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Draft Environmental Impact Statement

Lake Stevens Center

Subarea Plan

DECEMBER 2011

CITY OF LAKE STEVENS

Planning and Community Development
City of Lake Stevens
P. O. Box 257
Lake Stevens, WA 98258
(425) 377-3230

December 27, 2011

Dear Affected Agencies, Tribes, Organizations and Interested Parties:

Enclosed is the Draft Environmental Impact Statement (Draft EIS) for the Lake Stevens Center Subarea Plan. This document has been prepared to comply with the requirements of the State Environmental Policy Act (SEPA).

The 359-acre Lake Stevens Center subarea covers an area of the city that primarily includes several commercial developments, such as the existing Frontier Village shopping center. The subarea also includes some existing residential neighborhoods adjacent to the commercial areas. The City is considering the following actions:

1. Adopting a subarea plan, pursuant to the Revised Code of Washington (RCW) 36.70A.080, which will amend and become an element of the Lake Stevens Comprehensive Plan;
2. Amending the zoning map to rezone properties consistent with the subarea plan;
3. Revising the zoning code to amend or adopt new classifications, development standards and/or design guidelines;
4. Amending the Comprehensive Plan's Transportation Element and Capital Facilities Element to address infrastructure needs required to support planned growth in the subarea; and
5. Adopting an ordinance designating the subarea as a Planned Action, pursuant to the State Environmental Policy Act (SEPA, RCW 43.21C.031) and the SEPA Rules (Washington Administrative Code (WAC, 197-11-164), for purposes of future environmental review and permitting.

The plan objectives encourage increased economic development, guiding future growth at higher densities within a designated center, revitalizing the area, and enhancing the quality of development.

The City is using an integrated planning and environmental review process to evaluate three land use alternatives for the subarea. The alternatives presented in the Draft EIS consider varying levels of growth and place different emphases on commercial or residential land uses. There is not a preferred alternative at this time. The table below summarizes the land use assumptions for the alternatives.

Alternative	Retail (Gross Sq. Ft)	Office (Gross Sq. Ft)	Housing Units
Alternative 1 – No Action	50,000-60,000	30,000-40,000	100-120
Alternative 2 – Center Revitalization	140,000-150,000	140,000-150,000	180-200
Alternative 3 – Retail & Residential Emphasis	140,000-150,000	100,000-120,000	500-600

The Draft EIS considers the following broad areas of environmental concern:

Earth	Land Use
Stormwater	Population, Housing & Employment
Water Resources	Aesthetics
Plants & Animals	Transportation
Air Quality & Greenhouse Gas Emissions	Public Services
	Utilities

The City of Lakes Stevens has distributed the Draft EIS to agencies, tribes and organizations noted on the Distribution List. Interested parties can review the Draft EIS and background information concerning the proposal, between the hours of 8:30 AM and 4:30 PM, at the Lake Stevens Department of Planning and Community Development offices at 1812 Main Street. The Draft EIS is also available for review at the Sno-Isle Library in Lake Stevens located at 1804 Main Street.

Printed and CD copies of the Draft EIS may also be purchased from the Lake Stevens Planning and Community Development Department at the address listed above. The Draft EIS is also available to view or download on the City's website at http://www.ci.lake-stevens.wa.us/LakeStevensCenter.htm.

Comments Invited: The public comment period for this Draft EIS is **December 27, 2011 through February 10, 2012.** Interested parties and affected agencies should address comments to the SEPA Responsible Official at the following address:

Rebecca Ableman, SEPA Responsible Official
City of Lake Stevens
P.O. Box 257
Lake Stevens, WA 98258
Fax: 425.212.3327
Email: bableman@lakestevenswa.gov

For additional information, please contact:

Russ Wright, Senior Planner
City of Lake Stevens
P.O. Box 257
Lake Stevens, WA 98258
425.212.3315
rwright@lakestevenswa.gov

The City has scheduled a public meeting for the Draft EIS **January 12, 2012 at 6:00 pm**. Interested parties may also provide comments at this meeting. For details on meeting location, please see the City's website at www.ci.lake-stevens.wa.us.

Thank you for your interest in the Lake Stevens Center Subarea Plan.

SEPA Responsible Official

Rebecca Ableman

Rebecca Ableman

FACT SHEET

PROJECT TITLE

Lake Stevens Center Subarea Plan/Planned Action Draft EIS.

PROPONENT

City of Lake Stevens

PROPOSED ACTION & ALTERNATIVES

The City of Lake Stevens will consider the following actions and approvals:

1. Adopting a subarea plan, pursuant to the Revised Code of Washington (RCW) 36.70A.080, which will amend and become an element of the Lake Stevens Comprehensive Plan;
2. Amending the zoning map to rezone properties consistent with the subarea plan;
3. Revising the zoning code to amend or adopt new classifications, development standards and/or design guidelines;
4. Amending the Comprehensive Plan's Transportation Element and Capital Facilities Element to address infrastructure needs required to support planned growth in the subarea; and
5. Adopting an ordinance designating the subarea as a Planned Action, pursuant to the State Environmental Policy Act (SEPA, RCW 43.21C.031) and the SEPA Rules (Washington Administrative Code (WAC, 197-11-164), for purposes of future environmental review and permitting.

These actions are legislative in nature and require a public hearing(s), recommendation by the Planning Commission, and approval by the City Council.

The EIS considers three alternatives, which involve different types and intensities of growth within the subarea:

No Action (Alternative 1), which is required by SEPA, assumes continued growth under existing zoning and current plans without adopting a subarea plan;

Alternative 2 emphasizes commercial growth (e.g., retail, office, and mixed-use) and redevelopment in the subarea along with some increased multifamily residential growth; and

Alternative 3 assumes the same level of retail growth as *Alternative 2,* but with less office space and a greater area dedicated to multifamily residential growth.

The City is using an integrated planning and environmental review process to evaluate three land use alternatives for the subarea. The alternatives presented in the Draft EIS consider varying levels of growth and place different emphases on commercial or residential land uses. There is not a preferred alternative at this time. The preferred alternative may combine elements of several EIS alternatives within the identified ranges for land uses, jobs and population estimates considered in the EIS. The table below summarizes the land use assumptions for the alternatives.

Summary of Alternative Growth Assumptions

Alternative	Retail (Gross Sq. Ft)	Office (Gross Sq. Ft)	Housing Units
Alternative 1 – No Action	50,000-60,000	30,000-40,000	100-120
Alternative 2 – Center Revitalization	140,000-150,000	140,000-150,000	180-200
Alternative 3 – Retail & Residential Emphasis	140,000-150,000	100,000-120,000	500-600

LOCATION

The City of Lake Stevens is located in Snohomish County, approximately six miles east of downtown Everett. The Lake Stevens Center Subarea is comprised of approximately 359 acres of land centered on the SR-9/SR-204 intersection. The study area extends to Lundeen Park Way on the north and west, 2nd Street SE on the south, and Springbrook Road, 98th Drive and 103rd Ave NE on the east.

LEAD AGENCY

City of Lake Stevens Planning and Community Development Department

RESPONSIBLE OFFICIAL

Rebecca Ableman

CONTACT PERSON

For additional information, please contact:
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DRAFT EIS PRINCIPAL AUTHORS & CONTRIBUTORS

The Draft EIS was prepared under the direction of the City of Lake Stevens. The following firms and entities participated in preparation of the Draft EIS.

Weinman Consulting – Document compilation and editing; Planned Action Ordinance
AHBL – Earth; Water Resources; Plants & Animals, Wetlands; Utilities
Fehr & Peers - Transportation
Environ – Air Quality
City of Lake Stevens – Land Use; Population, Housing & Employment; Public Services
LMN Architects – Subarea Plan & Alternatives

LOCATION OF BACKGROUND MATERIAL

Lake Stevens Planning and Community Development Department
Permit Center
1812 Main Street
Lake Stevens, WA 98258

PREVIOUS ENVIRONMENTAL REVIEW

The City updated its Comprehensive Plan in 2006 and prepared an integrated EIS pursuant to SEPA for that action. (City of Lake Stevens Comprehensive Plan, Appendix A, 2006). Yearly Comprehensive Plan amendments with SEPA review have also occurred and have included SEPA documents as appendices. The City is hereby adopting the 2006 Comprehensive Plan, as amended, for purposes of environmental review.

DATE OF DRAFT EIS ISSUANCE

December 27, 2011

COMMENT PERIOD/PUBLIC MEETING

The City will accept comments on the Draft EIS until 5 PM on **February 10, 2012**. Interested parties or affected agencies may submit comments by mail, email or fax to:

Rebecca Ableman, SEPA Responsible Official
City of Lake Stevens
P.O. Box 257
Lake Stevens, WA 98258
Fax: 425.212.3327
Email: bableman@lakestevenswa.gov

The City has scheduled a public meeting for the Draft EIS **January 12, 2012 at 6:00 pm at the Lake Stevens Fire Conference Center**, which is located at 1825 S. Lake Stevens Road, Lake Stevens WA. Interested citizens will have an opportunity to obtain further information about the subarea plan and EIS, and to provide comments on the Draft EIS.

COST AND AVAILABILITY OF DOCUMENT

Copies of the Draft EIS and/or notices of availability have been distributed to the agencies, tribes, organizations and individuals noted in the Distribution List.

The Draft EIS is available for review at the Lake Stevens Planning and Community Development Department, at the address above, and at the Lake Stevens Library, located at 1804 Main Street, in downtown Lake Stevens and on the City's website at http://www.ci.lake-stevens.wa.us/LakeStevensCenter.htm.

Interested parties or affected agencies may purchase printed copies or compact discs (CDs) of the Draft EIS from the City, pursuant to the City's adopted fees resolution.

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1. SUMMARY

1.1 PROPOSED ACTION & ALTERNATIVES

Legislative Actions

The City of Lake Stevens will consider the following actions and approvals for the Lake Stevens Center Subarea:

1. Adopting a subarea plan, pursuant to the Revised Code of Washington (RCW) 36.70A.080, which will amend and become an element of the Lake Stevens Comprehensive Plan;
2. Amending the zoning map to rezone properties consistent with the subarea plan;
3. Revising the zoning code to amend or adopt new classifications, development standards and/or design guidelines;
4. Amending the Comprehensive Plan's Transportation Element and Capital Facilities Element to address infrastructure needs required to support planned growth in the subarea; and
5. Adopting an ordinance designating the subarea as a Planned Action, pursuant to the State Environmental Policy Act (SEPA, RCW 43.21C.031) and the SEPA Rules (Washington Administrative Code (WAC, 197-11-164), for purposes of future environmental review and permitting.

Study Area

The City of Lake Stevens is located in Snohomish County, approximately six miles east of downtown Everett. The Lake Stevens Center Subarea, shown in Figure 2-1, is comprised of approximately 359 acres of land centered on the SR-9/SR-204 intersection. The study area extends to Lundeen Park Way on the north and west, 2nd Street SE on the south, and Springbrook Road, 98th Drive and 103rd Ave NE on the east. The subarea was annexed into the City in 2009.

Proposal Objectives

The objectives for the Lake Stevens Center Subarea Plan are based on policies in the Lake Stevens Comprehensive Plan and the opportunities identified in the *Economic Assessment Report* and *Retail Forecast and Leakage Analysis*. The objectives provide a basis for developing and evaluating subarea plan alternatives.

1. Promote economic development and balanced jobs and housing.
2. Transform the area into a regional center with anchor retail, a greater array of restaurants, visitor lodging, family-oriented entertainment and public spaces.
3. Recognize and strengthen Lake Stevens Center as an important crossroad for commerce for communities along SR-9.

4. Redevelop existing commercial and retail land uses from auto-oriented, strip commercial retail to a village-like environment that meets the need of people who live in Lake Stevens and the surrounding area.
5. Encourage infill, greater intensity and redevelopment where older buildings have outlived their economic life and look for opportunities to upgrade older properties into places where people can live as well as conduct business.
6. Develop mixed-use nodes to anchor local shops, restaurants, and larger retail chains utilized by the local and regional community.
7. Incorporate mixed-use residential buildings with ground-floor retail or office that allow people to word within walking distance of their home.
8. Provide a variety of professional services and offices that cater to the needs of local residents.
9. Promote the creation of a traditional "main street" along 91st Avenue NE that features pedestrian-oriented land uses and street amenities (e.g., benches, trash and streetlights) and street trees.
10. Achieve a mixture of jobs, goods and services, housing and recreation that combines urban development with an abundance of natural features and open space
11. Retrofit major streets and intersections to improve circulation and provide distinctive landscaping and lighting to create a welcoming entry to the community.
12. Upgrade the transportation network to ensure that multiple modes of travel have effective circulation and access to destinations.
13. Enhance the appearance of streets, sidewalks, sites, and buildings through the development of effective development regulations, guidelines, and standards.
14. Protect important environmental resources.
15. Strengthen attributes that reflect Lake Stevens as a distinct, unified community.
16. Create an incentive for redevelopment through a SEPA Planned Action.

Subarea Alternatives

The EIS considers three alternatives, which involve different amounts, types and intensities of growth within the subarea, as summarized in Table 1-1. Assumptions about future growth are based on a review of historical land use patterns, adopted forecasts, projects currently under review, and emerging economic development strategies. Land use for the alternatives is illustrated in Figures 2-2, 2-3 and 2-4, contained in Chapter 2.

Table 1-1. Summary of Growth Assumptions for Alternatives

Alternative	Retail (Gross Sq. Ft)	Office (Gross Sq. Ft)	Housing Units (dwelling units)
Alternative 1 – No Action	50,000-60,000 gsf	30,000-40,000 gsf	100-120 du's
Alternative 2 – Center Revitalization	140,000-150,000 gsf	140,000-150,000 gsf	180-200 du's
Alternative 3 – Retail & Residential Emphasis	140,000-150,000 gsf	100,000-120,000 gsf	500-600 du's

The EIS alternatives all envision Lake Stevens Center redeveloping over time as a concentrated, high intensity retail center. None of the alternatives is preferred at this time. The City is using the integrated SEPA/GMA process described below to help craft and select a preferred alternative which will be proposed for adoption. The selected alternative may combine elements of the various EIS alternatives, and will be identified in the Final EIS.

Alternative 1 – No Action

The *No Action Alternative*, a mandatory element of every EIS, assumes that the City will not adopt a subarea plan for Lake Stevens Center. It does not mean that growth or redevelopment will not occur in the subarea. Rather, existing zoning and land use designations will continue to apply; any changes to land use would result from project-specific applications, which could include requests for Comprehensive Plan or zoning amendments. The City would not adopt plans, policies or development regulations to emphasize revitalization of the subarea under this alternative. No significant redevelopment of the Frontier Village shopping center and surrounding areas is assumed to occur, which would limit the economic development of the City. Similarly, no significant infrastructure improvements would occur in the subarea, beyond those identified in the adopted Capital Facilities Plan. However, to address congestion, pedestrian mobility, access and safety issues, the City and/or WSDOT will implement near-term and long-term transportation improvements in the subarea under any alternative.

Alternative 2 – Center Revitalization

Alternative 2 would plan for the revitalization of Lake Stevens Center, with an emphasis on retail and office growth. Future residential development would be primarily multifamily. The general land use pattern would consist of a commercial core, smaller commercial and mixed-use areas, and transit-oriented development. Building height and scale would range from two to five stories, depending on location and the nature of the dominant use.

The most intensive commercial development (retail and services) would occur on both the eastern and western sides of SR-9. A portion of 91st Ave. NE, south of the SR-9/SR-204 intersection, could be developed as a commercial "main street." with a mix of retail, office and multifamily residential development along the street. Several areas for multifamily development would be designated adjacent to the commercial center. A transit-oriented development (TOD) -- including a mix of retail, services and multifamily -- could be located south of Market Place, near the existing Transit Center. No changes in land use would occur for existing single-family residential areas in the northern and western portions of the subarea adjacent to the transmission line corridor.

The City, special purpose districts, and developers would provide new and upgraded utility infrastructure (sewer, water, and drainage/stormwater) to support planned growth. The City would also encourage the development of park facilities and a multiuse trail in the powerline corridor. *Alternative 2* includes the same potential program of near-term and long-term transportation improvements identified for the *No Action Alternative*.

New and amended development regulations will address the mix, density, scale and form of planned development. This could include new zoning classifications and development standards and design guidelines. To mitigate growth related impacts, a transportation impact fee program will be considered to help address subarea transportation needs, along with other techniques to help finance improvements.

The Lake Stevens Center subarea would be designated as a Planned Action, which would encourage economic development and streamline SEPA review for projects that are consistent with the subarea plan and the EIS.

Alternative 3 – Retail and Residential Emphasis

The overall land use pattern for *Alternative 3* is similar to that of *Alternative 2.* It includes a mix of retail and office development similar to *Alternative 2,* but with a greater emphasis on housing and a reduction in office development. The major differences are a larger mixed-use area north of the SR-9/SR-204 intersection and the redesignation of an existing single-family area to multifamily. As with *Alternative 2*, new transit-oriented mixed-use development, including multifamily housing would be located near the existing Transit Center. "Gateways" would be established at the boundaries of the subarea, along SR-9, 91st Ave. NE and SR-204.

Similar to *Alternative 2*, new and upgraded utility infrastructure (sewer, water drainage) would be provided to support planned growth. The City would also encourage development of park facilities and a multiuse trail adjacent to the powerlines. *Alternative 3* includes the same potential program of near-term and long-term transportation improvements identified for the *No Action Alternative*.

New and amended development regulations will address the mix, density, scale and form of development. This could include new zoning classifications and requirements along with area-specific design guidelines and standards. A transportation impact fee program would also be considered to help address subarea transportation needs, along with other techniques to help finance improvements.

The subarea would be designated as a Planned Action, which would encourage economic development and facilitate SEPA review for projects that are consistent with the subarea plan and the EIS.

1.2 PLANNED ACTION & ENVIRONMENTAL REVIEW PROCESS

Planned Action

A Planned Action is a tool that cities can use to provide regulatory certainty and encourage economic development. This tool is permitted by state law (RCW 43.21C.031 and WAC 197-11-164), and operates by performing up-front SEPA review for a subarea plan and/or specific geographic area to streamline SEPA review for subsequent projects that are consistent with the plan. A Planned Action is designated by ordinance following preparation of an Environmental Impact Statement (EIS); the EIS evaluates the impacts of planned growth and identifies mitigation measures the City will require of the development.

Environmental Review Process

SEPA/GMA Integration. State Rules for implementing the State Environmental Policy Act (SEPA), authorize cities to combine the planning requirements of the Growth Management Act GMA with the environmental review requirements of SEPA in their planning processes (WAC 197-11-210). The goal of this "integration" is to ensure that consideration of environmental issues is an integral part of local planning, that it occurs early in the process, and that informed public involvement occurs. The integration rules provide flexibility regarding the timing of SEPA review and the format of planning and SEPA documents.

The City is developing a subarea plan for the Lake Stevens Center concurrently with the Planned Action EIS. This approach will generate environmental information early in the planning process, and allow decision makers to make planning decisions – including identification of a preferred alternative – using this information.

Prior Environmental Review. In 2006, the City prepared an integrated EIS for its 10-year Comprehensive Plan Update, which extended the planning horizon and population projections for the Comprehensive Plan. The EIS to the Comprehensive Plan identified the general (programmatic) impacts to the natural and built environment associated with the additional incremental growth. The EIS also identified a range of programmatic actions – including changes to policies and development regulations – that could

mitigate potential impacts. The 2025 population and employment targets evaluated in the EIS are still the basis for City planning and for *Alternative 1* of this EIS.

Scope of Environmental Review

The City initiated the SEPA process for the Lake Stevens Center in June 2011, by issuing a determination of significance (DS), indicating that an environmental impact statement would be prepared, and requesting comments on the scope of the EIS. A public scoping meeting was held on July 14, 2011. The scoping comment period was open from June 28 to July 22, 2011. Based on its review of comments received and other available information, the City identified the following topics for discussion in the EIS:

- **Natural Environment**
  Earth – soils, geologically hazardous areas
  Water – wetlands, streams and groundwater
  Plants & Animals – wildlife, habitat and fisheries
- **Air** – air quality and greenhouse gas emissions
- **Land Shoreline Use** – land use patterns, consistency with adopted plans & polices, population, housing and employment
- **Aesthetics/Light & Glare** – changes to visual character and impacts to views
- **Transportation** – vehicular and pedestrian movement, traffic congestion, parking, and public transit
- **Public Services** – police, fire, schools, parks and recreation
- **Utilities** – sewer, water, drainage and stormwater

1.3 SUMMARY OF IMPACTS

Table 1-2, which follows, summarizes of the impacts of the EIS alternatives. The summary statements are based on the analysis in Chapter 3 of the Draft EIS, and are intended to be brief and selective. The reader is directed to the complete analysis for more detailed information.

Table 1-2. Summary of Impacts

Alternative 1 – No Action	Alternative 2	Alternative 3
Natural Environment	**Natural Environment**	**Natural Environment**
Earth • Clearing and grading could cause some erosion. • Limited impacts due to existing degree of development, and small amount of vacant land. *Geologically Hazardous Areas* • Less than one acre of geologic hazards; no significant impacts are anticipated. *Water Resources* • Aquifer sensitivity of subarea is "low" and no designated recharge areas or wellhead protection areas are present. No significant impacts to groundwater are anticipated. • An incremental increase in impervious surface from redevelopment would increase runoff to surface water bodies. *Wetlands* • Redevelopment could affect wetlands and buffers, but impacts would be limited by adopted regulations. *Flooding* • No flooding impacts would occur. *Wildlife/ Habitat* • Incremental reduction in vegetation and further fragmentation of remaining habitat. • No significant impacts to threatened, endangered or	*Earth* • Clearing and grading could cause some erosion. • Limited impacts due to existing degree of development, and small amount of vacant land. *Geologically Hazardous Areas* • Less than one acre of geologic hazards; no significant impacts are anticipated. *Water Resources* • Aquifer sensitivity of subarea is "low" and no designated recharge areas or wellhead protection areas are present. No significant impacts are anticipated. • Increased open space and landscaping would reduce incremental increase in impervious surfaces. *Wetlands* • Redevelopment could affect wetlands and buffers, but impacts would be limited by adopted regulations. *Flooding* • No flooding impacts would occur. *Wildlife/Habitat* • Incremental reduction in vegetation and further fragmentation of remaining habitat. Increased open space and landscaping per subarea	*Earth* • Clearing and grading could cause some erosion. • Limited impacts due to existing degree of development, and small amount of vacant land. *Geologically Hazardous Areas* • Less than one acre of geologic hazards; no significant impacts are anticipated. *Water Resources* • Aquifer sensitivity of subarea is "low" and no designated recharge areas or wellhead protection areas are present. No significant impacts are anticipated. • Increased open space and landscaping would reduce incremental increase in impervious surfaces. *Wetlands* • Redevelopment could affect wetlands and buffers, but impacts would be limited by adopted regulations. *Flooding* • No flooding impacts would occur. *Wildlife/Habitat* • Incremental reduction in vegetation and further fragmentation of remaining habitat. Increased open space and landscaping per subarea

Alternative 1 – No Action	Alternative 2	Alternative 3
candidate species would occur. • No significant impacts to fish would occur.	plan and regulations would reduce impacts compared to No Action. • No significant impacts to threatened, endangered or candidate species would occur. • No significant impacts to fish would occur.	plan and regulations would reduce impacts compared to No Action. • No significant impacts to threatened, endangered or candidate species would occur. • No significant impacts to fish would occur.
Air	**Air**	**Air**
Air Quality <u>Construction Impacts</u> • Dust from construction activities would contribute to ambient concentrations of suspended particulate matter • Construction would require the use of heavy trucks and smaller equipment such as generators and compressors. These engines would emit air pollutants that would slightly degrade local air quality. • Some phases of construction would cause odors detectable to some people in the area. This would be particularly true during paving operations using asphalt. Such odors from paving operations would be short term. <u>Operational Impacts</u> • Based on projected traffic with *any alternative*, under existing (2011) or future conditions (2025), and assuming a background CO concentration of 3 ppm, WASIST model-calculated CO concentrations are less than the ambient air quality standards for CO. No significant impacts to ambient air quality are likely due to the subarea plan alternatives.	*Air Quality* <u>Construction Impacts</u> • Dust from construction activities would contribute to ambient concentrations of suspended particulate matter • Construction would require the use of heavy trucks and smaller equipment such as generators and compressors. These engines would emit air pollutants that would slightly degrade local air quality. • Some phases of construction would cause odors detectable to some people in the area. This would be particularly true during paving operations using asphalt. Such odors from paving operations would be short term. <u>Operational Impacts</u> • Based on projected traffic with *any alternative*, under existing (2011) or future conditions (2025), and assuming a background CO concentration of 3 ppm, WASIST model-calculated CO concentrations are less than the ambient air quality standards for CO. No significant impacts to ambient air quality are likely due to the subarea plan alternatives.	*Air Quality* <u>Construction Impacts</u> • Dust from construction activities would contribute to ambient concentrations of suspended particulate matter • Construction would require the use of heavy trucks and smaller equipment such as generators and compressors. These engines would emit air pollutants that would slightly degrade local air quality. • Some phases of construction would cause odors detectable to some people in the area. This would be particularly true during paving operations using asphalt. Such odors from paving operations would be short term. <u>Operational Impacts</u> • Based on projected traffic with *any alternative*, under existing (2011) or future conditions (2025), and assuming a background CO concentration of 3 ppm, WASIST model-calculated CO concentrations are less than the ambient air quality standards for CO. No significant impacts to ambient air quality are likely due to the subarea plan alternatives.

Alternative 1 – No Action	Alternative 2	Alternative 3
Greenhouse Gas Emissions • The No Action Alternative would result in lower total GHG emissions than *Alternative 2* or *Alternative 3*, but would have higher GHG emissions per service area population. • The overall significance of this impact at the subarea level is uncertain.	*Greenhouse Gas Emissions* • *Alternative 2* would result in the highest total GHG emissions, but would have lower emissions per service area population compared to existing conditions. • The overall significance of this impact at the subarea level is uncertain.	*Greenhouse Gas Emissions* • *Alternative 3* would result in the highest total GHG emissions, but would have the lowest GHG emissions per service area population. • The overall significance of this impact at the subarea level is uncertain.
Land Use	**Land Use**	**Land Use**
• Growth would be modest and would occur primarily through redevelopment. Some existing uses could be displaced.	• Growth would be more substantial than for *No Action*, and would have a focus on office and retail uses. • Growth would occur primarily through redevelopment; some existing uses could be displaced.	• Growth would be more substantial than for *No Action*, and would emphasize retail growth and increased multifamily residential land uses. • Growth would occur primarily through redevelopment. Some existing uses could be displaced, including some single-family development in the northern portion of the subarea.
• Construction would cause short-term impacts such as dust, noise, and temporary interruptions in access.	• Construction would cause short-term impacts, including dust, noise, and temporary interruptions in access.	• Construction would cause short-term impacts, including dust, noise, and temporary interruptions in access.
• The existing mix, intensity and form of development would continue. Development would occur lot-by-lot, controlled by existing zoning and without the guidance of a subarea plan. Design standards would not be adopted and existing character would continue.	• The land use pattern would include more mixed-use and mid-rise buildings, and development would be guided to various nodes through a plan; new zoning regulations, design guidelines and standards would positively influence development character.	• The land use pattern would include more mixed-use and mid-rise buildings, and development would be guided to various nodes of activity through a plan; new zoning regulations, design guidelines and standards would positively influence development character.
• Gross residential density would increase from 2.4 dwelling units (d.u.) per acre to approximately 2.7 du. per acre.	• Gross residential density would increase from 2.4 d.u. per acre to approximately 2.9 d.u. per acre.	• Gross residential density would increase from 2.4 d.u. per acre to approximately 4 d.u. per acre
• Potential for land use conflicts exists due to broad range of permitted uses.	• Land uses would be guided to identified activity nodes; uses within the activity nodes would generally be	• Land uses would be guided to identified activity nodes would generally be complementary in

Alternative 1 – No Action	Alternative 2	Alternative 3
• Employment opportunities and the mix of goods and services would not change significantly. Existing leakage of spending outside the City would continue, with consequent loss of potential revenues. • Without adoption of subarea plans for Lake Stevens Center and 20th Street SE, growth would be less focused in designated centers.	complementary in character and no significant land use conflicts are anticipated. • Center would be upgraded and revitalized to attract additional jobs and to capture market leakage. • Adoption of subarea plans for Lake Stevens Center and 20th Street SE together would help focus growth in designated centers, consistent with the Comprehensive Plan and regional growth policies.	character and no significant land use conflicts are anticipated. • Center would be upgraded and revitalized to attract additional jobs and to capture market leakage. • Adoption of subarea plans for Lake Stevens Center and 20th Street SE together would help focus growth in designated centers, consistent with the Comprehensive Plan and regional growth policies.
Population, Housing & Employment	**Population, Housing & Employment**	**Population, Housing & Employment**
Population • Population increase of 290-350 from existing over 20 years; within City's 2025 population target. *Housing* • Housing increase of 100-200 units. *Employment* • Increase of 190-240 jobs over 20 years.	*Population* • Population increase of 520-575 from existing; within City's 2025 population target. *Housing* • Housing increase of 180-200 units from existing. *Employment* • Greatest focus on employment uses, and increase of 700-750 jobs.	*Population* • Population increase of 1,440-1,720 from existing; within City's 2025 population target. *Housing* • Greater emphasis on housing, with increase of 500-600 units from existing. • Potential redevelopment of existing relatively affordable single-family area in northwestern portion of subarea. *Employment* • More balance between housing and employment uses, with Increase of 580-660 jobs.
Aesthetics	**Aesthetics**	**Aesthetics**
Visual Character • Existing character would not change significantly. No new regulations or design guidelines/standards would	*Visual Character* • Design guidelines and standards would be adopted and would help establish consistent	*Visual Character* • Impacts would be the same as Alternative 2.

Alternative 1 – No Action	Alternative 2	Alternative 3
be adopted to influence design. No design consistency. *Views* • No significant impacts to views, which are limited. *Light & Glare* • Increase in lighting, but no significant impacts are anticipated.	approach to design of sites, streetscape, landscaping and lighting. *Views* • Impacts would be the same as No Action. Potential to locate parks and open space to capture views, and to protect view corridors through design review. *Light & Glare* • Increase in lighting, but no significant impacts are anticipated. Lighting design would be addressed in design guidelines and standards.	*Views* • Impacts would be the same as No Action. Potential to locate parks and open space to capture views, and to protect view corridors through design review. *Light & Glare* • Increase in lighting, but no significant impacts are anticipated. Lighting design would be addressed in design guidelines and standards.
Transportation	**Transportation**	**Transportation**
Roadway Operations Level of Service (LOS) would be degraded at the following intersections during the PM peak hour: • SR-9 and Lundeen Parkway (LOS F); • Vernon Road and N Davies Road (LOS F); • Safeway Driveway and N. Davies Road (LOS D); • SR-9 and SR-204 (LOS F); • SR-9 and 4th Street SE (LOS F); • 91st Avenue SE and SR-204 (LOS F); and • Market Place and SR-9 (LOS F). • During the AM peak hour, the intersection of SR-9 and SR-204 would operate at LOS D, compared to LOS C at present. *Pedestrian and Bicycle System*	*Roadway Operations* Level of Service (LOS) would be degraded at the following intersections during the PM peak hour: • SR-9 and Lundeen Parkway (LOS F); • Vernon Road and N Davies Road (LOS F); • Safeway Driveway and N. Davies Road (LOS E); • SR-9 and SR-204 (LOS F); • SR-9 and 4th Street SE (LOS F); • 91st Avenue SE and SR-204 (LOS F); • Market Place and SR-9 (LOS F); • Market Place and SR-204 (LOS D); • Market Place and 91st Avenue SE (LOS D); • During the AM peak hour, the intersection of SR-9 and SR-204 would operate at LOS D, compared to LOS C at present. *Pedestrian and Bicycle System*	*Roadway Operations* Level of Service (LOS) would be degraded at the following intersections during the PM peak hour: • SR-9 and Lundeen Parkway (LOS F); • Vernon Road and N Davies Road (LOS F); • Safeway Driveway and N. Davies Road (LOS F); • SR-9 and SR-204 (LOS F); • SR-9 and 4th Street SE (LOS F); • 91st Avenue SE and SR-204 (LOS F); • Market Place and SR-9 (LOS F); • Market Place and SR-204 (LOS D); • Market Place and 91st Avenue SE (LOS D); • During the AM peak hour, the intersection of SR-9 and SR-204 would operate at LOS D; compared to LOS C at present. *Pedestrian and Bicycle System*

Alternative 1 – No Action	Alternative 2	Alternative 3
• The *No Action Alternative* is not anticipated to interfere with any existing or planned pedestrian or bicycle facilities. Overall traffic growth would result in more pedestrian and bicycle interactions. *Transit* • No transit routes are expected to be adversely affected. Vehicle operations may be slower due to increased traffic congestion.	• *Alternative 2* is not anticipated to interfere with any existing or planned pedestrian or bicycle facilities. Proposed improvements (new bicycle lanes, sidewalks, landscaping, and off-street trails) would substantially improve the quality of the pedestrian and bicycle system when compared to the *No Action Alternative*. *Transit* • Similar to No Action.	• *Alternative 3* is not anticipated to interfere with any existing or planned pedestrian or bicycle facilities. Proposed improvements (new bicycle lanes, sidewalks, landscaping, and off-street trails) would substantially improve the quality of the pedestrian and bicycle system when compared to the *No Action Alternative*. *Transit* • Similar to No Action.
Public Services	**Public Services**	**Public Services**
• Public service impacts would generally be proportional to population increase. *Police Service* • Calls for service would increase. • Need for .39-.47 additional officers per adopted level of service, and additional equipment and facility space. Needs are addressed in the adopted CIP. *Fire & EMS* • Calls for service would increase, generating need for additional firefighters and equipment. • A ladder truck would be required for any development above 2 stories.	• Public service impacts would generally be proportional to population increase. *Police Service* • Calls for service would increase. • Need for .69-.77 additional officers per adopted level of service, and additional equipment and facility space. Needs are addressed in the adopted CIP. *Fire & EMS* • Calls for service would increase, generating need for additional firefighters and equipment. • A ladder truck would be required for any development above 2 stories. • Response times could be reduced for a more concentrated, higher	• Public service impacts would generally be proportional to population increase. *Police Service* • Calls for service would increase. • Need for 1.92-2.29 additional officers per adopted level of service, and additional equipment and facility space. Needs are addressed in the adopted CIP. *Fire & EMS* • Calls for service would increase, generating need for additional firefighters and equipment. • A ladder truck would be required for any development above 2 stories. • Response times could be reduced for a more concentrated, higher

Alternative 1 – No Action	Alternative 2	Alternative 3
	density development pattern.	density development pattern.
Schools • Housing growth could generate between 5.3 and 10.6 additional students, depending on the type, number and size of housing units. Growth is addressed in school district's CFP. • Construction could have temporary impacts for school bus routes.	*Schools* • Housing growth could generate between 9.6 and 10.6 additional students, depending on the type, number and size of housing units. Growth is addressed in school district's CFP. • Construction could have temporary impacts for school bus routes.	*Schools* • Housing growth could generate between 26.6 and 31.2 additional students, depending on the type, number and size of housing units. Growth is addressed in school district's CFP. • Construction could have temporary impacts for school bus routes.
Parks & Recreation • Subarea growth would require between 2.2 and 2.6 acres of park land, based on the City's adopted LOS.	*Parks & Recreation* • Subarea growth would require between 3.9 and 4/3 acres of park land based on the City's adopted LOS. • The utility corridor could provide locations for 8-10 acres of public trails. New residential and commercial areas could provide additional parks and open spaces.	*Parks & Recreation* • Subarea growth would require between 10.8 and 12.9 acres of park land based on the City's adopted LOS. • The utility corridor could provide locations for 8-10 acres of public trails. New residential and commercial areas could provide additional parks and open spaces.
Utilities	**Utilities**	**Utilities**
Stormwater & Drainage • The subarea is primarily developed, but some limited increases in impervious surface and clearing and resulting increases in stormwater runoff would occur in conjunction with redevelopment. The City would review development proposals and apply its adopted stormwater regulations to ensure that no significant impacts occur.	*Stormwater & Drainage* • The subarea is primarily developed, but some limited increases in impervious surface and clearing and resulting increases in stormwater runoff would occur in conjunction with redevelopment. The City would review development proposals and apply its adopted stormwater regulations to ensure that no significant impacts occur.	*Stormwater & Drainage* • The subarea is primarily developed, but some limited increases in impervious surface and clearing and resulting increases in stormwater runoff would occur in conjunction with redevelopment. The City would review development proposals and apply its adopted stormwater regulations to ensure that no significant impacts occur.
Water • Projected increase in water demand from development (160-195 equivalent	*Water* • Projected increase in water demand from development (399-435 equivalent	Water • Projected increase in water demand from development (399-435 equivalent

Alternative 1 – No Action	Alternative 2	Alternative 3
residential units/30,000-37,000 gallons per day) represents 2.6% of available water supply. No significant impact would occur. • Planned improvements in 2012 and 2018 would provide sufficient water storage; increase in required storage would not result in significant impacts to the system. • No deficiencies in the water distribution system would occur. • Some upgrading of fire flow conveyance systems (pipes) could be required in specific areas, depending on the type and intensity of development. Project-specific needs would be determined by the City, PUD and Fire Marshall in conjunction with development review. *Sewer* • Growth would increase the demand for sewerage collection and treatment, but are within the capacity of the existing and planned system; no significant impacts would occur. • A planned upgrade of the Vernon Road Trunk line could need to occur sooner than currently programmed.	residential units/75,000-81,850 gallons per day) represents 5.9% of available water supply. No significant impact would occur. • Planned improvements in 2012 and 2018 would provide sufficient water storage; increase in required storage would not result in significant impacts to the system. • No deficiencies in the water distribution system would occur. • Some upgrading of fire flow conveyance systems (pipes) could be required in specific areas, depending on the type and intensity of development. Project-specific needs would be determined by the City, PUD and Fire Marshall in conjunction with development review. *Sewer* • Growth would increase sewerage flows and loadings (94%-113%) but are within the capacity of the existing and planned treatment system; no significant impacts would occur. • A planned upgrade of the Vernon Road Trunk line could need to occur sooner than currently programmed.	residential units/75,000-81,850 gallons per day) represents 5.9% of available water supply. No significant impact would occur. • Planned improvements in 2012 and 2018 would provide sufficient water storage; increase in required storage would not result in significant impacts to the system. • No deficiencies in the water distribution system would occur. • Some upgrading of fire flow conveyance systems (pipes) could be required in specific areas, depending on the type and intensity of development. Project-specific needs would be determined by the City, PUD and Fire Marshall in conjunction with development review. *Sewer* • Growth would increase sewerage flows and loadings (353%-361%) but are within the capacity of the existing and planned system; no significant impacts would occur. • A planned upgrade of the Vernon Road Trunk line could need to occur sooner than currently programmed.

1.4 MITIGATION MEASURES

1.4.1 Natural Environment

Earth

Applicable Regulations and Commitments

- ***Geological Assessments Required*:** The City's critical area regulations require a geological assessment for any development proposal within 200 feet of a designated geologically hazardous area. Geological assessments must contain an analysis of the potential impacts to geologically hazardous areas resulting from the proposed development and identify appropriate mitigation measures to protect development and the geologically hazardous area LSMC 14.88.630).

- **Native Growth Protection Area:** LSMC 14.88.670 requires developers to place geologically hazardous areas not approved for alteration and their buffers in a native growth protection area; lawfully altered geologically hazardous areas are subject to a covenant of notification and indemnification/hold harmless agreement.

- ***Erosion Control Measures Required*:** LSMC 14.64.130 requires the implementation of sedimentation and erosion control measures for any development that would entail land disturbance. The Public Works Director must review and approve erosion control plans.

Additional Mitigation Measures

- None required

Water Resources

Applicable Regulations and Commitments

- **Stormwater Management:** The City's municipal code requires the use of natural drainage systems to the extent feasible in order to preserve natural topography (LSMC 14.64.100). The Code also requires all new stormwater drainage systems to be constructed in accordance with the requirements of the Department of Ecology's *2005 Stormwater Management Manual for Western Washington* (LSMC 11.06.020 and LSMC 14.64.140). Rigorous permit review and continued implementation of the City's stormwater management codes will promote sound development and redevelopment policies; continued protection of water quality in the City's lakes, streams and wetlands habitats and groundwater recharge; property protection from increased runoff; and the promotion of low impact development (LID) strategies that reduce impervious surface and stormwater runoff.

- **NPDES Phase II Municipal Stormwater Permit:** The Western Washington Phase II Municipal Stormwater Permit was issued in 2007 to implement the requirements of the Clean Water Act and the National Pollutant Discharge Elimination System as codified in Sections 11.06.020 and 14.64.140 of the City's municipal code. Local jurisdictions covered under the permit, including the City of Lake Stevens, are required to develop a stormwater management program designed to reduce the discharge of pollutants and protect water quality. In accordance with the requirements of the permit, the City of Lake Stevens has adopted a stormwater management plan focused on public education and outreach, detection and elimination of illicit stormwater discharge, controlling runoff generated by new development activities, and prevention of pollution resulting from municipal activities. Continued implementation of the measures contained in the stormwater management program would reduce pollutant loading and improve water quality in the City's lakes, streams and wetlands.

- **Critical Areas Regulations:** As described in the impact analysis, the City and study area contain varied critical areas, including wetlands and streams. Under all alternatives, future development will be subject to the adopted critical areas regulations found in Chapter 14.88 LSMC, including all applicable mitigation requirements and mitigation sequencing procedures. In particular, wetland mitigation is required to take the form of in-kind replacement of the impacted wetland functions and values; replacement wetlands must adhere to the design requirements of LSMC 14.88.840, including performance standards and mitigation ratios.

Additional Mitigation Measures

- **Stormwater Detention:** For properties adjacent to identified wetlands and associated buffers, new development and redevelopment shall not result in an increased rate of runoff from the site to the wetland. To prevent alteration of established hydrologic wetland processes, the municipal code requires stormwater to be either detained or infiltrated onsite.

- **Low Impact Development (LID):** The City should consider providing incentives in the subarea plan and new development regulations to encourage the use of LID techniques to reduce stormwater impacts.

- **Critical Areas:** More detailed analysis -- including full delineation, classification and function assessment -- will be required in conjunction with development permitting for future projects that occur on sites containing critical areas.

- **Wetland Mitigation Banking:** LSMC 14.88.840 allows the use of credits from an approved wetland mitigation bank to compensate for unavoidable impacts to wetlands. The City should investigate the potential for either establishing a

mitigation bank for the study area to address potential wetland impacts that may occur under any of the alternatives, or coordinate with an established mitigation bank within the watershed, such as the Narbeck Wetland Sanctuary at Paine Field, to obtain a pool of credits for future development. Per LSMC 14.88.840(a)(5), projects using mitigation bank credits must be consistent with the replacement ratios specified in the mitigation bank's certification. If mitigation credits are not available and establishment of a separate mitigation bank is not feasible, the City could encourage preservation and enhancement of these areas in exchange for increased development potential in other portions of the site or subarea.

Plants & Animals

Applicable Regulations and Commitments

- **Tree Retention:** The City's land use code requires every development to retain significant trees and stands of trees that occur on the development site unless such retention would create an unreasonable burden on the developer or create a safety hazard. The code requires that significant trees removed as part of a development project be replaced. This code also requires retained and replanted trees be protected during construction.

- **Critical Areas Regulations**: Future development in the study area, under all alternatives, has the potential to adversely affect plants and animals through clearing of vegetated areas. However, the City's critical areas regulations will protect wetlands, riparian areas, and other critical areas that provide habitat for plants and animals, by limiting the activities allowed within the critical area and establishing appropriate protective buffers and mitigation strategies for unavoidable impacts.

1.4.2 Air

Air Quality

Mitigation During Construction

Although significant air quality impacts from construction are not anticipated with any of the alternatives, construction contractors would be required to comply with all relevant federal, state, and local air quality rules. In addition, implementation of best management practices would also reduce emissions related to the construction phase of the project. Possible management practices for reducing the potential for air quality impacts during construction include measures for reducing both exhaust emissions and fugitive dust. The Washington Associated General Contractors brochure *Guide to Handling Fugitive Dust from Construction Projects* and the PSCAA suggest a number of methods for controlling dust and reducing the potential exposure of people to emissions from diesel equipment. A list of some possible control measures that could be implemented to reduce potential air quality impacts from construction activities follows:

- Use only equipment and trucks that are maintained in optimal operational condition;
- Require all off-road equipment to have emission reduction equipment (i.e., require participation in Puget Sound Region Diesel Solutions, a program designed to reduce air pollution from diesel, by project sponsors and contractors);
- Use bio diesel or other lower-emission fuels for vehicles and equipment;
- Use car-pooling or other trip-reduction strategies for construction workers;
- Implement restrictions on construction truck and other vehicle idling (i.e., limit idling to a maximum of 5 minutes);
- Spray exposed soil with water or other suppressant to reduce emissions of PM and deposition of particulate matter;
- Pave or use gravel on staging areas and roads that would be exposed for long periods;
- Cover all trucks transporting materials, wetting materials in trucks, or providing adequate freeboard (space from the top of the material to the top of the truck bed), to reduce PM emissions and deposition during transport;
- Provide wheel washers to remove particulate matter that would otherwise be carried off site by vehicles to decrease deposition of particulate matter on area roadways;
- Remove particulate matter deposited on paved, public roads, sidewalks, and bicycle and pedestrian paths to reduce mud and dust; sweep and wash streets continuously to reduce emissions;
- Cover dirt, gravel, and debris piles as needed to reduce dust and wind-blown debris; and
- Stage construction to minimize overall transportation system congestion and delays to reduce regional emissions of pollutants during construction.

Mitigation During Operation

The air quality analysis indicates that the alternatives would not result in any significant adverse air quality impacts in the study area. Consequently, no operational impact mitigation measures are warranted or proposed.

Greenhouse Gas Emissions

Some or all of the following strategies for reducing GHG could be implemented:

- Adopt green building standards for new development (e.g., LEED silver or better);

- Adopt a mandatory commute trip reduction program for all employers in the Lake Stevens Center subarea. This commute trip reduction program could include the establishment of the following:
    - Mode split goals
    - Mode split monitoring program
    - Mode split goal implementation program
    - Transportation management agency which provides resources for employers such as carpool matching, vanpool/transit information, and a guaranteed ride home program;
- In conjunction with a commute trip reduction program, expand transit options such as the Community Transit vanpool program or new fixed route bus service; and
- Implement efficient transportation design standards including the use of roundabouts and LED street lighting and area lighting where appropriate.

1.4.3 Land Use

Many of the land use changes identified in the foregoing analysis – including increased density/intensity and a greater diversification and mix of land uses – are not considered adverse impacts. The change in the subarea's land use pattern would be incremental and does not require mitigation.

Potential land use conflicts, such as between proximate land uses of different intensity, can be avoided or otherwise mitigated through the application of new development regulations and design guidelines and standards that ensure appropriate land uses along with adequate buffering and transitions between different abutting land uses. For example, height and bulk limits and setback requirements in zoning regulations could be tailored to address these potential conflicts. Landscaping requirements can also help to buffer and screen land uses of dissimilar intensity or scale. Design guidelines and standards would also require approaches to site planning and building design, which reduce a range of potential impacts, such as shadows, noise and visual incongruities. These techniques are an integral aspect of implementing the subarea plan.

1.4.4 Population, Housing & Employment

Population

No significant adverse impacts have been identified and no mitigation is necessary.

Housing

No significant adverse impacts have been identified and no mitigation is necessary.

Employment

No significant adverse impacts have been identified and no mitigation is necessary.

1.4.5 Aesthetics, Light & Glare

Mitigation measures to address impacts to visual character and to preserve views include a combination of existing development regulations and new implementation measures identified in the *Draft Lake Stevens Center Subarea Plan*.

Visual Character

- **Development Regulations**: New zoning regulations in combination with specific design guidelines and standards would be adopted to implement the subarea plan. Regulations would address appropriate uses, height, setbacks, and similar development parameters. The code could also include incentives, such as bonuses in height or intensity, in exchange for incorporating a menu of public amenities in new development. Existing landscaping standards would be modified to create the desired character for development sites, roads, and sidewalks and trails. Existing tree protection/replacement requirements could be modified to ensure the subarea maintains a desirable amount of vegetative cover.

- **Design Guidelines and Standards**: Design guidelines and standards would be adopted to ensure future development achieves a cohesive visual character and high-quality site planning, building design, lighting and signage.

Views

- **Park & Open Space Planning**: The City will be updating its *Parks & Open Space Plan* to address needs created by planned growth in Lake Stevens Center. In conjunction with this planning, the City may identify new parks or open space areas that provide views of landscape features, as discussed above, and determine that these views should not be obstructed from specified viewpoints. New development in some portions of the subarea may also create public spaces to provide open views of the landscape.

- **Design Guidelines and Standards**: In coordination with planning new parks and open spaces and identifying potential viewpoints, the City could consider adopting guidelines and standards that identify when and how site plans or building design should be modified to protect views from parks and other public spaces.

Light & Glare

- **Development Regulations**: The City should consider adopting "dark sky" regulations to minimize lighting increases and night glow in the subarea.

- **Design Guidelines and Standards**: Design guidelines and standards would be adopted to implement the subarea plan, and could provide guidance on avoiding light spillage, glare and shadow impacts though site planning, building design and landscaping. The guidelines and standards would specifically address lighting and signage.

1.4.6 Transportation

Mitigation for transportation impacts includes a combination of adopted regulatory programs, modification of LOS standards, intersection specific projects, and programmatic actions.

Concurrency

The Growth Management Act (GMA) includes provisions, generally referred to as "concurrency," to ensure that sufficient public facilities are available for new development. Local jurisdictions must also set level of service (LOS) standards to measure a project's impact potential. If the trips generated by a development will cause a facility to fall below the adopted LOS standard, the local government may deny permits for the project, change the LOS standard to allow the development, or modify the land use. Existing City regulations incorporate this provision.

Level of Service Threshold

Current regulations require intersections to maintain LOS C; however, maintaining LOS C conditions at all the intersections in the study area would be financially prohibitive. It is recommended that the City amend its threshold for signalized intersections in designated centers/mixed-use areas and strive to meet a LOS E standard. However, based on the discretion of the public works director, intersections that are built to their ultimate size would be allowed to operate at LOS F conditions as long as other programmatic mitigation measures to reduce trip generation are implemented.

For uncontrolled and unsignalized intersections, it is recommended that an intersection be considered deficient if it falls below LOS E operations *and* meets a signal warrant. This level of service is more realistic to maintain, is consistent with the Comprehensive Plan, and is in line with the typical traffic activity seen in economically vibrant areas.

Location-Specific Mitigation Measures

SR-9 Corridor

Impacted intersections along SR-9 are under the jurisdiction of WSDOT; roadway and intersection improvements would be addressed in the *SR-9 Corridor Planning Study* or *SR-9 Route Development Plan*. A coordinated approach along SR-9 is essential, rather than simply moving the bottleneck to a different location.

The City Stevens should enter into an interlocal agreement with WSDOT, similar to many other jurisdictions in Snohomish County, which could address coordination related to permitting, funding, and sharing of traffic impact fees.

Frontier Village Access: Vernon Road/N Davies Road and Safeway Driveway/N Davies Road Intersections

A new access plan would address the following:

- Vernon Road potentially vacated between N Davies Road and SR 204;
- Shopping center/Safeway N. Davies driveway converted to a public road from N. Davies Road to 7th Place NE;
- The intersection of N. Davies Road and the Safeway Driveway would operate as a single-lane mini-roundabout;
- The old intersection at Vernon Road/N. Davies Road could potentially be realigned to a curve or would operate as a single-lane mini-roundabout; and
- The intersection of 7th Place NE and the Safeway N. Davies Driveway would be reconfigured; alternative designs are identified for 91st Avenue NE and SR-204.

Additional Mitigation Measures

In addition to the capacity enhancing projects described above, it is recommended that the City of Lake Stevens explore the potential for other programmatic mitigation measures.

Traffic Impact Fees

To generate the funds necessary to implement the mitigation measures described above, and to help address identified impacts, it is recommended that a traffic impact fee be established, as authorized by RCW 82.02.050. This fee could be exclusive to the Lake Stevens Center area, or could be part of a citywide impact fee program. An interlocal agreement with WSDOT could allow a sharing of fee revenues to help construct needed improvements.

Transportation Benefit District

Formation of a Transportation Benefit District (TBD), as authorized by RCW 36.73.120, is another approach that could be used to help finance transportation improvements. Formation of a TBD would enable the City to assess additional fees and charges within the district, including a supplemental sales tax. A TBD could apply citywide or specific to Lake Stevens Center, and could be used in conjunction with a traffic impact fee.

Transportation Demand Management

Transportation demand management (TDM) strategies include mandatory commute trip reduction programs and enhanced transit service. These measures have been proven to be effective at reducing trip generation.

1.4.7 Public Services

Under all alternatives, development would be subject to adopted development regulations, which require emergency access, fire suppression systems, and school and park impact mitigation fees to offset impacts to these services. *Alternative 2* and Alternative *3* could incorporate the following additional measures:

- During construction, implement security measures such as onsite lighting, fencing, onsite surveillance, etc. to reduce potential criminal activity.
- Construct a well-designed internal street system that provides fast and efficient police, fire and emergency vehicle access to all areas of the subarea.
- Develop streets, sidewalks, walkways, bicycle and pedestrian paths and public spaces designed to promote public safety and visibility for residents, employees, site visitors and police.
- Design all parking areas and public spaces with specially designed no-glare security lighting to provide for security.
- Include incentives in revised development regulations for providing public spaces in new development.
- Begin a planning process to identify additional park space within the subarea. Identify land that is suitable for acquisition, and investigate the potential for acquiring easements within the utility corridor.
- The School District could recalculate school mitigation fees to include upgrades to local schools to meet the needs of the new students.
- The City should review its adopted level of service standards and consider regional averages for service, the experience of comparable cities, and local needs.

1.4.8 Utilities

Drainage

Applicable Regulations and Commitments

- **City of Lake Stevens Stormwater Ordinance:** Chapter 11.06 and Chapter 14.64 (Part II) of the Lake Stevens Municipal Code adopt the *Department of Ecology's 2005 Stormwater Management Manual for Western Washington*. Any project that meets or exceeds the thresholds defined in the manual for new impervious area, drainage system modifications, or redevelopment is subject to City review and permit approval.

- **Ecology Stormwater Manual Adopted:** The City has adopted the *Department of Ecology's 2005 Stormwater Management Manual for Western Washington* as its minimum design standard for stormwater infrastructure. All development meeting the minimum thresholds is required to design associated stormwater infrastructure to be consistent with these standards.
- **Low Impact Development Encouraged:** The City's stormwater ordinance states that Low Impact Development solutions, as defined and listed in the LID Technical Guidance Manual for Puget Sound, are acceptable and encouraged alternative standards for management of stormwater.

Additional Mitigation Measures

- **Permitting Incentives for Low Impact Development:** To reduce the need for new stormwater conveyance infrastructure and protect water quality, the City should incentivize the use of LID techniques for onsite stormwater treatment and detention for appropriate projects. Incentives could include expedited development permit review or reduced permit fees.

Water

Applicable Regulations and Commitments

- **Supply Upgrades:** Snohomish County PUD's *2011 Water System Plan* identifies necessary capital improvements to provide adequate water supply for the next 20 years. Planned and budgeted supply improvements include conversion of the system's two emergency groundwater wells to a full-time source, increasing system supply by approximately 1.2 MG per day.
- **Storage Upgrades:** The PUD's *2011 Water System Plan* identifies the following planned and budgeted capital improvements to storage capacity:
    - Walker Hill Booster Zone Intertie: Eliminates dead storage in the Walker Hill tanks, making this water available to the Lake Stevens 500 zone for emergency use. (2012)
    - Getchell Reservoir: New 9.2 MG reservoir serving the Lake Stevens 500 pressure zone.
- **Distribution Upgrades:** The PUD's ongoing water main replacement program annually evaluates aging pipes for replacement with a focus on the replacement of galvanized iron/steel and asbestos cement pipes.

Additional Mitigation Measures

- **Joint Planning with Snohomish County PUD:** Upon adoption of a preferred alternative, the City should consult with Snohomish County PUD to establish a joint planning process for capital improvements necessary to serve anticipated development in the subarea.
- **Design Review for Fire Flow:** The City and developers would coordinate development permit application with Snohomish County PUD and the Lake

Stevens Fire Marshal to determine fire flow requirements based on project design. Upgrades to existing lines would be coordinated with Snohomish County PUD. Installation of new water lines adequate to provide required fire flows would be the responsibility of the developer and/or the City, as follows.

- 12-inch pipes and 3000 gpm for commercial areas, possibly multifamily;
- 8-inch pipes and 1500 gpm for existing residential areas; and an
- Intermediate value for other areas, for example 10-inch pipe with 2000 gpm.

Sewer

Applicable Regulations and Commitments

- **Planned Capital Improvements:** As described in the impact analysis, the Lake Stevens Sewer District adopted updates to its Comprehensive Plan in 2007 and 2010, describing the capital improvements planned for the near future, including several pipeline expansions, decommissioning of several lift stations, pump upgrades, and construction of a new wastewater treatment plant. These improvements are designed to relieve existing system deficiencies and create the capacity necessary to serve future development.

Additional Mitigation Measures

- **Joint Planning with Lake Stevens Sewer District:** Upon adoption of a preferred alternative, the City should consult with the Lake Stevens Sewer District to establish a joint planning process for capital improvements necessary to serve anticipated development in the subarea, including new wastewater collection infrastructure and future expansions to the new treatment plant that may be necessary to accept projected flows from development under the subarea plan.
- **Design Review for Wastewater Flows and Loads:** Because planned improvements to the wastewater system will be implemented in phases over several years, the Planned Action should establish size thresholds for new development that, when met or exceeded, would require developers to initiate consultation with Lake Stevens Sewer District. Consultation would confirm that projected wastewater flows and loads from any proposed project would not exceed the treatment or conveyance capacity of the wastewater system existing at that time.

1.5 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

1.5.1 Natural Environment

All alternatives could result in additional development within the subarea, thereby increasing the level of impervious surface and reducing vegetated areas. Additional

development within the study area is also anticipated to generate increased stormwater runoff that must by detained or treated before discharge to surface water. With application of the City's adopted regulations regarding critical areas, stormwater, and tree retention, as well as proposed mitigation measures, no significant unavoidable adverse impacts to the natural environment are anticipated.

1.5.2 Air

Air Quality

No significant unavoidable adverse impacts would occur.

Greenhouse Gas Emissions

GHG emissions would increase with any land use alternative considered for the subarea. Information is currently lacking, however, upon which to base a conclusion about the significance of the increased GHG emissions on climate change and the broader environment. Similarly, the potential for additional regulatory action at the state and local level in the future indicates that such impacts may not be unavoidable.

1.5.3 Land Use

The land use pattern of the subarea would change significantly to accomplish the objectives of *Alternative 2* or *Alternative 3.* This would result in the subarea becoming more urbanized and intensively developed, with a greater mix of uses, and would experience a significant increase in employment uses and population relative to the *No Action Alternative*. This change, while significant, is not considered to be adverse.

1.5.4 Population, Housing & Employment

While population growth is unavoidable, it is not necessarily an adverse impact. No significant unavoidable adverse impacts would occur. Similarly, employment growth is not considered to be an adverse impact, but is an unavoidable effect of successful implementation of the subarea alternatives.

1.5.5 Aesthetics, Light & Glare

Visual Character

The visual character of the subarea would change significantly over time as a result of growth and development. The direction of change would be from a primarily single-family residential area with large lots to an area that includes a mixed-use employment district alongside residential neighborhoods. It would become more densely developed and urban in character with taller, larger scale buildings. This change could be considered adverse by some viewers and positive by others, but this change is an unavoidable consequence of implementing the subarea plan.

Views

Some existing views to the west from locations in the western portion of the subarea could be partially or completely obstructed by future development. View blockage could

be mitigated through use of new development regulations, however, so this impact is not considered unavoidable. The subarea plan, and future planning for parks and open spaces, would focus on identifying future public spaces from which views would be protected through design guidelines and standards.

Light & Glare

Lighting will increase but will be controlled through development regulations and design guidelines and standards. No significant unavoidable adverse impacts are anticipated.

1.5.6 Transportation

Traffic congestion will increase under any alternative and this impact is unavoidable. Increased traffic volumes caused by *Alternative 2* and *Alternative 3* would lead to increased delay along SR-9. Since WSDOT has not yet defined its plan to improve traffic conditions along SR-9, specific mitigation measures cannot be identified. Given that WSDOT is actively planning to improve the SR-9 corridor and some level of mitigation is possible (although full improvement to provide LOS D conditions is unlikely because of the high costs), impacts are not necessarily inevitable or entirely unavoidable.

1.5.7 Public Services

Demand for public services would increase incrementally in conjunction with the additional population and commercial growth expected to locate in the subarea. Any additional needs would be addressed in the City's Capital Facilities Plan and are not unavoidable.

1.5.8 Utilities

All alternatives are anticipated to result in additional development within the subarea, thereby increasing demand for water, sewer, and drainage services. An increase in population and employment in the study area could exacerbate existing water and wastewater system deficiencies and increase demand for services beyond the capacity of existing infrastructure in some limited areas. However, with application of mitigation measures, which include both regulatory measures and planned capital improvements, no significant unavoidable adverse impacts are anticipated.

1.6 BENEFITS & DISADVANTAGES OF DELAYING THE PROPOSED ACTION

Subarea planning is an element of the City's deliberate strategy to grow and diversify the local economy. Benefits of the proposed action, and the objectives of the subarea plan, include attracting additional retail and services, providing increased employment opportunities, and concentrating growth in a mixed-use center. From an economic development perspective, the proposal seeks to attract a greater amount of regional employment to the City and decrease market leakage by increasing local retail opportunities; the subarea plan and planned action designation would help to create an attractive environment and incentives for development.

Delaying the proposed subarea plan would be equivalent to implementing the *No Action* alternative, and would result in these benefits being postponed or potentially lost. Growth in the City would also be relatively more dispersed and less concentrated in centers. At the same time, lower levels of growth would create lower demand for public services and capital facilities.

1.7 ISSUES TO BE RESOLVED

Major issues to be resolved by the City in selecting a preferred alternative include determining the appropriate types, intensity and overall magnitude of development that is appropriate in the subarea, and how this could change the existing character of the area. Some existing uses, including housing, could be displaced. In addition, increased growth will affect the cost, timing and ability to fund necessary public services and capital improvements.

2. DESCRIPTION OF PROPOSAL AND ALTERNATIVES

2.1 OVERVIEW OF THE PROPOSED ACTION

The action proposed by the City of Lake Stevens is comprised of the following related elements:

1. Adopting a subarea plan, pursuant to the Revised Code of Washington (RCW) 36.70A.080, which will amend and become an element of the Lake Stevens Comprehensive Plan;
2. Amending the zoning map to rezone properties consistent with the subarea plan;
3. Revising the zoning code to amend or adopt new classifications, development standards and/or design guidelines;
4. Amending the Comprehensive Plan's Transportation Element and Capital Facilities Element to address infrastructure needs required to support planned growth in the subarea; and
5. Adopting an ordinance designating the subarea as a Planned Action, pursuant to the State Environmental Policy Act (SEPA, RCW 43.21C.031) and the SEPA Rules (Washington Administrative Code (WAC, 197-11-164), for purposes of future environmental review and permitting.

Study Area

The City of Lake Stevens is located in Snohomish County, approximately six miles east of downtown Everett. The Lake Stevens Center Subarea, shown in Figure 2-1, is comprised of approximately 359 acres of land centered on the SR-9/SR-204 intersection. The study area extends to Lundeen Park Way on the north and west, 2nd Street SE on the south, and Springbrook Road, 98th Drive and 103rd Ave NE on the east. The subarea was annexed into the City in 2009.

2.2 BACKGROUND & PLANNING CONTEXT

Growth Management Act

The Growth Management Act (GMA, RCW 36.70A) establishes a framework that must be used by the state's largest cities and counties to plan for growth in a manner that is coordinated with infrastructure needs and protects important environmental resources. Each city subject to the GMA must plan to accommodate the population and employment projected to occur over a 20-year period. Local Comprehensive Plans must contain specific "elements" that, among other things, designate land uses, guide where and how growth will occur, identify necessary facilities and services, and plan for efficient multimodal transportation systems. In general, development projects must provide facilities and services "concurrent" with development (defined as within 6 years). The GMA (RCW 36.70A.080) authorizes cities to prepare plans for smaller subareas (RCW 36.70A.080).

Figure 2-1. Lake Stevens Center Study Area

Source: City of Lake Stevens

Lake Stevens Growth Strategy

The City's strategy for accommodating growth, as expressed in the Lake Stevens Comprehensive Plan (adopted 1994 and amended annually), is to direct the majority of residential and employment growth into highly concentrated "growth centers," where infrastructure and services are available. The centers, designated in 2006 and refined in 2010, include the Central Business District, Lake Stevens Center (Frontier Village area), Hartford Industrial Center, and 20th Street SE (South Lake Center). Objectives of the growth strategy include increasing employment and improving the City's jobs/housing balance, conserving environmental resources, and providing services and facilities efficiently. The Comprehensive Plan expresses the City's intent to prepare a subarea plan for each growth center.

Economic Assessment Report

In 2010, the City had an *Economic Assessment* prepared to evaluate the opportunities and constraints associated with each growth center (Leland Consulting Group & LMN Architects, 2011a). For the Lake Stevens Center, the assessment identified the potential to improve and upgrade the center's appearance and circulation in the near-term, which would set the stage for added and revitalized retail, office, and residential development over the long term.

Economic Development Strategy

Along with the economic assessment, Leland Consulting Group & LMN Architects prepared an economic development strategy (*Retail Forecast and Leakage Analysis* 2011b). The Economic Development Strategy identified that significant retail "leakage" was occurring (i.e., consumers were travelling outside the City to spend retail dollars) and that the City has an opportunity to attract new retail development and capture this retail spending based on its demographics, location and quality of life. The City could become a retail destination and increase its tourism draw. The vision for a revitalized Lake Stevens Center was for an attractive mixed-use center that serves as a key "gateway" to the City and helps to accomplish the economic development strategy.

2.3 PROPOSAL OBJECTIVES

The objectives for the Lake Stevens Center Subarea Plan are based on policies in the Lake Stevens Comprehensive Plan and the opportunities identified in the *Economic Assessment Report* and *Retail Forecast and Leakage Analysis,* discussed above. The objectives provide a basis for developing and evaluating subarea plan alternatives.

1. Promote economic development and balanced jobs and housing.
2. Transform the area into a regional center with anchor retail, a greater array of restaurants, visitor lodging, family-oriented entertainment and public spaces.
3. Recognize and strengthen Lake Stevens Center as an important crossroad for commerce for communities along SR-9.

4. Redevelop existing commercial and retail land uses from auto-oriented, strip commercial retail to a village-like environment that meets the need of people who live in Lake Stevens and the surrounding area.
5. Encourage infill, greater intensity and redevelopment where older buildings have outlived their economic life and look for opportunities to upgrade older properties into places where people can live as well as conduct business.
6. Develop mixed-use nodes to anchor local shops, restaurants, and larger retail chains utilized by the local and regional community.
7. Incorporate mixed-use residential buildings with ground-floor retail or office that allow people to word within walking distance of their home.
8. Provide a variety of professional services and offices that cater to the needs of local residents.
9. Promote the creation of a traditional "main street" along 91st Avenue NE that features pedestrian-oriented land uses and street amenities (e.g., benches, trash and streetlights) and street trees.
10. Achieve a mixture of jobs, goods and services, housing and recreation that combines urban development with an abundance of natural features and open space
11. Retrofit major streets and intersections to improve circulation and provide distinctive landscaping and lighting to create a welcoming entry to the community.
12. Upgrade the transportation network to ensure that multiple modes of travel have effective circulation and access to destinations.
13. Enhance the appearance of streets, sidewalks, sites, and buildings through the development of effective development regulations, guidelines, and standards.
14. Protect important environmental resources.
15. Strengthen attributes that reflect Lake Stevens as a distinct, unified community.
16. Create an incentive for redevelopment through a SEPA Planned Action.

2.4 PLANNED ACTION DESIGNATION

A Planned Action is a tool that cities can use to provide regulatory certainty and encourage economic development. This tool is permitted by state law (RCW 43.21C.031 and WAC 197-11-164) and operates by performing up-front SEPA review for a subarea plan and/or specific geographic area as a way to streamline SEPA review for subsequent projects that are consistent with the plan. A Planned Action is designated by ordinance following preparation of an Environmental Impact Statement (EIS); the EIS evaluates the impacts of planned growth and identifies mitigation measures that the City will

require of the development. The Planned Action ordinance includes the following information:

- Designates the Planned Action area;
- Identifies the types of projects and total amount of development that will be considered Planned Actions for purposes of SEPA compliance (certain types of development, such as essential public facilities, are not eligible); Contains a finding that environmental impacts have been adequately addressed in the EIS;
- Identifies conditions or mitigation measures that will apply to projects; and
- Shows how the designated project meets the statutory definitions and criteria of a Planned Action.

When development is proposed in the planned action area, the City will evaluate the application to determine if it meets the criteria in the Planned Action Ordinance and "qualifies" as an implementing project. The criteria to determine consistency are:

- Is it the type of project anticipated in the subarea plan?
- Does it meet the conditions and mitigation requirements of the planned action?
- Have the significant environmental impacts been addressed in the EIS?

If a development proposal meets these criteria, then it qualifies as a planned action project and no SEPA threshold determination is required; therefore, the project cannot be challenged on SEPA grounds. Developers may still propose projects that do not qualify as planned actions; however, they would perform their own SEPA analysis.

A draft planned action ordinance is included in Appendix A.

2.5 ENVIRONMENTAL REVIEW PROCESS

SEPA/GMA Integration

State Rules for implementing the State Environmental Policy Act (SEPA), authorize cities to combine the requirements of the GMA and SEPA in their planning processes (WAC 197-11-210). The goal of this "integration" is to ensure that consideration of environmental issues is an integral part of local planning, that it occurs early in the process, and that informed public involvement occurs. The integration rules provide flexibility regarding the timing of SEPA review and the format of planning and SEPA documents.

The City is developing a subarea plan for the Lake Stevens Center concurrently with the Planned Action EIS. This approach will generate environmental information early in the planning process and allow decision makers to make planning decisions – including identification of a preferred alternative –using this information.

Prior Environmental Review

In 2006, the City prepared an integrated EIS for its 10-year Comprehensive Plan Update, which extended the planning horizon and population projections for the Comprehensive Plan. The EIS to the Comprehensive Plan identified the general (programmatic) impacts to the natural and built environment associated with the additional incremental growth. The EIS also identified a range of programmatic actions – including changes to policies and development regulations – that could mitigate potential impacts. The 2025 population and employment targets evaluated in the EIS are still the basis for City planning and for evaluating the *No Action Alternative* of this EIS.

Scope of Review for Subarea Plan

The City initiated the SEPA process for the Lake Stevens Center in June 2011, by issuing a determination of significance (DS), indicating that an environmental impact statement would be prepared and requesting comments on the scope of the EIS. A public scoping meeting was held on July 14, 2011. The scoping comment period was open from June 28 to July 21, 2011. Based on its review of comments received and other available information, the City identified the following topics for discussion in the EIS.

- **Natural Environment**

  Earth – soils, geologically hazardous areas

  Water – wetlands, streams and groundwater

  Plants & Animals – wildlife, habitat and fisheries
- **Air** – air quality and greenhouse gas emissions
- **Land & Shoreline Use** -- land use patterns, consistency with adopted plans & polices, population, housing and employment
- **Aesthetics/Light & Glare** – changes to visual character and impacts to views
- **Transportation** – vehicular and pedestrian movement, traffic congestion, parking, and public transit
- **Public Services** – police, fire, schools, parks and recreation
- **Utilities** – sewer, water, drainage and stormwater.

Other potential issues, such as historic resources, noise and soil contamination, were eliminated from detailed study in the EIS based on review of existing environmental information and conclusions that the subarea plan was not likely to have a significant impact on those elements of the environment.

2.6 PROPOSAL & ALTERNATIVES

Overview

The EIS considers three alternatives, all of which envision Lake Stevens Center redeveloping over time as a concentrated, high intensity retail center:

Alternative 1, the *No Action Alternative* required by SEPA, assumes continued growth under existing zoning and current plans;

Alternative 2, which emphasizes retail and employment growth and significant redevelopment in the subarea focused in existing or expanded centers along with some multifamily residential growth along the periphery of the subarea; and

Alternative 3*,* which assumes the same intensity of retail growth as *Alternative 2*, but includes less office space and a greater amount of multifamily residential growth.

With *Alternative 2* and *Alternative 3*, a subarea plan would be adopted and the subarea would be designated as a Planned Action (see Section 2.4 above). With *Alternative 1/No Action*, a subarea plan would not be adopted and a Planned Action would not be designated.

The City is using the integrated planning and environmental review process, described in Section 2.5, to help identify a preferred alternative for further consideration. The resulting preferred alternative may combine elements of several EIS alternatives within the identified ranges for land uses, jobs and population estimates considered in the EIS. Table 2-1 provides an overview of the type and amount of new growth for consideration under the EIS alternatives.

Table 2-1. Summary of Growth Assumptions for Alternatives

Alternative	Retail (Gross Sq. Ft)	Office (Gross Sq. Ft)	Housing Units (dwelling units)
Alternative 1 – No Action	50,000-60,000 gsf	30,000-40,000 gsf	100-120 du's
Alternative 2 – Center Revitalization	140,000-150,000 gsf	140,000-150,000 gsf	180-200 du's
Alternative 3 – Retail & Residential Emphasis	140,000-150,000 gsf	100,000-120,000 gsf	500-600 du's

The major elements of each alternative are described below. The graphics for *Alternative 2* and *Alternative 3* are generalized representations of the locations of various land uses. These illustrations are not zoning maps or regulatory in nature. Boundaries shown on the graphics are generalized and do not necessarily follow

property boundaries. Zoning maps will be developed later, following public discussion of subarea issues and legislative direction establishing a preferred alternative for the plan.

Alternative 1 – No Action

The *No Action Alternative*, a mandatory element of every EIS, assumes that the City will not adopt a subarea plan for Lake Stevens Center. It does not mean that growth or redevelopment will not occur in the subarea. Rather, existing zoning and land use designations will continue to apply; any changes to land use would result from project-specific applications, which could include requests for Comprehensive Plan or zoning amendments. Figure 2-2 shows current land uses that reflect existing zoning. The City would not adopt plans, policies or development regulations to emphasize revitalization of the subarea under this alternative. New retail, office and residential development would occur at the levels shown in Table 2-2. No significant redevelopment of Frontier Village and surrounding areas is assumed to occur, which limits the City's economic development. Housing would be primarily multifamily. Similarly, no significant infrastructure improvements would occur in the subarea, beyond those identified in the adopted Capital Facilities Plan.

Overall, the subarea would retain much of its current character in terms of the types, intensity and pattern of land use. Site-by-site development would occur without the guidance of an overall plan or vision.

Table 2-2. No Action – 2025 Growth Assumptions

Land Use	Net Housing Increase	Net Population Increase	Net Commercial Increase (Gross Sq.Ft)	Net Jobs Increase
Mix of retail, office & residential	100-120 du	290-350	Retail: 50,000-60,000 Office: 30,000-40,000	190-240

However, to address congestion, pedestrian mobility, access and safety issues, the City and/or WSDOT will implement near-term and long-term transportation improvements in the subarea under any alternative. WSDOT is currently evaluating several concepts to improve the SR-9/SR-204 intersection; the initial concepts include a widened at-grade separation, a fly-over ramp (for the eastbound to northbound movement), a standard interchange, and a grade-separated roundabout. A program of long-term improvements, which is conceptual at this time, could include construction of the following:

- Several new streets, or street extensions, with sidewalks to create a finer-grained street system and improve pedestrian circulation. This could include a two-lane north-south street, between approximately Market Place and Lundeen Park Way; 92nd Ave NE would be closed;
- Multiple roundabouts for better traffic control;

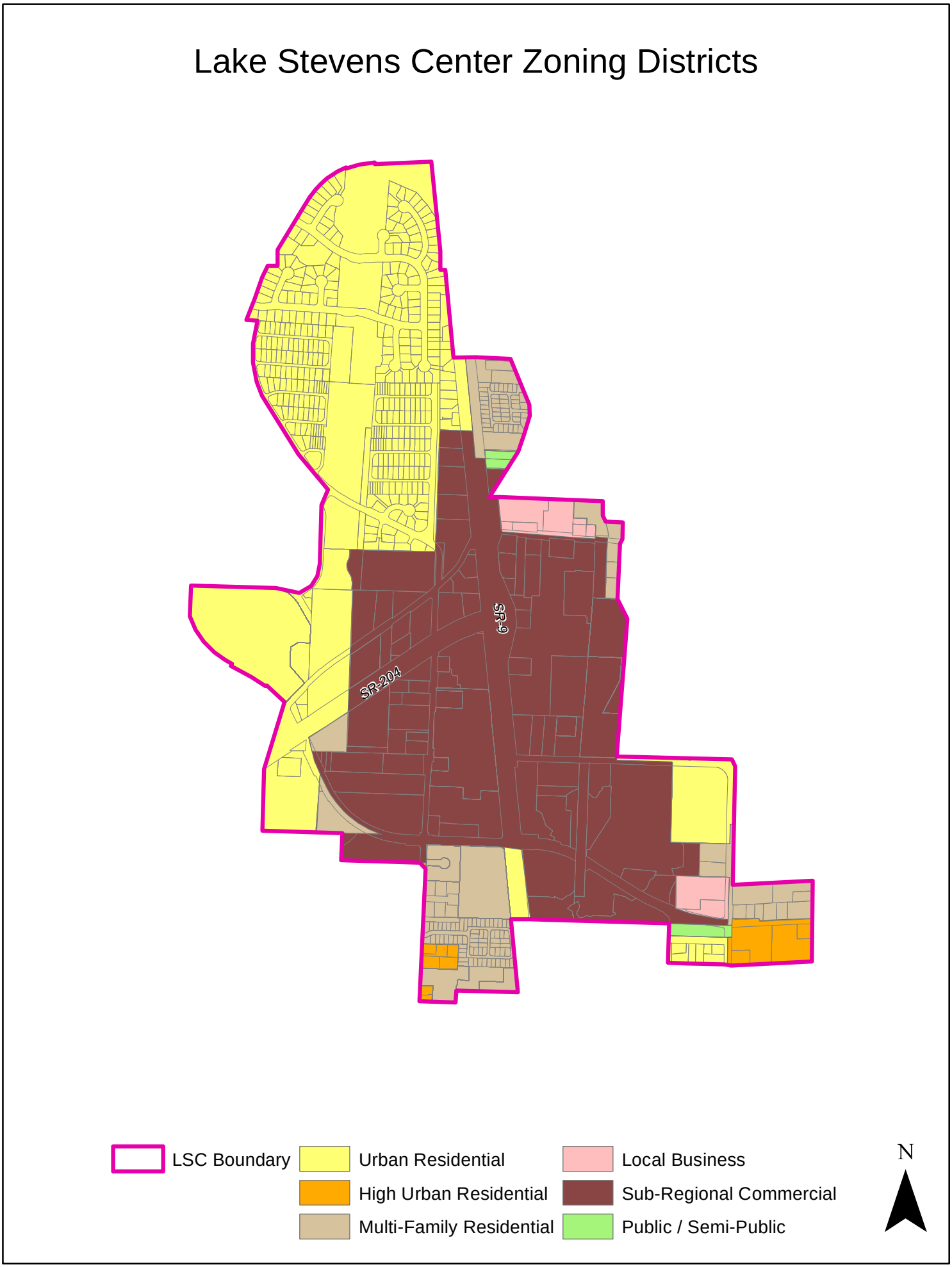
- A pedestrian/bicycle bridge over SR-9, at a location between SR-204 and Market Place;
- A full intersection with traffic signal and cross-walks at 4th Street SE and SR-9;
- Bicycle routes, with widened shoulders and signage, along 96th Ave SE;
- Traffic calming on some residential streets;
- A multi-use trail under the powerlines; and
- Possible relocation of the existing transit center.

Some near-term improvements include:

- Several new streets, or street extensions, with sidewalks to create a finer-grained street system and improve pedestrian circulation. This could include a two-lane north-south street, between approximately Market Place and Lundeen Park Way; 92nd Ave NE would be closed;
- Multiple roundabouts for better traffic control;
- A pedestrian/bicycle bridge over SR-9, at a location between SR-204 and Market Place;
- A full intersection with traffic signal and cross-walks at 4th Street SE and SR-9;
- Bicycle routes, with widened shoulders and signage, along 96th Ave SE;

Under the *No Action Alternative*, the City would not designate the Lake Stevens Center as a Planned Action; therefore, individual development projects would prepare their own SEPA documentation to identify project-specific impacts. The *No Action Alternative* would not accomplish the City's stated objectives for the subarea.

Figure 2-2 No Action Alternative (Existing Zoning)



Source: City of Lake Stevens

Alternative 2 – Center Revitalization

Alternative 2 would plan for redevelopment and revitalization of Lake Stevens Center, with an emphasis on retail and office growth. Future residential development would be primarily multifamily. Growth assumptions are shown in Table 2-3. Proposed land use is shown in Figure 2-3. Draft subarea policies and design guidelines are summarized in Section 2.8 below.

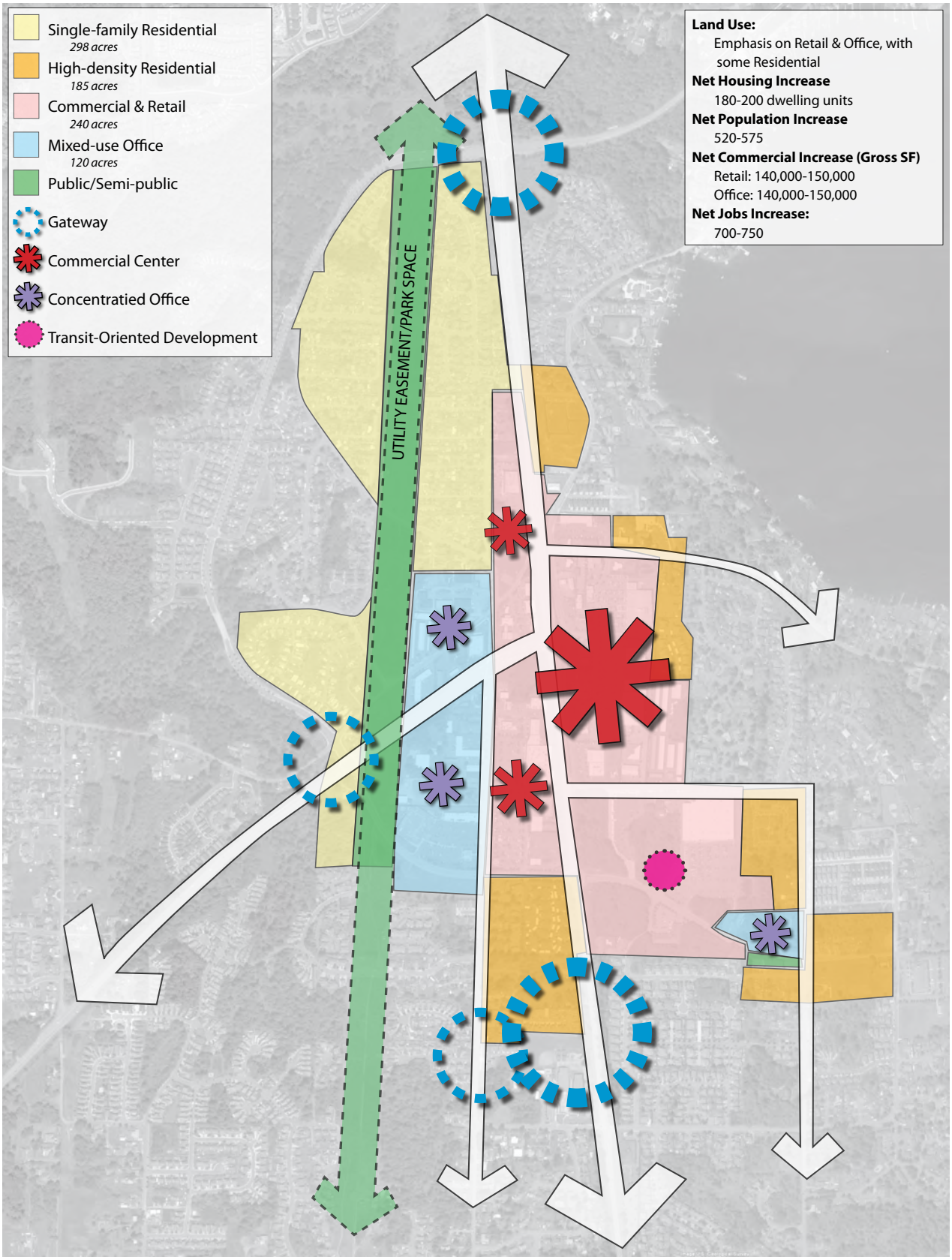
Table 2-3. Alternative 2 – 2025 Growth Assumptions

Land Use	Net Housing Increase	Net Population Increase	Net Commercial Increase (Gross Square Feet)	Net Jobs Increase
Emphasis on Retail and Office, with some Residential	180-200	520-575	Retail: 140,000-150,000 gsf Office: 140,000-150,000 gsf	700-750

The general land use pattern would consist of a commercial core, smaller commercial and mixed-use areas, and transit-oriented development. These would be abutted by high-density multifamily development, which would help create a transition to existing single-family neighborhoods adjacent to the subarea. Building height and scale would range from two to five stories, depending on location and the nature of the dominant use.

