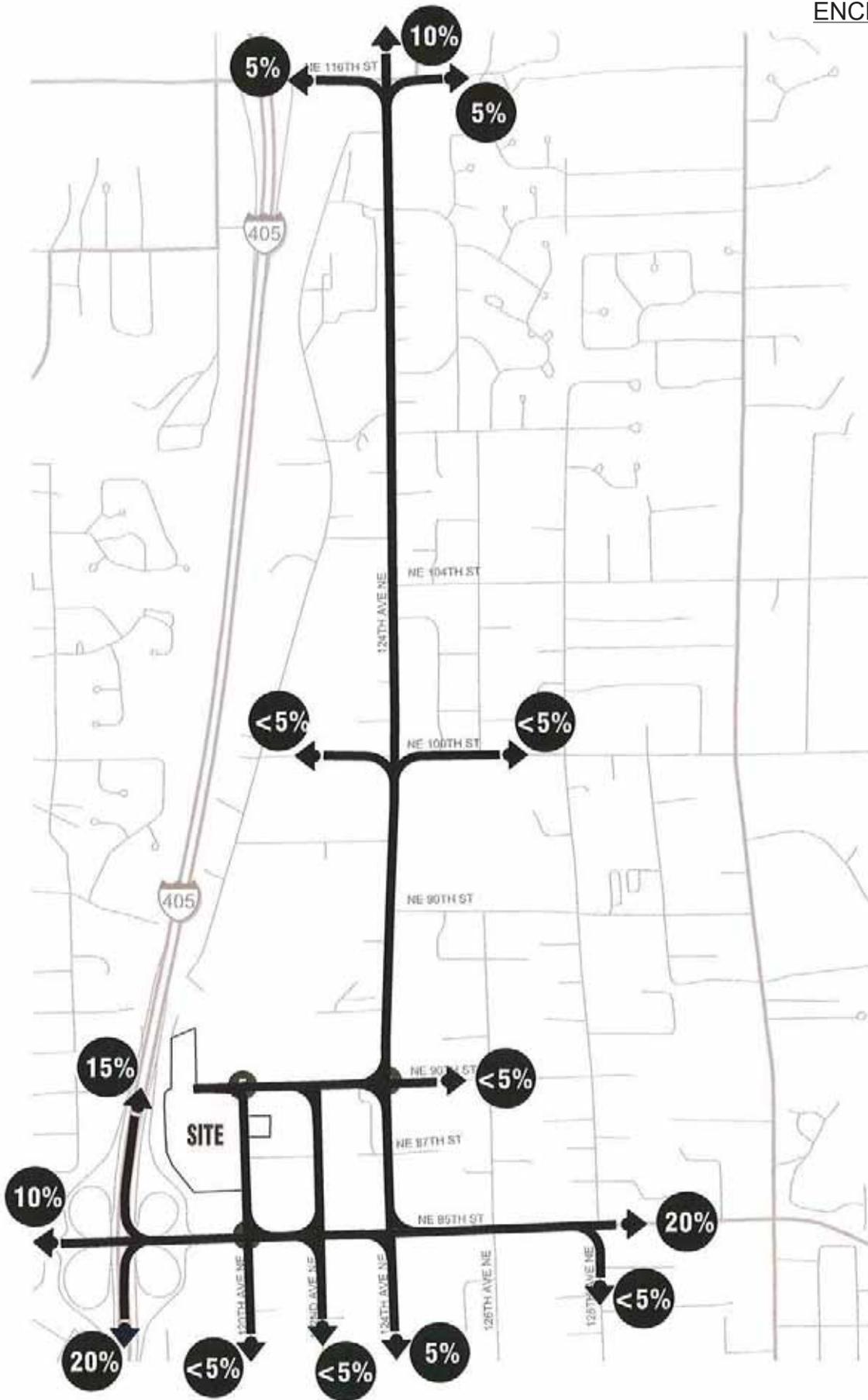
Future (2012) with-project traffic volumes were estimated by adding site-generated weekday PM peak hour traffic volumes to the future without-project traffic volumes. Additionally, traffic was shifted at the 120th Avenue NE/NE 90th Street intersection and the main driveway for the warehouse parking lot on 120th Avenue NE. This was done to account for anticipated changes in on-site travel patterns due to the construction of the fuel station and the addition of parking stalls in the main parking lot closer to the warehouse building. The resulting 2012 with-project traffic volumes are illustrated in Figure 8. Table 4 provides a summary of without- and with-project traffic volumes at each study intersection and the proportional share of project traffic at each study intersection.

Table 4. Future AM & PM Peak Hour Without- and With-Project Traffic Volumes

Intersection	2012 Without- Project Volumes	Total Project Traffic Volumes	2012 With-Project Volumes	Project Proportional Share
Weekday AM Peak Hour				
124th Avenue NE/NE 90th Street	1,400	74	1,474	5.0%
120th Avenue NE/NE 90th Street	120	220	340	64.7%
120th Avenue NE/NE 85th Street	2,985	111	3,096	3.6%
Weekday PM Peak Hour				
124th Avenue NE/NE 116th Street	2,730	28	2,758	1.0%
124th Avenue NE/NE 100th Street	1,590	39	1,629	2.4%
124th Avenue NE/NE 90th Street	1,590	86	1,676	5.1%
122nd Avenue NE/NE 90th Street	545	119	664	17.9%
120th Avenue NE/NE 90th Street	465	270	720	37.5%
120th Avenue NE/NE 85th Street	3,975	133	4,108	3.2%
122nd Avenue NE/NE 85th Street	3,475	34	3,509	1.0%
124th Avenue NE/NE 85th Street	3,990	35	4,025	0.9%
128th Avenue NE/NE 85th Street	2,900	38	2,938	1.3%
Main Parking Lot/120th Avenue NE	710	141	851 ¹	16.5%
East Parking Lot/120th Avenue NE	710	166	876 ¹	18.9%

1. Includes existing traffic volumes anticipated to shift due to reduction in supply in the north parking lot and an increase in supply in the main lot and east lot.

As shown in **Table 4**, the study intersection with highest proportional project share in both the weekday AM and PM peak hours is 120th Avenue NE/NE 90th Street.



Project Trip Distribution

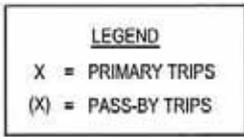
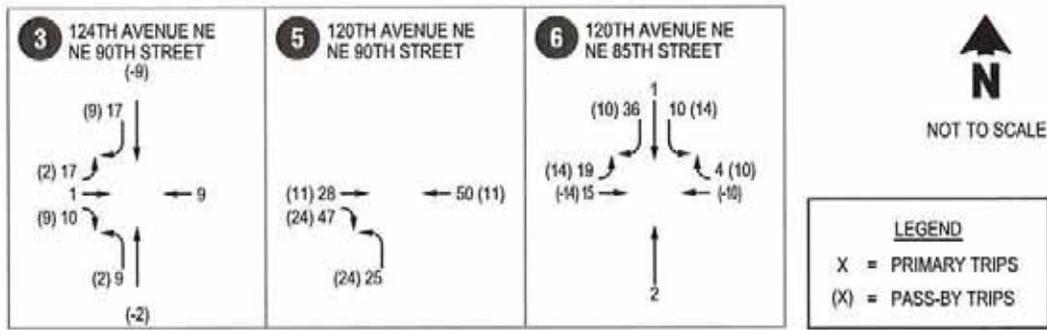
Kirkland Costco Gas Station

M:\11111117 Costco Gas Station - Kirkland\Graphics\11117_graphic01 <Fig 5> kyles 09/02/11 14:11



FIGURE

5



Weekday AM Peak Hour Trip Assignment

Kirkland Costco Gas Station

M:\11111117 Costco Gas Station - Kirkland\Graphics\11117_graphic01 <Fig 6> kyles 09/02/11 14:16