The most intensive commercial development (retail and services) would occur , on both the eastern and western sides of SR-9. A mix of office and commercial uses and potentially residential uses would be located in the area between 91st Ave NE and the transmission line easement. Buildings would range from two to five stories and could be a combination of single purpose retail and office, or residential uses above ground-floor retail. A portion of 91st Ave. NE, south of the SR-9/SR-204 intersection, could be developed as a commercial "main street" with a mix of retail, office and multifamily residential development along the street. Several areas for multifamily development would be designated adjacent to the commercial center; some limited re-designation of adjacent single-family areas to multifamily could occur. Residential buildings would be up to five stories. Density would be determined by floor area ratio (FAR), which is a ratio of total building area to lot area, and would not be expressed as a maximum number of units per acre.

Figure 2-3. Alternative 2 Illustration



LSC Alt. 2: Intensive Employment with Residential

September 2, 2011

A transit-oriented development (TOD) -- including a mix of retail, services and multifamily -- could be located south of Market Place, near the existing Transit Center. No changes in land use would occur for existing single-family residential areas in the northern and western portions of the subarea adjacent to the transmission line corridor.

"Gateways" would be established at the boundaries of the subarea, along SR-9, 91st Ave. NE and SR-204. These areas would help to establish a sense of entry and identity for the subarea, and would consist of distinctive landscaping, lighting and signage.

The City, special purpose districts, and developers would provide new and upgraded utility infrastructure (sewer, water, and drainage/stormwater) to support planned growth. The City would also encourage the development of park and open space facilities in conjunction with development projects, and a multiuse trail (approximately 8-10 acres) in the powerline corridor.

Alternative 2 includes the same potential program of near-term and long-term transportation improvements identified for the *No Action Alternative*.

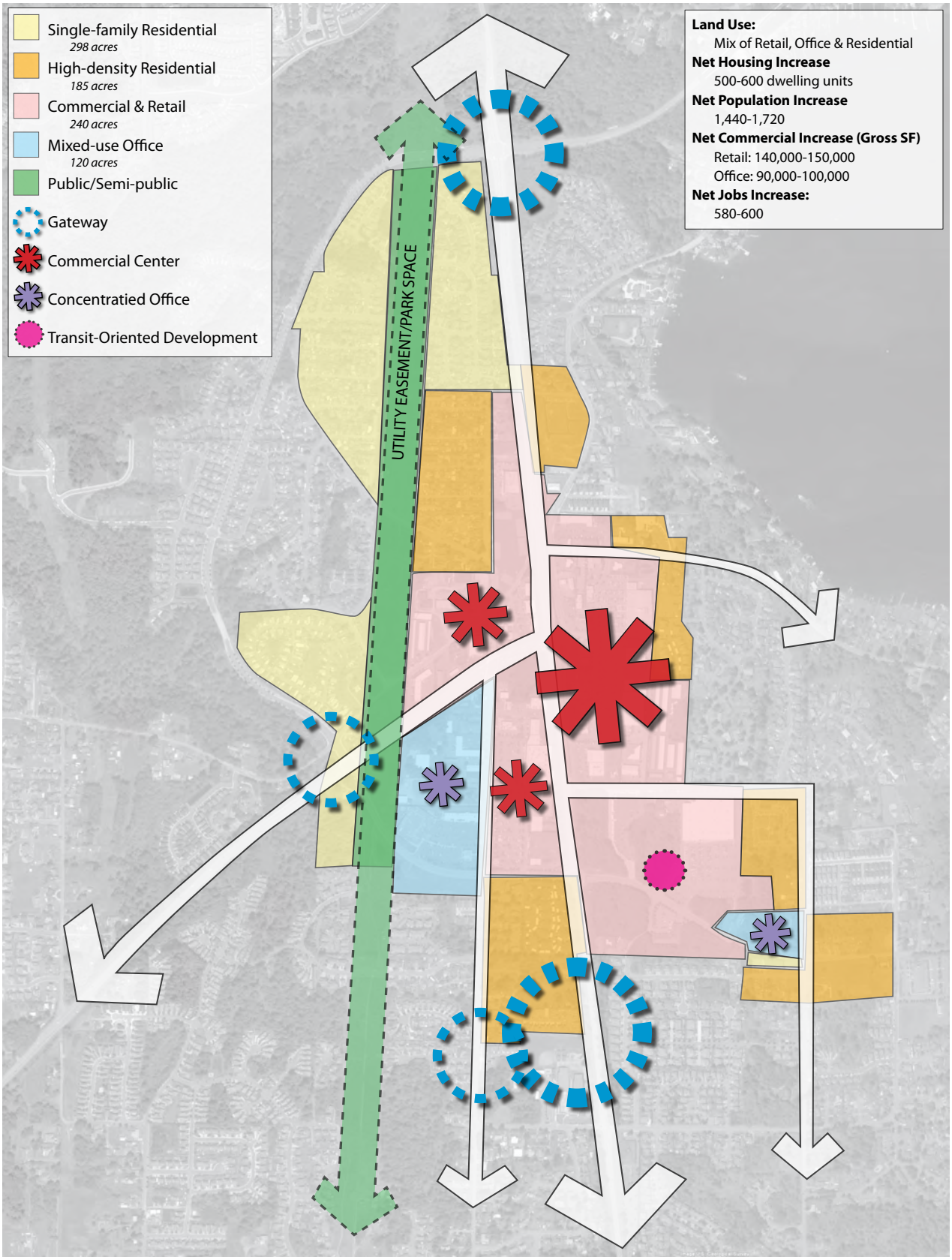
New and amended development regulations will address the mix, density, scale and form of planned development. This could include new zoning classifications and standards and design guidelines. To mitigate growth related impacts, a transportation impact fee program will be considered to help address subarea transportation needs, along with other techniques to help finance improvements.

The Lake Stevens Center subarea would be designated as a Planned Action, which would encourage economic development and streamline SEPA review for projects that are consistent with the subarea plan and the EIS.

Alternative 3 – Retail and Residential Emphasis

The overall land use pattern, shown in Figure 2-4, for *Alternative 3* is similar to that of *Alternative 2.* It includes a mix of retail and office development similar to *Alternative 2,* but with a greater emphasis on housing and a reduction in office development. Amounts of development are shown in Table 2-4. The major differences are a larger mixed-use area north of the SR-9/SR-204 intersection and the redesignation of an existing single-family area to multifamily. As with *Alternative 2*, new transit-oriented mixed-use development, including multifamily housing would be located near the existing Transit Center. "Gateways" would be established at the boundaries of the subarea, along SR-9, 91st Ave. NE and SR-204. These areas would help to establish a sense of entry and identity for the subarea and would consist of distinctive landscaping, lighting and signage.

Figure 2-4 Alternative 3 Illustration



LSC Alt. 3: Enhanced Employment/Increased Residential

September 2, 2011

Table 2-4. Alternative 3 – 2025 Growth Assumptions

Land Use	Net Housing Increase	Net Population Increase	Net Commercial Increase (Gross Sq.Ft)	Net Jobs Increase
Mix of Retail & Office, greater Residential Emphasis	500-600	1,440-1,720	Retail: 140,000-150,000 gsf Office: 100,000-120,000 gsf	580-660

Similar to *Alternative 2*, new and upgraded utility infrastructure (sewer, water drainage) would be provided to support planned growth. The City would also encourage the development of park and open space facilities in conjunction with development projects, and a multiuse trail (approximately 8-10 acres) in the powerline corridor.

Alternative 3 includes the same potential program of near-term and long-term transportation improvements identified for the *No Action Alternative*.

New and amended development regulations will address the mix, density, scale and form of development. This could include new zoning classifications and requirements along with area-specific design guidelines and standards. A transportation impact fee program would also be considered to help address subarea transportation needs, along with other techniques to help finance improvements.

The subarea would be designated as a Planned Action, which would encourage economic development and facilitate SEPA review for projects that are consistent with the subarea plan and the EIS.

2.7 BUILDING TYPOLOGIES

For purposes of illustration, and to assist in analysis for the EIS, several typical building types that could occur in the subarea are shown in Figures 2-5 through 2-8. Illustrative building types include multifamily residential, retail (including large format retail), office and mixed-use (including different combinations of office, retail and residential). The illustrations are intended to represent the potential types and scale of development that could occur under *Alternative 2* and *Alternative 3*, consistent with draft subarea plan policies; revised/new zoning regulations and new area-specific design guidelines and standards; and the development assumptions in the Draft EIS. The illustrations provide a basis for evaluating the representative type, intensity and character of development that could occur within the subarea. They do not represent specific development proposals by property owners or the City and are not intended to act as limitations on the form of development.

Development Typologies

1. Retail

Commercial uses in the Lake Stevens Center are intended for both smaller sites in or near residential neighborhoods and more auto-oriented commercial sites that include small and moderately sized chain stores. The amount of proposed retail corresponds to the location of residential areas and the street network. Future developments recognize and respect natural areas. Future development also recognizes pedestrian-oriented areas as realized by restricting parking to the side or the rear of the building.

a. Frontier Village

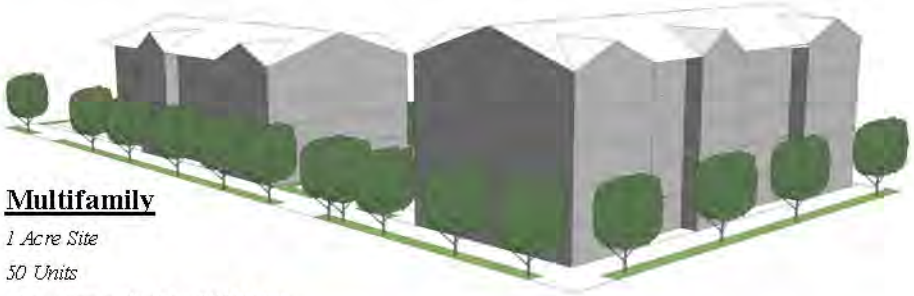
Big-Box Retail
2 Acre Site
28,000 SF
127 parking stalls @ 4.5/1000 SF

b. "Main Street" 91st Street

Retail
1 Acre Site
16,000 SF
60 parking stalls @ 3.5/1000 SF

2. Multi-Family Residential

Multi-family residential (condominiums and apartments, duplexes, townhouses, and row houses) land uses proposed in the Lake Village Center subarea are expected to be 4-5 stories with a common street frontage and structured or surface parking behind or to the side of the building. Based upon the size of the development, buildings are to include a common or shared open space that encourages neighbors to gather and children play. Neighborhoods that include a mix of housing types and a range of affordability promote diversity-allowing singles, families as well as seniors to stay and be part of the community. Buildings should be oriented toward the street to create a consistent and unified edge. The street facades shall be landscaped to soften the appearance of the building and provide a transition from the public to the private realm. Where feasible, the primary street facing façade shall be oriented to a public amenity such as a park, neighborhood retail or a community service or a civic use such as a local library or a post office.



Multifamily
1 Acre Site
50 Units
80 parking stalls @ 1.7/1000 SF

Source: LMN Architects

Figure 2-5 Building Typologies – Retail and Multi-family

3. Office

Employment opportunities within the City of Lake Stevens Center are supported by a combination low and medium intensity office uses. In response to the more built-up nature of Lake Stevens Center, structured parking is incorporated into most developments to conserve land.

Office

1.5 Acre Site

80,000 SF

160 parking stalls @ 2/1000 SF

4. Low-Rise Office:

Low-rise office or professional buildings are intended to serve the surrounding neighborhood. Anticipated uses include dentists and doctors, insurance agents, travel agents, attorneys, architects, etc. These small-scale professional businesses are intended to reflect the scale and character of the surrounding residential neighborhoods.

Low-Rise Office

1.5 Acre Site

20,000 SF

70 parking stalls @ 3.5/1000 SF

Source: LMN Architects

Figure 2-6 Building Typologies – Office

5. Mixed-Use Office:

The mixed-use typology is designed to accommodate and be applied to areas with an established commercial zone. The mixed use typology allows for a full range of retail, service, and business uses within a local and regional market area.
The desired character of this typology envisions buildings close to and oriented towards the sidewalk, especially at corners.

Mixed use developments typically take one of two forms: horizontal and vertical.

- Horizontal mixed use developments consist of different but compatible land uses such as multi-family housing and neighborhood retail on a single site or within close proximity to a commercial center. This development pattern is more suburban in nature with an emphasis on the automobile.
- Conversely, a vertical mixed use project, as proposed in portions of the Lake Stevens Center, typically consists of stacked complimentary and compatible land uses. Besides maximizing the limited amount of space in existing developed areas, this approach creates an urban form that is more built-up and pedestrian-friendly
- Street trees and street furnishings.

MU Office

1.5 Acre Site

20,000 SF Office

40 parking stalls @ 2/1000 SF

15,000 SF Retail

45 parking stall @ 3/1000 SF

6. Residential over Retail:

The goal of residential over retail is to generate intensity at the street level. As previously described, this is easily achieved by orienting the parking behind the building. Other pedestrian-oriented features include:

- Large ground floor retail or office uses (typically 12-14 feet).
- Spacious sidewalks that can accommodate two or more people.
- Locating primary entries to the street or to the corner as a means of further defining the intersection.

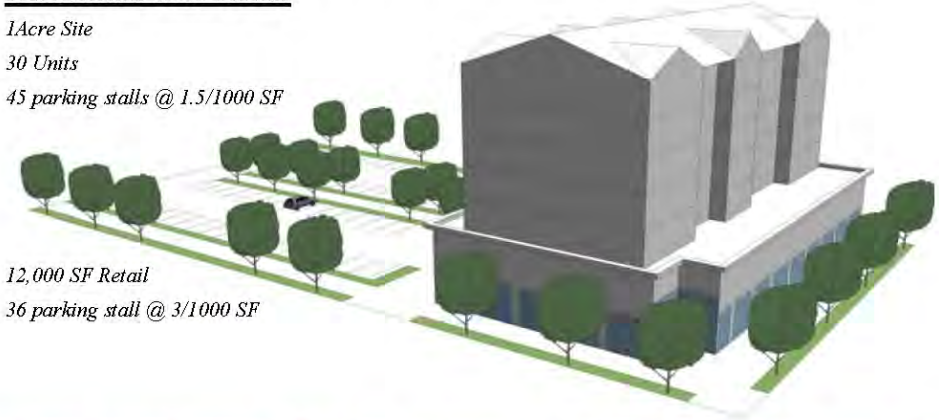
These development patterns are envisioned along the proposed "Main Street" District and in the Commercial Core District, with the latter replacing a portion of existing surface parking over time.

Residential over Retail

1Acre Site

30 Units

45 parking stalls @ 1.5/1000 SF



12,000 SF Retail

36 parking stall @ 3/1000 SF

Source: LMN Architects

Figure 2-7 Building Typologies – Mixed Use Office/Residential Over Retail

7. Office over Retail:

Office over Retail typically requires additional parking which in many cases triggers the need for some type of parking structure of deck. The intent of this building type is to promote intensity and development of employment related land uses, while protecting the pedestrian. Successful mixed use environments with structured parking exhibit the following characteristics:

- Entries are located along primary street frontages with secondary entries from the parking area.
- Parking is accessed from the rear of the site, where possible.
- Sub-grade or above grade structures are acceded from a side street or alleyway.

Office over Retail

1.5 Acre Site
64,000 SF Office
128 parking stalls @ 2/1000 SF
15,000 SF Retail
45 parking stall @ 3/1000 SF

Source: LMN Architects

Figure 2-8 Building Typologies – Office Over Retail

2.8 DRAFT SUBAREA PLAN GOALS

Under *Alternative 2* and *Alternative 3*, a subarea plan would be adopted to guide the type, amount, location and character of future growth. The subarea plan is being developed in coordination with the EIS and will change in response to environmental information, public comment and legislative direction established by the City Council with the assistance of the Planning Commission. As noted previously, the *No Action Alternative* does not include adoption of a subarea plan.

The subarea plan establishes a framework for implementing a shared vision for the Lake Stevens Center. It relies on and supplements general policies in the Lake Stevens Comprehensive Plan with clear policy statements and guidance regarding the type, amount, location, and character of future growth in the Lake Stevens Center Subarea. New development regulations and design guidelines and standards will be based on the guidance in the subarea plan.

The major objective of the subarea plan is to add significant retail and office space in the subarea over the long-term in multiple commercial /mixed-use nodes, creating a concentrated job and retail center. Secondary objectives include attracting a variety of different sized employers; establishing a program of road, circulation and transit improvements; and emphasizing high quality design standards. Major plan elements and goals are summarized below.

1. **Community Character –** *Goal 1 Dramatically upgrade the appearance, function, identity and economic value of the area.*
2. **Community Character, Livable Places & Housing** – *Goal 2 Transform the subarea into a safe, complete, and vibrant district with a wide range of retail, employment , and housing uses that are mutually supportive and integrated through appropriate design requirements and zoning regulations available to all residents.*
3. **Land Use & Intensity** – *Goal 3 Encourage a mix of uses, including retail, office, institutional, civic, and residential throughout the subarea that support the redevelopment of older properties into a more vibrant, intense and diverse center over a 10 to 20 year period with some areas developing earlier and others later depending upon access, market demand, environmental factors and other variables*.
4. **Circulation & Mobility** –*Goal 4 This subarea should have a complete and efficient transportation system that supports all modes of travel supported by an attainable Level of Service.*
5. **Sustainability& Natural Resources –** *Goal 5 Redevelopment and infill projects should apply best management practices and integrate site design into the natural systems and greenbelts and strive to retain natural elements such as existing vegetation and significant trees and take advantage of lake and mountain views.*

6. **Public Places and Community Facilities –** *Goal 6 Invest in and/or plan for public and semi-public opens spaces to attract high-quality residential and employment development throughout the subarea.*

In addition, the subarea plan includes development typologies as a supplemental resource to portray the main development types visually and descriptively, as they relate to specific locations envisioned in the plan. The main typologies include Retail, Multifamily Residential, Office, and Mixed-use.

2.9 BENEFITS & DISADVANTAGES OF DELAYING THE PROPOSED ACTION

Subarea planning is an element of the City's deliberate strategy to grow and diversify the local economy. Benefits of the proposed action, and the objectives of the subarea plan, include attracting additional retail and services, expanding housing opportunities, increasing employment opportunities, and concentrating growth in a mixed-use center. From an economic development perspective, the proposal seeks to attract a greater amount of regional employment to the City and decrease market leakage by increasing local retail opportunities; the subarea plan and planned action designation would help to create an attractive environment and incentives for development.

Delaying the proposed subarea plan would be equivalent to implementing the *No Action* alternative, and would result in these benefits being postponed or potentially lost. Growth in the City would also be relatively more dispersed and less concentrated in designated centers. At the same time, lower levels of growth would create lower demand for public services and capital facilities.

2.10 ISSUES TO BE RESOLVED

Major issues to be resolved by the City in selecting a preferred alternative include determining the appropriate types, intensity and overall magnitude of development that is appropriate in the subarea, and how this growth could change the existing character of the area. Some existing development, including housing, could be displaced. The change in zoning could, indirectly, lead to changes in property values, which could have positive effects on individual wealth, but which could also result in higher property taxes. In addition, increased growth will affect the cost, timing and ability to fund necessary public services and capital improvements.

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3. ENVIRONMENTAL ANALYSIS

3.1 NATURAL ENVIRONMENT

3.1.1 Affected Environment

This section includes a discussion of existing conditions within the City of Lake Stevens in general, and within the study area in particular, as they relate to the natural environment. Natural resources discussed here include the following: Earth Resources, including physical and geological features such as topography, soils and geological hazards; Water Resources, including groundwater, surface water, and wetlands; and Plants and Animals (including wildlife and fish). This section provides a general overview of these topics, but focuses on those resources protected by local, state, and federal regulations, particularly those identified in the City of Lake Stevens Municipal Code (LSMC) as critical areas (Chapter 14.88 LSMC).

Earth

Topography and Soils

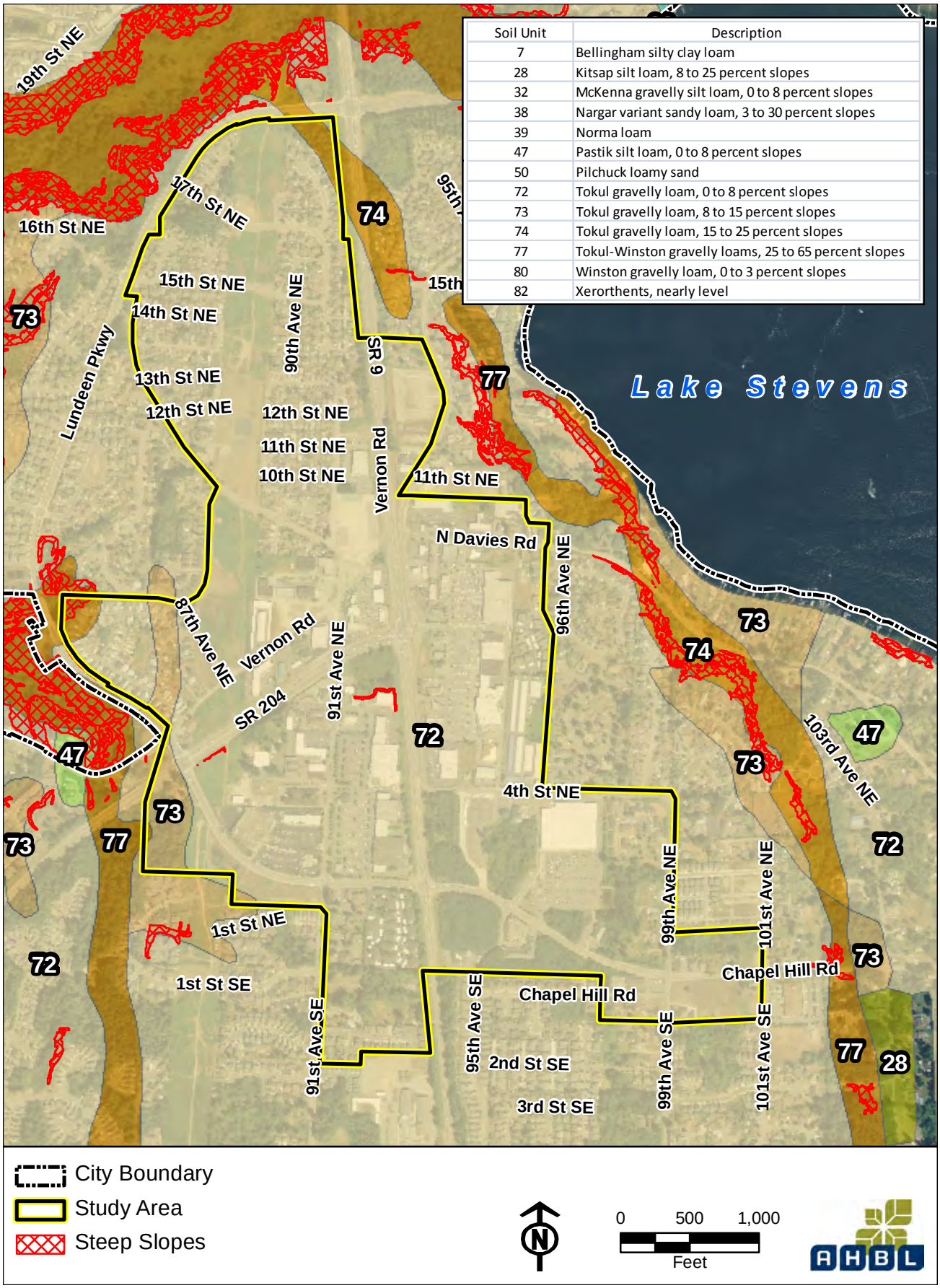
While the central portion of the City of Lake Stevens is characterized by a ring of hills surrounding the lake basin, the study area lies on a relatively level Pleistocene terrace at approximately 300 feet above sea level. Land east of the study area slopes down toward Lake Stevens and land to the west of the study area slopes down toward Ebey Slough. (City of Lake Stevens, 2010) Isolated slopes occur west of SR-9 adjacent to streams.

Soils in the study area consist of gravelly loams with gentle slopes and moderate depth and drainage. Approximately 96 percent of the study area is underlain by Tokul gravelly loam with 0-8 percent slopes. The City's comprehensive plan notes that these soil types often have limited permeability, which affects surface runoff and increases the likelihood of septic system failure. (USDA, 2010).

Geologically Hazardous Areas

Geologically hazardous areas, as defined by the Lake Stevens Municipal Code, include areas susceptible to erosion, landslides, earthquakes, liquefaction, or other geological events (LSMC 14.88.600(a)). Development proposals within 200 feet of any mapped geologically hazardous area are required to submit a geological assessment that analyzes the potential impacts associated with development in proximity to the hazard area and identifies mitigation measures to protect development on-site and on adjacent properties.

Figure 3.1-1 Soil Types and Geologic Hazard Areas



Soil Unit	Description
7	Bellingham silty clay loam
28	Kitsap silt loam, 8 to 25 percent slopes
32	McKenna gravelly silt loam, 0 to 8 percent slopes
38	Nargar variant sandy loam, 3 to 30 percent slopes
39	Norma loam
47	Pastik silt loam, 0 to 8 percent slopes
50	Pilchuck loamy sand
72	Tokul gravelly loam, 0 to 8 percent slopes
73	Tokul gravelly loam, 8 to 15 percent slopes
74	Tokul gravelly loam, 15 to 25 percent slopes
77	Tokul-Winston gravelly loams, 25 to 65 percent slopes
80	Winston gravelly loam, 0 to 3 percent slopes
82	Xerorthents, nearly level

Source: USDA Soil Survey Geographic Database for Snohomish County Area, WA (2010)

According to the City's GIS database, the study area contains approximately 0.63 acres of geologically hazardous areas in the form of steep slopes (City of Lake Stevens, 2007a). The distribution of geologically hazardous areas in the Lake Stevens Center subarea is shown in Figure 3.1-1.

The Lake Stevens Municipal Code regulates areas that are geologically hazardous due to risk of soil erosion. Erosion hazard areas are defined as areas designated by the USDA Soil Conservation Service, the US Geological Survey, or the Department of Ecology Coastal Zone Atlas as being erosion hazards. Soil survey data obtained from the US Department of Agriculture classifies Tokul gravelly loams at 15-25percent slopes as moderate erosion hazards. Some erosion is likely in these areas, and erosion control measures may be necessary. Tokul-Winston gravelly loams with slopes greater than 25percent are considered severe erosion hazard areas. As illustrated in Figure 3.1-1, these soil types, indicated by soil map units 74 and 77, respectively, cover approximately 3.6 acres, which is less than one percent of the acreage of the study area.

Water Resources

Groundwater

Snohomish County Public Utility District (PUD) #1 maintains two groundwater wells outside the study area, but no public water system currently uses the aquifer as its primary water source. However, the PUD plans to convert these wells to full-time use within the next few years to supplement the primary water supply.

According to the Lake Stevens Comprehensive Plan, the aquifer is located in the northeastern portion of the city, outside the study area (City of Lake Stevens, 2010). "Aquifer sensitivity" is an indication of the potential for spills or releases from surface activities to infiltrate to and contaminate groundwater. Snohomish County records indicate that the sensitivity of the aquifer to pollution from surface activities is low, because depth to groundwater in most of the study area is over 100 feet and because local soils have limited permeability (Snohomish County, 2007).

While no public water systems near Lake Stevens currently use groundwater as a primary source, the study area contains two private water wells that serve development that is not connected to a public water supply. While the City does not maintain records of the exact locations of private wells, the Washington State Department of Ecology maintains well log records for legally established resource protection and water supply wells, including approximate locations. According to Ecology records, one private well within the study area is located at the intersection of North Davies Road and SR-9, and another is located in the southwest corner of the study area, south of Market Place and between 91st Avenue NE and SR-204.

The City's Critical Area regulations (Chapter 14.88 LSMC) do not define or map aquifer recharge areas and do not categorize them as geologic hazard areas.

Surface Water

Portions of the city lie within three major drainage basins: the Lake Stevens drainage basin, the Sunnyside Creek drainage basin, and the Pilchuck River drainage basin (City of Lake Stevens, 2010). Ultimately, all surface waters in the city drain to the Puget Sound, either directly via Ebey Slough or via the Pilchuck and Snohomish Rivers. Based on sub-basin mapping performed by the Snohomish County Department of Public Works, the majority of the study area lies within the Sunnyside drainage basin, though the eastern edge of the study area lies within the Lake Stevens drainage basin (Snohomish County, N.d.).

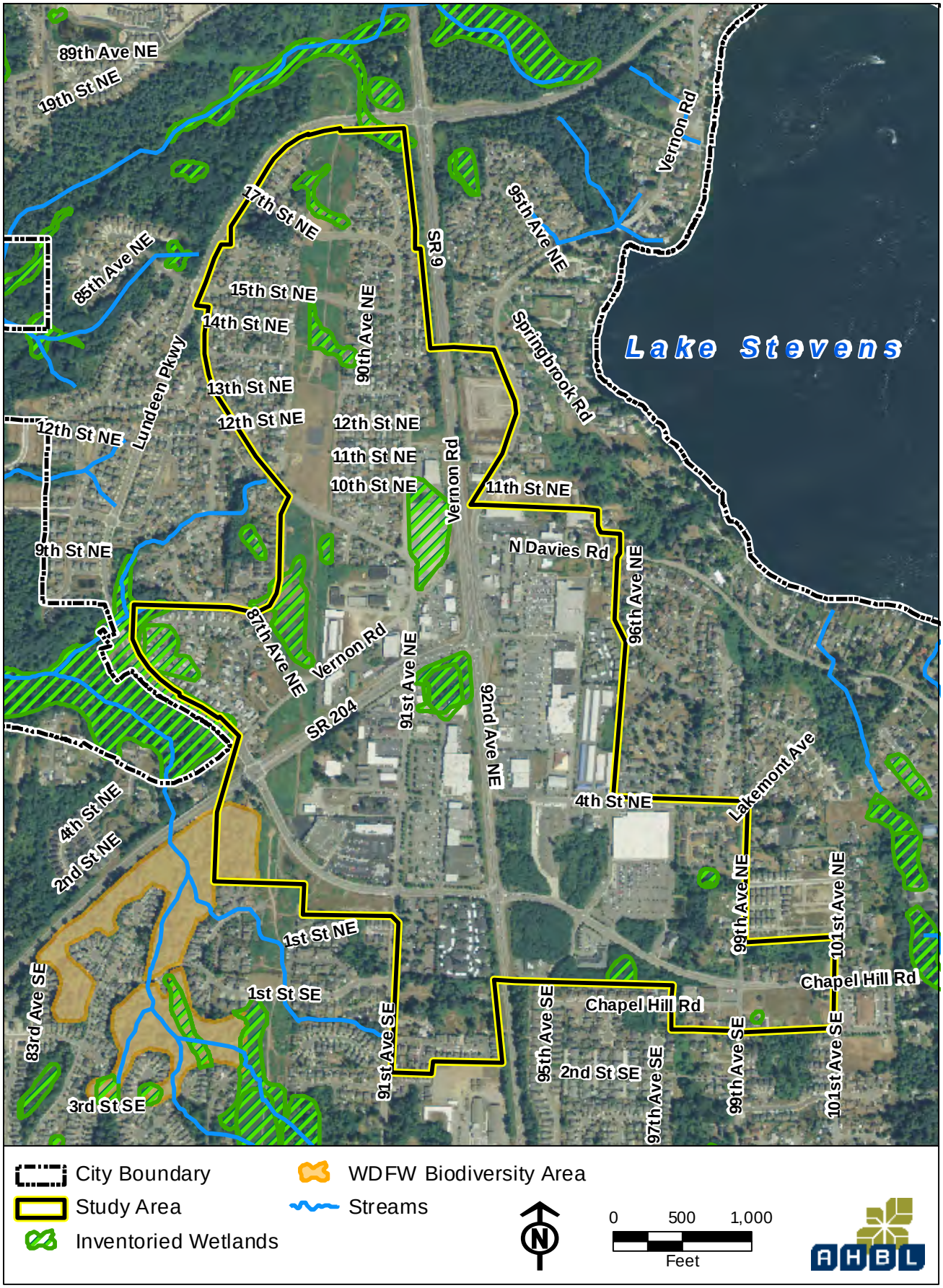
The study area contains only a small portion (128.9 linear feet) of a single, unnamed non-fish bearing stream, located at the far western edge of the study area (DNR, 2006).

Wetlands

Wetlands are widespread throughout the City of Lake Stevens, with several large complexes located along streams, including Catherine Creek, Lundeen Creek, and Stevens Creek, as well as a number of unnamed streams that drain into or provide drainage from Lake Stevens.

Wetland areas within the Lake Stevens Center subarea, shown on Figure 3.1-2, consist of palustrine systems (primarily palustrine forested and palustrine scrub-shrub), though emergent wetlands are also present. According to the Snohomish County Stream and Wetland Inventory, the study area contains approximately 28.4 acres of wetlands (City of Lake Stevens, 2007a). However, based on review of USDA aerial photography flown in 2009, this inventory does not accurately reflect current conditions; a number of wetlands have been mapped in areas that aerial photography shows to be either fully or partially developed (USDA, 2009). AHBL conducted field reconnaissance at two locations within the study area in June 2011, specifically the areas adjacent to the Target store at the intersection of SR-9 and 4th Street NE, and at the intersection of SR-9 and SR-204.

Figure 3.1-2 Wetlands & Streams



Sources: Snohomish County Stream and Wetland Inventory (2010); City of Lake Stevens; WDFW Biodiversity Area Data (2011)

The wetland complex adjacent to the Target store consists of five depressional Palustrine Forested wetland units, surrounded by narrow buffers, with a preliminary rating of Category II. Plant species present in the wetlands and their associated buffers include maple, red alder, elderberry, salmonberry, western red cedar, skunk cabbage, sedges, willows, rushes, and black cottonwood. Invasive blackberry was also observed, as well as some ornamental plants associated with landscaping for the nearby Target store. Native Growth Protection easements have been established and are indicated by the presence of on-site signage. Water quality treatment is provided for adjacent pollutant-generating impervious surfaces by catch basin filters located in the private storm drainage system within the Target parking lot. This drainage system discharges to the wetland complex, which provides stormwater storage. While the five wetlands are physically isolated from each other by streets, parking, and commercial development, a system of drainage culverts maintains hydrologic connections. The entire system ultimately drains off-site through a pipe buried under 4th Street NE.

Field observation indicated that, due to the strong connections between individual wetlands, hydrologic function in this complex is relatively high. Habitat function, on the other hand, is relatively low due to the proximity to urban development and the fractured nature of vegetation cover in the study area.

The wetland at the intersection of SR-9 and SR-204 is a Category II, Palustrine scrub-shrub and emergent wetland surrounded by roads and commercial development. On-site signage indicates the presence of Native Growth Protection easements in several portions of the property. Vegetation in this wetland consists primarily of willow, spiraea, reed canarygrass, cattails, red alder, and red osier dogwood, with some blackberry present at the edges.

Frequently Flooded Areas

Floodplain areas in the city are confined to the areas around Lake Stevens and along Catherine Creek. The study area does not contain any lands that lie within the FEMA 100-year floodplain (City of Lake Stevens, 2007a).

Plants & Animals

Vegetation

The Lake Stevens area supports a variety of deciduous and coniferous trees, such as Douglas fir, spruce, hemlock, cedar, alder, cottonwood, and maple. Native shrubs, grasses, herbs, and wetland plants also occur in the greater city and study area, though much of the remaining habitat is disjointed and fractured due to urbanization (City of Lake Stevens, 2010).

The Washington Natural Heritage Program (NHP), administered by the Washington State Department of Natural Resources (DNR), maintains an inventory of species and ecosystems that are rare or are not widely distributed outside a specific area and that

are targeted for conservation efforts. Review of the latest dataset indicates that no NHP plant species or ecosystems occur within the City of Lake Stevens or within the bounds of the subarea (DNR, 2010).

Wildlife

The Lake Stevens area supports a variety of wildlife species. While urbanization in the area has removed much native habitat for these creatures, common urban birds, such as sparrows, robins, crows, and starlings are likely to occur, as well as small mammals, such as raccoons, opossum, skunks, mice, rats, moles, voles, and shrews. Deer may also be present in less intensely developed portions of the city (Snohomish County Public Works, 2005).

Washington Department of Fish and Wildlife (WDFW) data identify several monitored species within the City of Lake Stevens, including bald eagles and great blue heron. Two bald eagle nests have been identified northwest of the lake, and a great blue heron colony is located near the City's southwestern shoreline of the lake. However, no threatened or endangered species habitat has been documented within either the City or the Lake Stevens Center subarea (WDFW, 2011).

The study area contains approximately 3.6 acres of a WDFW-defined Biodiversity Area. This corresponds to an area of dense vegetation south of the intersection of SR-204 and Lundeen Parkway. WDFW defines Biodiversity Areas based on two tiers of criteria. In rural areas, they represent areas that have been identified as biologically diverse through a landscape-scale assessment. Within urban areas, they denote areas that contain habitat that is valuable to fish or wildlife and that consist mostly of native vegetation. However, urban Biodiversity Areas may also have limited habitat functions because they are surrounded by development. The Biodiversity Area within the study area is part of a larger pattern of native vegetation preserved amongst residential development, and WDFW has classified it as part of the larger network of West Snohomish County Open Space Areas. Because no threatened or endangered species have been documented within the study area, this Biodiversity Area provides ecological value primarily in the form of preservation of native vegetation. (WDFW, 2011) No specific state regulatory restrictions apply to Biodiversity Areas. However, because WDFW has designated the area as potentially containing valuable habitat, it would qualify as a Fish and Wildlife Conservation Area under the City's Critical Areas regulations and would be subject to protection under Chapter 14.88 LSMC.

Fish

The Lake Stevens area supports a variety of fish species including trout (genus *Oncorhynchus*), Kokanee salmon (*Oncorhynchus nerka*), bass, catfish, and perch (City of Lake Stevens, 2010 WDFW has documented the presence of Coho salmon, a species of concern, in Lake Stevens and Stevens Creek, but no fish-bearing streams or any habitat

for threatened or endangered fish species are located within the study area (City of Lake Stevens, 2007b).

Applicable Regulations

Several existing federal, state and city regulations will protect vegetation, wildlife and habitat and reduce the potential for environmental impacts from development:

- **Endangered Species Act (ESA, 16 U.S.C. 1531-1544):** The ESA provides for the conservation of threatened or endangered plant and animal species and their habitat. Any action taken, authorized, or funded by a federal agency is subject to review by the U.S. Fish and Wildlife Service (USFWS) or the U.S. National Oceanic and Atmospheric Administration (NOAA). The ESA also prohibits "taking" of any listed species.
- **Clean Water Act (33 U.S.C. 1251):** Section 404 of the Clean Water Act prohibits the discharge of dredged or fill material to waters of the United States, which often include wetlands. Any development activity that proposes to fill a wetland that has been determined to be a water of the United States must obtain a permit from the U.S. Army Corps of Engineers.
- **Washington State Water Pollution Control Act (90.48 RCW):** Chapter 90.48 of the Revised Code of Washington (RCW) prohibits discharge of any material that causes pollution into waters of the state. The Act applies the Washington Department of Ecology standards for Clean Water Act Section 404 permits to projects without a federal nexus.
- **City of Lake Stevens Critical Areas Ordinance:** Chapter 14.88 of the Lake Stevens Municipal Code regulates development activities that occur in environmentally critical areas, including valuable vegetation, fish, and wildlife habitat; geologically hazardous areas; wetlands; streams; frequently flooded areas; and fish and wildlife conservation areas. Development within a designated critical area is subject to additional development standards designed to preserve and protect sensitive natural resources from human influence.

3.1.2 Impacts of the Alternatives

Overview

Similar impacts to natural resources could occur in connection with development under any of the alternatives. Relative differences in impacts would be the result of differing types and intensities of development in relation to the location of environmental resources, particularly wetlands. While the study area is primarily developed, impacts to earth resources have the potential to result from development of currently vacant land, incremental increases in impervious coverage, and soil erosion from excavation and clearing of vegetation in connection with redevelopment. Construction on steep slopes can also cause adverse impacts.

Under current zoning and the *No Action Alternative*, buildings could be larger in scale than under *Alternatives 2 and 3*, which will be subject to new development regulations and design guidelines and standards. Landscaping and open space requirements would be lower for *No Action,* and impervious coverage could be incrementally greater. Site planning under all alternatives would be subject to the City's adopted critical areas regulations.

Because the level of available information about wetland resources in the subarea is somewhat general, additional review would need to occur at the project level, consistent with the City's critical area regulations (Chapter 14.88 LSMC). The analysis in this section is focused on potential impacts that are common to all the alternatives, but also identifies situations or locations in which one or another alternative could result in a greater level of impacts.

Earth

Topography and Soils

As described in Section 3.1.1, the topography of the study area is relatively flat, with limited steep slopes. Even though the study area is not steeply sloped, clearing and grading of development sites has the potential to cause soil erosion. The limited permeability of Tokul gravelly loam may also increase surface runoff from cleared land, leading to increased soil erosion. Under all alternatives, site development will be subject to best management practices, local and state regulations, and site-specific mitigation measures to control erosion or other soil impacts common to development.

Geologically Hazardous Areas

The subarea contains less than one acre of land classified as a geologically hazardous, shown in Figure 3.1-1, located in an area that is currently and would continue to be designated for single-family residential use. Significant development is not anticipated for this area under the action alternatives. Pursuant to adopted regulations (Chapter 14.88 (Part VI) LSMC), the City would require a geologic assessment for any development proposed within 200 feet of a geologically hazardous area to protect the proposed development and neighboring properties. Given this regulatory requirement, and the limited area of geologic hazards present in the study area, no significant adverse impacts are anticipated pursuant to any of the subarea alternatives.

Water Resources

Groundwater

As described in Section 3.1.1, the depth to groundwater in most of the study area is greater than 100 feet, aquifer sensitivity is considered low, and no designated aquifer recharge zones or wellhead protection areas are located in the vicinity. No significant impacts to groundwater are anticipated to result under any of the alternatives.

Surface Water

Impacts on surface water resources would primarily result from increased stormwater run-off, caused by increased impervious surface in the study area, under all of the alternatives. As discussed under Section 3.1-1, the study area contains only a single stream, but all stormwater runoff from the study area that is not infiltrated on-site is eventually discharged to a surface water body. While the study area is already extensively developed, future growth under all alternatives is anticipated to involve redevelopment and an incremental increase in impervious surface, resulting in additional stormwater runoff. Stormwater runoff may carry pollutants and sediment to receiving surface water bodies, if not treated. *Alternative 2* and *Alternative 3* would implement new development regulations that require increased open space and landscaping compared to existing regulations and would have reduced parking requirements. The *No Action Alternative* would not incorporate these features and would rely on currently adopted stormwater regulations for protection.

Under all alternatives, stormwater discharges to surface waters would require implementation of mitigation measures and best management practices, including water storage and water quality measures, to minimize effects on surface water resources pursuant to chapters 11.06 and 14.64 (Part II) LSMC.

Wetlands

As shown on Figure 3.1-2, the study area contains approximately 28 acres of wetlands located primarily in the western portion of the subarea. Development pursuant to all alternatives could affect these wetlands or buffers. The City's adopted Critical Areas Regulations (LSMC 14.88) include restrictions on allowed uses within critical areas, and establish buffers to protect the wetlands; required buffer widths vary in size based on the quality of ecological function provided and the intensity of the land use proposed.

While adopted critical areas regulations will protect existing wetlands from development activities, increased development in the study area under all alternatives would incrementally increase the level of impervious surface. Increases in impervious surface would generate additional stormwater runoff, which could increase the amount of water and pollutant loads draining to wetlands and/or streams if not detained and treated. While wetlands provide pollution filtration and groundwater infiltration functions, large alterations to existing hydrology can have adverse effects on wetland plant and animal species. As described under Surface Water, *Alternative 2* and *Alternative 3* would implement new development regulations that require increased open space and landscaping over the existing development code and would have reduced parking requirements.

As described in Section 3.1.1, field reconnaissance conducted in June and August 2011 indicated that the study area contains Category II and Category III wetland complexes, which would be subject to protection under Section 404 of the Clean Water Act and

Lake Stevens critical area regulations. Federal, State and local regulations require avoidance of impacts to wetlands whenever possible, and filling of any such wetlands would require an individual permit from the Army Corps of Engineers, pursuant to Section 404 of the Clean Water Act. In addition to undergoing critical areas review by the City, any development project that would impact wetlands must also submit an application to the Army Corps of Engineers, including a mitigation plan. The Corps reviews applications and solicits comments from other related federal agencies, including the Environmental Protection Agency (EPA), the US Fish and Wildlife Service (USFWS), and the Washington State Department of Fish and Wildlife (WDFW), before issuing a permit to allow any work or placement of fill material in a wetland. The approved permit contains detailed conditions for development, including approved mitigation measures, which may include onsite or off-site replacement of the impacted wetlands, restoration and/or enhancement of nearby wetlands, or acquisition of wetland mitigation banking credits to offset unavoidable impacts.

All alternatives would implement best management practices and mitigation measures pursuant to local, state, and federal requirements to minimize wetland impacts.

Frequently Flooded Areas

The subarea does not contain any lands within the FEMA 100-year floodplain. No adverse impacts to frequently flooded areas would occur under any of the alternatives.

Plants & Animals

Vegetation

Further development of the subarea under all alternatives could result in impacts on vegetated areas through clearing of vegetation from development sites and further fragmentation of vegetated areas. However, the study area is already extensively developed and vegetative cover is limited. Most areas of extensive vegetation are located in wetlands, which are protected under the City's Critical Areas Regulations. In addition, the Washington Natural Heritage Program (NHP) database indicates that no rare or protected plant species are present in the study area.

Alternative 2 and *Alternative 3* would result in the conversion of some current development to mixed commercial/office and high-density residential development. As described above, the majority of the study area is already developed, and extensive clearing of mature vegetation is unlikely. However, development or redevelopment on sites with mature vegetation could result in localized clearing and grading, which has the potential to further reduce the area's habitat function for native wildlife. However, all development in the city, including future development in the study area, is subject to the provision of the City's tree retention and protection code (Chapter 14.76.120 LSMC). The tree code requires that all development retain existing significant trees to the greatest extent possible and replace any significant trees removed at a 3:1 ratio.

The Washington Forest Practices Act (RCW 76.09) governs forest practices occurring on non-federal land. A forest practice permit is required when more than 5,000 board-feet of merchantable timber is harvested from a property within any 12-month period (WAC 122-16-050(3)). This includes the removal of salable timber as part of pre-construction site clearing. Some vegetated properties within the study area may meet the requirements for a forest practices permit if they are cleared for development under any of the alternatives. Permit applications are reviewed by Washington State Department of Natural Resources to ensure adequate protection of forest soils, fisheries, wildlife, and water quality.

Capital improvement projects, such as the installation of utility infrastructure or development of City rights-of-way, can occur within critical areas per LSMC 14.88.220. Such projects, which would occur under *all alternatives*, could potentially disturb vegetated areas and would require the implementation of best management practices and mitigation measures to avoid or minimize impacts to vegetation areas.

Wildlife

As described in Section 3.1.1, much of the wildlife habitat in the City generally has been lost or fragmented due to ongoing urbanization. Given the extensive level of development in the subarea currently, wildlife habitat is concentrated in wetlands and other vegetated areas, as described above. Priority Habitat and Species (PHS) data from the Washington Department of Fish and Wildlife indicates that a small portion of the study area, located at the southwest edge of the study area, south of the intersection of SR-204 and Lundeen Parkway -- is part of a WDFW-defined Biodiversity Area. Biodiversity Areas represent areas where native vegetation still exists or where a diverse array of native wildlife may be present. Biodiversity Areas in urban locations may have limited habitat functions, due to surrounding development.

PHS data confirms that no threatened, endangered, or candidate species occur within the study area. With the application of mitigation measures for the preservation of vegetated areas and wetlands, no significant adverse impacts on wildlife are anticipated to occur.

Fish

No fish-bearing streams or lakes occur within the study area. No significant adverse impacts on fish are anticipated to occur under any of the alternatives.

3.1.3 Mitigation Measures

Earth

Applicable Regulations and Commitments

- ***Geological Assessments Required*:** The City's critical area regulations require a geological assessment for any development proposal within 200 feet of a

designated geologically hazardous area. Geological assessments must contain an analysis of the potential impacts to geologically hazardous areas resulting from the proposed development and identify appropriate mitigation measures to protect development and the geologically hazardous area LSMC 14.88.630).

- **Native Growth Protection Area:** LSMC 14.88.670 requires developers to place geologically hazardous areas not approved for alteration and their buffers in a native growth protection area; lawfully altered geologically hazardous areas are subject to a covenant of notification and indemnification/hold harmless agreement.
- ***Erosion Control Measures Required*:** LSMC 14.64.130 requires the implementation of sedimentation and erosion control measures for any development that would entail land disturbance. The Public Works Director must review and approve erosion control plans.

Additional Mitigation Measures

None required

Water Resources

Applicable Regulations and Commitments

- **Stormwater Management:** The City's municipal code requires the use of natural drainage systems to the extent feasible in order to preserve natural topography (LSMC 14.64.100). The Code also requires all new stormwater drainage systems to be constructed in accordance with the requirements of the Department of Ecology's *2005 Stormwater Management Manual for Western Washington* (LSMC 11.06.020 and LSMC 14.64.140). Rigorous permit review and continued implementation of the City's stormwater management codes will promote sound development and redevelopment policies; continued protection of water quality in the City's lakes, streams and wetlands habitats and groundwater recharge; property protection from increased runoff; and the promotion of low impact development (LID) strategies that reduce impervious surface and stormwater runoff.
- **NPDES Phase II Municipal Stormwater Permit:** The Western Washington Phase II Municipal Stormwater Permit was issued in 2007 to implement the requirements of the Clean Water Act and the National Pollutant Discharge Elimination System as codified in Sections 11.06.020 and 14.64.140 of the City's municipal code. Local jurisdictions covered under the permit, including the City of Lake Stevens, are required to develop a stormwater management program designed to reduce the discharge of pollutants and protect water quality. In accordance with the requirements of the permit, the City of Lake Stevens has adopted a stormwater management plan focused on public education and outreach, detection and elimination of illicit stormwater discharge, controlling

runoff generated by new development activities, and prevention of pollution resulting from municipal activities. Continued implementation of the measures contained in the stormwater management program would reduce pollutant loading and improve water quality in the City's lakes, streams and wetlands.

- **Critical Areas Regulations:** As described in the impact analysis, the City and study area contain varied riparian critical areas, including wetlands and streams. Under all alternatives, future development will be subject to the adopted critical areas regulations found in Chapter 14.88 LSMC, including all applicable mitigation requirements and mitigation sequencing procedures. In particular, wetland mitigation is required to take the form of in-kind replacement of the impacted wetland functions and values whenever possible, and replacement wetlands must adhere to the design requirements of LSMC 14.88.840, including performance standards and mitigation ratios.

Additional Mitigation Measures

- **Stormwater Detention:** For properties adjacent to identified wetlands and associated buffers, new development and redevelopment shall not result in an increased rate of runoff from the site to the wetland. To prevent alteration of established hydrologic wetland processes, the municipal code requires stormwater to be either detained or infiltrated onsite.
- **Low Impact Development (LID):** The City should consider developing incentives in the subarea plan and new development regulations to encourage the use of LID techniques to reduce stormwater impacts.
- **Critical Areas:** More detailed analysis -- including full delineation, classification and function assessment -- will be required in conjunction with development permitting for future projects that occur on sites containing critical areas.
- **Wetland Mitigation Banking:** LSMC 14.88.840 allows the use of credits from an approved wetland mitigation bank to compensate for unavoidable impacts to wetlands. The City should investigate the potential for either establishing a mitigation bank for the study area to address potential wetland impacts that may occur under any of the alternatives, or coordinate with an established mitigation bank within the watershed, such as the Narbeck Wetland Sanctuary at Paine Field, to obtain a pool of credits for future development. Per LSMC 14.88.840(a)(5), projects using mitigation bank credits must be consistent with the replacement ratios specified in the mitigation bank's certification. If mitigation credits are not available and establishment of a separate mitigation bank is not feasible, the City could encourage preservation and enhancement of these areas in exchange for increased development potential in other portions of the site or subarea.

Plants & Animals

Applicable Regulations and Commitments

- **Tree Retention:** The City's land use code requires every development to retain significant trees and stands of trees that occur on the development site unless such retention would create an unreasonable burden on the developer or create a safety hazard.

  The code requires that significant trees removed as part of a development project be replaced. This code also requires retained and replanted trees be protected during construction.

- **Critical Areas Regulations:** As described in the impact analysis, future development in the study area, under all alternatives, has the potential to adversely affect plants and animals through clearing of vegetated areas. However, the City's critical areas regulations protect wetlands, riparian areas, and other critical areas that provide habitat for plants and animals, by limiting the activities allowed within the critical area and establishing appropriate protective buffers and mitigation strategies for unavoidable impacts.

3.1.4 Significant Unavoidable Adverse Impacts

All alternatives would lead to additional development within the subarea, increasing the level of impervious surface coverage and reducing vegetated area incrementally. Development within the study area would also generate increased stormwater runoff that must be detained or treated before discharge to surface water. With application of the City's adopted regulations regarding environmentally critical areas, stormwater, and tree retention, as well as proposed mitigation measures, no significant unavoidable adverse impacts to the natural environment are anticipated.

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3.2 AIR

3.2.1 Air Quality

Three agencies have jurisdiction over the ambient air quality in Lake Stevens: the U.S. Environmental Protection Agency (EPA), the Washington State Department of Ecology (Ecology), and the Puget Sound Clean Air Agency (PSCAA). These agencies establish regulations that govern concentrations of pollutants in the outdoor air and rates of contaminant emissions from some air pollution sources. The air quality analysis is focused on the implications of project-related traffic based on estimated concentrations of carbon monoxide, and was conducted in accord with EPA guidelines and in a manner consistent with state and federal air quality rules.

Affected Environment

Typical air pollution sources in the project area include vehicular traffic, retail and commercial uses, and residential wood-burning devices. While many types of air pollutant sources are present, the largest pollutant emission sources are vehicles and residential wood burning. For analyses that consider proposed transportation source, the air pollutant used as the primary indicator of potential impacts is carbon monoxide (CO) because this is the vehicular pollutant emitted in the largest quantities for which there are health-based ambient air quality standards. Vehicle exhaust and tire action on paved and unpaved surfaces also generate fine particles (also called PM10 and PM2.5 based on their size), but emission rates are small compared with fine particle emitting combustion sources like wood-burning stoves. Motor vehicles also emit sulfur oxides and nitrogen dioxide, but ambient concentrations of these pollutants are not usually high except near large industrial facilities.

Existing Air Quality

To measure air pollutant concentrations and classify air quality conditions, Ecology and PSCAA maintain a network of monitoring stations throughout the Puget Sound region. Based on monitoring information collected over a period of years, the state (Ecology) and federal (EPA) agencies classify regions as "attainment" (i.e., complying with) or "nonattainment" areas for specific air pollutants. Attainment status is therefore a measure of whether air quality in an area complies with the National Ambient Air Quality Standards (NAAQS) which are intended to protect human health and welfare. Applicable air quality standards for selected air pollutants are shown in Table 3.2-1. Regions that were once designated nonattainment but that have since attained compliance with a standard are considered "maintenance" areas. The project area is within CO and ozone maintenance areas.

Another area of concern related to air pollution is the potential for such emissions to affect climate. Global climate change and greenhouse gas emissions (including carbon dioxide, CO_2) from transportation are currently unregulated federally, but some state

and local jurisdictions have developed recommended approaches for project-level disclosure of greenhouse gas emissions which are discussed further in this section.

Ozone

Ozone is a highly reactive form of oxygen not emitted directly by emission sources but created by sunlight-activated chemical transformations of nitrogen oxides and volatile organic compounds (hydrocarbons) in the atmosphere. Ozone problems tend to be regional in nature because the atmospheric chemical reactions that produce ozone occur over a period of time, and because during the delay between emission and ozone formation, ozone precursors can be transported far from their sources. Transportation is a major source of ozone precursors.

Table 3.2-1. Applicable Ambient Air Quality Standards for Criteria Pollutant

Pollutant	Terms of Compliance [(a)]	Concentration
Total Suspended Particulate (TSP) Annual Average (μg/m^3) 24-Hour Average (μg/m^3) WA State only; no federal standard	Geometric mean not to exceed Not to be exceeded more than once per year	60 μg/m^3 150 μg/m^3
Inhalable Particulate Matter (PM10) 24-Hour Average (μg/m^3)	The 3 year average of the 99th percentile of the daily concentrations must not exceed	150 μg/m^3
Fine Particulate Matter (PM2.5) Annual Average (μg/m^3) 24-Hour Average (μg/m^3)	The 3-year annual average of daily concentrations must not exceed The 3-year average of the 98th percentile of daily concentrations must not exceed	15 μg/m^3 35 μg/m^3
Carbon Monoxide (CO) 8-Hour Average (ppm) 1-Hour Average (ppm)	The 8-hour average must not exceed more than once per year The 1-hour average must not exceed more than once per year	9 ppm 35 ppm
Ozone (O_3) 8-Hour Average (ppm)	The 3-year average of the 4th highest daily maximum 8-hour average must not exceed	0.075 ppm

Source: ENVIRON International Corporation

Note: μg/m^3 = micrograms per cubic meter; ppm = parts per million

[(a)] All limits are federal *and* state air quality standards except as noted. All indicated limits represent "primary" air quality standards intended to protect human health.

In the past, due to violations of the federal ozone standard, the Puget Sound region was designated nonattainment for ozone based on the 1-hour standard in effect at that time. In 1997, the EPA determined that the Puget Sound region had attained the public health-based NAAQS for ozone and redesignated the region as attainment for ozone. In 2005 EPA revoked the 1-hour ozone standard in most areas of the US including the Puget Sound region. This action ended the maintenance status of this region including the project study area. EPA has since adopted a more stringent 8-hour ozone standard, and although currently considered attainment, the Puget Sound region may once again be designated as nonattainment for ozone in the future. Note that because ozone is not emitted directly, only very sophisticated air quality models are capable of considering ozone formation in the atmosphere, and such models are typically used for regional assessments of air quality plans, not for project-specific reviews. So under current air quality plans and policies, the potential future nonattainment status for ozone probably has no direct implications for the proposed project.

Inhalable Particulate Matter – PM10 and PM2.5

Particulate matter air pollution is generated by many sources, including fuel combustion sources like residential wood burning, motor vehicle engines and tires, and other sources. Federal, state, and local regulations set limits for particles concentrations in the air based on the size of the particles and the related potential threat to health. When first regulated, particle pollution rules were based on concentrations of "total suspended particulate," which included all size fractions. As air sampling technology has improved and the importance of particle size and chemical composition have become more clear, ambient standards have been revised to focus on the size fractions thought to be most dangerous to people. Based on the most recent studies, EPA has redefined the size fractions and set new, more stringent standards for particulate matter based on "coarse" and "fine" inhalable particulate matter to focus control efforts on the smaller size fractions.

There are currently health-based ambient air quality standards for PM10, or particles less than or equal to about 10 micrometers (microns) in diameter, as well as for PM2.5, or particulate matter less than or equal to 2.5 microns in diameter. The latter size fraction and even smaller (ultra-fine) particles are now considered the most dangerous size fractions of airborne particulate matter because such small particles (e.g., a typical human hair is about 100 microns in diameter) can be breathed most deeply into lungs. In addition, such particles are often associated with toxic substances that are deleterious in their own right that can adsorb to the particles and be carried into the respiratory system.

With the revocation of the federal annual standard for PM10 in October 2006, the focus of ambient air monitoring and control efforts related to particle air pollution in the Puget Sound region has been almost entirely on fine particulate matter (PM2.5). There are several PM2.5 monitoring stations in the Puget Sound area, located at known or

suspected PM "hot-spots." The closest PM monitors to the project area are located in Marysville (PM2.5). Based on reported data from that location, measured PM2.5 values are about two-thirds of the current 24-hour and about one-half of the annual NAAQS.

Based on particulate matter measurements over the last few years EPA in 2009 established a PM2.5 nonattainment area in Tacoma. There are no other PM nonattainment areas in Washington.

Carbon Monoxide

Carbon monoxide is the product of incomplete combustion. It is generated by transportation sources and other fuel-burning activities like residential space heating, especially heating with solid fuels like coal or wood. Carbon monoxide is usually the pollutant of greatest concern related to roadway transportation sources because it is the pollutant emitted in the greatest quantity for which there are short-term health standards. CO is a pollutant whose impact is usually localized, and CO concentrations typically diminish within a short distance of roads. The highest ambient concentrations of CO usually occur near congested roadways and intersections during wintertime periods of air stagnation.

The project area is located within the former Puget Sound region CO nonattainment area (established in 1991) that encompassed a large portion of the Everett-Seattle-Tacoma urban area. Because no monitoring stations had recorded violations of the CO standards in many years, in 1997 EPA redesignated the Central Puget Sound region as attainment for CO. The former nonattainment area remains an air quality maintenance area for CO, but there have been no measured violations of the standards in many years, and the former CO problem is thought to have been resolved.

In the case of projects and plans affecting the transportation system and/or traffic sources, CO is used as an indicator of potential air quality problems because of the various vehicular emissions, CO is the pollutant emitted in the largest quantity for which there are ambient air standards. Therefore, CO was the primary focus of the air quality analysis for this project. The analysis considered future roadway conditions and screening modeling to assess the potential for air quality impacts related to the proposed project.

Impacts of the Alternatives

Methodology

In accord with EPA guidance, the air quality analysis considered the potential for traffic-related impacts based on conditions at signalized intersections most likely to be adversely affected by the project alternatives. EPA guidance focuses on potentially performing air quality modeling analyses for the most congested signalized intersections based on the overall intersection delay or "level of service" (LOS) during peak-hour conditions. Intersection LOS ranges from "A" (good operation with little or no delay) to "F" (poor operation due to extensive delay). The criteria for selecting intersections for potential inclusion in air quality "hot-spot" modeling are based on considering intersections operating at LOS "D," "E," or "F," or any expected to change to LOS "D," "E," or "F" as a result of a proposed project. Intersections operating at LOS "C" or better are therefore unlikely to cause a potential violation of the CO standard, and generally do not require further analysis (EPA 1992).

Typically, projects and plans that affect either the physical structure or the operation of the regional transportation system in an air quality nonattainment or maintenance area are subject to a transportation air quality conformity review. Conformity rules are intended to prevent regionally significant transportation projects from either causing or contributing to localized air quality problems. Although traffic volume increases related to planned growth and development are expected with the subarea plan alternatives, the plan is not subject to an air quality conformity review. Instead, future transportation infrastructure projects that include configuration or capacity revisions would be required to consider transportation conformity under separate review(s). The air quality analysis reported here included a SEPA-level "hot-spot" analysis that assessed potential impacts from transportation sources.

Consistent with EPA guidance, project-affected signalized intersections were screened for possible "hot-spot" modeling based on review of intersection LOS and traffic volumes in future years. The three worst-performing intersections during the PM-peak period were selected for review using air quality modeling: SR-9 intersections with Lundeen Parkway, SR-204, and Market Place. Each of these signalized intersections is projected to perform at LOS F in the plan's horizon year 2025.

To assess the potential for traffic-related air quality impacts, the worst-case operating scenario at the most project-affected intersections was evaluated using the Washington State Department of Transportation screening tool, WASIST. This tool applies worst-case operations and dispersion assumptions to estimate CO concentrations at nearby locations. If under these conditions no problematic concentrations are predicted, no CO impacts are likely (WSDOT 2009).

Construction Impacts – All Alternatives
Future construction in Lake Stevens Center would occur with or without the subarea plan and could temporarily change localized air quality. Construction activities would be similar (although of varying magnitude) under all alternatives, so similar short-term changes could occur regardless of the alternative. For example, dust from construction activities would contribute to ambient concentrations of suspended particulate matter. Construction contractor(s) would have to comply with the PSCAA regulations requiring all reasonable precautions be taken to minimize fugitive dust emissions.

Construction would require the use of heavy trucks and smaller equipment such as generators and compressors. These engines would emit air pollutants that would slightly degrade local air quality. Nonetheless, emissions from construction equipment, and especially from diesel-fueled engines, are coming under increasing scrutiny because of their suspected risk to human health. Although there is little or no danger of these emissions resulting in pollutant concentrations that would exceed a health-based ambient air quality standard, pollution control agencies are now urging that emissions from diesel-powered equipment be minimized to the extent practicable in order to reduce potential health risks.

Some phases of construction would cause odors detectable to some people in the area. This would be particularly true during paving operations using asphalt. The construction contractor(s) would have to comply with the PSCAA regulations during activities that emit odor bearing air contaminants. Such odors from paving operations would be short term.

Construction equipment and material hauling can affect traffic flow in a project area. Given that there is heavy traffic during some periods of the day, scheduling haul traffic during off peak times (e.g., between 9 a.m. and 4 p.m.) would have the least effect on other traffic and would minimize indirect increases in traffic related emissions.

With implementation of required measures to provide reasonable controls of dust and odors, construction activities related to development under any alternative is not expected to result in significant air quality impacts.

Impacts during Operation
Based on projected traffic with *any alternative*, under existing (2011) or future conditions (2025), and assuming a background CO concentration of 3 ppm, WASIST model-calculated CO concentrations are less than the ambient air quality standards for CO. Compared to existing conditions, model-calculated CO concentrations increase by about 2 ppm with growth and development under the *No Action Alternative*. Concentrations are the same under *Alternative 2* or *Alternative 3*, and are similar or increase slightly compared to the *No Action Alternative*. This suggests that subarea plan-related changes under *any alternative* would not affect air quality near the most

congested intersections or within the vicinity of the subarea. Table 3.2-2 summarizes the WASIST modeling results. Based on this review, no significant impacts to ambient air quality are likely due to the subarea plan alternatives.

Table 3.2-2. Estimated CO Concentrations at the Most Project-Affected Intersections

Intersection with SR-9	Period	Existing 2011	2025 Alternatives		
			1 No Action	2 Commercial Emphasis	3 Residential Emphasis
Lundeen Pkwy.	1-Hr	5.9	8.7	8.7	8.7
	8-Hr	5.0	7.0	7.0	7.0
SR-204	1-Hr	5.5	7.8	8.0	8.0
	8-Hr	4.8	6.4	6.5	6.5
Market Pl.	1-Hr	4.8	6.8	7.0	7.0
	8-Hr	4.3	5.7	5.8	5.8

Source: ENVIRON International Corporation

Note: The 1-hour and 8-hour ambient air quality standards are 35 ppm and 9 ppm respectively. Model-calculated 1-hour concentrations were converted to represent 8-hour average concentrations using a 0.7 persistence factor that reflects likely changes in emission and atmospheric conditions over an 8-hour period.

Mitigation Measures

Mitigation During Construction

Although significant air quality impacts are not anticipated due to construction associated with any of the alternatives , construction contractors would be required to comply with all relevant federal, state, and local air quality rules. In addition, implementation of best management practices would also reduce emissions related to the construction phase of the project. Possible management practices for reducing the potential for air quality impacts during construction include measures for reducing both exhaust emissions and fugitive dust. The Washington Associated General Contractors brochure Guide to Handling Fugitive Dust from Construction Projects and the PSCAA suggest a number of methods for controlling dust and reducing the potential exposure of people to emissions from diesel equipment. A list of some possible control measures that could be implemented to reduce potential air quality impacts from construction activities follows:

- Use only equipment and trucks that are maintained in optimal operational condition
- Require all off-road equipment to have emission reduction equipment (e.g., require participation in Puget Sound Region Diesel Solutions, a program

designed to reduce air pollution from diesel, by project sponsors and contractors)

- Use bio diesel or other lower-emission fuels for vehicles and equipment
- Use car-pooling or other trip-reduction strategies for construction workers
- Implement restrictions on construction truck and other vehicle idling (e.g., limit idling to a maximum of 5 minutes)
- Spray exposed soil with water or other suppressant to reduce emissions of PM and deposition of particulate matter
- Pave or use gravel on staging areas and roads that would be exposed for long periods
- Cover all trucks transporting materials, wetting materials in trucks, or providing adequate freeboard (space from the top of the material to the top of the truck bed), to reduce PM emissions and deposition during transport
- Provide wheel washers to remove particulate matter that would otherwise be carried off site by vehicles to decrease deposition of particulate matter on area roadways
- Remove particulate matter deposited on paved, public roads, sidewalks, and bicycle and pedestrian paths to reduce mud and dust; sweep and wash streets continuously to reduce emissions
- Cover dirt, gravel, and debris piles as needed to reduce dust and wind-blown debris
- Stage construction to minimize overall transportation system congestion and delays to reduce regional emissions of pollutants during construction

Mitigation During Operation

The air quality analysis indicates that the alternatives would not result in any significant adverse air quality impacts in the study area. Consequently, no operational impact mitigation measures are warranted or proposed.

Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts would occur.

3.2.2 Greenhouse Gas Emissions & Climate Change

Affected Environment

Climate Change and GHG Emissions

The phenomenon of natural and human-caused effects on the atmosphere due to global warming and other changes is generally referred to as "climate change." Due to the importance of the "greenhouse effect" and related atmospheric warming to climate change, the gases that affect such warming are called greenhouse gases or GHGs. The GHGs of primary importance are carbon dioxide (CO_2), methane, ozone, and nitrous oxide. Because CO_2 is the most abundant of these gases (but not necessarily the most damaging to the atmosphere on a volume basis because of varying residence time after emission), GHGs are now often quantified in terms of CO_2 equivalents, or CO_2e.

Vehicles are a significant source of GHG emissions primarily through the burning of gasoline and diesel fuels. National estimates indicate the transportation sector (including on-road and construction vehicles, airplanes and boats) accounts for 30 percent or more of total domestic CO_2 emissions. Estimates for Washington State suggest that transportation accounts for nearly half of GHG emissions because our State relies heavily on hydropower for electricity, unlike other states that rely more heavily on fossil fuels (coal, petroleum, and natural gas) to generate electricity. The next largest contributors to total gross GHG emissions in Washington are about 20 percent each in fossil fuel combustion in the residential, commercial, and industrial sectors; and in electricity consumption. Solid waste contributes about two percent (WSDOT 2010).

Compared to the "criteria" air pollutants like carbon monoxide and fine particulate matter, GHGs have only recently been recognized as an issue for consideration during the environmental review of proposed projects. CO_2 is not considered an air "pollutant" based on direct health-related impacts, so it is not subject to ambient standards used to gauge pollutant concentrations in the air. Instead, approaches to managing CO_2e emissions are based on controls aimed at first slowing down and then reducing overall atmospheric concentrations over time. On the local level, GHG management is typically aimed at transportation and land use planning and/or energy conservation associated with proposed new development or redevelopment.

In response to the issue of climate change on a global or regional scale, several states and many local jurisdictions are now taking steps to begin reducing GHG emissions. For example, the states of California, Massachusetts, and Washington have adopted GHG emission reduction goals similar to those included in the Kyoto Protocol, the widely-adopted international guideline intended to address this issue. Numerous cities have adopted similar goals and have begun implementing programs to quantify GHG emissions in order to begin reducing them eventually. The U.S. Environmental Protection Agency (EPA) has recently joined the effort to quantify and reduce CO_2 emissions, but this effort has only just begun. Although recent legislation in Washington

State established GHG emission reduction targets in future years and set specific emission targets for some sources, there are as yet no generally accepted emission level "impact" thresholds that provide effective means to assess potential localized impacts of GHG emissions.

In 2008, the Washington legislature passed and the Governor signed HB 2815. This bill includes, among other elements, statewide per capita vehicle miles traveled (VMT) reduction goals as part of the state's GHG emission reduction strategy.

This bill also established the Climate Action Team, a group similar to 2007's Climate Advisory Team. This group refined the Climate Advisory Team's 2007 broad recommendations into specific actions the state can take to reduce emissions. WSDOT worked as a member of this group on strategies to reduce VMT and on how to include climate change in SEPA evaluations (WSDOT 2008).

WSDOT and regional transportation planning organizations are working on methods and models to improve the quality of information and guidance for evaluating GHG emissions from transportation. Tools under development but not yet available will allow for GHG calculations that account for changes in VMT and other factors depending on project size and type in the future. In the meantime, guidelines for qualitative review and discussion for transportation projects under WSDOT jurisdiction have been developed and were used for this analysis (WSDOT 2010).

Impacts of the Alternatives

Methodologies

Two types of methodologies are used to estimate greenhouse gas emissions. The first employs the King County SEPA GHG spreadsheet which is used to estimate embodied and energy consumption emissions (see next section for details). The second methodology estimates on-road GHG emissions using the Fehr & Peers vehicle-miles traveled (VMT)-GHG Analysis Tool.

It should be noted that the analysis methods used in this document provide a conservative estimate of GHG emissions because they assume that additional development would increase emissions. However, the effect of new development is actually more complex. From a regional perspective, residents and employees may not have to travel as far as they would otherwise because new development pursuant to the subarea plan would provide a closer location to live, work, or shop. While the Fehr & Peers tool captures some of these effects, the Snohomish County travel model, which is used as an input to the VMT-GHG method, is limited in its ability to capture the trip internalization benefits of the proposed mixed-use zoning and land use regulations.

Calculating Greenhouse Gas Emissions using the King County SEPA GHG Spreadsheet

Tabulation of existing embodied and energy greenhouse gas emissions within the Lake Stevens Center subarea was based on the SEPA Greenhouse Gas Emissions spreadsheet tool developed by King County[1]. The King County spreadsheet is a comprehensive tool that encompasses a variety of emissions categories that estimate GHG emissions related to building materials, and energy consumed at the development. Embodied and energy emissions as described below.

- **Embodied emissions –** Embodied emissions are related to construction and building materials. This portion of the calculation considered both the "upstream" (i.e., mining, harvest, manufacturing, and transport) and the "downstream" (i.e., subsequent, "in place" use) of building materials. The King County spreadsheet assumes the lifespan of the buildings to be 62.5 years.
- **Energy emissions –** Energy emissions are related to the day-to-day energy use in the building related to space heating, water heating, and electrical usage. Buildings were assumed to be constructed using standard materials and insulation levels. Some studies suggest that more energy efficient buildings (e.g., LEED or EnergyStar) could result in at least 20 percent reductions in overall energy usage.

To estimate the GHG emissions of the existing development within the Lake Stevens Center subarea, the project team used the following existing land use information:

- 680,000 square feet of retail;
- 230,000 square feet of office; and
- 850 dwelling units (590 single family and 260 multi-family)

Table 3.2-3 provides greenhouse gas emissions estimates from the existing development based upon the King County SEPA GHG Spreadsheet. To provide more context for this data, the emissions per service population of the study area (service population includes both residential population and employment) is also shown.

Table 3.2-3. Existing Embodied and Energy Greenhouse Gas Emissions

Methodology	Embodied Emissions ($MTC0_2e$)	Energy Emissions ($MTC0_2e$)	Total Estimated Existing Embodied and Energy GHG Emissions ($MTC0_2e$)	Embodied and Energy Emissions per Service Population
King County SEPA GHG Emissions Worksheet	102,579	1,065,131	1,167,710	195.1

[1] http://www.kingcounty.gov/property/permits/publications/~/media/property/permits/documents/forms/SEPA_GHG_EmissionsWorksheet_Bulletin26PDF.ashx

Based upon the calculations from the King County SEPA GHG Spreadsheet, the existing land uses in the Lake Stevens Center subarea are expected to generate roughly 1,167,710 $MTCO_2e$[2] embodied and energy GHG emissions over their lifespan. This translates into 195.1 $MTCO_2e$ per service population. Detailed calculations are included in Appendix B.

Calculating On-Road Transportation Greenhouse Gas Emissions using the Fehr & Peers VMT-GHG Analysis Tool

GHG emissions analyses for land use developments in the Puget Sound Region are typically prepared using the spreadsheet tool developed by King County (discussed above). While the spreadsheet tool encompasses a variety of emissions categories, it is designed for high-level planning and lacks the detail necessary to prepare an accurate estimate of GHG emissions for a project like the Lake Stevens Center subarea plan. The lack of detail is particularly pronounced when it comes to estimating transportation related GHG emissions.

To provide a more accurate estimate of the transportation related GHG emissions of the Lake Stevens subarea, a more detailed tool developed by Fehr & Peers was used. In the Fehr & Peers tool, the travel demand model was used to calculate the VMT generated by the study area. The VMT results are stratified by speed and emissions factors are applied to arrive at the final emissions estimate. Since the travel demand model was only run for *Alternative 3*, Fehr & Peers factored the results to determine total VMT for *Alternative 1* and *Alternative 2* according to the trip characteristics of each alternative's land use.

The VMT-GHG tool estimates average weekday and annual GHG emissions in the form of "metric tons of carbon dioxide equivalent (CO_2e)[3]." To develop "lifetime" GHG emissions estimates that are similar to those produced by the King County GHG Spreadsheet tool, the average building lifespan defined in the King County tool was used to factor up the annual GHG emissions estimates described above. The results of the transportation GHG emissions estimates are presented in Table 3.2-4.

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[2] $MTCO_2e$ is defined as Metric Ton Carbon Dioxide Equivalent; equates to 2204.62 pounds of CO_2. This is a standard measure of amount of equivalent CO_2 emissions.

[3] CO_2e is commonly used in GHG analyses since it simplifies the reporting of GHG emissions to a single number. For transportation, over 95 percent of all GHG emissions are in the form of carbon dioxide.

Table 3.2-4: Existing Transportation Greenhouse Gas Emissions

Time Period	GHG Emissions in Metric Tons of CO_2e
Average Weekday	26.7
Annual	9,411
Lifespan	588,173
Transportation Emissions per Service Population	92.4

Source: Fehr & Peers, 2011.

Table 3.2-5 summarizes the greenhouse gas emissions estimates from the existing development in the Lake Stevens Center subarea based on the King County Greenhouse Gas Emissions Inventory Worksheets (see Appendix B) and the Fehr & Peers VMT-GHG Analysis Tool.

Table 3.2-5: Total Lifespan Greenhouse Gas Emissions – Existing Conditions

Methodology	Embodied Emissions	Energy Emissions	Trans. Emissions	Total GHG Emissions	GHG Emissions per Service Population
King County Spreadsheet w/VMT-GHG Transportation Emissions	102,579	1,065,131	588,173	1,755,883	287.5

Note: GHG emissions estimates in metric tons of CO_2e

Source: Fehr & Peers, 2011.

Based on the calculations highlighted in the table above, the existing land uses in the Lake Stevens Center subarea are expected to generate roughly 1,755,883 $MTCO_2e$[4] GHG emissions over the lifespan of the buildings, with the energy component comprising the majority of emissions.

Future Alternative Emissions

Greenhouse gas emissions for each of the three future year alternatives were assessed. Impacts of the two "action" alternatives (*Alternative 2* and *Alternative 3*) were assessed against the *No Action Alternative*.

GHG emissions for the 2025 land use scenarios were calculated using the methods described in the Methodologies section above. The King County SEPA GHG Emissions worksheet was used to calculate embodied and energy emissions and the Fehr & Peers

[4] $MTCO_2e$ is defined as Metric Ton Carbon Dioxide Equivalent; equates to 2204.62 pounds of CO_2. This is a standard measure of amount of equivalent CO_2 emissions.

VMT-GHG Analysis Tool was used to calculate the transportation emissions. Note that the vehicle GHG emissions factors used in the 2025 analysis reflect improvements to vehicle fuel economy and fuel carbon content, which tends to reduce the share of emissions generated by the transportation sector. These fuel economy and fuel carbon content assumptions are based on the California Air Resources Board EMFAC emissions factor model, which is a component of the VMT-GHG tool. Table 3.2-6 shows the total GHG emissions results for each alternative.

Table 3.2-6: Lifespan GHG Emissions – 2025 Alternatives

Scenario	Embodied Emissions	Energy Emissions	Trans. Emissions	Total GHG Emissions	GHG Emissions per Service Population
Alternative 1	111,979	1,183,702	511,528	1,807,209	270.8
Alternative 2	122,684	1,348,949	578,528	2,050,161	276.5
Alternative 3	135,556	1,481,598	588,198	2,205,352	262.4

Note: GHG emissions estimates in metric tons of CO_2e
Source: Fehr & Peers, 2011.

Table 3.2-6 shows that *Alternative 2* would have the highest GHG emissions per service population, while *Alternative 3* would have the highest total lifetime GHG emissions. *Alternative 1/No Action* would have the lowest total emissions, but *Alternative 3* would have the lowest GHG emissions per service population.

Despite the lower emissions per service population generated by *Alternative 2* and *Alternative 3*, both alternatives will lead to an increase in total GHG emissions. Given the cumulative nature of GHG emissions and potential climate change effects, this is considered an impact. However, the lack of information regarding how potential climate change effects will impact the broad environment does not necessarily imply that these increased GHG emissions will have a significant or unavoidable adverse environmental impact within the study area.

Mitigation Measures

Based on the goals and strategies included in the draft Lake Stevens Center subarea plan, some or all of the following strategies for reducing GHG could be implemented:

- Adopt green building standards for new development (e.g., LEED silver or better);
- Adopt a mandatory commute trip reduction program for all employers in the Lake Stevens Center subarea. This commute trip reduction program could include the establishment of the following:
    - Mode split goals
    - Mode split monitoring program

  - Mode split goal implementation program
  - Transportation management agency which provides resources for employers such as carpool matching, vanpool/transit information, and a guaranteed ride home program;
- In conjunction with a commute trip reduction program, expand transit options such as the Community Transit vanpool program or new fixed route bus service;
- Implement efficient transportation design standards including the use of roundabouts and LED street lighting and area lighting where appropriate.

Significant Unavoidable Adverse Impacts

GHG emissions would increase with any subarea plan use alternative. Information is currently lacking, however, upon which to base a conclusion about the significance of the increased GHG emissions on climate change and the broader environment. Similarly, the potential for additional regulatory action at the state and local level in the future indicates that such impacts may not be unavoidable.