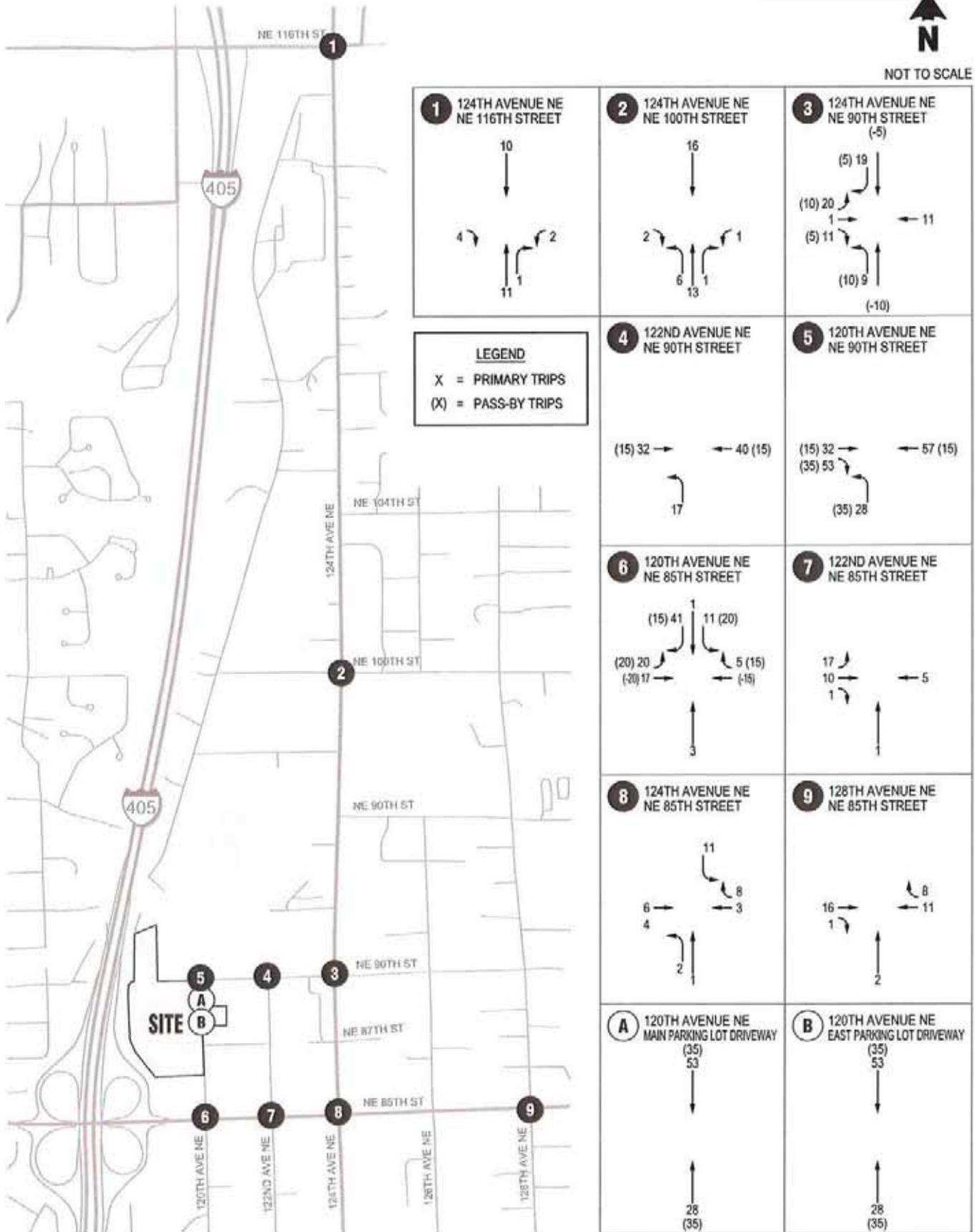


FIGURE

6



NOT TO SCALE



Weekday PM Peak Hour Trip Assignment

Kirkland Costco Gas Station

M:\11111117 Costco Gas Station - Kirkland\Graphics\11117_graphic01 <Fig 7> kyles 09/02/11 14:12

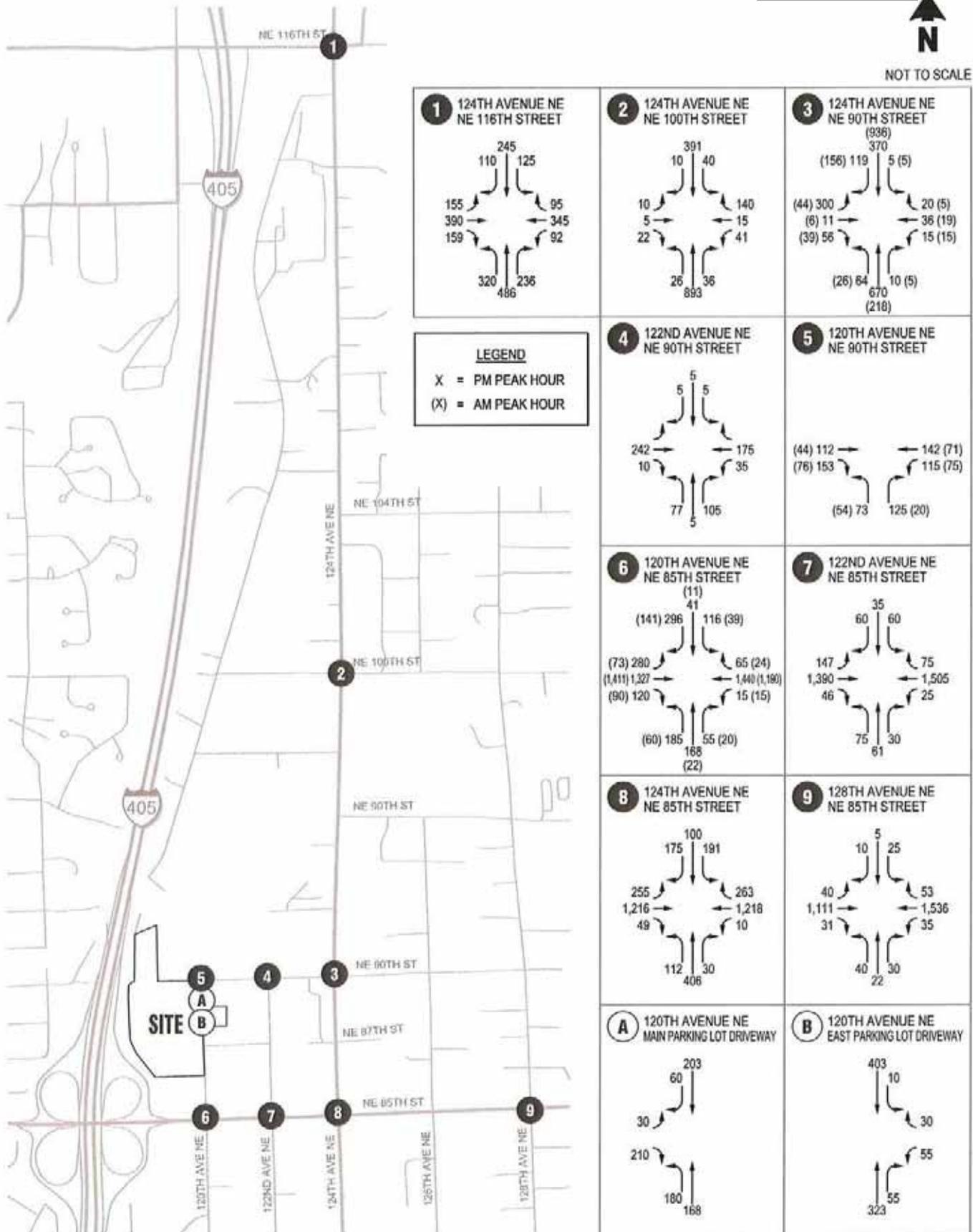


FIGURE

7



NOT TO SCALE



With-Project (2012) AM & PM Peak Hour Traffic Volumes

FIGURE 8

Kirkland Costco Gas Station



8

Traffic Operations

A level of service analysis was conducted for 2012 with-project conditions. Channelization at the study intersections were not modified from the 2012 without-project to with-project analyses; however, the signal timing at study intersections were optimized to account for the change in travel patterns attributable to the proposed project. Comparison between the future scenarios reflect the impact of adding project-generated trips to the study intersections with how the intersections are anticipated to operate before the the proposed project.

The results of the LOS analyses for the without- and with-project conditions are summarized in [Table 5](#). Levels of service worksheets for 2012 with-project traffic conditions are included in [Appendix D](#) of this report.

Table 5. Future AM & PM Peak Hour Without- and With-Project LOS Summary

Intersection	2012 Without-Project			2012 With-Project		
	LOS ¹	Delay ²	V/C ³ or W/M ⁴	LOS	Delay	V/C or W/M
Weekday AM Peak Hour						
124th Avenue NE/NE 90th Street	B	15.0	0.83	C	22.0	0.87
120th Avenue NE/NE 90th Street	A	7.5	NA	A	8.6	NA
120th Avenue NE/NE 85th Street	B	16.0	0.58	C	20.1	0.61
Weekday PM Peak Hour						
124th Avenue NE/NE 116th Street	C	34.0	0.81	D	35.8	0.82
124th Avenue NE/NE 100th Street	A	6.7	0.62	A	6.8	0.63
124th Avenue NE/NE 90th Street	B	19.4	0.68	B	21.1	0.70
122nd Avenue NE/NE 90th Street	A	9.0	NA	A	9.9	NA
120th Avenue NE/NE 90th Street	A	8.1	NA	A	9.6	NA
120th Avenue NE/NE 85th Street	D	38.6	0.80	D	43.8	0.85
122nd Avenue NE/NE 85th Street	B	11.2	0.66	B	11.4	0.67
124th Avenue NE/NE 85th Street	D	52.2	0.82	D	53.4	0.83
128th Avenue NE/NE 85th Street	A	8.2	0.60	A	8.0	0.61
Main Parking Lot/120th Avenue NE	B	11.8	EB	B	14.0	EB
East Parking Lot/120th Avenue NE	B	12.0	WB	B	13.6	WB

1. Level of service, based on 2000 Highway Capacity Manual methodology.
2. Average delay in seconds per vehicle.
3. Volume-to-Capacity (V/C) ratio reported for signalized traffic control.
4. Worst movement (WM) reported for two-way stop sign traffic control.

As described previously, study intersections operating at LOS A through D require no mitigation. Study intersections operating at LOS E when the project's proportionate share exceeds 15 percent or LOS F with a project's proportionate share greater than 5 percent do require mitigation by the developer.

As shown in [Table 5](#), with the addition of project traffic, all study intersections are anticipated to operate at or above LOS D with the addition of project generated trips. The traffic volumes added by the project do not trigger any intersection operational issues nor do they warrant any off-site transportation improvements based on the LOS results from the AM and PM weekday peak hours and the City's *TIA Guidelines*.

Neighborhood Cut-Through Traffic

Cut-through traffic occurs when it is more convenient and quicker to use neighborhood streets than to drive on collector and arterial streets. The traffic generated by the proposed *Costco Gasoline* is not expected to have a significant impact on overall congestion on NE 85th Street nor is it anticipated to create a large increase of drivers that choose to cut-through neighborhood streets to reach the project site. Speed humps and speed cushions have already been installed on NE 90th Street between 126th and 128th Avenue NE, 126th

Avenue NE between NE 80th Street and NE 95th Street, and 128th Avenue NE between NE 85th Street and NE 95th Street. These are in place to deter existing cut-through traffic that may already occur. The City is also designing improvements for the NE 85th Street corridor that would include access management strategies, signal priority, signal optimization, and installing additional turn-pockets and through lanes. These improvements will further decrease the amount of drivers taking neighborhood routes by improving flow on NE 85th Street.

In the immediate vicinity of the site, NE 90th Street, 120th Avenue NE, and 122nd Avenue NE are classified as collector streets north of NE 85th Street and west of NE 124th Street and will be utilized the most by patrons traveling from the proposed project to arterial street. These streets have been designed to accommodate additional traffic flows, and the City would not allow traffic calming measures to be installed on these roadways.

Site Access and Circulation

The main parking lot will be reconfigured with the proposed project to provide for additional parking and improve overall site circulation. Additional parking will be provided through adding stalls along the western boundary of the site, expanding the east parking lot, and by reconfiguring much of the angled parking in the main lot to 90 degree parking. This will provide for more parking in the preferred areas closer to the main entrance.

Site circulation is being improved in a few ways. A longer driveway throat at the main entrance provides more on-site storage before drivers have parking decision points to help prevent back-ups from spilling onto the local street system. Shifting to 90 degree parking through much of the main lot allows two-way travel and provides for more internal flow options. The internal intersection at NE 90th Street has been aligned to provide safer and more efficient access to the gas station from both NE 90th Street and the main parking lot. In addition, the circulation through the gas station will occur in a counter clockwise rotation through the northern lot.

Operations for main site driveways were evaluated and are anticipated to operate at LOS B during the PM peak hour, as shown in [Table 5](#).