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3.3 LAND USE

3.3.1 Affected Environment

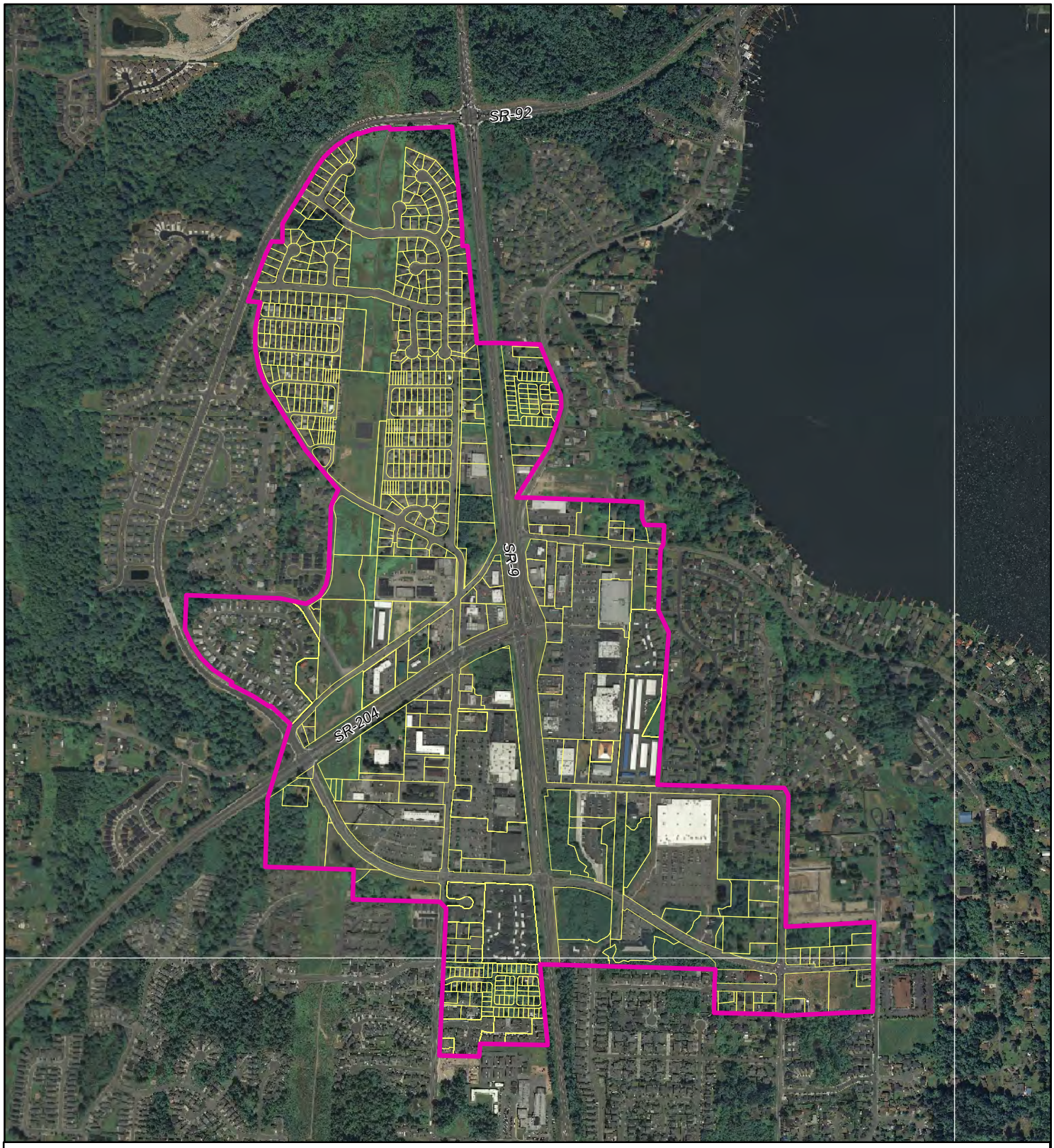
Vicinity Land Uses

The City of Lake Stevens surrounds the northeastern, northern, western and southern, sides of its namesake lake. The eastern city boundary starts on the eastern shoreline, extends southeast from the lake to 4th Street SE, north up 131st Ave NE to approximately 16th Street SE and then continues northeast to Machias Road. The northern city boundary is primarily SR-92 and Soper Hill Road. Lake Stevens shares its northwestern boundary with the city of Marysville near SR-9 and Soper Hill Road. The City's western boundary extends roughly to SR-204 and includes the residential areas above SR-204 up to Soper Hill Road. In the south, the city boundary skirts South Lake Stevens Road and other local roads and roughly follows platted lots. Following a series of recent annexations, the City has grown to approximately 5,761 acres (nine square miles) from approximately 2,368 acres (3.7 square miles) five years ago. Figure 3.3-1 illustrates the vicinity of the Lake Stevens Center study area.

The predominant land use within the City and its surrounding UGA is single-family residential, which comprises more than 40 percent of the City's land area. Multifamily uses occur around the perimeter of the Central Business District (Old Town), along Grade Road, along 16th Street NE and near Lake Stevens Center (Frontier Village). Large portions of the City have developed within the past several decades resulting in a relatively new housing stock. Until recently, the City had limited commercial land, primarily situated around the downtown core. Following recent annexations, the City has added two commercial areas: Frontier Village (Lake Stevens Center) and South Lake (20th Street SE Corridor). Lake Stevens has two industrial areas; the largest is on Hartford Road. Industrial uses are primarily restricted to warehouse and storage uses. Some light industrial/heavy commercial uses are located within the Lake Stevens Center subarea.

The transmission line corridor generally demarks the western boundary of the subarea, but it also bisects a single-family residential neighborhood in the northern portion of the subarea. Physically, it contains aspects both of utility infrastructure and passive open space. The existence of the transmission line limits the location of most land uses within the width of the easement. Currently, no formal public park or recreational uses occur within the transmission line corridor.

Figure 3.3-1 Study Area Vicinity



Lake Stevens Center Vicinity

LSC Boundary

0 500 1,000 2,000 3,000 Feet

N

Source: USDA National Agricultural Imagery Program (2009)

Land uses adjacent to the City are primarily low-density and low-intensity in character. Snohomish County has designated a majority of the surrounding unincorporated parcels in the Rural Urban Transition Area (RUTA) and UGA as Rural Residential. Directly west of the City is the Snohomish River floodplain; this area consists largely of critical areas, agricultural uses and rural residential uses, which limit future development potential. The floodplain separates Lake Stevens from the City of Everett, approximately 6 miles to the west. The Pilchuck River is east of the City with the foothills to the Cascades beyond. This eastern unincorporated area contains large parcels and forested lands with scattered low-density residential development. Other rural residential areas north of Lake Stevens also contain agricultural lands and critical areas. The areas south of the City, between Lake Stevens and the City of Snohomish include a patchwork of platted neighborhoods, large residential lots, small farms and wooded areas with limited commercial areas.

Lake Stevens has direct access to the regional transportation system via SR-9, SR-92 and SR-204. SR-9 is the major north-south highway, which provides connectivity to US-2 and ultimately links to I-5. SR-204 provides an alternate connection to US-2, while SR-92 joins the City to eastern Snohomish County.

The local transportation system consists of a dispersed road network reflective of past suburban development patterns; many neighborhood roads loop through residential developments and end in cul-de-sacs, limiting local traffic connections. Commercial uses are primarily adjacent to collectors and arterials with few connecting local streets.

Subarea Land Use & Zoning Designations

The City's growth strategy, as described in the Comprehensive Plan and discussed in Section 3.4 of the Draft EIS, envisions residential and employment growth occurring in concentrated, well designed "growth centers" where infrastructure and services are available. Each center should have its own distinguishing character and serve the surrounding and/or regional market. Lake Stevens Center (also referred to as the "subarea" or the "study area") is one of the City's designated growth centers.

Tables 3.3-1 and 3.3-2 summarize current subarea Comprehensive Plan and zoning designations by area and percentage; Figures 3.3-2 and 3.3-3 graphically illustrate these designations. Existing land use designations in the subarea include High Density Residential, Medium Density Residential, Sub-Regional Commercial, Downtown/Local Commerce and Public/Semi-Public. The corresponding zoning districts are High Urban Residential, Urban Residential, Multi-Family Residential, Sub-Regional Commercial, Local Business and Public/Semi-Public. The land use designations and zoning districts correspond closely to actual land uses. The biggest difference relates to the utility uses found throughout the subarea.

Table 3.3-1. Lake Stevens Center Comprehensive Plan Designations

Land Use Designation	Acres	Percentage
Medium Density Residential (4 to 12 units per acre)	148.42	41.34%
High Density Residential (no density limits)	37.63	10.48%
Sub-Regional Commercial	163.90	45.65%
Downtown / Local Commerce	7.09	1.97%
Public / Semi-Public	1.91	0.53%
Totals	**358.96**	**99.97%**

Source: City of Lake Stevens GIS 2009 Land Use Data

Table 3.3-2. Lake Stevens Center Zoning Districts

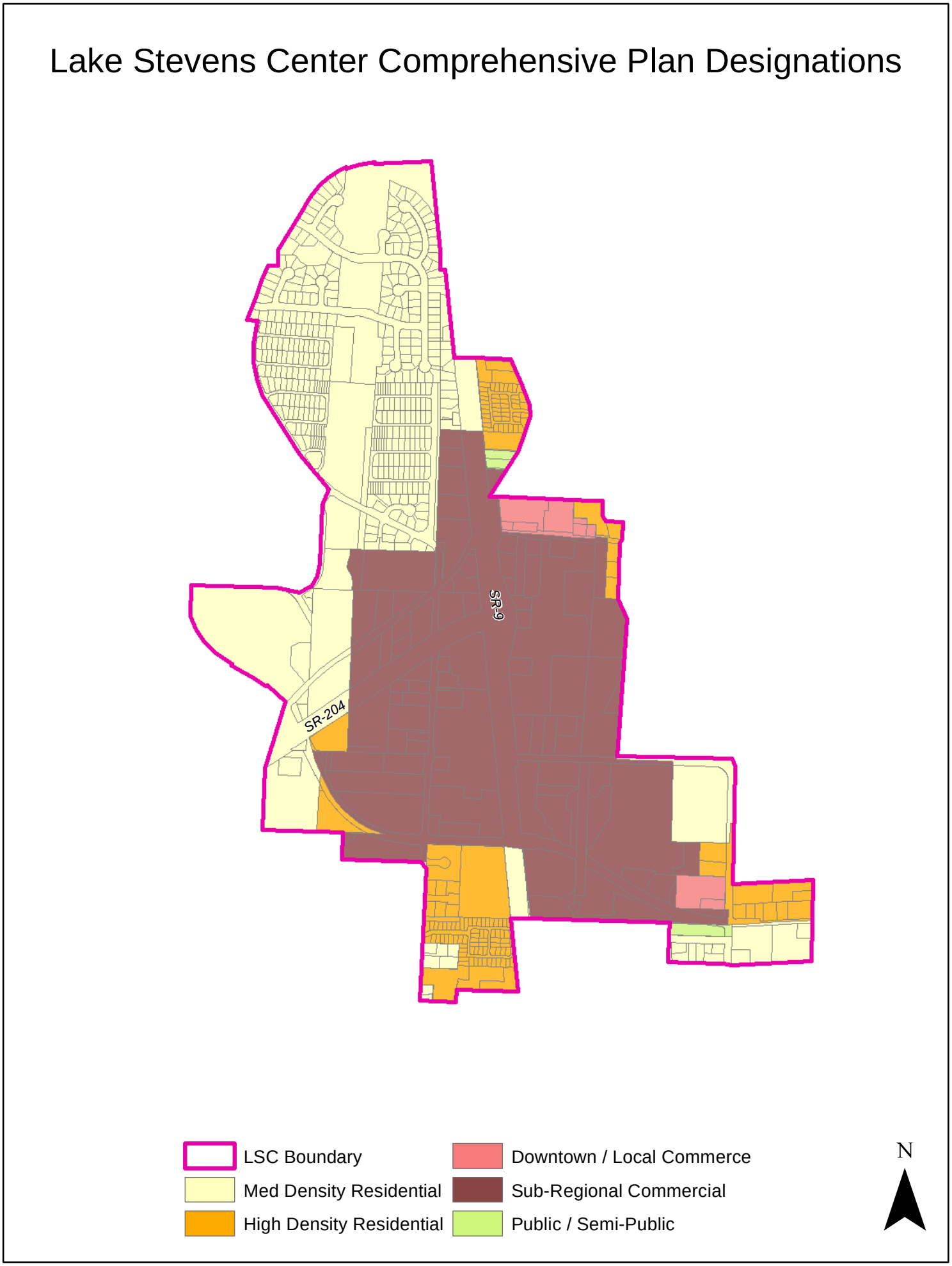
Zoning District	Acres	Percentage
Suburban Residential (9,600 sq. ft. per dwelling unit)	7.40	2.06%
Urban Residential (7,500 sq. ft. per dwelling unit)	140.51	39.13%
Multi-Family Residential	38.96	10.85%
Sub-Regional Commercial	163.11	45.43%
Local Business	7.75	2.16%
Public / Semi-Public	1.89	0.53%
Totals	**359.61**	**100.16%**

Source: City of Lake Stevens GIS 2010 Zoning Data

Actual Subarea Land Uses

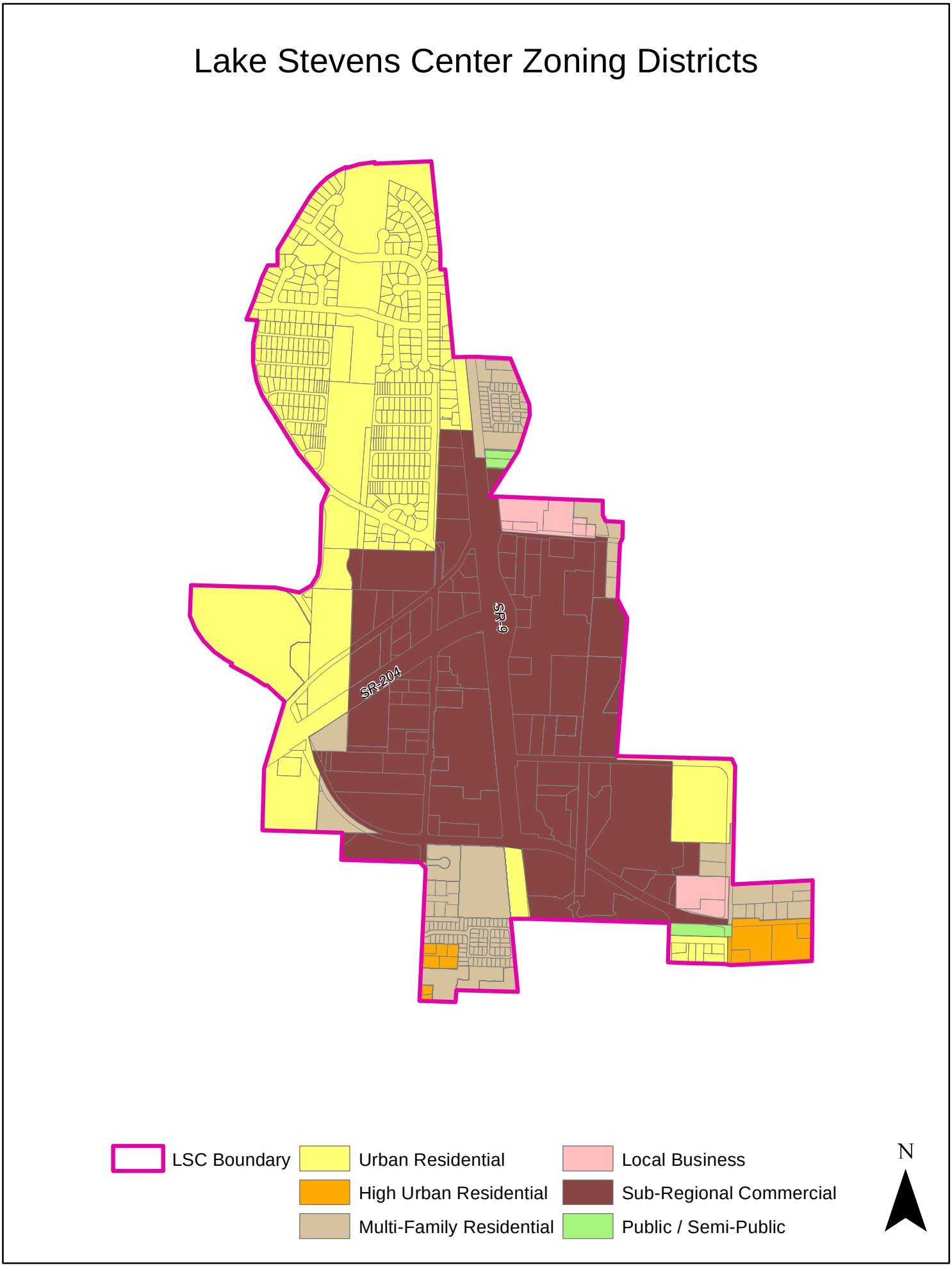
Lake Stevens Center encompasses approximately 359 acres of land. Nearly 250 acres are developed and approximately another 80 acres are in right-of-way. In total, 92 percent of the subarea is developed. The City Center, which includes a small commercial area and municipal services, is located approximately 2.25 miles to the east. The Lake Stevens Sewer District's sewage treatment plant is located southwest of the subarea off SR-204. The subarea enjoys excellent transportation access because of the intersections of two regional highways. Outside of the highways, the local road network is limited, due to the pattern of large commercially zoned parcels.

Figure 3.3-2 Lake Stevens Existing Comprehensive Plan Map



Source: City of Lake Stevens

Figure 3.3-3 Lake Stevens Center Existing Zoning Map



Source: City of Lake Stevens

Existing land uses in the subarea are shown in Table 3.3-3 and Figure 3.3-4. Notably, this area includes multiple commercial retail developments, comprising 22.31 percent of the study area; the Frontier Village shopping center is the largest retail development. The majority of commercial development in the area occurred after 1990. The subarea has more commercial uses than the rest of the City, reflecting the subarea's function as a regional commercial center for eastern Snohomish County from the cities of Marysville to Snohomish. Most of the commercial uses in the subarea are auto-oriented with large parking areas on relatively large parcels. General uses in the vicinity include strip malls with smaller tenants, some junior anchors, grocery stores, convenience stores, restaurants, gas stations, one big-box retailer (Target), office uses (medical and professional) and some light industrial uses (storage facilities, limited manufacturing, and some auto repair uses). Existing development in the subarea is estimated to include approximately 680,000 gross square feet of retail development, and 230,000 gross square feet of office development (Leland Consulting Group, 2011).

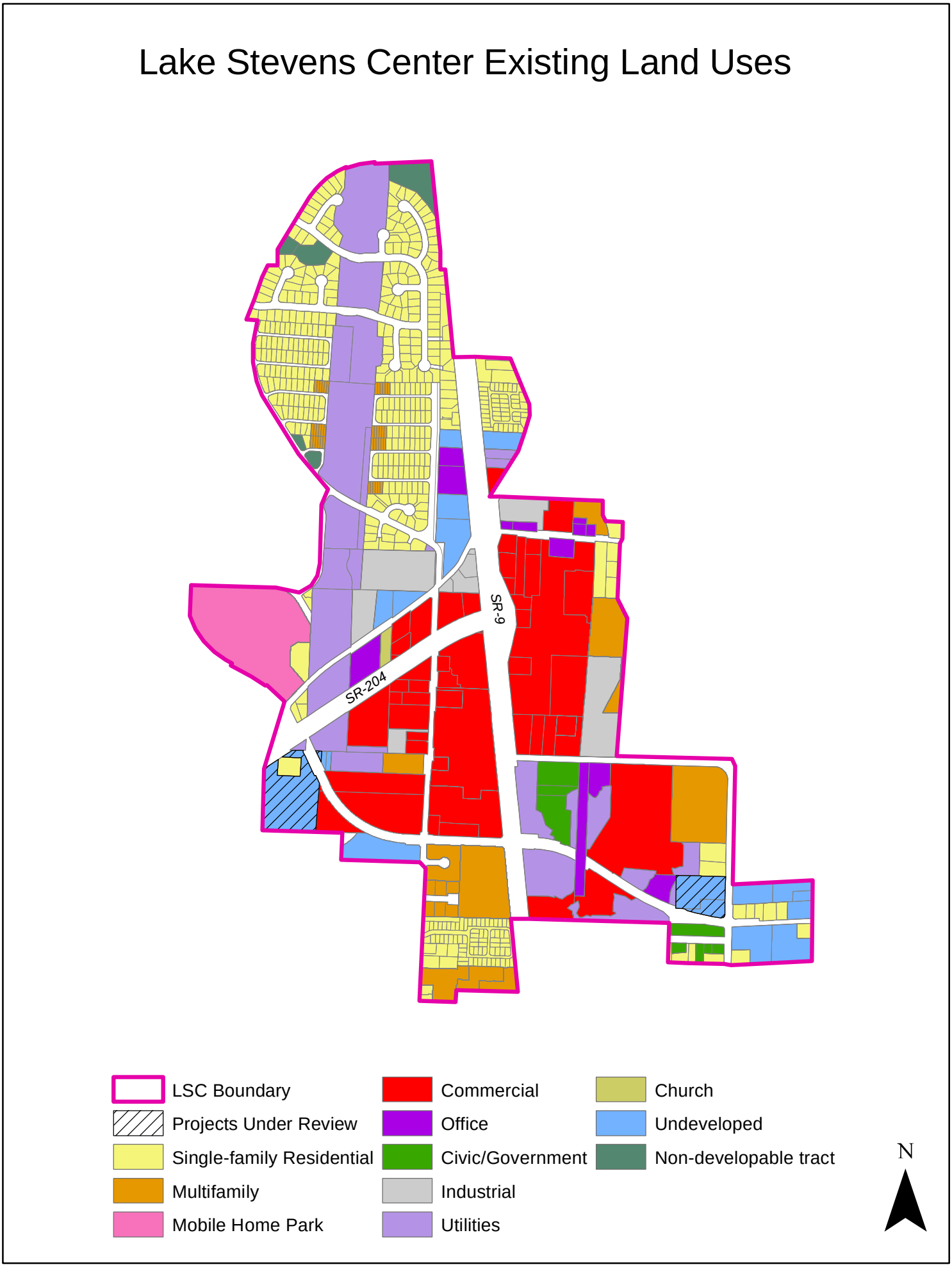
Table 3.3-3. Lake Stevens Center Existing Land Uses

Study Area LSC Existing Land Use			City Existing Land Use[1]	
Land Use	**Acres**	**Percentage**	**Acres**	**Percentage**
Single-family Residential	66.55	18.54%	729	63.1
Multifamily Residential	26.36	7.34%	78	6.7
Mobile Home Park	13.68	3.81%		
Sub-Total	106.59	29.69%	807	69.8
Commercial	80.10	22.31%	231	20.0%
Office	8.94	2.49%		
Sub-Total	89.04	24.8%	231	20.0%
Civic/Government	5.59	1.56%	116	10.1%
Utilities	50.04	13.94%		
Church	0.58	0.16%		
Sub-Total	56.21	15.66%	116	10.1%
Undeveloped	24.15	6.73%		
Non-Developable Tract	3.96	1.10%	139.30	12.07%
Right-of-Way (ROW)	79.09	22.03%		
Sub-Total	**107.20**	**29.86%**		
Totals	**359.05**	**100.00%**		

Sources: Snohomish County Assessors Data April 2011 / 2005 City of Lake Stevens Comprehensive Plan

[1] Adapted from Table 4-1 - Buildable Lands Analysis from the 2005 Comprehensive Plan – the acreage and percentage figures, based on the 2005 city limits, are for comparative purposes only and do not fully represent current land use patterns inside the city limits.

Figure 3.3-4 Lake Stevens Center Existing Land Use Map



Source: Snohomish County Assessors Data (April 2011)

Residential neighborhoods – including single-family, multifamily and a mobile home park – are located adjacent to the commercial area along the border of the subarea. Combined residential uses total almost 52 percent of the study area. In comparison, approximately 70 percent of the City is devoted to residential uses. These established neighborhoods vary in age from the late 1960s to new construction, with the majority of houses constructed after 1990. The subarea currently contains approximately 851 dwelling units. Of this total, 590 are single-family detached dwelling units with a mix of duplexes, manufactured homes, and detached condominiums. Single-family density ranges from 4 to 12 dwelling units per acre. There are approximately 260 multifamily units. Current gross density of the subarea is approximately 2.4 dwelling units per acre.

The study area also has a relatively large amount of utility and civic/government uses. Utilities include power transmission lines and detention facilities. The largest contiguous utility tract is located west of SR-9 and includes PUD and Seattle City Light transmission lines. Civic and government uses include a transit facility, fire district offices, schools, and City or County owned properties. Combined, these categories add up to approximately 55 acres or 15.49 percent of the area; this total includes some open space tracts within subdivisions.

There are approximately 24 undeveloped acres of land scattered throughout the subarea, excluding the utility areas and other non-developable tracts, such as native growth protection areas and private access easements. The subarea also includes nearly 28 acres of wetlands, which are found in utility tracts, non-developable tracts, and undeveloped areas.

Currently, the City is reviewing applications for two proposed projects within the study area: Seneca Lane Subdivision, an 18-lot subdivision on 5 acres; and Chapel Rock Center, a 30,000-square foot commercial/office development.

As identified in the Comprehensive Plan, the current zoning configuration and small amount of undeveloped land in the study area limits the potential for residential infill development. However, there is potential for redevelopment of larger commercial parcels and increased employment.

3.3.2 Impacts of the Alternatives

As previously discussed, the City is considering three development alternatives for the subarea to guide future land use and policy decisions. The *No Action Alternative* assumes that future development will occur under existing zoning and standards. *Alternatives 2 and 3*, the proposed action alternatives, provide different visions for the intensification and diversification of land uses that include a mix of retail, office, and residential uses.

The general development concept encourages efficient pedestrian and automobile circulation throughout the subarea. Conceptually, Lake Stevens Center will connect to the 20th Street Corridor by three main roads: 91st Avenue to the west, SR-9 centrally, and 99th Avenue to the east. In addition, a power line trail could provide another connection to tie projected land uses together. The commercial areas would connect to adjacent uses by collectors and arterial streets.

Although adoption of a subarea plan in itself will have no impact to the physical environment, the plan will provide a framework within which future growth and change will occur. Future development and redevelopment under any of the subarea alternatives will result in direct, indirect and cumulative impacts to land use. Together, these impacts could result in changes to the types, form and intensity of land uses that may affect the overall land use pattern of the subarea.

The range of impacts considered in this section includes direct, indirect and/or cumulative impacts.

- *Direct impacts* are those caused by future construction, which will entail development and consumption of undeveloped land or redevelopment of existing uses. Construction can cause short-term impacts such as noise, dust and truck traffic. Planned growth may also result in different types, forms and/or intensity of development, which may conflict with other land uses and create a need for new or improved infrastructure such as roads or utilities to support planned growth.
- *Indirect impacts* are those that can result from the precedent established by a land use action (such as adoption of a subarea plan or zoning changes), from increased attractiveness of an area for development, or by perceived market opportunities for additional businesses. Indirect impacts may also include increased levels of economic activity resulting from employment, spending and revenues.
- *Cumulative impacts* are a combination of direct and indirect impacts along with current development projects. Any of these types of impacts can result in or reinforce changes to the land use pattern and character of the area.

Direct Impacts

General Impacts Common to All Alternatives

Development and Redevelopment. Under all alternatives, future growth would result in the development of vacant land and redevelopment of some existing uses over time. As most of the subarea is already developed and little vacant land remains (approximately 24 acres), future growth will primarily involve redevelopment of existing land uses. Estimated increases in retail development (gross square feet) associated with the alternatives, shown in Table 2-1, would range from 7-9 percent for

the *No Action Alternative*, and 20-22 percent for *Alternative 2 and Alternative 3*. Estimated increases in office development would range from 13-17 percent for the *No Action Alternative*, 61-65 percent for *Alternative 2*, and 43-52 percent for *Alternative 3*.

Redevelopment of currently developed property would displace existing uses and displacement could be either temporary (during construction) or permanent. In general, displaced activities could relocate to other sites in Lake Stevens Center, in other centers within Lake Stevens (including 20th Street SE, the downtown or the Hartford industrial area), or within other communities in the region.

Timing of Development. The *Lake Stevens Center Subarea Plan* addresses a twenty-year period; growth associated with each alternative is assumed to occur over that time. Growth could occur at an even rate over this period or could occur unevenly. A variety of national and regional economic factors could also affect the timing of growth. Development is likely to occur slowly over the next few years due to the national economic downturn. In addition, most of the subarea's growth will occur through redevelopment. Factors such as the age and value of existing buildings and the investment decisions of individual property owners will also strongly influence the timing of growth and redevelopment.

Construction Impacts. Construction and redevelopment of buildings and infrastructure would result in some short-term impacts to the environment, including generation of dust and noise, which would affect adjacent properties. Future construction activities may also temporarily disrupt utility services. Truck transport associated with construction would generate similar impacts and could entail temporary traffic congestions and temporary interruptions in access. As construction impacts are limited in duration, the application of existing code requirements and project-specific conditions will mitigate construction impacts. In general, impacts would be more extensive and of greater duration for *Alternative 2* and *Alternative 3,* both of which entail greater and more intensive redevelopment. As the projected growth under all alternatives may not be even or constant, development impacts would occur at intervals during the planning horizon.

Land Use Pattern. The overall land use pattern of an area is a reflection of the types of uses, the density/intensity of development, and the spatial/structural form of this development. The subarea alternatives would result in different effects to the land use pattern based on expected types and amounts of development as shown in Table 2-1 of the Draft EIS. The proposed subarea alternatives refine a pattern of urban development with varying intensity. The major differences among the alternatives lie in the intensity and form of development and the mix of land uses. A mix of different land use is an inherent part of urban development and does not intrinsically cause incompatibility. In general, the existing concentrated and commercially-dominated land use pattern would

not change significantly; the subarea is and will remain an intensively developed commercial center.

Alternative 1 – No Action Alternative

Assuming no change to existing zoning, *the No Action Alternative* would essentially continue the existing pattern and intensity of development and the existing mix of land uses. Relatively small increases in commercial, office and residential land uses would occur, as shown in Table 2-1. Retail, services and some office development would occur in the Sub-Regional Commercial zoned areas and additional multifamily development would occur in areas zoned for that use. Light industrial activities could continue to develop in commercial areas, as permitted by existing zoning. No changes are assumed to occur in existing single-family residential neighborhoods.

Gross residential density of the subarea (total area divided by total number of dwelling units) would increase modestly, from approximately 2.4 dwelling units per acre at present to 2.6-2.7 dwelling units per acre.

Development would occur on a lot-by-lot basis, without the guidance provided by a subarea plan. Current zoning regulations and design guidelines would continue to control the form and design of developments, primarily through height limits, setback requirements and impervious surface limits. Existing zoning permits building heights of up to 80 feet; setbacks are 30 feet. Impervious surface limits apply only to single family residential uses. City regulations do not provide guidance on the design of buildings or sites, and do not require or encourage provision of amenities, so the ultimate design of buildings under *Alternative 1* would remain unpredictable and provision of amenities is uncertain. It is assumed to be similar to what presently exists.

Overall, the subarea's existing character and functions would continue into the future. The land use pattern would remain a combination of unconnected neighborhood shopping centers, strip retail and large format retail, with some office and light industrial uses interspersed. Lake Stevens Center would continue to be an auto-oriented local shopping area and would have limited attraction to those living outside the City. The subarea would not be planned comprehensively, would not be revitalized or updated, would not become a regional retail destination and would not generate significant new employment.

Alternative 2 – Center Revitalization

Major objectives of *Alternative 2* are to update and revitalize the existing center, to attract substantial new employment and to capture existing retail leakage; the land use emphasis, therefore, is on expanding retail and office uses. The planned land use pattern is shown in Figure 2-3. Because the subarea is substantially developed, land use change would occur primarily in the context of redevelopment and intensification of existing land uses. The focus would be on attracting additional retail and office uses in single use

and mixed-use buildings in identified locations and in different configurations within the subarea. Change would be incremental over a 20-year or longer period. The overall pattern of land use would not change substantially, however. Some high-density multifamily residential development would also occur, generally located adjacent to the concentrations of commercial and office development and within walking distance of the transit center.

General illustrations of the form and scale of buildings that could locate within the subarea are shown in Figures 2-5 and 2-6 of the Draft EIS and are described below. The illustrations are generally representative of the type and intensity of development anticipated to occur pursuant to the subarea plan. The locations of planned concentrations of various land uses or of mixes of uses are also described. These descriptions provide a basis for evaluating potential land use impacts within discrete portions of the subarea; however, they are not intended to limit the amount of such development within each area.

Major Commercial Center. The existing Frontier Village area, on the east side of the SR-9/SR-204 intersection, would continue to be the commercial core of the subarea, characterized by a range of retail and service uses, similar to what currently exists. An entertainment use, such as a cinema, could also occur. The core area would continue to contain single-use retail buildings primarily, which would likely be one or two stories in height. Some mixed-use buildings could also develop, in the form of two-to-three story buildings with ground floor retail and office. Over time, the existing shopping center site could be substantially redeveloped and used more intensively. Redevelopment would not significantly modify the existing land use pattern or the types of land uses occurring in this commercial core area. There could be more mixed-use multi-story buildings, however, greater office development and an increase in the intensity of development.

Much of this core area consists of a single property and the timing of redevelopment is dependent on the actions of the property owner. In the near term, relatively little net additional retail development is assumed (approximately 20,000 square feet is assumed for traffic modeling purposes), although some upgrading could occur. Over the longer term, however, this area has potential for more significant redevelopment.

The type and intensity of land uses expected within the commercial core would be generally compatible in terms of scale and operations and there would be small potential for on-site land use conflicts or incompatibilities. However, developed single-family residential areas, located east of and adjacent to the subarea, and the intensity and scale of the commercial core would contrast. This same contrast currently exists, however, and some impacts – such as noise associated with truck deliveries -- would continue under any alternative. Landscaping, screening and other design considerations can help to mitigate or alleviate these types of impacts.

Similar or greater land use conflicts could occur under *Alternative 1*. As noted previously, existing zoning for the major commercial core (Sub Regional Commercial) would permit a wide range of retail, commercial and light industrial uses at intensities that are potentially greater than what would occur under *Alternative 2*. The limited design guidelines under *Alternative 1* would make it more difficult to use site planning and design approaches to mitigate conflicts and to update the character of the area. *Alternative 2*, in contrast, would limit or redirect intensive light industrial uses as to help attract increased retail and office development. The adoption of area-specific design guidelines and standards will help unify and update the subarea's appearance and to minimize land use conflicts.

Other Commercial Concentrations. SR-9 and local streets separate the Frontier Village shopping center from other existing commercial concentrations on the east side of the highway, generally bounded by 91st Ave NE and extending north and south of SR-204; refer to Figure 2-3. Existing land uses in these areas include a neighborhood shopping center, strip commercial development and some light industrial activities. The northern commercial area contains a vacant property and is also adjacent to an existing single-family residential neighborhood. In addition to this area, there is another commercial center near Target between 4th and Market Place.

Approximately 20,000 gross square feet of retail and 20,000 gross square feet of office development could be spread over the commercial concentrations north and south of SR-204 (based on assumptions used for traffic modeling). The type, form and intensity of development in this area would be similar to that described for the major commercial concentration above. Land use impacts would be similar to those described above and are not expected to be significant. The same potential for contrasts in scale and intensity exists where commercial development is adjacent to existing residential areas to the north (single-family) and south (multifamily) and the same mitigation approaches – landscaping, screening, design – could be applied.

Mixed-Use Areas. The existing commercial area between 91st Ave. NE and the utility corridor, north and south of SR-204, would be redeveloped with a mix of office and retail development. Approximately 60,000 gross square feet of retail and 80,000 gross square feet of office development could occur within these two areas. Another, smaller mixed-use area would develop adjacent to the Transit Oriented Development (TOD) south of Market Place; refer to Figure 2-3. The mix of uses could include ground floor retail with residential or office above, as well as a horizontal mix of retail, office and residential buildings. Buildings would generally be between two and four stories in height and would face an upgraded 91st Ave NE, which would be improved with wider sidewalks, landscaping, amenities and lighting.

The intensity of different uses within the mixed-use areas themselves would be generally compatible in terms of scale and functions and there would be small potential

for on-site land use conflicts or incompatibilities. However, an existing single-family residential area is located adjacent to the northern mixed-use area and the intensity and scale of the mixed-use area would contrast with existing single-family development.

Transit-Oriented Development Area. A Transit-Oriented Development (TOD) would develop in the area south of Market Place, proximate to the existing transit center. There is currently some retail and office development in this area; a wetland complex is also present. Development would include a mix of retail, office and multifamily residential land uses in mixed-use and single purpose buildings ranging from two-to-four stories in height. Approximately 50,000 gross square feet of office and 50,000 gross square feet of office use could occur in this area. High-density multifamily development could occur within the TOD area and in adjacent residential areas, which are discussed further below.

Potential adverse impacts would be similar to those identified previously, including an increase in development scale and intensity and contrasts or conflicts with adjacent development. These are not likely to be significant and can be mitigated through development standards and application of design guidelines. Positive impacts of TOD, from locating a mix of uses within convenient walking distance of a transit center, could include enhanced pedestrian-orientation, reduced auto dependency, and a potential for increased use of public transit.

Multifamily Residential Areas. High-density residential development, generally multifamily, would occur in several discrete locations at the edges of the subarea or as a part of mixed-use developments; please refer to Figure 2-3. These areas are currently identified for either single-family or multifamily residential use under existing Comprehensive Plan and zoning designations. Some re-designation of single-family land would occur. Multifamily residential buildings would be two-to-four stories in height; development density would be determined by floor area ratio (FAR) and could be in the range 50-60 dwelling units per acre. Some buildings could be mixed-use, with ground floor retail or service uses. A total of 180-200 housing units would be developed. Gross residential density in the subarea would increase modestly, from 2.4 dwelling units per acre to approximately 2.9 dwelling units per acre.

The scale and intensity of high-density residential buildings would be generally similar to that of office and retail development, as shown in Figures 2-5 and 2-6. Significant conflicts would not likely occur. As noted previously, the implementation of refined zoning regulations and area-specific design guidelines and standards will help to mitigate or alleviate potential impacts.

The designated residential areas adjacent to intensive retail/commercial developments may be impacted by noise, lighting and traffic generated by commercial activities to affect residential uses. At the same time, these areas could provide buffers to adjacent

single-family residential neighborhoods from these same types of impacts. Impacts are not expected to be significant.

Alternative 3 – Retail and Residential Emphasis

The land use pattern for *Alternative 3,* as shown in Figure 2-4, would be similar to *Alternative 2* in terms of types of uses, the intensity and scale of buildings, and the overall concentration of land uses that would occur in various portions of the subarea. Compared to *Alternative 2*, office uses would be reduced to permit a greater emphasis on high-density residential development. *Alternative 3* would also redesignate some land within or adjacent to existing single-family neighborhoods – located north of SR-204, east of the TOD and adjacent to the southern boundary of the subarea – to multifamily residential. Gross residential density would be in the range of 3.8 to 4 dwelling units per acre, which is a significant increase from the *No Action Alternative*. Potential housing impacts are discussed in Chapter 3.5.

Impacts within the mixed-use areas and commercial concentrations would be the same as described above for *Alternative 2*. In general, uses would be complimentary in terms of density, intensity and scale. No significant land use conflicts are expected to occur. As with *Alternative 2*, the greatest potential for impacts would occur where a larger concentration of higher intensity commercial activity is located adjacent to a low density residential area. These impacts could be mitigated through application of new or revised zoning regulations and area-specific design guidelines and standards, which would address site planning, building orientation and design, setbacks and landscaping.

Indirect Impacts

Adoption of the subarea plan, rezoning and adoption of a Planned Action would increase opportunities for and the desirability of development within Lake Stevens Center. Development of the subarea over time according to proposed policies would create greater employment opportunities, a more vital and attractive retail center and a greater balance between jobs and housing in the city overall, all of which are major objectives of the subarea plan.

Attracting the types and amounts of development anticipated in the subarea plan could reduce growth pressure to some degree in adjacent areas, both incorporated and unincorporated. The types and amount of commercial uses anticipated in the subarea plan are intended to capture expenditures for goods and services that are currently leaving the city.

As noted in Section 3.5 (Population, Housing & Employment) of the Draft EIS, employment growth in the subarea is assumed to capture an additional increment of the adopted 2025 growth target relative to the *No Action Alternative.* The subarea could also potentially attract some additional increment of population growth to the City and surrounding area, as workers seek to live closer to jobs.

Any additional growth attracted to the Lake Stevens Center Subarea would be concentrated in a designated center at higher densities. This could include some increment of growth that could otherwise occur in a more dispersed or strip development pattern along transportation corridors in the region. A more concentrated pattern of growth would be consistent with regional and local land use policies.

Cumulative Impacts

All known and proposed development projects within the Lake Stevens Center Subarea are included within the growth and land use assumptions for the alternatives and the foregoing analysis is cumulative in this respect. This section considers some other potential land use impacts associated with concurrent implementation of the Lake Stevens Center Subarea Plan and the 20th Street SE Subarea Plan.

Cumulatively, the Lake Stevens Center Subarea Plan and the 20th Street SE Subarea Plan are both intended to increase employment and retail land uses and jobs within the City. Both plans would also create greater opportunities for high-density housing, varying by alternative. The cumulative extent of these increases is identified in Section 3.5 of the Draft EIS. On balance, single-family land uses would remain the predominant land use in the City. A minor increase in gross residential density would occur for the City as a whole.

In general, growth would be more focused and concentrated in designated mixed-use centers at higher densities. To the extent that this concentration occurred, it would reinforce fundamental land use policies, adopted in state, regional, county and local growth management plans, intended to guide future growth to designated centers. This effect is considered positive. Please see the policy discussion in Section 3.4.

3.3.3 Mitigation Measures

Many of the land use changes identified in the foregoing analysis – including increased density/intensity and a greater diversification and mix of land uses – are not considered adverse impacts. The change in the subarea's overall land use pattern would be minor and does not require mitigation.

Potential land use conflicts, such as between proximate land uses of different intensity, can be mitigated through site plan review, and the application of development regulations and design guidelines. For example, height and bulk limits and setback requirements in zoning regulations can be tailored to address potential conflicts between commercial and residential land uses. Landscaping requirements can also help to buffer and screen land uses of dissimilar intensity or scale. Design guidelines would also require the use of approaches to site planning and building design that reduce a

range of potential impacts, such as shadows, noise and visual incongruities. These techniques are an integral aspect of the subarea plan's implementation program.

3.3.4 Significant Unavoidable Adverse Impacts

The underlying land use pattern of the subarea would not change significantly as a result of *Alternative 2* or *Alternative 3*. The subarea would, however, become more urban, more intensively developed, contain a greater mix of uses, and would experience a significant increase in employment uses relative to the *No Action Alternative*. These changes, while significant, are not considered to be adverse.

3.4 PLANS & POLICIES

Lake Stevens adopted a Comprehensive Plan complying with the Growth Management Act in 1994. A major update was adopted in 2006 and the next major update is required by 2014. This section of the Draft EIS evaluates the general consistency of the Lake Stevens Center Subarea Plan with the vision, goals and policies of the City's Comprehensive Plan as amended through 2010.

The analysis focuses on goals and policies that are most relevant to the proposed action. Goals and policies are provided verbatim, followed by a brief assessment of relative consistency of the Subarea Plan. The Land Use Element is evaluated in detail, since it is best encompasses the range of issues implicit in the proposed subarea plan. This is followed by discussion of the Housing, Economic Development and Transportation elements.

Because the proposed action will modify zoning classifications and regulations, an evaluation of existing zoning regulations is not considered necessary.

City of Lake Stevens Comprehensive Plan

Vision Statement (2006 Lake Stevens Vision)
Summary:

VG-2 The City of Lake Stevens will encourage changes that promote livability, pedestrian orientation and high-quality design, and limit stress factors, such as noise pollution and traffic congestion…

VG 3 The community will focus its economic development activity in the Hartford Road Industrial Area, three Community growth centers and small neighborhood service centers.

VG-5 The City of Lake Stevens will encourage the development of the local economy by: providing a predictable development atmosphere; emphasizing diversity in the range of goods and services; encouraging non-consumptive, sustainable level markets; and ensuring that as the economy changes employment opportunities are balanced with a range of housing opportunities.

Discussion: Lake Stevens Center is one of the growth centers currently designated in the Comprehensive Plan. Land uses planned for the subarea focus on increasing commercial and employment opportunities and the size and vitality of the local economy, with varying emphases on residential growth. The Planned Action technique is part of the City's strategy to attract desired types of development. The proposed subarea plan would be consistent with these policies and strategies.

Land Use Goals
Summary:

GOAL 4.1 ENSURE THAT LAND USES OPTIMIZE ECONOMIC BENEFIT AND THE ENJOYMENT AND PROTECTION OF NATURAL RESOURCES WHILE MINIMIZING THE THREAT TO HEALTH, SAFETY AND WELFARE;

GOAL 4.2 GROWTH MANAGEMENT: MANAGE GROWTH SO THAT THE DELIVERY OF PUBLIC FACILITIES AND SERVICES WILL OCCUR IN A FISCALLY RESPONSIBLE MANNER TO SUPPORT POSITIVE ECONOMIC ACTIVITY IN THE CITY;

GOAL 4.3 ECONOMIC DEVELOPMENT: ATTAIN THE HIGHEST LEVEL OF ECONOMIC WELL-BEING POSSIBLE FOR ALL CITIZENS IN LAKE STEVENS THROUGH THE ACHIEVEMENT OF A STABLE AND DIVERSIFIED ECONOMY OFFERING A WIDE VARIETY OF EMPLOYMENT OPPORTUNITIES;

GOAL 4.4 NEIGHBORHOOD CONSERVATION: ACHIEVE A WELL BALANCED AND WELL ORGANIZED COMBINATION OF OPEN SPACE, COMMERCIAL, INDUSTRIAL, RECREATION AND PUBLIC USES SERVED BY A CONVENIENT AND EFFICIENT TRANSPORTATION NETWORK WHILE PROTECTING THE FABRIC AND CHARACTER OF RESIDENTIAL NEIGHBORHOODS; AND;

GOAL 4.5 ENVIRONMENTAL PRESERVATION AND CONSERVATION: ENSURE THE PROPER MAINTENANCE OF THE CITY'S ENVIRONMENTAL QUALITY THROUGH THE PRESERVATION AND CONSERVATION OF THE NATURAL ENVIRONMENT AND RESOURCES.

Discussion: The Land Use Element of the Comprehensive Plan establishes the framework for evaluating the proposed land use alternatives and describes the intended purpose for each land use designation as a basis for implementing zoning regulations. Many of the goals and policies, in this element, focus on integrating existing neighborhoods with future infill and redevelopment of sites in planned urban centers and mixed-use developments. As a planned growth center, the Lake Stevens Center will provide balanced and efficient growth where infrastructure and transportation facilities are available.

Important goals of the subarea plan are to revitalize the existing center, to attract more commercial and employment uses to the City and thereby increase the economic benefits of growth for all residents. The mix of office retail development is a means to grow and diversify the local economy. The proposed plan includes provisions for increasing open space areas and parks and open spaces on a subarea-wide basis as part of individual development proposals or through acquisition of easements. The City's

critical area regulations would protect important environmental resources (wetlands and streams) within the subarea. As a designated growth center in the City's Comprehensive Plan, future development will be coordinated with the provision of services and facilities. The subarea plan (*Alternative 2* and *Alternative 3*) recognizes and reinforces the commercial nature of the subarea. Alternative 3 includes a larger proportion of residential uses relative to the *No Action Alternative*. The proposed subarea plan would be consistent with these policies.

Comprehensive Plan Designations (Only designations within the study area boundary or designations being considered for inclusions within the study area are included)

Summary:

A. Residential

1. *High Density Residential* -- Allows a variety of residential forms of residential structures containing three or more dwellings. Multiple structures may be located on a single parcel, and there are no density limits, provided that the project meets the site requirements of the zoning and other pertinent codes and adopted development guidelines. Also allows limited public/semi-public, community, recreational, and commercial uses.
2. *Medium Density Residential* -- Allows single-family (1 du/lot) and two-family residential development with a gross density of 4 to 12 units per acre. Includes detached, attached, conversion, accessory apartments, townhouses, condominiums, duplexes, tourist homes, special service homes and some manufactured/mobile structures. Also allows limited public/semi-public, community, recreational, and neighborhood commercial uses.

B. Commercial

1. *Sub-Regional Commercial* -- Allows high intensity, automobile-oriented commercial uses, including dense arrangements of retail stores, services, and professional offices which are used not only by local residents but by those of other communities. Also allows limited public/semi-public, community, and recreational uses.
2. *Downtown/Local Commercial* -- Allows medium to high intensity commercial uses, including the Central Business District and other dense arrangements of professional offices and retail stores. This designation allows mixed-use development. This land use designation may be placed on lands between Sub-Regional Commercial and residential areas to act as a buffer. Also allows limited public/semi-public, community, and recreational uses.
3. *Mixed-Use* -- Allows medium to high intensity mixed use (commercial and residential). It is intended that this land use designation will be placed where a "village atmosphere" is desired, or on lands between high and low

intensity uses to act as a buffer (e.g., between Sub-regional commercial and residential zones). Also allows limited public/semipublic, community, and recreational uses.

D. Public/Semi-Public
This category is intended for use on all land that is publicly owned. It allows public buildings and services, recreational uses, utilities, and transportation facilities.

***Discussion*:** The subarea plan may modify some existing Comprehensive Plan land use designations in various locations, but it will be generally consistent with the types of uses and densities described for each category. Alternatively, the Comprehensive Plan could be modified to show a more general "subarea plan" designation/overlay specific to the subarea land use plan. Existing land use categories that are most relevant to the subarea plan include Sub-Regional Commercial, High Density Residential, and Public/Semi Public. The Mixed Use category, while not currently used, could be applied in some portions of the subarea. No industrial designations apply currently, although some light industrial activities currently exist in portions of the subarea. The Sub-Regional Commercial land use designation does permit intensive auto-oriented commercial uses, some of which may be similar to light industrial activities.

Summary:

GOAL 4.5 PRESERVE AND ACCENTUATE THE LAKE AS THE CENTERPIECE OF LAKE STEVENS.

Policies

4.5.1 Encourage design of subdivisions and structures that maintain public lake views.

4.5.2 Structure minimum lot size, lot coverage, and setback standards within the Waterfront Residential or other zones so that public lake views between buildings on adjacent lots are possible.

4.5.3 Regulate boathouses and other dock structures to allow for reasonable public access to, and views of, the lake.

Discussion: The Lake Stevens Center subarea is not contiguous to Lake Stevens, although it does not provide views of the Lake from some locations; please refer to the discussion in Section 3.6 of the Draft EIS.

Population Growth and Growth Management
Summary:

GOAL 4.9 ACCOMMODATE GROWTH THAT FACILITATES AND ENHANCES AN URBAN SMALL TOWN CHARACTER.

Policies

4.9.1 Accommodate new development to support a rate of growth that is consistent with the City's responsibilities under the Growth Management Act and the County-wide Planning Policies.

4.9.2 Ensure that growth is phased to maintain consistency with the City's Capital Facilities Plan for providing public facilities including streets, sidewalks, lighting systems, traffic signals, water, storm and sanitary sewer, parks and recreational facilities, and schools.

4.9.3 Assure that development provides for transportation access consistent with the level of service established for the community and is concurrent with the impacts of the development.

4.9.4 Encourage growth that is responsive to environmental concerns and that enhances the natural environment of the lake drainage basin and the areas watersheds.

4.9.5 An urban level of development shall be defined as gross densities area's of 4 dwelling units per acre or more.

4.9.6 The City will actively participate in Snohomish County Tomorrow's population monitoring strategy. The strategy will be used to amend the Plan as necessary to remain consistent with actual settlement patterns and population trends.

Discussion: Population growth associated with the action alternatives for the subarea plan would be consistent with the City's 2025 growth target. Growth within the subarea will be coordinated and consistent with the Comprehensive Plan's Capital Facilities Element; the element will be updated to reflect the subarea plan. As discussed in the Transportation section of the Draft EIS (3.8), planned growth will be consistent with adopted level of service standards and concurrency requirements and will provide improvements according to City standards. Planned residential densities are urban in character and would be determined by floor area ratios established in revised zoning regulations. Gross density for the entire subarea is currently 2.4 dwelling units per acre, which reflects the predominantly commercial nature of the center. For the subarea plan alternatives, gross residential density would increase from approximately 2.6 dwelling units per acre under the *No Action Alternative to* 2.9 dwelling units per acre for *Alternative 2*, and to approximately 4 dwelling units per acre for *Alternative 3*. Environmental resources will be protected pursuant to adopted critical area regulations. The draft Planned Action Ordinance (Appendix A) includes a provision for

regular monitoring of growth to ensure that planned development levels are not exceeded. The subarea plan would be consistent with these goals and policies.

Summary:

GOAL 4.11 DIRECT NEW RESIDENTIAL GROWTH TO AREAS WHERE INFRASTRUCTURE AND SERVICES ARE AVAILABLE.

Policies

4.12.1 Require retention of all trees within a 30' visual/noise buffer along SR 92, SR 9, and the Hartford/Machias Road (as measured from the edge of ultimate right-of-way). Where trees need to be removed because of instability, require replanting of 5-gallon (minimum) conifers at a 3:1 ratio within the 30' buffer.

4.12.2 Ensure that design of highway accessible/visible commercial uses along SR 92, SR 9, and the Hartford/Machias Road is aesthetically pleasing from both the roadway and the local roads.

***Discussion*:** The SR-9/ SR-204 intersection is a key development location and is identified as a commercial center in the City's Comprehensive Plan. Implementation of the subarea plan will include area-specific design guidelines and standards, which could supplement existing tree retention and landscaping requirements and establish standards for high quality design.

Residential Land Use

Summary:

GOAL 4.13 ACHIEVE A DIVERSE ARRAY OF HOUSING OPPORTUNITIES.

Policies

4.13.1 Allow for high density development in appropriate areas, e.g., near the Central Business District.

4.13.2 Allow manufactured single family residences on individual lots in the same zones and with the same land use permit requirements as a site built home, provided the manufacture homes are built to HUD standards, or to IBC standards and inspected by the State Department of Labor and Industries.

4.13.4 Allow accessory units in single family residential zones by right, without requiring an increase in lot size above the minimum set for that zone.

4.13.6 Create opportunities for low-income housing when necessary and/or appropriate.

***Discussion*:** Planned residential development in the subarea would be high-density multifamily in character. Most of this housing is likely to be for rent and could be relatively more affordable to many households. No changes to existing regulations regarding manufactured housing or accessory units are proposed. Some displacement of housing would occur under *Alternative 3* and is discussed in Section 3.5 of the Draft EIS. Proposed zoning regulations would provide incentives for affordable units.

Summary:

GOAL 4.14 PRESERVE AND PROMOTE CHARACTER OF EXISTING NEIGHBORHOODS.

Policies

4.14.1 Promote architectural design that is similar to that of historic homes (i.e., front porches, garages behind houses, gabled roofs, etc.).

GOAL 4.15 PRESERVE AND PROMOTE "SMALL TOWN" CHARACTER.

Policies

4.15.1 Promote architecture that is pedestrian friendly and conducive to human interaction (e.g., front porches, garages behind houses, small front yard setbacks, no "walled" neighborhoods).

4.15.2 Ensure that plat designs are pedestrian friendly (e.g., ample street trees, adequate sidewalks, walkways and paths connecting plats).

4.15.3 Require that all new residential development mitigate their impacts on demands for parks.

4.15.4 Review and revise Development Design Guidelines for Multi-Family Residential uses and Planned Residential Development.

***Discussion*:** As discussed in Section 3.3 (Land Use) of the Draft EIS, land uses of greater density and intensity would occur adjacent to existing single-family neighborhoods in some locations. Zoning regulations (e.g., setbacks, landscaping) and design guidelines and standards would be applied to mitigate potential land use conflicts and to preserve the character of existing neighborhoods. This is particularly applicable to the existing residential neighborhoods north of SR-204 and to several other sites near the edges of the subarea. Design guidelines and standards that are specific to the Lake Stevens Center will be developed and will help to establish consistent architectural design. In general, the subarea is being planned to be pedestrian friendly and to provide convenient connections between various land uses. Future demand for parks is identified in Section 3.8 (Public Services) of the Draft EIS will be mitigated project-by-project and on an area-wide basis. The subarea plan would be consistent with these goals and policies.

Commercial Land Use

Summary:

GOAL 4.20 PROMOTE NEIGHBORHOOD COMMERCIAL USES IN APPROPRIATE PLACES.

Policies

4.20.1 Allow the designation of property for neighborhood commercial uses on the Land Use map where the property:

a. is located at an intersection with at least one arterial street.
b. is at least one-half mile distance from other similarly designated properties.
c. results in no more than two acres of land being designated for neighborhood commercial uses at the same intersection.

4.20.2 Neighborhood Commercial is not a euphemism for "convenience store commercial." It is the intent of this policy to promote commercial uses catering to day to day needs of neighbors in locations that are easily reached by foot. Proposed uses shall clearly reflect this intent.

GOAL 4.22 APPLY COMMERCIAL LAND USE DESIGNATIONS TO PREVENT STRIP OR "LEAP-FROG" COMMERCIAL DEVELOPMENT.

Policies

4.22.1 Discourage strip development and encourage nodal development through adoption of zoning designations, specific design guidelines and development regulations.

***Discussion*:** Lake Stevens Center is one of the City's designated centers and is currently developed as a commercial node. The subarea plan would reinforce this pattern, intensify retail and office development, and encourage complimentary high-density housing. Several mixed-use areas are identified as well. The proposed land use pattern would discourage "strip development" and encourage high-quality contemporary retail centers concentrated in use-specific nodes. New or revised development and design regulations and standards will ensure that redevelopment and new construction meets the intent of this policy..

Summary:

GOAL 4.28 REQUIRE DEVELOPMENT TO BE SENSITIVE TO SITE CHARACTERISTICS AND TO PROTECT NATURAL RESOURCES.

Policies

4.28.1 Allow the use of Planned Residential Developments (PRDs) and Cluster Subdivisions on properties with environmentally sensitive areas as a means of transferring, within the boundaries of the site, development density from the sensitive to the non-sensitive portions of the site. Avoid development in erosion areas near water bodies that would require bank stabilization.

4.28.2 City shall promote the retention of significant trees during development.

4.28.3 Preserve existing vegetation as much as possible due to its vital role in the ground water and wildlife systems of Lake Stevens in order to prevent additional storm water runoff or soil erosion from new developments and to provide a habitat for wildlife.

4.28.4 Protect salmonid streams and natural drainage ways from adverse impacts of land development in order to maintain the stream flow regime necessary for continued life cycle activities, avoid unnatural bank or bed erosion and increased turbidity.

4.28.5 The City considers, and deems worthy of protection, the following sensitive resources: wetlands, streams and creeks, lakes and ponds, aquifer recharge areas, steep slopes, significant trees, fish and wildlife habitat and corridors, archaeological and historical sites and artifacts, geologically hazardous areas, and frequently flooded areas. In writing policies and regulations, the City shall consider the cumulative effects of land use and development.

GOAL 4.29 WHERE POSSIBLE, USE ELEMENTS OF THE NATURAL DRAINAGE SYSTEM TO MINIMIZE STORM WATER RUNOFF IMPACTS.

Policies

4.29.1 Encourage new developments to use natural drainage patterns and incorporate means to contain storm water pollutants.

4.29.2 Encourage new developments to implement "low impact development" techniques which can better manage stormwater while providing cost savings in terms of land and improvements.

GOAL 4.30 ENCOURAGE ENERGY-SAVING METHODS IN TRANSPORTATION, LAND USE, AND BUILDING CONSTRUCTION.

Policies

4.30.1 Encourage the development of paths and easements for non-motorized transportation to facilitate pedestrian and bicycle use throughout the City.

4.30.2 Encourage car pooling and use of public transit as an alternative to single-person use of automobiles.

4.30.3 Encourage new developments to compliment and improve development of a grid system to reduce public and private utility and transportation costs.

4.30.5 Encourage small scale, neighborhood compatible, commercial uses to be distributed throughout the community, thus reducing the need to drive to the nearest "big-box" retailer to pick up day to day convenience items. It also provides the opportunity for pedestrian access to stores along with the health and social benefits related to pedestrian activity.

GOAL 4.31 PROTECT SPECIAL HISTORIC, ARCHITECTURAL, AESTHETIC OR CULTURAL RESOURCES THROUGH THE DESIGNATION OF HISTORIC LANDMARKS AND DISTRICTS AND THE ADOPTION OF APPROPRIATE INCENTIVES.

GOAL 4.32 PROMOTE THE IDENTIFICATION, MAINTENANCE, AND PRESERVATION OF GEOGRAPHICAL AREAS OR STRUCTURES WHICH HAVE SPECIAL SIGNIFICANCE BECAUSE OF HISTORICAL, ARCHAEOLOGICAL, ARCHITECTURAL, RECREATIONAL, SOCIAL, CULTURAL, AND/OR SCENIC IMPORTANCE.

Policies

4.32.2 Encourage the development of written narratives and maps for self-guided tours of significant areas and the provision for site markers to identify significant sites.

4.32.3 Encourage additions and alterations to significant architectural buildings to conform to the style and period of the initial construction as much as possible.

***Discussion*:** As discussed in Section 3.1 (Natural Environment) of the Draft EIS, the subarea contains several wetlands and a non-fish bearing stream. The subarea is almost completely developed with only 24 acres of undeveloped land remaining. Existing natural resources would be protected by the city's critical area regulations. Planning the

subarea as a whole would enable the City to consider area-wide mitigation strategies where appropriate.

Stormwater planning will be based on natural drainage systems and encourage low impact development. The City will apply its adopted stormwater regulations to manage stormwater and improve water quality. New development regulations specific to the subarea will consider providing incentives for use of low impact development techniques.

The subarea will contain a network of sidewalks, paths and bikeways, including a new main street, to encourage non-motorized travel. Mixing higher density commercial and residential land uses in a pedestrian oriented pattern proximate to transit, as is proposed in *Alternative 2* and particularly in *Alternative 3*, will also facilitate walking and reduce transportation-related energy consumption. New roads and an improved street grid will be part of the subarea plan.

The subarea does not contain any known historic or cultural sites.

Housing Summary:

GOAL 3.1 SUPPORT THE NEED FOR A VARIETY OF HOUSING TYPES AND DENSITIES, AND THE NEED FOR AFFORDABLE HOUSING THROUGH REGULATIONS AND CAPITAL INVESTMENTS.

<u>Policies</u>

3.1.6 Permit innovative housing options as infill with specific design considerations to ensure it is compatible with the expected future development of the neighborhood.

3.1.8 Allow flexibility in setback, lot coverage and unit size standards in return for exemplary design and neighborhood amenities.

GOAL 3.2 ENCOURAGE THE NEW DEVELOPMENT OF MULTI-FAMILY HOUSING AND SMALL SINGLE FAMILY UNITS IN A MANNER THAT IS COMPATIBLE WITH EXISTING NEIGHBORHOODS.

GOAL 3.3 INCREASE THE OPPORTUNITY FOR ALL RESIDENTS TO PURCHASE OR RENT AFFORDABLE, SAFE, AND SANITARY HOUSING.

GOAL 3.4 TO ADDRESS THE NEEDS OF THE ELDERLY, A PORTION OF THE RESIDENTIAL LAND SHOULD BE ZONED FOR HIGH DENSITIES TO ENCOURAGE THE PROVISION OF COMPACT HOUSING TYPES (CLUSTER, TOWNHOUSE, APARTMENT, OR CONDOMINIUMS) AND PLANNED RESIDENTIAL DEVELOPMENTS (PRDs).

Policies

3.4.1 Support the development of housing for the elderly, handicapped, or other special-needs populations through the allowance of PRDs, mixed-use housing, group housing, and other measures in appropriate areas.

3.4.2 In siting development for the elderly, review the proximity to shopping, hospitals, public transportation routes, retail and service centers, and parks.

GOAL 3.5 STRIVE TO PROVIDE A DEVELOPMENT PATTERN WHICH PROMOTES PEDESTRIAN ACTIVITIES, A SENSE OF COMMUNITY AND SAFETY. STRIVE TO PROVIDE HOUSING IN GOOD CONDITION, WITH HIGH QUALITY DESIGNS, PROTECTIONS FROM NOISE, ODORS, AND OTHER ENVIRONMENTAL STRESSES.

GOAL 3.6 STREAMLINE AND SHORTEN PERMIT PROCESSING WHERE AND WHEN EVER POSSIBLE.

***Discussion*:** Many of the goals and policies, in the Housing Element, encourage the development of varied housing types (e.g., single-family, multifamily, congregate housing) to support the needs of a diverse population. Residential development within the subarea would include high-density multifamily housing, including rental apartments and condominiums. Design guidelines and standards would promote compatibility of higher density/intensity development with existing residential neighborhoods. Zoning regulations could also include incentives to encourage public amenities. Other goals emphasize the equitable distribution of affordable, well designed, and quality housing for all economic levels and age groups. Depending on future development proposals and market conditions, higher density housing could include housing for the elderly and other special needs populations along with different financial segments. The housing element also promotes developing residential neighborhoods that provide pedestrian activities, a sense of community and safety. The planned mix of uses in a concentrated area would enhance access to services for the subarea's population. Zoning regulations and design guidelines and standards would ensure that new development mitigates its impacts and is compatible with existing neighborhoods. The development pattern proposed for the subarea would concentrate a mix of activities and make walking and biking provision more comfortable.

Some existing affordable single-family housing could be displaced under *Alternative 3* and replaced with higher density multifamily housing. In general, such housing would be relatively more affordable than single-family structures. Incentives included in proposed zoning regulations would also encourage provision of affordable housing.

The Planned Action technique proposed for the subarea would expedite environmental review and shorten the permit process for qualifying projects. In general, *Alternative 2* and *Alternative 3* would be more consistent with these goals than the *No Action Alternative*.

Economic Development

Summary:

GOAL 9.2: REVITALIZE, MAXIMIZE, AND ENERGIZE THE DOWNTOWN, SOUTH LAKE AND FRONTIER VILLAGE AREAS AS THE KEY GROWTH CENTERS FOR RETAIL, OFFICE AND SERVICE CENTERS OF LAKE STEVENS.

GOAL 9.3: PROVIDE A PREDICTABLE DEVELOPMENT ATMOSPHERE, EMPHASIZE DIVERSITY OF GOODS AND SERVICES AVAILABLE, AND ENSURE EMPLOYMENT OPPORTUNITIES ARE BALANCED WITH A RANGE OF HOUSING OPPORTUNITIES.

Policies

9.3.1 Provide opportunities to achieve a jobs/housing balance that encourages and advances smart growth goals including financial stability, environmental integrity, and a healthy community.

9.3.2 Develop strategies and techniques to adjust the balance at an appropriate rate that the regional market can absorb.

GOAL 9.5: IMPROVE THE CITY'S ECONOMIC CONDITION FOR A HEALTHY, VIBRANT AND SUSTAINABLE COMMUNITY.

Policies

9.5.1 Develop a comprehensive economic development strategy guiding land use planning resources that will:
A. Diversify sustainable revenue sources that weather swings in economic cycles.
B. Promote job creation for its residents.
C. Provides a strategy based on an up-to-date market analysis and forecasting.
D. Identifies potential employment sectors that will flourish in the Lake Stevens environment given its location to Everett, US2, and the I-5 corridor.

9.5.2 Coordinate with other appropriate regional agencies to help advance economic development goals and policies.

9.5.3 Develop economic development recruitment strategies that take advantage of Lake Steven's community attributes and assets.

9.5.4 Coordinate and balance the economic development strategies and techniques in growth centers that complement the existing growth centers for maximum economic benefit.

***Discussion*:** The Economic Development Element stresses the need for the City to diversify its economy by promoting a balanced employment sector that increases office, and retail employment with a secondary emphasis on entertainment-oriented commercial uses and industrial uses. The Lake Stevens Center Subarea is intended to become a vibrant mixed-use center that will contain a substantial number of new jobs and enhanced retail opportunities, as well as provide increased higher density housing opportunities. Jobs increases would vary from a low of 190 under the *No Action Alternative* (low range estimate) to 750 under *Alternative 2* (high range estimate). This potential increase represents between 5.6 percent (*No Action*, low range estimate) and 22 percent (*Alternative 2*, high range estimate) of the citywide 2025 employment increase. Economic benefits could include increased wages, greater wealth and higher levels of local spending and economic activity. Fiscal benefits accruing to the City could include increased revenues and fees, which could improve the City's fiscal stability.

Transportation

The following discussion is focused on relevant goals and policies that would be affected or modified by the subarea plan and associated growth. These goals and policies generally relate to the operational efficiency of the roadway network, level of service, and non-motorized circulation.

Summary:

GOAL 6.1 PROVIDE A ROADWAY NETWORK WHICH MEETS ADOPTED LEVEL OF SERVICE STANDARDS.

Policies

6.1.1 For traffic levels of service, the City adopts LOS C for residential areas and LOS D in the central business district at peak hour for all arterial roadways.

6.1.3 Provide a safe, convenient and efficient transportation system.

6.1.7 Develop criteria for the signing of streets, with the goal of providing a smooth, efficient transportation system.

Discussion: The Draft EIS concludes that it may not be financially feasible to maintain the existing Level of Service – LOS C – in Lake Stevens Center, and recommends that the City adopt LOS E as a measure that will balance land use with the transportation system. The subarea plan is intended to create a land use pattern and circulation system that will make walking and biking more practical and comfortable. Proposed design

guidelines and standards would establish criteria for signage within Lake Stevens Center.

Summary:

GOAL 6.2 STRIVE FOR CONTINUOUS AND LONG TERM EXPANSIONS TO THE TRAIL AND PEDESTRIAN SYSTEM.

Policies

6.2.1 Private property owners shall be required to install new right-of-way improvements, including curbs, gutters, sidewalks, and planting strips, for all new development projects.

6.2.3 The City will continue to incorporate regular and routine consideration of bicycles in accordance with the Washington Department of Transportation, and the American Association of State Highway and Transportation Officials (AASHTO) standards in all transportation improvements.

Discussion: Proposed zoning regulations and design guidelines and standards would supplement existing requirements for right-of-way improvements by property owners. A trail system is proposed within portions of the powerline corridor that would create connections to other portions of the City. The plan also propose trail connections within or through existing or new neighborhoods as feasible. The subarea plan includes improvements and would help to create an environment that is more conducive to biking.

Summary:

GOAL 6.3 BY 2012, REDUCE THE ACCIDENT RATE AT REPRESENTATIVE LOCATIONS ON THE ROADWAY SYSTEM WITHIN THE CITY BY AT LEAST 5%.

Policies

6.3.1 The City shall identify specific high accident intersections on both the collector and arterial system and develop and implement appropriate plans to effectively lower the accident rate.

6.3.2 The City will develop and maintain traffic control devices in accordance with adopted guidelines.

6.3.3 Standards should be developed which enhance the safety of pedestrians and motorists in regard to sidewalk design and maintenance, lighting requirements, signs, and access to properties.

Discussion: No high accident locations have been identified within the Lake Stevens Center subarea.

Summary:

GOAL 6.4 ENSURE THAT THE TRANSPORTATION SYSTEM IS ADEQUATE TO SERVE ALL EXISTING AND FUTURE LAND USES. IN ADDITION, THE CITY WILL DEVELOP A CONCURRENCY MANAGEMENT SYSTEM, EXPLORE ALTERNATIVES FOR DEMAND MANAGEMENT, AND SECURE ADEQUATE FINANCING FOR TRANSPORTATION.

Policies

6.4.1 New roads shall be routed so as to avoid traversing publicly-owned natural preserves, parks and recreation areas, and areas identified as critical wildlife habitat, except in cases of overriding public interest.

6.4.2 The City will coordinate with the Washington Department of Transportation in the selection of the criteria used to establish future right-of-way cross sections of the state highway system.

6.4.3 Traffic impacts shall be determined through project-specific impact assessment reports, which shall be required of every project for which the concurrency test must be applied.

Discussion: No proposed roads or improvements would affect identified critical areas. The City will continue to coordinate closely with WSDOT regarding improvements to SR-9 and SR-204. Future development proposals will prepare project-specific traffic assessments to determine whether they meet concurrency requirements and are consistent with the analysis in the EIS.

Summary:

GOAL 6.5 PROVIDE AN AFFORDABLE LEVEL OF SERVICE FOR THE ROADWAY NETWORK.

Policies

6.5.1 The City will maintain a list of annually updated road improvement priorities.

6.5.2 Upon the annual date of adoption, the City's concurrency management system may be revised as part of the annual review and amendment of the Comprehensive Plan.

6.5.3 The City will coordinate with the PSRC Regional Transportation Planning Organization to ensure consistency and compatibility between transportation plans.

6.5.4 In order to preserve the character of neighborhoods, City Council may adopt reduced road standards for built neighborhoods where necessary for the provision of safer pedestrian access.

***Discussion*:** Transportation improvements associated with the subarea plan will be adopted in the City's Transportation Improvement Program. As discussed in the Transportation section of the Draft EIS (Section 3.7), a modification to the adopted level of service may be considered for Lake Stevens Center.

Summary:

GOAL 6.6 ESTABLISH MECHANISMS TO REDUCE THE DEMAND FOR TRANSPORTATION FACILITIES SUCH AS CAR/VAN POOL, AND STAGGERED WORK HOURS.

Policies

6.6.2 Land use and density of development will be coordinated with transportation centers within the City to support and encourage the use of transit. Clustering and other development techniques will be encouraged near transit access area.

6.6.3 Work with Community Transit to identify the best routes, stops and scheduling to best serve the community, encourage use and maximize the efficiency of public transportation.

6.6.4 Encourage developers to consider public transportation in transportation plans submitted as part of preliminary plat consideration.

6.6.5 Coordinate public transportation corridors with Community Transit and neighboring communities.

6.6.6 Encourage and plan for "pedestrian-scale" neighborhoods and centers to enhance access and mobility for public transportation users.

6.6.7 Continue to coordinate with all agencies and neighboring jurisdictions involved with public transportation, whether they be bus, HOV lanes, light rail, heavy rail, ride sharing, van pooling, or other forms, to identify what is of best use to the citizens of the City and participate in those ventures and proposals which are of general, and/or specific, benefit to the citizens of the City.

Discussion: The subarea plan encourages compact, higher density, mixed-use development within a designated center which contains an existing transit center. A transit-oriented development (TOD) site is identified proximate to the transit center. This land use pattern could encourage greater use of public transit. Non-motorized improvements would also make walking and biking more convenient and pleasant.

Summary:

GOAL 6.7 ALLOW FOR ALTERNATIVE DESIGN STANDARDS, AND/OR MATERIALS FOR STREET AND PARKING AREAS.

Policies

6.7.1 Explore the feasibility of reducing right-of-way widths by using new materials (e.g., grasscrete) for emergency vehicle turn-around.

6.7.2 Encourage increased levels of pervious surfaces in parking lots by using new designs and/or materials (e.g., grasscrete).

6.7.3 Study the feasibility of adopting increased design standards for certain arterial "entryways" into the community.

6.7.4 Encourage low impact development projects and low impact development techniques on non-LID projects to conserve and use existing natural site features; integrate distributed, small-scale stormwater controls; and prevent measurable harm to streams, lakes, wetlands, and other natural aquatic systems from commercial, residential, or industrial development sites by maintaining a more hydrologically functional landscape.

Discussion: The draft subarea plan includes policies which encourage integration of development with natural systems and the use of LID techniques to manage stormwater. The subarea plan would also establish and guide the design of gateways to the subarea.

Summary:

GOAL 6.8 TRANSPORTATION IMPROVEMENTS SHALL BE PRIORITIZED AND FINANCED CONSISTENT WITH THE CAPITAL FACILITIES ELEMENT, AND ALL POSSIBLE AVENUES OF PAYING FOR THE IMPROVEMENTS SHOULD BE EVALUATED FOR AVAILABILITY AND FAIRNESS.

Policies

6.8.1 The City may investigate and consider creating a street utility district to share the cost of capital street improvements over all users.

6.8.2 Continue to require developers to pay for improvements related to the impacts of their developments.

6.8.3 Keep transportation improvement cost estimates current to collect appropriate shares from developers and users as established.

6.8.4 The City will investigate alternative methods of obtaining financing for transportation improvements, including: local option taxes, bonding, Local Improvement Districts, combining efforts with other agencies,

investigate all possible grant and loan opportunities such as the Public Works Trust Fund, Intermodal Surface Transportation Efficiency Act funding, and interlocal agreements for mitigation costs with Snohomish County.

6.8.5 If funding is unavailable, or if development is progressing beyond the ability to provide sufficient transportation facilities, development moratoriums may be necessary until the transportation facilities can be brought into alignment with approved LOS.

6.8.6 The City will develop an annual Six Year Transportation Improvement Program (TIP) to correlate with improvements identified in the Transportation Element and the Capital Facilities Element (consistent with GMA, only funded TIP projects will be included in the Capital Facilities Element).

Discussion: The Draft EIS recommends that the City consider several approaches – including a traffic impact fee and/or transportation benefit district – to help fund needed transportation improvements. The City will implement adopted programs, including the transportation improvement program and concurrency requirements, to ensure that provision of facilities is coordinated with subarea growth. An update to the Comprehensive Plan Transportation Element and TIP will be considered in conjunction with adoption of a subarea plan for Lake Stevens Center.

Summary:

GOAL 6.11 COMMIT TO MEETING FEDERAL AND STATE AIR QUALITY REQUIREMENTS AND WORK WITH STATE, REGIONAL, AND LOCAL AGENCIES AND JURISDICTIONS TO DEVELOP TRANSPORTATION CONTROL MEASURES AND/OR SIMILAR MOBILE SOURCE EMISSION REDUCTION PROGRAMS THAT MAY BE WARRANTED TO ATTAIN OR MAINTAIN AIR QUALITY REQUIREMENTS.

<u>Policies</u>

6.11.1 Encourage residents and businesses to maintain or improve air quality by completing emissions testing, using alternative transportation, discouraging burning of yard wastes and slash, and discouraging the use of uncertified wood stoves and fireplaces.

6.11.2 Take a lead role in encouraging other modes of transportation by using more efficient vehicles and alternative-fueled vehicles in the City fleet and by encouraging employees use alternative transportation to work.

6.11.3 Encourage alternatives to automobile transportation by promoting improvements to the public transit system, increasing availability of

bicycling and walking facilities, and limiting the amount of parking that may be included in some new developments.

6.11.4 Consider alternative transportation options when considering land use decisions and designations to support increased use of walking, biking, carpooling, and bus riding.

6.11.5 Encourage conservation of trees and vegetation through development regulations and incentive mechanisms.

6.11.6 Advocate with Community Transit in designing a public transportation system compatible with the City's centers growth strategy.

***Discussion*:** The air quality analysis contained in the Draft EIS (Section 3.2) indicates that growth as proposed under any of the subarea plan alternatives would satisfy federal and state air quality requirements. The compact, higher density, mixed-use land use pattern of *Alternative 2* and *Alternative 3*, and focusing growth in a designated center, could also encourage increase of public transit, walking and biking.

3.5 POPULATION, HOUSING & EMPLOYMENT

3.5.1 Affected Environment

Population

Population & Household Growth

In 2000, the population of Lake Stevens was 6,631. As of 2010, the Office of Financial Management (OFM) estimates the population to be 26,6701, with 10,206 housing units. The City's recent growth has largely been the result of annexations; OFM estimates that between 2000 and 2010 the City annexed 18,223 people. Table 3.5-1 shows population growth for Lake Stevens and Snohomish County between 2000 and 2010.

There are roughly 851 residential units (households) in the Lake Stevens Center subarea, including all housing types. Based on the City's current average household size of 2.87 persons per household, the current population for the study area is approximately 2,442, which represents 9.2 percent of the City's total population.

By 2025, the Comprehensive Plan forecasts that the City's population will grow to more than 46,000. A recent study prepared for the City projects that the population growth rate in Lake Stevens will be 1.63 percent between 2009 and 2014, which is faster than Snohomish County (1.54 percent) and the Puget Sound region (1.18 percent) (Leland Consulting Group and LMN Architects, 2011a). Using this growth rate, assuming existing zoning, the study area could have a population of 2,641 by 2014. Extending this same growth rate to 2025 would result in a study area population of approximately 2,900; this would represent approximately 6.3 percent of citywide population.

Table 3.5-1. Population Growth Trends[1]

Area	2000 Population	2010 Population	Percent Change
Snohomish County	606,024	711,110	17.34%
Lake Stevens	6,361	26,670	319.27%

Source: WA State Office of Financial Management 2010 Population Trends / OFM 2010 Population Worksheet

As shown in Table 3.5-2, between 2000 and 2010, households in Lake Stevens increased by over 356.85 percent from development and annexation, compared to a 20.02 percent increase in Snohomish County.

[1] The reconciled OFM and Census Bureau data for Lake Stevens is 28,069 and the reconciled population estimate for Snohomish County is 713,335. Source: OFM Fact Sheets OFM/Forecasting Division February 24, 2011.

Table 3.5-2. Household Growth Trends

Area	2000 Households	2010 Households	Percent Change
Snohomish County	236,205	283,495	20.02%
Lake Stevens	2,234	10,206	356.85%

Source: WA State Office of Financial Management 2010 Population Trends / U.S. Census Bureau, 2005-2009 American Community Survey
Note: Census Bureau data excludes annexations completed in 2010

Race and Ethnicity

The City of Lake Stevens is less diverse ethnically than Snohomish County and Washington State, as shown in Table 3.5-3. Minorities make up about 19 percent of the population in Lake Stevens, compared to nearly 25 percent in Snohomish County. The largest minority group is Hispanic/Latino (of any race), followed by mixed race and Asian populations. Based on the 2010 Census, 4.8 percent of the City's population was born outside of the United States. The subarea likely shares similar ethnic characteristics with the greater City.

Table 3.5-3. Racial Characteristics

Race	Lake Stevens	Snohomish County	Washington	United States
White	87.4	82.1	80.04	74.5
Black or African American	1.7	2.1	3.4	12.4
American Indian, Alaska Native	1.2	1.2	1.4	0.08
Asian	3.1	7.9	6.6	4.4
Native Hawaiian, Pacific Islander	0.1	0.3	0.4	0.1
Hispanic, Latino of any race	6.2	7	9.6	15.1
Some other race	1.8	2.6	3.9	5.6
Two or more races	4.8	3.9	3.8	2.2

Source: U.S. Census Bureau, 2005-2009 American Community Survey

Age and Gender

The majority of the City's population is over the age of 18. About 32 percent of the population is under the age of 18, which is slightly higher than in Snohomish County and Washington State (See Table 3.5-4.) The percentage of the population over the age of 65 is below the County and State averages. According to the U.S. Census Bureau, the median age in Lake Stevens is 32.9 (2005-2009 American Community Survey). In

comparison, the median age in Snohomish County is 36.4. Age characteristics in the study area are likely similar to the city as a whole.

The City's population is roughly equal in gender – 49.2 percent male and 50.8 percent female. The subarea's population is likely similar in terms of age and gender.

Table 3.5-4. Age Profiles

Age Categories	Lake Stevens	Snohomish County	Washington	United States
Under 5 years	8.7	6.9	6.7	6.9
5 to 17 years	23.1	18.3	17.3	12.4
18 and over	68.2	74.8	76.1	75.4
65 and over	5.3	9.6	11.8	12.6

Source: U.S. Census Bureau, 2005-2009 American Community Survey

Household Characteristics

Approximately 73 percent of Lake Stevens households are "family households" (i.e., related persons), while 27 percent are "non-family households" (i.e., unrelated singles and singles with roommates). The family household component in Lake Stevens is greater than that of Snohomish County (68 percent) and the non-family household component is lower than Snohomish County (32 percent). Because of the slightly higher percentage of multifamily units in the study area, the family household numbers may be closer to the county average.

Income and Poverty

Generally, families in Lake Stevens and Snohomish County have higher incomes and a lower poverty rate compared to the state and regional averages. The 2009 median family income for Lake Stevens is $75,574 compared to $75,955 in Snohomish County, while the Washington median household income was $68,457.

The family poverty rate in the City is 5.4 percent, 5.6 percent in Snohomish County, and 7.9 percent statewide. Statistically, the poverty ratio increases for individuals in non-family households. Table 3.5-5, compares the income ranges for households and families in the City of Lake Stevens and summarizes the median and mean incomes for these groups.

As noted elsewhere, the study area includes multifamily units and manufactured homes; in general, these types of units may be more affordable to a broader population. This may also affect the income and poverty profile for the study area to some degree.

Table 3.5-5. Median Household Incomes

Subject	Households[2]	Families	Nonfamily households
Less than $10,000	4.60%	3.80%	10.60%
$10,000 to $14,999	2.40%	0.80%	6.90%
$15,000 to $24,999	4.00%	3.20%	8.80%
$25,000 to $34,999	5.90%	5.50%	9.10%
$35,000 to $49,999	13.80%	13.70%	12.70%
$50,000 to $74,999	22.70%	22.60%	18.30%
$75,000 to $99,999	21.70%	22.10%	21.20%
$100,000 to $149,999	16.50%	17.30%	11.80%
$150,000 to $199,999	5.30%	7.00%	0.70%
$200,000 or more	3.10%	4.10%	0.00%
Median income (dollars)	$71,893	$75,574	$51,757
Mean income (dollars)	$85,591	$94,664	$54,320

Source: U.S. Census Bureau, 2005-2009 American Community Survey

Housing

Characteristics of the Housing Stock

Between 2000 and 2010, Lake Stevens experienced a dramatic increase in housing units because of development and annexations. Housing growth, summarized in Table 3.5-6, includes a measurable increase in single-family residences, multifamily units, and manufactured homes.

Table 3.5-6. Change in Housing Units by Structure Type, 2005 – 2010

Structure Type	2000	2010	Actual	Percent Change
One Unit	1,778	8,026	6,248	351.41%
Two or More Units	456	1,755	1,299	284.87%
Mobile Home, Trailer, Special Housing	0	425	425	
Total	2,234	10,206	7,972	356.85%

Source: State of Washington Office of Financial Management, 2010 Population Trends

As shown in Table 3.5-7, the majority of residences in the City were constructed after 1990. This is also true of the study area; however, it is worth noting that there is a large

[2] As the income information for Snohomish County and the City of Lake Stevens are similar, no significant differences in income and poverty levels for annexed households are anticipated.

neighborhood centered between Frontier Circles East and West constructed in the late 1960s that makes up a portion of the residential units constructed before 1979.

Table 3.5-7. Age of Housing

Year Built	Snohomish County	Lake Stevens	Study Area[3]
2000 or later	16.0%	21.2%	27.34%
1990 to 1999	22.7%	33.3%	46.56%
1980 to 1989	18.4%	15.3%	0.0%
1960 to 1979	27.8%	22.5%	26.11%
1959 or Before	15.2%	7.7%	0.0%

Source: U.S. Census Bureau, 2005-2009 American Community Survey / Snohomish County Assessors Data 2011

Housing in the City is currently predominantly single-family; multifamily developments of four or more units are limited. The City's proportion of single-family housing is greater than Snohomish County's as a whole, while the multifamily component is less.

As shown in Table 3.5-8, the City has a greater proportion of single-family units and a lower proportion of multifamily units than the County as a whole. In comparison to the rest of the city, the proportion of the subarea devoted to single-family housing (18.54 percent) is smaller than that in the rest of the City, while the proportion of multifamily units is almost identical to the rest of the City. This reflects the concentration of commercial uses in the subarea. The subarea also includes a greater proportion of manufactured homes (82 units, 3.81 percent of the study area) compared to the city as a whole (1.2 percent overall). Most of these units are situated in a 14-acre park on the western edge of the subarea

[3] The percentages shown were the result of a survey of platted developments where the construction of units generally occurs around the same time. In total 567 units were sampled out of 851. Individually built lots may cause the percentages to fluctuate slightly or represent categories not shown.

Table 3.5-8. Percentage of Units by Structure Type

Structure Type	Snohomish County	Lake Stevens	Study Area
1 unit, detached	63.9%	79.7%	18.54%
1 unit, attached	4.1%	3.9%	
2 units	2.6%	7.8%	
3 or 4 units	3.5%	1.9%	7.34%
5 to 9 units	4.8%	2.2%	
10 or more units	14.6%	3.3%	
Mobile homes/other	6.5%	1.2%	3.81%

Source: U.S. Census Bureau, 2005-2009 American Community Survey / 2011 Snohomish County Assessors Data

The Lake Stevens Housing Market

Vacancy Rates and Ownership

As shown in Table 3.5-9, between 2005 -2009, the vacancy rate in Lake Stevens was 5.7 percent, while the statewide rate was 8.5 percent. A vacancy rate of five percent generally represents a "balanced" market, where the supply of new and existing units meets the demand of those seeking units. Vacancy rates between one and three percent indicate a "tight" housing market where demand for units is high. Lower vacancy rates are typically associated with higher housing costs based on the greater demand. High vacancy rates indicate an oversupply of available housing units and a market in which property owners are having difficulty renting units or selling properties.

Table 3.5-9. Comparative Vacancy rates and Occupancy, 2005 - 2009

	Total Vacancy Rate	Owner-occupied housing units	Renter-occupied housing units
Washington State	8.5%	65.3%	34.7%
Snohomish County	5.1%	68.1 %	31.9%
Lake Stevens	5.7%	70.2 %	29.8%

Source: U.S. Census Bureau, 2005-2009 American Community Survey

Lake Stevens' residents are more likely to own their own homes than are residents of comparable areas (Leland Consulting Group and LMN Architects, 2011a). The Lake Stevens homeownership rate is 72.5 percent, compared to less than 60 percent for the Puget Sound region and Washington State. From 2005 to 2009, the City occupancy rate for owner-occupied housing units was 70.2 percent and 29.8 percent for renter-occupied housing units, which is comparable to the County and State data.

Housing Costs

Table 3.5-10 shows the estimated monthly housing costs for mortgaged and rental units found in Lake Stevens and Snohomish County. Between 2005 and 2009, the median monthly housing cost in Lake Stevens was $1,879 for owner-occupied units with a mortgage and $1,941 in Snohomish County. As expected, the monthly housing cost locally is greater than in the state ($1,704). The monthly housing cost for units without a mortgage was $627 in Lake Stevens and $546 in Snohomish County, while the state housing cost for units without a mortgage was $461. The U.S. Census bureau defines the monthly housing costs as the selected monthly costs calculated from the sum of mortgage payments, real estate taxes, insurance, utilities, fuel, mobile home costs, and condominium fees. Gross rent, during this time, (i.e., contract rent amount plus the estimated cost of utilities and fuels), was higher in Lake Stevens ($1139) than in Snohomish County ($960). Statewide, gross rent was $853 in this same period.

Table 3.5-10. Monthly Median Housing Costs, 2005-2009

Monthly housing costs 2005-2009	Mortgaged housing units	Renter-occupied housing units
City of Lake Stevens	$1,879.00	$1,139.00
Snohomish County	$1,941.00	$960.00
Washington State	$1,704.00	$853.00

Source: U.S. Census Bureau, 2005-2009 American Community Survey

Federal standards consider rental housing "affordable" if a household pays no more than 30 percent of their income for rent and utilities. Housing affordability is often an issue for households with 30 percent (extremely low-income), 50 percent (very low-income), and 80 percent (low-income) of median income. Looking back to Table 3.5-5, the City income data suggest that for households of four, 16.9 percent of City households make 30 percent or less of the Average Median Income (AMI); 30.7 percent of City households make 50 percent or less of AMI; and 53.4 percent of City households make 80 percent or less of AMI. This analysis suggests that housing costs for nearly 53 percent of households of four or more are not affordable across all income levels. Snohomish County projects that the Lake Stevens UGA will need to accommodate 4,174 low to moderate-income households by 2025. Table 3-5-11 shows the 2010 federal income limits for households in these income categories. Table 3.5-12 compares fair market and affordable rents for Snohomish County in 2010

Table 3.5-11. Snohomish County 2010 Federal Income Limits Summary

Household Size	30% Median	50% Median	80% Median
1	$18,000	$30,000	$45,100
2	$20,600	$34,250	$51,550
3	$23,150	$38,500	$58,000
4	$25,700	$42,800	$64,400
5	$27,800	$46,250	$69,600
6	$29,850	$49,650	$74,750
7	$31,900	$53,100	$79,900
8	$33,950	$56,500	$85,050

Source: U.S. Department of Housing and Urban Development, 5/2010

Table 3.5-12. 2010 Fair Market and Affordable Rents for Snohomish County

Rate	Studio	One Bedroom	Two Bedroom	Three Bedroom	Four Bedroom
Fair Market	$770	$878	$1,056	$1,492	$1,823
30% Median	4231	$263	$317	$448	$547
50% Median	$385	$439	$528	$746	$911.5
80% Median	$616	$702	$845	$1,194	$1,458

Source: U.S. Department of Housing and Urban Development, 5/2010, rounded to nearest dollar

Based on 2010 Census data, nearly 33 percent of renters in Lake Stevens and 47 percent in Snohomish County pay 30 percent or more of their income on rent and utilities. Table 3.5-13 compares market costs to income categories in Snohomish County and illustrates the general percentage of household incomes in Snohomish County and the City of Lake Stevens. Monthly housing costs were greater in Lake Stevens at 47.6 percent, while the housing costs in Snohomish County were less at 44.6 percent.

Table 3.5-13. Housing Costs as a Percentage of Household Income

	Snohomish County		Lake Stevens	
	Gross Rent	Housing Costs	Gross Rent	Housing Costs
29.9% or less	52.7%	55.5%	67.3%	52.4%
30% or more	47.3%	44.6%	32.7%	47.6%

Source: U.S. Census Bureau, 2005-2009 American Community Survey

Home Ownership

Between 2005 and 2009, as shown in Table 3.5-14, the average median home price was $330,400 in Snohomish County and $316,500 in the City of Lake Stevens (US Census Bureau 2011). In 2010, the median price in Snohomish County was $275,000 (WCRER December 2010). Despite the relatively high cost of housing in the City, it is still one of the more affordable housing markets in the County (Leland Consulting Group and LMN Architects, 2011a). Based on a summary of Northwest Multiple Listing Service data compiled between June 2009 to June 2010 for NE Snohomish County, which includes Lake Stevens, housing prices in this area have decreased by 1.7%, which compares favorably to the rest of Snohomish County, where prices have dropped an average of 10.56 percent (Leland Consulting Group and LMN Architects, 2011a: 16).

Table 3.5-14. Average Housing Cost in Snohomish County and Lake Stevens (2005-2009)

	Snohomish County	Lake Stevens
Median Home Price	$330,400	$316,500
Cost below 199,999	14.40%	12.00%
200,000 to 499,999	78.40%	69.30%
Over 500,000	9.60%	16.20%

Source: U.S. Census Bureau, 2005-2009 American Community Survey

Employment & Economics

Employment

The Puget Sound Regional Council (PSRC) estimates that there were 3,248 total jobs in the City of Lake Stevens in 2009, as shown in Table 3.5-15. Overall, employment grew during the 2005 – 2009 period by approximately 39.86 percent annually. There were notable increases in several categories, with the exception of education and manufacturing jobs that decreased during this period. The most significant increases were in the retail, FIRE (finance, insurance and real estate), and services sectors. As discussed earlier, a percentage of the growth resulted from recent annexations (including Frontier Village and the southwest UGA).

Table 3.5-15. City of Lake Stevens Employment by Job Category

Job Sector	2005	2009	Annual Growth
Construction/Resources	132	308	33.33%
FIRE	20	130	137.5%
Manufacturing	78	71	<-2.24%>
Retail	35	697	472.86%
Services	247	1,220	98.48%
WTU	54	63	4.17%
Government	69	178	39.49%
Education	617	581	<-1.46%>
Total	1,252	3,248	39.86%

Source: Puget Sound Regional Council, April 2010

PSRC's 2006 Forecasts of Population, Households and Employment included an analysis of FAZ 7905, the Frontier Village Area, which roughly matches the boundaries of the subarea and represents area employment trends. This forecast showed an overall annual growth rate of 5.37 percent, which is below the City's growth rate for an overlapping period. The largest growth sectors in this area were manufacturing and WTCU (wholesale trade, communications & utilities), which is surprising based on observations of actual land uses. Table 3.5-16 provides a summary of employment trends in the Frontier Village area for different job sectors and includes the annual growth rate for these sectors between 2000 and 2010.

Table 3.5-16. Frontier Village (FAZ 7905) Employment Estimate

Study Area Job Sector	2000	2010	Annual Growth
Manufacturing	90	357	29.67%
WTCU	46	93	10.22%
Retail	947	1,166	2.31%
FIRES	551	806	4.63%
Government/Education	672	1,122	6.97%
Total	2,306	3,544	5.37%

Source: Puget Sound Regional Council, October 2006.

The City's current employment target for 2025, used for planning purposes, is 6,615, which reflects an increase of approximately 3,367 jobs. As part of the next regularly scheduled Comprehensive Plan update, the city will review and revise these targets as appropriate.

The *2007 Buildable Lands Report for Snohomish County* found an employment deficit of 264 employees for the Lake Stevens Urban Growth area by 2025 (Snohomish County, 2007). In the context of buildable lands analysis, a deficit indicates there is insufficient zoned land available within the UGA to meet 2025 employment targets. Capacity is a function of zoning, land availability, development and estimates of reduction factors to account for infrastructure, parks, undevelopable land and market factors. Updated land use data estimated the deficit to be closer to 235 employees for the entire UGA (Triad Associates, 2010). However, this difference does not erase the projected employment deficit.

PSRC projections for the Lake Stevens Area estimate 6,785 jobs by 2020. This growth projection reflects an increase of 1,516 jobs or a 2.88 percent annual growth rate between 2010 and 2020. Comparatively, PSRC data indicates a growth rate of 2.56 percent for the Frontier Village Area (FAZ 7905), assuming the same zoning, there could be an additional 906 jobs – approximately 60 percent of the citywide increase –between 2010 and 2020.

The U.S. Census Bureau evaluates employment differently, focusing on broad labor categories and different industry sectors. A recent economic survey for the City looked at employment in a similar manner; it also included education and occupation type as variables (Leland Consulting Group and LMN Architects, 2011a). The report concludes that the majority of Lake Stevens' residents work in professional or "white collar" jobs (57.3 percent), with the remaining workforce works in "blue collar jobs" (26.4 percent). Compared to Snohomish County, there are fewer "white collar" jobs and slightly more "blue collar" jobs. The overall unemployment rate in 2009, shown in Table 3.5-17, was 10.60 percent, which is directly attributable to the national recession.

Table 3.5-17. Education and Employment for Lake Stevens and Snohomish County

Education and Employment		Lake Stevens	Snohomish County
Bachelors or Advanced Degree		20.90%	27.10%
Occupation	Blue Collar	57.30%	61.40%
	White Collar	26.40%	22.40%
Employment, 2009	Civilian Unemployed	89.40%	89.90%
	Civilian Employed	10.60%	10.10%

Sources: U.S. Census Bureau, 2005-2009 American Community Survey and Leland Consulting Group and LMN Architects, 2011a

Of note, despite relatively high wages regionally, Lake Stevens' residents earn fewer bachelors and advanced degrees compared to other cities and Snohomish County as a whole. This anomaly is likely attributable to the demand for regional labor in the aerospace industry. Because educational attainment continues to be one of the key indicators of income and economic growth, the economic report recommends that the

City look for ways to spur additional educational attainment (Leland Consulting Group and LMN Architects 2011a).

The Leland report suggests that key job growth sectors regionally will be Professional Services, Education, and Health Services, driven by an aging population and growing need for health care services; Government; and with additional growth clusters in Aerospace and Clean Technology (Leland Consulting Group and LMN Architects, 2011a). The report also predicts employment losses for Manufacturing and Natural Resource sectors. Lake Stevens can play a role in the identified growth industries, for example, the city could target office park expansion or serve as a retail and recreation center for employees in those industries (Leland Consulting Group and LMN Architects, 2011a).

Business Climate and Market Opportunities

The City's Comprehensive Plan notes that Lake Stevens has a relatively low ratio of jobs-to-housing, which means that people that live in the City generally have to commute to other areas for employment, with Everett being the primary employment destination. In addition, a significant number of employees travel to Seattle, Bellevue, and other locations (Leland Consulting Group and LMN Architects, 2011a).

Lake Stevens is at a "crossroads" location in the retail market, with considerable pass-through from residents of communities to the east and north that travel through Lake Stevens on the way west and south to other markets in the Puget Sound region. Geographically, the City is squarely in the path of population and job growth, as the Puget Sound region intensifies to the north and east (Leland Consulting Group and LMN Architects, 2011a). Because of the proximity and convenience of Lake Stevens to the secondary market area, there is an opportunity to attract population and employment to the City (Leland Consulting group and LMN Architects, 2011a).

One primary focus of the city's economic growth strategy is to attract more retail development (Leland Consulting Group and LMN Architects, 2011b). Expanded retail employment could produce a number of social and economic benefits, including generating more tax revenue for the city and providing jobs and shopping convenience for local residents. For a retail area to be successful, it must be visible and accessible among other factors (Leland Consulting Group and LMN Architects, 2011b). The Leland study suggests that the City can implement three strategies to attract additional retail development: first, capture retail "leakage" (i.e., purchases of goods in another market by residents that they could be purchasing locally); second, become a retail destination; and third, increase the City's tourism draw.

3.5.2 Impacts of the Alternatives

Population

Table 3.5-18 shows the total increase in population for each alternative. All alternatives would result in an increase in subarea population over the 20-year plan horizon. In general, the subarea is and will continue to be primarily a commercial center under any alternative. *Alternative 1/No Action* assumes a continuation of trends. Under the *No Action Alternative*, the subarea would capture a relatively small increment of population growth, resulting in a2025 population between 2,732 and 3,142 people, which represents between 5.9 percent and 6.8 percent of the 2025 citywide population target. *Alternative 2* focuses on fostering employment growth. However, the population would also increase and be approximately double that of the *No Action Alternative*. Total population of the subarea in 2025 would be between 2,962 and 3,017 people, which would represent approximately 6.5 percent of the citywide population target. *Alternative 3* achieves more balanced job and population growth comparatively. *Alternative 3* proposes the largest population increase, potentially six times greater than the *No Action Alternative,* leading to a subarea population in 2025 up to 4,162 people or approximately 9 percent of citywide population.

For all alternatives, the increase in population and housing are consistent with the City's 2025 population target. As noted previously, the City will be updating and increasing its population targets and Comprehensive Plan in the next few years.

Table 3.5-18. Lake Stevens Center Population Increases for Alternatives

Alternative	Population Increase
Existing	2,442
Alternative 1 – No Action	290-350
Increase from Existing	290-350
Alternative 2 – Center Revitalization	520-575
Increase from No Action	230-285
Alternative 3 – Retail & Residential Emphasis	1,440-1,720
Increase from No Action	1,150-1,370

The City does not allocate its overall population growth target among centers or subareas, so there is not a specific target for the Lake Stevens Center other than those presented in the EIS alternatives. Relative increases in the subarea population may reflect an attraction of forecast growth to the subarea because of the greater availability of multifamily housing.

Population growth is not an adverse impact in itself. Such growth can generate increased needs for public services and capital facilities to accommodate the additional population. A larger population will also result in increased construction and more

traffic and impacts to other elements of the environment. These impacts are considered in other sections of this EIS.

Cumulatively, considering proposed subarea plans for both the Lake Stevens Center and 20th Street SE Subarea together, the City would attract and accommodate an increased proportion of forecast housing and population growth within designated growth centers. Cumulative increases in population within both subareas range from a low of 12 percent for the *No Action Alternatives*, to a high of 34 percent for *Alternatives 3*. There would be an increased concentration of population in designated centers developed in a higher density pattern; this concentration would be consistent with the Growth Management Act and with City policy.

Indirectly, concentrating growth in these two centers could decrease development pressure in other areas within and outside of city, including adjacent rural areas. In fact, concentrating growth at higher densities in mixed-use centers is a key strategy of the Growth Management Act and Vision 2040 to reduce sprawl and conversion of rural lands. Any such effect, therefore, would be considered positive.

A portion of the population growth locating within one or both subareas could represent an incremental increase above the adopted 2025 population target. In a GMA context, population targets are not caps on the amount of growth that can occur within a city. Rather, they are intended to ensure that cities have the capacity to accommodate at least the amount of growth reflected in the target and that cities plan to provide adequate services and facilities for the expected levels of growth. In a regional context, increasing growth in Lake Stevens' designated centers – due to greater employment opportunities, or increased attractiveness of the city generally -- could result in reduced levels of population in other locations. This could reduce growth pressure on rural lands.

Several City planning efforts and programs would mitigate any additional growth that is attracted to Lake Stevens. First, the City will be extending and increasing its growth targets in the next few years as part of regional GMA growth planning. Therefore, an additional increment of growth will be effectively integrated within the City's Comprehensive Plan. Second, the City monitors growth on an ongoing basis to ensure that it is complying with GMA requirements, including buildable lands and Countywide planning policies. Therefore, any unexpected increase in growth would be recognized and responded to in a timely manner. In addition, the Planned Action Ordinance requires regular monitoring and a five-year review of the planned action program, to ensure that land use, housing, population and jobs are occurring as anticipated. Third, the City requires payment of impact fees for some services, such as parks and schools. These fees would address the costs of additional services needed to support growth and would enable the City to extend services as needed. Please see the additional discussion in Sections 3.8 (Public Services) and 3.9 (Utilities) of the Draft EIS.

Housing

Changes in housing for the alternatives are shown in Table 3.5-19. In quantitative terms, increases in housing would parallel the impacts identified above for Population. *Alternative 1/No Action* would result in the smallest increase in housing and *Alternative 3* would result in the largest increase. All alternatives assume an increase in multifamily housing for sale and for rent at market rates.

Housing meets a basic human need and increases in housing does not in itself create an adverse impact. Changes in the type or cost of housing, however, could affect different income groups. With *Alternative 3*, future development could displace some existing, older single-family housing in the subarea, particularly near Frontier Circle East, with multifamily units. In total, this area includes 121 single-family units, of which 98 units were constructed in 1969. The median house price for the Frontier Circle neighborhood is $119,000 compared to $134,000 for the rest of the subarea and $227,950 citywide (Snohomish County Assessors Data, October 2011). This existing neighborhood, therefore, is likely to be relatively affordable to moderate, low, and very low income families as defined earlier in this chapter. The displacement of this neighborhood's existing housing would be considered significant although relatively limited in extent.

Table 3.5-19. Lake Stevens Center Housing Increases

Alternative	Housing Units
Existing	851
Alternative 1 – No Action	100-200
Increase from Existing	100-200
Alternative 2 – Center Revitalization	180-200
Increase from No Action	0-100
Alternative 3 – Retail & Residential Emphasis	500-600
Increase from No Action	320-400

On balance, however, *Alternative 3* would result in an increase in housing units. Most of this housing would multifamily. Depending on size and market conditions, some of this housing could provide additional affordable housing options to compensate for the loss of 98 units over time. No changes are proposed for the existing mobile home park – another affordable neighborhood located in the subarea.

Indirectly, construction of new housing will generate more traffic and impacts to other elements of the environment. These impacts are considered in other sections of this EIS.

Employment

Total and relative employment increases for the alternatives are shown in Table 3.5-20. Changes in jobs would range from a small increase under *Alternative 1* (190-240 jobs), to more substantial increases for both *Alternative 2* (700-750) and *Alternative 3* (580-660).

Alternative 1 would result in a modest amount of additional retail and office development and a modest increase in jobs. Total jobs associated with this alternative would represent between 5.6 percent and 7.1 percent of the total citywide forecasted job increase by 2025 (3,367). The subarea would not undergo a significant change in function or character.

Alternative 2 emphasizes employment related land uses, while *Alternative 3* places greater relative emphasis on housing. The alternatives would provide the potential to accommodate between 17.2 percent (*Alternative 3*, low range) and 22 percent (*Alternative 2*, high range) of all new jobs forecast to locate in the city by 2025. The timing of new jobs will depend on a variety of factors, including national and regional market conditions, the perceived attractiveness of Lake Stevens in general and the Lake Stevens Center Subarea in particular as a desirable business location.

Table 3.5-20. Lake Stevens Center Employment Increases

Alternative	Retail (Gross Sq. Ft)	Office (Gross Sq. Ft)	Jobs Increase
Existing			3,544
Alternative 1 – No Action	50,000-60,000	30,000-40,000	190-240
Increase from Existing			190-240
Alternative 2 – Center Revitalization	140,000-150,000	140,000-150,000	700-750
Increase from No Action	90, 000 - 110,000	90, 000 - 110,000	510
Alternative 3 – Retail & Residential Emphasis	140,000-150,000	100,000-120,000	580-660
Increase from No Action	90, 000 - 110,000	70,000 - 80,000	390-420

Subarea development, especially pursuant to the action alternatives, would support design and building jobs during construction. Infill development could also positively affect local and regional supporting industries such as materials manufacturing, delivery, and sales

An increase in employment is not, per se, an adverse impact. It would result in increases in wages, spending, business creation, and tax revenues, which would produce numerous positive benefits to local residents. Development to accommodate these jobs could also indirectly result in numerous impacts to the environment, addressed throughout this Draft EIS. Indirectly, there could also be an increase in competition for jobs, locally and regionally. To the extent that there is a finite number of jobs to distribute among all jurisdictions, jobs that locate in Lake Stevens would not locate in other jurisdictions in the region.

The *Economic Development Strategy* report, discussed in Chapter 2, estimates that revenue generated for the Lake Stevens Center Corridor would be a balanced mix of future property and sales taxes in addition to temporary increases related to construction costs. Tax revenues will likely increase significantly under the action alternatives. There will also be revenue and profits derived from "hard construction costs" that would benefit the local and regional economy. Hard construction costs include goods and materials, such as lumber, cement, tools, and other building products (Leland Consulting Group, 2011). *Alternative 2* most closely matches the development, economic, and revenue assumptions presented in the Leland Consulting Group report (2011).

Cumulative increases in employment, for the Lake Stevens Center Subarea and 20th Street SE Subarea together, if realized, could exceed the current citywide target for additional jobs by 2025 (3,367 total). Depending on the land use scenario for the 20th Street SE Subarea, the combined increases for both subareas together could range from a low of 16 percent of total forecast 2025 jobs (both subareas *No Action* alternatives) to 156 percent of the total (both subareas *Alternative 2*, high estimates). In the planning framework of the Growth Management Act, there is no prohibition, limitation or adverse consequence associated with a city exceeding either its population or employment target. This is not considered an adverse impact.

3.5.3 Mitigation Measures

Population

The previous sections did not identify any significant adverse impacts; therefore, no mitigation is necessary. However, to verify that growth is occurring as forecast and to comply with GMA requirements, the City will continue to monitor population growth on an ongoing basis. In addition, the Planned Action Ordinance requires the City to monitor growth and development within the subarea to ensure that it is within established thresholds.

Housing

Alternative 3 would designate some existing, older single-family residential land to High Density Residential to support additional multifamily housing. This could lead to

redevelopment of these areas, displacement of existing residents, and elimination of housing that is relatively affordable. Maintaining housing stock that meets the needs of all segments of the population is a policy of the City's Comprehensive Plan. The City will, therefore, consider a number of programmatic mitigation measures, identified in the Housing Element of the Lake Stevens Comprehensive Plan, which would help to address this impact. The construction of high-density multifamily housing units, assumed under all the alternatives, will also likely result in additional affordable residential units, as the construction costs of denser housing is less and leading to lower costs for rents and sale. In addition, the city proposes to create regulatory incentives for including affordable housing units within new residential development. The City may also consider tax incentives for the inclusion of fair share housing within the subarea as allowed by RCW 84.14.020. All of these actions are considered interim measures that will apply until the city, in coordination with the interjurisdictional housing committee, develops a countywide affordable housing program.

No significant adverse impacts have been identified for *No Action* or *Alternative 2* and no mitigation is required.

Employment

No significant adverse impacts have been identified and no mitigation is necessary.

3.5.4 Significant Unavoidable Adverse Impacts

No significant or unavoidable adverse impacts are anticipated to result from the implementation of the action alternatives. In general, the defined action alternatives would create positive economic impacts that would likely include an increase in local hiring, expansion of businesses, new business formation, and greater tax revenues. While population growth is unavoidable, it is not necessarily an adverse impact. Similarly, employment growth, which is a fundamental objective of the subarea plan, is unavoidable but not adverse. Depending on the success of the inclusionary housing efforts identified in Section 3.5.4, there could be a loss of affordable units within the subarea under *Alternative 3*; this impact is not unavoidable, however.

3.6 AESTHETICS

3.6.1 Affected Environment

Visual Character

The visual character of the Lake Stevens Center is a product of the existing street network and transportation facilities, built environment (scale and type of structures), topography and natural features, and an electric transmission corridor. From an aesthetic perspective, the subarea and adjacent areas do not possess cohesive architecture and site design.

The existing land use pattern is a developed, auto-oriented commercial area comprised of shopping centers and strip development, low-rise buildings, and large surface parking lots. Existing development includes a community-scale shopping center (Frontier Village), east of SR-9, anchored by a grocery store, with a variety of retail and service businesses. Other commercial centers of different scale are in the immediate area including a mini-storage facility; several large format retail stores (Target, Haggen's Supermarket); and a mix of neighborhood-scale shopping centers and strip commercial development along 91st Ave. NE. Single-family residential neighborhoods and some scattered multifamily buildings are peripheral to these commercial areas. These residential areas vary in scale and age. Most existing buildings are one or two stories in height. In general, existing buildings are not distinctive in character or design; however, the Haggen's Supermarket does incorporate some unique design elements, including varied façade and large timber details. Vegetation is generally sparse in the commercial areas and limited to landscaping along streets and in parking lots. Aside from land and streetscape vegetation, there are several wetland areas scattered throughout the subarea and open space tracts found along the electrical transmission corridor.

An electric transmission line crosses the subarea from north-to-south in the western/central portion of the subarea and constitutes a significant visual element. The transmission structures are large and prominent. As noted above, this utility corridor forms a broad, linear open space.

Views

Topographically, the subarea is a relatively flat plateau. Elevation drops along the western edge of the subarea and adjacent to the subarea on the east. Occasional views are present from scattered locations. Scenic elements include the Olympic Mountains to the west, Lake Stevens and the Cascades to the east, and the Cascades to the north. Because of the extent of development and the relatively flat terrain in the subarea, buildings and road networks obstruct most scenic views. Additionally, vegetation located in and adjacent to the western portion of the subarea obstructs potential views to the west. Currently, the northeastern portion of the subarea, north of Frontier Village

affords the most open views to the east and north of the Lake and the Cascades. There are currently no public parks or public spaces within the subarea that provide significant views.

Light & Glare

As noted, the subarea contains intensive retail and service uses. These commercial areas produce sources of lighting alongside streetlights and vehicle lights. Current glare results from buildings, fencing, and roofs. Factors that influence the amount of glare include cloud cover, time of day, building height and size, building orientation, façade material, percentage of reflective surfaces, and landscaping. Similar factors affect onsite shadows, notably building size and height.

3.6.2 Impacts of the Alternatives

Visual Character

All of the alternatives would result in incremental visual change in the subarea as it continues to develop and redevelop as a commercial center. Visual change would generally be positive under *Alternative 2* and *Alternative 3,* as zoning regulations and design guidelines and standards would help to establish consistent architecture and streetscape over time. Revitalizing the appearance, as well as the function, of the subarea is a major objective of the subarea plan.

Alternative 1 – No Action

Under *Alternative 1/No Action,* the subarea would continue to develop as a commercial center with essentially the same character as present. The City would not adopt a subarea plan, would not modify existing zoning regulations and would not adopt area-specific design guidelines and standards. However, the City would apply its citywide design guidelines, not previously applied, when the area was under Snohomish County's jurisdiction. The current Sub-Regional Commercial zoning classification allows a very broad range of intensive commercial, sales and service, and recreational uses. It also allows generous development standards. For example under the current zoning classification, buildings could be up to 85 feet in height. High-density residential development would remain a minor component of the subarea. It may be difficult or impossible, therefore, to establish a more coherent pattern of land uses, to attract high quality office and mixed-use development, or to transform the existing undistinguished visual character of the area.

Alternative 2 & Alternative 3

The visual impacts of *Alternative 2* and *Alternative 3* would be similar and they are discussed together. Both action alternatives would intensify and diversify the existing land use pattern. Under the action alternatives, visual change would be incremental and generally positive in nature as infill and redevelopment occurs. Building heights would range between two and five stories, which are higher than the present scale of development, but within the current allowed range. The subarea plan envisions

diversified and upgraded shopping centers. Existing strip development along 91st Ave. NE would be replaced with mixed-use buildings fronting a tree-lined, walkable main street. Area-specific design guidelines and standards would lead to a consistent quality of site, architectural and streetscape design, landscaping, signage and lighting, but would not dictate an architectural theme. New zoning regulations would also provide incentives for the provision of public spaces and other amenities. The overall effect would be the creation of a vibrant, interesting and attractive commercial center. These changes would occur over an extended period, as redevelopment occurs.

Over time, compared to the character of existing development, the change in visual quality would be significant, but positive rather than adverse. However, aesthetic judgments and preferences are inherently subjective. Some residents may consider the change in the visual character of the subarea to be negative, while others may regard it as a sign of the City's maturation, progress or economic vitality.

Views

As noted in Section 3.6.1 above, most views within the subarea are typically of existing commercial buildings and roads. Existing buildings and vegetation largely obstruct views of surrounding landscape features to the east, west and north. Some open views of the Lake, the Cascades or the Olympics are available from specific locations; these vary across the subarea depending on topography, existing development, and vegetation. The residential area just north of Frontier Village likely provides the most open and expansive view of the Lake and Cascade Mountains. Areas adjacent to the electrical transmission line enjoy pocket views along this corridor to the north and south. There are currently no public parks or dedicated public spaces within the subarea that provide expansive views of the surrounding landscape.

View impacts are not expected to be significant and would not vary substantially among the alternatives. Taller buildings under any of the alternatives could block views of landscape features from specific locations. At the same time, taller buildings would enhance private views of these features. *Alternative 2* and *Alternative 3* also have greater potential to provide parks and open spaces that provide views from public spaces.

Light & Glare

Lighting associated with new development – including building lights, signage, parking areas, streets, and headlights from vehicular traffic – would occur under all alternatives, and lighting levels in the subarea would increase. These changes are not expected to be significant.

Alternatives with higher levels of development and greater traffic generation could result in increased lighting from these sources. However, area-specific design guidelines and standards in conjunction with refined zoning regulations adopted for

Alternative 2 and *Alternative 3* would address lighting design, which in turn would result in reduced potential for off-site light and glare impacts.

The potentially taller buildings under the *No Action Alternative* (up to 85 feet in the Sub-Regional Commercial zone) could result in greater shadowing of adjacent sites compared to the more moderate heights under *Alternative 2* and *Alternative 3*. Shadow impacts are not anticipated to be significant for *Alternative 2* or *Alternative 3*.

3.6.3 Mitigation Measures

Visual Character

- **Development Regulations**: New zoning regulations in combination with specific design guidelines and standards would be adopted to implement the subarea plan. Regulations would address appropriate uses, height, setbacks, and similar development parameters. The code could also include incentives, such as bonuses in height or intensity, in exchange for incorporating a menu of public amenities in new development. Existing landscaping standards would be modified to create the desired character for development sites, roads, and for sidewalks and trails. Existing tree protection/replacement requirements could be strengthened to ensure the subarea maintains a desirable amount of vegetative cover.
- **Design Guidelines and Standards**: Area-specific design guidelines and standards would ensure future development achieves a cohesive visual character and high-quality site planning, building design, lighting and signage.

Views

- **Park & Open Space Planning**: The City will update its *Parks & Open Space Plan* to address needs created by planned residential growth in the Lake Stevens Center Subarea. In conjunction with future parks planning, the City may identify new parks or open space areas that provide views opportunities of scenic landscape features. New development in some portions of the subarea may also create public spaces that provide open views of the landscape.
- **Design Guidelines and Standards**: In coordination with planning new parks and open spaces and identifying potential viewpoints, the City could consider adopting guidelines that identify when and how site plans or building design can incorporate elements to protect views from parks and other public spaces.

Light & Glare

- **Development Regulations**: The City should consider adopting "dark sky" regulations to minimize lighting increases and night glow in the subarea.

- **Design Guidelines and Standards**: Design guidelines to implement the subarea plan could provide guidance on avoiding light spillage, glare and shadow impacts though site planning, building design and landscaping. The guidelines and standards would specifically address lighting and signage.

3.6.4 Significant Unavoidable Adverse Impacts

Visual Character

The visual character of the subarea would change over time as a result of redevelopment and diversification of land uses. As the subarea becomes more intensively developed, area-specific design guidelines and standards will guide changes to its visual character and quality. This change is a positive effect rather than an adverse impact. However, aesthetics are inherently subjective and some viewers may consider the proposed changes to be negative. This change is an unavoidable consequence of adopting the subarea plan and implementing area-specific design guidelines and standards.

Views

As previously discussed, new development or redevelopment may obstruct some views from specific locations, but such impacts will be limited and minor. The implementation of development regulations and design guidelines and standards will help mitigate potential view impacts; therefore, view impacts are avoidable. The subarea plan and future parks planning may identify and provide scenic viewing opportunities.

Light & Glare

Lighting will increase but will be controlled through development regulations and design guidelines and standards. No significant unavoidable adverse impacts are anticipated.

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3.7 TRANSPORTATION

This section describes the potential impacts of the Lake Stevens Center Subarea Plan to the transportation system.

3.7.1 Affected Environment

The City of Lake Stevens is located east of Everett, north of Snohomish, and southeast of Marysville, and has an estimated population of over 26,000 as of 2010. Figure 3.7-1 displays the Lake Stevens Center area.

Existing Transportation Network

This section describes the key elements of the transportation system within the Lake Stevens Center study area. The roadway network, traffic operations, transit service, pedestrian and bicycle network, and parking conditions are described.

Existing Roadway Network

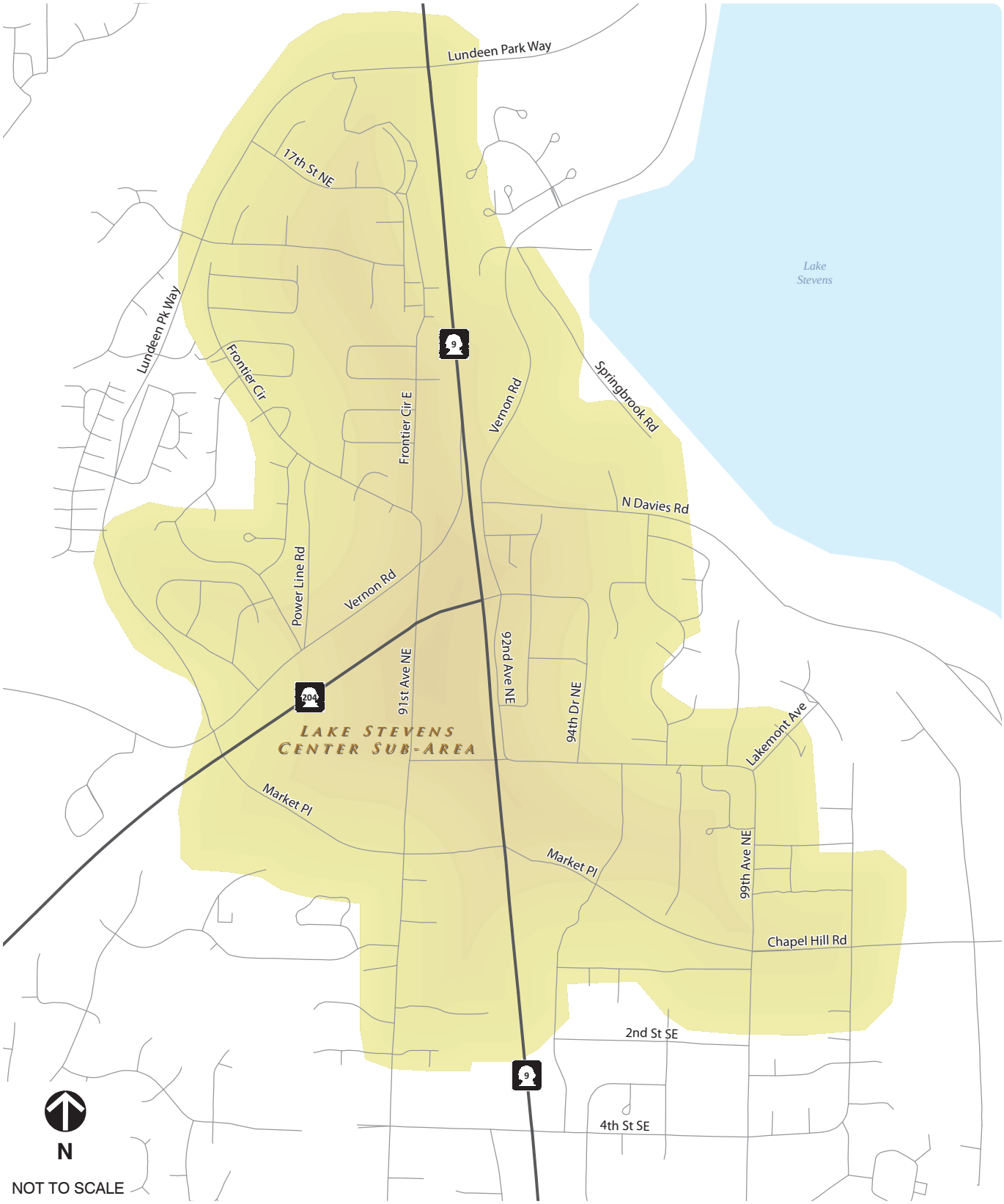
The majority of travel in the area is on the state highway system, although there are several important city roads, as described below. Figure 3.7-2 shows an overview of the roadways within the study area.

State Route (SR)-9 is a north-south highway, connecting Marysville to the north and Snohomish to the south. SR-9 is an important regional route that serves as an alternative to I-5 on the east side of the Puget Sound lowlands. SR-9 is primarily a two-lane highway with wider sections in some locations, such as between Lundeen Parkway and Market Place, in the Lake Stevens Center subarea. WSDOT is currently widening SR-9 to four lanes between Lundeen Parkway and SR-92. The ADT north of SR-204 is approximately 33,000 vehicles.

SR-204 is a northeast-southwest highway that connects US-2 and SR-9. The highway has two lanes in the northeast direction and one lane in the southwest direction, and provides the most direct route between the western approach to the City and Lake Stevens Center. SR-204 is also an important route connecting Granite Falls and the northern part of Lake Stevens to US-2 and Everett. The ADT northeast of the US-2 junction is approximately 34,000 vehicles.

SR-92, also called Granite Falls Highway, is a two-lane highway stretching east of SR-9, and running along the northern edge of the City. The highway leads to the City of Granite Falls northeast of Lake Stevens, and has an ADT of 17,000 vehicles just east of SR-9.

Figure 3.7-1. Study Area



Source: Fehr & Peers

Figure 3.7-2. Roadway Functional Classification

Source: City of Lake Stevens, Comprehensive Plan, 2010

Market Place is a three-lane arterial running in a northwest-southeast orientation, connecting four arterials: SR-204, 91st Avenue SE, SR-9 and 99th Avenue SE. Market Place extends north of SR-204 as Lundeen Parkway. Sidewalks and bicycle lanes are provided throughout the length of the roadway.

91st Avenue SE is a north-south roadway connecting the 20th Street SE corridor to Lake Stevens Center. The roadway has one through lane in each direction, with a center turn lane provided within the Lake Stevens Center area. Two transit routes run along 91st Avenue SE south of Market Place, where there are limited pedestrian facilities. North of Market Place, 91st Avenue SE has complete sidewalk coverage.

99th Avenue SE is another north-south roadway connecting the 20th Street SE corridor to Lake Stevens Center. The roadway has one through lane in each direction. Sidewalk coverage and shoulder width vary throughout the corridor.

Existing Traffic Operations

Recent field observations indicate that traffic congestion is generally light to moderate during the AM and PM peak hours[1]. However, two study intersections – SR-9/Lundeen Parkway and SR-9/SR-204 experience increased congestion during the afternoon peak.

As of late summer 2011, SR-9 has only one northbound lane between Lundeen Parkway and Soper Hill Road due to construction. This bottleneck causes a northbound queue to spill back into the study area from the Soper Hill Road intersection. At times, this queue stretches back to Lundeen Parkway, a distance of over half a mile. This prevents some vehicles at SR-9 and Lundeen Parkway from proceeding north through the intersection.

Due to the heavy traffic volumes during the afternoon peak hours at the SR-9/SR-204 intersection, some vehicles are forced to wait for more than one cycle before moving through the intersection. Volumes are also high during the morning peak hour, particularly along southbound SR-9. However, because of light traffic around the retail areas in the morning and the free right-turn from southbound SR-9 to westbound SR-204, queues and congestion are less pronounced than in the afternoon.

[1] Field visits to the study area occurred on Thursday, April 7th from 2 to 4 PM, Wednesday, April 13th from 4 to 6 PM, and Thursday, April 14th from 6:30 to 8:30 AM.

Figure 3.7-3. Lake Stevens Transit Center

Existing Transit Services

Community Transit provides bus service to Lake Stevens. Bus service is relatively infrequent and service targets commute trips to major employment centers. Overall, transit service is fairly typical for a smaller suburban community. Lake Stevens does have a modern transit center located between 4th Street NE and Market Place just east of SR-9, a feature not typically found in similar communities (see Figure 3.7-3 at left). The parking lot at the transit center has 207 spaces, slightly over half of which were occupied in the mid-afternoon during a site visit in Spring 2011. The Puget Sound Regional Council (PSRC) provides park-and-ride lot utilization data for Lake Stevens Transit Center. Surveys taken in the fall of 2009 and 2010 show parking utilization rates of 63 and 58 percent respectively. The same surveys also provided information on the origins of riders who park at Lake Stevens Transit Center. The results indicate that approximately 13 percent of riders travel from within a one-mile radius of the transit center, another 20 percent travel from locations between one and two miles from the transit center and the remaining two-thirds of riders travel more than two miles to reach the transit center.[2] Figure 3.7-4 shows the bus routes, which serve the study area. The bus routes that serve the area are described below:

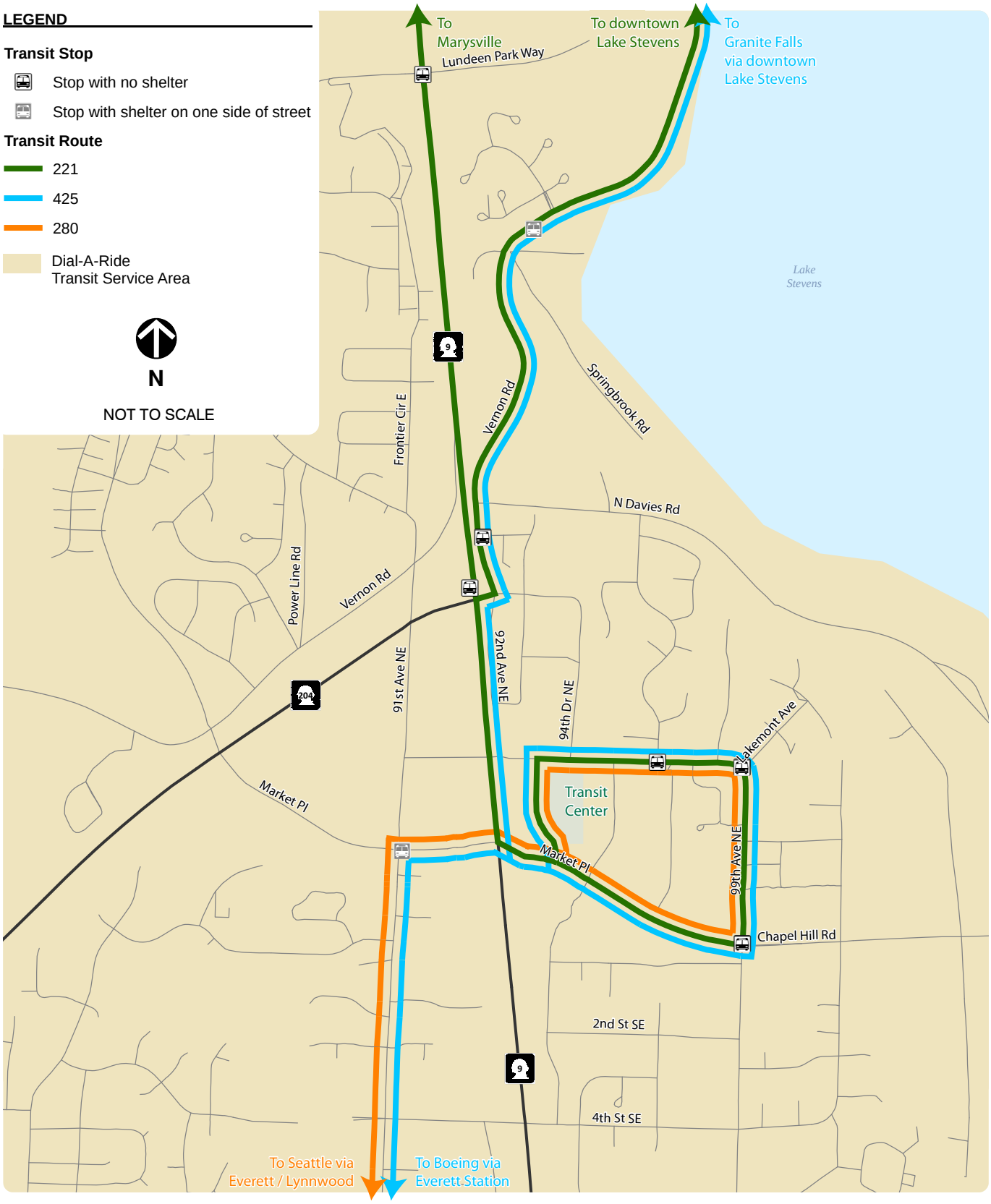
Currently, **Route 221** runs from Marysville to the Transit Center in Lake Stevens Center to Downtown Lake Stevens. This route runs six days a week, with approximately one hour headways. Weekday service has slightly longer hours than that provided on Saturdays.

Currently, **Route 280** connects Granite Falls, Lake Stevens Transit Center, and Everett Station six days a week. The bus continues to Boeing during designated times of the day. Weekday service headways range from approximately 30 minutes to one hour and run from early morning to late evening. Saturday service runs with one hour headways over a shorter time period than weekday service.

Figure 3.7-5. Community Transit bus shelter

[2] *Long Range Transit Plan*, Community Transit, 2011.

Figure 3.7-4. Transit Routes and Facilities



Source: Community Transit, 2011

Currently, **Route 425** is a commuter bus connecting Lake Stevens Transit Center to Downtown Seattle via Everett and Lynnwood. Four buses run from Lake Stevens to Seattle in the morning and five buses return in the afternoon.

In addition, Community Transit provides Dial-A-Ride Transit (DART) service for disabled riders. This service is available within 0.75 miles of any local bus route during the regular bus operation hours. An overlay illustrating the DART service area is shown in Figure 3.7-4.

Pedestrian and Bicycle System

Figure 3.7-6, on the following page, shows the typical pedestrian and bicycle facilities on many of the arterials in Lake Stevens Center study area. With the exception of Lundeen Parkway and Market Place, the pedestrian and bicycle network is fairly disjointed. For example, the Figure 3.7-7 on the right shows a fence constructed across a road in the Lake Stevens Center area that restricts pedestrian and bicycle access.

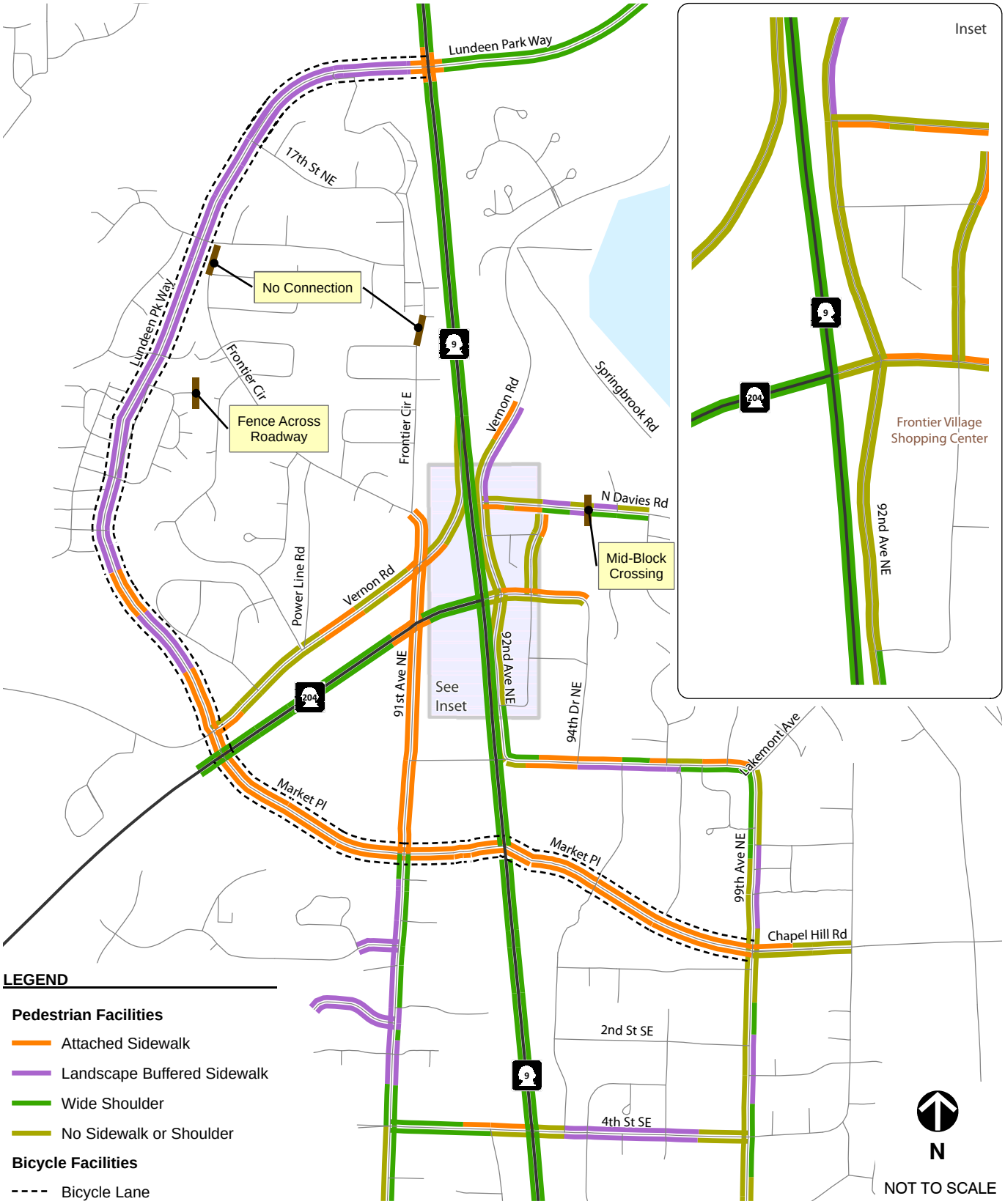
Figure 3.7-7. Fence blocking roadway and sidewalk

Many roads have wide shoulders that may accommodate pedestrians or bicyclists, but do not provide dedicated facilities. Some roads, including much of 99th Avenue SE, have little to no shoulders, making non-motorized travel difficult. In general, sidewalks are provided in residential neighborhoods on at least one side of the road.

Due to the piecemeal nature of past development, many sidewalks do not connect to any other facilities, as shown at right in Figure 3.7-8. See Figure 3.7-6 for some unusual discontinuities in the residential area north of SR-204. Marked crosswalks are limited in some areas, particularly in the vicinity of the SR-9/SR-204 junction. Figure 3.7-9 highlights some of the challenges that pedestrians and bicyclists face at the SR-9/SR-204 intersection.

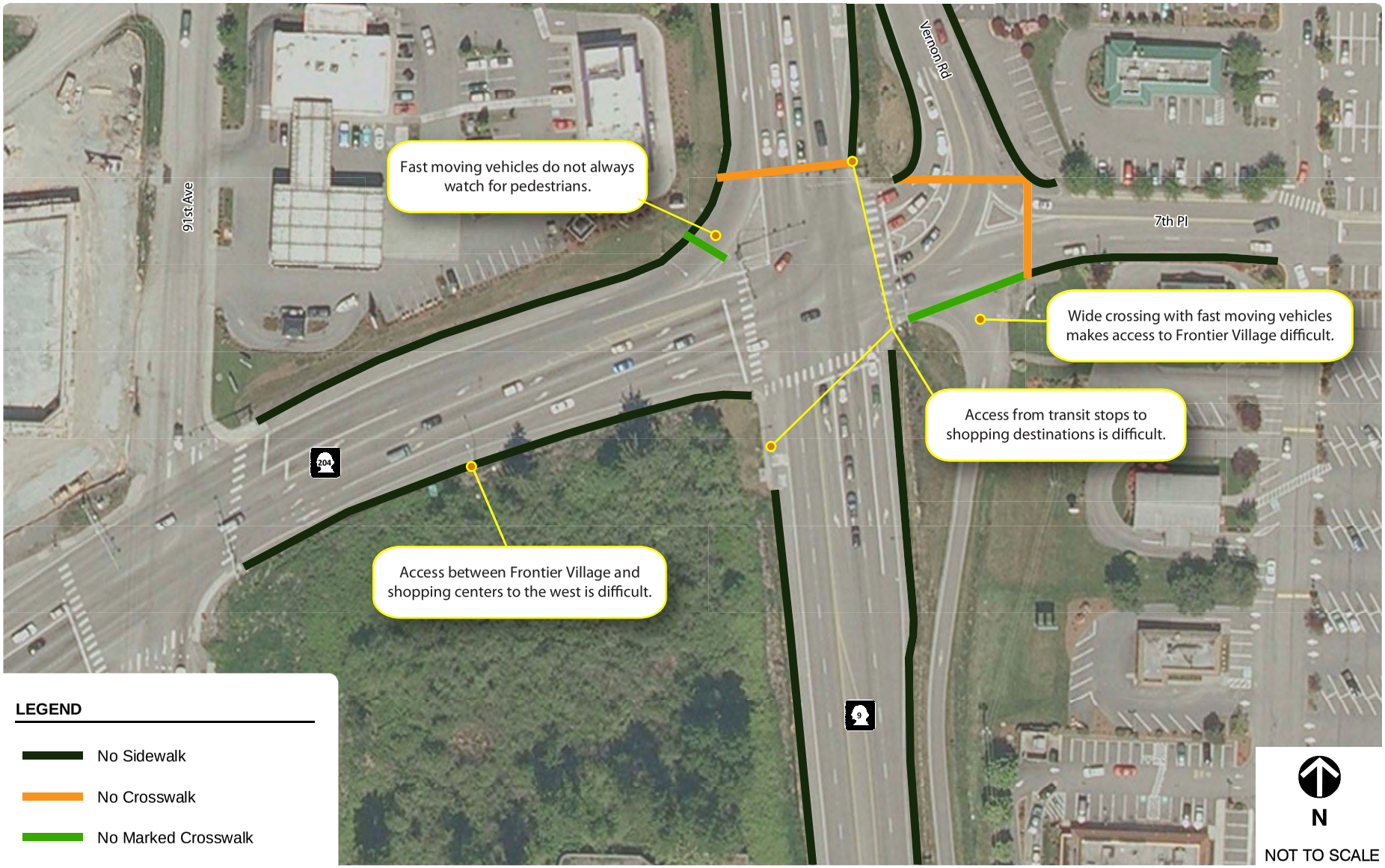
Figure 3.7-8. Intermittent sidewalk

Figure 3.7-6. Pedestrian and Bicycle Facilities



Source: Fehr & Peers

Figure 3.7-9. Pedestrian and Bicycle Challenges at the State Route 9 / State Route 204 Intersection



Source: Fehr & Peers

Field observations of pedestrian and bicycle activity indicated fairly low volumes, typical of low-density rural/suburban areas like Lake Stevens. Pedestrian and bicyclists are prohibited from traveling along some segments of SR-9. Some pedestrian activity was observed at the SR-9/Market Place and SR-9/SR-204 intersections. No pedestrians were observed crossing SR-9 at the SR-204 intersection to access the Frontier Village shopping center, potentially because of the challenging pedestrian environment depicted on Figure 3.7-9. No bicycle activity was observed during the field visits.

Parking

There is ample parking in the Lake Stevens Center area due to the predominance of commercial uses. Many parking lots never reach capacity although spots nearest to the buildings are frequently in short supply. This type of parking configuration is fairly typical of suburban strip centers and indicates that less land could be devoted to parking if the City adopted an efficient shared parking strategy. With the exception of residential streets, on-street parking is very limited. The Lake Stevens Transit Center has a dedicated park-and-ride facility, as previously discussed.

Traffic Collisions

In January 2011, WSDOT performed a collision analysis of the SR 9 corridor as part of the SR-9 Corridor Planning Study. The SR-9 Corridor Planning Study includes a new methodology for traffic safety analysis that identifies "Collision Analysis Locations" (CAL) and "Collision Analysis Corridors" (CAC). A CAL is location that is up to a half-mile in length that has six or more injury collisions and four or more serious/fatal collisions over the past five years, as well as no planned safety improvements over the next six years. Often the CAL identifies intersections or locations in the road that have unusually high collision rates that should be addressed to improve public safety. In addition, CACs are identified which are five-mile segments that have 11 or more serious/fatal collisions over the past five years. The CAL and CAC definitions are part of WSDOT's new traffic safety analysis procedures that support the agency's "Target Zero" goal to eliminate fatality and serious injury collisions by 2030.

WSDOT's analysis did not identify any CALs or CACs in the project study area, indicating that no locations near Lake Stevens Center have abnormally high collision rates.

Planned Improvements

This section describes planned and programmed improvements to the transportation system in the study area.

SR 9 Route Development Plan

The Washington Department of Transportation (WSDOT) in coordination with the City is performing a study to determine what future improvements should be made to the SR-9/SR-204 intersection. This study, including recommendations, is expected to be completed in 2012. The *SR-9 Route Development Plan* cited the need for some type of

reconfiguration to ease the congestion and inconvenience currently experienced by drivers at this intersection. WSDOT is currently reviewing several options:

- Widening SR-9 to six lanes through Lake Stevens
- Constructing a diamond interchange with signals or roundabouts (see Figure 3.7-10 on right)
- Constructing a single-point urban interchange (where all ramps meet at one signalized intersection)
- Constructing a grade-separated roundabout
- Constructing a fly-over ramp for eastbound to northbound travel

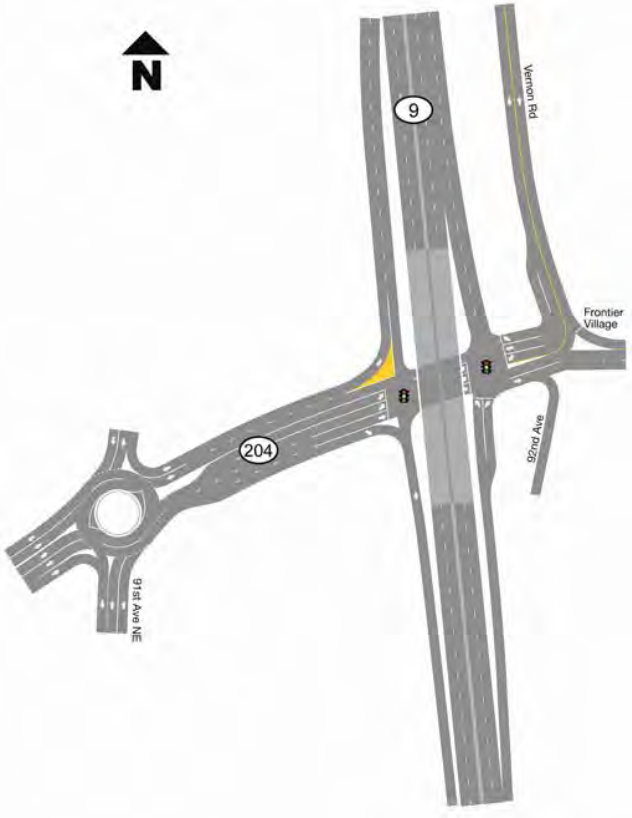


Figure 3.7-10. SR-9/SR-204 diamond interchange concept

WSDOT is only conducting preliminary engineering for the intersection, as construction funding is not currently available. In addition to improvements at the SR9/SR-204 intersection, WSDOT was in the process of widening SR-9 to four lanes from Lundeen Parkway to SR-92. The construction project, which included upgrades to the SR-92 and Lundeen Parkway traffic signals, was completed in Fall 2011.

Lake Stevens Center Transportation Improvements

While WSDOT is working to improve traffic conditions along the state highways, the City of Lake Stevens is working to reduce congestion on city streets in the Lake Stevens Center Area. Specifically, the City is exploring the possibility of constructing mini-roundabouts at the N. Davies Road/Safeway Driveway and N. Davies Road/Vernon Road intersections. The city is also looking for opportunities to improve traffic operations along Lundeen Parkway and through the southern portion of the Frontier Village Shopping Center. These improvements are designed to complement the transportation improvements included in the Lake Stevens Center Subarea Plan.

City of Lake Stevens Comprehensive Plan Transportation Element

The City's Comprehensive Plan, adopted in 2006 and last amended in December 2010, includes policies and programs intended to manage growth for the next twenty years.

The Transportation Element inventories the existing transportation network, presents current street design standards, provides improvement proposals for areas with safety concerns, and sets level of service (LOS) standards for the City's roadways. The document sets the construction of sidewalks, bicycle lanes, and trails as a high priority. The following goals are set forth in the Transportation Element:

- Provide a roadway network which meets adopted level of service standards.
- Strive for continuous and long term expansions to the trail and pedestrian system.
- By 2012, reduce the accident rate at representative locations on the roadway system within the City by at least 5 percent.
- Ensure that the transportation system is adequate to serve all existing and future land uses. In addition, the City will develop a concurrency management system, explore alternatives for demand management, and secure adequate financing for transportation.
- Provide an affordable level of service for the roadway network.
- Establish mechanisms to reduce the demand for transportation facilities such as car/van pool, and staggered work hours.
- Allow for alternative design standards, and/or materials for street and parking areas.
- Transportation improvements shall be prioritized and financed consistent with the capital facilities element, and all possible avenues of paying for the improvements should be evaluated for availability and fairness.
- Support neighborhood efforts to implement appropriate traffic calming devices and strategies.
- Update transportation element of the Comprehensive Plan to verify the existing road inventory and update with new inventory generated from annexed areas.
- Commit to meeting federal and state air quality requirements and work with state, regional, and local agencies and jurisdictions to develop transportation control measures and/or similar mobile source emission reduction programs that may be warranted to attain or maintain air quality requirements.

The Comprehensive Plan uses volume-to-capacity ratios for roadway segments to measure level of service. However, for the purposes of this study, individual intersections were evaluated. The City sets LOS D as the standard for acceptable operation in the central business district, and LOS C as the standard for acceptable operations in residential areas. This study will apply the residential standard; however, recommendations identified later in this analysis suggest that the City adopt a standard for designated centers and mixed-use areas such as Lake Stevens Center.

Analysis Methodology

This section summarizes the methodology used to analyze the existing conditions of the transportation network for vehicles. Figure 3.7-11 shows the study intersections considered in this analysis. All intersections were evaluated during the PM peak hour; additionally, a subset was analyzed during the AM peak hour.

The roadway analysis is based on the *Highway Capacity Manual* (HCM) 2000 methodology. The Synchro software package, which considers factors such as signal timing and traffic volumes, was used to analyze all study intersections. For select intersections, the SimTraffic simulation component of the Synchro software was also used. Level of service (LOS) is assigned based on the delay experienced by vehicles traveling through the intersection. For signalized intersections and unsignalized all-way stop-controlled intersections, the LOS is determined by the average delay experienced by all vehicles. For unsignalized side-street stop-controlled intersections, LOS is determined by the movement with the highest delay. Table 3.7-1 displays the HCM thresholds used to determine LOS at signalized and unsignalized intersections.

WSDOT sets LOS standards for state highways in the Lake Stevens area. WSDOT considers LOS D or better conditions to be acceptable. The City is currently reviewing the LOS standards for local streets and may adopt an overall standard of LOS E, with some key intersections allowed to operate at LOS F during peak hours.

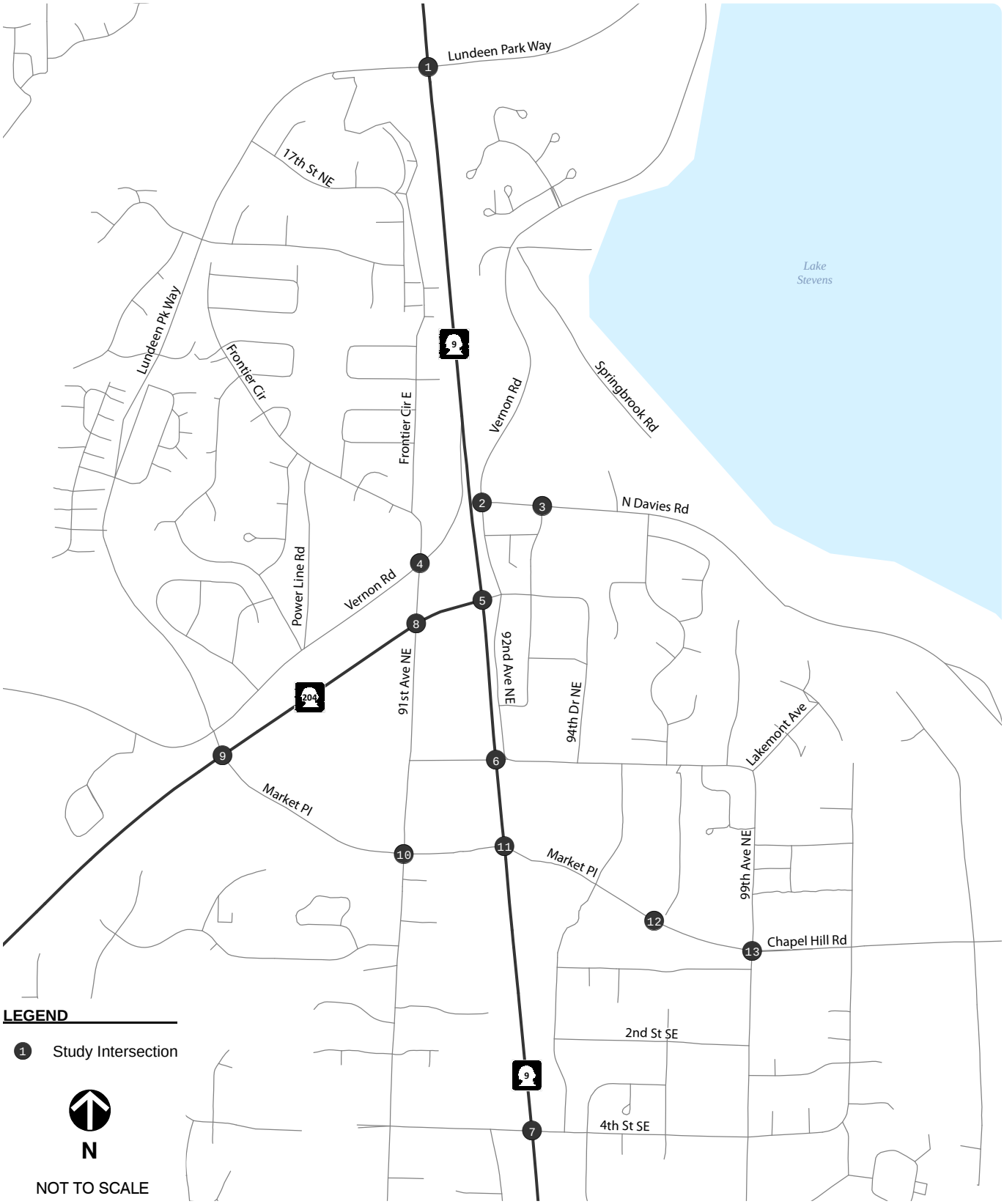
Table 3.7-1. Level of Service Criteria for Signalized & Unsignalized Intersections

Level of Service	Signalized Intersection Delay per Vehicle (seconds)	Unsignalized Intersection Delay per Vehicle (seconds)
A	0-10	0-10
B	>10-20	>10-15
C	>20-35	>15-25
D	>35-55	>25-35
E	>55-80	>35-50
F	>80	>50

Source: HCM 2000

For the PM peak hour analysis, the City of Lake Stevens provided existing count data from January 2011. In addition, two intersections – SR-9 and SR-204, and SR 204 and Market Place – were analyzed during the AM peak hour. Volumes for those intersections were counted in April 2011.

Figure 3.7-11. Study Intersections



Source: Fehr & Peers

Detailed traffic count sheets are provided in Appendix C. Figure 3.7-12 displays the peak hour turning movements.

Frontier Village Shopping Center Access and Circulation

Lake Stevens residents often joke that, "you can get into Frontier Village, but you can't get out." There is some truth to the saying. Entering the Frontier Village shopping center is convenient from most directions, but exiting the area is challenging. The westbound approach of the SR 9/SR 204 intersection can only be accessed from southbound Vernon Road, since 7th Place NE forces drivers to turn northbound onto Vernon Road shortly before reaching the intersection. This requires drivers to exit Frontier Village by making left turns from the Safeway driveway onto westbound N. Davies Road, and from N. Davies Road onto Vernon Road. Both of those intersections are stop-controlled which can result in queues during periods of heavy traffic. Alternatively, drivers may exit Frontier Village at the southwestern or southern edges and enter SR 9 via the ramp at 92nd Avenue NE/4th Street NE. However, the ramp allows access to northbound SR 9 only. Many drivers also choose to exit Frontier Village and head south on SR 9 via the Target or Transit Center parking lots.

Analysis Results

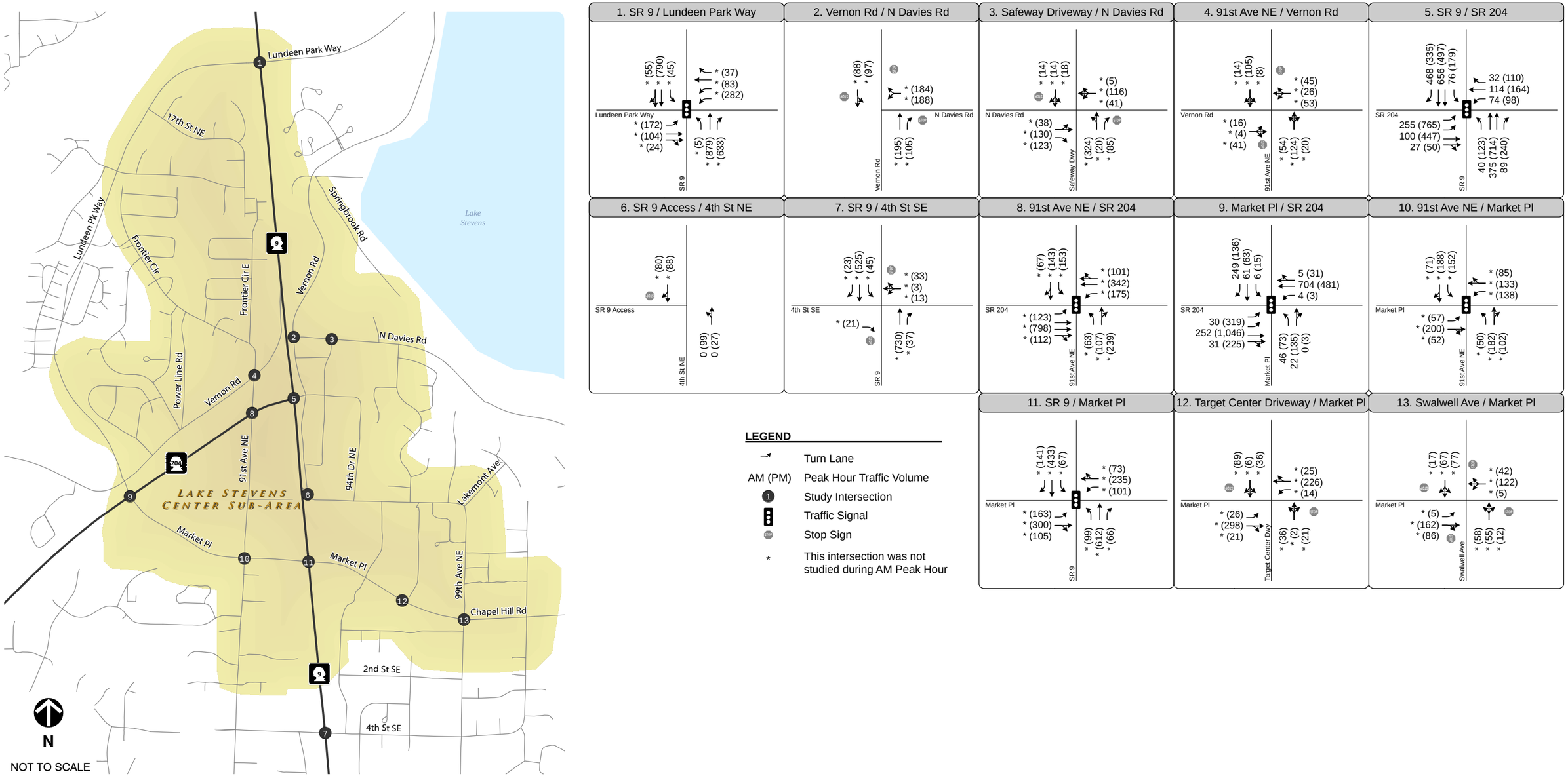
The results of the intersection operations analysis are shown in Table 3.7-2 and Figure 3.7-13. Detailed LOS calculation sheets are in Appendix B.

Both of the intersections analyzed during the AM peak hour operate acceptably. During the PM peak hour, five intersections operate at LOS D, falling below the City's current LOS C standard[3]:

- SR-9 and Lundeen Parkway;
- Safeway Driveway and N Davies Road;
- SR-9 and SR-204;
- 91st Avenue NE and SR-0204; and
- Market Place and SR-9.

[3] The City adopted a LOS C standard prior to the annexation of the Lake Stevens Center area. At that time, the City consisted of only local streets with small pockets of trip generators with public schools being the largest trip generators during peak hours. The City will be re-examining an acceptable LOS to establish obtainable levels for its commercial and high volume areas.

Figure 3.7-12. Peak Hour Traffic Volumes and Lane Configurations - Existing Conditions



Source: Fehr & Peers

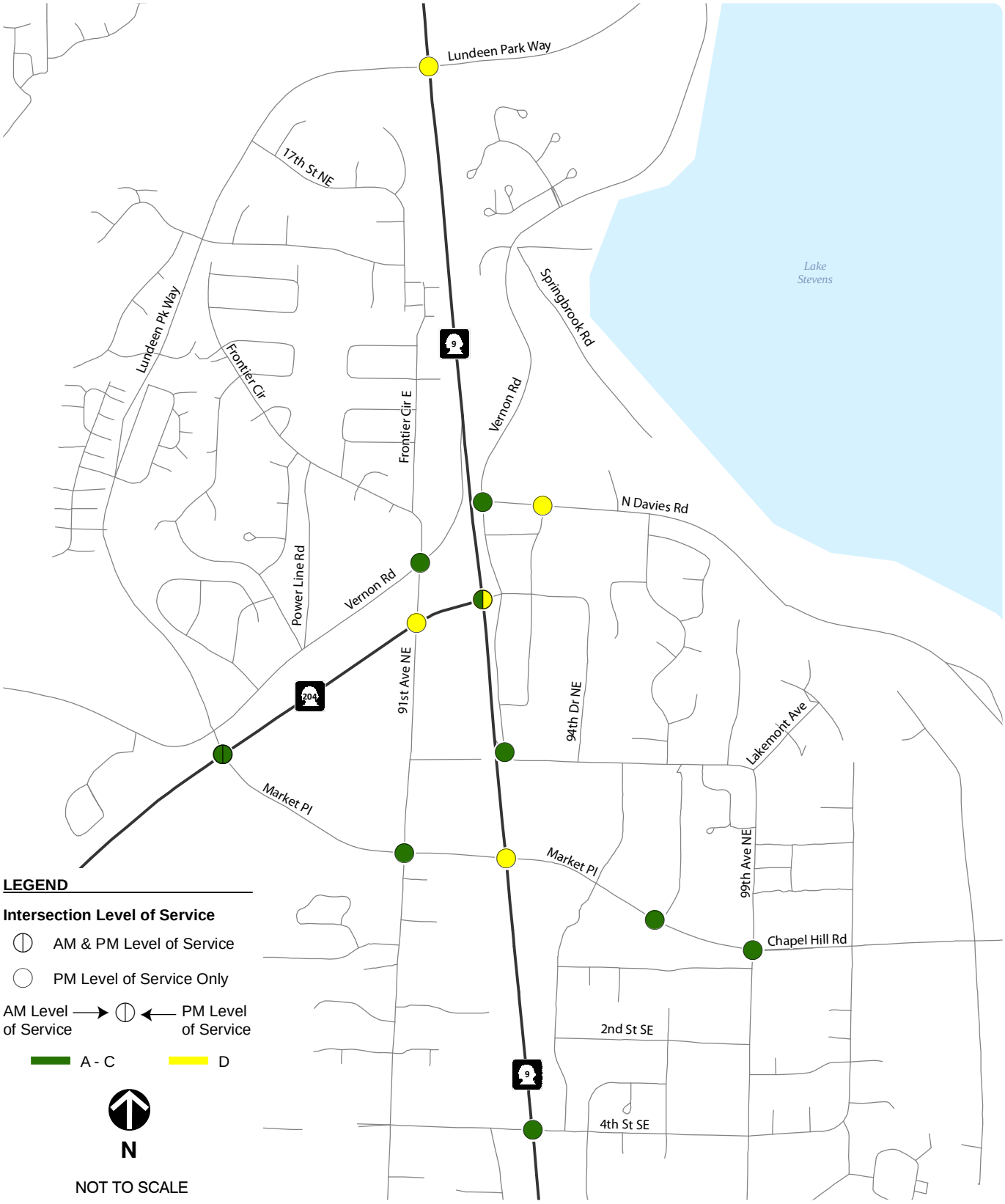
The intersection of the Safeway Driveway and N Davies Road warrants further discussion. Due to the current roadway configuration at the Frontier Village Shopping Center, it is difficult for drivers to reach the SR-9/SR-204 intersection. Because of the existing road and parking lot configuration of Frontier Village, motorists are forced to travel north through the Safeway parking lot and then make two left turns to return to the SR-9/ SR-204 intersection. The left turns are located along Davies Road at the Safeway Driveway and at Vernon Road. To obtain an accurate level of service for these locations, a traffic simulation of these two stop-controlled intersections was completed. Those results, shown in Table 3.7-2, indicate that the Safeway Driveway intersection operates at LOS D and the Vernon Road intersection operates at LOS A. The simulation indicates that 95 percent of the time, the queue length does not exceed approximately 10 cars at the northbound approach of the Safeway Driveway/Davies Road intersection. This confirms anecdotal evidence from local residents as well as recent field observations.