Fuel Station Queuing

During fuel station operations, some queuing will occur on site with vehicles waiting to use the fuel pumps. *Costco Gasoline* has at least one trained attendant on-site at all times to assist in directing vehicles to line up in an efficient. Additionally, the site has been designed to accommodate approximately 48 cars stacked vehicles behind the 20 cars simultaneously fueling.

As mentioned previously, the number of fueling positions has little impact on the amount of trips generated but does provide an increase in fueling and storage capacity of the fuel station. This reduces the amount of waiting time for customers. Previous studies conducted of similar *Costco Gasoline* sites show that the 48 vehicle stacking positions provided for the proposed project should be adequate, even during the peak hour of fueling. On the rare and unlikely occasion that vehicles back up further, there is ample room on-site that would provide for additional storage and queues are not anticipated to spill back onto the adjacent roadway system.

Transportation Concurrency

A transportation concurrency test was completed for the proposed with the proposed project passing concurrency on July 25, 2011. The concurrency test results are shown in

Appendix F. The concurrency test notice shall expire and a new concurrency test application is required unless:

- A complete SEPA checklist, traffic impact analysis, and all required documentation are submitted to the City within 90 calendar day of the concurrency test notice.
- A Certificate of Concurrency is issued or an extension is requested and granted by the Public Works Department within one year of issuance of the concurrency test notice. (A Certificate of Concurrency is issued at the same time a development permit or building permit is issued if the applicant holds a valid concurrency test notice).
- A Certificate of Concurrency shall expire six years from the date of issuance of the concurrency test notice unless all building permits are issued for buildings approved under the concurrency test notice.

Traffic Safety

Traffic generated by the proposed development would likely result in a proportionate increase in the probability of traffic accidents. It is unlikely, however, that this traffic would create a safety hazard or significantly increase the number of reported accidents at most locations within the project vicinity.

Pedestrian safety along NE 90th Street will be improved by providing additional sidewalk facilities to better connect pedestrian facilities and destinations located east of the site

Transit Service

The proposed project is not anticipated to generate any transit riders due to the nature of the development. The existing transit service in the area will see little to no change attributable to the project.

Non-motorized Facilities

The proposed project is not anticipated to generate any non-motorized use due to the nature of the development; however, the project plans to construct sidewalk on the south side of NE 90th Street between 120th Avenue NE and 124th Avenue NE and the west side of 120th Avenue NE from the east parking lot to NE 90th Street. Crosswalks will be constructed on the eastbound and northbound approaches at the intersection of 122nd Avenue NE/NE 90th Street. Additionally, the project is scheduled to reconstruct the existing on-site trail connecting Slater Avenue NE to NE 90th Street. These improvements are part of the unfunded NE 90th Street Sidewalk (Phase II) project (NM 0026 00) identified in the City's 2011 to 2016 Capital Improvement Program and will assist in improving the overall pedestrian and bicycle connectivity of the North Rose Hill neighborhood adjacent to the project site.

Parking

Parking is currently provided in three parking areas referred to as the main lot, the north lot and the east lot. The main parking lot is located immediately to the north of the *Costco Wholesale* entrance and currently provides 398 spaces (including 24 disabled spaces), the north parking lot is located north of NE 90th Street and provides 239 spaces and the east parking lot is located east of 120th Avenue NE and contains 69 striped spaces. Overall, 706 parking spaces are currently provided.

Parking demand for the existing site was documented through field observations during typical weekday and weekend conditions. A previous parking study was conducted in 2008, showing the peak parking demand occurring between 11 AM and 3 PM on weekdays and 12

PM to 5 PM on Saturdays. New parking studies were conducted during these peak parking periods on a Wednesday, Thursday, and Saturday in August 2011. The parking utilization during the weekday and Saturday peak parking hours is summarized in [Table 6](#). A full summary of the parking study is included in [Appendix G](#).

Based on field observations, the east parking lot is the most highly utilized due to its close proximity to the *Costco Wholesale* main entrance. This lot is used by employees and customers and is the first lot encountered by vehicles traveling from NE 85th Street. The proposed *Costco Gasoline* is located in the north parking which is the furthest lot from the *Costco Wholesale* entrance and is the least utilized parking lot. The parking utilization counts from 2011 during the weekday and weekend peak hours are consistent with the previous parking study with only minor variances that can be accounted for in normal fluctuations in day-to-day operations.

Table 6. Existing Peak Parking Utilization for Kirkland Costco Wholesale

Parking Lot	Supply	Weekday (12:00 to 1:00 PM)		Saturday (4:00 to 5:00 PM)	
		Observed Parked Vehicles	Percent Utilization ¹	Observed Parked Vehicles	Percent Utilization
Main Parking Lot	398	341	86%	380	95%
East Parking Lot	69	71	103%	70	101%
North Parking Lot	239	24	10%	80	33%
On-Street ²	-	5	NA	8	NA
Total	706	441	66%	539	76%

1. Percent utilization is the number of parked vehicles relative to the parking supply

2. Includes vehicles parked to the northeast of the 120th Avenue NE/NE 90th Street intersection.

With the development of the proposed project on the northernmost portion, the north lot would be restriped to replace the existing angled spaces with 155 ninety-degree parking stalls. The main parking lot would also be reconfigured from angled stalls to ninety-degree stalls to increase its supply to 515 stalls. Property will be leased to the south of the existing east parking lot to increase its capacity to 131 stalls. The overall parking supply with the proposed project would increase to 803, approximately 100 stalls greater than current supply, with more stalls located closer to the main *Costco Wholesale* entrance. Changing to perpendicular stalls will allow the parking area to be utilized more efficiently and improve site circulation by allowing two-way traffic in the parking aisles.