Table 3.7-2. Existing Peak Hour Intersection Level of Service

ID	Intersection	Traffic Control Device	AM		PM	
			Delay (seconds)	LOS	Delay (seconds)	LOS
1	SR-9 and Lundeen Parkway	Signalized	-	-	38	D
2	Vernon Road and N Davies Road	All-way stop control	-	-	9	A
3	Safeway Driveway and N Davies Road	Side-street stop control	-	-	27	D
4	91st Avenue NE and Vernon Road	Side-street stop control	-	-	13	B
5	SR-9 and SR-204	Signalized	28	C	51	D
6	SR-9 Access and 4th Street NE	Side-street stop control	-	-	10	B
7	SR-9 and 4th Street SE	Side-street stop control	-	-	18	C
8	91st Avenue NE and SR-204	Signalized	-	-	44	D
9	Market Place and SR-204	Signalized	18	B	26	C
10	Market Place and 91st Avenue NE	Signalized	-	-	13	B
11	Market Place and SR-9	Signalized	-	-	46	D
12	Market Place and Target Center Driveway	Side-street stop control	-	-	13	B
13	Market Place and Swalwell Avenue	All-way stop control	-	-	10	B

Source: Fehr & Peers, 2011.

Figure 3.7-13. Existing Peak Hour Level of Service



Source: Fehr & Peers

3.7.2 Impacts of the Alternatives

Land Use Alternatives

As discussed in previous sections, this EIS analyzes three development alternatives with a horizon year of 2025. Table 3.7-3 summarizes the type and amount of new growth considered under the EIS alternatives. The travel demand modeling assumes the upper bound of the projected growth to provide a conservative analysis. The travel modeling assumes a substantial amount of growth outside of the study area. These additional projects include development in the 20th Street Corridor (as part of a similar subarea planning effort), infill growth of some of the vacant residential properties near Lake Stevens Center, and regional growth throughout Snohomish County. Note that these projections are based on the estimated growth expected by 2025, rather than the hypothetical buildout capacity possible under each zoning alternative.

Table 3.7-3. Summary of Growth Assumptions for Land Use Alternatives

Alternative	Retail (Gross Square Feet)	Office (Gross Square Feet)	Dwelling Units
Alternative 1 – No Action	50,000-60,000	10,000-40,000	105-120
Alternative 2 – Commercial Emphasis	140,000-150,000	140,000-150,000	180-200
Alternative 3 – Residential Emphasis	140,000-150,000	100,000-120,000	500-600

Source: City of Lake Stevens Planning & Community Development, 2011

Transportation Network Assumptions

Some transportation network changes are assumed to be in place by the horizon year of 2025, such as the widening in the vicinity of SR-9 and Lundeen Parkway. This modification was completed in 2011 but after existing conditions were assessed; it adds a second northbound and southbound through lane, a southbound right turn lane, and a second westbound left turn lane to the intersection. Based on discussions with WSDOT staff, it was assumed that no modifications would be made to the intersection of SR-9 and SR-204 due to the uncertainty of funding.

Methodology

The analysis began by adjusting the trip generation in the Snohomish County travel model[4] based on the land use assumptions for the most trip-intensive alternative, which is *Alternative 3*. Next, a trip distribution and assignment tool was used to determine the difference in expected trips under the other two alternatives. Applying this difference to the Snohomish County travel demand model results in the overall expected volumes (both background and project-related). Intersections were analyzed using the Synchro software package, including SimTraffic simulation in the vicinity of Frontier Village.

Note that the Snohomish County model only provides forecasts for the PM peak hour. AM peak hour forecasts were developed using the relationship between existing AM and PM peak hour traffic movements, as well as the PM peak hour forecasts generated from the travel demand model.

Similar land use alternatives are being considered for the 20th Street SE corridor area south of the Lake Stevens Center area. To provide a conservative analysis of the Lake Stevens Center alternatives, the most intense land use is assumed to be in place in 20th Street SE corridor area.

Impact Identification

The 2025 *No Action Alternative (Alternative 1)* serves as the baseline for identifying impacts to transportation facilities under the two action alternatives. A transportation impact is considered to occur if an alternative would:

- Cause a study intersection that operates acceptably under the 2025 *No Action Alternative* (LOS C), to operate unacceptably (LOS D, E or F);
- Cause a study intersection that operates unacceptably under the 2025 *No Action Alternative* to operate with higher delay;
- Interfere with any existing or planned transit service; or
- Interfere with any existing or planned pedestrian or bicycle facility.

[4] The Snohomish County travel model is a regional travel forecasting tool used by Snohomish County to forecast future traffic and transit conditions that result from new land use growth and changes to the transportation network. The Snohomish County travel model is a more detailed version of the travel model used by the Puget Sound Regional Council to estimate travel demand in the Central Puget Sound area.

No Action Alternative Analysis Results

Roadway Operations

Table 3.7-4 summarizes the projected LOS under the 2025 *No Action Alternative*. Figure 3.7-14 displays the peak hour turning movements and Figure 3.7-15 displays the LOS results on a map of the subarea. Intersections with deficient operations are shown in bold.

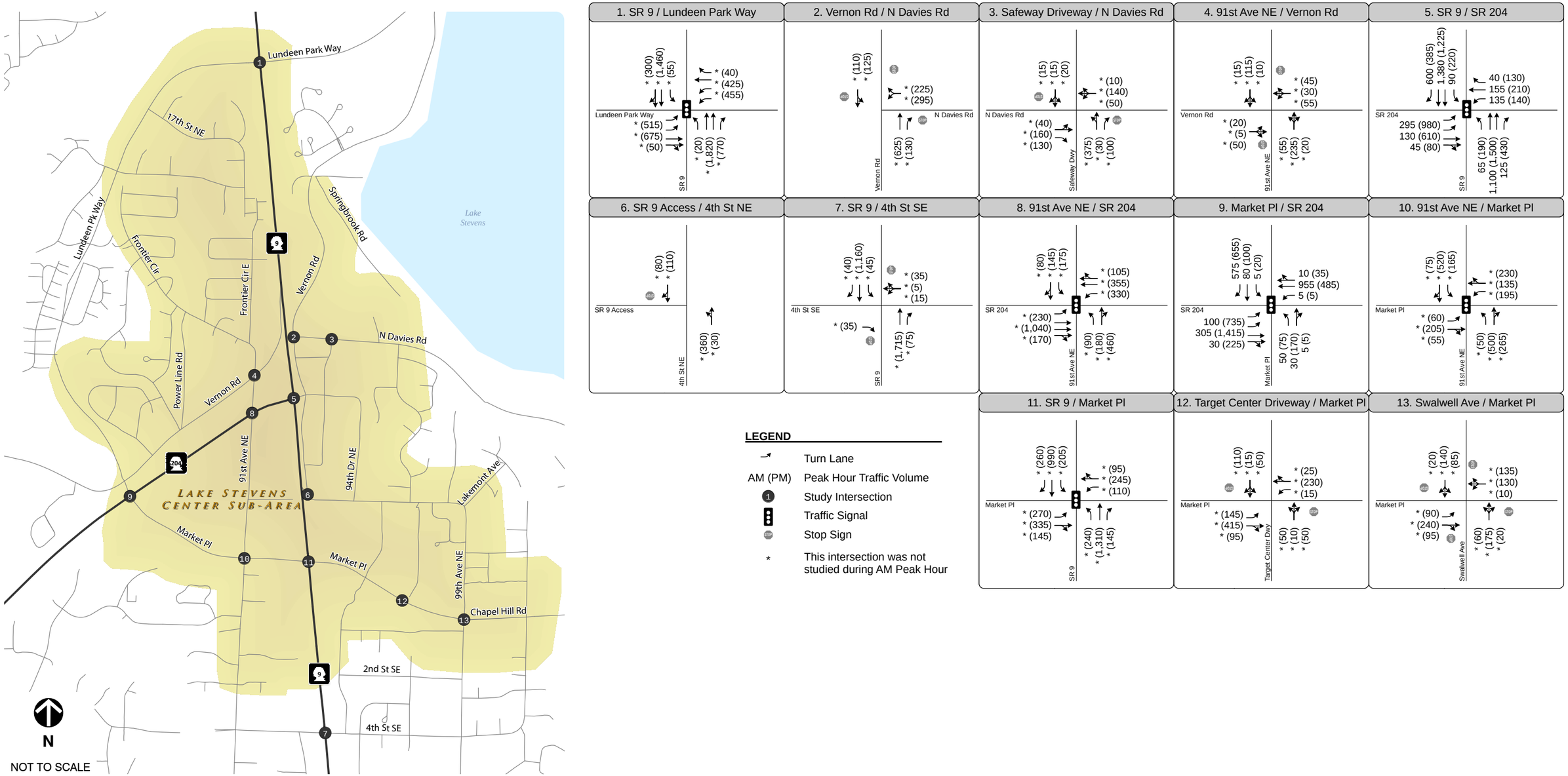
Table 3.7-4. 2025 No Action Alternative – AM and PM Peak Hour Level of Service

ID	Intersection	Traffic Control Device	LOS/Delay (seconds)	
			AM	PM
1	SR-9 and Lundeen Parkway	Signalized	-	**F / 117**
2	Vernon Road and N Davies Road	All-way stop control	-	**F / 58**
3	Safeway Driveway and N Davies Road	Side-street stop control	-	**D / 34**
4	91st Avenue NE and Vernon Road	Side-street stop control	-	C / 15
5	SR-9 and SR-204	Signalized	**D / 46**	**F / 187**
6	SR-9 Access and 4th Street NE	Side-street stop control	-	B / 14
7	SR-9 and 4th Street SE	Side-street stop control	-	**F / 117**
8	91st Avenue NE and SR-204	Signalized	-	**F / 93**
9	Market Place and SR-204	Signalized	C / 33	C / 34
10	Market Place and 91st Avenue NE	Signalized	-	C / 34
11	Market Place and SR-9	Signalized	-	**F / 194**
12	Market Place and Target Center Driveway	Side-street stop control	-	C / 20
13	Market Place and Swalwell Avenue	All-way stop control	-	C / 20

Source: Fehr & Peers, 2011.

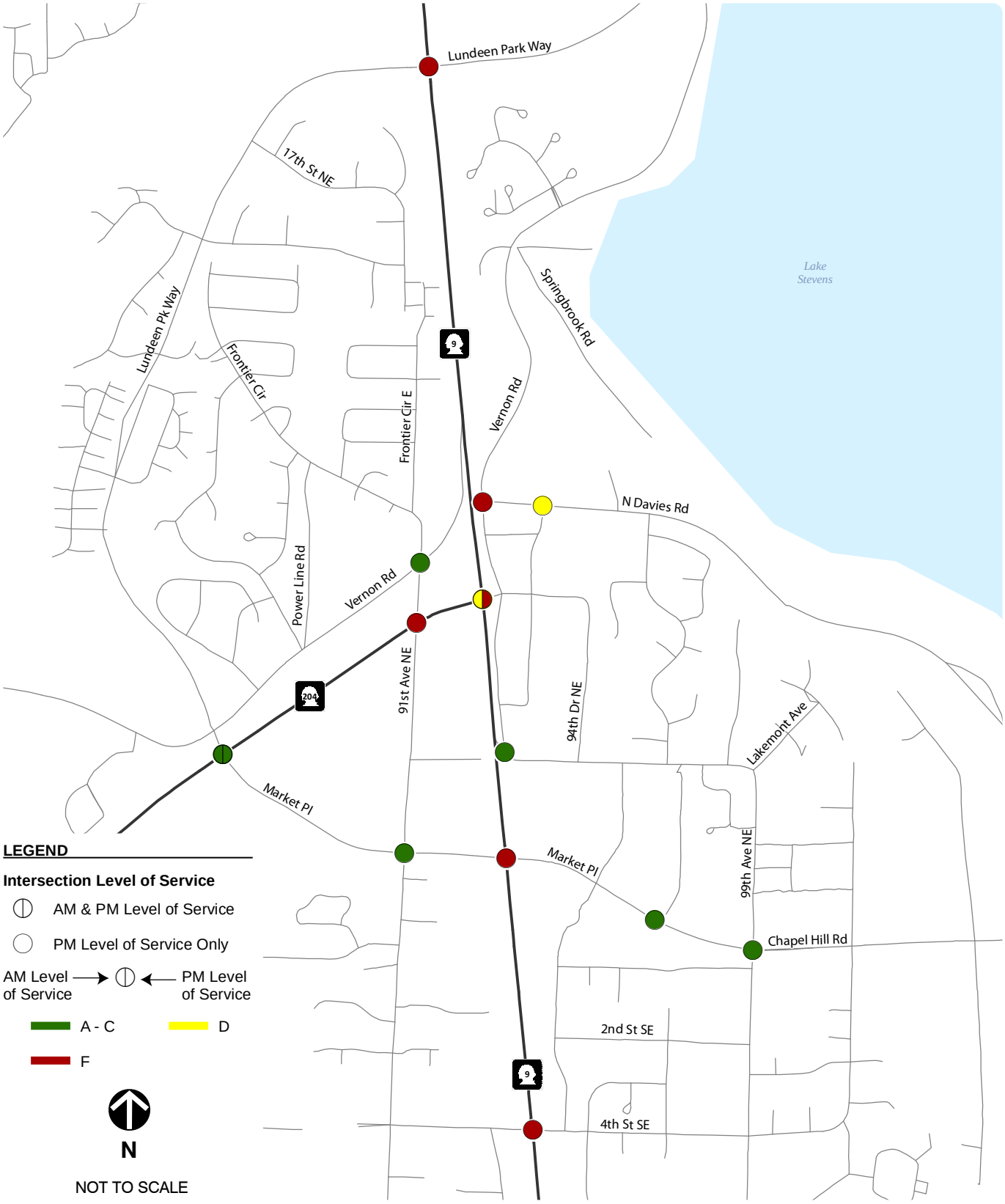
Volumes at the intersection of SR-9 and SR-204 will increase substantially by 2025 even under the *No Action Alternative* and will fall below the City's standard of LOS C during the AM peak hour. Westbound traffic would experience the highest delays, with that approach operating at LOS F.

Figure 3.7-14. Peak Hour Traffic Volumes and Lane Configurations - Alternative 1 - No Action (2025)



Source: Fehr & Peers

Figure 3.7-15. Peak Hour Level of Service - Alternative 1 - No Action (2025)



Source: Fehr & Peers

The following intersections fall below the City's standard during the PM peak hour:

- SR-9 and Lundeen Parkway;
- Vernon Road and N Davies Road;
- Safeway Driveway and N. Davies Road;
- SR-9 and SR-204;
- SR-9 and 4th Street SE;
- 91st Avenue SE and SR204; and
- Market Place and SR-9.

Heavy traffic volumes would cause SR-9 and Lundeen Parkway to operate at LOS F on all approaches despite the recent widening of the intersection. To avoid that congestion, a substantial amount of traffic is expected to use Vernon Road to reach the area north of the lake. This additional traffic would travel through the N Davies Road stop sign controlled intersection, where they would experience LOS F operations, although with slightly less delay than northbound drivers at the SR-9/Lundeen Parkway intersection. As is the case under existing conditions, vehicles exiting Frontier Village via the Safeway N. Davies Driveway would experience moderate delays as they travel the circuitous route back to the SR-9/SR-204 intersection.

The intersection of SR-9 and SR-204 would experience long delays on all approaches, with eastbound left-turning vehicles faring the worst. Likewise, the two adjacent intersections along each state route (SR-204/91st Avenue SE and SR-9/Market Place) would operate at LOS F. The southernmost intersection in the study area, SR-9 and 4th Street SE, is stop sign controlled on the minor approaches. Westbound drivers would experience LOS F operations as they attempt to enter or cross the heavy volumes along SR 9. Eastbound drivers (who are only permitted to make a right turn) would have only moderate delays of 26 seconds.

It should be noted that the *No Action Alternative* forecasts presented here differ from WSDOT forecasts prepared for other projects, such as the *SR-9 Corridor Planning Study*. The traffic forecasts for this project were developed within the Snohomish County travel demand model, which is based on the County's household and employment forecasts, rather than the PSRC's small area population and employment forecasts. In addition, more development is assumed to occur in the Snohomish County travel model since growth areas like the 20th Street SE corridor were included in the model. The Snohomish County model also has much more road network detail, which is important when forecasting the turning movement volumes for this study.

Compared to the growth forecasted by WSDOT, the Snohomish County travel demand model predicts more growth in the southbound direction, with the biggest differences

seen from Lake Stevens southward. In the northbound direction, the Snohomish County model shows less growth to the north and south of the study area. Within the study area, the County's model assumes somewhat lower growth between Lundeen Parkway and SR-204, but very similar growth between SR-204 and 20th Street SE.

Pedestrian and Bicycle System

The No Action Alternative is not anticipated to interfere with any existing or planned pedestrian or bicycle facilities. Overall traffic growth would result in more pedestrian and bicycle interactions and potential conflicts with vehicles, but this does not constitute an impact as defined above. This is the baseline condition under which the action alternatives will be compared.

Transit

No transit routes are expected to be adversely affected under the No Action Alternative. Vehicle operations may be slower due to increased traffic congestion, but that does not constitute an impact as defined above. This is the baseline condition under to which the action alternatives will be compared.

Alternative 2 and Alternative 3 Analysis Results

This section presents the transportation findings related to *Alternative 2* and *Alternative 3*. The results are compared to those under the *No Action Alternative* to identify impacts related to the proposed subarea plans.

Roadway Operations

Tables 3.7-5 and 3.7-6 summarize the projected LOS under the two action alternatives in 2025 for the AM and PM peak hours. Figures 3.7-16 and 3.7-17 display the turning movements and LOS results for *Alternative 2*, and Figures 3.7-18 and 3.7-19 display the turning movements and LOS results for *Alternative 3*. The *No Action Alternative* is used as the baseline to identify impacts.

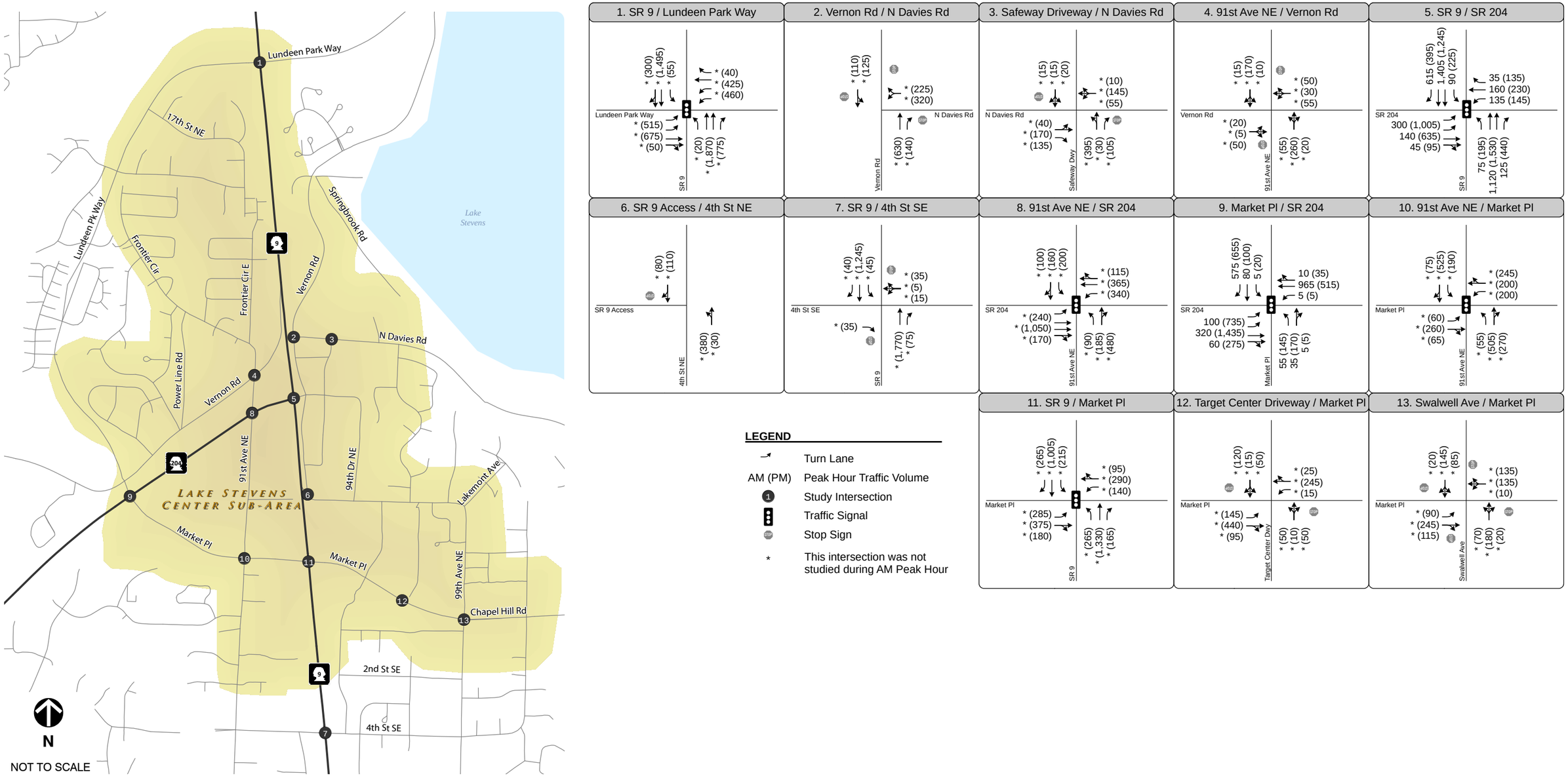
Table 3.7-5. 2025 AM Peak Hour Level of Service

ID	Intersection	Traffic Control Device	No Action Alternative	Alternative 2	Alternative 3
5	SR-9 and SR-204	Signalized	**D / 46**	**D / 54**	**D / 54**
9	Market Place and SR- 204	Signalized	C / 33	C / 33	C / 33

Source: Fehr & Peers, 2011.

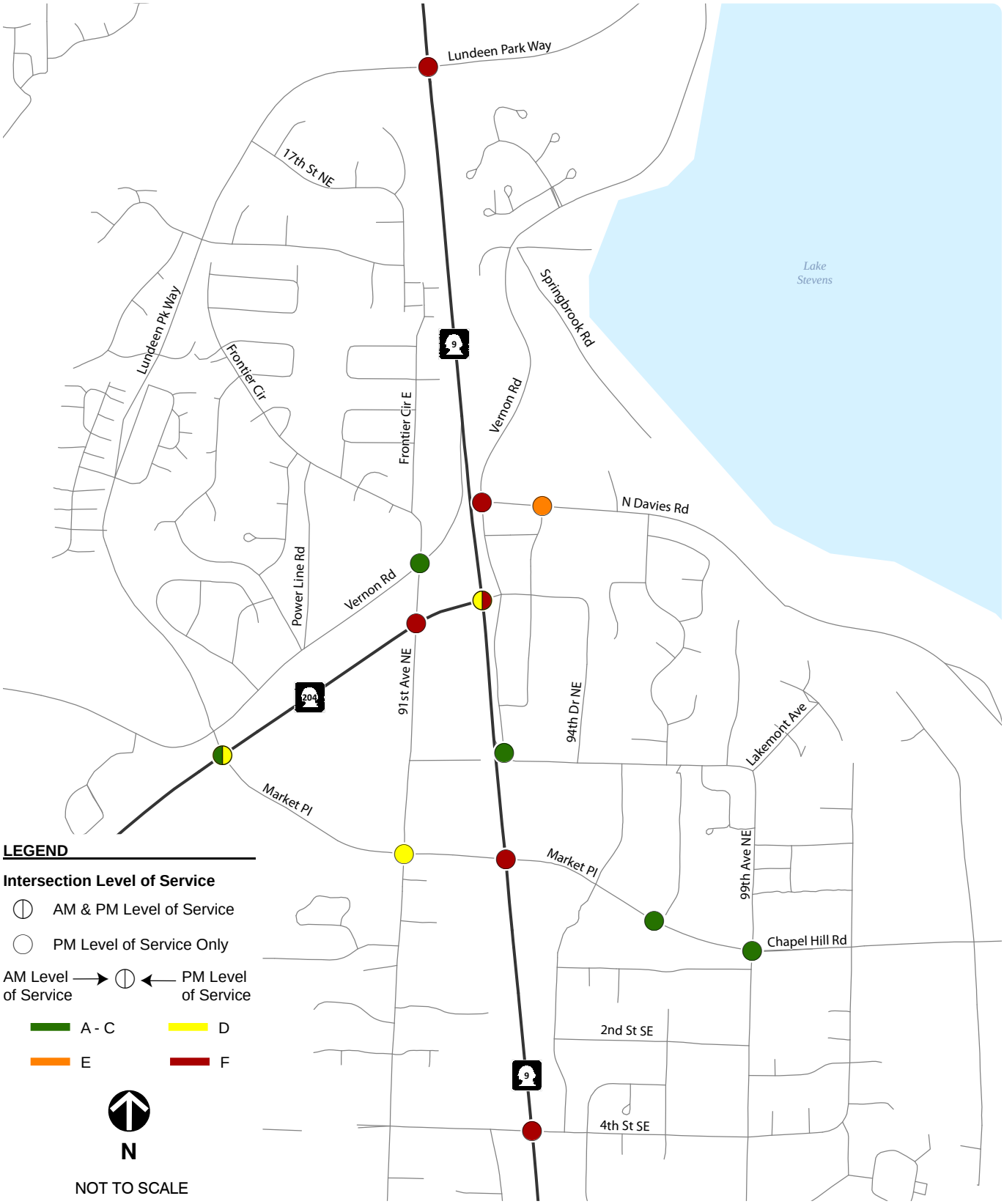
During the AM peak hour, *Alternative 2* and *Alternative 3* would cause an impact to SR-9 and SR-204 compared to the *No Action Alternative*, Operations would deteriorate slightly at the intersection, but the overall delay would remain at LOS D which is acceptable under WSDOT's standards for SR-9.

Figure 3.7-16. Peak Hour Traffic Volumes and Lane Configurations - Alternative 2 (2025)



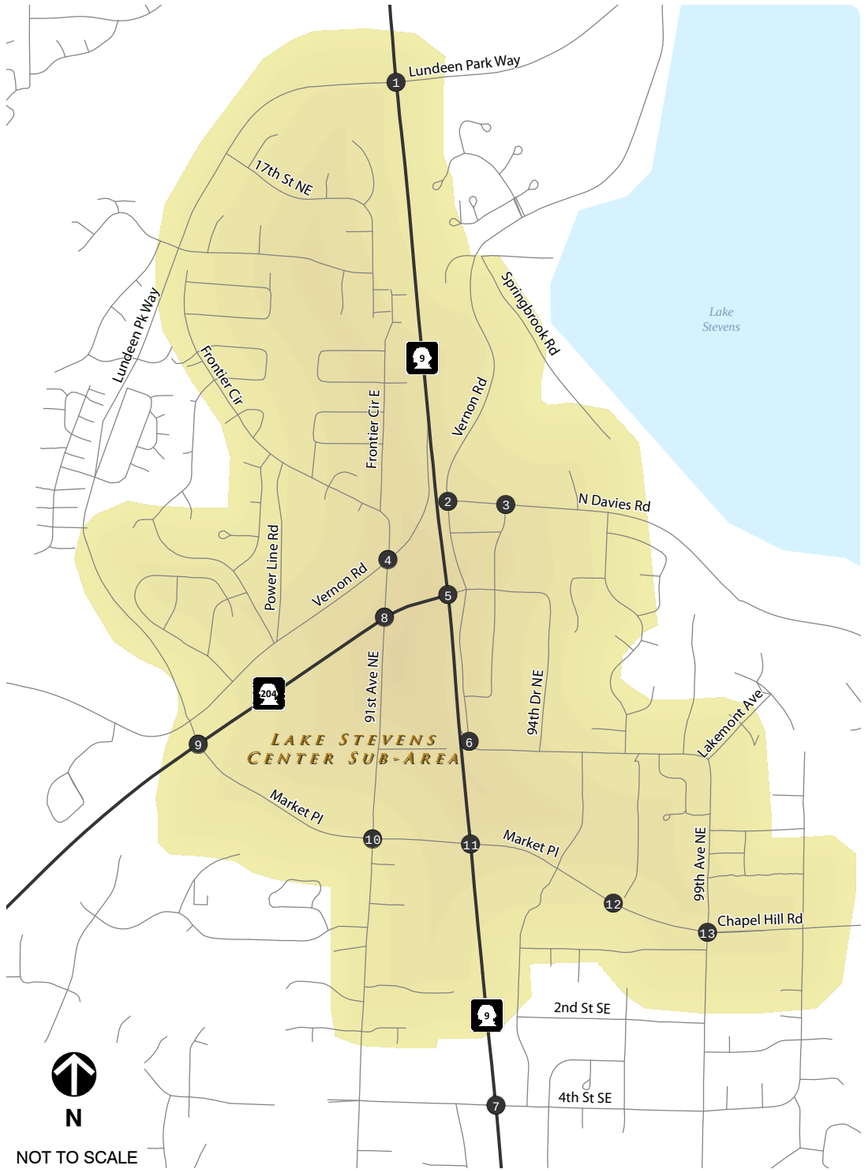
Source: Fehr & Peers

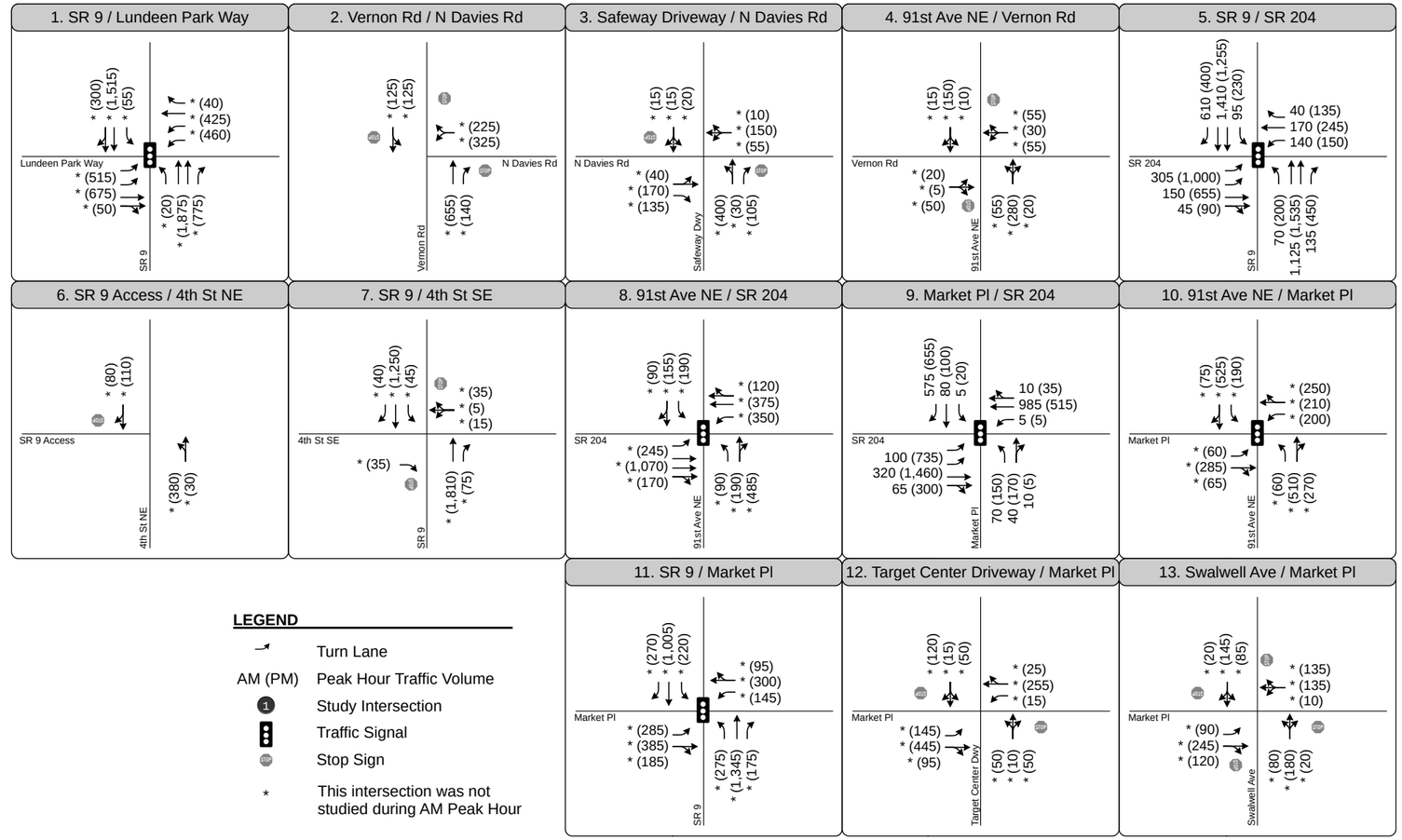
Figure 3.7-17. Peak Hour Level of Service - Alternative 2 (2025)



Source: Fehr & Peers

Figure 3.7-18. Peak Hour Traffic Volumes and Lane Configurations - Alternative 3 (2025)



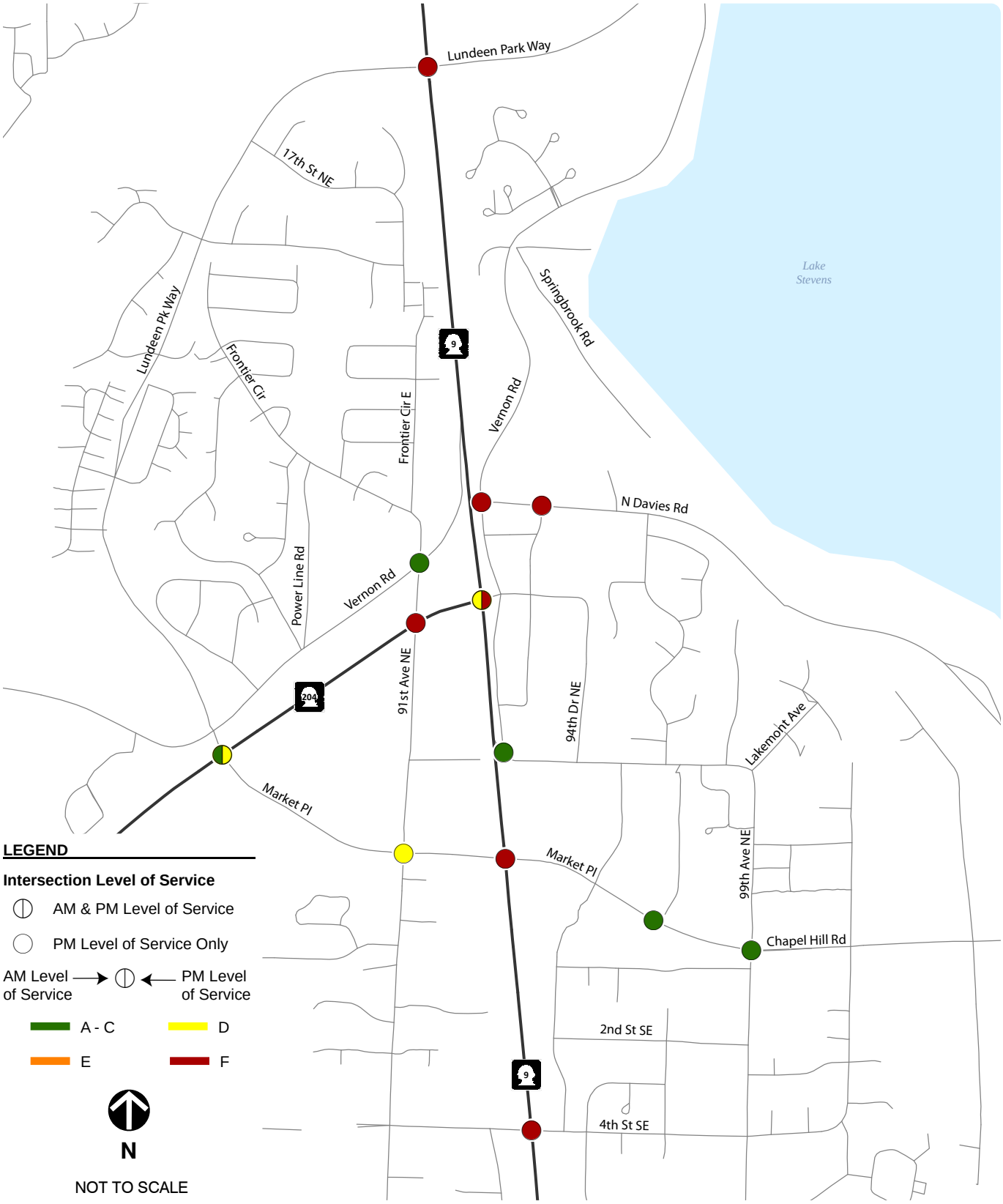


LEGEND

	Turn Lane
AM (PM)	Peak Hour Traffic Volume
1	Study Intersection
	Traffic Signal
STOP	Stop Sign
*	This intersection was not studied during AM Peak Hour

Source: Fehr & Peers

Figure 3.7-19. Peak Hour Level of Service - Alternative 3 (2025)



Source: Fehr & Peers

Table 3.7-6. 2025 PM Peak Hour Level of Service

ID	Intersection	Traffic Control Device	No Action Alternative	Alternative 2	Alternative 3
1	SR-9 and Lundeen Parkway	Signalized	**F / 117**	**F / 123**	**F / 124**
2	Vernon Road and N Davies Road	All-way stop control	**F / 58**	**F / 60**	**F / 89**
3	Safeway Driveway and N Davies Road	Side-street stop control	**D / 34**	**E / 39**	**F / 78**
4	91st Avenue NE and Vernon Road	Side-street stop control	C / 15	C / 17	C / 17
5	SR-9 and SR-204	Signalized	**F / 187**	**F / 200**	**F / >200**
6	SR-9 Access and 4th Street NE	Side-street stop control	B / 14	B / 14	B / 14
7	SR-9 and 4th Street SE	Side-street stop control	**F / 117**	**F / 142**	**F / 157**
8	91st Avenue NE and SR-204	Signalized	**F / 93**	**F / 109**	**F / 111**
9	Market Place and SR - 204	Signalized	C / 34	**D / 36**	**D / 36**
10	Market Place and 91st Avenue NE	Signalized	C / 34	**D / 47**	**D / 50**
11	Market Place and SR-9	Signalized	**F / 194**	**F / >200**	**F / >200**
12	Market Place and Target Center Driveway	Side-street stop control	C / 20	C / 22	C / 22
13	Market Place and Swalwell Avenue	All-way stop control	C / 20	C / 23	C / 24

Source: Fehr & Peers, 2011.

During the PM peak hour, both *Alternative 2* and *Alternative 3* would cause impacts compared to the *No Action Alternative* at the following intersections:

- SR-9 and Lundeen Parkway;
- Vernon Road and N. Davies Road;
- Safeway Driveway and N. Davies Road;
- SR-9 and SR-204;
- SR-9 and 4th Street SE;
- 91st Avenue SE and SR-204;

- Market Place and SR-204;
- Market Place and 91st Avenue NE; and
- Market Place and SR-9.

The general trends described for the *No Action Alternative* would hold true for *Alternative 2* and *Alternative 3*. However, the increased traffic volumes generated by the additional land use would exacerbate operations at already problematic intersections. *Alternative 3* would have slightly worse operations than *Alternative 2* in most areas. More substantial deterioration is seen at the two study intersections along N. Davies Road.

Note that the analysis results shown in Tables 3.7-4, 3.7-5, and 3.7-6 represent the LOS conditions using the traffic demand estimates from the Snohomish County travel demand model. While the model can forecast overall levels of demand for travel, these tools are not very sensitive to bottlenecks that can meter traffic flow. A good example of this is the eastbound off-ramp from US-2 to SR-204. The Snohomish County travel model estimates 2,500 vehicles per hour of demand in the PM peak hour traveling eastbound on SR-204 approaching Market Place. However, only about 1,800 vehicles per hour can exit a freeway ramp under ideal conditions.[5]

While it is appropriate to base the impact assessment on the more conservative (higher) demand volumes, a limited assessment of the more realistic metered volumes was also performed using *Alternative 3*. At the intersection of SR-9 and SR-204, the metered volumes entering eastbound SR-204 resulted in a reduction of 41 seconds of delay compared to the full demand volumes (over 200 seconds of delay). However, even with the reduced volumes, the SR-9/SR-204 intersection would still operate at LOS F conditions with substantial delays in the eastbound, westbound, and northbound directions.

Pedestrian and Bicycle System

Despite increased traffic volumes, the action alternatives are not expected to interfere with any existing or planned pedestrian or bicycle facilities. The increased vehicle, pedestrian, and bicycle traffic would increase the potential for conflicts between the modes. However, these additional conflicts would not necessarily result in unsafe conditions and would not result in significant impacts to the pedestrian and bicycle system.

The proposed subarea plan reflected in *Alternative 2* and *Alternative 3* includes substantial improvements to the pedestrian and bicycle system. These improvements

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[5] Although there are several intersecting roadways between the US-2 ramps and Market Place, the overall change in traffic volume is likely small.

include new bicycle lanes, sidewalks, landscaping, and off-street trails. These improvements would substantially improve the quality of the pedestrian and bicycle system when compared to the *No Action Alternative*.

Transit

As was the case under the *No Action Alternative*, transit operations may be slower due to increased traffic congestion. However, this would not constitute an impact as defined previously.

Impact Timing and Thresholds

The results in Table 3.7-4 indicate that even with no rezoning in the Lake Stevens Center area, the background growth in traffic will cause traffic operations at many intersections in the study area to degrade to LOS D or worse conditions. In fact, with the exception of the SR-9/4th Street SE intersection, all the intersections along SR-9 will operate at LOS F conditions under the *No Action Alternative*.

Analysis of the existing conditions Synchro network concluded that the LOS at SR-9/SR-204 (the intersection most sensitive to additional background traffic) would degrade to LOS E conditions (falling below WSDOT's standard) if the traffic increased eight percent over existing conditions. Assuming background traffic growth continues at its historic (2000-2007) annual rate of about 1.5 percent, this translates to an additional five years of acceptable operations.

In addition, an "existing plus project" evaluation was performed to determine if development of *Alternative 3* (the most intensive in terms of traffic generation) would trigger any immediate traffic impacts. Since rapid development of a subarea plan is not likely to occur in a short time period, this evaluation is for planning purposes to determine how much development could be absorbed under existing conditions before a traffic impact is triggered.

Using the City's current LOS C standard, no development could occur without causing an impact because some intersections already operate at LOS D and would only deteriorate with additional traffic. Using WSDOT's LOS D standard, the only intersection to fail under full *Alternative 3* development would be Market Place and SR-9. Roughly half of the *Alternative 3* development could be implemented before Market Place/SR-9 would fall to LOS E.

In summary, results of this impact timing and threshold analysis indicate the following:

- Even with no change in land use zoning in Lake Stevens, background traffic growth along the state highway system will result in substantial traffic congestion in the Lake Stevens Center Area; and

- While the proposed rezoning of the Lake Stevens Center does generate additional traffic, approximately 50 percent of the *Alternative 3* development could be accommodated if it were not for regional traffic growth.

These results suggest that WSDOT and the City of Lake Stevens have a shared responsibility to maintain adequate traffic flow through the Lake Stevens Center area, although the magnitude of background traffic growth is more substantial than the locally generated traffic that would be caused by the rezoning proposals.

3.7.3 Mitigation Measures

This section identifies mitigation measures and strategies that are required by state or local regulations and additional measures that could be implemented to lessen the magnitude of identified impacts.

Concurrency

The Growth Management Act (GMA) includes provisions, generally referred to as "concurrency," to ensure that sufficient public facilities are available for new development. Cities must adopt Transportation and Capital Facilities elements in their Comprehensive Plans that identify facilities needed to accommodate projected growth in addition to establishing a funding program to construct the necessary improvements. Within their Comprehensive Plans, jurisdictions include capital projects scheduled for completion within six years that they assume will mitigate development impacts and provide concurrency. Local jurisdictions must also set level of service (LOS) standards as a measure to determine a project's impact potential. If the trips generated by a development will cause a facility to fall below the adopted LOS standard, the local government may deny permits for the project, change the LOS standard to allow the development, or modify the land use. Changes may be made to a development proposal to enable it to meet the concurrency requirements, such as by reducing project size, employing travel demand management to reduce the number of trips generated, or financing the needed improvements.

Level of Service Threshold

While the roadways within Lake Stevens Center could be engineered to maintain LOS C conditions at all the intersections in the study area, doing so would be financially prohibitive (Fehr & Peers, 2011). Therefore, it is recommended that the City amend its threshold for signalized intersections in designated centers/mixed-use areas and strive to meet a LOS E standard. However, based on the discretion of the public works director, intersections that are built to their ultimate size would be allowed to operate at LOS F conditions as long as other programmatic mitigation measures to reduce trip generation are implemented.

For unsignalized intersections, it is recommended that an intersection be considered deficient if it falls below LOS E operations *and* meets a signal warrant. This level of

service is more realistic to maintain, is consistent with the Comprehensive Plan, and is in line with the typical traffic activity seen in economically vibrant areas. If the LOS E threshold described above is adopted, then the following intersections would be considered deficient or impacted during the PM peak hour.

- SR-9 and Lundeen Parkway - all alternatives;
- Vernon Road and N. Davies Road - all alternatives;
- Safeway Driveway and N. Davies Road - Alternative 3;
- SR-9 and SR-204 - all alternatives;
- 91st Avenue NE and SR-204 - all alternatives; and
- Market Place and SR-9 - all alternatives.

Specific mitigation measures for these intersections are discussed in the next section.

LOS: What Does it Really Mean?

When considering a change to a LOS policy, it is important to consider what LOS is actually measuring. Based on the *Highway Capacity Manual*, LOS is a measure of the traffic conditions during the **peak 15 minutes of the peak hour** during a typical weekday. Therefore, when LOS E is reported in the tables above, it suggests that there will be traffic congestion during the busy commute periods; however, for the vast majority of the day the location will operate with little congestion.

While it is important to manage traffic congestion, many cities and counties have come to the conclusion that providing a relatively free-flow standard of LOS C is too expensive, requires too much right-of-way, and leads to wide highways that are not consistent with the community's vision. Many locations are willing to accept peak hour traffic congestion in exchange for lower taxes, smaller-scale roads, and more pedestrian-oriented places.

Location Specific Mitigation Measures

SR-9 Corridor

Three of the impacted intersections are along SR-9 and are under the jurisdiction of WSDOT. Therefore, mitigation measures in the form of roadway and intersection improvements would be addressed in the *SR-9 Corridor Planning Study* or *SR-9 Route Development Plan*. A coordinated approach along SR-9 is essential, rather than simply moving the bottleneck to a different location.

A basic widening of SR-9 through the study area was tested to explore what magnitude of mitigation would be necessary to reach LOS D operations (using *Alternative 3* demand volumes). Even if three through-lanes were provided in each direction throughout the

study area along with an exclusive eastbound right turn pocket at SR-9/SR-204, the intersection would continue to operate at LOS F[6]. Therefore, the grade separation being considered by WSDOT may be required to reach LOS D or better operations at SR-9/SR-204.

At SR-9/Lundeen Parkway, LOS E operations could be achieved by constructing a third northbound and southbound through lane, but LOS D conditions could not be achieved without a more substantial improvement such as grade separation, turn prohibitions, or a continuous flow intersection. Similarly, LOS E conditions could be achieved with three northbound and southbound through lanes at SR-9/Market Place, but LOS D conditions would require the following more substantial improvements:

- Dual northbound and southbound left turn lanes
- Dual northbound and southbound through lanes
- Additional eastbound and westbound through lane

It should be noted that this is a very conservative analysis using the full demand volumes estimated by the travel model, which do not fully account for the metering effects that occur at the US-2 interchanges to the south and west of the subarea. The actual level of traffic reaching the key SR-9/SR-204 intersection would likely be lower than those volumes considered here, although the SR-9/SR-204 would still operate at LOS F conditions.

To implement any improvements along SR-9, it is recommended that Lake Stevens enter into an interlocal agreement with WSDOT, similar to many other jurisdictions in Snohomish County. This interlocal agreement can include coordination related to permitting, funding, and sharing of traffic impact fees, if the City chooses to implement the impact fee programmatic measures discussed below.

Frontier Village Access: Vernon Road/N Davies Road and Safeway Driveway/N Davies Road Intersections

The poor LOS in the vicinity of Frontier Village coupled with the inconvenient traffic patterns used to exit the shopping center highlight the need for mitigation at Frontier Village. The project team developed and analyzed a new access plan with the following key features. Note that this plan is not been fully designed and could be modified based on the actual land use that is constructed on the site:

[6] While the SR 9/SR 204 intersection would still operate at LOS F conditions under the six-through lane configuration, the SR 9/Lundeen Parkway and SR 9/Market Place intersections would improve to LOS E conditions.

- Vernon Road potentially vacated between N Davies Road and SR 204;
- Shopping center/Safeway N. Davies driveway converted to a public road from N. Davies Road to 7th Place NE;
- The intersection of N. Davies Road and the Safeway Driveway would operate as a single lane mini-roundabout;
- The old intersection at Vernon Road/N. Davies Road could potentially be realigned to a curve or operate as a single lane mini-roundabout; and
- The intersection of 7th Place NE and the Safeway N. Davies Driveway would have one of the following two configurations:
    - Single lane stop-controlled approaches on the northbound and westbound legs. The southbound leg would have a two lane stop-controlled approach with a right turn lane and a shared through and left turn lane. To avoid backups into the SR-9/SR-204 intersection, the eastbound leg would be uncontrolled and have a left turn lane and a shared through and right turn lane.
    - Single lane mini-roundabout with right turn bypass lanes on the west and south approaches. To avoid backups, the west approach should have two entry lanes, with the right lane trapping into the bypass lane. The eastbound approach at the SR-9/SR-204 intersection would ideally feature dual left turn lanes, a through lane, and a right turn lane (although this could be avoided if metering is used). Also, it may be necessary to install metering lights on all but the east approach to prevent backups into SR-9. These metering lights would only be necessary during the busiest portion of the PM peak hour and would likely not be necessary for many years. In addition, if there are no substantial improvements to the SR-9/SR-204 intersection, metering lights may not be necessary since congestion at the SR-9/SR-204 intersection would limit the number of vehicles that could enter the roundabout.

<u>Current Frontier Village Access Plans</u>

To address traffic congestion under existing conditions, the City is designing a mini-roundabout at the Safeway Driveway/N. Davies Road intersection and is considering implementing a mini-roundabout at the intersection of Vernon Road and N. Davies Road.

These improvements are consistent with the strategies outlined in the bullets at left. However, as redevelopment occurs on the site, the improvements may need to be modified.

To provide a conservative analysis, this configuration was tested with *Alternative 3* volumes. The mini-roundabout at N Davies Road and the Safeway Driveway would operate at LOS A for all movements. The sign-controlled intersection at the New Public Street/7th Place NE would operate at LOS F for one movement (northbound left with a

delay of 51 seconds), but all other movements would operate at LOS E or better. The roundabout-controlled intersection at the New Public Street/7th Place NE would operate at LOS B conditions.

91st Avenue NE and SR-204

The intersection of 91st Avenue NE and SR-204 operates at LOS F under all three land use alternatives. The project team tested several minor intersection modifications using the *Alternative 3* demand volumes. Adding a northbound right turn pocket would improve operations to LOS D with 53 seconds of delay (a reduction of 58 seconds). Changing the northbound and southbound signal phasing from protected left turns to protected/permitted left turns would reduce delay a further 15 seconds. However, even with these improvements, congestion at the SR-9/SR-204 intersection may adversely affect operations at this intersection.

Additional Mitigation Measures

In addition to the capacity enhancing projects described above, it is recommended that the City of Lake Stevens explore the potential for other programmatic mitigation measures.

Traffic Impact Fees

Implementing the improvements described above will require a substantial investment of money (see Appendix C). To generate the funds necessary to implement the mitigation measures described above, and to help address identified impacts, it is recommended that a traffic impact fee be established, as authorized by RCW 82.02.050. This fee could be exclusive to the Lake Stevens Center area, or could be part of a citywide impact fee program.

Given that the majority of the traffic impacts occur on the state highway system, it is recommended that if any impact fee program is established, the City of Lake Stevens enter an interlocal agreement with WSDOT. The interlocal agreement would allow the City and WSDOT to share fee revenues and help construct the improvements described above.

Transportation Benefit District

Formation of a Transportation Benefit District (TBD), as authorized by RCW 36.73.120, is another approach that could be used to help finance transportation improvements. While more complex to establish and administer compared to traffic impact fees, formation of a TBD would enable the City to assess additional fees and charges within the district, including a supplemental sales tax. A TBD could apply citywide or specific to Lake Stevens Center, and could be used in conjunction with a traffic impact fee.

Transportation Demand Management
Transportation demand management (TDM) strategies include mandatory commute trip reduction programs and enhanced transit service. These measures have been proven to be effective at reducing trip generation even in relatively low-density areas such as Lake Stevens. While these measures can help to reduce overall trip generation and vehicle congestion impacts, their effectiveness relative to the magnitude of the congestion levels in the study area would be relatively small.

3.7.4 Significant Unavoidable Adverse Impacts

Traffic congestion will increase under any alternative and this impact is unavoidable. As described above, the increased traffic volumes caused by Alternative 2 and Alternative 3, would lead to increased delay along SR-9. Since WSDOT has not yet defined its plan to improve traffic conditions along SR-9, specific mitigation measures cannot be identified. Given that WSDOT is actively planning to improve the SR-9 corridor and some level of mitigation is possible (although full improvement to provide LOS D conditions is unlikely because of the high costs), impacts are not inevitable or entirely unavoidable.

3.8 PUBLIC SERVICES

3.8.1 Affected Environment

Police Service

The Lake Stevens Police Department (LSPD) offers multiple law enforcement services to Lake Stevens' business owners, residents, and visitors, including patrol, criminal and collision investigation, along with marine patrol, traffic and City code enforcement. In addition, LSPD provides School Resource Officers to Lake Stevens School District, crime prevention services such as Neighborhood Crime Watch and animal control services. The department also contracts some of its services, including 911 dispatch, jail, and fleet maintenance.

From January 1, 2010 to December 31, 2010, the Police Department responded to 30,764 incidents. This was 9,861 more incidents than in 2009, following the Southwest Annexation. During the same 2009 to 2010 period reported collisions increased from 453 to 727 and DUIs increased from 342 to 456. The average response time (call entry to police arrival) from January 1, 2011 to May 31, 2011 for emergency calls was less than two minutes, for high-priority calls less than seven minutes, and for low-priority calls less than 12 minutes.

The City's adopted goal for officer coverage is to strive to maintain a ratio of one police officer per 750 people, understanding that as population increases and efficiencies increase, a lower ratio may be permitted provided an acceptable level of service is maintained.

The City constructed the police department building, located at 2211 Grade Road, in 2005.

Fire & Emergency Medical Services

The Lake Stevens Fire District provides fire, emergency medical services (EMS), and rescue services to an estimated 40,346 citizens in central Snohomish County. Department boundaries cover approximately 42 square miles and include the City of Lake Stevens and several unincorporated communities and neighborhoods (Lake Stevens Fire, September 16, 2010 & Personal Communication). As of 2011, Lake Stevens Fire has 53 employees. District policy requires that a minimum of eight firefighters be on duty at any time. Currently, Lake Stevens Fire averages 11 firefighters and other emergency employees. Lake Stevens Fire also provides fire marshal service to the City through an interlocal agreement executed in 2007

Lake Stevens Fire utilizes specialized apparatus to respond to Fire, EMS, and Rescue calls. The Department uses class "A" fire engines outfitted with firefighting equipment in accordance with National Fire Protection Association standards. All fire engines are

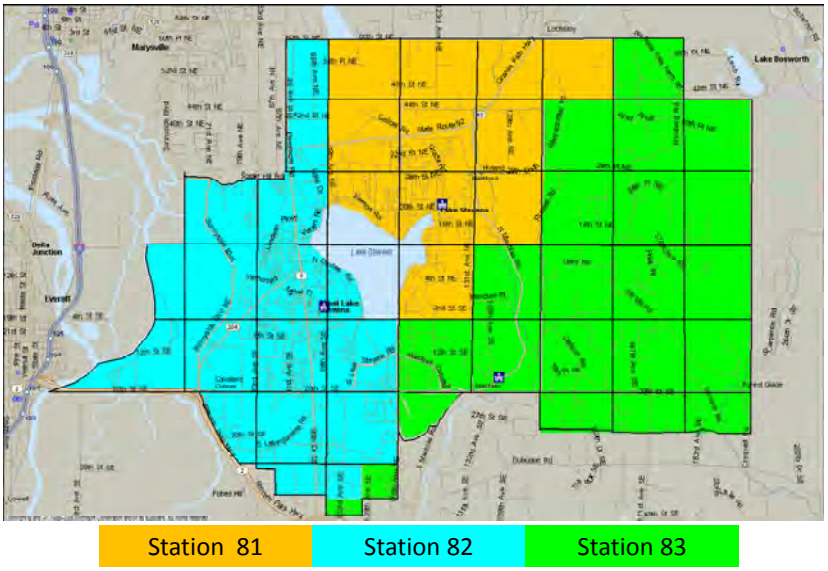
also equipped with medical equipment and supplies. EMS resources consist of two Advanced Life Support paramedic units and three Basic Life Support units. Lake Stevens Fire also has a 24-foot fire rescue boat moored at the northern end of Lake Stevens Lake (Lake Stevens Fire, September 16, 2010).

Lake Stevens Fire has an administration office and a conference center located at South Lake Stevens Road and 20th Street SE, a training facility located in Machias, and three fire stations: Station 81 - 12409 21st Street NE; Station 82 - 9811 Chapel Hill Road; and Station 83 - 13717 Division Street (Snohomish).

Figure 3.8-1 illustrates district boundaries, fire station locations, and related response areas.

Figure 3.8-1 Lake Stevens Fire District Boundaries Stations and Primary Response Area

Station Primary Response Areas



Source: Lake Stevens Fire (2011)

In 2006, Lake Stevens Fire adopted its current level of service objectives for suburban and rural response times. According to the Lake Stevens Fire 2010 Annual Report, the adopted suburban response/travel time objective for single engine responses to residential and commercial fires is four minutes. In 2010, response time ranged from approximately four minutes to just under seven minutes depending on the type of single engine response. Comparatively, the suburban level of service for full deployments with multiple engines, and a combination of rescue, aid, and medic unit is eight minutes – the actual response time ranged from nine to 10 minutes. For marine rescue calls, Lake Stevens Fire has adopted a response/travel time objective of eight minutes for the arrival of the first unit. In 2010, this objective was met 100 percent of the time (Lake Stevens Fire 2010 Annual Report).

In 2011, Lake Stevens Fire had responded to 1,557 calls through May 18. A sample of 87 calls from May 12, 2011 through May 18, 2011 shows that 71.26 percent of the calls (62 calls) were for EMS services (Lake Stevens Fire website June 2, 2011). In comparison, in 2010, Lake Stevens Fire responded to 4,317 incidents. The majority of calls were also for EMS related (Lake Stevens Fire, Personal Communication 2011). Station 82 responded to a majority of calls or 45.50 percent of dispatched calls in the district. Table 3.8-1 illustrates the 2010 allocation of dispatched calls from Station 82; more than three-quarters of all calls were for EMS services.

Table 3.8-1. 2010 Dispatched Call Service Type for Station 82

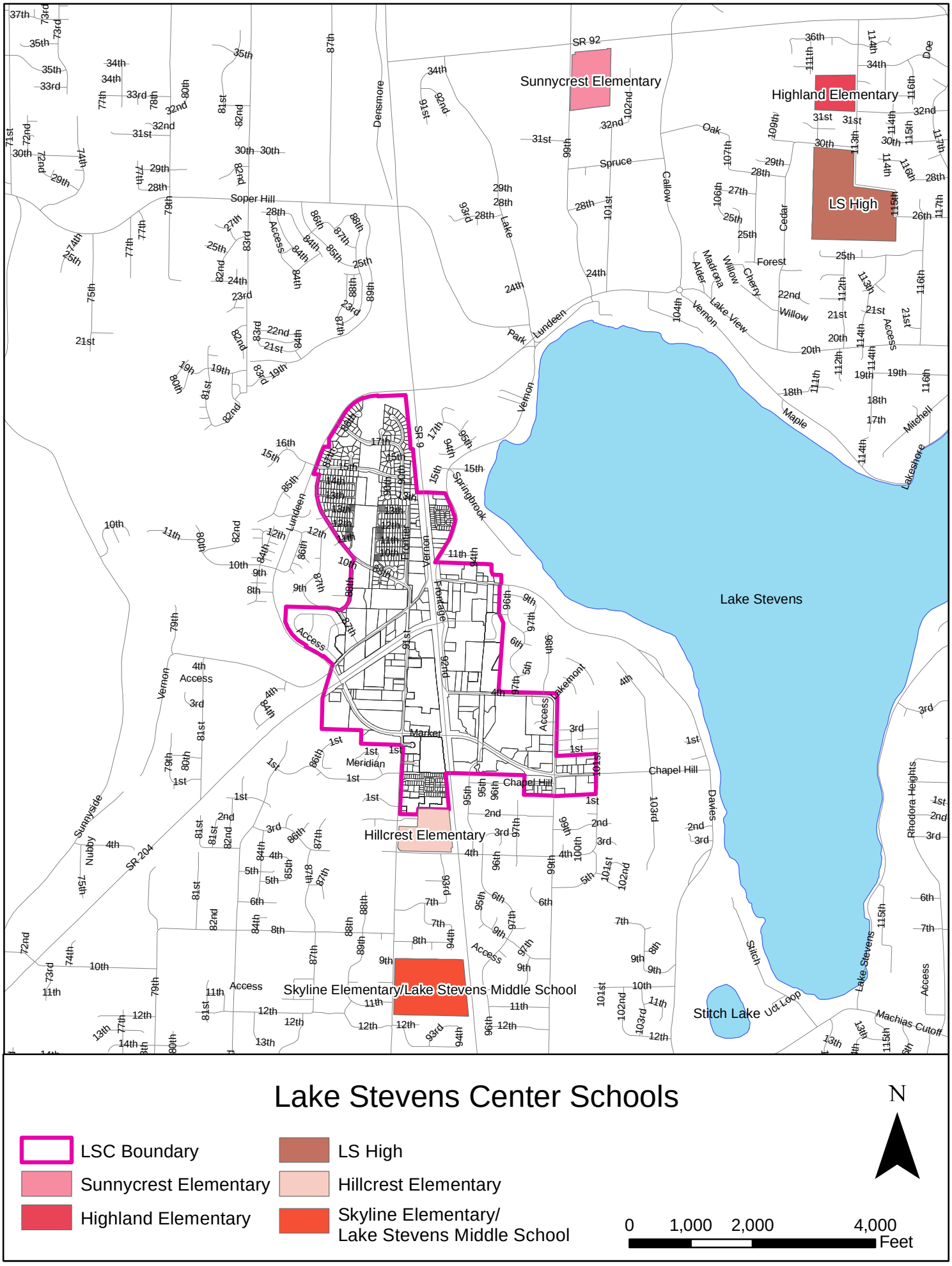
Station 82 Service Type	Dispatched Calls
EMS	1,525
Fire	168
Rescue	2
Service/Other	269
Total	1,964

Source: Lake Stevens Fire District, June 2011

Public Schools

The Lake Stevens Center subarea is located within the Lake Stevens School District #4 boundaries. The Lake Stevens School District covers approximately 37 square miles and encompasses most of the City of Lake Stevens, portions of unincorporated Snohomish County, and a small portion of the City of Marysville. Schools serving the area include Highland Elementary, Hillcrest Elementary, Skyline Elementary/Lake Stevens Middle School, and Lake Stevens High School; locations of these schools are illustrated in Figure 3.8-2.

Figure 3.8-2 School Service Areas



Source: Snohomish County Assessors Data (2011)

Current data on student enrollment and facility capacity were obtained from the school district and Public School Review websites (lkstevens.wednet.edu and publicschoolreview.com). Hillcrest Elementary provides service to the majority of the area. It has kindergarten through fifth grade and currently serves 625 students. The total student capacity for Hillcrest is 549 students (711 with portables). Highland houses 592 students with a capacity of 512 students (620 with portables) and Skyline houses 533 students with a total capacity of 513 students (620 with portables). Lake Stevens Middle School and Cavelero Mid-High School provide middle school needs for the subarea. Cavelero Mid-High School has eighth and ninth graders. Lake Stevens Middle School has sixth and seventh graders. According to Public School Review, Cavelero Mid-High School has 1,249 students and Lake Stevens Middle School has 535 students. The student capacity for Cavelero is 1,418 students and Lake Stevens Middle School is 684 students (924 with portables).

The Lake Stevens School District projects that its student population will increase nearly 39 percent by 2025. It also predicts its elementary, mid-high, and high schools to be over capacity by 2015. Table 3.8-2 includes the current capacity and projected 2025 enrollment for the Lake Stevens School District.

Table 3.8-2. Lake Stevens School District Capacity

School Level	2011 Capacity	Projected 2025 Enrollment
Elementary	3,289	4,581
Middle	1,250	1,742
Mid-High	1,306	1,819
High School	1,660	2,313
Total	7,505	10,455

Source: Lake Stevens School District No.4 Capital Facilities Plan 2010

The District uses student generation rates, shown in Table 3.8-3, to estimate the number of students that new housing development will generate.

Table 3.8-3. Lake Stevens School District Student Generation Rates

Housing Type	Elementary	Middle	Mid-High	High School	Total
Single Family	0.356	0.120	0.090	0.124	0.690
Multiple Family, 1 Bedroom	0.000	0.000	0.000	0.000	0.000
Multiple Family, 2+ Bedroom	0.213	0.040	0.048	0.016	0.317

Source: Lake Stevens School District No.4 Capital Facilities Plan 2010

Parks & Recreation

According to the Parks and Recreation Element of the Lake Stevens Comprehensive Plan (which was last updated in 2006), there are currently almost 195 acres of parks, trails and open space within city limits or nearby in the Lake Stevens Urban Growth Area or County area. This total includes the 2009 annexation of the Southwest UGA, which increased the City's population by over 10,000 residents and the purchase of additional park property by the City and the County since 2006. Population and facilities translates to a current level of service of 6.9 acres of recreational land per thousand in population. The City's adopted level of service is 7.5 acres per thousand. Therefore, there is a current need of approximately 15.5 acres additional recreational land citywide to meet the standard.

Figure 3.8-3 shows the locations of parks inside or within a mile of the study area. The nearest public parks to the study area are Lundeen Park, Eagle Ridge Park, and Wyatt Regional Park. Additionally, Frontier Heights Homeowner's Association maintains a large private park in the area.

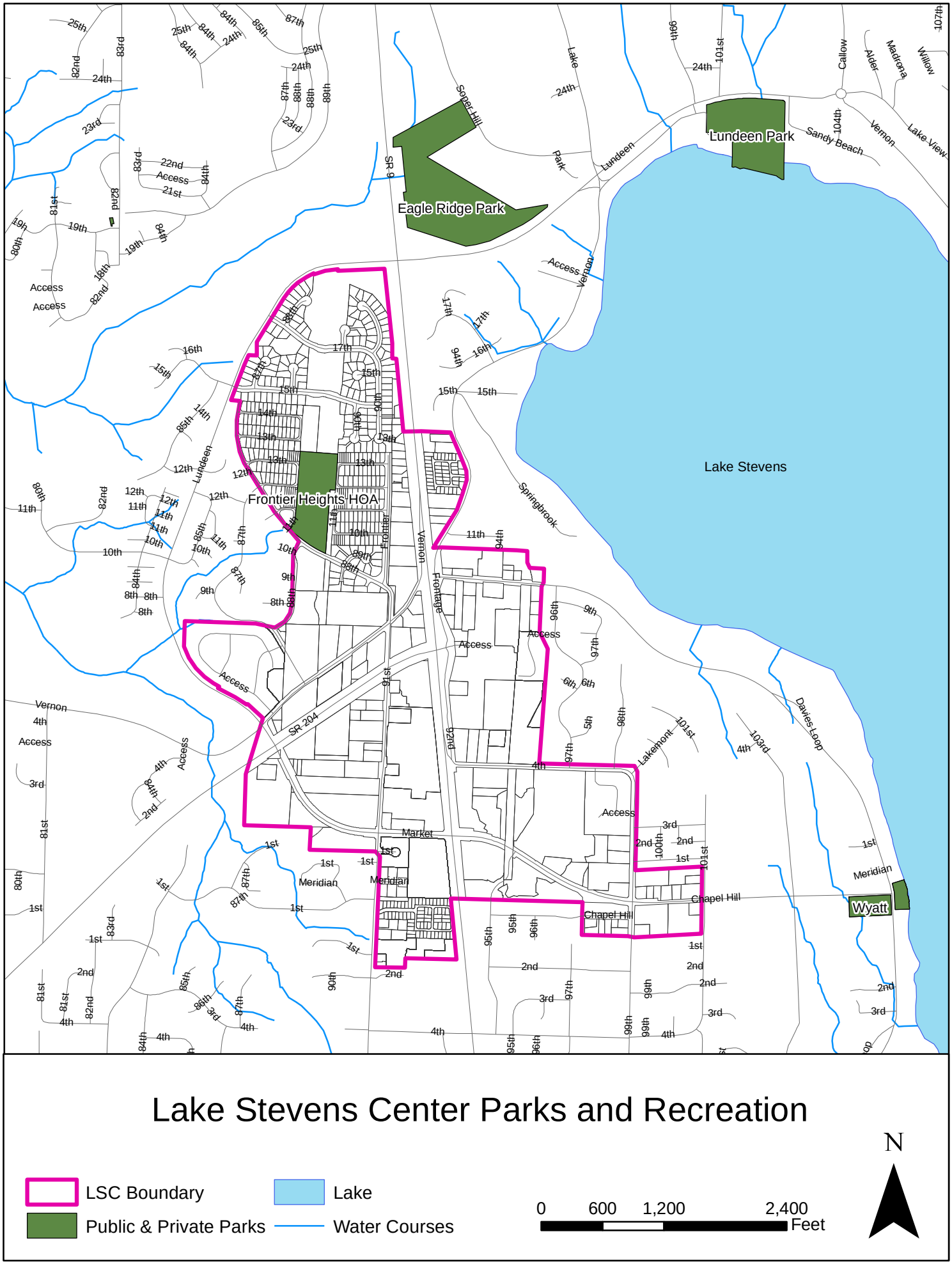
Eagle Ridge Park is located northwest of the lake. This approximate 28-acre park includes a 15.6-acre passive recreation area with approximately 3,000 linear feet of trails that wind through the wetlands headwaters of Hubert and Eagle creeks. Future improvements include adding interpretive signs and observation areas. The second part of the park is an undeveloped 4.8-acre area that houses a 2,800 square foot Senior Center. The City purchased an additional 7.63 acres, with a house and other structures, in 2010. A master plan for the park is complete and includes plans to turn an existing barn into an interpretive center and incorporate an outdoor classroom theme.

Lundeen Park is located north of the lake near 99th Avenue NE. This park is approximately 10 acres and includes a swimming area, picnic facilities, passive interpretive trails, basketball courts, public restrooms, and children's play equipment. It also provides beach access and a public dock.

Wyatt Regional Park, a three-acre County facility, is located approximately one-third mile east of the study area on the southwestern shoreline of the lake near Davies Road and Chapel Hill Road. Wyatt Regional Park is a fully developed water-oriented park that provides swimming, fishing, and boat launch amenities. It also includes picnic, restroom, and parking facilities.

There are additional recreational opportunities available at schools in the area, described previously, and at other park facilities located in the greater City. In addition, Frontier Heights Subdivision, located north of SR-204 and west of SR-9, owns a 7-acre park under the power lines, which has been offered to the City for future purchase and use.

Figure 3.8 3 Parks Facilities



Sources: City of Lake Stevens and Snohomish County Assessors Data (2011)

3.8.2 Impacts of the Alternatives

Jurisdictions commonly estimate the demand for public services (e.g., police, fire/EMS, schools, and parks and recreation) using a population-based standard or ratio, i.e., an additional increment of population (usually 1,000 people) will generate a need for an increment of service and/or facilities, based on a locally adopted standard for providing the service. For example, a ratio may be expressed as service personnel per 1,000 population or additional acres of land per 1,000 people. For emergency services, service standards may be expressed as a response time.

The analysis in the Draft EIS relies on adopted levels of service identified in existing school district, fire district and City capital facilities plans. Population-based ratios are used to identify police coverage (officers per 1,000 population), and parks and open space land (acres per 1,000 population), based on the City's Comprehensive Plan. The Comprehensive Plan's estimates for park needs were modified to reflect recent annexations.

The impacts of the alternatives to public services are generally proportionate to the amount and type of growth. In general, residential development typically generates greater demand for services than commercial or retail development and, therefore, establishes the basis for estimating demand in the EIS. While commercial uses may add to demand incrementally, employees do not typically generate significant demand for police and fire service and do not use local parks or schools intensively. If employees also live within the City, then the increase in demand correlates to population growth.

Population growth assumptions used in the EIS are shown below. The *No Action Alternative* projects increases to the existing population and employment based on current growth. Increases for *Alternative 2* and *Alternative 3* reflect the net change compared to the *No Action Alternative* and cumulative growth. To avoid repetition, the impacts discussion provides an overview of the common types of impacts that could occur, and then identifies any difference in the degree of impacts among the alternatives.

As discussed in Section 3.5 of the Draft EIS (Population, Housing & Employment), the population growth associated with all alternatives including the *No Action Alternative* is within the City's 2025 population target and does not reflect an increase in overall citywide population growth. In comparison, employment growth under the subarea plan will exceed 2025 employment targets, but commercial development is not used to estimate demand.

To the extent that projected growth coincides with Comprehensive Plan targets, population and employment increases and associated levels of services may not require additional mitigation measures. If growth specific to the subarea results in growth

beyond anticipated levels and the demand for public services also increases above the adopted level of service, however, project-level mitigation or revisions to existing capital facilities plans will need to considered.

Table 3.8-4 shows the projected subarea population, under the different alternatives as a portion of the projected citywide growth (which includes the 20th Street SE subarea). Table 3.8-5 shows the projected employment growth for the different alternatives using the same criteria.

Table 3.8-4 Cumulative Population Growth Assumptions[1] – Lake Stevens Center and Citywide

LSC Population Growth			Subarea as Portion of Citywide Population Growth			
Alternative	**Low**	**High**	**Total Low**	**Total High**	**Low %**	**High %**
Alternative 1	290	350	28,359	28,419	37.35	37.7
Alternative 2	520	575	28,589	28,644	38.66	38.97
Increase from No Action	230	225	230	225	1.31	1.27
Alternative 3	1,440	1,720	29,509	29,789	43.69	45.16
Increase from No Action	1,150	1,370	1,150	1,370	6.34	7.46

Table 3.8-5 Cumulative Employment Growth Assumptions[2] – Lake Stevens Center and Citywide

LSC Employment Growth			Subarea as Portion of Citywide Employment Growth			
Alternative	**Low**	**High**	**Total Low**	**Total High**	**Low %**	**High %**
Alternative 1	190	240	4,885	4,935	64.59	65.96
Alternative 2	750	750	5,445	5,445	78.51	78.51
Increase from No Action	560	510	560	510	13.92	12.55
Alternative 3	580	600	5,275	5,295	74.60	75.07
Increase from No Action	390	360	390	360	10.01	9.11

[1] The assumptions combine the alternative projections and the current City population of 28,069 and compare these to the City's 2025 growth forecast of 46,125.
[2] The assumptions combine the alternative projections and the City's 2006 employment number and compare these to the City's 2025 growth forecast of 6,615.

Police Service

The City's adopted goal for police officer coverage is to strive to maintain a ratio of one police officer per 750 people. The proportionate demand for police coverage within the subarea, assumed for each alternative, as shown in Table 3.8-6, would be incremental in nature and consistent with population growth identified in the Comprehensive Plan. The table shows both total demand based on estimated population, and the incremental increase of the alternatives relative to either existing conditions (for *No Action*) or to *No Action* (for *Alternatives 2 and 3*).

Table 3.8-6 Lake Stevens Center Demand for Police Service

Alternative	Additional Officers Per Standard	
	Low	High
Alternative 1/No Action	0.39	0.47
Alternative 2	0.69	0.77
Increase from No Action	.31	.30
Alternative 3	1.92	2.29
Increase from No Action	1.53	1.83

Source: City of Lake Stevens, 2011

In general, operational impacts for all alternatives would include an increase in calls for service related to crimes against persons and property and traffic accident investigation, and a potential need for additional police officers to meet that demand. Impacts would also include a need for additional equipment and an incremental increase in need for departmental facility space. Construction could also generate service calls related to traffic control, vandalism and responses to accidents.

The existing standard relates only to population and not to commercial space or jobs. *Alternative 3*, which has the greatest population increase, would also generate the greatest relative demand for service. Where land use is primarily commercial in nature, as with *Alternative 2*, there could be some unquantifiable demand for services outside the population-based standard. It is also possible the population-based standard reflects an average of the demand attributable to both housing and commercial development, meaning all or a portion of the commercially-generated demand is in fact captured.

As discussed in Section 3.5 (Population, Housing & Employment) of the Draft EIS, the population increase associated with the Lake Stevens Center Subarea alternatives falls within the City's 2025 population target. All or most of the demand for police service to serve this expected population is, therefore, already addressed in the Comprehensive Plan's Capital Facilities Element on a city-wide basis. The present analysis identifies that demand more specific to the subarea, which could enhance future police planning.

Retail and commercial uses will also generate some additional calls for service although they are not anticipated to be significant. *Alternative 2* contains the largest increment of employment-related uses and would generate the highest number of calls in this regard.

Cumulative Impact

Cumulatively, population and employment growth associated with the Lake Stevens Subarea Plan and the 20th Street SE Corridor Subarea together would increase calls for service and contribute to a need for additional officers, but remain consistent with identified citywide needs. Under current forecasts, the projected citywide need for police coverage would be an additional 61.5 police officers in 2025 at the adopted level of service. Table 3.8-7 shows the increased demand for police service from the assumed population growth for both subarea plans under the different land use alternatives. In comparison, Table 3.8-8 identifies the overall police need based on the assumed 2025 citywide population and increases from the land use alternatives projected for both subarea plans. As discussed above, the cumulative population increase is within the City's 2025 population growth target per the adopted Comprehensive Plan.

Table 3.8-7. Cumulative Subarea Demand for Police Services

Alternative	Additional Officers Per Standard	
	Low	High
Alternative 1	2.68	5.06
Alternative 2	4.16	4.63
Alternative 3	6.59	7.63

Table 3.8-8. Cumulative Citywide Demand for Police Services

Alternative	Cumulative Additional Officers Standard		Citywide 2025 Forecast
	Low	High	
Alternative 1	40.11	42.48	61.5
Alternative 2	41.59	42.06	
Alternative 3	44.01	45.05	

Fire & Emergency Medical Services

Lake Stevens Fire uses response time rather than population to determine the level of service. The adopted suburban response/travel time objective for single engine responses to residential and commercial fires is four minutes; actual response time in 2010 ranged from four to just under seven minutes. The suburban level of service for full deployments with multiple engines, and a combination of rescue, aid and medic unit is eight minutes; actual response time in 2010 ranged from nine to 10 minutes. Due to

the recent annexation of over 10,000 people and the large area annexed, Lake Stevens Fire is looking for a site for a new fire station in the new annexation area, potentially within the 20th Street SE Corridor Subarea.

The general impacts of *all alternatives* would include an increase in calls related to fire suppression and medical emergencies; based on historical patterns, the latter will likely comprise the greatest proportion of calls for service. Additional firefighters and equipment may be needed, as well as an incremental need for new or upgraded facilities, to maintain the District's response time standard. In general, concentrating growth with designated centers could have a positive effect on response times, compared to a lower density, more dispersed development pattern, especially when denser developments will likely include onsite fire-suppression equipment. As discussed below, demand will increase proportionately because of the increase in housing units and commercial space within the subarea.

For *all alternatives*, the population growth that will occur within the Lake Stevens Center Subarea is consistent with the City's 2025 population target; as such, population growth is addressed on a citywide basis in the adopted Comprehensive Plan. Similarly, the Comprehensive Plan and Lake Stevens Fire Capital Plan have addressed fire service demand associated with this growth in the subarea.

For *Alternative 2* and *Alternative 3*, future employment growth would exceed the current planning target of 6,615 jobs citywide; see Table 3.8-5 above. Demand for fire service related to commercial uses, therefore, would increase incrementally but this is not expected to be significant. Similarly, the cumulative demand associated with the action alternatives for both subarea plans would also exceed the current employment forecast.

Lake Stevens Fire would continue to serve the subarea primarily from Station 82 on Chapel Hill Road. To serve any buildings above 2 stories – which could occur under all alternatives –the district would need to purchase a ladder truck or quint (dual-purpose engine and ladder truck) to reach the higher floors.

Cumulative Impact

As discussed in Section 3.5 (Population, Housing & Employment) of the Draft EIS, the cumulative population growth identified for the Lake Stevens Center Subarea and the 20th Street SE Subarea combined falls within the bounds of the City's 2025 population target. Therefore, the Comprehensive Plan already addresses population impacts on a citywide basis, which means that cumulative fire service demand (in Lake Stevens Center plus all other areas of the city) is consistent with the Comprehensive Plan. Focusing growth within centers could enhance response times compared to the current dispersed, low-density land use pattern. However, the cumulative employment growth

for the two subareas would exceed the current forecast, representing an incremental increase in demand for services.

Schools

The Lake Stevens School District uses the number of bedrooms in residential units to estimate student generation. For estimating purposes, the Draft EIS assumes all new units in Lake Stevens Center will be multifamily, comprised of one-third 1-bedroom units, and two-thirds 2+ bedroom units. Table 3.8-9, identifies the housing units for each EIS alternative and the student generation for multifamily units with two or more bedrooms. The student generation ratio used is 0.079, based on an average of the district's ratios for different school types (shown in Table 3.8-3). The actual size of future units will be based on market conditions and is unknown at this time.

Table 3.8-9. Student Generation for Alternatives

Alternative	Total Housing Units		Student Generation	
	Low	High	Low	High
Alternative 1	100	200	5.31	10.62
Alternative 2	180	200	9.56	10.62
Increase from No Action	0	100	4.25	0
Alternative 3	500	600	26.55	31.86
Increase from No Action	320	400	21.24	21.24

All alternatives would result in an increase in multifamily housing units, generating additional school age students. Impacts would be proportionate to the number and size of units. If the *No Action* Alternative resulted in some amount of single-family housing rather than all multifamily, student generation would be higher. *Alternative 3* would result in redevelopment of some existing single-family housing for multifamily housing, and there could be some additional net reduction in student generation, since the School District estimates that single-family housing generates more students than multifamily units.

As noted above, the population growth identified for the Lake Stevens Center falls within the bounds of the City's 2025 population target. The Comprehensive Plan, and by reference the Lake Stevens School District's Capital Facilities Plan, have addressed population impacts on a citywide and district-wide basis as they affect student generation and enrollment projections. If some portion of this demand creates an additional increment of growth above the 2025 targets, impacts could increase by some degree.

Construction within the subarea could have temporary impacts for school bus routes, which can be minimized by early communication with the school district before and

during construction. New or modified bus routes may also be required to serve the new dwelling units.

Cumulative Impacts

Table 3.8-10 illustrates the cumulative increases in student populations for the Lake Stevens Center subarea and the 20th Street SE Corridor subarea combined. The housing assumptions for the Lake Stevens Center were described above. For the 20th Street SE Corridor, the Draft EIS assumes that the *No Action Alternative* contains 75 percent single-family housing and 25 percent multifamily housing, while the action alternatives would contain 75 percent multifamily housing and 25 percent single-family housing. For purposes of analysis, multifamily housing is assumed to consist of one-third one-bedroom units and two-thirds 2+ bedrooms units with an average rate of 0.079 students per multifamily unit. The single-family student generation ratio is 0.1725 per dwelling unit.

Table 3.8-10 Cumulative Subarea Student Generation for Alternatives

Alternative	Housing Units		Student Generation Increase	
	Low	High	Low	High
Alternative 1	700	1,400	85.59	171.19
Alternative 2	1,080	1,200	74.68	82.97
Increase from No Action	380	<-200>	<10.92>	<-88.22>
Alternative 3	1,700	2,000	99.57	116.16
Increase from No Action	100	600	13.97	<-55.03>

Student generation impacts are generally proportionate to the amount and type of residential development, and reflect the lower student generation associated with multifamily development. For this reason, *No Action Alternative,* which contains the most single-family housing (primarily in the 20th Street SE Corridor), could generate more students and have greater impacts on schools compared to the action alternatives; this is true in particular for *Alternative 3*, which contains substantially more multifamily residential units. The greater proportions of multifamily housing contained in both subarea plans represent a divergence from Lake Stevens' historical growth pattern, which is currently approximately 75 percent single family. Since multifamily housing generates fewer students than single-family housing on a per unit basis, the increase in multifamily housing would generally result in lower student generation rates, relative to past trends.

As noted above, the cumulative population growth identified for the Lake Stevens Center and the 20th Street SE Corridor combined fall within the bounds of the City's 2025 population target. The Comprehensive Plan and by reference the Lake Stevens

School District's Capital Facilities Plan have addressed population impacts on a citywide and district wide basis as they affect student generation and enrollment projections. As described in Section 3.8.1, the Lake Stevens School District estimates that its student population will increase by nearly 39 percent by 2025 under existing conditions (*No Action Alternative*). The District also predicts that its elementary schools, mid-high and high schools will be over capacity by 2015. The school district adopts a new six-year capital facilities plan every two years, which will occur after 2013. As the Capital Facilities plan is iterative, it will address changes to the district's enrollment at that time it will estimate capital needs and recalculate school mitigation fees at that time to address district needs.

Parks & Recreation

Table 3.8-11 shows the amount of recreational land needed to serve the population associated with each alternative, based on the City's adopted level of service of 7.5 acres of recreational land per 1,000 people.

Table 3.8-11 Parks Needs by Alternative

Alternative	Subarea Population		Subarea Park Needs in acres	
	Low	High	Low	High
Alternative 1	290	350	2.18	2.63
Alternative 2	520	575	3.90	4.31
Increase from No Action	230	225	1.72	1.68
Alternative 3	1,440	1,720	10.80	12.90
Increase from no Action	1,150	1,370	8.62	10.27

General impacts from any of the alternatives would include the need for additional parks and recreational land to serve the subarea population, along with more intensive use of existing facilities. Construction within the subarea could result in dust and noise, which could affect park users, but these impacts would be temporary and limited in degree.

Because the City's level of service standard is based on population, *Alternative 3*, which has the greatest population increase, would also generate the greatest relative demand for parks. As discussed in Section 3.5 (Population, Housing & Employment) of the Draft EIS, the population increase associated with the Lake Stevens Center Subarea alternatives falls within the City's 2025 population target. Park service impacts to serve this expected population would be addressed by the level of service requirement adopted in the Comprehensive Plan.

The present analysis identifies an increased demand for additional recreation land based on assumed population growth within the subarea. The recreation areas

identified within the subarea may add to the citywide inventory, which could enhance future parks planning in the area. Commercial uses are not anticipated to generate any significant demand for park services. In addition, the subarea plan includes connectivity improvements that would assist residents and visitors to reach park areas and trails more easily from residential, commercial and business areas.

As noted in Section 3.8.1, there is currently a citywide deficiency of 15.5 acres of parks, based on the level of service standard. The subarea plan for *Alternative 2* and *Alternative 3* proposes to add a multiuse trail within the north/south utility easement and public open spaces within residential, office and commercial developments. The utility corridor within the Lake Steven Center Subarea is approximately 40 acres in area, and it could provide locations for approximately 8-to-10 acres of additional public trails. As discussed earlier there is a possibility that the City may consider purchasing a 7.5-acre park, located under the power lines, from the Frontier Heights Homeowners Association. The new residential areas would provide additional parks and open spaces. Commercial and business areas could provide additional recreational land as well that has not been traditionally accounted for under the current level of service standard.

These new park and open space areas would increase the recreational land in the City to meet the need created by additional population within the Lake Stevens Center Subarea and help address the current need of 15.5 acres citywide. If the City purchases the Frontier Heights Park, which has been offered, then citywide park deficits would be met.

Under the subarea plan and EIS, public park impacts are being reviewed for broad consistency with the Comprehensive Plan. The findings of the subarea plan and EIS will provide a framework for considering parks and recreation issues that will lead to specific master plans or to future updates to the Parks and Recreation Element of the Comprehensive Plan.

Cumulative Impacts

As noted above, the cumulative population growth identified for the Lake Stevens Center Subarea and the 20th Street SE Subarea falls within the bounds of the City's 2025 population target and is consistent with the adopted Comprehensive Plan. Similarly, park demand associated with this cumulative growth has been addressed in the Comprehensive Plan. Parks identified within the subareas would help to address or reduce the existing parks deficiency. Table 3.8-12 identifies the cumulative park needs for the estimated population of both subarea plans to identify citywide recreational land needs under the current level of service. As shown, the city will need to add between 15.09 acres (combined *No Action Alternative)* at the low end of the range and 42.90 acres (combined *Alternative 3)* at the high end of the range beyond the existing recreational land inventory of 195 acres to meet the existing level of service of 7.5 acres of recreational land per 1,000 people.

Table 3.8-12 Cumulative Subarea Park Needs

Alternative	Combined Subarea Population		Combined Subarea Park Needs	
	Low	High	Low	High
Alternative 1	2,012	3,794	15.09	28.46
Alternative 2	3,120	3,475	23.40	26.06
Increase from No Action	1,108	<-319>	8.31	<-2.46>
Alternative 3	4,940	5,720	37.05	42.90
Increase from No Action	2,928	1,926	21.96	14.44

By comparison, Table 3.8-13 shows the cumulative citywide park need using the subarea assumptions and the current population estimate. The identified cumulative citywide park deficit is between 30.61 to 58.42 acres with the subarea alternatives and current city population.

Table 3.8-13 Cumulative Citywide Park Needs

Alternative	Citywide Population		Total Citywide Park Needs	
	Low	High	Low	High
Alternative 1	30,081	31,863	225.61	238.97
Alternative 2	31,189	31,544	233.92	236.58
Increase from No Action	1,108	<-319>	8.31	<-2.39>
Alternative 3	33,009	33,789	247.57	253.42
Increase from No Action	2,928	1,926	21.96	16.84

3.8.3 Mitigation Measures

Applicable Regulations & Commitments

Development under all of the alternatives would be required to comply with existing regulations related to emergency access, fire suppression systems, traffic mitigation, and payment of school and park impact mitigation fees. These requirements would assist in providing the required public services for planned growth.

Additional Mitigation Measures

Alternatives 2 and *3* could incorporate the following additional measures:

- During construction, implement security measures such as onsite lighting, fencing, onsite surveillance, etc. to reduce potential criminal activity.
- Review current levels of service for emergency services to ensure that they are consistent with regional standards and with standards of comparable cities, and that they meet the needs of the community.
- Construct a well-designed internal street system that provides fast and efficient police, fire and emergency vehicle access to all areas of the subarea.
- Develop streets, sidewalks, walkways, bicycle and pedestrian paths and public spaces designed to promote public safety and visibility for residents, employees, site visitors and police.
- Design all parking areas and public spaces with specially designed no-glare security lighting to provide for security.
- Include incentives in revised development regulations for providing public spaces in new development.
- Begin a planning process to identify additional park space or needs within the subarea for consideration with updates to the Parks and Recreation Element of the Comprehensive Plan. Identify land that is suitable for acquisition, and investigate the potential for acquiring easements within the utility corridor.
- The City could consider purchasing the existing 7.5-acre park, located under the power lines, from the Frontier Heights Homeowners Association.
- The School District could recalculate school mitigation fees to include upgrades to local schools to meet the needs of the new students.

3.8.4 Significant Unavoidable Adverse Impacts

Demand for public services would increase incrementally in conjunction with the population and commercial growth expected to locate in the subarea. Any additional needs would be addressed in the City's Capital Facilities Plan.

3.9 UTILITIES

3.9.1 Affected Environment

Stormwater and Drainage

Drainage service in the study area is a mixture of public and private infrastructure. The City of Lake Stevens owns and maintains stormwater piping, ditches and catch basins along public streets, while smaller ditches and detention facilities created through plats or located on private property are the responsibility of individual property owners, homeowner associations, the City, or Snohomish County. There are also several regional road detention facilities maintained by WSDOT and Snohomish County.

New projects constructed in the City are required to meet the requirements of the 2005 State Department of Ecology Stormwater Management Manual for Western Washington, in compliance with the City's National Pollutant Discharge Elimination System (NPDES) municipal stormwater permit from the Department of Ecology and Lake Stevens Municipal Code.

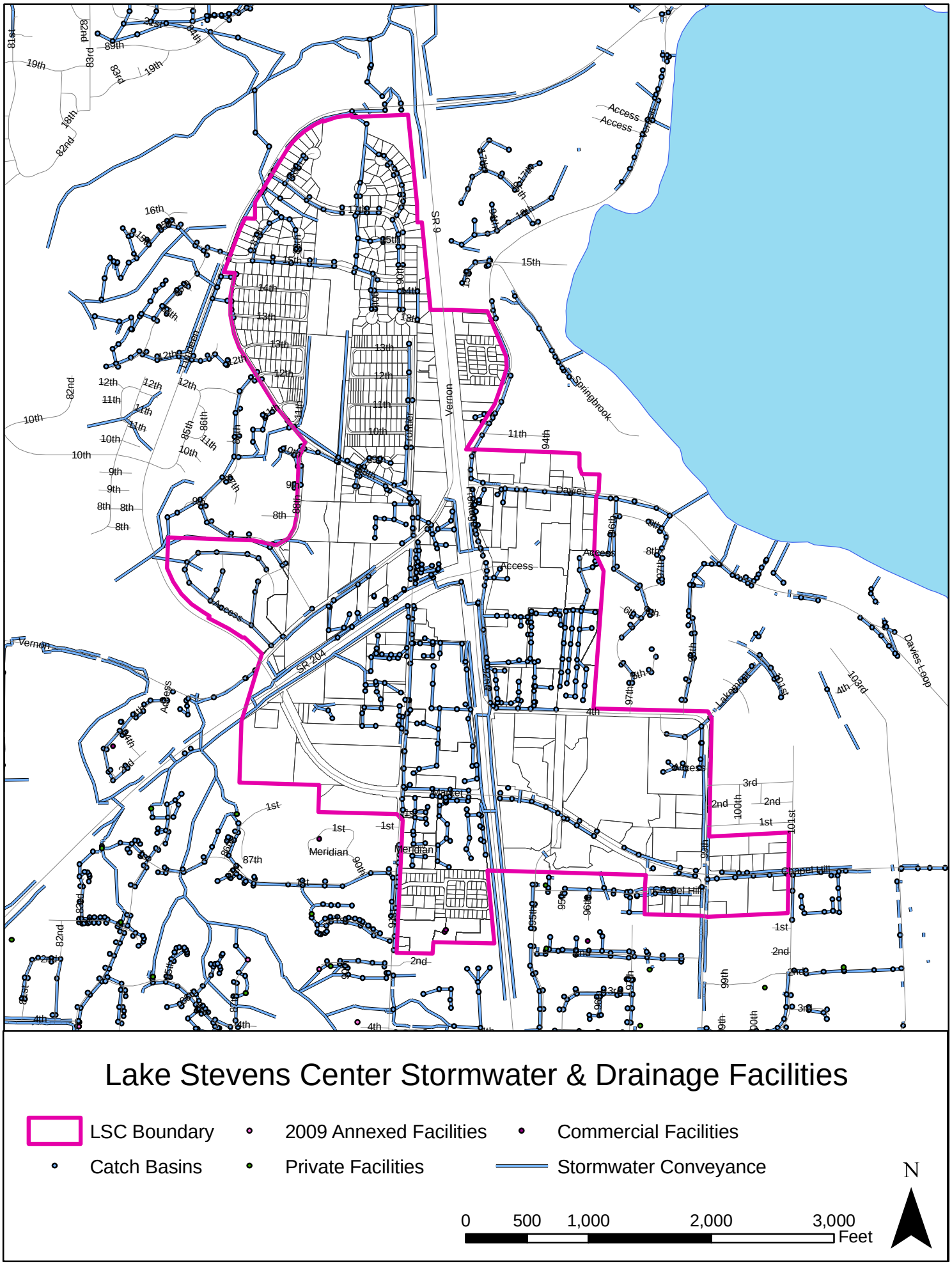
Stormwater infrastructure is present throughout the study area, though the majority is concentrated in the commercial areas surrounding the intersection of SR-9 and SR-204, as well as in the residential neighborhoods at the far north of the study area. The study area does contain limited areas with minimal drainage infrastructure, including the properties east of SR-9 between 4th Street NE and Market Place, as well as the residential properties west of SR-9 and south of 15th Street NE. Figure 3.10-1 illustrates the conveyance and stormwater facilities located within the 20th Street SE Corridor

Water

Water Supply

Snohomish County Public Utility District (PUD) #1, through its Lake Stevens Water System, provides public water service to approximately 20,000 water customers in the City of Lake Stevens, as well as its Urban Growth Area. The PUD purchases its water from the City of Everett and maintains five permanent connections to the City of Everett's water system. The PUD also maintains two permanent interties to the City of Marysville's water system. Emergency standby supply consists of one intertie to the City of Marysville water system and two groundwater wells, located in the northeastern corner of the city (City of Lake Stevens, 2010). These wells each have a capacity of 1,200 gallons per minute (Snohomish County PUD 2011 and Department of Health, 2011).

Figure 3.9-1 Lake Stevens stormwater facilities



Source: City of Lake Stevens

Snohomish County PUD plans to convert the two emergency groundwater wells to a full-time source, increasing available water and reducing reliance on flow from the City of Everett system.

While the PUD is not limited in how much water it is allowed to draw from the City of Everett water system, the combined physical capacity of the system pumps is 8,500 gallons per minute (gpm), which translates to a Limiting Supply Rate of 12.24 million gallons daily (MGD). Based on an average household daily demand of 188 gallons and maximum household demand of 386 gallons per day, the Lake Stevens water system is capable of serving up to 31,710 Equivalent Residential Units (ERUs). As of 2009, the system served 24,281 ERUs, resulting in supply capacity to serve an additional 7,429 ERUs.

Water Storage

The Lake Stevens Water System includes three reservoirs for water storage with a combined capacity of 9.9 million gallons (MG). The Walker Hill Reservoir consists of a pair of 2.0 MG storage tanks located near the northern end of the lake, on the eastern side of Cedar Road. The Hillcrest Reservoir consists of a pair of storage tanks on the east side of SR-9, south of 4th Street SE and north of 20th Street SE with a combined capacity of approximately 6.0 MG (Snohomish County PUD, 2009). An additional 9.2 MG reservoir, located outside the study area, but serving the pressure zone in which Lake Stevens Center lies, is planned for construction in 2018 (Snohomish PUD, 2011).

Based on average daily water demand and equalizing storage needed to replenish storage tanks during periods when demand exceeds supply capacity, the PUD has established a storage requirement of 387 gallons per ERU. The amount of water storage available in the Lake Stevens system is sufficient for 25,377 ERUs. As of 2009, the system provided storage for 21,555 ERUs, resulting in storage capacity for an additional 3,822 ERU's. Review of overall water system capacity indicates that existing water storage is a limiting factor for future growth within the water service area.

Water Distribution

Water distribution infrastructure is available throughout the Lake Stevens Center subarea. Pipe diameters are smaller in the residential areas in the northern and western portions of the study area, while slightly larger diameter lines are present in the commercial areas in the southern and eastern portions of the study area. Existing water distribution infrastructure for the subarea is summarized below, and the location of water distribution infrastructure in the study area is shown in Figure 3.9-2 (Snohomish County PUD, 2011):

- 43.2 feet of 1-inch water line
- 159.7 feet of 1.5-inch water line
- 157.0 feet of 2-inch water line

- 7,421 feet of 4-inch water line
- 5,170.2 feet of 6-inch water line
- 33,500.3 feet of 8-inch water line
- 3,268.4 feet of 10-inch water line
- 11,598.9 feet of 12-inch water line

While no major improvements of the distribution system are currently planned within the study area, the PUD conducts an ongoing review of distribution piping throughout the water system for aging, damage, or obsolete materials. They also update their Water Plan periodically to incorporate changes from the City's Comprehensive Plan and zoning regulations. The PUD's 2011 update to their water system plan targets the 4-inch and 8-inches pipes in the northwest corner of the study area for replacement in the near future (Snohomish PUD, 2011).

Sewer

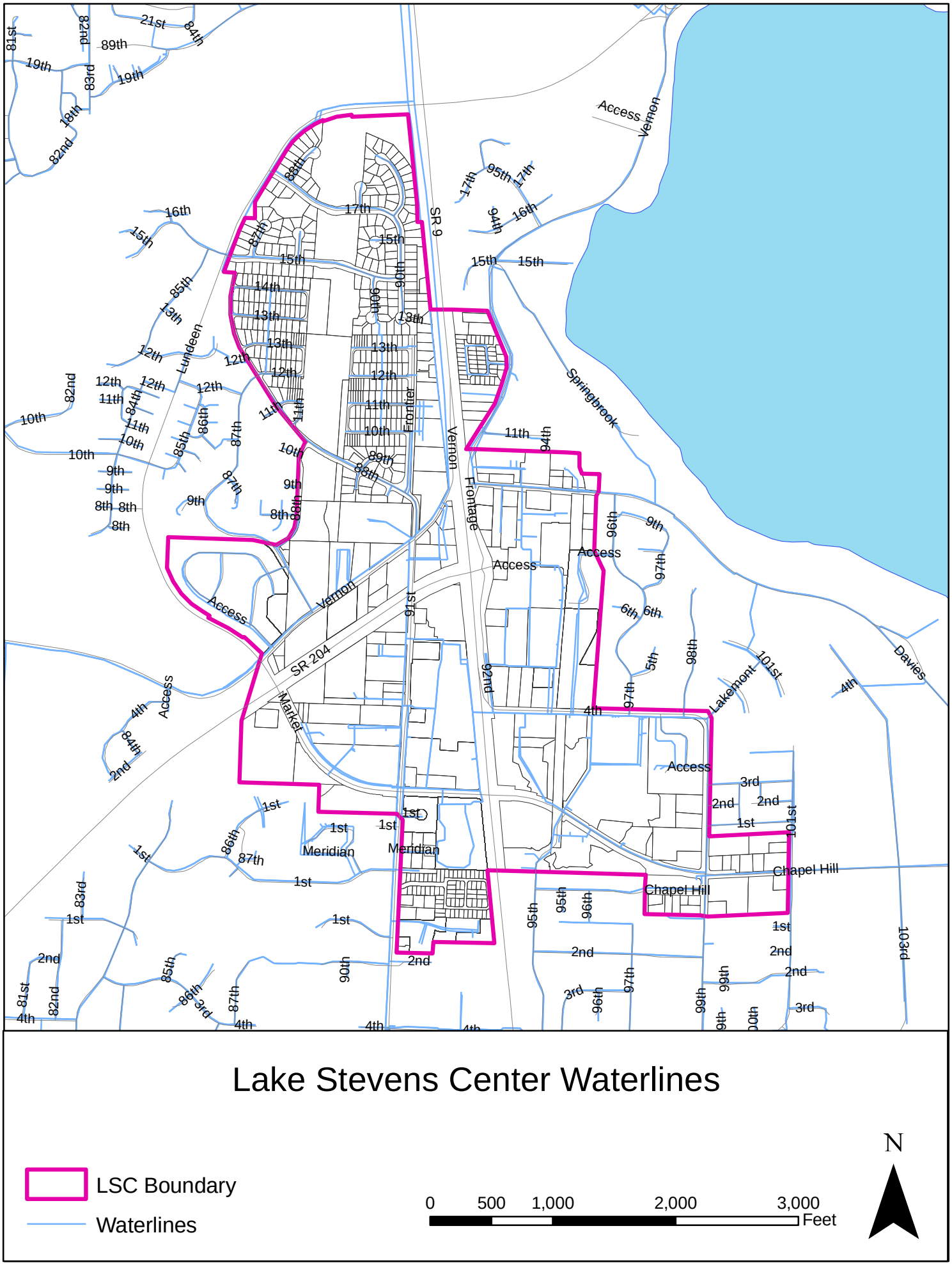
The Lake Stevens Sewer District (LSSD), established in 1957, provides sewer service to the entire Lake Stevens UGA and portions of surrounding areas. Since 2005, the City and the District have operated as a Unified Sewer District, and capital facilities planning for the sewer system is conducted jointly (City of Lake Stevens, 2010).

Collection

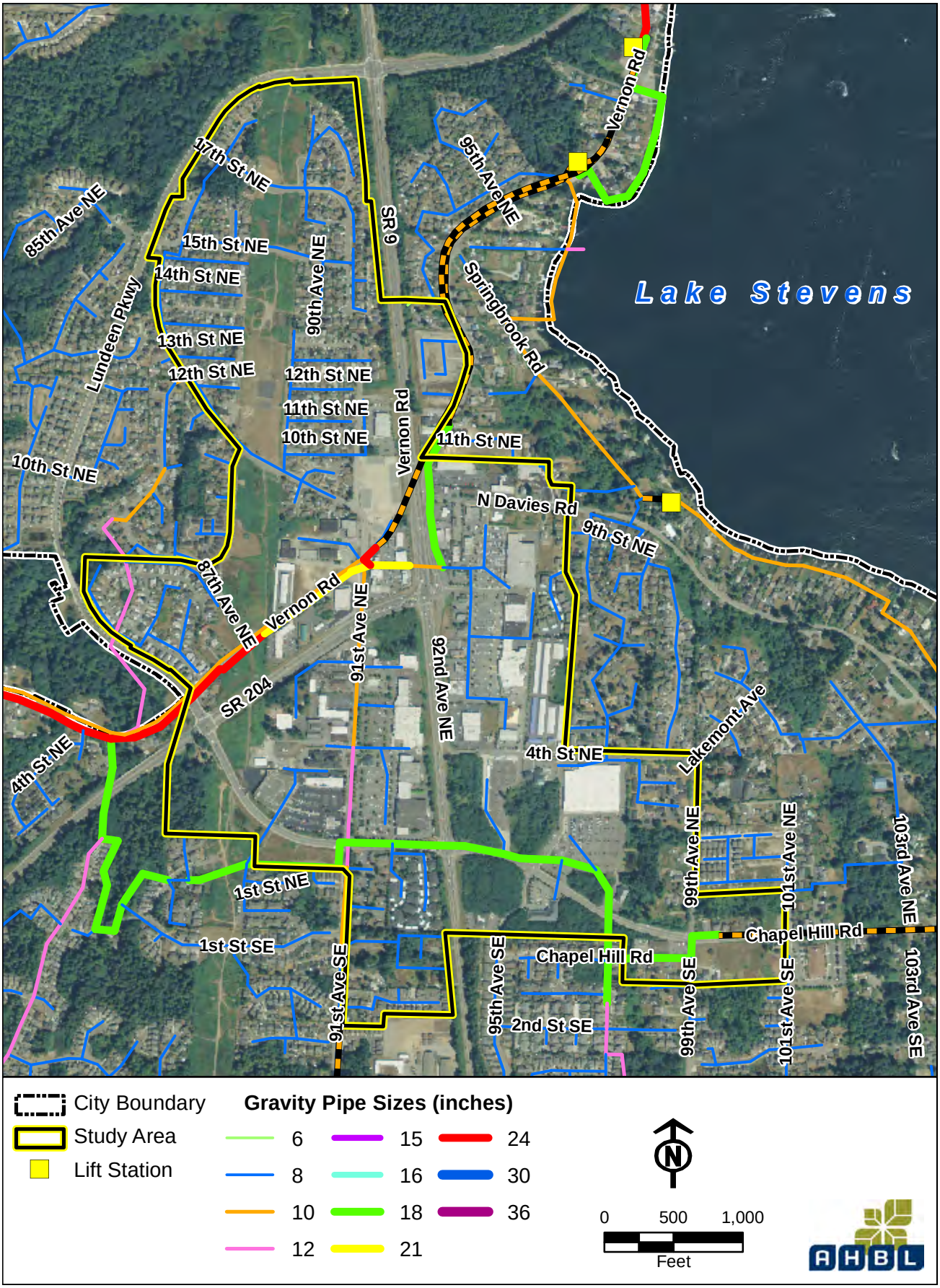
The LSSD wastewater system includes a variety of facilities: collection and transmission lines, pump stations and force mains, wastewater treatment, effluent disposal and biosolids reuse citywide. Sewer infrastructure is available throughout the Lake Stevens Center subarea. Large-diameter collection pipes are concentrated along Vernon Road and 91st Avenue NE, including a force main under Vernon Road that runs from 91st Avenue NE north toward Springbrook Road. Existing collection infrastructure for the subarea is summarized below and shown in Figure 3.9-3 (Gray & Osborne, 2011):

- 60.7 feet of 6-inch diameter gravity pipe
- 35,640.6 feet of 8-inch diameter gravity pipe
- 3,284 feet of 10-inch diameter gravity pipe
- 1,507.7 feet of 12-inch diameter gravity pipe
- 4,836.3 feet of 18-inch diameter gravity pipe
- 1,196.9 feet of 21-inch diameter gravity pipe
- 958.8 feet of 24-inch diameter gravity pipe
- 1,600 feet of 22-inch diameter force main.

Figure 3.9-2 Water System



Source: Snohomish County PUD (2011)



Source: Lake Stevens Sewer District (2011)

The sewer district's 2007 comprehensive plan and 2010 amendments contain a list of scheduled capital improvements, including the following improvements planned to occur in the vicinity of the Lake Stevens Center subarea:

- Replacement of 1,020 linear feet of 21-inch diameter pipe with 42-inch diameter pipe between Manhole 99 and Manhole 101 on Vernon Road West Trunk; and
- Replacement 1,095 linear feet of 21-inch diameter pipe with 36-inch diameter pipe between Manhole 94 and Manhole 91B on Vernon Road West Trunk.

Treatment

The Sewer District's treatment plant on Ebey Slough, west of the city limits, receives all sewer flows from the City of Lake Stevens. This plant was originally constructed in the 1960's and has been subject to periodic upgrades and redesigns. The last significant update was completed in 2000. The existing plant is an activated sludge facility with a maximum treatment capacity of 4.07 MGD. Growth projections indicate that wastewater flows will exceed the capacity of the existing wastewater treatment plant (WWTP). The existing Ebey Slough wastewater treatment plant is scheduled for decommissioning in 2013. The sewer district is constructing a replacement wastewater treatment on a 14-acre site between Sunnyside Boulevard and SR-204 on 9th Street SE with greater treatment capacity. The new plant should be operational in 2012 with phased improvements to accommodate capacity increases from future development and growth in the service area. The phased improvements also anticipate new connections when existing septic systems convert to sanitary sewer following expanded sewer availability or when older systems fail. Phase I of the new treatment facility will have a treatment capacity of 5.01 MGD, which is adequate to meet projected demand through 2019. Phase II of the project will increase treatment capability to 6.36 MGD, which is anticipated to provide adequate capacity through 2028 (Gray & Osborne, 2007). Table 3.9-1 provides capacity estimates for phased improvements to the new wastewater treatment plant.

Table 3.10-2. Lake Stevens Sewer District Wastewater Treatment Plant Capacity

Flow Type[1]	Phase 1	Phase 2
Maximum Month Flow (MGD)	5.01	6.36
Peak Hour Flow (MGD)	11.53	14.43
Approximate Total ERUs	15,978	19,997

Source: Personal Communication Gray and Osborne, June 2011

[1] Maximum Month Flow means the highest flow occurring during a one-day period in a calendar year. Peak Hour Flow means the highest hourly flow during a calendar year. MGD means millions of gallons per day.

3.9.2 Impacts of the Alternatives

Stormwater and Drainage

Impacts Common to All Alternatives

Due to the developed nature of the study area, implementation of any of the alternatives is anticipated to result in limited increases in impervious surface coverage and limited additional clearing of existing vegetation to accommodate new development. Increased impervious surface and reduced vegetative cover would result in increased stormwater flows from the study area. Stormwater runoff from developed areas often contains pollutants, such as pesticides, fertilizers, and petroleum products that can degrade water quality in both groundwater and surface water bodies.

To avoid and minimize stormwater impacts, individual project review will be required at the time of development permit application. Under the City's adopted Stormwater Management Ordinance, any project that meets or exceeds the thresholds established in the Department of Ecology's 2005 Stormwater Manual for Western Washington will be reviewed or conditioned by the City to ensure that adequate stormwater treatment is provided.

Alternative 1 – No Action

Water

Water Supply

As described in Section 3.9-1 above, the Lake Stevens water system has supply capacity for an additional 7,429 ERUs, based on a current daily supply of 12.24 MG. The 2011 Water System Plan for Snohomish PUD estimates the average daily demand per ERU in the Lake Stevens system at 188 gallons per day. Based on this demand, the *No Action* alternative would increase demand on water supply by approximately 30,000 – 37,000 gallons per day, which equates to approximately 160 – 195 ERUs. Growth under *No Action* would account for approximately 2.6% of the currently available supply capacity. As such, the *No Action* alternative is not anticipated to result in any significant impacts to water supply.

Water Storage

As described in Section 3.9-1 above, storage capacity is currently a limiting factor for future growth in the Lake Stevens water system service area. Projections by Snohomish County PUD indicate that required standby and equalizing storage requirements are anticipated to increase over time in response to continued growth in the service area. Based on a storage requirement of 387 gallons per ERU, development under the *No Action* alternative would require an additional 61,700 – 75,600 gallons of equalizing and standby storage by 2025.

Snohomish County PUD's *2011 Water System* Plan projected a storage surplus of approximately 243,421 gallons for the year 2010. By 2029, this surplus is projected to increase to 1.2 MG, provided that the system's emergency groundwater wells are converted to full-time sources in 2012 and that the planned Getchell reservoir (9.2 MG) is completed on-schedule in 2018. Given the large surplus anticipated as a result of these planned improvements, the increased demand for storage capacity generated under the *No Action Alternative* is relatively small and is not anticipated to result in any significant impacts to water storage.

Water Distribution

As described in Section 3.9-1, the *2011 Water System Plan* identified no current or future deficiencies for the distribution system in the study area within the 20-year planning period, and no major distribution system capital improvements are planned for the study area during that timeframe. The PUD conducts ongoing examinations of distribution piping for aging and damage, and 4-inch and 8-inches pipes in the northwest corner of the study area have been targeted for replacement in the near future. Because the projected increase in water flows would be relatively small, and no deficiencies have been identified in the study area, the *No Action Alternative* is not anticipated to result in any significant adverse impacts to water distribution.

Fire Flow

Fire Flow Storage

Fire flow storage is necessary to respond to a fire emergency within the water service area, and Snohomish County PUD has committed to varying levels of fire flow in different portions of its service area. These varying flows are based on existing development levels and the fact that different land uses and development typologies require differing levels of fire flow. For example, a low-density residential development may only require 1,000 gpm of fire flow, while a regional commercial center may require 3,000-4,000 gpm of fire flow. The PUD has adopted a fire flow design criteria for the Lake Stevens water system of 0-3,000 gpm for 1-3 hours.

Because the design criteria cover a wide range, the PUD's demand projections calculate future required fire flow storage on the basis of 1,500 gpm for 2 hours. This equates to 180,000 gallons of fire flow storage. The projected demand for fire flow storage is relatively small when compared with the overall storage requirements for the water system, and the PUD design criteria nest this fire flow storage within the standby storage requirement. As discussed under *Water Storage* above, the currently projected storage surplus is anticipated to provide sufficient water storage under the *No Action Alternative.* The City, in cooperation with the Lake Stevens Fire Marshal, evaluates each proposed development project to determine its specific fire flow requirements, and available fire flow is confirmed by the PUD.

Fire Flow Conveyance

In addition to storage, adequate conveyance infrastructure is necessary to provide sufficient fire flow to a given site. Undersized distribution piping can prevent adequate flow from reaching a site without exceeding velocity limits. In preparing its 2011 Water System Plan, Snohomish County PUD classified water mains with recorded velocities greater than 10 feet per second as potentially requiring upgrades. As described in Section 3.9-1 above, most of the water mains in the study area are 8-inch or 12-inch pipes. At a velocity of 10 feet per second, an 8-inch line can provide approximately 1,579 gallons of flow per minute, and a 12-inch line can provide up to 3,529 gallons per minute. Based on these flow values and generally accepted fire flow requirements, an 8-inch main can provide sufficient flow for most low- and medium-density residential development, as well as low-intensity commercial and office development. A 12-inch main can provide sufficient fire flow for high-density residential development and most commercial and office uses, though industrial uses and large, regional-scale commercial centers may require higher flows, based on individual project characteristics. The City, in cooperation with the Lake Stevens Fire Marshal, reviews each project to determine its fire flow requirements. The PUD confirms what flows are available at the development site and, when there is a deficiency, provides technical guidance on methods to reduce needed fire flow or increase available flow through piping improvements.

The area north of SR 204 and west of SR-9 contains a mix of 4-8 inch lines, as well as a 12-inch line under Vernon Road. Fire flows of 1,000 – 1,500 gpm are available throughout this area, and 3,000 gpm flows are available adjacent to SR-9 and 91st Avenue NE. Intensification of residential density in areas without access to adequate fire flow or expanded commercial development may create fire flow deficiencies unless there are improvements to the existing system.

Sewer

Collection

Wastewater from the study area flows through a network of small-diameter gravity lines and is collected in the 24-inch sewer main under Vernon Road. This main transmits wastewater flows south and west, eventually reaching the current wastewater treatment plant. The 2007 Lake Stevens Sewer District Comprehensive Plan identified a capacity deficiency in a portion of the force main under Vernon Road (MH 99 – MH 101) within the study area, d However, as described in Section 3.9.1 above, upgrades to this portion of trunk line are part of an adopted capital improvement project described in both the 2007 LSSD Comprehensive Plan and the subsequent 2010 Plan Amendment. The Sewer District has proposed to complete these systems upgrades within the next 20 years.

No other collection system deficiencies were identified within the study area, and *No Action* is not anticipated to result in any significant adverse impacts to wastewater collection.

Treatment

Development under *Alternative 1 – No Action* would increase wastewater flows and place additional demands on the District's wastewater treatment plant, consistent with growth projections contained in the LSSD's Comprehensive Plan. The LSSD models wastewater flows based on Equivalent Residential Units (ERU), which allows the wastewater flows of non-residential land uses to be expressed as an equivalent number of residential customers. A single ERU represents an average single-family residence of approximately 2.9 persons. Based on the design criteria established in the District's Comprehensive Plan, each ERU contributes approximately 203 additional gallons of wastewater flow per day. Per capita Biochemical Oxygen Demand (BOD_5) and Total Suspended Solids (TSS) loading is estimated to be approximately 0.235 pounds and 0.188 pounds per day, respectively. Based on a household size of 2.9 persons, daily BOD_5 and TSS loading per ERU is approximately 0.682 pounds and 0.545 pounds, respectively. The District models commercial and industrial uses at 2,700 gallons per acre per day, which is equivalent to approximately 13.3 ERU's.

Growth under the *No Action Alternative* is anticipated to increase average wastewater flows by 25,000 – 30,600 gallons per day. Biochemical Oxygen Demand loading is projected to increase by approximately 84 – 103 pounds per day, and Total Suspended Solids loading would increase by approximately 67 – 82 pounds per day.

Estimated levels of growth under *No Action* are consistent with the sewer district's growth projections for the area, and projected increases in wastewater flows and loading would be within the capacity of the existing treatment plant. Completion of the new wastewater treatment facility in 2011-2012 would further increase the ability to treat additional flows. The *No Action Alternative* is not anticipated to result in any significant unavoidable adverse impacts to wastewater treatment.

Alternative 2

Water

Water Supply

As described in Section 3.9-1 above, the Lake Stevens water system has supply capacity for an additional 7,429 ERUs, based on a current daily supply of 12.24 MG. The 2011 Water System Plan for Snohomish PUD estimates the average daily demand per ERU in the Lake Stevens system at 188 gallons per day. Based on this demand, *Alternative 2* would increase demand on water supply by approximately 75,000 – 81,850 gallons per day, which equates to approximately 399 – 435 ERUs. Growth under *Alternative 2* would account for approximately 5.9% of the currently available supply capacity. Because growth under this alternative comprises only a small portion of the available

water supply, *Alternative 2* is not anticipated to result in any significant impacts to water supply.

Water Storage

As described in Section 3.9-1, existing storage capacity is a potential limiting factor for future growth in the Lake Stevens water system service area. Growth projections by Snohomish County PUD indicate that required standby and equalizing storage requirements are anticipated to increase over time in response to continued growth in the service area. Based on a storage requirement of 387 gallons per ERU, development under *Alternative 2* would require an additional 154,600 – 168,500 gallons of equalizing and standby storage by 2025.

Snohomish County PUD's *2011 Water System Plan* projected a storage surplus of approximately 243,421 gallons for the year 2010. By 2029, this surplus is projected to increase to 1.2 MG, provided that the system's emergency groundwater wells are converted to full-time sources in 2012 and that the planned Getchell reservoir (9.2 MG) is completed on-schedule in 2018. Given the large surplus anticipated as a result of these planned improvements, the increased demand for storage capacity generated under *Alternative 2* is relatively small and is not anticipated to result in any significant impacts to water storage capacity.

Water Distribution

As described in Section 3.9-1, the 2011 Water System Plan identified no current or future deficiencies for the distribution system in the study area within the 20-year planning period, and no major distribution system capital improvements are planned for the study area during that timeframe. The PUD conducts ongoing examinations of distribution piping for aging and damage, and 4-inch and 8-inches pipes in the northwest corner of the study area have been targeted for replacement in the near future. Because the projected increase in water flows would be relatively small, and no deficiencies have been identified in the study area, *Alternative 2* is not anticipated to result in any significant adverse impacts to water distribution.

Fire Flow

Fire Flow Storage

As described for the *No Action* alternative, fire flow storage is necessary to respond to a fire emergency within the water service area, and Snohomish County PUD has committed to varying levels of fire flow in different portions of its service area. The PUD has adopted a fire flow design criteria for the Lake Stevens water system of 0-3,000 gpm for 1-3 hours. Because the design criteria cover a wide range, the PUD's demand projections calculate future required fire flow storage on the basis of 1,500 gpm for 2 hours. This equates to 180,000 gallons of fire flow storage. The projected demand for fire flow storage is relatively small when compared with the overall storage requirements for the water system, and the PUD design criteria nest this fire flow

storage within the standby storage requirement. As discussed under *Water Storage* above, the currently projected storage surplus is anticipated to provide sufficient water storage under *Alternative 2*. The City, in cooperation with the Lake Stevens Fire Marshal, evaluates each proposed development project to determine its specific fire flow requirements, and available fire flow is confirmed by the PUD.

Fire Flow Conveyance

In addition to storage, adequate conveyance infrastructure is necessary to provide sufficient fire flow to a given site. Undersized distribution piping can prevent adequate flow from reaching a site without exceeding velocity limits. As described for the *No Action* alternative, an 8-inch main would likely provide sufficient flow for most low- and medium-density residential development, as well as low-intensity commercial and office development. A 12-inch main would likely provide sufficient fire flow for high-density residential development and most commercial and office uses, though industrial uses and large, regional-scale commercial centers may require higher flows, based on individual project characteristics. The City, in cooperation with the Lake Stevens Fire Marshal, reviews each project to determine its fire flow requirements. The PUD confirms what flows are available at the development site and, when there is a deficiency, provides technical guidance on methods to reduce needed fire flow or increase available flow through piping improvements.

The retail and office development component of *Alternative 2* would require higher levels of fire flow than the existing residential development in the northwestern portion of the study area, but would require similar levels of fire flow as the commercial development present south of SR-204 and east of SR-9. Currently, 12-inch water mains are located under portions of SR-9, Vernon Road, 91st Avenue SE, and Market Place, and Snohomish County PUD has confirmed that fire flows up to 3,000 gpm are available in these areas. If proposed commercial development would create a localized fire flow deficiency, it may be possible to alleviate the condition through looping or upsizing existing lines.

Residential portions of the study area north of SR-204 and west of SR-9 are generally served by 4-, 6-, or 8-inch lines. Fire flow in these areas is approximately 1,000 – 1,500 gpm. Intensification of residential density in these areas or conversion to commercial development could create fire flow deficiencies and would not be appropriate without improvements to the system. As mitigation, water lines in residential areas should be up-sized to at least 8 inches upon redevelopment.

As illustrated in Figure 2-3, *Alternative 2* would also create several commercial centers and concentrations of office development, resulting in increased residential and commercial densities in the areas along SR-9, Davies Road, 4th Street NE, 91st Avenue NE, and part of SR-204. While fire flows of 3,000 gpm are available in various locations in the study area, not all of this new commercial, office, and high-density residential

development would be served by adequate flows, requiring mitigation in the form of installation of additional conveyance piping and upsizing of existing pipes to provide sufficient fire flow where the development site is not already served by a 3,000 gpm line. In particular, increased line sizes to 12 inches would be necessary upon redevelopment of commercial areas east of SR-9 to accommodate increased density and taller buildings.

Sewer

Collection

As described for *Alternative 1/No Action*, wastewater from the study area is collected in the Vernon Road Trunk line, which conveys flows to the existing wastewater treatment plant on Ebey Slough. The 2007 Lake Stevens Sewer District Comprehensive Plan identified a capacity deficiency in a portion of this line within the study area (between MH 99 and MH 101). The Sewer District has identified upgrades to this portion of trunk line are part of an adopted capital improvement project described in both the 2007 LSSD Comprehensive Plan and the subsequent 2010 Plan Amendment. The Sewer District has proposed to complete these systems upgrades within the next 20 years. No other collection system deficiencies were identified within the study area. Any future improvements necessary to adequately serve development in the study area will be implemented by the City, special purpose districts, and by developers prior to construction. *Alternative 2* is not anticipated to result in any significant unavoidable adverse impacts to wastewater collection.

Treatment

Additional growth in the study area under *Alternative 2* would increase flows to the wastewater treatment facility. Each additional ERU would contribute an estimated 203 gallons of wastewater flow per day, as well as 0.682 pounds of BOD_5 loading and 0.545 pounds of TSS loading per day. Based on the levels of growth projected for *Alternative 2*, wastewater flows from the study area would increase by 53,900 – 59,200 gallons per day. BOD_5 loading would increase by 181 – 199 pounds per day, and TSS loading would increase by 145 – 159 pounds per day. Compared to the *No Action Alternative*, which is equivalent to the baseline for which the District's new wastewater treatment plant has been designed, *Alternative 2* represents a 94 – 113% increase in flows and loadings.

Although this is within the capacity of the planned wastewater treatment plant, increased development in the study area could potentially increase demand for wastewater treatment at a faster rate than projected in the Sewer District's Comprehensive Plan. As a result, further upgrades and expansions to the plant may be necessary sooner than originally anticipated.

Alternative 3

Water

Water Supply

As described in Section 3.9-1, the Lake Stevens water system has supply capacity for an additional 7,429 ERUs, based on a current daily supply of 12.24 MG. The 2011 Water System Plan for Snohomish PUD estimates the average daily demand per ERU in the Lake Stevens system at 188 gallons per day. Based on this demand, *Alternative 3* would increase demand on water supply by approximately 128,220 – 151,740 gallons per day, which equates to approximately 682 – 807 ERUs. Growth under *Alternative 3* would account for approximately 10.9% of the currently available supply capacity. Because growth under this alternative comprises only a small portion of the available water supply, *Alternative 3* is not anticipated to result in any significant impacts to water supply.

Water Storage

As described in Section 3.9-1, existing storage capacity is a potential limiting factor for future growth in the Lake Stevens water system service area. Growth projections by Snohomish County PUD indicate that required standby and equalizing storage requirements are anticipated to increase over time in response to continued growth in the service area. Based on a storage requirement of 387 gallons per ERU, development under Alternative 3 would require an additional 263,942 – 312,358 gallons of equalizing and standby storage by 2025.

Snohomish County PUD's2011 Water System Plan projected a storage surplus of approximately 243,421 gallons for the year 2010. By 2029, this surplus is projected to increase to 1.2 MG, provided that the system's emergency groundwater wells are converted to full-time sources in 2012 and that the planned Getchell reservoir (9.2 MG) is completed on-schedule in 2018. Increased demand for storage capacity generated under Alternative 3 would constitute approximately 26% of the projected planning horizon storage surplus, but would not generate any storage deficiencies. Therefore, development under *Alternative 3* is not anticipated to result in any significant impacts to water storage capacity.

Water Distribution

As described in Section 3.9-1, the 2011 Water System Plan identified no current or future deficiencies for the distribution system in the study area within the 20-year planning period, and no major distribution system capital improvements are planned for the study area during that timeframe. The PUD conducts ongoing examinations of distribution piping for aging and damage, and 4-inch and 8-inches pipes in the northwest corner of the study area have been targeted for replacement in the near future. Because no deficiencies have been identified in the study area, *Alternative 3* is not anticipated to result in any significant adverse impacts to water distribution.

Fire Flow

Fire Flow Storage

As described for the *No Action Alternative*, fire flow storage is necessary to respond to a fire emergency within the water service area, and Snohomish County PUD has committed to varying levels of fire flow in different portions of its service area. The PUD has adopted a fire flow design criteria for the Lake Stevens water system of 0-3,000 gpm for 1-3 hours. Because the design criteria cover a wide range, the PUD's demand projections calculate future required fire flow storage on the basis of 1,500 gpm for 2 hours. This equates to 180,000 gallons of fire flow storage. The projected demand for fire flow storage is relatively small when compared with the overall storage requirements for the water system, and the PUD design criteria nest this fire flow storage within the standby storage requirement. As discussed under *Water Storage* above, the currently projected storage surplus is anticipated to provide sufficient water storage under *Alternative 3*. The City, in cooperation with the Lake Stevens Fire Marshal, evaluates each proposed development project to determine its specific fire flow requirements, and available fire flow is confirmed by the PUD.

Fire Flow Conveyance

In addition to storage, adequate conveyance infrastructure is necessary to provide sufficient fire flow to a given site. Undersized distribution piping can prevent adequate flow from reaching a site without exceeding velocity limits. As described for the *No Action Alternative* above, an 8-inch main can provide sufficient flow for most low- and medium-density residential development, as well as low-intensity commercial and office development. A 12-inch main can provide sufficient fire flow for high-density residential development and most commercial and office uses, though industrial uses and large, regional-scale commercial centers may require higher flows, based on individual project characteristics. The City, in cooperation with the Lake Stevens Fire Marshal, reviews each project to determine its fire flow requirements. The PUD confirms what flows are available at the development site and, when there is a deficiency, provides technical guidance on methods to reduce needed fire flow or increase available flow through piping improvements.

The housing growth proposed under *Alternative 3* would generally require higher levels of fire flow than the existing residential development in the northwestern portion of the study area. The retail and office uses proposed would require similar levels of fire flow as the commercial development present south of SR-204 and east of SR-9. Currently, 12-inch water mains are located under portions of SR-9, Vernon Road, 91st Avenue SE, and Market Place, and Snohomish County PUD has confirmed that fire flows up to 3,000 gpm are available in these areas.

Residential portions of the study area north of SR-204 and west of SR-9 are generally served by 4-, 6-, or 8-inch lines. Fire flow in these areas is approximately 1,000 – 1,500

gpm. Intensification of residential density in these areas or conversion to commercial development could create fire flow deficiencies and would not be appropriate without improvements to the system. As mitigation, water lines in residential areas should be up-sized to at least 8 inches upon redevelopment.

As illustrated in Figure 2-4, Alternative 3 would also create several commercial centers and concentrations of office development, resulting in increased residential and commercial densities in the areas along SR-9, Davies Road, 4th Street NE, 91st Avenue NE, and SR-204. While fire flows of 3,000 gpm are available in various locations in the study area, not all of this new commercial, office, and high-density residential development would be served by adequate flows, requiring mitigation in the form of installation of additional conveyance piping and upsizing of existing pipes to provide sufficient fire flow where the development site is not already served by a 3,000 gpm line. In particular, increased line sizes to 12 inches would be necessary upon redevelopment of commercial areas east of SR-9 to accommodate increased density and taller buildings.

Sewer

Collection

As described for *Alternative 1* and *Alternative 2* above, wastewater from the study area is collected in the Vernon Road Trunk line, which conveys flows to the wastewater treatment plant on Ebey Slough. The *2007 Lake Stevens Sewer District Comprehensive Plan* identified a capacity deficiency in a portion of this line between MH 99 and MH 101 within the study area, which could be exacerbated by additional growth in Lake Stevens Center. However, upgrades to this portion of trunk line are part of an adopted capital improvement project described in both the 2007 LSSD Comprehensive Plan and the subsequent 2010 Plan Amendment. No other collection system deficiencies were identified within the study area, and any future improvements necessary to adequately serve development in the study area will be implemented by the City, special purpose districts, and by developers prior to construction. *Alternative 3* is not anticipated to result in any significant adverse impacts to wastewater collection.

Treatment

Additional growth in the study area under *Alternative 3* would increase flows to the wastewater treatment facility. Each additional ERU would contribute 203 gallons of wastewater flow per day, as well as 0.682 pounds of BOD_5 loading and 0.545 pounds of TSS loading per day. Based on the levels of growth projected for *Alternative 3*, wastewater flows from the study area would increase by 116,300 – 138,500 gallons per day. BOD_5 loading would increase by 391 – 465 pounds per day, and TSS loading would increase by 312 – 372 pounds per day. Compared to the *No Action* alternative, which is equivalent to the baseline for which the District's new wastewater treatment plant has been designed, *Alternative 3* represents a 353 – 361% increase in flows and loadings.

While this increase is within the capacity of the planned wastewater treatment plant, increased development in the study area could potentially increase demand for wastewater treatment at a faster rate than projected in the Sewer District's Comprehensive Plan. As a result, further upgrades and expansions to the plant may be necessary sooner than originally anticipated.

3.9.3 Mitigation Measures

Drainage

Applicable Regulations and Commitments

***City of Lake Stevens Stormwater Ordinance*:** Chapter 11.06 and Chapter 14.64 (Part II) of the Lake Stevens Municipal Code adopt the Department of Ecology's 2005 Stormwater Management Manual for Western Washington. Any project that meets or exceeds the thresholds defined in the manual for new impervious area, drainage system modifications, or redevelopment is subject to City review and permit approval.

***Ecology Stormwater Manual*:** The City has adopted the Department of Ecology's *2005 Stormwater Management Manual for Western Washington* as its minimum design standard for stormwater infrastructure. All development meeting the minimum thresholds is required to design associated stormwater infrastructure to be consistent with these standards.

Low Impact Development: The City's stormwater ordinance states that Low Impact Development solutions, as defined and listed in the LID Technical Guidance Manual for Puget Sound, are acceptable and encouraged alternative standards for management of stormwater.

Additional Mitigation Measures

***Permitting Incentives for Low Impact Development*:** To reduce the need for new stormwater conveyance infrastructure and protect water quality, the City should incentivize the use of LID techniques for on-site stormwater treatment and detention for appropriate projects. Incentives could include expedited development permit review or reduced permit fees.

Water

Applicable Regulations and Commitments

***Supply Upgrades*:** Snohomish County PUD's *2011 Water System Plan* identifies necessary capital improvements to provide adequate water supply for the next 20 years. Planned and budgeted supply improvements include conversion of the system's two emergency groundwater wells to a full-time source, increasing system supply by approximately 1.2 MG per day.

***Storage Upgrades*:** The PUD's *2011 Water System Plan* identifies the following planned and budgeted capital improvements to storage capacity:
Walker Hill Booster Zone Intertie: Eliminates dead storage in the Walker Hill tanks, making this water available to the Lake Stevens 500 zone for emergency use (2012); and Getchell Reservoir: New 9.2 MG reservoir serving the Lake Stevens 500 pressure zone.

Distribution Upgrades: The PUD's ongoing water main replacement program annually evaluates aging pipes for replacement with a focus on the replacement of galvanized iron/steel and asbestos cement pipes. Aged piping in the northwest corner of the study area has been identified by the PUD for replacement in the near future.

Proposed Mitigation Measures

***Joint Planning with Snohomish County PUD*:** Upon adoption of a preferred alternative, the City should consult with Snohomish County PUD to establish a joint planning process to identify and implement capital improvements necessary to serve anticipated development in the subarea.

***Design Review for Fire Flow*:** The City and developers will coordinate development permit application with Snohomish County PUD and the Lake Stevens Fire Marshal to determine fire flow requirements based on project design. Upgrades to existing lines should be coordinated with Snohomish County PUD. Installation of new water lines adequate to provide required fire flows should be the responsibility of the developer and/or the City, in accordance with the fire flow design thresholds established below.

Commercial, Office, and High-Density Residential: 12-inch pipes and 3,000 gpm.
Existing Medium and Low-Density Residential Areas: 8-inch pipes and 1,500 gpm.

All Other Areas and Development Types: 10-inch pipes and 2,000 gpm.

Sewer

Applicable Regulations and Commitments

***Planned Capital Improvements*:** As described in the impact analysis, the Lake Stevens Sewer District adopted updates to its Comprehensive Plan in 2007 and 2010, describing the capital improvements planned for the near future; these include several pipeline expansions, decommissioning of several lift stations, pump upgrades, and construction of a new wastewater treatment plant. These improvements are designed to relieve existing system deficiencies and create the capacity necessary to serve future development.

Proposed Mitigation Measures

***Joint Planning with Lake Stevens Sewer District*:** Upon adoption of a preferred alternative, the City should consult with the Lake Stevens Sewer District to establish a joint planning process to identify and implement capital improvements necessary to serve anticipated development in the subarea, including new wastewater collection infrastructure and future expansions to the new treatment plant that may be necessary to accept projected flows from development under the subarea plan.

***Design Review for Wastewater Flows and Loads*:** Because planned improvements to the wastewater system will be implemented in phases over several years, the Planned Action should establish size thresholds for new development that, when met or exceeded, would require developers to initiate consultation with Lake Stevens Sewer District. Consultation would confirm that projected wastewater flows and loads from any proposed project would not exceed the treatment or conveyance capacity of the wastewater system existing at that time.

3.9.4 Significant Unavoidable Adverse Impacts

All alternatives are anticipated to result in additional development within the subarea, thereby increasing demand for water, sewer, and drainage services. An increase in population and employment in the study area could exacerbate existing water and wastewater system deficiencies and increase demand for services beyond the capacity of existing infrastructure in some limited areas. However, with application of mitigation measures, which include both regulatory measures and planned capital improvements, no significant unavoidable adverse impacts are anticipated.

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5. ACRONYMS & ABBREVIATIONS

ADT	Average daily traffic
AMI	Average monthly income
BMP	Best Management Practices
BOD	Biochemical Oxygen Demand
CIP	Capital Improvement Program
CO	Carbon monoxide
COE	U.S. Army Corps of Engineers
CO2	Carbon dioxide
CO2e	Carbon dioxide equivalent
DART	Dial-A-Ride Transit
DNR	Washington Department of Natural Resources
DOE	Washington Department of Ecology
DEIS	Draft environmental impact statement
DS	Determination of significance
DU	Dwelling units
EIS	Environmental impact statement
EMS	Emergency medical services
EPA	U.S. Environmental Protection Agency
ERU	Equivalent residential unit
ESA	Endangered Species Act
FAZ	Forecast analysis zone
FEIS	Final environmental impact statement
FEMA	Federal Emergency Management Administration
FIRE	Finance, insurance and real estate
GHG	Greenhouse gases
GMA	The Washington Growth Management Act, RCW 36.70A
GPM	Gallons per minute
GSF	Gross square feet
HCM	Highway Capacity Manual
LEED	Leadership in Energy and Environmental Design
LID	Low impact development
LOS	Level of service
LSMC	Lake Stevens Municipal Code

LSPD	Lake Stevens Police Department
LSSD	Lake Stevens Sewer District
MG	Million gallons
MGD	Million gallons daily
MLS	Multiple Listing Service
MTCO2e	Metric ton carbon equivalent
NAAQS	National Ambient Air Quality Standards
NHP	Washington Natural Heritage Program
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
OFM	Washington Office of Financial Management
PHS	Priority Habitat and Species database
PM10	Particulate matter equal to or less than 10 micrometers in diameter
PM2.5	Particulate matter equal to or less than 2.5 micrometers in diameter
PPM	Parts per million
PSCAA	Puget Sound Clean Air Agency
PSRC	Puget Sound Regional Council
PUD#1	Public Utility District # 1
RCW	Revised Code of Washington
RUTA	Rural Urban Transition Area
SEPA	State Environmental Policy Act, RCW 43.21C and WAC 197-11
SR	State Route
TBD	Transportation Benefit District
TDM	Transportation demand management
TIP	Transportation Improvement Program
TOD	Transit-oriented development
TOS	Total Suspended Solids
UGA	Urban Growth Area
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
V/C	Volume to capacity ratio
VMT	Vehicle miles travelled

WAC	Washington Administrative Code
WASIST	Washington State Department of Transportation screening tool
WCTU	Wholesale trade, communication and utilities
WDFW	Washington Department of Fish and Wildlife
WSDOT	Washington Department of Transportation
WWTP	Wastewater Treatment Plant

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6. DISTRIBUTION LIST

The following parties were provided with a notice of availability of the Draft EIS. Those entities denoted with an asterisk (*) received a copy of the document.

Federal Agencies

U.S. Army Corps of Engineers *
U.S. Environmental Protection Agency *
U.S. Fish & Wildlife Service *
National Atmospheric and Oceanic Administration *

State Agencies

Washington Department of Archaeology & Historic Preservation *
Washington Department of Commerce *
Washington Department of Ecology SEPA Unit *
Washington Department of Fish & Wildlife *
Interagency Commission on Outdoor Recreation
Washington Department of Natural Resources *
Washington State Department of Transportation *

Tribes

Tulalip Tribes *
Stillaguamish Tribe
Sauk-Suiattle Tribe *

Regional and Local Governments

City of Arlington *
City of Everett *
City of Lake Stevens *
City of Marysville *
City of Snohomish *
Community Transit *
Snohomish County Planning & Development Services *
Snohomish Health District *
Puget Sound Clean Air Agency *
Puget Sound Regional Council *

Special Purpose Districts

Lake Stevens Fire District *
Lake Stevens Sewer District *
Lake Stevens School District *
Marysville School District *
Puget Sound Energy *

Snohomish County PUD *
Snohomish School District *

Public Libraries

Lake Stevens Library *

Community Organizations

Economic Development Council of Snohomish County *
Lake Stevens Chamber of Commerce *

Media

Everett Herald *
Lake Stevens Journal *

Private Firms & Individuals

Sue Ambler
Camie Anderson
Merle Ash
Erik Ashlie
Janet Backus
Tom Bahr
Jerry Bayha
Stephanie Baron
Russ Bosanko
Will Brandt
Bart Brynestad
Carla Busby
Jim Busby
John C. Cannon
George Capestany
James & Christina Chapin
Steve Clagett
Comcast Cable (Casey Brown) *
Ron Cushman
Lorrie Davidson
Gloria Davis
Matt Dixon
Crystal Donner
Doug Ecklund
Jess Eline
Chris Fenwick
Jessica Fenwick
Futurewise (Kristen Kelly, Tim Trahimovich) *

Ruth Fletcher
Debe Franz
Kathleen Friend
David Gibson
David Graef
Mike Hansen
Tom Hoban
Dave & Wendy Hueser
Steve Iblings
Mike Jauhola
Kimco Realty
Laana Larson
Larsen Financial Services (Jim Larsen)
Brad Lincoln
Jonette Limantzakis
Chief Dave Lingenfelter
Don Lundquist
Tom Matlack
Master Builders Association (Mike Pattinson) *
David Matulich
Kevin McDaniel
Glenn McLoughlin
Barry Miller
Kathy Milton
Robert Milton
Darrell Moore
Barbara Mounsey
Leigh Nelson
Jim Nottoli
Steve & Darlene Owens
James B. Potter
Keith & Corrie Perry
Steve Pesce
Darron Pyper
Chris Radosovich
Noah Reandeau
Richard Reese
Republic Services (Don Frey)
Ridgeline Management Company
Scott Ritterbush
Brittney Rourke
Dennis & Meri Scafe
James & Elaine Schroedl
Paula Simonson

Darwin Smith
Jozette Smith
John Spaulding
Joel St. Marie
Robb Stanton
Tracy Stevens
Steve Smith
Alan Tandy
Team Fitness
Tom Thorleifson
Laurey Tobiason
Kate Tourtellot
Michael & Stacy Turner
Keith Tyson
Marilyn Webber
Mary Wicklund
Kevyn Williams
Ken Withrow
Jean Wrona
Peter Zuvela

INTERNAL REVIEW DRAFT

ORDINANCE NO._____

AN ORDINANCE OF THE CITY OF LAKE STEVENS, WASHINGTON ESTABLISHING A PLANNED ACTION FOR THE LAKE STEVENS CENTER SUBAREA PURSUANT TO THE STATE ENVIRONMENTAL POLICY ACT (RCW 43.21C.031 AND WAC 197-11-164)

WHEREAS, the State Environmental Policy Act (SEPA) (RCW 43.21C.031) and implementing rules (WAC 197-11-164) provide for the integration of environmental review with land use planning and project review through designation of "Planned Actions" by jurisdictions planning under the Growth Management Act (GMA) (Chapter 36.70a RCW); and

WHEREAS, on July 27, 2006 the Lake Stevens City Council enacted Ordinance No. 726 adopting an updated Comprehensive Plan for the City of Lake Stevens complying with the GMA; and

WHEREAS, on November 27, 2006, Ordinance No. 739 was adopted to adopt Comprehensive Plan provisions consistent with the incomplete provisions adopted in Ordinance No. 726; and

WHEREAS, the Growth Management Act allows jurisdictions to amend comprehensive plans once a year, except in those situations enumerated in RCW 36.70A.130(2)(a); and

WHEREAS, RCW 36.70A.130(2)(a)(i) and (v) allows jurisdictions to amend the comprehensive plan with initial adoption of a subarea plan and adoption of comprehensive plan amendments necessary to enact a planned action under RCW 43.21C.031(2); and

WHEREAS, the City held numerous workshops and open houses to elicit public input including March 29, July 14 and _____, 2011; and

WHEREAS, the City has prepared an initial subarea plan for the Lake Stevens Center Subarea, which is referred to as the Planned Action Area; and

WHEREAS, the City issued a Determination of Significance and request for comments on the scope of the environmental impact statement on June 28, 2011 and held a Scoping Meeting on July 14, 2011; and

WHEREAS, on _____, 2011 the City issued a Draft environmental impact statement (EIS) for the Lake Stevens Center Subarea Plan which identifies impacts and mitigation measures associated with planned development in the subarea; and

WHEREAS, on _____, 2012 the City issued a Final environmental impact statement (EIS) for the Lake Stevens Center Subarea Plan which identifies impacts and mitigation measures associated with planned development in the subarea; and

WHEREAS, in taking the actions set forth in this ordinance, the City has complied with the requirements of the State Environmental Policy Act, Ch. 43.21C RCW; and

WHEREAS, on _____, 2012 the City submitted the proposed Lake Stevens Center Subarea Plan, Comprehensive Plan Land Use Map and Zoning Map amendments, and other text amendments to the Washington State Department of Commerce for its 60-day review and received a letter dated _____, 2012 stating the procedural requirement was met.

WHEREAS, the Department of Commerce's 60-day review period was completed on _____, 2012; and

WHEREAS, on _____, 2012 the Lake Stevens Planning Commission, after review of the proposed Lake Stevens Center Subarea Plan, Comprehensive Plan Land Use Map and Zoning Map amendments, and other text amendments, held a duly noticed public hearing on the amendment, and all public testimony was given full consideration before making a recommendation to the City Council to approve the proposed Subarea Plan, map amendments, and other text amendments; and

WHEREAS, on _____ and _____, 2012, the Lake Stevens City Council reviewed the Planning Commission's recommendation relating to the proposed Lake Stevens Center Subarea Plan, Comprehensive Plan Land Use Map and Zoning Map amendments, and other text amendments, and held a duly noticed public hearing, and all public testimony and arguments have been given full consideration.

WHEREAS, the City has adopted development regulations which will help protect the environment; and

WHEREAS, designation of a Planned Action expedites the permitting process for subsequent, implementing projects whose impacts have been previously addressed in a Planned Action EIS, and thereby encourages desired growth and economic development; and

WHEREAS, the Lake Stevens Center Subarea is deemed to be appropriate for designation of a Planned Action.

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF LAKE STEVENS, WASHINGTON, DO ORDAIN AS FOLLOWS:

SECTION 1. Purpose**.** The City Council declares that the purpose of this ordinance is to:

A. Combine analysis of environmental impacts with the City's development of plans and regulations;

B. Designate the Lake Stevens Center Subarea as a Planned Action for purposes of environmental review and permitting of subsequent, implementing projects pursuant to the State Environmental Policy Act (SEPA), RCW 43.21C.031;

C. Determine that the EIS prepared for the subarea plan meets the requirements of a Planned Action EIS pursuant to SEPA;

D. Establish criteria and procedures, consistent with state law, that will determine whether subsequent, implementing projects qualify as Planned Actions;

E. Provide the public with information about Planned Actions and how the City will process applications for implementing projects;

F. Streamline and expedite the land use review and approval process for qualifying projects by relying on the environmental impact statement (EIS) completed for the Planned Action; and

G. Apply the City's development regulations together with the mitigation measures described in the EIS and this Ordinance to address the impacts of future development contemplated by the Planned Action.

SECTION 2. Findings**.** The City Council finds as follows:

A. The City is subject to the requirements of the Growth Management Act, RCW 36.70A, and is located within an Urban Growth Area;

B. The City has adopted a Comprehensive Plan complying with the GMA, and is amending the Comprehensive Plan to incorporate a subarea element specific to the Lake Stevens Center Planned Action Area;

C. The City is adopting development regulations concurrent with the Subarea Plan to implement said Plan;

D. The City has prepared an EIS for the Lake Stevens Center Subarea and finds that this EIS adequately addresses the probable significant environmental impacts associated with the type and amount of development planned to occur in the designated Planned Action Area;

E. The mitigation measures identified in the Planned Action EIS and attached to this ordinance as Exhibit B, together with adopted City development regulations, will adequately mitigate significant impacts from development within the Planned Action Area;

F. The subarea plan and Planned Action EIS identify the location, type and amount of development that is contemplated by the Planned Action;

G. Future projects that are implemented consistent with the Planned Action will protect the environment, benefit the public and enhance economic development within the City;

H. The City has provided numerous opportunities for meaningful public involvement in the proposed Planned Action; has considered all comments received; and, as appropriate, has modified the proposal or mitigation measures in response to comments;

I. The Lake Stevens Center Subarea Plan is not an essential public facility as defined by RCW 36.70A.200(1). Future improvements to state highways within the subarea are not

eligible for review or permitting as Planned Actions. However, such future proposals may use the information contained in the Planned Action EIS, consistent with SEPA;

J. The Planned Action Area is a defined area that is smaller than the overall City boundaries; and

K. Public services and facilities are adequate to serve the proposed Planned Action, with implementation of mitigation measures identified in the EIS.

SECTION 3. Procedures and Criteria for Evaluating and Determining Projects as Planned Actions.

A. *Planned Action Area*. The Planned Action designation shall apply to the area shown in Exhibit A.

B. *Environmental Document*. A Planned Action determination for a site-specific implementing project application shall be based on the environmental analysis contained in the Draft EIS issued by the City on _____and the Final EIS published on _____. The Draft and Final EISs together shall comprise the Planned Action EIS. The mitigation measures contained in Exhibit B are based upon the findings of the Planned Action EIS and shall, along with adopted City regulations, provide the framework that the City will use to impose appropriate conditions on qualifying Planned Action Projects.

C. *Planned Action Designated*. Land uses and activities described in the Planned Action EIS, subject to the thresholds described in subsection 3.D and the mitigation measures contained in Exhibit B, are designated Planned Actions or Planned Action Projects pursuant to RCW 43.21C.031. A development application for a site-specific project located within the Lake Stevens Center Subarea shall be designated a Planned Action if it meets the criteria set forth in subsection 3.D of this ordinance and applicable laws, codes, development regulations and standards of the City.

D. *Planned Action Qualifications*. The following thresholds shall be used to determine if a site-specific development proposed within the Lake Stevens Center Subarea is contemplated by the Planned Action and has had its environmental impacts evaluated in the Planned Action EIS:

(1) Land Use. The following general categories/types of land uses, which are permitted or conditionally permitted in zoning districts applicable to the Lake Stevens Center Planned Action Area, are considered Planned Actions:

(a) Retail and service activities;
(b) Civic and cultural uses which are not defined as essential public facilities;
(c) Office uses;
(d) Commercial uses;
(e) Residential dwelling units; and
(f) Infrastructure improvements identified in the EIS to support planned land uses.

Individual land uses considered to be Planned Actions shall include those uses specifically listed in development regulations applicable to the zoning classifications applied to properties within the Planned Action Area.

(2) Development Thresholds.

(a) The following amount of various new land uses are contemplated by the Planned Action:

Land Use	Development Amount
Residential	____units
Retail/Service	_____gross square feet
Office	_____gross square feet
Commercial	_____gross square feet

(b) Shifting the total build out between categories of uses may be permitted so long as the total build out does not exceed the aggregate amount of development and the trip generation reviewed in the EIS, and so long as the impacts of that development have been identified in the Planned Action EIS and are mitigated consistent with Exhibit B.

(c) If future development proposals in the Lake Stevens Center Planned Action Area exceeds the development thresholds specified in this ordinance, further environmental review may be required pursuant to WAC 197-11-172. In addition, if proposed development would alter the assumptions and analysis in the Planned Action EIS, further environmental review may be required.

(3) Building Height. Building height shall not exceed those permitted in the underlying zoning district(s) pursuant to the standards of the Lake Stevens Municipal Code.

4) Transportation.

(a) *Trip Ranges & Thresholds*. The number of new PM peak hour trips anticipated in the Planned Action Area and reviewed in the EIS are as follows:

Total PM Peak Hour Trips	Tbd

Uses or activities that would exceed these maximum trip levels will require additional SEPA review.

(b) *Concurrency*. The determination of transportation impacts shall be based on the City's concurrency management program contained in Chapter 14.110 LSMC.

(c) *Off-Site Mitigation*. As provided in the EIS and Chapter 14.110 LSMC in order to mitigate transportation related impacts, all Planned Action Projects shall pay a traffic impact mitigation fee to participate in and pay a proportionate share of off-site improvements. Off-site improvements are identified in Attachment B.

(d) *Director Discretion*. The Director of Public Works shall have discretion to determine incremental and total trip generation, consistent with the latest edition of the Institute of Traffic Engineers (ITE) Trip Generation Manual or an alternative manual

accepted by the Director of Public Works at his or her sole discretion, for each project permit application proposed under this Planned Action.

(5) Elements of the Environment and Degree of Impacts. A proposed project that would result in a significant change in the type or degree of impacts to any of the elements of the environment analyzed in the Planned Action EIS, or that causes significant impacts to an element of the environment that was not considered in the Planned Action EIS, would not qualify as a Planned Action.

(6) Changed Conditions. Should environmental conditions change significantly from those analyzed in the Planned Action EIS, the City's SEPA Responsible Official may determine that the Planned Action designation is no longer applicable until supplemental environmental review has been conducted.

E. **Planned Action Review Criteria**.

(1) The City's SEPA Responsible Official may designate as "Planned Actions", pursuant to RCW 43.21C.030, applications that meet all of the following conditions:

(a) the proposal is located within the Planned Action Area identified in Exhibit A of this ordinance;

(b) the proposed uses and activities are consistent with those described in the Planned Action EIS and Section 3.D of this ordinance;

(c) the proposal is within the Planned Action thresholds and other criteria of Section 3.D of this ordinance;

(d) the proposal is consistent with the City of Lake Stevens Comprehensive Plan;

(e) the proposal's significant adverse environmental impacts have been identified in the Planned Action EIS;

(f) the proposal's significant impacts have been mitigated by application of the measures identified in Exhibit B, and other applicable city regulations, together with any modifications or variances or special permits that may be required;

(g) the proposal complies with all applicable local, state and/or federal laws and regulations, and the SEPA Responsible Official determines that these constitute adequate mitigation; and

(h) the proposal is not an essential public facility as defined by RCW 36.70A.200(1).

(2) The City shall base its decision on review of a SEPA checklist, or an alternative form approved by the Department of Ecology, and review of the application and supporting documentation.

(3) A proposal that meets the criteria of this section shall be considered to qualify and be designated as a Planned Action, consistent with the requirements or RCW 43.21C.030, WAC 197-11-164 et seq, and this ordinance.

F. **Effect of Planned Action**

(1) Designation as a Planned Action Project means that a qualifying proposal has been reviewed in accordance with this ordinance and found to be consistent with its development parameters and thresholds, and with the environmental analysis contained in the Planned Action EIS.

(2) Upon determination by the City's SEPA Responsible Official that the proposal meets the criteria of Section 3.D and qualifies as a Planned Action, the proposal shall not require a SEPA threshold determination, preparation of an EIS, or be subject to further review pursuant to SEPA.

G. **Planned Action Permit Process**. Applications for Planned Actions shall be reviewed pursuant to the following process.

(1) Development applications shall meet all applicable requirements of the Lake Stevens Municipal Code (LSMC). Applications for Planned Actions shall be made on forms provided by the City and shall include a SEPA checklist, or an approved Planned Action checklist.

(2) The City's Director of Planning and Community Development or designee shall determine whether the application is complete as provided in LSMC 14.16A.220(f).

(3) If the application is for a project within the Planned Action Area defined in Exhibit A, the application will be reviewed to determine if it is consistent with the criteria of this ordinance and thereby qualifies as a Planned Action Project. The SEPA Responsible Official shall notify the applicant of his/her decision. If the project is determined to qualify as a Planned Action, it shall proceed in accordance with the applicable permit review procedures specified in 14.16B LSMC, except that no SEPA threshold determination, EIS or additional SEPA review shall be required. The decision of the SEPA Responsible Official regarding qualification as a Planned Action shall be final.

(4) Public notice and review for projects that qualify as Planned Actions shall be tied to the underlying permit. The review process for the underlying permit shall be as provided in Chapter 14.16B LSMC. If notice is otherwise required by Chapter 14.16B LSMC for the underlying permit, in addition to the noticing requirements in LSMC 14.16A.225, the notice shall state that the project has qualified as a Planned Action. If notice is not otherwise required for the underlying permit, no special notice is required by this ordinance.

(5) Development Agreement. To provide additional certainty about applicable requirements, the City or an applicant may request consideration and execution of a development agreement for a Planned Action Project. The development agreement may address review procedures applicable to a Planned Action Project, permitted uses, mitigation measures, payment of impact fees or provision of improvements through other methods, design standards, phasing, vesting of development rights, or any other topic that may properly be considered in a development agreement consistent with RCW 36.70B.170 et seq.

(6) If a project is determined to not qualify as a Planned Action, the SEPA Responsible Official shall so notify the applicant and prescribe a SEPA review procedure consistent with the City's SEPA regulations and the requirements of state law. The notice shall describe the elements of the application that result in failure to qualify as a Planned Action.

(7) Projects that fail to qualify as Planned Actions may incorporate or otherwise use relevant elements of the Planned Action EIS, as well as other relevant SEPA documents, to meet their SEPA requirements. The SEPA Responsible Official may limit the scope of SEPA

review for the non-qualifying project to those issues and environmental impacts not previously addressed in the Planned Action EIS.

SECTION 4. Monitoring and Review.

A. The City shall monitor the progress of development in the designated Planned Action Subarea to ensure that it is consistent with the assumptions of this ordinance and the Planned Action EIS regarding the type and amount of development and associated impacts, and with the mitigation measures and improvements planned for the Lake Stevens Center Planned Action Area.

B. This Planned Action Ordinance shall be reviewed by the SEPA Responsible Official no later than five years from its effective date to determine the continuing relevance of its assumptions and findings with respect to environmental conditions in the Planned Action Area, the impacts of development, and required mitigation measures. Based upon this review, the City may propose amendments to this ordinance or may supplement or revise the Planned Action EIS.

SECTION 5. Conflict. In the event of a conflict between this Ordinance or any mitigation measure imposed thereto, and any ordinance or regulation of the City, the provisions of this ordinance shall control, EXCEPT that the provision of any International Code shall supersede.

SECTION 6. Severability. If any section, clause, phrase, or term of this ordinance is held for any reason to be invalid or unconstitutional, such decision shall not affect the validity of the remaining portions of this ordinance, and the remaining portions shall be in full force and effect.

SECTION 7. Effective Date and Publication. A summary of this ordinance consisting of its title shall be published in the official newspaper of the City. This ordinance shall take effect and be in full force five days after the date of publication.

PASSED by the City Council of the City of Lake Stevens this ___ day of _____, 2012.

_____
Vern Little, Mayor

ATTEST/AUTHENTICATION:

_____
Norma J. Scott, City Clerk/Admin Asst

APPROVED AS TO FORM:

_____

Grant K. Weed, City Attorney

First Reading:
Published:
Effective Date:

DRAFT

EXHIBIT A
PLANNED ACTION AREA

DRAFT

EXHIBIT B
PLANNED ACTION EIS MITIGATION MEASURES

DRAFT

LAKE STEVENS CENTER GHG SUMMARY

Scenario	Type of GHG Emissions			Service Population		Total Emissions/ Service Population
	Embodied	Energy	Total	Population	Employment	
Existing	102,579	1,065,131	1,167,710	2,442	3,544	195.1
Alternative 1 Growth	9,400	118,571	127,971	345	240	
Alternative 1 Total	111,979	1,183,702	1,295,681	2,787	3,784	197.2
Alternative 2 Growth	20,105	283,818	303,923	575	750	
Alternative 2 Total	122,684	1,348,949	1,471,633	3,017	4,294	201.3
Alternative 3 Growth	32,977	416,467	449,444	1,720	600	
Alternative 3 Total	135,556	1,481,598	1,617,154	4,162	4,144	194.7

Source: Embodied and Energy Emissions from King County SEPA GHG Worksheet.