The parking demand is anticipated to remain the same with the proposed project during typical weekday and weekend operations. During busy, non-typical operations at the warehouse, such as holiday seasons, parking management strategies should continue to be implemented as needed to maximize available parking for customers.

Mitigation

No off-site improvements are necessary to mitigate the impacts of the project; however, the project will be providing sidewalk improvements in the area as well as paying City of Kirkland transportation impact fees that will contribute to future transportation improvements in the City.

The sidewalk connections are illustrated in the site plan and would occur along the south side of NE 90th Street between 120th Avenue NE and 124th Avenue NE and on the east side of 120th Avenue NE from the east parking lot to NE 90th Street. These improvements are a portion of the improvements outlined in the City's NE 90th Street Sidewalk (Phase II) project (NM 0026 00) from the 2011 to 2016 Capital Improvement Program and fill in some of the sidewalk gaps that are present in the area. In addition, the proposed project will also stripe two crosswalks at 122nd Avenue NE/NE 90th Street and reconstruct the existing non-motorized trail along the east edge of the north parking lot that connects Slater Avenue NE to NE 90th Street.

The developer is also required to pay City of Kirkland transportation impact fees. For fuel stations, impact fees are approximately \$10,198 per vehicle fueling position based on the City's *Transportation Impact Fee Schedule* (September 1, 2010). The project proposes to construct 20 fuel pumps for an estimated total impact fee of \$203,960. This fee is provided only as an estimate and will be finalized by the City upon review.

Summary of Findings

- The proposed project would develop a member's only fuel station with 20 fueling positions. The proposed project is anticipated to generate approximately 150 (75 in / 75 out) new trips during the AM peak hour and approximately 170 (85 in / 85 out) new trips during the PM peak hour.
- During the weekday AM and PM peak hours, none of the study intersection are anticipated to experience operational issues that are deemed project impacts by the City of Kirkland.
- No off-site improvements are necessary to mitigate the intersection impacts caused by the increase in volume from the projects. Costco is voluntarily constructing sidewalk along NE 90th Street and 120th Avenue NE and pedestrian crosswalks at the NE 90th Street/120th Avenue NE intersection.
- The parking demand forecast for the proposed project and adjacent *Costco Wholesale* can be accommodated with the proposed supply during typical weekday and weekend operations.
- The project will contribute to future transportation improvements through payment of traffic impact fees to the City of Kirkland.

Proportional Share Impact Worksheet

Input appropriate information in green cells

¹ See "Intersection Description" worksheet for descriptions

Project Name:	Costco Gas Station		Through Lanes ¹
Major Street ¹	NE 85th Street	# of Lanes* =	2
Minor Street ¹	114th Avenue NE	# of Lanes* =	1

1. May Change without notice, call Thang Nguyen 425-587-3869 with questions

DATE: 7/26/2011

Daily Project Traffic Entering the Intersection	Daily Volumes	Entering Leg Volumes *		
(Total of both approaches divided by two) Major Street Volume $V_1 =$	83	71	95	Major
(Total of both approaches divided by two) Minor Street Volume $V_2 =$	12	12	12	Minor

*Do not leave cell empty for zero volume

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f_1	f_2	f_3	f_4
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f_1	f_2	f_3	f_4
1	1	1	1

Calculate Base Percentages

$P_1 = V_1 / (10,000 \times f_1) =$ 0.83%

$P_2 = V_2 / (5,000 \times f_2) =$ 0.24%

$P_3 = V_1 / (15,000 \times f_3) =$ 0.55%

$P_4 = V_2 / (2,500 \times f_4) =$ 0.48%

Calculate Proportional Share

$S_1 = (P_1 + P_2) / 2 =$ 0.54%

$S_2 = (P_3 + P_4) / 2 =$ 0.52%

Intersection Proportional Share = Maximum of S_1 and $S_2 =$ 0.54%

Significant Intersection? no

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By: Dan McKinney

Company: Transpo Group

Proportional Share Impact Worksheet

Input appropriate information in green cells

¹ See "Intersection Description" worksheet for descriptions

Project Name:	Costco Gas Station		Through Lanes ¹
Major Street ¹	124th Avenue NE	# of Lanes* =	1
Minor Street ¹	NE 116th Street	# of Lanes* =	1

¹ May Change without notice, call Thang Nguyen 425-587-3869 with questions

DATE: 7/26/2011

Daily Project Traffic Entering the Intersection

	Daily Volumes	Entering Leg Volumes *		
(Total of both approaches divided by two) Major Street Volume V ₁ =	130	142	118	Major
(Total of both approaches divided by two) Minor Street Volume V ₂ =	47.5	71	24	Minor

*Do not leave cell empty for zero volume

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f ₁	f ₂	f ₃	f ₄
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f ₁	f ₂	f ₃	f ₄
0.833	1	0.833	1