LAKE STEVENS CENTER - EXISTING CONDITIONS

Section I: Buildings

			Emissions Per Unit or Per Thousand Square Feet (MTCO2e)			Lifespan Emissions by Type (MTCO2e)	
Type (Residential) or Principal Activity (Commercial)	# Units	Square Feet (in thousands of square feet)	Embodied	Energy	**Lifespan Emissions (MTCO2e)**	Embodied	Energy
Single-Family Home	590		98	672	**454303**	57722	396581
Multi-Family Unit in Large Building	208		33	357	**81146**	6821	74325
Multi-Family Unit in Small Building	52		54	681	**38200**	2804	35395
Mobile Home	0		41	475	**0**	0	0
Education		0.0	39	646	**0**	0	0
Food Sales		0.0	39	1,541	**0**	0	0
Food Service		0.0	39	1,994	**0**	0	0
Health Care Inpatient		0.0	39	1,938	**0**	0	0
Health Care Outpatient		0.0	39	737	**0**	0	0
Lodging		0.0	39	777	**0**	0	0
Retail (Other Than Mall)		680.0	39	577	**418858**	26327	392531
Office		230.0	39	723	**175203**	8905	166299
Public Assembly		0.0	39	733	**0**	0	0
Public Order and Safety		0.0	39	899	**0**	0	0
Religious Worship		0.0	39	339	**0**	0	0
Service		0.0	39	599	**0**	0	0
Warehouse and Storage		0.0	39	352	**0**	0	0
Other		0.0	39	1,278	**0**	0	0
Vacant		0.0	39	162	**0**	0	0
						102579	1065131

Section II: Pavement

Pavement		0.00			**0**

Total Project Emissions: **1167710**

LAKE STEVENS CENTER - ALTERNATIVE 1 GROWTH

Section I: Buildings

Type (Residential) or Principal Activity (Commercial)	# Units	Square Feet (in thousands of square feet)	Emissions Per Unit or Per Thousand Square Feet (MTCO2e) Embodied	Energy	**Lifespan Emissions (MTCO2e)**	Lifespan Emissions by Type (MTCO2e) Embodied	Energy
Single-Family Home	18		98	672	**13860**	1761	12099
Multi-Family Unit in Large Building	82		33	357	**31990**	2689	29301
Multi-Family Unit in Small Building	20		54	681	**14692**	1079	13614
Mobile Home	0		41	475	**0**	0	0
Education		0.0	39	646	**0**	0	0
Food Sales		0.0	39	1,541	**0**	0	0
Food Service		0.0	39	1,994	**0**	0	0
Health Care Inpatient		0.0	39	1,938	**0**	0	0
Health Care Outpatient		0.0	39	737	**0**	0	0
Lodging		0.0	39	777	**0**	0	0
Retail (Other Than Mall)		60.0	39	577	**36958**	2323	34635
Office		40.0	39	723	**30470**	1549	28922
Public Assembly		0.0	39	733	**0**	0	0
Public Order and Safety		0.0	39	899	**0**	0	0
Religious Worship		0.0	39	339	**0**	0	0
Service		0.0	39	599	**0**	0	0
Warehouse and Storage		0.0	39	352	**0**	0	0
Other		0.0	39	1,278	**0**	0	0
Vacant		0.0	39	162	**0**	0	0
						9400	118571

Section II: Pavement

Pavement		0.00			**0**

Total Project Emissions: **127971**

LAKE STEVENS CENTER - ALTERNATIVE 2 GROWTH

Section I: Buildings

Type (Residential) or Principal Activity (Commercial)	# Units	Square Feet (in thousands of square feet)	Emissions Per Unit or Per Thousand Square Feet (MTCO2e) Embodied	Energy	**Lifespan Emissions (MTCO2e)**	Lifespan Emissions by Type (MTCO2e) Embodied	Energy
Single-Family Home	18		98	672	**13860**	1761	12099
Multi-Family Unit in Large Building	146		33	357	**56958**	4788	52171
Multi-Family Unit in Small Building	36		54	681	**26446**	1942	24504
Mobile Home	0		41	475	**0**	0	0
Education		0.0	39	646	**0**	0	0
Food Sales		0.0	39	1,541	**0**	0	0
Food Service		0.0	39	1,994	**0**	0	0
Health Care Inpatient		0.0	39	1,938	**0**	0	0
Health Care Outpatient		0.0	39	737	**0**	0	0
Lodging		0.0	39	777	**0**	0	0
Retail (Other Than Mall)		150.0	39	577	**92395**	5807	86588
Office		150.0	39	723	**114263**	5807	108456
Public Assembly		0.0	39	733	**0**	0	0
Public Order and Safety		0.0	39	899	**0**	0	0
Religious Worship		0.0	39	339	**0**	0	0
Service		0.0	39	599	**0**	0	0
Warehouse and Storage		0.0	39	352	**0**	0	0
Other		0.0	39	1,278	**0**	0	0
Vacant		0.0	39	162	**0**	0	0
						20105	283818

Section II: Pavement

Pavement		0.00			**0**

Total Project Emissions: **303923**

LAKE STEVENS CENTER - ALTERNATIVE 3 GROWTH

Section I: Buildings

Type (Residential) or Principal Activity (Commercial)	# Units	Square Feet (in thousands of square feet)	Emissions Per Unit or Per Thousand Square Feet (MTCO2e) Embodied	Emissions Per Unit or Per Thousand Square Feet (MTCO2e) Energy	**Lifespan Emissions (MTCO2e)**	Lifespan Emissions by Type (MTCO2e) Embodied	Lifespan Emissions by Type (MTCO2e) Energy
Single-Family Home	18		98	672	**13860**	1761	12099
Multi-Family Unit in Large Building	466		33	357	**181799**	15281	166518
Multi-Family Unit in Small Building	116		54	681	**85215**	6256	78959
Mobile Home	0		41	475	**0**	0	0
Education		0.0	39	646	**0**	0	0
Food Sales		0.0	39	1,541	**0**	0	0
Food Service		0.0	39	1,994	**0**	0	0
Health Care Inpatient		0.0	39	1,938	**0**	0	0
Health Care Outpatient		0.0	39	737	**0**	0	0
Lodging		0.0	39	777	**0**	0	0
Retail (Other Than Mall)		150.0	39	577	**92395**	5807	86588
Office		100.0	39	723	**76175**	3872	72304
Public Assembly		0.0	39	733	**0**	0	0
Public Order and Safety		0.0	39	899	**0**	0	0
Religious Worship		0.0	39	339	**0**	0	0
Service		0.0	39	599	**0**	0	0
Warehouse and Storage		0.0	39	352	**0**	0	0
Other		0.0	39	1,278	**0**	0	0
Vacant		0.0	39	162	**0**	0	0
						32977	416467

Section II: Pavement

Pavement		0.00			**0**

Total Project Emissions: **449444**

Transportation GHG Emissions Calculations

Step 1: Existing GHG Emissions from Travel Demand Model

2005-Existing Conditions		
	Annual Tonnes CO2e	Lifespan Tonnes CO2e
II	183	11,438
Half of IXXI	9,476	592,250
Sum	9,659	**603,688**
	From SnoCo 2005 Model	
	Population	4,353
	Employment (including MANU, WTCU & GOVED)	2,184
	Total Service Population	**6,537**
	GHG per service pop	92.35
	MANU, WTCU, GOVED emp	168
	GHG attributed to MANU, WTCU, GOVED	15,515
	Total GHG emissions to be reported	588,173
	Adjusted Service Population	6,369
	GHG per Adjusted Service Population	92.35

Step 2: 2025 Alternative 3 GHG Emissions from Travel Demand Model

2025-Alternative 3		
	Annual Tonnes CO2e	Lifespan Tonnes CO2e
II	185	11,563
Half of IXXI	9,648	602,969
Sum	9,833	**614,531**
	SnoCo 2005 Model+City's Proposed Growth	
	Population	6,073
	Employment (including MANU, WTCU & GOVED)	3,005
	Total Service Population	**9,078**
	GHG per service pop	67.69
	MANU, WTCU, GOVED emp	389
	GHG attributed to MANU, WTCU, GOVED	26,333
	Total GHG emissions to be reported	588,198
	Adjusted Service Population	8,689
	GHG per Adjusted Service Population	67.69

Step 3: Compare land use for each alternative

Land Use			
Alternative	Retail	Office	Dwelling Units
Alt 1	60,000	40,000	120
Alt 2	150,000	150,000	200
Alt 3	150,000	100,000	600

Step 4: Compare service populations for each alternative

Service Population Equivalents				Service Population per ksf and dwelling unit assumptions	
Alternative	Retail	Office	Dwelling Units		
Alt 1	120	120	344	2	emp/retail ksf
Alt 2	300	450	573	3	emp/office ksf
Alt 3	300	300	1,720	2.866	pop/DU
Service Population Proportions					
Alternative	Retail	Office	Dwelling Units		
Alt 1	21%	21%	59%		
Alt 2	23%	34%	43%		
Alt 3	13%	13%	74%		

Step 5: Determine VMT factor based on mix of land use/service population relative to Alternative 3 model results

VMT/serv pop equivalents	
1.75	Retail
0.75	Office
0.75	DU

Alternative	Relative VMT	VMT Factor
Alt 1	0.956	1.087
Alt 2	0.977	1.111
Alt 3	0.879	1.000

Step 6: Apply VMT factor to Alternative 3 model results to determine total GHG emissions for Alternatives 1 and 2

Alternative	VMT Factor	GHG/Service Population	Service Population	Total GHG Emissions
Alt 1	1.087	73.559	6954	511,528
Alt 2	1.111	75.192	7694	578,528
Alt 3	1.000	67.695	8689	588,198

Existing Internal Trips

PM VMT By Speed Bin	Existing	EMFAC	Daily tonnes
0-5 MPH	0	1167.456	0
5-10 MPH	0	891.3495	0
10-15 MPH	21	706.5965	0.01510714
15-20 MPH	0	581.8555	0
20-25 MPH	4	499.5845	0.002052303
25-30 MPH	154	444.2145	0.068437374
30-35 MPH	25	408.532	0.010321297
35-40 MPH	0	388.249	0
40-45 MPH	0	381.085	0
45-50 MPH	0	386.3035	0
50-55 MPH	7	404.5695	0.002709351
55-60 MPH	0	438.0805	0
60-65 MPH	0	491.015	0
65-70 MPH	0	495.7775	0
70+ MPH	0	503.256	0

TOTAL VMT	**212**	Total Daily Tonnes CO2e	0.519091933
		Annual Tonnes	**182.7203603**
Pop	4353	Annual Tonnes per Serv POP	0.027951715
Jobs	2184		
Service Population	6537		
		Building Lifespan	62.5
Daily VMT Estimate	0.323563	Total Lifetime Trans GHG	11,420

Existing Internal-External Trips

PM VMT By Speed Bin	Existing	EMFAC	Daily tonnes
0-5 MPH	0	1154.107	0
5-10 MPH	0	880.077	0
10-15 MPH	93	696.736	0.064848563
15-20 MPH	6	572.974	0.003458275
20-25 MPH	190	491.402	0.093425892
25-30 MPH	4,877	436.519	2.128981778
30-35 MPH	10,615	401.17	4.258246909
35-40 MPH	2,357	381.105	0.898095538
40-45 MPH	3,196	374.066	1.1956785
45-50 MPH	814	379.331	0.308675935
50-55 MPH	533	397.572	0.211994637
55-60 MPH	1,135	430.986	0.489374633
60-65 MPH	769	483.747	0.372136238
65-70 MPH	419	489.044	0.204759715
70+ MPH	0	497.335	0

TOTAL VMT	**25,004**	Total Daily Tonnes CO2e	53.8404043
		Annual Tonnes	**18951.82231**
Pop	4353	Annual Tonnes per Serv POP	2.899162049
Jobs	2184		
Service Population	6537		
		Building Lifespan	62.5
Daily VMT Estimate	38.25055	Total Lifetime Trans GHG	1,184,489

2025 Alternative 3 Internal Trips

PM VMT By Speed Bin	Alt 3	EMFAC	Daily tonnes
0-5 MPH	0	858.04	0
5-10 MPH	0	655.17	0
10-15 MPH	29	519.22	0.01526319
15-20 MPH	0	427.38	0
20-25 MPH	6	367.07	0.002073341
25-30 MPH	212	326.45	0.069151651
30-35 MPH	35	300.25	0.010429767
35-40 MPH	0	285.34	0
40-45 MPH	0	280.06	0
45-50 MPH	0	283.88	0
50-55 MPH	9	297.30	0.002737461
55-60 MPH	0	321.92	0
60-65 MPH	0	360.82	0
65-70 MPH	0	364.73	0
70+ MPH	0	370.82	0

TOTAL VMT	**291**	Total Daily Tonnes CO2e	0.524502165
		Annual Tonnes	**184.624762**
Pop	6073	Annual Tonnes per Serv POP	0.020337603
Jobs	3005		
Service Population	9078		
		Building Lifespan	62.5
Daily VMT Estimate	0.320357	Total Lifetime Trans GHG	11,539

2025 Alternative 3 Internal-External Trips

PM VMT By Speed Bin	Alt 3	EMFAC	Daily tonnes
0-5 MPH	0	858.0411	0
5-10 MPH	0	655.1659	0
10-15 MPH	127	519.2158	0.065769184
15-20 MPH	8	427.3836	0.003510629
20-25 MPH	259	367.0722	0.09497827
25-30 MPH	6,638	326.4489	2.166838494
30-35 MPH	14,446	300.2477	4.337351163
35-40 MPH	3,207	285.3395	0.915128763
40-45 MPH	4,350	280.0621	1.218324642
45-50 MPH	1,107	283.8828	0.314388081
50-55 MPH	726	297.2961	0.215744996
55-60 MPH	1,545	321.9173	0.497467885
60-65 MPH	1,047	360.8186	0.377759185
65-70 MPH	570	364.7258	0.207828693
70+ MPH	0	370.8205	0

TOTAL VMT	**34,030**	Total Daily Tonnes CO2e	54.81626417
		Annual Tonnes	**19295.32499**
Pop	6073	Annual Tonnes per Serv POP	2.125503964
Jobs	3005		
Service Population	9078		
		Building Lifespan	62.5
Daily VMT Estimate	37.48595	Total Lifetime Trans GHG	1,205,958

Prepared for: **Fehr & Peers**

Traffic Count Consultants, Inc.

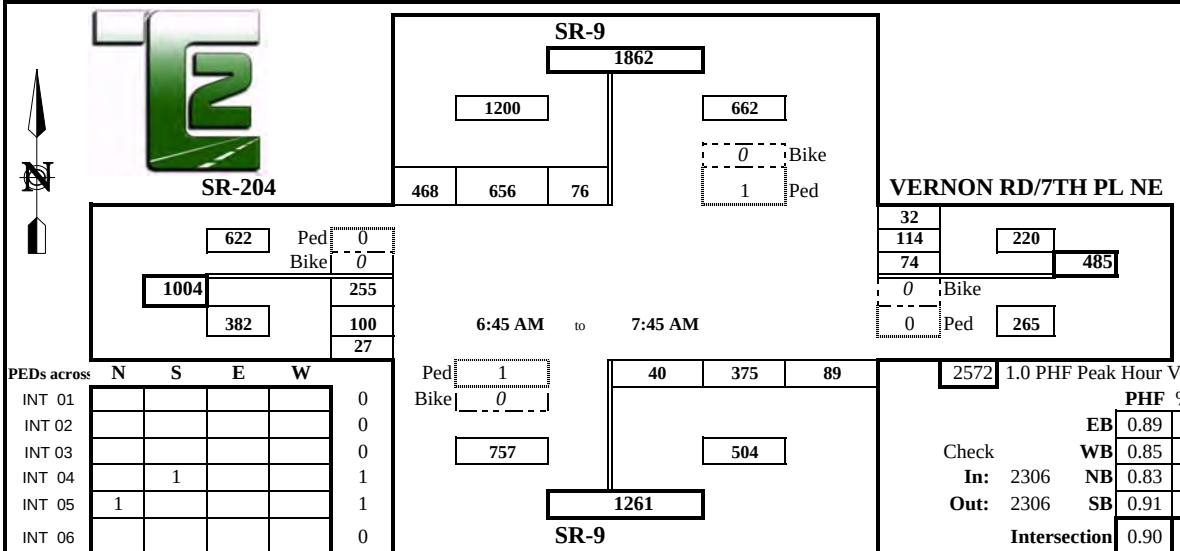
Phone: (425) 861-8866 FAX: (425) 861-8877 E-Mail: Team@tc2inc.com

WBE/DBE

Intersection: SR-9 & SR-204 (VERNON RD/7TH PL NE)
Location: LAKE STEVENS, WASHINGTON

Date of Count: Wed 4/13/11
Checked By: J.H

Time Interval Ending at	From North on (SB) SR-9				From South on (NB) SR-9				From East on (WB) VERNON RD/7TH PL NE				From West on (EB) SR-204				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
6:45 A	13	14	129	124	5	18	49	5	5	10	29	24	10	69	13	1	485
7:00 A	16	24	169	138	10	6	73	19	2	11	25	3	10	69	17	10	564
7:15 A	20	15	186	119	15	8	110	33	3	15	40	10	4	76	28	3	643
7:30 A	13	21	152	119	12	16	108	23	3	27	24	5	5	51	27	8	581
7:45 A	19	16	149	92	10	10	84	14	2	21	25	14	14	59	28	6	518
8:00 A	18	18	110	103	11	20	75	24	0	16	36	8	18	62	36	8	516
8:15 A	22	32	124	119	12	20	78	14	4	15	30	11	13	57	28	8	536
8:30 A	25	18	114	113	14	13	72	21	1	8	29	8	15	50	24	7	477
8:45 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:15 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Survey	146	158	1133	927	89	111	649	153	20	123	238	83	89	493	201	51	4320
Peak Hour:							6:45				to				7:45		
Total	68	76	656	468	47	40	375	89	10	74	114	32	33	255	100	27	2306
Approach	1200				504				220				382				2306
%HV	5.7%				9.3%				4.5%				8.6%				6.9%
PHF	0.91				0.83				0.85				0.89				0.90



PEDs across	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04		1			1
INT 05	1				1
INT 06					0
INT 07					0
INT 08		2			2
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	1	3	0	0	4

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06					0
INT 07			1		1
INT 08					0
	0	0	1	0	1

2572 1.0 PHF Peak Hour Volume

		PHF	%HV
	EB	0.89	8.6%
Check	WB	0.85	4.5%
In: 2306	NB	0.83	9.3%
Out: 2306	SB	0.91	5.7%
	Intersection	0.90	6.9%

Special Notes:

FnP11101_10301a

Prepared for: **Fehr & Peers**

Traffic Count Consultants, Inc.

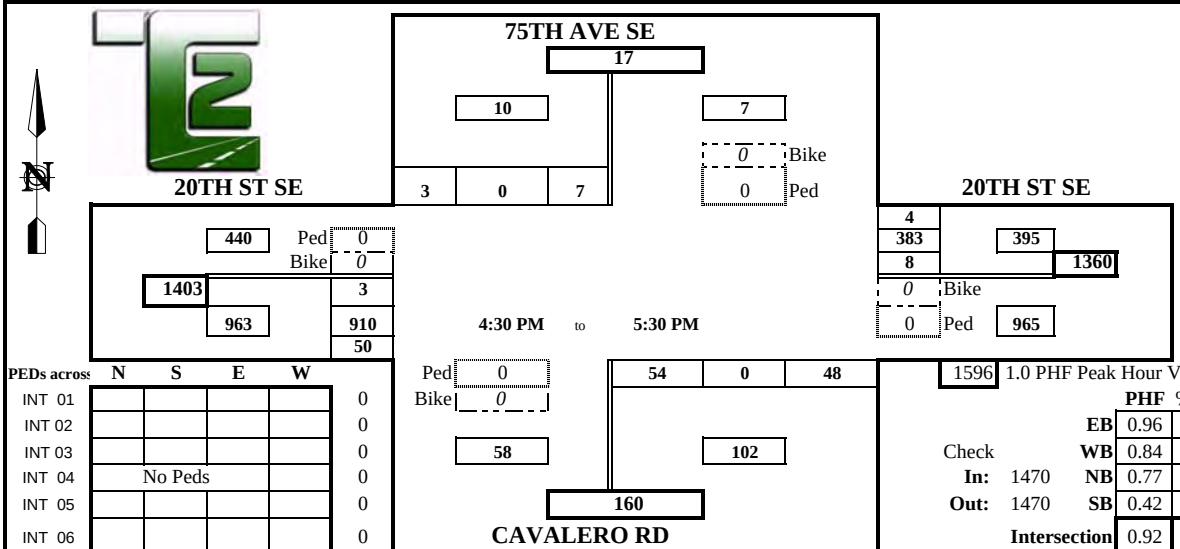
Phone: (425) 861-8866 FAX: (425) 861-8877 E-Mail: Team@tc2inc.com

WBE/DBE

Intersection: 75TH AVE SE (CAVALERO RD) & 20TH ST SE
Location: LAKE STEVENS, WASHINGTON

Date of Count: Thurs 4/14/11
Checked By: J.H

Time Interval Ending at	From North on (SB) 75TH AVE SE				From South on (NB) CAVALERO RD				From East on (WB) 20TH ST SE				From West on (EB) 20TH ST SE				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	0	0	2	0	14	0	12	3	5	120	0	8	0	216	17	386
4:30 P	0	0	0	0	1	9	0	11	4	1	103	1	2	1	201	14	341
4:45 P	0	0	0	0	0	17	0	16	2	3	91	0	1	0	206	9	342
5:00 P	0	6	0	0	0	9	0	11	3	2	84	1	6	1	230	14	358
5:15 P	0	0	0	2	1	13	0	7	4	1	95	1	2	2	236	14	371
5:30 P	0	1	0	1	0	15	0	14	1	2	113	2	6	0	238	13	399
5:45 P	0	0	0	1	1	10	0	9	2	2	95	0	3	2	209	13	341
6:00 P	0	1	0	2	0	10	0	14	4	4	83	0	4	0	214	12	340
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Survey	0	8	0	8	3	97	0	94	23	20	784	5	32	6	1750	106	2878
Peak Hour:					16:30				to		17:30						
Total	0	7	0	3	1	54	0	48	10	8	383	4	15	3	910	50	1470
Approach	10				102				395				963				1470
%HV	n/a				1.0%				2.5%				1.6%				1.8%
PHF	0.42				0.77				0.84				0.96				0.92



PEDs across	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04	No Peds				0
INT 05					0
INT 06					0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03	No Bicycles				0
INT 04					0
INT 05					0
INT 06					0
INT 07					0
INT 08					0
	0	0	0	0	0

1596 1.0 PHF Peak Hour Volume

	PHF	%HV
EB	0.96	1.6%
WB	0.84	2.5%
NB	0.77	1.0%
SB	0.42	n/a
Intersection	0.92	1.8%

Check In: 1470 Out: 1470

Special Notes:

FnP11101_10402p

Prepared for: **Fehr & Peers**

Traffic Count Consultants, Inc.

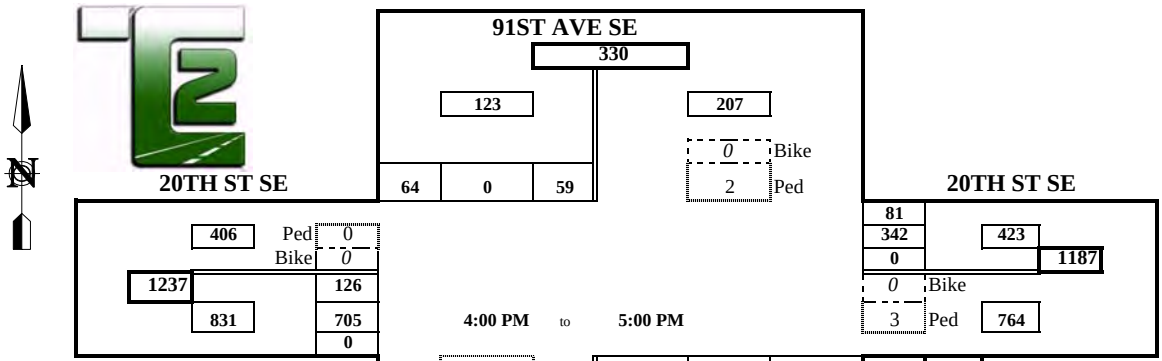
Phone: (425) 861-8866 FAX: (425) 861-8877 E-Mail: Team@tc2inc.com

WBE/DBE

Intersection: 91ST AVE SE & 20TH ST SE
Location: LAKE STEVENS, WASHINGTON

Date of Count: Wed 4/13/11
Checked By: J.H

Time Interval	From North on (SB) 91ST AVE SE				From South on (NB) PRIVATE DRIVEWAY				From East on (WB) 20TH ST SE				From West on (EB) 20TH ST SE				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	28	0	21	0	0	0	0	5	0	95	28	5	40	203	0	415
4:30 P	0	10	0	12	0	0	0	0	3	0	78	10	5	28	149	0	287
4:45 P	2	5	0	13	0	0	0	0	1	0	101	19	3	32	164	0	334
5:00 P	1	16	0	18	0	0	0	0	0	0	68	24	3	26	189	0	341
5:15 P	1	17	0	17	0	0	0	0	2	0	77	20	3	33	197	0	361
5:30 P	0	18	0	13	0	0	0	0	0	0	81	26	4	28	171	0	337
5:45 P	0	5	0	12	0	0	0	0	1	0	69	13	3	31	168	0	298
6:00 P	1	16	0	13	0	0	0	0	5	0	85	23	4	42	146	0	325
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Survey	5	115	0	119	0	0	0	0	17	0	654	163	30	260	1387	0	2698
Peak Hour:					16:00				to		17:00						
Total	3	59	0	64	0	0	0	0	9	0	342	81	16	126	705	0	1377
Approach	123				0				423				831				1377
%HV	2.4%				n/a				2.1%				1.9%				2.0%
PHF	0.63				n/a				0.86				0.85				0.83



PEDs across	N	S	E	W	
INT 01					0
INT 02	2	2	2		6
INT 03					0
INT 04			1		1
INT 05					0
INT 06					0
INT 07		1	1		2
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	2	3	4	0	9

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03	No Bicycles				0
INT 04					0
INT 05					0
INT 06					0
INT 07					0
INT 08					0
	0	0	0	0	0

1660 1.0 PHF Peak Hour Volume

	PHF	%HV
EB	0.85	1.9%
WB	0.86	2.1%
NB	n/a	n/a
SB	0.63	2.4%
Intersection	0.83	2.0%

Check
In: 1377
Out: 1377

Special Notes:

FnP1101_10303p

Prepared for: **Fehr & Peers**

Traffic Count Consultants, Inc.

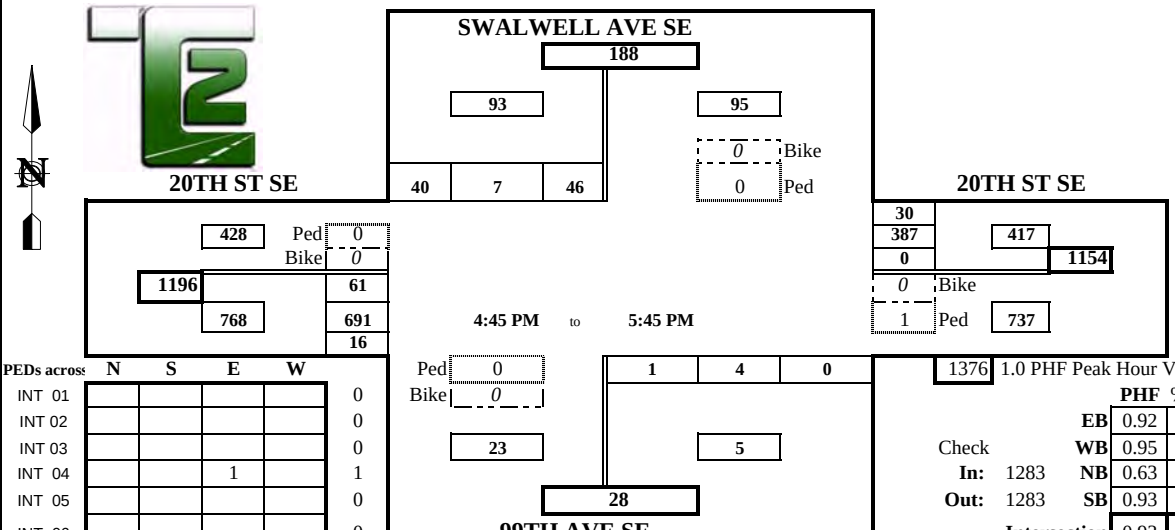
Phone: (425) 861-8866 FAX: (425) 861-8877 E-Mail: Team@tc2inc.com

WBE/DBE

Intersection: SWALWELL AVE SE/99TH AVE SE & 20TH ST SE
Location: LAKE STEVENS, WASHINGTON

Date of Count: Wed 4/13/11
Checked By: J.H

Time Interval Ending at	From North on (SB) SWALWELL AVE SE				From South on (NB) 99TH AVE SE				From East on (WB) 20TH ST SE				From West on (EB) 20TH ST SE				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	11	0	16	0	0	0	0	1	1	92	9	0	23	175	1	328
4:30 P	0	15	5	11	0	1	1	0	1	0	80	9	0	9	167	4	302
4:45 P	0	12	3	13	0	4	1	0	0	0	93	10	0	15	146	2	299
5:00 P	0	11	1	7	0	0	2	0	0	0	89	7	0	17	169	5	308
5:15 P	0	11	3	10	0	1	1	0	1	0	94	12	0	17	164	4	317
5:30 P	0	12	0	13	0	0	1	0	0	0	99	6	0	14	166	3	314
5:45 P	0	12	3	10	0	0	0	0	0	0	105	5	0	13	192	4	344
6:00 P	0	6	2	7	0	2	2	0	1	0	89	7	1	18	147	2	282
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Survey	0	90	17	87	0	8	8	0	4	1	741	65	1	126	1326	25	2494
Peak Hour:	16:45	to	17:45														
Total	0	46	7	40	0	1	4	0	1	0	387	30	0	61	691	16	1283
Approach	93				5				417				768				1283
%HV	n/a				n/a				0.2%				n/a				0.1%
PHF	0.93				0.63				0.95				0.92				0.93



PEDs across	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04			1		1
INT 05					0
INT 06					0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	1	0	1

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03	No Bicycles				0
INT 04					0
INT 05					0
INT 06					0
INT 07					0
INT 08					0
	0	0	0	0	0

1376 1.0 PHF Peak Hour Volume

		PHF	%HV
	EB	0.92	n/a
Check	WB	0.95	0.2%
In: 1283	NB	0.63	n/a
Out: 1283	SB	0.93	n/a
	Intersection	0.93	0.1%

Special Notes:

FnP1101_10304p

Prepared for: **Fehr & Peers**

Traffic Count Consultants, Inc.

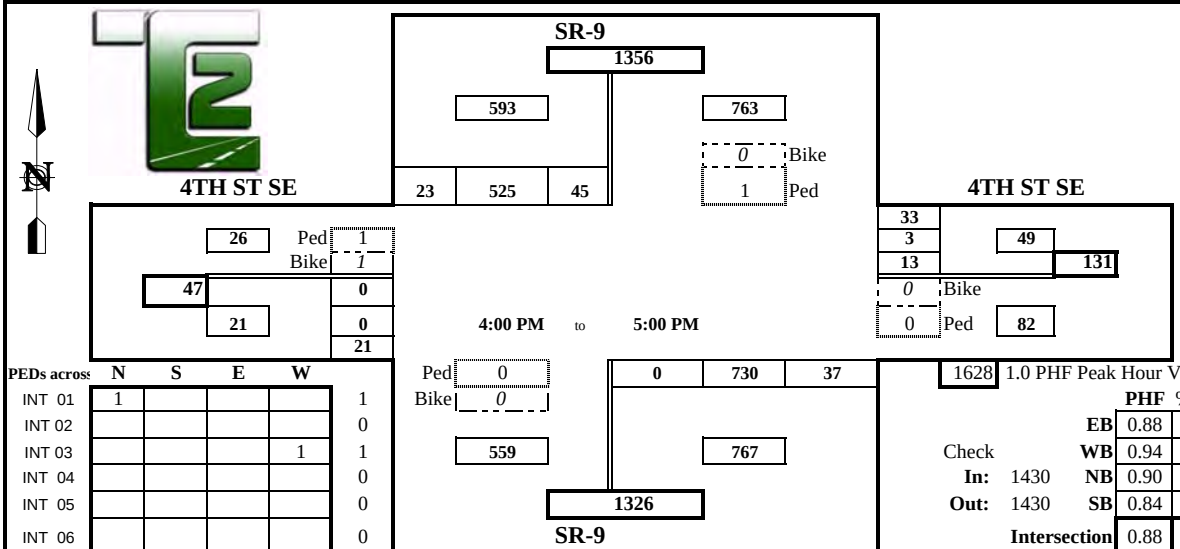
Phone: (425) 861-8866 FAX: (425) 861-8877 E-Mail: Team@tc2inc.com

WBE/DBE

Intersection: 4TH ST SE & SR-9
Location: LAKE STEVENS, WASHINGTON

Date of Count: Wed 4/13/11
Checked By: J.H

Time Interval Ending at	From North on (SB) SR-9				From South on (NB) SR-9				From East on (WB) 4TH ST SE				From West on (EB) 4TH ST SE				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	6	11	159	6	13	0	203	11	1	4	3	6	0	0	0	4	407
4:30 P	8	11	125	7	4	0	179	8	0	2	0	9	0	0	0	5	346
4:45 P	4	6	108	6	7	0	169	11	0	3	0	10	0	0	0	6	319
5:00 P	7	17	133	4	6	0	179	7	0	4	0	8	0	0	0	6	358
5:15 P	1	13	116	3	3	0	166	15	0	10	0	13	0	0	0	20	356
5:30 P	3	13	123	5	5	0	173	14	0	6	0	5	0	0	0	4	343
5:45 P	2	13	120	6	6	0	155	12	0	1	0	10	0	0	0	8	325
6:00 P	2	14	97	11	4	0	161	19	0	3	1	12	0	0	1	6	325
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Survey	33	98	981	48	48	0	1385	97	1	33	4	73	0	0	1	59	2779
Peak Hour:					16:00				to		17:00						
Total	25	45	525	23	30	0	730	37	1	13	3	33	0	0	0	21	1430
Approach			593				767				49				21		1430
%HV			4.2%				3.9%				2.0%				n/a		3.9%
PHF			0.84				0.90				0.94				0.88		0.88



PEDs across	N	S	E	W	
INT 01	1				1
INT 02					0
INT 03				1	1
INT 04					0
INT 05					0
INT 06					0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	1	0	0	1	2

Bicycles From:	N	S	E	W	
INT 01					0
INT 02				1	1
INT 03					0
INT 04					0
INT 05					0
INT 06	1				1
INT 07					0
INT 08		1			1
	1	1	0	1	3

1628 1.0 PHF Peak Hour Volume

	PHF	%HV
EB	0.88	n/a
WB	0.94	2.0%
NB	0.90	3.9%
SB	0.84	4.2%
Intersection	0.88	3.9%

Check In: 1430 Out: 1430

Special Notes:

FnP1101_10305p

Prepared for: **Fehr & Peers**

Traffic Count Consultants, Inc.

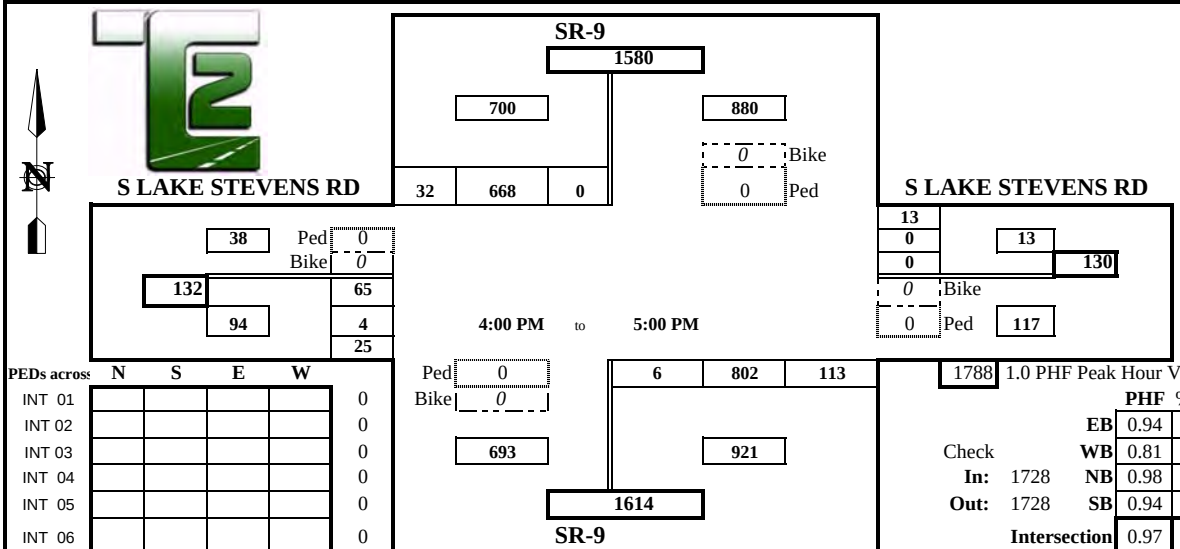
Phone: (425) 861-8866 FAX: (425) 861-8877 E-Mail: Team@tc2inc.com

WBE/DBE

Intersection: SR-9 & S LAKE STEVENS RD
Location: LAKE STEVENS, WASHINGTON

Date of Count: Wed 4/13/11
Checked By: J.H

Time Interval Ending at	From North on (SB) SR-9				From South on (NB) SR-9				From East on (WB) S LAKE STEVENS RD				From West on (EB) S LAKE STEVENS RD				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	3	0	175	12	2	2	197	35	0	0	0	3	1	16	1	6	447
4:30 P	4	0	180	6	2	2	198	33	0	0	0	4	0	13	1	9	446
4:45 P	0	0	146	7	0	2	210	20	0	0	0	2	0	22	0	3	412
5:00 P	1	0	167	7	1	0	197	25	0	0	0	4	0	14	2	7	423
5:15 P	0	0	177	8	0	0	200	35	0	0	0	1	0	18	0	6	445
5:30 P	0	0	163	7	0	1	186	27	0	0	0	1	0	25	3	8	421
5:45 P	0	0	166	8	1	1	165	38	0	0	0	6	0	12	0	4	400
6:00 P	0	0	135	7	1	1	191	36	0	0	0	0	0	27	1	4	402
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Survey	8	0	1309	62	7	9	1544	249	0	0	0	21	1	147	8	47	3396
Peak Hour:							16:00			to					17:00		
Total	8	0	668	32	5	6	802	113	0	0	0	13	1	65	4	25	1728
Approach			700				921				13				94		1728
%HV			1.1%				0.5%				n/a				1.1%		0.8%
PHF			0.94				0.98				0.81				0.94		0.97



PEDs across	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06					0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	**0**

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06					0
INT 07					0
INT 08	1				1
	1	0	0	0	**1**

1788 1.0 PHF Peak Hour Volume

		PHF	%HV
	EB	0.94	1.1%
Check	WB	0.81	n/a
In: 1728	NB	0.98	0.5%
Out: 1728	SB	0.94	1.1%
	Intersection	0.97	0.8%

Special Notes:

FnP1101_10306p

Prepared for: **Fehr & Peers**

Traffic Count Consultants, Inc.

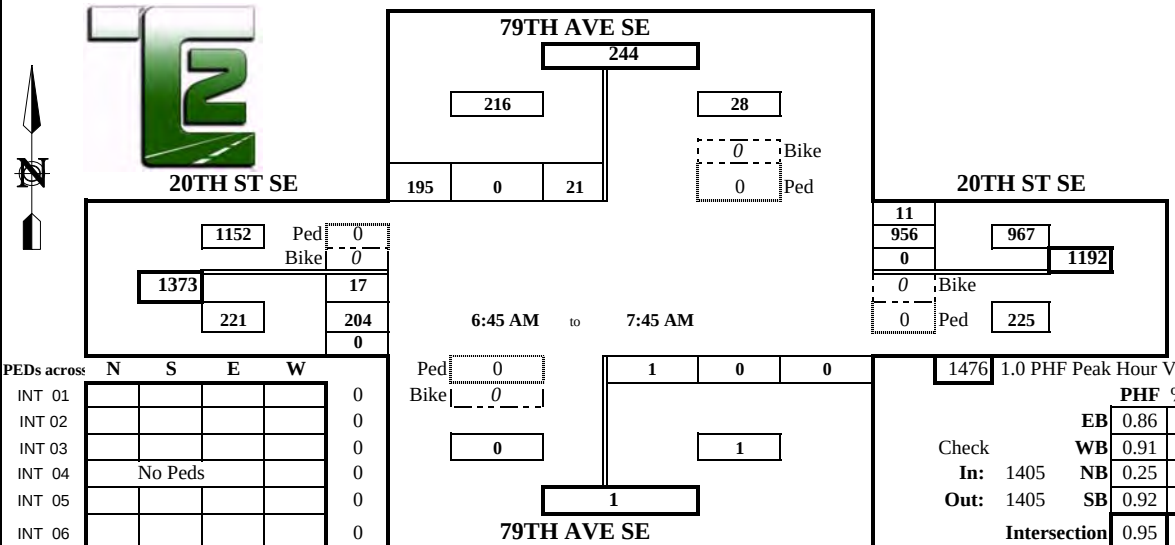
Phone: (425) 861-8866 FAX: (425) 861-8877 E-Mail: Team@tc2inc.com

WBE/DBE

Intersection: 79TH AVE SE & 20TH ST SE
Location: LAKE STEVENS, WASHINGTON

Date of Count: Tue 4/12/11
Checked By: J.H

Time Interval Ending at	From North on (SB) 79TH AVE SE				From South on (NB) 79TH AVE SE				From East on (WB) 20TH ST SE				From West on (EB) 20TH ST SE				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
6:45 A	3	3	0	28	0	0	0	0	5	0	188	0	5	5	39	0	263
7:00 A	2	4	0	42	0	0	0	0	3	0	264	1	4	3	53	0	367
7:15 A	1	10	0	47	0	1	0	0	2	0	228	5	3	5	59	0	355
7:30 A	3	4	0	50	0	0	0	0	5	0	254	4	3	3	54	0	369
7:45 A	0	3	0	56	0	0	0	0	4	0	210	1	4	6	38	0	314
8:00 A	3	4	0	50	0	0	0	2	6	2	195	0	3	5	45	0	303
8:15 A	0	0	0	35	0	0	0	0	4	1	146	0	5	0	41	0	223
8:30 A	2	2	0	22	0	0	0	1	8	0	180	1	4	1	49	0	256
8:45 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:15 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Survey	14	30	0	330	0	1	0	3	37	3	1665	12	31	28	378	0	2450
Peak Hour:	6:45	to	7:45														
Total	6	21	0	195	0	1	0	0	14	0	956	11	14	17	204	0	1405
Approach	216				1				967				221				1405
%HV	2.8%				n/a				1.4%				6.3%				2.4%
PHF	0.92				0.25				0.91				0.86				0.95



PEDs across	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04	No Peds				0
INT 05					0
INT 06					0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06					0
INT 07			1		1
INT 08					0
	0	0	1	0	1

1476 1.0 PHF Peak Hour Volume

		PHF	%HV
	EB	0.86	6.3%
Check	WB	0.91	1.4%
In: 1405	NB	0.25	n/a
Out: 1405	SB	0.92	2.8%
	Intersection	0.95	2.4%

Special Notes:

FnP1101_10207a

Prepared for: **Fehr & Peers**

Traffic Count Consultants, Inc.

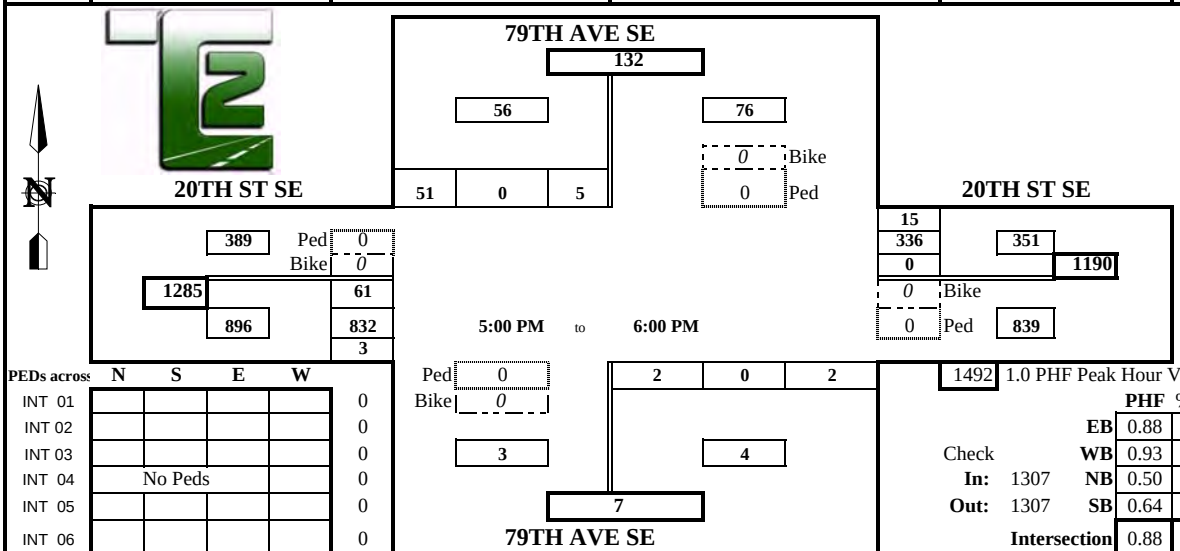
Phone: (425) 861-8866 FAX: (425) 861-8877 E-Mail: Team@tc2inc.com

WBE/DBE

Intersection: 79TH AVE SE & 20TH ST SE
Location: LAKE STEVENS, WASHINGTON

Date of Count: Thurs 4/14/11
Checked By: J.H

Time Interval Ending at	From North on (SB) 79TH AVE SE				From South on (NB) 79TH AVE SE				From East on (WB) 20TH ST SE				From West on (EB) 20TH ST SE				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	1	4	1	14	0	0	0	0	2	0	107	6	5	18	186	1	337
4:30 P	0	0	0	10	0	1	0	0	4	0	95	2	2	11	210	1	330
4:45 P	0	4	0	10	0	0	0	1	2	0	80	3	2	16	168	0	282
5:00 P	1	1	0	15	0	0	0	0	1	1	70	4	4	12	204	0	307
5:15 P	0	1	0	10	0	0	0	1	4	0	87	7	4	17	214	0	337
5:30 P	0	3	0	19	0	2	0	0	1	0	89	5	4	23	231	1	373
5:45 P	0	0	0	9	0	0	0	1	2	0	85	1	1	9	184	0	289
6:00 P	1	1	0	13	0	0	0	0	4	0	75	2	3	12	203	2	308
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Survey	3	14	1	100	0	3	0	3	20	1	688	30	25	118	1600	5	2563
Peak Hour:					17:00				to		18:00						
Total	1	5	0	51	0	2	0	2	11	0	336	15	12	61	832	3	1307
Approach	56				4				351				896				1307
%HV	1.8%				n/a				3.1%				1.3%				1.8%
PHF	0.64				0.50				0.93				0.88				0.88



PEDs across	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04	No Peds				0
INT 05					0
INT 06					0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03	No Bicycles				0
INT 04					0
INT 05					0
INT 06					0
INT 07					0
INT 08					0
	0	0	0	0	0

1492 1.0 PHF Peak Hour Volume

	PHF	%HV
EB	0.88	1.3%
WB	0.93	3.1%
NB	0.50	n/a
SB	0.64	1.8%
Intersection	0.88	1.8%

Check
In: 1307
Out: 1307

Special Notes:

FnP11101_10407p

Prepared for: **Fehr & Peers**

Traffic Count Consultants, Inc.

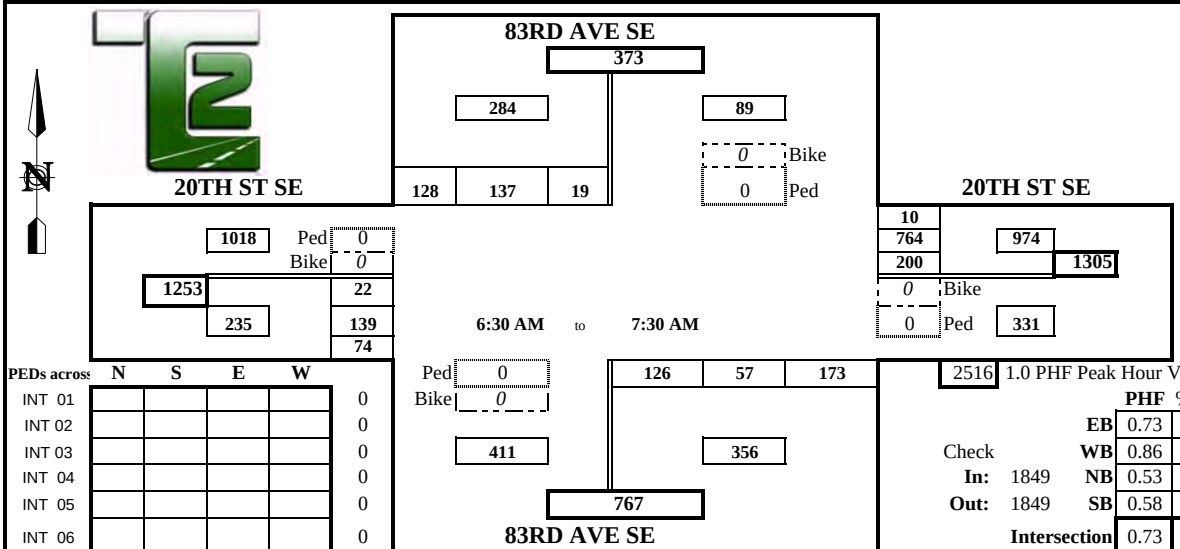
Phone: (425) 861-8866 FAX: (425) 861-8877 E-Mail: Team@tc2inc.com

WBE/DBE

Intersection: 83RD AVE SE & 20TH ST SE
Location: LAKE STEVENS, WASHINGTON

Date of Count: Tue 4/12/11
Checked By: J.H

Time Interval Ending at	From North on (SB) 83RD AVE SE				From South on (NB) 83RD AVE SE				From East on (WB) 20TH ST SE				From West on (EB) 20TH ST SE				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
6:45 A	1	6	9	35	1	13	2	9	10	21	197	2	3	5	28	10	337
7:00 A	6	1	39	31	2	24	10	32	17	76	201	5	2	6	29	20	474
7:15 A	2	5	88	30	15	46	29	93	2	90	168	0	5	3	35	42	629
7:30 A	0	7	1	32	3	43	16	39	5	13	198	3	5	8	47	2	409
7:45 A	0	6	1	29	0	2	1	5	3	9	210	2	5	5	43	1	314
8:00 A	0	8	2	13	0	0	0	6	9	6	155	6	5	8	37	0	241
8:15 A	0	1	1	16	0	1	0	1	3	0	119	0	5	1	30	1	171
8:30 A	2	8	6	22	0	3	1	2	9	3	132	4	4	5	46	0	232
8:45 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:15 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Survey	11	42	147	208	21	132	59	187	58	218	1380	22	34	41	295	76	2807
Peak Hour:							6:30		to		7:30						
Total	9	19	137	128	21	126	57	173	34	200	764	10	15	22	139	74	1849
Approach	284				356				974				235				1849
%HV	3.2%				5.9%				3.5%				6.4%				4.3%
PHF	0.58				0.53				0.86				0.73				0.73



PEDs across	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06					0
INT 07					0
INT 08			1		1
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	1	0	1

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06			1		1
INT 07					0
INT 08			1		1
	0	0	2	0	2

2516 1.0 PHF Peak Hour Volume

	PHF	%HV
EB	0.73	6.4%
WB	0.86	3.5%
NB	0.53	5.9%
SB	0.58	3.2%
Intersection	0.73	4.3%

Check In: 1849 Out: 1849

Special Notes:

FnP1101_10208a

Prepared for: **Fehr & Peers**

Traffic Count Consultants, Inc.

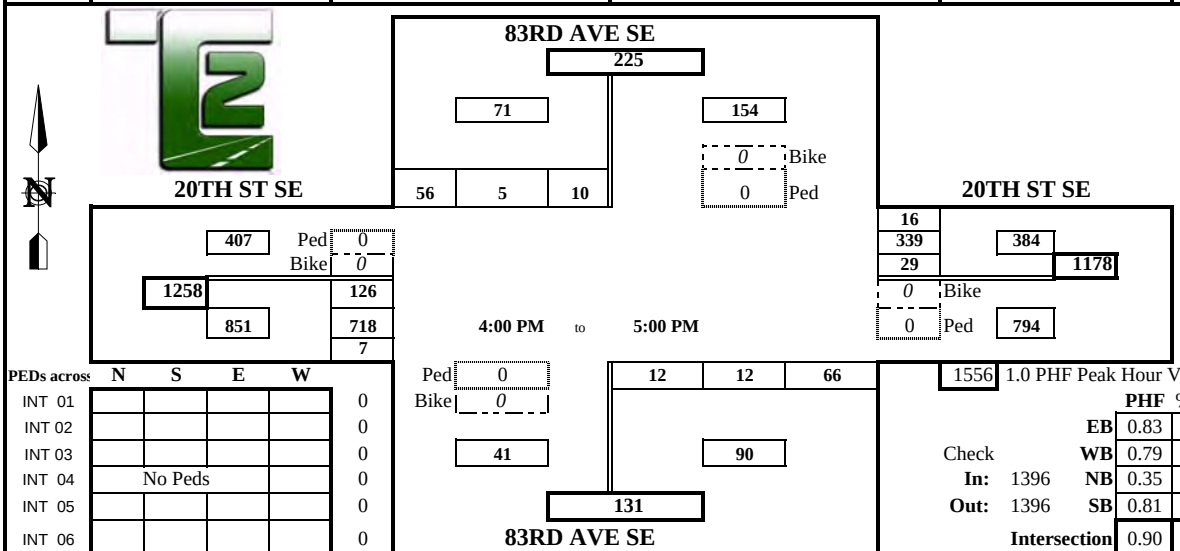
Phone: (425) 861-8866 FAX: (425) 861-8877 E-Mail: Team@tc2inc.com

WBE/DBE

Intersection: 83RD AVE SE & 20TH ST SE
Location: LAKE STEVENS, WASHINGTON

Date of Count: Thurs 4/14/11
Checked By: J.H

Time Interval Ending at	From North on (SB) 83RD AVE SE				From South on (NB) 83RD AVE SE				From East on (WB) 20TH ST SE				From West on (EB) 20TH ST SE				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	2	3	10	0	7	8	50	1	16	103	2	6	22	165	1	389
4:30 P	0	0	2	20	0	0	2	9	3	7	91	2	1	33	178	1	345
4:45 P	0	7	0	9	0	3	1	5	2	2	76	7	1	40	152	3	305
5:00 P	1	1	0	17	0	2	1	2	1	4	69	5	6	31	223	2	357
5:15 P	1	6	1	16	0	0	0	3	2	2	84	1	2	28	177	2	320
5:30 P	0	3	0	14	0	5	8	17	2	2	76	2	6	35	194	5	361
5:45 P	0	1	2	17	0	0	2	0	2	6	78	5	1	29	157	3	300
6:00 P	4	4	5	17	0	3	4	9	1	16	59	6	4	41	159	18	341
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Survey	6	24	13	120	0	20	26	95	14	55	636	30	27	259	1405	35	2718
Peak Hour:					16:00				to		17:00						
Total	1	10	5	56	0	12	12	66	7	29	339	16	14	126	718	7	1396
Approach	71				90				384				851				1396
%HV	1.4%				n/a				1.8%				1.6%				1.6%
PHF	0.81				0.35				0.79				0.83				0.90



PEDs across	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04	No Peds				0
INT 05					0
INT 06					0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03	No Bicycles				0
INT 04					0
INT 05					0
INT 06					0
INT 07					0
INT 08					0
	0	0	0	0	0

1556 1.0 PHF Peak Hour Volume

		PHF	%HV
	EB	0.83	1.6%
Check	WB	0.79	1.8%
In: 1396	NB	0.35	n/a
Out: 1396	SB	0.81	1.4%
	Intersection	0.90	1.6%

Special Notes:

FnP11101_10408p

Prepared for: **Fehr & Peers**

Traffic Count Consultants, Inc.

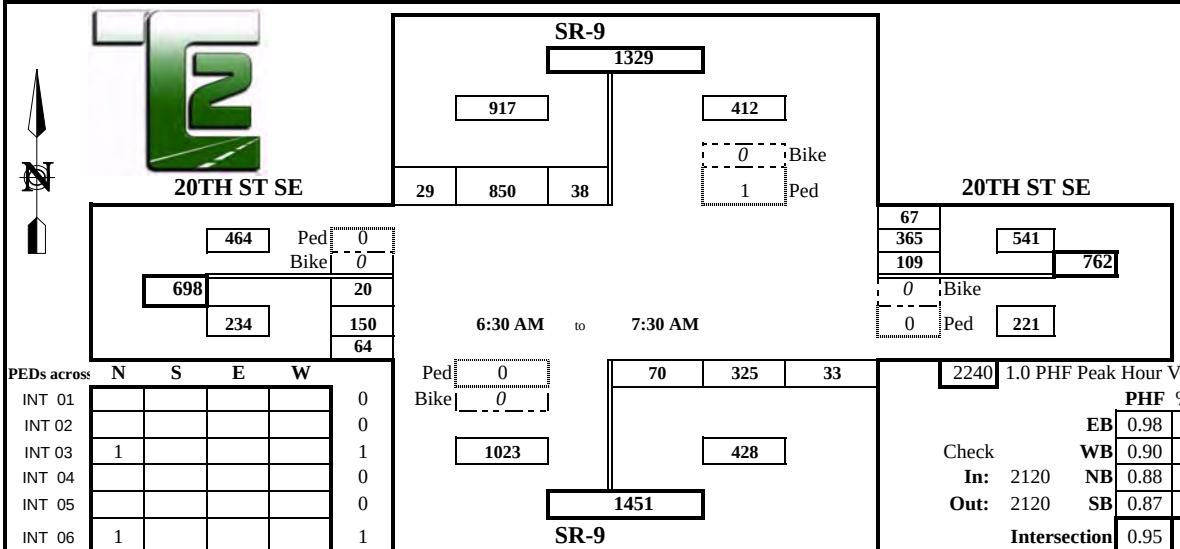
Phone: (425) 861-8866 FAX: (425) 861-8877 E-Mail: Team@tc2inc.com

WBE/DBE

Intersection: SR-9 & 20TH ST SE
Location: LAKE STEVENS, WASHINGTON

Date of Count: Tue 4/12/11
Checked By: J.H

Time Interval Ending at	From North on (SB) SR-9				From South on (NB) SR-9				From East on (WB) 20TH ST SE				From West on (EB) 20TH ST SE				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
6:45 A	2	10	199	7	2	15	67	4	1	26	108	16	0	4	44	12	512
7:00 A	2	7	176	6	5	15	88	9	1	27	86	22	0	5	40	15	496
7:15 A	2	9	248	6	4	21	75	12	0	27	82	18	0	10	26	18	552
7:30 A	8	12	227	10	2	19	95	8	0	29	89	11	0	1	40	19	560
7:45 A	6	9	215	9	3	19	72	5	0	25	71	14	0	5	35	14	493
8:00 A	8	7	179	16	2	13	69	7	1	22	77	11	1	3	33	11	448
8:15 A	5	12	166	14	7	17	84	10	1	20	70	9	0	6	25	15	448
8:30 A	3	9	159	13	2	10	79	14	2	30	43	10	1	6	55	8	436
8:45 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:15 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Survey	36	75	1569	81	27	129	629	69	6	206	626	111	2	40	298	112	3945
Peak Hour:					6:30				to		7:30						
Total	14	38	850	29	13	70	325	33	2	109	365	67	0	20	150	64	2120
Approach			917				428				541				234		2120
%HV			1.5%				3.0%				0.4%				n/a		1.4%
PHF			0.87				0.88				0.90				0.98		0.95



PEDs across	N	S	E	W	
INT 01					0
INT 02					0
INT 03	1				1
INT 04					0
INT 05					0
INT 06	1				1
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	2	0	0	0	2

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03	No Bicycles				0
INT 04					0
INT 05					0
INT 06					0
INT 07					0
INT 08					0
	0	0	0	0	0

2240 1.0 PHF Peak Hour Volume

	PHF	%HV
EB	0.98	n/a
WB	0.90	0.4%
NB	0.88	3.0%
SB	0.87	1.5%
Intersection	0.95	1.4%

Check In: 2120
Check Out: 2120

Special Notes:

FnP1101_10209a

Prepared for: **Fehr & Peers**

Traffic Count Consultants, Inc.

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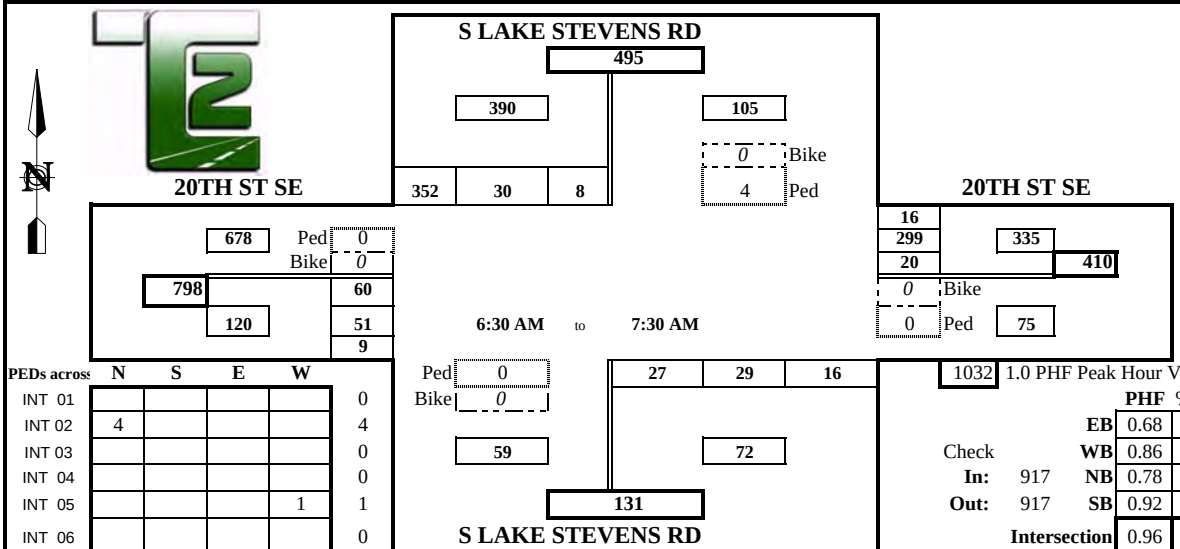
WBE/DBE

Intersection: S LAKE STEVENS RD & 20TH ST SE
Location: LAKE STEVENS, WASHINGTON

Date of Count: Wed 4/13/11
Checked By: J.H

Time Interval	From North on (SB) S LAKE STEVENS RD				From South on (NB) S LAKE STEVENS RD				From East on (WB) 20TH ST SE				From West on (EB) 20TH ST SE				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
6:45 A	2	1	5	90	1	11	8	4	4	5	83	4	2	4	9	2	226
7:00 A	3	4	6	80	1	4	0	6	4	6	83	8	3	13	15	1	226
7:15 A	2	2	8	96	0	9	8	4	2	6	71	2	7	17	13	2	238
7:30 A	2	1	11	86	1	3	13	2	2	3	62	2	2	26	14	4	227
7:45 A	8	1	18	78	0	2	5	4	0	7	5	4	2	13	22	5	164
8:00 A	1	5	15	64	3	3	9	6	2	7	55	4	3	9	20	11	208
8:15 A	4	1	8	76	1	3	7	3	2	7	55	4	4	8	14	7	193
8:30 A	5	8	24	64	0	15	9	6	2	11	68	4	4	19	20	10	258
8:45 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:15 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Survey	27	23	95	634	7	50	59	35	18	52	482	32	27	109	127	42	1740
					Peak Hour:		6:30		to		7:30						
Total	9	8	30	352	3	27	29	16	12	20	299	16	14	60	51	9	917
Approach	390				72				335				120				917
%HV	2.3%				4.2%				3.6%				11.7%				4.1%
PHF	0.92				0.78				0.86				0.68				0.96



PEDs across	N	S	E	W	
INT 01					0
INT 02	4				4
INT 03					0
INT 04					0
INT 05				1	1
INT 06					0
INT 07					0
INT 08		2		2	4
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	4	2	0	3	9

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06			1		1
INT 07					0
INT 08					0
	0	0	1	0	1

1032 1.0 PHF Peak Hour Volume

		PHF	%HV
	EB	0.68	11.7%
Check	WB	0.86	3.6%
In: 917	NB	0.78	4.2%
Out: 917	SB	0.92	2.3%
	Intersection	0.96	4.1%

Special Notes:

FnP11101_10310a

Prepared for: **Fehr & Peers**

Traffic Count Consultants, Inc.

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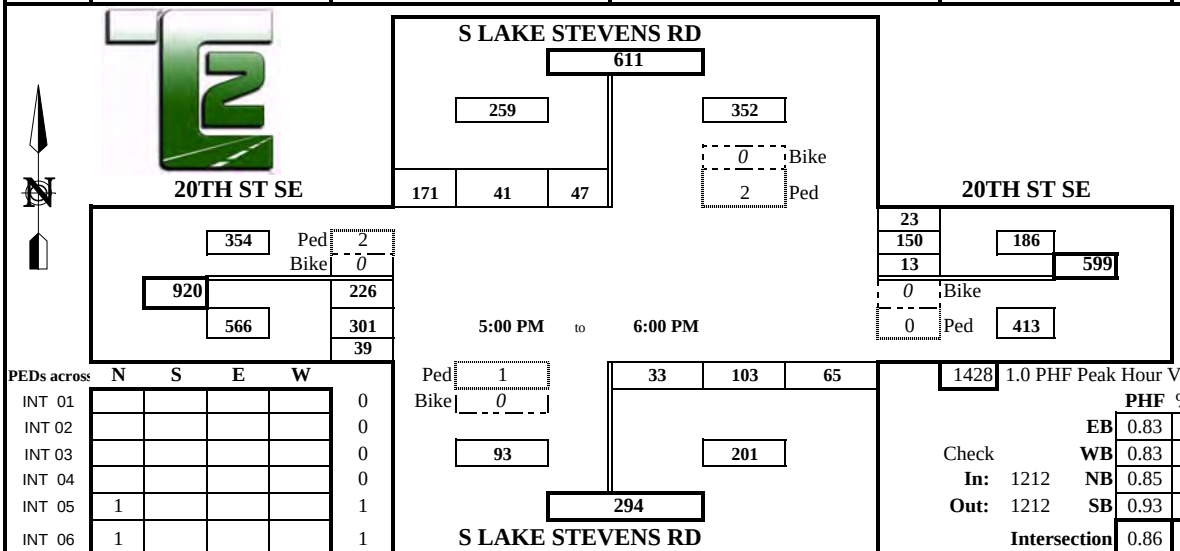
WBE/DBE

Intersection: S LAKE STEVENS RD & 20TH ST SE
Location: LAKE STEVENS, WASHINGTON

Date of Count: Thurs 4/14/11
Checked By: J.H

Time Interval	From North on (SB) S LAKE STEVENS RD				From South on (NB) S LAKE STEVENS RD				From East on (WB) 20TH ST SE				From West on (EB) 20TH ST SE				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	3	10	7	41	0	9	32	21	2	5	53	2	3	59	66	5	310
4:30 P	1	11	6	34	2	12	22	15	1	5	57	7	2	71	103	14	357
4:45 P	2	4	4	35	4	10	33	18	1	6	37	5	1	55	60	5	272
5:00 P	1	9	9	39	0	3	20	18	1	6	30	2	3	49	64	8	257
5:15 P	1	7	7	41	1	11	18	15	0	3	31	3	4	49	62	8	255
5:30 P	1	17	14	39	0	11	23	9	2	3	41	3	2	58	59	11	288
5:45 P	2	8	8	50	0	5	29	21	1	3	35	8	0	51	90	7	315
6:00 P	1	15	12	41	0	6	33	20	0	4	43	9	1	68	90	13	354
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Survey	12	81	67	320	7	67	210	137	8	35	327	39	16	460	594	71	2408
Peak Hour:							17:00		to		18:00						
Total	5	47	41	171	1	33	103	65	3	13	150	23	7	226	301	39	1212
Approach	259				201				186				566				1212
%HV	1.9%				0.5%				1.6%				1.2%				1.3%
PHF	0.93				0.85				0.83				0.83				0.86



PEDs across	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05	1				1
INT 06	1				1
INT 07		1		2	3
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	2	1	0	2	5

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03	No Bicycles				0
INT 04					0
INT 05					0
INT 06					0
INT 07					0
INT 08					0
	0	0	0	0	0

1428 1.0 PHF Peak Hour Volume

	PHF	%HV
EB	0.83	1.2%
WB	0.83	1.6%
NB	0.85	0.5%
SB	0.93	1.9%
Intersection	0.86	1.3%

Check In: 1212 Out: 1212

Special Notes:

FnP11101_10410p

Prepared for: **Fehr & Peers**

Traffic Count Consultants, Inc.

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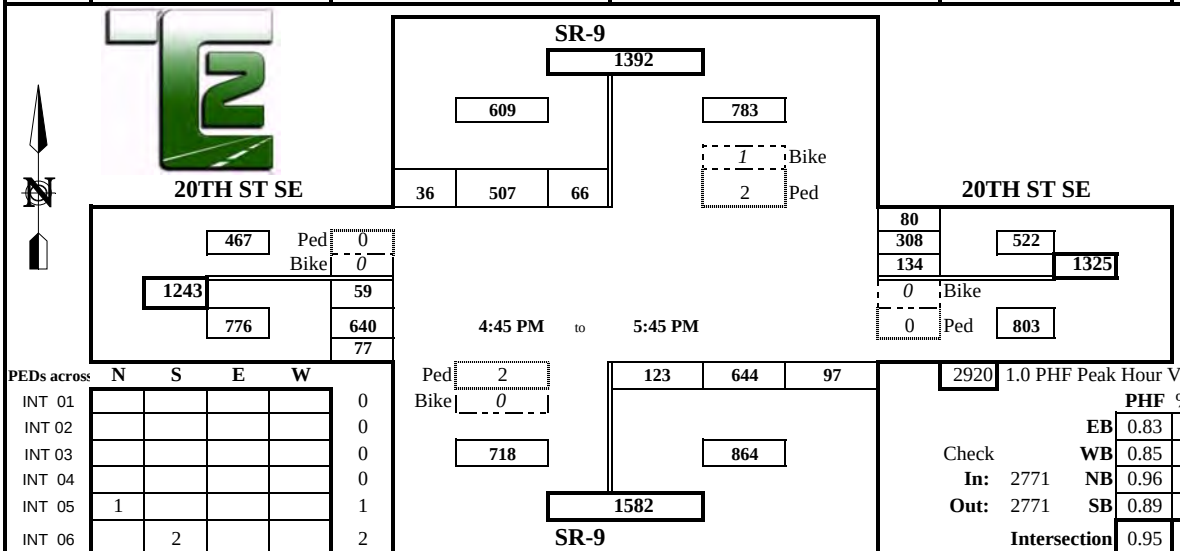
WBE/DBE

Intersection: SR-9 & 20TH ST SE
Location: LAKE STEVENS, WASHINGTON

Date of Count: Tues 4/12/11
Checked By: J.H

Time Interval Ending at	From North on (SB) SR-9				From South on (NB) SR-9				From East on (WB) 20TH ST SE				From West on (EB) 20TH ST SE				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	14	116	16	2	19	169	26	0	20	73	21	0	7	158	17	656
4:30 P	2	18	117	13	0	39	161	22	0	27	67	21	0	21	157	29	692
4:45 P	1	17	120	17	0	41	136	21	0	28	58	14	1	23	151	29	655
5:00 P	0	18	97	7	1	26	165	27	0	37	94	23	0	14	164	24	696
5:15 P	3	9	153	9	1	37	161	26	1	34	71	27	1	11	144	19	701
5:30 P	1	21	136	5	0	27	160	22	0	26	65	15	0	13	142	12	644
5:45 P	1	18	121	15	1	33	158	22	0	37	78	15	1	21	190	22	730
6:00 P	0	20	88	10	0	34	153	31	0	31	81	21	0	12	154	35	670
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Survey	8	135	948	92	5	256	1263	197	1	240	587	157	3	122	1260	187	5444
Peak Hour:						16:45			to		17:45						
Total	5	66	507	36	3	123	644	97	1	134	308	80	2	59	640	77	2771
Approach	609				864				522				776				2771
%HV	0.8%				0.3%				0.2%				0.3%				0.4%
PHF	0.89				0.96				0.85				0.83				0.95



PEDs across	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05	1				1
INT 06		2			2
INT 07	1				1
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	2	2	0	0	4

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06	1				1
INT 07					0
INT 08					0
	1	0	0	0	1

2920 1.0 PHF Peak Hour Volume

		PHF	%HV
	EB	0.83	0.3%
Check	WB	0.85	0.2%
In: 2771	NB	0.96	0.3%
Out: 2771	SB	0.89	0.8%
	Intersection	0.95	0.4%

Special Notes:

FnP1101_10209p

Prepared for: **Fehr & Peers**

Traffic Count Consultants, Inc.

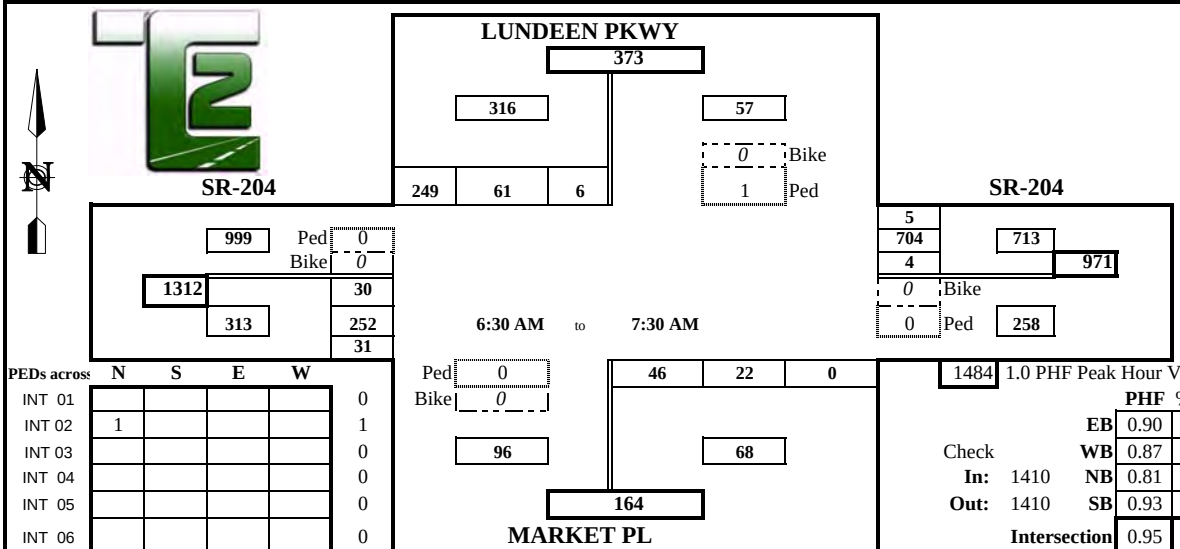
Phone: (425) 861-8866 FAX: (425) 861-8877 E-Mail: Team@tc2inc.com

WBE/DBE

Intersection: LUNDEEN PKWY (MARKET PL) & SR-204
Location: LAKE STEVENS, WASHINGTON

Date of Count: Wed 4/13/11
Checked By: J.H

Time Interval Ending at	From North on (SB) LUNDEEN PKWY				From South on (NB) MARKET PL				From East on (WB) SR-204				From West on (EB) SR-204				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
6:45 A	0	1	13	59	0	9	7	0	0	2	203	1	6	5	58	9	367
7:00 A	0	1	14	59	0	9	3	0	0	1	174	1	4	6	64	5	337
7:15 A	0	3	18	63	0	14	7	0	5	0	177	2	2	6	74	7	371
7:30 A	0	1	16	68	0	14	5	0	6	1	150	1	1	13	56	10	335
7:45 A	0	1	23	49	0	11	7	0	4	0	135	0	7	12	64	13	315
8:00 A	0	3	16	45	1	16	6	0	3	0	131	1	6	6	77	17	318
8:15 A	0	1	15	62	0	18	6	1	4	0	151	0	8	12	70	7	343
8:30 A	0	2	10	55	0	13	7	0	3	0	165	4	10	7	56	16	335
8:45 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:15 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Survey	0	13	125	460	1	104	48	1	25	4	1286	10	44	67	519	84	2721
Peak Hour:						6:30			to		7:30						
Total	0	6	61	249	0	46	22	0	11	4	704	5	13	30	252	31	1410
Approach	316				68				713				313				1410
%HV	n/a				n/a				1.5%				4.2%				1.7%
PHF	0.93				0.81				0.87				0.90				0.95



PEDs across	N	S	E	W	
INT 01					0
INT 02	1				1
INT 03					0
INT 04					0
INT 05					0
INT 06					0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	1	0	0	0	1

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06					0
INT 07					0
INT 08				1	1
	0	0	0	1	1

1484 1.0 PHF Peak Hour Volume

	PHF	%HV
EB	0.90	4.2%
WB	0.87	1.5%
NB	0.81	n/a
SB	0.93	n/a
Intersection	0.95	1.7%

Check In: 1410 Out: 1410

Special Notes:

FnP11101_10311a

HCM Signalized Intersection Capacity Analysis
5: SR 204 & SR 9

4/20/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	255	100	27	74	114	32	40	375	89	76	656	468
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.3		5.0	5.3	5.3	5.0	5.3	5.3	5.0	5.3	5.3
Lane Util. Factor	0.97	0.95		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3273	3266		1687	1776	1509	1687	3374	1509	1687	3374	1509
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3273	3266		1687	1776	1509	1687	3374	1509	1687	3374	1509
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	283	111	30	82	127	36	44	417	99	84	729	520
RTOR Reduction (vph)	0	23	0	0	0	31	0	0	53	0	0	268
Lane Group Flow (vph)	283	118	0	82	127	5	44	417	46	84	729	252
Heavy Vehicles (%)	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases						6			8			4
Actuated Green, G (s)	13.8	20.9		8.6	15.7	15.7	6.5	51.2	51.2	8.7	53.4	53.4
Effective Green, g (s)	13.8	20.9		8.6	15.7	15.7	6.5	51.2	51.2	8.7	53.4	53.4
Actuated g/C Ratio	0.13	0.19		0.08	0.14	0.14	0.06	0.47	0.47	0.08	0.49	0.49
Clearance Time (s)	5.0	5.3		5.0	5.3	5.3	5.0	5.3	5.3	5.0	5.3	5.3
Vehicle Extension (s)	2.0	4.0		2.0	4.0	4.0	2.0	3.5	3.5	2.0	3.5	3.5
Lane Grp Cap (vph)	411	621		132	253	215	100	1570	702	133	1638	733
v/s Ratio Prot	c0.09	0.04		0.05	c0.07		0.03	0.12		c0.05	c0.22	
v/s Ratio Perm						0.00			0.03			0.17
v/c Ratio	0.69	0.19		0.62	0.50	0.02	0.44	0.27	0.07	0.63	0.45	0.34
Uniform Delay, d1	46.0	37.4		49.1	43.5	40.6	50.0	17.9	16.2	49.1	18.6	17.5
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.8	0.2		6.4	2.1	0.1	1.1	0.4	0.2	7.0	0.9	1.3
Delay (s)	49.9	37.6		55.5	45.7	40.6	51.1	18.3	16.4	56.1	19.5	18.8
Level of Service	D	D		E	D	D	D	B	B	E	B	B
Approach Delay (s)		45.8			48.2			20.6			21.5	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	27.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.3
Intersection Capacity Utilization	51.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
9: SR 204 & Lundeen Park Way

4/20/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	30	252	31	4	704	5	46	22	0	6	61	249
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.7		5.0	5.7		5.3	5.3		5.3	5.3	5.3
Lane Util. Factor	0.97	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3400	3447		1752	3501		1770	1863		1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.72	1.00		0.74	1.00	1.00
Satd. Flow (perm)	3400	3447		1752	3501		1332	1863		1383	1863	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	32	265	33	4	741	5	48	23	0	6	64	262
RTOR Reduction (vph)	0	4	0	0	0	0	0	0	0	0	0	230
Lane Group Flow (vph)	32	294	0	4	746	0	48	23	0	6	64	32
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	2%	2%	2%	2%	2%	2%
Turn Type	Prot			Prot			Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		4
Actuated Green, G (s)	3.7	79.5		1.1	76.9		13.4	13.4		13.4	13.4	13.4
Effective Green, g (s)	3.7	79.5		1.1	76.9		13.4	13.4		13.4	13.4	13.4
Actuated g/C Ratio	0.03	0.72		0.01	0.70		0.12	0.12		0.12	0.12	0.12
Clearance Time (s)	5.0	5.7		5.0	5.7		5.3	5.3		5.3	5.3	5.3
Vehicle Extension (s)	2.0	4.0		2.0	4.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	114	2491		18	2448		162	227		168	227	193
v/s Ratio Prot	c0.01	c0.09		0.00	c0.21			0.01			0.03	
v/s Ratio Perm							c0.04			0.00		0.02
v/c Ratio	0.28	0.12		0.22	0.30		0.30	0.10		0.04	0.28	0.17
Uniform Delay, d1	51.9	4.6		54.0	6.3		44.0	42.9		42.6	43.9	43.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.5	0.1		2.3	0.3		1.0	0.2		0.1	0.7	0.4
Delay (s)	52.3	4.7		56.3	6.6		45.0	43.1		42.7	44.6	43.7
Level of Service	D	A		E	A		D	D		D	D	D
Approach Delay (s)		9.3			6.9			44.4			43.9	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	17.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	21.7
Intersection Capacity Utilization	52.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
1: Lundeen Park Way & SR 9

4/28/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	172	104	24	282	83	37	5	879	633	45	790	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5	5.5	5.5	6.5	6.5	5.5	6.5	
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3440		3433	1863	1583	1770	1863	1583	1770	3505	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3440		3433	1863	1583	1770	1863	1583	1770	3505	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	187	113	26	307	90	40	5	955	688	49	859	60
RTOR Reduction (vph)	0	12	0	0	0	31	0	0	129	0	2	0
Lane Group Flow (vph)	187	127	0	307	90	9	5	955	559	49	917	0
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			
Actuated Green, G (s)	18.8	15.5		16.7	13.4	13.4	1.0	73.3	73.3	7.0	79.3	
Effective Green, g (s)	18.8	15.5		16.7	13.4	13.4	1.0	73.3	73.3	7.0	79.3	
Actuated g/C Ratio	0.14	0.11		0.12	0.10	0.10	0.01	0.54	0.54	0.05	0.59	
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5	5.5	6.5	6.5	5.5	6.5	
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.0	4.5	4.5	2.0	4.5	
Lane Grp Cap (vph)	246	394		423	184	157	13	1008	856	91	2051	
v/s Ratio Prot	c0.11	0.04		0.09	c0.05		0.00	c0.51		c0.03	0.26	
v/s Ratio Perm						0.01			0.35			
v/c Ratio	0.76	0.32		0.73	0.49	0.06	0.38	0.95	0.65	0.54	0.45	
Uniform Delay, d1	56.2	55.2		57.2	57.8	55.3	66.9	29.3	22.1	62.7	15.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	12.4	0.3		5.7	1.5	0.1	6.8	17.3	2.2	3.0	0.3	
Delay (s)	68.6	55.5		62.9	59.3	55.5	73.7	46.5	24.3	65.7	16.1	
Level of Service	E	E		E	E	E	E	D	C	E	B	
Approach Delay (s)		63.0			61.5			37.3			18.6	
Approach LOS		E			E			D			B	

Intersection Summary			
HCM Average Control Delay	37.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	135.5	Sum of lost time (s)	23.0
Intersection Capacity Utilization	74.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Volume (vph)	188	184	195	105	97	88
Peak Hour Factor	0.80	0.80	0.68	0.68	0.80	0.80
Hourly flow rate (vph)	235	230	287	154	121	110

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total (vph)	465	287	154	231
Volume Left (vph)	235	0	0	121
Volume Right (vph)	230	0	154	0
Hadj (s)	-0.20	0.00	-0.70	0.10
Departure Headway (s)	5.5	6.3	5.6	6.2
Degree Utilization, x	0.71	0.50	0.24	0.40
Capacity (veh/h)	636	542	613	543
Control Delay (s)	20.4	14.3	9.1	13.3
Approach Delay (s)	20.4	12.5		13.3
Approach LOS	C	B		B

Intersection Summary			
Delay	15.9		
HCM Level of Service	C		
Intersection Capacity Utilization	52.0%	ICU Level of Service	A
Analysis Period (min)	15		

2: Davies Road & 92nd Ave Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Delay / Veh (s)	12.6	1.9	10.6	11.3	5.3	7.4	8.2	9.0
Denied Entry Before	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0

3: Davies Road & West Shopping Center Drive Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Delay / Veh (s)	2.9	1.7	2.8	3.4	1.3	0.3	26.2	26.6	13.7	8.9	15.7	7.1
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

3: Davies Road & West Shopping Center Drive Performance by movement

Movement	All
Delay / Veh (s)	12.3
Denied Entry Before	0
Denied Entry After	0

Total Network Performance

Delay / Veh (s)	25.3
Denied Entry Before	0
Denied Entry After	2

Intersection: 2: Davies Road & 92nd Ave

Movement	WB	NB	NB	SB
Directions Served	LR	T	R	LT
Maximum Queue (ft)	166	116	82	76
Average Queue (ft)	86	74	46	55
95th Queue (ft)	185	132	82	82
Link Distance (ft)	320	346		231
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			90	
Storage Blk Time (%)		4	0	
Queuing Penalty (veh)		6	0	

Intersection: 3: Davies Road & West Shopping Center Drive

Movement	EB	EB	WB	NB	NB	B44	SB
Directions Served	LT	R	LTR	LT	R	T	LTR
Maximum Queue (ft)	33	9	36	189	100	289	77
Average Queue (ft)	9	2	13	162	84	132	45
95th Queue (ft)	33	12	36	231	136	384	79
Link Distance (ft)	320		758	116		409	134
Upstream Blk Time (%)				46	1	8	0
Queuing Penalty (veh)				0	0	0	0
Storage Bay Dist (ft)		90			75		
Storage Blk Time (%)				61	1		
Queuing Penalty (veh)				69	5		

Network Summary

Network wide Queuing Penalty: 80

HCM Unsignalized Intersection Capacity Analysis
4: S Vernon Rd & 91st Avenue NE

4/28/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	16	4	41	53	26	45	54	124	20	8	105	14
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.76	0.76	0.76	0.84	0.84	0.84	0.87	0.87	0.87	0.91	0.91	0.91
Hourly flow rate (vph)	21	5	54	63	31	54	62	143	23	9	115	15
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								466				
pX, platoon unblocked												
vC, conflicting volume	488	430	123	421	427	154	131			166		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	488	430	123	421	427	154	131			166		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	95	99	94	87	94	94	96			99		
cM capacity (veh/h)	426	496	933	492	498	897	1467			1425		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	80	148	228	140
Volume Left	21	63	62	9
Volume Right	54	54	23	15
cSH	681	590	1467	1425
Volume to Capacity	0.12	0.25	0.04	0.01
Queue Length 95th (ft)	10	25	3	0
Control Delay (s)	11.0	13.1	2.3	0.5
Lane LOS	B	B	A	A
Approach Delay (s)	11.0	13.1	2.3	0.5
Approach LOS	B	B		

Intersection Summary				
Average Delay		5.7		
Intersection Capacity Utilization		35.8%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	765	447	50	98	164	110	123	714	240	179	497	335
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.3		5.0	5.3	5.3	5.0	5.3	5.3	5.0	5.3	5.3
Lane Util. Factor	0.97	0.95		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3486		1770	1863	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3486		1770	1863	1583	1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.90	0.90	0.90	0.88	0.88	0.88	0.94	0.94	0.94
Adj. Flow (vph)	805	471	53	109	182	122	140	811	273	190	529	356
RTOR Reduction (vph)	0	6	0	0	0	103	0	0	128	0	0	256
Lane Group Flow (vph)	805	518	0	109	182	19	140	811	146	190	529	100
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases						6			8			4
Actuated Green, G (s)	39.9	47.3		12.4	19.8	19.8	13.3	32.5	32.5	17.2	36.4	36.4
Effective Green, g (s)	39.9	47.3		12.4	19.8	19.8	13.3	32.5	32.5	17.2	36.4	36.4
Actuated g/C Ratio	0.31	0.36		0.10	0.15	0.15	0.10	0.25	0.25	0.13	0.28	0.28
Clearance Time (s)	5.0	5.3		5.0	5.3	5.3	5.0	5.3	5.3	5.0	5.3	5.3
Vehicle Extension (s)	2.0	4.0		2.0	4.0	4.0	2.0	3.5	3.5	2.0	3.5	3.5
Lane Grp Cap (vph)	1054	1268		169	284	241	181	885	396	234	991	443
v/s Ratio Prot	c0.23	0.15		0.06	c0.10		0.08	c0.23		c0.11	c0.15	
v/s Ratio Perm						0.01			0.09			0.06
v/c Ratio	0.76	0.41		0.64	0.64	0.08	0.77	0.92	0.37	0.81	0.53	0.23
Uniform Delay, d1	40.8	30.9		56.7	51.8	47.3	56.9	47.4	40.3	54.8	39.6	36.0
Progression Factor	1.34	0.89		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.4	0.8		6.2	5.4	0.2	16.9	14.2	0.7	18.0	0.6	0.3
Delay (s)	59.0	28.4		62.9	57.2	47.4	73.8	61.6	40.9	72.8	40.2	36.3
Level of Service	E	C		E	E	D	E	E	D	E	D	D
Approach Delay (s)		46.9			55.8			58.4			44.7	
Approach LOS		D			E			E			D	

Intersection Summary			
HCM Average Control Delay	50.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	25.9
Intersection Capacity Utilization	77.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	0	99	27	88	80
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.85	0.85	0.82	0.82
Hourly flow rate (vph)	0	0	116	32	107	98
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	148				132	132
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	148				132	132
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				88	89
cM capacity (veh/h)	1433				866	922

Direction, Lane #	WB 1	SB 1
Volume Total	148	205
Volume Left	0	107
Volume Right	32	98
cSH	1700	892
Volume to Capacity	0.09	0.23
Queue Length 95th (ft)	0	22
Control Delay (s)	0.0	10.2
Lane LOS		B
Approach Delay (s)	0.0	10.2
Approach LOS		B

Intersection Summary			
Average Delay	5.9		
Intersection Capacity Utilization	23.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	21	13	3	33	0	730	37	45	525	23
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	0	0	24	15	3	38	0	830	42	51	597	26
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			None	
Median storage veh)								2				
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1568	1570	597	1552	1555	830	623			872		
vC1, stage 1 conf vol	699	699		830	830							
vC2, stage 2 conf vol	869	872		723	725							
vCu, unblocked vol	1568	1570	597	1552	1555	830	623			872		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	95	94	99	90	100			93		
cM capacity (veh/h)	222	263	503	267	290	370	949			765		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	24	56	830	42	51	597	26
Volume Left	0	15	0	0	51	0	0
Volume Right	24	38	0	42	0	0	26
cSH	503	331	1700	1700	765	1700	1700
Volume to Capacity	0.05	0.17	0.49	0.02	0.07	0.35	0.02
Queue Length 95th (ft)	4	15	0	0	5	0	0
Control Delay (s)	12.5	18.1	0.0	0.0	10.0	0.0	0.0
Lane LOS	B	C			B		
Approach Delay (s)	12.5	18.1	0.0		0.8		
Approach LOS	B	C					

Intersection Summary				
Average Delay	1.1			
Intersection Capacity Utilization	48.4%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	123	798	112	175	342	101	63	107	239	153	143	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.3		5.0	5.3		5.0	5.3		5.0	5.3	
Lane Util. Factor	1.00	0.91		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.97		1.00	0.90		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	4991		1770	3418		1770	1670		1770	1773	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	4991		1770	3418		1770	1670		1770	1773	
Peak-hour factor, PHF	0.95	0.95	0.95	0.91	0.91	0.91	0.87	0.87	0.87	0.95	0.95	0.95
Adj. Flow (vph)	129	840	118	192	376	111	72	123	275	161	151	71
RTOR Reduction (vph)	0	14	0	0	20	0	0	63	0	0	12	0
Lane Group Flow (vph)	129	944	0	192	467	0	72	335	0	161	210	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	15.1	45.2		17.3	47.4		8.9	30.0		16.9	38.0	
Effective Green, g (s)	15.1	45.2		17.3	47.4		8.9	30.0		16.9	38.0	
Actuated g/C Ratio	0.12	0.35		0.13	0.36		0.07	0.23		0.13	0.29	
Clearance Time (s)	5.0	5.3		5.0	5.3		5.0	5.3		5.0	5.3	
Vehicle Extension (s)	3.5	3.5		2.0	3.5		2.5	3.0		2.5	3.0	
Lane Grp Cap (vph)	206	1735		236	1246		121	385		230	518	
v/s Ratio Prot	0.07	c0.19		c0.11	0.14		0.04	c0.20		c0.09	0.12	
v/s Ratio Perm												
v/c Ratio	0.63	0.54		0.81	0.37		0.60	0.87		0.70	0.41	
Uniform Delay, d1	54.8	34.1		54.8	30.4		58.8	48.1		54.1	36.9	
Progression Factor	1.03	0.77		1.11	1.14		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.3	1.1		15.2	0.7		6.4	18.4		8.3	0.5	
Delay (s)	61.6	27.4		75.9	35.3		65.2	66.6		62.4	37.4	
Level of Service	E	C		E	D		E	E		E	D	
Approach Delay (s)		31.4			46.8			66.4			47.9	
Approach LOS		C			D			E			D	

Intersection Summary			
HCM Average Control Delay	44.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	20.6
Intersection Capacity Utilization	73.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	319	1046	225	3	481	31	73	135	3	15	63	136
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.7		5.0	5.7		5.3	5.3		5.3	5.3	5.3
Lane Util. Factor	0.97	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.97		1.00	0.99		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3445		1770	3507		1770	1856		1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.71	1.00		0.44	1.00	1.00
Satd. Flow (perm)	3433	3445		1770	3507		1329	1856		819	1863	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.91	0.91	0.91	0.82	0.82	0.82	0.94	0.94	0.94
Adj. Flow (vph)	339	1113	239	3	529	34	89	165	4	16	67	145
RTOR Reduction (vph)	0	7	0	0	2	0	0	1	0	0	0	124
Lane Group Flow (vph)	339	1345	0	3	561	0	89	168	0	16	67	21
Turn Type	Prot			Prot			Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		4
Actuated Green, G (s)	17.2	93.8		1.1	77.7		19.1	19.1		19.1	19.1	19.1
Effective Green, g (s)	17.2	93.8		1.1	77.7		19.1	19.1		19.1	19.1	19.1
Actuated g/C Ratio	0.13	0.72		0.01	0.60		0.15	0.15		0.15	0.15	0.15
Clearance Time (s)	5.0	5.7		5.0	5.7		5.3	5.3		5.3	5.3	5.3
Vehicle Extension (s)	2.0	4.0		2.0	4.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	454	2486		15	2096		195	273		120	274	233
v/s Ratio Prot	c0.10	c0.39		0.00	0.16			c0.09			0.04	
v/s Ratio Perm							0.07			0.02		0.01
v/c Ratio	0.75	0.54		0.20	0.27		0.46	0.62		0.13	0.24	0.09
Uniform Delay, d1	54.3	8.3		64.0	12.5		50.7	52.0		48.2	49.1	47.9
Progression Factor	1.00	1.00		0.85	1.82		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.8	0.9		2.3	0.3		1.7	4.1		0.5	0.5	0.2
Delay (s)	60.1	9.1		56.8	23.1		52.4	56.1		48.8	49.5	48.1
Level of Service	E	A		E	C		D	E		D	D	D
Approach Delay (s)		19.3			23.3			54.8			48.6	
Approach LOS		B			C			D			D	

Intersection Summary			
HCM Average Control Delay	25.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	10.3
Intersection Capacity Utilization	65.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
10: Market Pl & 91st Avenue NE

4/28/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	57	200	52	138	133	85	50	182	102	152	188	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.94		1.00	0.95		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	1823		1787	1771		1770	1763		1787	1804	
Flt Permitted	0.51	1.00		0.49	1.00		0.56	1.00		0.36	1.00	
Satd. Flow (perm)	958	1823		927	1771		1044	1763		683	1804	
Peak-hour factor, PHF	0.90	0.90	0.90	0.81	0.81	0.81	0.90	0.90	0.90	0.78	0.78	0.78
Adj. Flow (vph)	63	222	58	170	164	105	56	202	113	195	241	91
RTOR Reduction (vph)	0	12	0	0	30	0	0	25	0	0	15	0
Lane Group Flow (vph)	63	268	0	170	239	0	56	290	0	195	317	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	1%	1%	1%
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	14.9	14.9		14.9	14.9		19.0	15.6		26.6	19.4	
Effective Green, g (s)	14.9	14.9		14.9	14.9		19.0	15.6		26.6	19.4	
Actuated g/C Ratio	0.30	0.30		0.30	0.30		0.38	0.31		0.54	0.39	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	287	547		278	531		449	553		525	704	
v/s Ratio Prot		0.15			0.13		0.01	c0.16		c0.05	0.18	
v/s Ratio Perm	0.07			c0.18			0.04			0.14		
v/c Ratio	0.22	0.49		0.61	0.45		0.12	0.52		0.37	0.45	
Uniform Delay, d1	13.0	14.3		14.9	14.1		9.8	14.0		6.6	11.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.3		2.8	0.2		0.1	0.9		0.4	0.5	
Delay (s)	13.2	14.5		17.7	14.3		9.9	14.9		7.1	11.7	
Level of Service	B	B		B	B		A	B		A	B	
Approach Delay (s)		14.3			15.6			14.1			10.0	
Approach LOS		B			B			B			A	

Intersection Summary			
HCM Average Control Delay	13.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	49.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	58.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	163	300	105	101	235	73	99	612	66	67	433	141
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.1	5.5		5.1	5.5		5.1	6.5	6.5	5.1	6.5	6.5
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1790		1770	1797		1770	1863	1583	1770	1863	1583
Flt Permitted	0.22	1.00		0.19	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	419	1790		349	1797		1770	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.90	0.90	0.90	0.94	0.94	0.94	0.90	0.90	0.90
Adj. Flow (vph)	175	323	113	112	261	81	105	651	70	74	481	157
RTOR Reduction (vph)	0	6	0	0	6	0	0	0	35	0	0	78
Lane Group Flow (vph)	175	430	0	112	336	0	105	651	35	74	481	79
Turn Type	pm+pt			pm+pt			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8					2			6
Actuated Green, G (s)	52.8	38.2		44.2	33.9		12.9	54.8	54.8	10.4	52.3	52.3
Effective Green, g (s)	52.8	38.2		44.2	33.9		12.9	54.8	54.8	10.4	52.3	52.3
Actuated g/C Ratio	0.39	0.28		0.33	0.25		0.09	0.40	0.40	0.08	0.38	0.38
Clearance Time (s)	5.1	5.5		5.1	5.5		5.1	6.5	6.5	5.1	6.5	6.5
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)	308	503		221	448		168	751	638	135	717	609
v/s Ratio Prot	c0.06	c0.24		0.04	0.19		c0.06	c0.35		0.04	0.26	
v/s Ratio Perm	0.16			0.13					0.02			0.05
v/c Ratio	0.57	0.85		0.51	0.75		0.62	0.87	0.05	0.55	0.67	0.13
Uniform Delay, d1	30.5	46.2		34.9	47.1		59.2	37.2	24.7	60.5	34.7	27.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.4	13.2		0.7	6.8		5.1	10.7	0.0	2.4	2.7	0.1
Delay (s)	31.9	59.4		35.6	53.9		64.3	47.9	24.8	62.9	37.4	27.2
Level of Service	C	E		D	D		E	D	C	E	D	C
Approach Delay (s)		51.6			49.4			48.0			37.8	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM Average Control Delay	46.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	135.9	Sum of lost time (s)	15.7
Intersection Capacity Utilization	82.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	26	298	21	14	226	25	36	2	21	36	6	89
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.90	0.90	0.90	0.78	0.78	0.78	0.86	0.86	0.86
Hourly flow rate (vph)	28	324	23	16	251	28	46	3	27	42	7	103
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)		896										
pX, platoon unblocked												
vC, conflicting volume	279			347			781	702	335	705	699	265
vC1, stage 1 conf vol							392	392		296	296	
vC2, stage 2 conf vol							389	310		409	403	
vCu, unblocked vol	279			347			781	702	335	705	699	265
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			99			90	99	96	92	99	87
cM capacity (veh/h)	1295			1223			447	512	711	510	511	779

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	28	347	16	279	76	152
Volume Left	28	0	16	0	46	42
Volume Right	0	23	0	28	27	103
cSH	1295	1700	1223	1700	517	666
Volume to Capacity	0.02	0.20	0.01	0.16	0.15	0.23
Queue Length 95th (ft)	2	0	1	0	13	22
Control Delay (s)	7.8	0.0	8.0	0.0	13.1	12.0
Lane LOS	A		A		B	B
Approach Delay (s)	0.6		0.4		13.1	12.0
Approach LOS					B	B

Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	36.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	5	162	86	5	122	42	58	55	12	77	67	17
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	176	93	5	133	46	63	60	13	84	73	18

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	5	270	184	136	175
Volume Left (vph)	5	0	5	63	84
Volume Right (vph)	0	93	46	13	18
Hadj (s)	0.53	-0.21	-0.11	0.07	0.07
Departure Headway (s)	6.2	5.4	5.2	5.5	5.4
Degree Utilization, x	0.01	0.40	0.27	0.21	0.26
Capacity (veh/h)	552	633	641	585	607
Control Delay (s)	8.0	10.8	10.1	9.9	10.4
Approach Delay (s)	10.8		10.1	9.9	10.4
Approach LOS	B		B	A	B

Intersection Summary			
Delay	10.4		
HCM Level of Service	B		
Intersection Capacity Utilization	31.7%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
5: SR 204 & SR 9

11/5/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	295	130	45	135	155	40	65	1100	125	90	1380	600
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.3		5.0	5.3	5.3	5.0	5.3	5.3	5.0	5.3	5.3
Lane Util. Factor	0.97	0.95		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3273	3243		1687	1776	1509	1687	3374	1509	1687	3374	1509
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3273	3243		1687	1776	1509	1687	3374	1509	1687	3374	1509
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	321	141	49	147	168	43	71	1196	136	98	1500	652
RTOR Reduction (vph)	0	35	0	0	0	36	0	0	48	0	0	318
Lane Group Flow (vph)	321	155	0	147	168	7	71	1196	88	98	1500	334
Heavy Vehicles (%)	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases						6			8			4
Actuated Green, G (s)	14.6	23.3		8.0	16.7	16.7	9.3	48.0	48.0	10.1	48.8	48.8
Effective Green, g (s)	14.6	23.3		8.0	16.7	16.7	9.3	48.0	48.0	10.1	48.8	48.8
Actuated g/C Ratio	0.13	0.21		0.07	0.15	0.15	0.08	0.44	0.44	0.09	0.44	0.44
Clearance Time (s)	5.0	5.3		5.0	5.3	5.3	5.0	5.3	5.3	5.0	5.3	5.3
Vehicle Extension (s)	2.0	4.0		2.0	4.0	4.0	2.0	3.5	3.5	2.0	3.5	3.5
Lane Grp Cap (vph)	434	687		123	270	229	143	1472	658	155	1497	669
v/s Ratio Prot	c0.10	0.05		c0.09	c0.09		0.04	0.35		c0.06	c0.44	
v/s Ratio Perm						0.00			0.06			0.22
v/c Ratio	0.74	0.23		1.20	0.62	0.03	0.50	0.81	0.13	0.63	1.00	0.50
Uniform Delay, d1	45.9	35.9		51.0	43.7	39.7	48.1	27.1	18.6	48.2	30.6	21.9
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.6	0.2		142.9	5.0	0.1	1.0	5.0	0.4	6.0	23.7	2.6
Delay (s)	51.5	36.1		193.9	48.7	39.8	49.1	32.1	19.0	54.2	54.3	24.5
Level of Service	D	D		F	D	D	D	C	B	D	D	C
Approach Delay (s)		45.8			107.2			31.7			45.7	
Approach LOS		D			F			C			D	

Intersection Summary			
HCM Average Control Delay	46.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.3
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
9: SR 204 & Lundeen Park Way

11/5/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	100	305	30	5	955	10	50	30	5	5	80	575
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.7		5.0	5.7		5.3	5.3		5.3	5.3	5.3
Lane Util. Factor	0.97	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3400	3457		1752	3499		1770	1825		1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.70	1.00		0.73	1.00	1.00
Satd. Flow (perm)	3400	3457		1752	3499		1308	1825		1365	1863	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	105	321	32	5	1005	11	53	32	5	5	84	605
RTOR Reduction (vph)	0	6	0	0	1	0	0	3	0	0	0	62
Lane Group Flow (vph)	105	347	0	5	1015	0	53	34	0	5	84	543
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	2%	2%	2%	2%	2%	2%
Turn Type	Prot			Prot			Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		4
Actuated Green, G (s)	6.1	51.2		0.6	45.7		42.2	42.2		42.2	42.2	42.2
Effective Green, g (s)	6.1	51.2		0.6	45.7		42.2	42.2		42.2	42.2	42.2
Actuated g/C Ratio	0.06	0.47		0.01	0.42		0.38	0.38		0.38	0.38	0.38
Clearance Time (s)	5.0	5.7		5.0	5.7		5.3	5.3		5.3	5.3	5.3
Vehicle Extension (s)	2.0	4.0		2.0	4.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	189	1609		10	1454		502	700		524	715	607
v/s Ratio Prot	c0.03	0.10		0.00	c0.29			0.02			0.05	
v/s Ratio Perm							0.04			0.00		c0.34
v/c Ratio	0.56	0.22		0.50	0.70		0.11	0.05		0.01	0.12	0.89
Uniform Delay, d1	50.6	17.5		54.6	26.5		21.8	21.3		21.0	21.9	31.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.0	0.3		13.6	2.8		0.1	0.0		0.0	0.1	15.6
Delay (s)	52.6	17.8		68.1	29.3		21.9	21.3		21.0	22.0	47.4
Level of Service	D	B		E	C		C	C		C	C	D
Approach Delay (s)		25.8			29.5			21.6			44.1	
Approach LOS		C			C			C			D	

Intersection Summary			
HCM Average Control Delay	32.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	80.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
1: Lundeen Park Way & SR 9

11/7/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	515	675	50	455	425	40	20	1820	770	55	1460	300
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5	5.5	5.5	6.5	6.5	5.5	6.5	
Lane Util. Factor	0.97	0.95		0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	3503		3433	1863	1583	1770	3539	1583	1770	3449	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	3503		3433	1863	1583	1770	3539	1583	1770	3449	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	560	734	54	495	462	43	22	1978	837	60	1587	326
RTOR Reduction (vph)	0	3	0	0	0	6	0	0	118	0	10	0
Lane Group Flow (vph)	560	785	0	495	462	37	22	1978	719	60	1903	0
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			
Actuated Green, G (s)	22.5	36.7		23.3	37.5	37.5	2.4	82.6	82.6	5.5	85.7	
Effective Green, g (s)	22.5	36.7		23.3	37.5	37.5	2.4	82.6	82.6	5.5	85.7	
Actuated g/C Ratio	0.13	0.21		0.14	0.22	0.22	0.01	0.48	0.48	0.03	0.50	
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5	5.5	6.5	6.5	5.5	6.5	
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.0	4.5	4.5	2.0	4.5	
Lane Grp Cap (vph)	451	751		467	408	347	25	1708	764	57	1728	
v/s Ratio Prot	c0.16	0.22		0.14	c0.25		0.01	c0.56		c0.03	c0.55	
v/s Ratio Perm						0.02			0.45			
v/c Ratio	1.24	1.05		1.06	1.13	0.11	0.88	1.16	0.94	1.05	1.10	
Uniform Delay, d1	74.3	67.2		73.9	66.8	53.4	84.2	44.2	41.9	82.8	42.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	126.4	45.2		58.4	85.8	0.1	124.9	78.2	19.8	134.7	55.0	
Delay (s)	200.7	112.4		132.3	152.6	53.5	209.1	122.4	61.8	217.5	97.7	
Level of Service	F	F		F	F	D	F	F	E	F	F	
Approach Delay (s)		149.1			138.3			105.2			101.3	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM Average Control Delay	117.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	171.1	Sum of lost time (s)	24.0
Intersection Capacity Utilization	102.0%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

2: Davies Road & 92nd Ave Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Delay / Veh (s)	56.6	17.4	58.0	82.0	58.4	11.7	11.7	57.8
Denied Entry Before	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0

3: Davies Road & West Shopping Center Drive Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Delay / Veh (s)	2.5	1.3	2.4	3.3	2.8	1.1	32.5	34.1	16.1	7.6	10.5	10.1
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

3: Davies Road & West Shopping Center Drive Performance by movement

Movement	All
Delay / Veh (s)	14.4
Denied Entry Before	0
Denied Entry After	0

Total Network Performance

Delay / Veh (s)	121.6
Denied Entry Before	0
Denied Entry After	1

Intersection: 2: Davies Road & 92nd Ave

Movement	WB	NB	NB	B58	B92	SB
Directions Served	LR	T	R	T	T	LT
Maximum Queue (ft)	328	420	115	284	1677	106
Average Queue (ft)	266	403	110	242	756	71
95th Queue (ft)	404	498	146	396	1811	109
Link Distance (ft)	320	346		210	2496	231
Upstream Blk Time (%)	9	70		56	1	
Queuing Penalty (veh)	51	0		0	0	
Storage Bay Dist (ft)			90			
Storage Blk Time (%)		93	1			
Queuing Penalty (veh)		132	5			

Intersection: 3: Davies Road & West Shopping Center Drive

Movement	EB	EB	WB	NB	NB	B44	B144	SB
Directions Served	LT	R	LTR	LT	R	T	T	LTR
Maximum Queue (ft)	21	6	52	189	100	318	21	51
Average Queue (ft)	5	1	20	157	82	116	3	30
95th Queue (ft)	23	7	55	229	136	362	31	55
Link Distance (ft)	320		758	116		381	2075	134
Upstream Blk Time (%)				47	1	6		
Queuing Penalty (veh)				0	0	0		
Storage Bay Dist (ft)		90			75			
Storage Blk Time (%)				62	1			
Queuing Penalty (veh)				67	3			

Network Summary

Network wide Queuing Penalty: 259

HCM Unsignalized Intersection Capacity Analysis
4: S Vernon Rd & 91st Avenue NE

11/5/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	20	5	50	55	30	45	55	235	20	10	115	15
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	5	54	60	33	49	60	255	22	11	125	16
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								466				
pX, platoon unblocked												
vC, conflicting volume	606	552	133	543	549	266	141			277		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	606	552	133	543	549	266	141			277		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	94	99	94	85	92	94	96			99		
cM capacity (veh/h)	350	423	921	407	424	777	1454			1297		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	82	141	337	152
Volume Left	22	60	60	11
Volume Right	54	49	22	16
cSH	608	493	1454	1297
Volume to Capacity	0.13	0.29	0.04	0.01
Queue Length 95th (ft)	12	29	3	1
Control Delay (s)	11.8	15.2	1.7	0.6
Lane LOS	B	C	A	A
Approach Delay (s)	11.8	15.2	1.7	0.6
Approach LOS	B	C		

Intersection Summary				
Average Delay		5.3		
Intersection Capacity Utilization		46.2%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	980	610	80	140	210	130	190	1500	430	220	1225	385
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.3		5.0	5.3	5.3	5.0	5.3	5.3	5.0	5.3	5.3
Lane Util. Factor	0.97	0.95		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3273	3315		1687	1776	1509	1687	3374	1509	1687	3374	1509
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3273	3315		1687	1776	1509	1687	3374	1509	1687	3374	1509
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1065	663	87	152	228	141	207	1630	467	239	1332	418
RTOR Reduction (vph)	0	9	0	0	0	104	0	0	121	0	0	249
Lane Group Flow (vph)	1065	741	0	152	228	37	207	1630	346	239	1332	169
Heavy Vehicles (%)	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases						6			8			4
Actuated Green, G (s)	16.0	30.3		6.0	20.3	20.3	8.7	43.4	43.4	9.7	44.4	44.4
Effective Green, g (s)	16.0	30.3		6.0	20.3	20.3	8.7	43.4	43.4	9.7	44.4	44.4
Actuated g/C Ratio	0.15	0.28		0.05	0.18	0.18	0.08	0.39	0.39	0.09	0.40	0.40
Clearance Time (s)	5.0	5.3		5.0	5.3	5.3	5.0	5.3	5.3	5.0	5.3	5.3
Vehicle Extension (s)	2.0	4.0		2.0	4.0	4.0	2.0	3.5	3.5	2.0	3.5	3.5
Lane Grp Cap (vph)	476	913		92	328	278	133	1331	595	149	1362	609
v/s Ratio Prot	c0.33	c0.22		0.09	0.13		0.12	c0.48		c0.14	0.39	
v/s Ratio Perm						0.02			0.23			0.11
v/c Ratio	2.24	0.81		1.65	0.70	0.13	1.56	1.22	0.58	1.60	0.98	0.28
Uniform Delay, d1	47.0	37.2		52.0	42.0	37.5	50.6	33.3	26.2	50.1	32.3	22.0
Progression Factor	1.34	0.97		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	558.4	1.4		336.7	6.7	0.3	283.8	108.0	4.1	300.8	19.7	1.1
Delay (s)	621.3	37.6		388.7	48.7	37.8	334.4	141.3	30.3	351.0	52.0	23.2
Level of Service	F	D		F	D	D	F	F	C	F	D	C
Approach Delay (s)		380.1			144.9			136.1			81.8	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM Average Control Delay	187.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.30		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.3
Intersection Capacity Utilization	109.8%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	0	360	30	110	80
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	391	33	120	87
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	424				408	408
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	424				408	408
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				80	87
cM capacity (veh/h)	1135				604	648

Direction, Lane #	WB 1	SB 1
Volume Total	424	207
Volume Left	0	120
Volume Right	33	87
cSH	1700	621
Volume to Capacity	0.25	0.33
Queue Length 95th (ft)	0	36
Control Delay (s)	0.0	13.6
Lane LOS		B
Approach Delay (s)	0.0	13.6
Approach LOS		B

Intersection Summary			
Average Delay	4.5		
Intersection Capacity Utilization	38.4%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
7: 4th Street SE & SR 9

11/5/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	35	15	5	35	0	1715	75	45	1160	40
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	38	16	5	38	0	1864	82	49	1261	43
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			None	
Median storage veh)								2				
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	3264	3304	1261	3261	3266	1864	1304			1946		
vC1, stage 1 conf vol	1359	1359		1864	1864							
vC2, stage 2 conf vol	1905	1946		1397	1402							
vCu, unblocked vol	3264	3304	1261	3261	3266	1864	1304			1946		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	82	76	94	58	100			84		
cM capacity (veh/h)	3	57	208	69	95	91	531			301		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	38	60	1864	82	49	1261	43
Volume Left	0	16	0	0	49	0	0
Volume Right	38	38	0	82	0	0	43
cSH	208	84	1700	1700	301	1700	1700
Volume to Capacity	0.18	0.71	1.10	0.05	0.16	0.74	0.03
Queue Length 95th (ft)	16	87	0	0	14	0	0
Control Delay (s)	26.2	117.3	0.0	0.0	19.3	0.0	0.0
Lane LOS	D	F			C		
Approach Delay (s)	26.2	117.3	0.0		0.7		
Approach LOS	D	F					

Intersection Summary				
Average Delay		2.6		
Intersection Capacity Utilization		100.3%	ICU Level of Service	G
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	230	1040	170	330	355	105	90	180	460	175	145	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.3		5.0	5.3		5.0	5.3		5.0	5.3	
Lane Util. Factor	1.00	0.91		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.97		1.00	0.89		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	4978		1770	3418		1770	1662		1770	1764	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	4978		1770	3418		1770	1662		1770	1764	
Peak-hour factor, PHF	0.95	0.95	0.95	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.95	0.95
Adj. Flow (vph)	242	1095	179	359	386	114	98	196	500	184	153	84
RTOR Reduction (vph)	0	20	0	0	25	0	0	83	0	0	18	0
Lane Group Flow (vph)	242	1254	0	359	475	0	98	613	0	184	219	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	16.0	30.7		16.0	30.7		7.9	33.7		9.0	34.8	
Effective Green, g (s)	16.0	30.7		16.0	30.7		7.9	33.7		9.0	34.8	
Actuated g/C Ratio	0.15	0.28		0.15	0.28		0.07	0.31		0.08	0.32	
Clearance Time (s)	5.0	5.3		5.0	5.3		5.0	5.3		5.0	5.3	
Vehicle Extension (s)	3.5	3.5		2.0	3.5		2.5	3.0		2.5	3.0	
Lane Grp Cap (vph)	257	1389		257	954		127	509		145	558	
v/s Ratio Prot	0.14	c0.25		c0.20	0.14		0.06	c0.37		c0.10	0.12	
v/s Ratio Perm												
v/c Ratio	0.94	0.90		1.40	0.50		0.77	1.20		1.27	0.39	
Uniform Delay, d1	46.5	38.2		47.0	33.2		50.2	38.1		50.5	29.4	
Progression Factor	0.82	0.90		1.13	1.15		1.00	1.00		1.00	1.00	
Incremental Delay, d2	30.6	6.7		192.3	1.1		23.8	109.3		164.2	0.5	
Delay (s)	68.8	41.2		245.3	39.2		74.0	147.4		214.7	29.8	
Level of Service	E	D		F	D		E	F		F	C	
Approach Delay (s)		45.6			125.3			138.4			110.6	
Approach LOS		D			F			F			F	

Intersection Summary			
HCM Average Control Delay	92.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.14		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.6
Intersection Capacity Utilization	106.8%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	735	1415	225	5	485	35	75	170	5	20	100	655
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.7		5.0	5.7		5.3	5.3		5.3	5.3	5.3
Lane Util. Factor	0.97	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.99		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3400	3433		1752	3469		1770	1855		1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.69	1.00		0.53	1.00	1.00
Satd. Flow (perm)	3400	3433		1752	3469		1284	1855		988	1863	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	774	1489	237	5	511	37	79	179	5	21	105	689
RTOR Reduction (vph)	0	9	0	0	4	0	0	1	0	0	0	379
Lane Group Flow (vph)	774	1717	0	5	544	0	79	183	0	21	105	310
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	2%	2%	2%	2%	2%	2%
Turn Type	Prot			Prot			Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		4
Actuated Green, G (s)	27.4	68.2		0.6	41.4		25.2	25.2		25.2	25.2	25.2
Effective Green, g (s)	27.4	68.2		0.6	41.4		25.2	25.2		25.2	25.2	25.2
Actuated g/C Ratio	0.25	0.62		0.01	0.38		0.23	0.23		0.23	0.23	0.23
Clearance Time (s)	5.0	5.7		5.0	5.7		5.3	5.3		5.3	5.3	5.3
Vehicle Extension (s)	2.0	4.0		2.0	4.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	847	2128		10	1306		294	425		226	427	363
v/s Ratio Prot	c0.23	c0.50		0.00	0.16			0.10			0.06	
v/s Ratio Perm							0.06			0.02		c0.20
v/c Ratio	0.91	0.81		0.50	0.42		0.27	0.43		0.09	0.25	0.86
Uniform Delay, d1	40.2	15.9		54.6	25.4		34.8	36.3		33.4	34.6	40.7
Progression Factor	1.00	1.00		1.31	0.69		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	13.9	3.4		11.7	0.8		0.5	0.7		0.2	0.3	17.5
Delay (s)	54.1	19.3		82.9	18.3		35.3	37.0		33.6	34.9	58.2
Level of Service	D	B		F	B		D	D		C	C	E
Approach Delay (s)		30.1			18.9			36.5			54.6	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM Average Control Delay	33.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	10.3
Intersection Capacity Utilization	79.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	205	55	195	135	230	50	500	265	165	520	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.91		1.00	0.95		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	1821		1787	1703		1770	1766		1787	1845	
Flt Permitted	0.25	1.00		0.41	1.00		0.37	1.00		0.07	1.00	
Satd. Flow (perm)	479	1821		771	1703		691	1766		132	1845	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	223	60	212	147	250	54	543	288	179	565	82
RTOR Reduction (vph)	0	8	0	0	52	0	0	16	0	0	4	0
Lane Group Flow (vph)	65	275	0	212	345	0	54	815	0	179	643	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	1%	1%	1%
Turn Type	Perm			Perm			Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	33.6	33.6		33.6	33.6		54.5	54.5		67.6	67.6	
Effective Green, g (s)	33.6	33.6		33.6	33.6		54.5	54.5		67.6	67.6	
Actuated g/C Ratio	0.31	0.31		0.31	0.31		0.50	0.50		0.62	0.62	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	147	560		237	524		345	881		220	1142	
v/s Ratio Prot		0.15			0.20			c0.46		c0.07	0.35	
v/s Ratio Perm	0.14			c0.27			0.08			0.44		
v/c Ratio	0.44	0.49		0.89	0.66		0.16	0.93		0.81	0.56	
Uniform Delay, d1	30.3	30.8		36.1	32.8		14.9	25.4		28.9	12.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.1	0.7		31.8	3.0		0.2	15.2		20.1	0.6	
Delay (s)	32.4	31.5		67.9	35.8		15.1	40.6		48.9	12.8	
Level of Service	C	C		E	D		B	D		D	B	
Approach Delay (s)		31.7			47.0			39.1			20.6	
Approach LOS		C			D			D			C	

Intersection Summary			
HCM Average Control Delay	34.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	109.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	89.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	270	335	145	110	245	95	240	1310	145	205	990	260
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.1	5.5		5.1	5.5		5.1	6.5	6.5	5.1	6.5	6.5
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.95		1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1778		1770	1785		1770	1863	1583	1770	1863	1583
Flt Permitted	0.11	1.00		0.13	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	204	1778		237	1785		1770	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.92	0.92	0.92	0.94	0.94	0.94	0.92	0.92	0.92
Adj. Flow (vph)	290	360	156	120	266	103	255	1394	154	223	1076	283
RTOR Reduction (vph)	0	9	0	0	8	0	0	0	36	0	0	61
Lane Group Flow (vph)	290	507	0	120	361	0	255	1394	118	223	1076	222
Turn Type	pm+pt			pm+pt			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8					2			6
Actuated Green, G (s)	49.5	39.5		36.4	31.5		15.9	89.5	89.5	13.9	87.5	87.5
Effective Green, g (s)	49.5	39.5		36.4	31.5		15.9	89.5	89.5	13.9	87.5	87.5
Actuated g/C Ratio	0.29	0.23		0.21	0.19		0.09	0.53	0.53	0.08	0.51	0.51
Clearance Time (s)	5.1	5.5		5.1	5.5		5.1	6.5	6.5	5.1	6.5	6.5
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)	178	413		95	331		166	981	833	145	959	815
v/s Ratio Prot	c0.12	0.28		0.04	0.20		c0.14	c0.75		0.13	0.58	
v/s Ratio Perm	c0.35			0.23					0.07			0.14
v/c Ratio	1.63	1.23		1.26	1.09		1.54	1.42	0.14	1.54	1.12	0.27
Uniform Delay, d1	52.0	65.2		65.8	69.2		77.0	40.2	20.6	78.0	41.2	23.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	307.3	121.9		178.7	75.8		269.1	195.5	0.1	273.5	68.7	0.2
Delay (s)	359.3	187.2		244.5	145.0		346.2	235.7	20.7	351.5	109.9	23.5
Level of Service	F	F		F	F		F	F	C	F	F	C
Approach Delay (s)		249.1			169.5			233.0			128.5	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM Average Control Delay	193.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.43		
Actuated Cycle Length (s)	170.0	Sum of lost time (s)	10.2
Intersection Capacity Utilization	132.4%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	145	415	95	15	230	25	50	10	50	50	15	110
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	158	451	103	16	250	27	54	11	54	54	16	120
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)		896										
pX, platoon unblocked				0.83			0.83	0.83	0.83	0.83	0.83	
vC, conflicting volume	277			554			1228	1128	503	1122	1166	264
vC1, stage 1 conf vol							818	818		296	296	
vC2, stage 2 conf vol							410	310		826	870	
vCu, unblocked vol	277			355			1171	1049	292	1043	1095	264
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	88			98			78	96	91	79	94	85
cM capacity (veh/h)	1297			1003			252	300	621	255	279	780

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	158	554	16	277	120	190
Volume Left	158	0	16	0	54	54
Volume Right	0	103	0	27	54	120
cSH	1297	1700	1003	1700	352	448
Volume to Capacity	0.12	0.33	0.02	0.16	0.34	0.42
Queue Length 95th (ft)	10	0	1	0	37	52
Control Delay (s)	8.2	0.0	8.6	0.0	20.4	18.8
Lane LOS	A		A		C	C
Approach Delay (s)	1.8		0.5		20.4	18.8
Approach LOS					C	C

Intersection Summary			
Average Delay	5.7		
Intersection Capacity Utilization	52.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	90	240	95	10	130	135	60	175	20	85	140	20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	98	261	103	11	141	147	65	190	22	92	152	22

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	98	364	299	277	266
Volume Left (vph)	98	0	11	65	92
Volume Right (vph)	0	103	147	22	22
Hadj (s)	0.53	-0.16	-0.25	0.03	0.05
Departure Headway (s)	7.8	7.0	6.9	7.2	7.2
Degree Utilization, x	0.21	0.71	0.57	0.55	0.54
Capacity (veh/h)	441	488	478	456	446
Control Delay (s)	11.6	24.4	18.7	18.7	18.3
Approach Delay (s)	21.7		18.7	18.7	18.3
Approach LOS	C		C	C	C

Intersection Summary			
Delay	19.7		
HCM Level of Service	C		
Intersection Capacity Utilization	64.9%	ICU Level of Service	C
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
5: SR 204 & SR 9

11/5/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	300	140	45	135	160	35	75	1120	125	90	1405	615
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.3		5.0	5.3	5.3	5.0	5.3	5.3	5.0	5.3	5.3
Lane Util. Factor	0.97	0.95		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3273	3250		1687	1776	1509	1687	3374	1509	1687	3374	1509
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3273	3250		1687	1776	1509	1687	3374	1509	1687	3374	1509
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	326	152	49	147	174	38	82	1217	136	98	1527	668
RTOR Reduction (vph)	0	31	0	0	0	32	0	0	49	0	0	322
Lane Group Flow (vph)	326	170	0	147	174	6	82	1217	87	98	1527	346
Heavy Vehicles (%)	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases						6			8			4
Actuated Green, G (s)	14.7	24.5		7.0	16.8	16.8	10.4	47.4	47.4	10.5	47.5	47.5
Effective Green, g (s)	14.7	24.5		7.0	16.8	16.8	10.4	47.4	47.4	10.5	47.5	47.5
Actuated g/C Ratio	0.13	0.22		0.06	0.15	0.15	0.09	0.43	0.43	0.10	0.43	0.43
Clearance Time (s)	5.0	5.3		5.0	5.3	5.3	5.0	5.3	5.3	5.0	5.3	5.3
Vehicle Extension (s)	2.0	4.0		2.0	4.0	4.0	2.0	3.5	3.5	2.0	3.5	3.5
Lane Grp Cap (vph)	437	724		107	271	230	159	1454	650	161	1457	652
v/s Ratio Prot	c0.10	0.05		c0.09	c0.10		0.05	0.36		c0.06	c0.45	
v/s Ratio Perm						0.00			0.06			0.23
v/c Ratio	0.75	0.23		1.37	0.64	0.03	0.52	0.84	0.13	0.61	1.05	0.53
Uniform Delay, d1	45.9	35.1		51.5	43.8	39.6	47.4	27.9	18.9	47.8	31.2	23.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.0	0.2		216.3	5.7	0.1	1.2	5.9	0.4	4.4	37.3	3.1
Delay (s)	51.8	35.3		267.8	49.5	39.7	48.6	33.7	19.3	52.2	68.5	26.1
Level of Service	D	D		F	D	D	D	C	B	D	E	C
Approach Delay (s)		45.5			137.8			33.2			55.5	
Approach LOS		D			F			C			E	

Intersection Summary			
HCM Average Control Delay	53.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.3
Intersection Capacity Utilization	77.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
9: SR 204 & Lundeen Park Way

11/5/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	100	320	60	5	965	10	55	35	5	5	80	575
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.7		5.0	5.7		5.3	5.3		5.3	5.3	5.3
Lane Util. Factor	0.97	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3400	3422		1752	3499		1770	1829		1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.70	1.00		0.73	1.00	1.00
Satd. Flow (perm)	3400	3422		1752	3499		1308	1829		1359	1863	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	105	337	63	5	1016	11	58	37	5	5	84	605
RTOR Reduction (vph)	0	12	0	0	1	0	0	3	0	0	0	62
Lane Group Flow (vph)	105	388	0	5	1026	0	58	39	0	5	84	543
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	2%	2%	2%	2%	2%	2%
Turn Type	Prot			Prot			Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		4
Actuated Green, G (s)	6.1	51.2		0.6	45.7		42.2	42.2		42.2	42.2	42.2
Effective Green, g (s)	6.1	51.2		0.6	45.7		42.2	42.2		42.2	42.2	42.2
Actuated g/C Ratio	0.06	0.47		0.01	0.42		0.38	0.38		0.38	0.38	0.38
Clearance Time (s)	5.0	5.7		5.0	5.7		5.3	5.3		5.3	5.3	5.3
Vehicle Extension (s)	2.0	4.0		2.0	4.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	189	1593		10	1454		502	702		521	715	607
v/s Ratio Prot	c0.03	0.11		0.00	c0.29			0.02			0.05	
v/s Ratio Perm							0.04			0.00		c0.34
v/c Ratio	0.56	0.24		0.50	0.71		0.12	0.06		0.01	0.12	0.90
Uniform Delay, d1	50.6	17.7		54.6	26.6		21.9	21.3		21.0	21.9	31.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.0	0.4		13.6	2.9		0.1	0.0		0.0	0.1	15.7
Delay (s)	52.6	18.1		68.1	29.5		22.0	21.4		21.0	22.0	47.5
Level of Service	D	B		E	C		C	C		C	C	D
Approach Delay (s)		25.3			29.7			21.7			44.2	
Approach LOS		C			C			C			D	

Intersection Summary			
HCM Average Control Delay	32.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	80.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
1: Lundeen Park Way & SR 9

11/7/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	515	675	50	460	425	40	20	1870	775	55	1495	300
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5	5.5	5.5	6.5	6.5	5.5	6.5	
Lane Util. Factor	0.97	0.95		0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	3503		3433	1863	1583	1770	3539	1583	1770	3451	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	3503		3433	1863	1583	1770	3539	1583	1770	3451	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	560	734	54	500	462	43	22	2033	842	60	1625	326
RTOR Reduction (vph)	0	3	0	0	0	6	0	0	116	0	10	0
Lane Group Flow (vph)	560	785	0	500	462	37	22	2033	726	60	1941	0
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			
Actuated Green, G (s)	21.5	35.6		23.4	37.5	37.5	2.4	83.6	83.6	5.5	86.7	
Effective Green, g (s)	21.5	35.6		23.4	37.5	37.5	2.4	83.6	83.6	5.5	86.7	
Actuated g/C Ratio	0.13	0.21		0.14	0.22	0.22	0.01	0.49	0.49	0.03	0.51	
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5	5.5	6.5	6.5	5.5	6.5	
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.0	4.5	4.5	2.0	4.5	
Lane Grp Cap (vph)	431	729		470	408	347	25	1729	773	57	1749	
v/s Ratio Prot	c0.16	0.22		0.15	c0.25		0.01	c0.57		c0.03	c0.56	
v/s Ratio Perm						0.02			0.46			
v/c Ratio	1.30	1.08		1.06	1.13	0.11	0.88	1.18	0.94	1.05	1.11	
Uniform Delay, d1	74.8	67.8		73.8	66.8	53.4	84.2	43.8	41.3	82.8	42.2	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	150.9	55.9		59.5	85.8	0.1	124.9	85.6	19.3	134.7	58.3	
Delay (s)	225.7	123.6		133.4	152.6	53.5	209.1	129.3	60.6	217.5	100.5	
Level of Service	F	F		F	F	D	F	F	E	F	F	
Approach Delay (s)		166.0			138.8			110.0			103.9	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM Average Control Delay	122.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.19		
Actuated Cycle Length (s)	171.1	Sum of lost time (s)	24.0
Intersection Capacity Utilization	103.3%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

2: Davies Road & 92nd Ave Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Delay / Veh (s)	60.6	23.8	60.6	82.8	62.2	12.8	12.2	59.6
Denied Entry Before	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0

3: Davies Road & West Shopping Center Drive Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Delay / Veh (s)	2.8	1.4	2.4	4.1	3.3	0.8	39.2	39.2	16.9	7.6	12.2	12.0
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

3: Davies Road & West Shopping Center Drive Performance by movement

Movement	All
Delay / Veh (s)	16.6
Denied Entry Before	0
Denied Entry After	0

Total Network Performance

Delay / Veh (s)	134.4
Denied Entry Before	0
Denied Entry After	2

Intersection: 2: Davies Road & 92nd Ave

Movement	WB	NB	NB	B58	B92	SB
Directions Served	LR	T	R	T	T	LT
Maximum Queue (ft)	329	420	115	284	1847	120
Average Queue (ft)	279	405	113	247	852	72
95th Queue (ft)	406	495	136	389	1977	120
Link Distance (ft)	320	346		210	2316	231
Upstream Blk Time (%)	10	72		57	2	
Queuing Penalty (veh)	60	0		0	0	
Storage Bay Dist (ft)			90			
Storage Blk Time (%)		95	1			
Queuing Penalty (veh)		145	6			

Intersection: 3: Davies Road & West Shopping Center Drive

Movement	EB	EB	WB	NB	NB	B44	B144	SB
Directions Served	LT	R	LTR	LT	R	T	T	LTR
Maximum Queue (ft)	27	2	59	189	100	426	258	53
Average Queue (ft)	7	0	22	167	82	205	59	33
95th Queue (ft)	29	4	71	232	138	514	261	53
Link Distance (ft)	320		758	116		381	2087	134
Upstream Blk Time (%)				58	1	19		
Queuing Penalty (veh)				0	0	0		
Storage Bay Dist (ft)		90			75			
Storage Blk Time (%)				72	1			
Queuing Penalty (veh)				82	5			

Network Summary

Network wide Queuing Penalty: 297

HCM Unsignalized Intersection Capacity Analysis
4: S Vernon Rd & 91st Avenue NE

11/5/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	20	5	50	55	30	50	55	260	20	10	170	15
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	5	54	60	33	54	60	283	22	11	185	16
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								466				
pX, platoon unblocked												
vC, conflicting volume	698	639	193	630	636	293	201			304		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	698	639	193	630	636	293	201			304		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	93	99	94	83	91	93	96			99		
cM capacity (veh/h)	298	376	854	353	378	751	1383			1268		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	82	147	364	212
Volume Left	22	60	60	11
Volume Right	54	54	22	16
cSH	539	447	1383	1268
Volume to Capacity	0.15	0.33	0.04	0.01
Queue Length 95th (ft)	13	35	3	1
Control Delay (s)	12.9	16.9	1.6	0.5
Lane LOS	B	C	A	A
Approach Delay (s)	12.9	16.9	1.6	0.5
Approach LOS	B	C		

Intersection Summary				
Average Delay		5.2		
Intersection Capacity Utilization		50.6%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1005	635	95	145	230	135	195	1530	440	225	1245	395
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.3		5.0	5.3	5.3	5.0	5.3	5.3	5.0	5.3	5.3
Lane Util. Factor	0.97	0.95		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3273	3308		1687	1776	1509	1687	3374	1509	1687	3374	1509
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3273	3308		1687	1776	1509	1687	3374	1509	1687	3374	1509
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1092	690	103	158	250	147	212	1663	478	245	1353	429
RTOR Reduction (vph)	0	11	0	0	0	101	0	0	116	0	0	250
Lane Group Flow (vph)	1092	782	0	158	250	46	212	1663	362	245	1353	179
Heavy Vehicles (%)	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases						6			8			4
Actuated Green, G (s)	16.0	30.9		6.0	20.9	20.9	8.1	44.4	44.4	8.1	44.4	44.4
Effective Green, g (s)	16.0	30.9		6.0	20.9	20.9	8.1	44.4	44.4	8.1	44.4	44.4
Actuated g/C Ratio	0.15	0.28		0.05	0.19	0.19	0.07	0.40	0.40	0.07	0.40	0.40
Clearance Time (s)	5.0	5.3		5.0	5.3	5.3	5.0	5.3	5.3	5.0	5.3	5.3
Vehicle Extension (s)	2.0	4.0		2.0	4.0	4.0	2.0	3.5	3.5	2.0	3.5	3.5
Lane Grp Cap (vph)	476	929		92	337	287	124	1362	609	124	1362	609
v/s Ratio Prot	c0.33	c0.24		0.09	0.14		0.13	c0.49		c0.15	0.40	
v/s Ratio Perm						0.03			0.24			0.12
v/c Ratio	2.29	0.84		1.72	0.74	0.16	1.71	1.22	0.59	1.98	0.99	0.29
Uniform Delay, d1	47.0	37.3		52.0	42.0	37.2	51.0	32.8	25.7	51.0	32.7	22.2
Progression Factor	1.34	0.93		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	583.0	0.7		364.3	9.1	0.4	351.2	106.3	4.2	466.8	22.9	1.2
Delay (s)	646.0	35.5		416.3	51.1	37.6	402.1	139.1	30.0	517.7	55.5	23.4
Level of Service	F	D		F	D	D	F	F	C	F	E	C
Approach Delay (s)		389.2			151.5			140.6			104.6	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM Average Control Delay	199.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.34		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.3
Intersection Capacity Utilization	112.7%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	0	380	30	110	80
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	413	33	120	87
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	446				429	429
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	446				429	429
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				80	86
cM capacity (veh/h)	1115				586	630

Direction, Lane #	WB 1	SB 1
Volume Total	446	207
Volume Left	0	120
Volume Right	33	87
cSH	1700	604
Volume to Capacity	0.26	0.34
Queue Length 95th (ft)	0	38
Control Delay (s)	0.0	14.0
Lane LOS		B
Approach Delay (s)	0.0	14.0
Approach LOS		B

Intersection Summary			
Average Delay	4.4		
Intersection Capacity Utilization	39.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	35	15	5	35	0	1770	75	45	1245	40
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	38	16	5	38	0	1924	82	49	1353	43
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			None	
Median storage veh)								2				
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	3416	3457	1353	3413	3418	1924	1397			2005		
vC1, stage 1 conf vol	1451	1451		1924	1924							
vC2, stage 2 conf vol	1965	2005		1489	1495							
vCu, unblocked vol	3416	3457	1353	3413	3418	1924	1397			2005		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	79	73	94	54	100			83		
cM capacity (veh/h)	2	50	183	61	87	83	489			285		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	38	60	1924	82	49	1353	43
Volume Left	0	16	0	0	49	0	0
Volume Right	38	38	0	82	0	0	43
cSH	183	76	1700	1700	285	1700	1700
Volume to Capacity	0.21	0.78	1.13	0.05	0.17	0.80	0.03
Queue Length 95th (ft)	19	95	0	0	15	0	0
Control Delay (s)	29.7	141.6	0.0	0.0	20.2	0.0	0.0
Lane LOS	D	F			C		
Approach Delay (s)	29.7	141.6	0.0		0.7		
Approach LOS	D	F					

Intersection Summary				
Average Delay		3.0		
Intersection Capacity Utilization		103.2%	ICU Level of Service	G
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	240	1050	170	340	365	115	90	185	480	200	160	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.3		5.0	5.3		5.0	5.3		5.0	5.3	
Lane Util. Factor	1.00	0.91		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.96		1.00	0.89		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	4979		1770	3412		1770	1661		1770	1755	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	4979		1770	3412		1770	1661		1770	1755	
Peak-hour factor, PHF	0.95	0.95	0.95	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.95	0.95
Adj. Flow (vph)	253	1105	179	370	397	125	98	201	522	211	168	105
RTOR Reduction (vph)	0	20	0	0	27	0	0	85	0	0	20	0
Lane Group Flow (vph)	253	1264	0	370	495	0	98	638	0	211	253	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	15.0	31.7		15.0	31.7		8.6	34.7		8.0	34.1	
Effective Green, g (s)	15.0	31.7		15.0	31.7		8.6	34.7		8.0	34.1	
Actuated g/C Ratio	0.14	0.29		0.14	0.29		0.08	0.32		0.07	0.31	
Clearance Time (s)	5.0	5.3		5.0	5.3		5.0	5.3		5.0	5.3	
Vehicle Extension (s)	3.5	3.5		2.0	3.5		2.5	3.0		2.5	3.0	
Lane Grp Cap (vph)	241	1435		241	983		138	524		129	544	
v/s Ratio Prot	0.14	c0.25		c0.21	0.15		0.06	c0.38		c0.12	0.14	
v/s Ratio Perm												
v/c Ratio	1.05	0.88		1.54	0.50		0.71	1.22		1.64	0.47	
Uniform Delay, d1	47.5	37.3		47.5	32.6		49.5	37.6		51.0	30.6	
Progression Factor	0.84	0.85		1.12	1.17		1.00	1.00		1.00	1.00	
Incremental Delay, d2	57.7	4.9		251.4	0.9		14.8	114.4		318.3	0.6	
Delay (s)	97.7	36.6		304.4	39.1		64.3	152.1		369.3	31.2	
Level of Service	F	D		F	D		E	F		F	C	
Approach Delay (s)		46.7			149.1			141.6			178.6	
Approach LOS		D			F			F			F	

Intersection Summary			
HCM Average Control Delay	109.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.3
Intersection Capacity Utilization	110.4%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	735	1435	275	5	515	35	145	170	5	20	100	655
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.7		5.0	5.7		5.3	5.3		5.3	5.3	5.3
Lane Util. Factor	0.97	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.99		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3400	3420		1752	3471		1770	1855		1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.69	1.00		0.54	1.00	1.00
Satd. Flow (perm)	3400	3420		1752	3471		1284	1855		1003	1863	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	774	1511	289	5	542	37	153	179	5	21	105	689
RTOR Reduction (vph)	0	12	0	0	4	0	0	1	0	0	0	356
Lane Group Flow (vph)	774	1788	0	5	575	0	153	183	0	21	105	333
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	2%	2%	2%	2%	2%	2%
Turn Type	Prot			Prot			Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		4
Actuated Green, G (s)	27.3	67.1		0.6	40.4		26.3	26.3		26.3	26.3	26.3
Effective Green, g (s)	27.3	67.1		0.6	40.4		26.3	26.3		26.3	26.3	26.3
Actuated g/C Ratio	0.25	0.61		0.01	0.37		0.24	0.24		0.24	0.24	0.24
Clearance Time (s)	5.0	5.7		5.0	5.7		5.3	5.3		5.3	5.3	5.3
Vehicle Extension (s)	2.0	4.0		2.0	4.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	844	2086		10	1275		307	444		240	445	378
v/s Ratio Prot	c0.23	c0.52		0.00	0.17			0.10			0.06	
v/s Ratio Perm							0.12			0.02		c0.21
v/c Ratio	0.92	0.86		0.50	0.45		0.50	0.41		0.09	0.24	0.88
Uniform Delay, d1	40.2	17.5		54.6	26.4		36.2	35.3		32.5	33.7	40.3
Progression Factor	1.00	1.00		1.22	0.72		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	14.3	4.8		11.7	1.0		1.3	0.6		0.2	0.3	20.5
Delay (s)	54.5	22.4		78.0	20.0		37.4	36.0		32.7	34.0	60.9
Level of Service	D	C		E	B		D	D		C	C	E
Approach Delay (s)		32.0			20.5			36.6			56.7	
Approach LOS		C			C			D			E	

Intersection Summary			
HCM Average Control Delay	35.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	10.3
Intersection Capacity Utilization	81.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	260	65	200	200	245	55	505	270	190	525	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.92		1.00	0.95		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	1825		1787	1726		1770	1766		1787	1846	
Flt Permitted	0.19	1.00		0.34	1.00		0.35	1.00		0.07	1.00	
Satd. Flow (perm)	359	1825		647	1726		653	1766		125	1846	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	283	71	217	217	266	60	549	293	207	571	82
RTOR Reduction (vph)	0	7	0	0	37	0	0	16	0	0	4	0
Lane Group Flow (vph)	65	347	0	217	446	0	60	826	0	207	649	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	1%	1%	1%
Turn Type	Perm			Perm			Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	41.0	41.0		41.0	41.0		56.0	56.0		71.0	71.0	
Effective Green, g (s)	41.0	41.0		41.0	41.0		56.0	56.0		71.0	71.0	
Actuated g/C Ratio	0.34	0.34		0.34	0.34		0.47	0.47		0.59	0.59	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	123	624		221	590		305	824		226	1092	
v/s Ratio Prot		0.19			0.26			c0.47		c0.08	0.35	
v/s Ratio Perm	0.18			c0.34			0.09			0.46		
v/c Ratio	0.53	0.56		0.98	0.76		0.20	1.00		0.92	0.59	
Uniform Delay, d1	31.7	32.1		39.1	35.1		18.8	32.0		36.9	15.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.1	1.1		55.1	5.5		0.3	31.9		37.4	0.9	
Delay (s)	35.8	33.2		94.2	40.6		19.1	63.9		74.3	16.3	
Level of Service	D	C		F	D		B	E		E	B	
Approach Delay (s)		33.6			57.2			61.0			30.3	
Approach LOS		C			E			E			C	

Intersection Summary			
HCM Average Control Delay	46.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	95.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	285	375	180	140	290	95	265	1330	165	215	1005	265
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.1	5.5		5.1	5.5		5.1	6.5	6.5	5.1	6.5	6.5
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.95		1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1772		1770	1794		1770	1863	1583	1770	1863	1583
Flt Permitted	0.10	1.00		0.11	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	184	1772		210	1794		1770	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.92	0.92	0.92	0.94	0.94	0.94	0.92	0.92	0.92
Adj. Flow (vph)	306	403	194	152	315	103	282	1415	176	234	1092	288
RTOR Reduction (vph)	0	11	0	0	7	0	0	0	41	0	0	62
Lane Group Flow (vph)	306	587	0	152	411	0	282	1415	135	234	1092	226
Turn Type	pm+pt			pm+pt			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8					2			6
Actuated Green, G (s)	53.5	42.5		41.4	35.5		15.9	85.5	85.5	13.9	83.5	83.5
Effective Green, g (s)	53.5	42.5		41.4	35.5		15.9	85.5	85.5	13.9	83.5	83.5
Actuated g/C Ratio	0.31	0.25		0.24	0.21		0.09	0.50	0.50	0.08	0.49	0.49
Clearance Time (s)	5.1	5.5		5.1	5.5		5.1	6.5	6.5	5.1	6.5	6.5
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)	178	443		105	375		166	937	796	145	915	778
v/s Ratio Prot	c0.13	0.33		0.05	0.23		c0.16	c0.76		0.13	0.59	
v/s Ratio Perm	c0.41			0.30					0.09			0.14
v/c Ratio	1.72	1.32		1.45	1.10		1.70	1.51	0.17	1.61	1.19	0.29
Uniform Delay, d1	49.0	63.8		61.7	67.2		77.0	42.2	23.0	78.0	43.2	25.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	346.2	160.8		246.7	74.7		338.9	235.1	0.1	305.7	97.8	0.3
Delay (s)	395.2	224.6		308.4	142.0		416.0	277.4	23.1	383.7	141.1	26.0
Level of Service	F	F		F	F		F	F	C	F	F	C
Approach Delay (s)		282.4			186.3			274.3			155.7	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM Average Control Delay	227.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.53		
Actuated Cycle Length (s)	170.0	Sum of lost time (s)	10.2
Intersection Capacity Utilization	138.9%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	145	440	95	15	245	25	50	10	50	50	15	120
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	158	478	103	16	266	27	54	11	54	54	16	130
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)		896										
pX, platoon unblocked				0.81			0.81	0.81	0.81	0.81	0.81	
vC, conflicting volume	293			582			1283	1171	530	1166	1209	280
vC1, stage 1 conf vol							845	845		312	312	
vC2, stage 2 conf vol							438	326		853	897	
vCu, unblocked vol	293			367			1232	1094	304	1088	1141	280
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	88			98			77	96	91	78	94	83
cM capacity (veh/h)	1280			975			234	287	601	242	267	764

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	158	582	16	293	120	201
Volume Left	158	0	16	0	54	54
Volume Right	0	103	0	27	54	130
cSH	1280	1700	975	1700	332	441
Volume to Capacity	0.12	0.34	0.02	0.17	0.36	0.46
Queue Length 95th (ft)	11	0	1	0	40	58
Control Delay (s)	8.2	0.0	8.8	0.0	21.8	19.8
Lane LOS	A		A		C	C
Approach Delay (s)	1.8		0.5		21.8	19.8
Approach LOS					C	C

Intersection Summary			
Average Delay	5.9		
Intersection Capacity Utilization	54.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	90	245	115	10	135	135	70	180	20	85	145	20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	98	266	125	11	147	147	76	196	22	92	158	22

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	98	391	304	293	272
Volume Left (vph)	98	0	11	76	92
Volume Right (vph)	0	125	147	22	22
Hadj (s)	0.53	-0.19	-0.25	0.04	0.05
Departure Headway (s)	8.0	7.2	7.2	7.5	7.5
Degree Utilization, x	0.22	0.79	0.61	0.61	0.57
Capacity (veh/h)	431	480	459	436	430
Control Delay (s)	12.0	30.8	20.7	21.3	20.0
Approach Delay (s)	27.0		20.7	21.3	20.0
Approach LOS	D		C	C	C

Intersection Summary			
Delay	23.0		
HCM Level of Service	C		
Intersection Capacity Utilization	65.9%	ICU Level of Service	C
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
5: SR 204 & SR 9

11/5/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	305	150	45	140	170	40	70	1125	135	95	1410	610
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.3		5.0	5.3	5.3	5.0	5.3	5.3	5.0	5.3	5.3
Lane Util. Factor	0.97	0.95		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3273	3257		1687	1776	1509	1687	3374	1509	1687	3374	1509
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3273	3257		1687	1776	1509	1687	3374	1509	1687	3374	1509
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	332	163	49	152	185	43	76	1223	147	103	1533	663
RTOR Reduction (vph)	0	28	0	0	0	36	0	0	52	0	0	317
Lane Group Flow (vph)	332	184	0	152	185	7	76	1223	95	103	1533	346
Heavy Vehicles (%)	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases						6			8			4
Actuated Green, G (s)	14.8	24.3		8.0	17.5	17.5	9.9	46.6	46.6	10.5	47.2	47.2
Effective Green, g (s)	14.8	24.3		8.0	17.5	17.5	9.9	46.6	46.6	10.5	47.2	47.2
Actuated g/C Ratio	0.13	0.22		0.07	0.16	0.16	0.09	0.42	0.42	0.10	0.43	0.43
Clearance Time (s)	5.0	5.3		5.0	5.3	5.3	5.0	5.3	5.3	5.0	5.3	5.3
Vehicle Extension (s)	2.0	4.0		2.0	4.0	4.0	2.0	3.5	3.5	2.0	3.5	3.5
Lane Grp Cap (vph)	440	720		123	283	240	152	1429	639	161	1448	647
v/s Ratio Prot	c0.10	0.06		c0.09	c0.10		0.05	0.36		c0.06	c0.45	
v/s Ratio Perm						0.00			0.06			0.23
v/c Ratio	0.75	0.26		1.24	0.65	0.03	0.50	0.86	0.15	0.64	1.06	0.53
Uniform Delay, d1	45.9	35.4		51.0	43.4	39.1	47.7	28.7	19.5	47.9	31.4	23.3
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.4	0.3		157.7	5.9	0.1	0.9	6.8	0.5	6.0	40.9	3.1
Delay (s)	52.3	35.6		208.7	49.3	39.1	48.6	35.4	20.0	53.9	72.3	26.4
Level of Service	D	D		F	D	D	D	D	B	D	E	C
Approach Delay (s)		45.8			111.9			34.6			58.2	
Approach LOS		D			F			C			E	

Intersection Summary			
HCM Average Control Delay	53.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.3
Intersection Capacity Utilization	77.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
9: SR 204 & Lundeen Park Way

11/5/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	100	320	65	5	985	10	70	40	10	5	80	575
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.7		5.0	5.7		5.3	5.3		5.3	5.3	5.3
Lane Util. Factor	0.97	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.97		1.00	1.00		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3400	3417		1752	3499		1770	1805		1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.70	1.00		0.72	1.00	1.00
Satd. Flow (perm)	3400	3417		1752	3499		1308	1805		1346	1863	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	105	337	68	5	1037	11	74	42	11	5	84	605
RTOR Reduction (vph)	0	14	0	0	1	0	0	7	0	0	0	61
Lane Group Flow (vph)	105	391	0	5	1047	0	74	46	0	5	84	544
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	2%	2%	2%	2%	2%	2%
Turn Type	Prot			Prot			Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		4
Actuated Green, G (s)	5.9	51.5		0.6	46.2		41.9	41.9		41.9	41.9	41.9
Effective Green, g (s)	5.9	51.5		0.6	46.2		41.9	41.9		41.9	41.9	41.9
Actuated g/C Ratio	0.05	0.47		0.01	0.42		0.38	0.38		0.38	0.38	0.38
Clearance Time (s)	5.0	5.7		5.0	5.7		5.3	5.3		5.3	5.3	5.3
Vehicle Extension (s)	2.0	4.0		2.0	4.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	182	1600		10	1470		498	688		513	710	603
v/s Ratio Prot	c0.03	0.11		0.00	c0.30			0.03			0.05	
v/s Ratio Perm							0.06			0.00		c0.34
v/c Ratio	0.58	0.24		0.50	0.71		0.15	0.07		0.01	0.12	0.90
Uniform Delay, d1	50.8	17.6		54.6	26.4		22.3	21.6		21.2	22.1	32.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.7	0.4		13.6	3.0		0.1	0.0		0.0	0.1	16.7
Delay (s)	53.6	17.9		68.1	29.4		22.5	21.7		21.2	22.1	48.8
Level of Service	D	B		E	C		C	C		C	C	D
Approach Delay (s)		25.3			29.6			22.1			45.4	
Approach LOS		C			C			C			D	

Intersection Summary			
HCM Average Control Delay	32.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	80.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
1: Lundeen Park Way & SR 9

11/7/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	515	675	50	460	425	40	20	1875	775	55	1515	300
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5	5.5	5.5	6.5	6.5	5.5	6.5	
Lane Util. Factor	0.97	0.95		0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	3503		3433	1863	1583	1770	3539	1583	1770	3451	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	3503		3433	1863	1583	1770	3539	1583	1770	3451	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	560	734	54	500	462	43	22	2038	842	60	1647	326
RTOR Reduction (vph)	0	3	0	0	0	6	0	0	116	0	9	0
Lane Group Flow (vph)	560	785	0	500	462	37	22	2038	726	60	1964	0
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			
Actuated Green, G (s)	21.5	35.6		23.4	37.5	37.5	2.4	83.6	83.6	5.5	86.7	
Effective Green, g (s)	21.5	35.6		23.4	37.5	37.5	2.4	83.6	83.6	5.5	86.7	
Actuated g/C Ratio	0.13	0.21		0.14	0.22	0.22	0.01	0.49	0.49	0.03	0.51	
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5	5.5	6.5	6.5	5.5	6.5	
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.0	4.5	4.5	2.0	4.5	
Lane Grp Cap (vph)	431	729		470	408	347	25	1729	773	57	1749	
v/s Ratio Prot	c0.16	0.22		0.15	c0.25		0.01	c0.58		c0.03	c0.57	
v/s Ratio Perm						0.02			0.46			
v/c Ratio	1.30	1.08		1.06	1.13	0.11	0.88	1.18	0.94	1.05	1.12	
Uniform Delay, d1	74.8	67.8		73.8	66.8	53.4	84.2	43.8	41.4	82.8	42.2	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	150.9	55.9		59.5	85.8	0.1	124.9	86.8	19.4	134.7	63.4	
Delay (s)	225.7	123.6		133.4	152.6	53.5	209.1	130.5	60.8	217.5	105.6	
Level of Service	F	F		F	F	D	F	F	E	F	F	
Approach Delay (s)		166.0			138.8			110.9			108.9	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM Average Control Delay	124.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.19		
Actuated Cycle Length (s)	171.1	Sum of lost time (s)	24.0
Intersection Capacity Utilization	103.5%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

2: Davies Road & 92nd Ave Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Delay / Veh (s)	101.7	34.9	104.1	124.8	96.7	21.8	21.3	89.2
Denied Entry Before	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0

3: Davies Road & West Shopping Center Drive Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Delay / Veh (s)	2.7	1.2	2.5	7.3	12.7	3.6	77.7	57.7	35.8	7.6	12.0	25.5
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

3: Davies Road & West Shopping Center Drive Performance by movement

Movement	All
Delay / Veh (s)	28.4
Denied Entry Before	0
Denied Entry After	0

Total Network Performance

Delay / Veh (s)	303.8
Denied Entry Before	0
Denied Entry After	20

HCM Unsignalized Intersection Capacity Analysis
4: S Vernon Rd & 91st Avenue NE

11/5/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	20	5	50	55	30	55	55	280	20	10	150	15
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	5	54	60	33	60	60	304	22	11	163	16
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								466				
pX, platoon unblocked												
vC, conflicting volume	704	639	171	630	636	315	179			326		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	704	639	171	630	636	315	179			326		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	93	99	94	83	91	92	96			99		
cM capacity (veh/h)	292	377	878	354	378	730	1408			1245		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	82	152	386	190
Volume Left	22	60	60	11
Volume Right	54	60	22	16
cSH	541	451	1408	1245
Volume to Capacity	0.15	0.34	0.04	0.01
Queue Length 95th (ft)	13	37	3	1
Control Delay (s)	12.8	17.0	1.5	0.5
Lane LOS	B	C	A	A
Approach Delay (s)	12.8	17.0	1.5	0.5
Approach LOS	B	C		

Intersection Summary			
Average Delay	5.3		
Intersection Capacity Utilization	50.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1000	655	90	150	245	135	200	1535	450	230	1255	400
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.3		5.0	5.3	5.3	5.0	5.3	5.3	5.0	5.3	5.3
Lane Util. Factor	0.97	0.95		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3273	3313		1687	1776	1509	1687	3374	1509	1687	3374	1509
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3273	3313		1687	1776	1509	1687	3374	1509	1687	3374	1509
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1087	712	98	163	266	147	217	1668	489	250	1364	435
RTOR Reduction (vph)	0	10	0	0	0	101	0	0	115	0	0	234
Lane Group Flow (vph)	1087	800	0	163	266	46	217	1668	374	250	1364	201
Heavy Vehicles (%)	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases						6			8			4
Actuated Green, G (s)	15.0	31.1		6.0	22.1	22.1	7.9	44.4	44.4	7.9	44.4	44.4
Effective Green, g (s)	15.0	31.1		6.0	22.1	22.1	7.9	44.4	44.4	7.9	44.4	44.4
Actuated g/C Ratio	0.14	0.28		0.05	0.20	0.20	0.07	0.40	0.40	0.07	0.40	0.40
Clearance Time (s)	5.0	5.3		5.0	5.3	5.3	5.0	5.3	5.3	5.0	5.3	5.3
Vehicle Extension (s)	2.0	4.0		2.0	4.0	4.0	2.0	3.5	3.5	2.0	3.5	3.5
Lane Grp Cap (vph)	446	937		92	357	303	121	1362	609	121	1362	609
v/s Ratio Prot	c0.33	c0.24		0.10	0.15		0.13	c0.49		c0.15	0.40	
v/s Ratio Perm						0.03			0.25			0.13
v/c Ratio	2.44	0.85		1.77	0.75	0.15	1.79	1.22	0.61	2.07	1.00	0.33
Uniform Delay, d1	47.5	37.3		52.0	41.3	36.2	51.0	32.8	26.0	51.0	32.8	22.6
Progression Factor	1.32	0.93		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	647.4	0.8		387.5	8.7	0.3	388.0	107.9	4.6	507.0	24.7	1.4
Delay (s)	710.1	35.4		439.5	50.0	36.5	439.0	140.7	30.6	558.1	57.5	24.0
Level of Service	F	D		F	D	D	F	F	C	F	E	C
Approach Delay (s)		422.0			156.8			145.3			111.5	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM Average Control Delay	212.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.35		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.3
Intersection Capacity Utilization	113.8%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	0	380	30	110	80
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	413	33	120	87
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	446				429	429
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	446				429	429
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				80	86
cM capacity (veh/h)	1115				586	630

Direction, Lane #	WB 1	SB 1
Volume Total	446	207
Volume Left	0	120
Volume Right	33	87
cSH	1700	604
Volume to Capacity	0.26	0.34
Queue Length 95th (ft)	0	38
Control Delay (s)	0.0	14.0
Lane LOS		B
Approach Delay (s)	0.0	14.0
Approach LOS		B

Intersection Summary			
Average Delay	4.4		
Intersection Capacity Utilization	39.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	35	15	5	35	0	1810	75	45	1250	40
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	38	16	5	38	0	1967	82	49	1359	43
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			None	
Median storage veh)								2				
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	3465	3505	1359	3462	3467	1967	1402			2049		
vC1, stage 1 conf vol	1457	1457		1967	1967							
vC2, stage 2 conf vol	2008	2049		1495	1500							
vCu, unblocked vol	3465	3505	1359	3462	3467	1967	1402			2049		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	79	72	93	52	100			82		
cM capacity (veh/h)	2	46	182	59	83	79	487			274		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	38	60	1967	82	49	1359	43
Volume Left	0	16	0	0	49	0	0
Volume Right	38	38	0	82	0	0	43
cSH	182	72	1700	1700	274	1700	1700
Volume to Capacity	0.21	0.83	1.16	0.05	0.18	0.80	0.03
Queue Length 95th (ft)	19	100	0	0	16	0	0
Control Delay (s)	30.0	157.3	0.0	0.0	21.0	0.0	0.0
Lane LOS	D	F			C		
Approach Delay (s)	30.0	157.3	0.0		0.7		
Approach LOS	D	F					

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	105.3%	ICU Level of Service	G
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	245	1070	170	350	375	120	90	190	485	190	155	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.3		5.0	5.3		5.0	5.3		5.0	5.3	
Lane Util. Factor	1.00	0.91		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.96		1.00	0.89		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	4981		1770	3411		1770	1662		1770	1760	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	4981		1770	3411		1770	1662		1770	1760	
Peak-hour factor, PHF	0.95	0.95	0.95	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.95	0.95
Adj. Flow (vph)	258	1126	179	380	408	130	98	207	527	200	163	95
RTOR Reduction (vph)	0	20	0	0	28	0	0	84	0	0	19	0
Lane Group Flow (vph)	258	1285	0	380	510	0	98	650	0	200	239	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	15.0	31.7		15.0	31.7		8.6	34.7		8.0	34.1	
Effective Green, g (s)	15.0	31.7		15.0	31.7		8.6	34.7		8.0	34.1	
Actuated g/C Ratio	0.14	0.29		0.14	0.29		0.08	0.32		0.07	0.31	
Clearance Time (s)	5.0	5.3		5.0	5.3		5.0	5.3		5.0	5.3	
Vehicle Extension (s)	3.5	3.5		2.0	3.5		2.5	3.0		2.5	3.0	
Lane Grp Cap (vph)	241	1435		241	983		138	524		129	546	
v/s Ratio Prot	0.15	c0.26		c0.21	0.15		0.06	c0.39		c0.11	0.14	
v/s Ratio Perm												
v/c Ratio	1.07	0.90		1.58	0.52		0.71	1.24		1.55	0.44	
Uniform Delay, d1	47.5	37.6		47.5	32.8		49.5	37.6		51.0	30.3	
Progression Factor	0.84	0.88		1.12	1.16		1.00	1.00		1.00	1.00	
Incremental Delay, d2	63.1	5.3		268.5	0.9		14.8	124.1		282.2	0.6	
Delay (s)	103.1	38.2		321.5	38.9		64.3	161.7		333.2	30.9	
Level of Service	F	D		F	D		E	F		F	C	
Approach Delay (s)		48.9			155.9			150.3			162.9	
Approach LOS		D			F			F			F	

Intersection Summary			
HCM Average Control Delay	111.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.3
Intersection Capacity Utilization	111.4%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	735	1460	300	5	515	35	150	170	5	20	100	655
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.7		5.0	5.7		5.3	5.3		5.3	5.3	5.3
Lane Util. Factor	0.97	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.97		1.00	0.99		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3400	3415		1752	3471		1770	1855		1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.69	1.00		0.53	1.00	1.00
Satd. Flow (perm)	3400	3415		1752	3471		1284	1855		995	1863	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	774	1537	316	5	542	37	158	179	5	21	105	689
RTOR Reduction (vph)	0	13	0	0	4	0	0	1	0	0	0	369
Lane Group Flow (vph)	774	1840	0	5	575	0	158	183	0	21	105	320
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	2%	2%	2%	2%	2%	2%
Turn Type	Prot			Prot			Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		4
Actuated Green, G (s)	27.2	67.7		0.6	41.1		25.7	25.7		25.7	25.7	25.7
Effective Green, g (s)	27.2	67.7		0.6	41.1		25.7	25.7		25.7	25.7	25.7
Actuated g/C Ratio	0.25	0.62		0.01	0.37		0.23	0.23		0.23	0.23	0.23
Clearance Time (s)	5.0	5.7		5.0	5.7		5.3	5.3		5.3	5.3	5.3
Vehicle Extension (s)	2.0	4.0		2.0	4.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	841	2102		10	1297		300	433		232	435	370
v/s Ratio Prot	c0.23	c0.54		0.00	0.17			0.10			0.06	
v/s Ratio Perm							0.12			0.02		c0.20
v/c Ratio	0.92	0.88		0.50	0.44		0.53	0.42		0.09	0.24	0.87
Uniform Delay, d1	40.3	17.6		54.6	25.9		36.8	35.8		33.0	34.2	40.5
Progression Factor	1.00	1.00		1.29	0.71		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	14.9	5.5		11.6	0.9		1.7	0.7		0.2	0.3	18.6
Delay (s)	55.3	23.1		82.1	19.2		38.5	36.5		33.2	34.5	59.1
Level of Service	E	C		F	B		D	D		C	C	E
Approach Delay (s)		32.6			19.7			37.4			55.3	
Approach LOS		C			B			D			E	

Intersection Summary			
HCM Average Control Delay	35.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	10.3
Intersection Capacity Utilization	83.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	285	65	200	210	250	60	510	270	190	525	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.92		1.00	0.95		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	1829		1787	1728		1770	1766		1787	1846	
Flt Permitted	0.18	1.00		0.32	1.00		0.34	1.00		0.07	1.00	
Satd. Flow (perm)	344	1829		601	1728		631	1766		125	1846	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	310	71	217	228	272	65	554	293	207	571	82
RTOR Reduction (vph)	0	7	0	0	36	0	0	16	0	0	4	0
Lane Group Flow (vph)	65	374	0	217	464	0	65	831	0	207	649	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	1%	1%	1%
Turn Type	Perm			Perm			Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	42.0	42.0		42.0	42.0		56.0	56.0		70.0	70.0	
Effective Green, g (s)	42.0	42.0		42.0	42.0		56.0	56.0		70.0	70.0	
Actuated g/C Ratio	0.35	0.35		0.35	0.35		0.47	0.47		0.58	0.58	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	120	640		210	605		294	824		211	1077	
v/s Ratio Prot		0.20			0.27			0.47		c0.08	0.35	
v/s Ratio Perm	0.19			c0.36			0.10			c0.49		
v/c Ratio	0.54	0.58		1.03	0.77		0.22	1.01		0.98	0.60	
Uniform Delay, d1	31.3	31.9		39.0	34.7		19.0	32.0		37.6	16.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.9	1.4		71.1	5.8		0.4	33.5		56.3	1.0	
Delay (s)	36.2	33.2		110.1	40.5		19.4	65.5		93.9	17.0	
Level of Service	D	C		F	D		B	E		F	B	
Approach Delay (s)		33.7			61.5			62.2			35.5	
Approach LOS		C			E			E			D	

Intersection Summary			
HCM Average Control Delay	49.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	97.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	285	385	185	145	300	95	275	1345	175	220	1005	270
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.1	5.5		5.1	5.5		5.1	6.5	6.5	5.1	6.5	6.5
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.95		1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1772		1770	1796		1770	1863	1583	1770	1863	1583
Flt Permitted	0.10	1.00		0.11	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	179	1772		204	1796		1770	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.92	0.92	0.92	0.94	0.94	0.94	0.92	0.92	0.92
Adj. Flow (vph)	306	414	199	158	326	103	293	1431	186	239	1092	293
RTOR Reduction (vph)	0	11	0	0	7	0	0	0	42	0	0	63
Lane Group Flow (vph)	306	603	0	158	422	0	293	1431	144	239	1092	230
Turn Type	pm+pt			pm+pt			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8					2			6
Actuated Green, G (s)	53.5	42.5		42.4	36.5		15.9	85.5	85.5	13.9	83.5	83.5
Effective Green, g (s)	53.5	42.5		42.4	36.5		15.9	85.5	85.5	13.9	83.5	83.5
Actuated g/C Ratio	0.31	0.25		0.25	0.21		0.09	0.50	0.50	0.08	0.49	0.49
Clearance Time (s)	5.1	5.5		5.1	5.5		5.1	6.5	6.5	5.1	6.5	6.5
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)	168	443		105	386		166	937	796	145	915	778
v/s Ratio Prot	c0.13	0.34		0.05	0.23		c0.17	c0.77		0.14	0.59	
v/s Ratio Perm	c0.45			0.32					0.09			0.15
v/c Ratio	1.82	1.36		1.50	1.09		1.77	1.53	0.18	1.65	1.19	0.30
Uniform Delay, d1	49.4	63.8		61.1	66.8		77.0	42.2	23.1	78.0	43.2	25.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	392.0	176.1		270.1	73.2		367.7	242.7	0.1	320.5	97.8	0.3
Delay (s)	441.5	239.9		331.2	140.0		444.8	284.9	23.2	398.5	141.1	26.0
Level of Service	F	F		F	F		F	F	C	F	F	C
Approach Delay (s)		307.0			191.4			284.0			158.2	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM Average Control Delay	236.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.58		
Actuated Cycle Length (s)	170.0	Sum of lost time (s)	10.2
Intersection Capacity Utilization	141.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	145	445	95	15	255	25	50	10	50	50	15	120
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	158	484	103	16	277	27	54	11	54	54	16	130
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)		896										
pX, platoon unblocked				0.81			0.81	0.81	0.81	0.81	0.81	
vC, conflicting volume	304			587			1299	1188	535	1182	1226	291
vC1, stage 1 conf vol							851	851		323	323	
vC2, stage 2 conf vol							448	337		859	902	
vCu, unblocked vol	304			372			1252	1114	308	1107	1161	291
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	88			98			76	96	91	77	94	83
cM capacity (veh/h)	1268			969			230	284	596	239	264	753

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	158	587	16	304	120	201
Volume Left	158	0	16	0	54	54
Volume Right	0	103	0	27	54	130
cSH	1268	1700	969	1700	327	435
Volume to Capacity	0.12	0.35	0.02	0.18	0.37	0.46
Queue Length 95th (ft)	11	0	1	0	41	60
Control Delay (s)	8.2	0.0	8.8	0.0	22.2	20.2
Lane LOS	A		A		C	C
Approach Delay (s)	1.7		0.4		22.2	20.2
Approach LOS					C	C

Intersection Summary			
Average Delay	5.9		
Intersection Capacity Utilization	54.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	90	245	120	10	135	135	80	180	20	85	145	20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	98	266	130	11	147	147	87	196	22	92	158	22

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	98	397	304	304	272
Volume Left (vph)	98	0	11	87	92
Volume Right (vph)	0	130	147	22	22
Hadj (s)	0.53	-0.20	-0.25	0.05	0.05
Departure Headway (s)	8.1	7.3	7.3	7.5	7.6
Degree Utilization, x	0.22	0.81	0.62	0.64	0.58
Capacity (veh/h)	427	476	452	435	424
Control Delay (s)	12.1	33.0	21.3	22.8	20.6
Approach Delay (s)	28.9		21.3	22.8	20.6
Approach LOS	D		C	C	C

Intersection Summary			
Delay	24.2		
HCM Level of Service	C		
Intersection Capacity Utilization	65.3%	ICU Level of Service	C
Analysis Period (min)	15		