Calculate Base Percentages

P₁ = V₁ / (10,000 x f₁) = 1.56%

P₂ = V₂ / (5,000 x f₂) = 0.95%

P₃ = V₁ / (15,000 x f₃) = 1.04%

P₄ = V₂ / (2,500 x f₄) = 1.90%

Calculate Proportional Share

S₁ = (P₁ + P₂) / 2 = 1.26%

S₂ = (P₃ + P₄) / 2 = 1.47%

Intersection Proportional Share = Maximum of S1 and S2 = 1.47%

Significant Intersection? yes

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By: Dan McKinney

Company: Transpo Group

Proportional Share Impact Worksheet

Input appropriate information in green cells

¹ See "Intersection Description" worksheet for descriptions

Project Name:	Costco Gas Station		Through Lanes ¹
Major Street ¹	124th Avenue NE	# of Lanes* =	1
Minor Street ¹	NE 100th Street	# of Lanes* =	1

1. May Change without notice, call Thang Nguyen 425-587-3869 with questions

DATE: 7/26/2011

Daily Project Traffic Entering the Intersection

(Total of both approaches divided by two)

(Total of both approaches divided by two)

	Daily Volumes	Entering Leg Volumes *		
Major Street Volume V ₁ =	235.5	247	224	Major
Minor Street Volume V ₂ =	0	0	0	Minor

*Do not leave cell empty for zero volume

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f ₁	f ₂	f ₃	f ₄
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f ₁	f ₂	f ₃	f ₄
0.833	1	0.833	1

Calculate Base Percentages

P₁=V₁/(10,000 x f₁) = 2.83%

P₂=V₂/(5,000 x f₂) = 0.00%

P₃=V₁/(15,000 x f₃) = 1.88%

P₄=V₂/(2,500 x f₄) = 0.00%

Calculate Proportional Share

S₁=(P₁+P₂)/2= 1.41%

S₂=(P₃+P₄)/2= 0.94%

Intersection Proportional Share = Maximum of S1 and S2 = 1.41%
 Significant Intersection? yes

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By: Dan McKinney
 Company: Transpo Group

Proportional Share Impact Worksheet

Input appropriate information in green cells

¹ See "Intersection Description" worksheet for descriptions

Project Name:	Costco Gas Station		Through Lanes ¹
Major Street ¹	120th Avenue NE	# of Lanes* =	1
Minor Street ¹	NE 90th Street	# of Lanes* =	1

1. May Change without notice, call Thang Nguyen 425-587-3869 with questions

DATE: 7/26/2011

Daily Project Traffic Entering the Intersection

(Total of both approaches divided by two)
 (Total of both approaches divided by two)

	Daily Volumes	Entering Leg Volumes *		
Major Street Volume V ₁ =	265	530	0	Major
Minor Street Volume V ₂ =	735.5	1000	471	Minor

*Do not leave cell empty for zero volume

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f ₁	f ₂	f ₃	f ₄
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f ₁	f ₂	f ₃	f ₄
0.833	1	0.833	1

Calculate Base Percentages

P₁ = V₁ / (10,000 x f₁) = 3.18%
 P₂ = V₂ / (5,000 x f₂) = 14.71%
 P₃ = V₁ / (15,000 x f₃) = 2.12%
 P₄ = V₂ / (2,500 x f₄) = 29.42%

Calculate Proportional Share

S₁ = (P₁ + P₂) / 2 = 8.95%
 S₂ = (P₃ + P₄) / 2 = 15.77%

Intersection Proportional Share = Maximum of S1 and S2 = 15.77%
 Significant Intersection? yes

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By: Dan McKinney
 Company: Transpo Group

Proportional Share Impact Worksheet

Input appropriate information in green cells

¹ See "Intersection Description" worksheet for descriptions

Project Name:	Costco Gas Station		Through Lanes ¹
Major Street ¹	NE 85th Street	# of Lanes* =	2
Minor Street ¹	132nd Avenue NE	# of Lanes* =	1

¹ May Change without notice, call Thang Nguyen 425-587-3869 with questions

DATE: 7/26/2011

Daily Project Traffic Entering the Intersection

(Total of both approaches divided by two)

(Total of both approaches divided by two)

	Daily Volumes	Entering Leg Volumes *		
Major Street Volume V ₁ =	183	189	177	Major
Minor Street Volume V ₂ =	6	12	0	Minor

*Do not leave cell empty for zero volume

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f ₁	f ₂	f ₃	f ₄
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f ₁	f ₂	f ₃	f ₄
1	1	1	1

Calculate Base Percentages

P₁ = V₁ / (10,000 x f₁) = 1.83%

P₂ = V₂ / (5,000 x f₂) = 0.12%

P₃ = V₁ / (15,000 x f₃) = 1.22%

P₄ = V₂ / (2,500 x f₄) = 0.24%

Calculate Proportional Share

S₁ = (P₁ + P₂) / 2 = 0.98%

S₂ = (P₃ + P₄) / 2 = 0.73%

Intersection Proportional Share = Maximum of S₁ and S₂ = 0.98%

Significant Intersection? no

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By: Dan McKinney

Company: Transpo Group

Proportional Share Impact Worksheet

Input appropriate information in green cells

¹ See "Intersection Description" worksheet for descriptions

Project Name:	Costco Gas Station		Through Lanes ¹
Major Street ¹	NE 85th Street	# of Lanes* =	2
Minor Street ¹	128th Avenue NE	# of Lanes* =	1

1. May Change without notice, call Thang Nguyen 425-587-3869 with questions

DATE:

7/26/2011

Daily Project Traffic Entering the Intersection

(Total of both approaches divided by two)

(Total of both approaches divided by two)

	Daily Volumes	Entering Leg Volumes *		
Major Street Volume $V_1 =$	194.5	200	189	Major
Minor Street Volume $V_2 =$	12	24	0	Minor

*Do not leave cell empty for zero volume

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f_1	f_2	f_3	f_4
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f_1	f_2	f_3	f_4
1	1	1	1

Calculate Base Percentages

$P_1 = V_1 / (10,000 \times f_1) =$	1.95%
$P_2 = V_2 / (5,000 \times f_2) =$	0.24%
$P_3 = V_1 / (15,000 \times f_3) =$	1.30%
$P_4 = V_2 / (2,500 \times f_4) =$	0.48%

Calculate Proportional Share

$S_1 = (P_1 + P_2) / 2 =$	1.09%
$S_2 = (P_3 + P_4) / 2 =$	0.89%

Intersection Proportional Share = Maximum of S_1 and $S_2 =$ 1.09%

Significant Intersection? yes

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

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Project Name:	Costco Gas Station		Through Lanes ¹	2
Major Street ¹	NE 85th Street	# of Lanes*= ¹	2	
Minor Street ¹	124th Avenue NE	# of Lanes*= ¹	1	

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DATE: 7/26/2011

Daily Project Traffic Entering the Intersection	Daily Volumes	Entering Leg Volumes *		
(Total of both approaches divided by two) Major Street Volume V ₁ =	100.5	71	130	Major
(Total of both approaches divided by two) Minor Street Volume V ₂ =	89	48	130	Minor

*Do not leave cell empty for zero volume

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f ₁	f ₂	f ₃	f ₄
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f ₁	f ₂	f ₃	f ₄
1	1	1	1

Calculate Base Percentages

P₁=V₁/(10,000 x f₁) = 1.01%

P₂=V₂/(5,000 x f₂) = 1.78%

P₃=V₁/(15,000 x f₃) = 0.67%

P₄=V₂/(2,500 x f₄) = 3.56%

Calculate Proportional Share

S₁=(P₁+P₂)/2= 1.39%

S₂=(P₃+P₄)/2= 2.12%

Intersection Proportional Share = Maximum of S1 and S2 = 2.12%
 Significant Intersection? yes

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

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Project Name:	Costco Gas Station		Through Lanes ¹
Major Street ¹	NE 85th Street	# of Lanes* =	2
Minor Street ¹	122nd Avenue NE	# of Lanes* =	1

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DATE:

7/26/2011

Daily Project Traffic Entering the Intersection

(Total of both approaches divided by two)

(Total of both approaches divided by two)

	Daily Volumes	Entering Leg Volumes *		
Major Street Volume V ₁ =	88.5	118	59	Major
Minor Street Volume V ₂ =	0	0	0	Minor

*Do not leave cell empty for zero volume

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f ₁	f ₂	f ₃	f ₄
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f ₁	f ₂	f ₃	f ₄
1	1	1	1

Calculate Base Percentages

$$P_1 = V_1 / (10,000 \times f_1) = \underline{\hspace{2cm}} \quad 0.89\%$$

$$P_2 = V_2 / (5,000 \times f_2) = \underline{\hspace{2cm}} \quad 0.00\%$$

$$P_3 = V_1 / (15,000 \times f_3) = \underline{\hspace{2cm}} \quad 0.59\%$$

$$P_4 = V_2 / (2,500 \times f_4) = \underline{\hspace{2cm}} \quad 0.00\%$$

Calculate Proportional Share

$$S_1 = (P_1 + P_2) / 2 = \underline{\hspace{2cm}} \quad 0.44\%$$

$$S_2 = (P_3 + P_4) / 2 = \underline{\hspace{2cm}} \quad 0.30\%$$

$$\text{Intersection Proportional Share} = \text{Maximum of } S_1 \text{ and } S_2 = \underline{\hspace{2cm}} \quad 0.44\%$$

Significant Intersection? no

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

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Project Name:	Costco Gas Station		Through Lanes¹
Major Street ¹	NE 85th Street	# of Lanes* = 2	
Minor Street ¹	120th Avenue NE	# of Lanes* = 1	

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Daily Project Traffic Entering the Intersection	Daily Volumes	Entering Leg Volumes *		
(Total of both approaches divided by two) Major Street Volume V ₁ =	247.5	436	59	Major
(Total of both approaches divided by two) Minor Street Volume V ₂ =	324	36	612	Minor

*Do not leave cell empty for zero volume

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f ₁	f ₂	f ₃	f ₄
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f ₁	f ₂	f ₃	f ₄
1	1	1	1

Calculate Base Percentages

P₁ = V₁ / (10,000 x f₁) = 2.48%

P₂ = V₂ / (5,000 x f₂) = 6.48%

P₃ = V₁ / (15,000 x f₃) = 1.65%

P₄ = V₂ / (2,500 x f₄) = 12.96%

Calculate Proportional Share

S₁ = (P₁ + P₂) / 2 = 4.48%

S₂ = (P₃ + P₄) / 2 = 7.31%

Intersection Proportional Share = Maximum of S1 and S2 = 7.31%
 Significant Intersection? **yes**

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

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